BELL'S ASBESTOS COMPANY,

LIMITED

Engineers' Stores Department.

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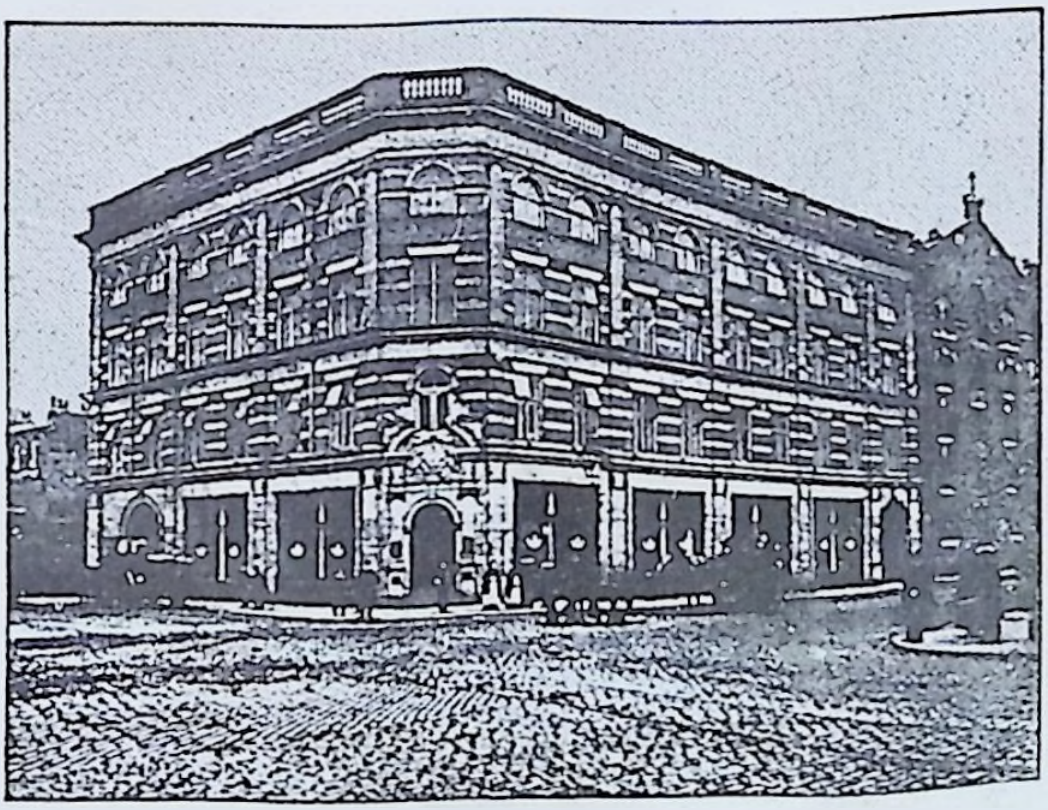
TELEGRAPHIC ADDRESS:
"DELFRY, LONDON."

TELEPHONE NO.:
4523 HOP.

TRADE  MARK.

BELL'S ASBESTOS COMPANY,

LIMITED.



ENGINEERS' STORES DEPARTMENT.

HEAD OFFICES AND SHOWROOMS:

59½, SOUTHWARK STREET, LONDON, S.E.

January, 1898.

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SOLE AGENCIES:

BIRMINGHAM	BELL & CO., 19, SUMMER ROW.
BRISTOL	ROBERT STOTESBURY, 22, VICTORIA STREET.
CARDIFF	BELL & CO., 110, BUTE ROAD.
HULL	THOMAS CLOUGH, MINERVA TERRACE, HUMBER DOCK BASIN.
LIVERPOOL...	PUTZ, CURPHEY & CO., 2, STRAND STREET, JAMES STREET.
MANCHESTER	F. R. PUTZ, 8 & 9, SOUTH PARADE, DEANSGATE.
NEWCASTLE-ON-TYNE ...	BELL'S ASBESTOS CO., LTD., 14, SIDE.

FOREIGN & COLONIAL AGENCIES:

CHINA and JAPAN ...	BELL'S ASBESTOS EASTERN AGENCY, LIMITED, HONG KONG, SINGAPORE, SHANGHAI, &c.
JOHANNESBURG (South Africa) ...	BELL'S TRANSVAAL, LIMITED, JOHANNESBURG, S.A.R.
NEW ZEALAND	BELL'S ASBESTOS AGENCY, LIMITED, DUNEDIN.
WEST AUSTRALIA ...	BELL'S ASBESTOS (WEST AUSTRALIAN) AGENCY, LIMITED, CLIFF STREET, FREMANTLE, W.A.

ALSO

AMSTERDAM,	BOMBAY,
ANTWERP,	CALCUTTA,
BERLIN,	RIO DE JANEIRO.

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GENERAL CONDITIONS OF SALE.

All previous Lists are hereby cancelled, and the prices given in this Catalogue are subject to alterations, of which we cannot undertake to give notice.

The Illustrations, although prepared with every care, are given merely as a general guide to purchasers, and are not strictly binding as to detail. When an article is made in more than one size, it occasionally happens that the different sizes vary in design.

The Weights and Measurements given in the tables must be taken as approximate.

Special quotations as a rule are binding for only two days after date.

TERMS.

For payment within twenty-eight days from date of invoice, a discount of 2½% is allowed upon transactions other than contracts or special quotations, which are net.

PAYMENTS.

Cheques and Postal Orders to be made payable to the Company, and crossed ——— & Co.

DELIVERY, PACKAGES, AND EMPTIES.

All light goods of the value of £2 and upwards are delivered carriage paid to any Station in the United Kingdom. Machinery and other heavy goods are ex warehouse unless otherwise quoted.

Packages are charged at cost, but will be allowed for in full if returned carriage paid within six months, and are in good condition. All returns must bear sender's name, and be duly advised.

EXPORT.

Foreign orders should be accompanied by remittances, or references to some established mercantile house in England, for payment on presentation of invoices.

Goods for export should, whenever possible, be inspected before being dispatched. We undertake to examine and pack all goods securely, but do not hold ourselves responsible for any damage or breakages that may occur after the goods leave our hands.

LEATHER BELTING.

SINGLE.

All Belts are **thoroughly stretched** and tested for Tensile strength. All joints are **Cemented, sewn with Hemp,** and riveted.

Belts can, if desired, be **Thong or Copper sewn,** but are not stocked.

Width	1	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10	11	12	Ins.
PRICE ...	-/4½	-/7	-/9	1/1	1/4	1/7½	1/11	2/2	2/5	3/-	3/7	4/3	4/10	5/5	6/-	6/7	per ft.

LEATHER BELTING.

DOUBLE.

All Stock Belts are **Cemented and Hemp sewn,** and are thoroughly tested for Tensile strength. Belts can be made with **Canvas between, Thong, Copper,** or **Wire sewn,** at same prices.

Width	3	4	4½	5	6	7	8	9	10	11	12	14	15	16	18	20	Ins.
PRICE ...	2/10	3/10	4/4	4/8	5/7	6/9	8/-	9/2	10/4	11/6	12/8	15/-	16/-	17/-	19/-	21/-	per ft.

LEATHER ENDLESS BELTS for PORTABLE ENGINES.

Width.	STOUT SINGLE ENDLESS.			LIGHT DOUBLE ENDLESS.			STOUT DOUBLE ENDLESS.		
	60 Ft.	65 Ft.	70 Ft.	60 Ft.	65 Ft.	70 Ft.	60 Ft.	65 Ft.	70 Ft.
4½ ins.	135/-	146/-	157/6	220/-	240/-	260/-	245/-	265/-	286/-
5 ,,	150/-	162/6	175/-	240/-	260/-	280/-	270/-	292/-	315/-
5½ ,,	165/-	179/-	192/6	264/-	286/-	308/-	290/-	314/-	338/-
6 ,,	180/-	195/-	210/-	288/-	312/-	336/-	320/-	346/-	373/-

HELVETIA LEATHER BELTING.

SINGLE.

These Belts are specially suitable for small pulleys and quick drives.

Width	1	1½	2	2½	3	3½	4	4½	5	5½	6	7	8	9	10	11	12	Ins.
PRICE	-/4½	-/7	-/9	1/-	1/4	1/7½	1/11	2/2	2/5	2/8	3/-	3/7	4/3	4/10	5/5	6/-	6/7	per ft.

HELVETIA LEATHER BELTING.

DOUBLE.

Width	3	4	4½	5	6	7	8	9	10	11	12	14	15	16	18	20	Ins.
PRICE	2/10	3/10	4/4	4/8	5/7	6/9	8/-	9/2	10/4	11/6	12/8	15/-	16/-	17/-	19/-	21/-	per ft.

LEATHER LINK BELTING.



This Belting is especially suitable for **Electrical Plants,** and for driving all kinds of **High Speed Machinery.**

Width ..	3	3½	4	4½	5	6	7	8	9	10	12	15	18	24	30	36	Ins.
By ¼ in.	1/11	2/3	2/6	2/10	3/2	3/9	4/5	5/-	5/8	6/3	7/6	9/5	11/3	15/-	18/9	22/6	per ft.
,, ½ ,,	2/8	3/1	3/7	4/-	4/11	5/9	6/8	7/7	8/5	9/3	11/-	13/8	16/3	19/9	25/-	30/3	,,
,, ¾ ,,	3/2	3/8	4/3	4/9	5/4	6/4	7/5	8/6	9/6	10/6	12/7	15/9	18/10	25/1	31/4	37/7	,,
,, 1 ,,	3/11	4/6	5/2	5/9	6/5	7/8	9/-	10/4	11/7	12/10	15/5	19/4	23/2	30/11	38/8	46/5	,,

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 4 of 298
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BELL'S IMPROVED WOVEN HAIR BELTING.

This special Belting, owing to the mode of manufacture and care in the selection of material of which it is composed, is unequalled by that of any other maker. It is waterproof and unaffected by damp or changes of temperature.

No. 1 is equal in tensile strength to Double Leather Belting of equal width.

No. 2 is especially heavy, and its tensile strength is greater than Compound Canvas and Treble Leather Belting. It is very useful for heavy and uneven strains.

No. 1 is sent, unless No. 2 is specified on order.

Width	2	2½	3	3½	4	4½	5	5½	6	7	8	9	10	12	15	18	24	30	in.
No. 1	·/7	·/9	1/·	1/3	1/6	1/9	2/·	2/3	2/6	3/·	3/8	4/4	5/·	6/4	8/4	10/4	15/·	20/·	per ft.
,, 2	...	...	...	...	...	...	...	...	3/2	3/9	4/7	5/5	6/3	8/·	10/5	13/·	18/9	25/·	,,

All holes should be opened with an awl, and not punched.

COTTON MACHINE BELTINGS.

Width	2	2½	3	3½	4	4½	5	6	7	8	9	10	12	15	18	24	30	in.
4-ply	·/6	·/7½	·/9	·/10½	1/·	1/1½	1/3	1/6										per ft.
6 ,,	....	....	1/·	1/2	1/4	1/6	1/8	2/·	2/4	2/8	3/·	3/4	4/·					,,
8 ,,	....	....	....	....	....	....	....	2/6	2/11	3/4	3/9	4/2	5/·	6/3	7/6	10/·	12/·	,,
10 ,,	....	....	....	....	....	....	....	....	....	....	....	..	6/·	7/6	9/·	12/6	15/·	,,

BELL'S ELEVATOR WEBBING.

Width..	2	2½	3	3½	4	4½	5	6	7	8	9	10	12	15	18	24	30	in.
PRICE.	·/2	·/2½	·/3	·/3½	·/4	·/4½	·/5	·/6	·/7	·/8	·/9	·/10	1/1	1/6	1/11	3/·	4/6	per ft.

BELL'S INDIA-RUBBER BELTING.

Made with Special India-rubber, with layers of strong Canvas.

Width	2	2½	3	3½	4	4½	5	5½	6	6½	7	8	9	10	11	12	in.
2-ply	·/6½	·/7½	·/9½	·/10½	1/0½	1/1½	1/3	1/4½	1/6	1/7½	1/9	2/·	2/3½	2/6	2/9	3/·	per ft.
3 ,,	·/8½	·/10½	1/·	1/1½	1/3½	1/6	1/7½	1/9½	1/11½	2/1½	2/3½	2/7½	2/10½	3/3	3/7½	3/10½	,,
4 ,,	....	....	1/3½	1/6	1/8½	1/11	2/1½	2/4	2/6½	2/9	2/11½	3/4½	3/9½	4/2½	4/7½	5/0½	,,
5 ,,	....	....	....	....	....	....	2/6	2/9	3/·	3/3	3/6	4/·	4/6	5/·	5/6	6/3	,,
6 ,,	....	....	....	..	....	....	2/10½	3/2½	3/5½	3/8½	4/·	4/6½	5/1½	5/8½	6/·	6/9½	,,

The 3-ply is equal to Light Single Leather; 4-ply is equal to Heavy Single Leather; 5-ply is equal to Light Double Leather; 6-ply is equal to Heavy Double Leather.

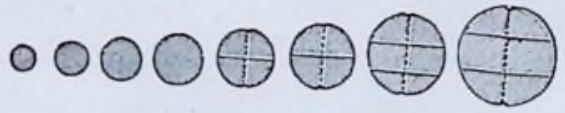
Bell's India-rubber Endless Belts charged 3 ft. extra.

Stock sizes are: 60 ft., 65 ft., and 70 ft.

GUTTA-PERCHA COMPOUND BELTING.

Width ..	2	2½	3	3½	4	4½	5	5½	6	6½	7	8	9	10	11	12	in.
3-ply...	·/4	·/6½	·/7½	·/9½	·/10½	1/0½	1/1½	1/3	1/4	1/5	1/5½	1/9½	2/1½	2/5	2/8½	3/0½	per ft.
4 ,, ...	..	·/8½	·/10½	1/0½	1/2	1/4	1/5½	1/7½	1/9½	1/11½	2/1½	2/7	2/10½	3/2½	3/6½	3/10	,,
5 ,, ...	...	...	...	...	1/4	1/6½	1/9½	2/0½	2/3½	2/5	2/7	3/0½	3/6½	3/10	4/1½	4/5½	,,
6 ,, ...	.	...	...	...	..	..	....	....	2/8	2/10	2/11½	3/7	4/2½	4/10	5/5½	6/1	,,

ROUND LEATHER BANDS.



Diameter.. ..	3/16	¼	5/16	⅜	7/16	½	9/16	⅝	¾	1	in.
PRICE	·/4½	·/7	1/·	1/7	1/8	2/·	2/10	3/8	4/8	6/·	per yd.

TWISTED ROUND LEATHER BANDS.



Diameter	3/16	¼	5/16	⅜	7/16	½	in
PRICE	·/2	·/3	·/5	·/7	·/9	·/10	per ft.

TWISTED ROUND HELVETIA BANDS.

Diameter .. .	¼	5/16	⅜	7/16	½	⅝	¾	in.
PRICE	·/3½	·/5	·/8	1/·	1/2	1/9	2/8	per ft.

Square and V Section Solid Leather Bands quoted to enquiry.
Buff Leather Endless Belts for Band Saws ,, ,,
Helvetia and Raw Hide Ropes ,, ,,

GUT BAND.

Diameter	3/16	5/16	¼	7/16	⅜	9/16	½	⅝	¾	⅞	1	in.
PRICE	·/2½	·/3½	·/6	·/8	·/10½	1/3	1/6	2/4	3/·	4/3	5/6	per ft.

A cheaper quality Gut Band can be supplied, but is not stocked.
For Hooks and Eyes, see Index.

HELVETIA LACES.

Quality	Lashing.					Sewing.				
Length	2 ft.	3 ft.	4 ft.	5 ft.	6 ft.	2 ft.	3 ft.	4 ft.	5 ft.	6 ft.
Per Doz.	1/·	2/6	4/·	6/6	8/6	1/·	2/·	3/6	5/6	7/·
,, Gross	9/·	23/·	36/·	56/·	78/·	9/·	19/·	28/·	46/·	73/·

Brown Leather Lashing Laces, per gross .. ...
,, ,, Sewing ,, ,, ...
White Ox Hide Lashing ,, ,, ...
,, ,, Sewing ,, ,, ...

SUNDRY LEATHER FOR MECHANICAL PURPOSES.

Dressed Leather Strap Butts, per lb. ... ...
,, ,, Pipe ,, ,, ...
,, ,, Hydraulic Butts, per lb. ... ...
,, ,, Engine Pump Butts, per lb. ... ...
,, ,, Picking Band ,, ,, ...
Waterproof Leather for Pump Buckets, ,, ...
Helvetia Leather for Cutting Laces, ,, ...

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BELL'S SEAMLESS WOVEN HOSE.

We beg to call special attention to the superiority of this Hose for all purposes. All yarns used are of the very best selection, and it is unaffected by changes of temperature.

No. 1 Quality. Tested to 400 lb. per square inch. Is a suitable Hose for Mill purposes, Manual Fire-engines, &c.

No. 2 Quality. Tested to 350 lb. per square inch. Is a substantial Hose for general purposes.

Inside diameter	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4	Inches.
No. 1 Quality	1/5	1/6	1/9	2/-	2/3	2/6	2/9	3/-	3/3	3/6	4/-	4/6	per yd.
No. 2 ,,	-/11	1/-	1/3	1/6	1/9	2/-	2/3	2/6	2/9	3/-	3/6	4/-	,,

Larger sizes quoted specially to inquiry.

This Hose should always be kept in a dry place, and after using thoroughly dried before being coiled and put away.

BELL'S SEAMLESS WOVEN SUCTION HOSE,

With 3-ply Canvas, Waterproofed with Special Composition, and Internal Spiral Galvanized Iron Wire.

Inside diameter	1½	1¾	2	2¼	2½	3	3½	4	Inches.
PRICE	1/7	1/10	2/1	2/4	2/7	3/1	...	..	per ft.

LEATHER DELIVERY HOSE,

COPPER RIVETED.

A Quality. Suitable for Pressures up to 100 lb. per square inch.
B ,, ,, ,, from 100 lb. to 150 lb. per square inch.

Inside diameter	1	1½	1¾	2	2¼	2½	2¾	3	3½	4	4½	5	6	Inches.
A General purposes	1/5	1/9	2/-	2/2	2/4	2/7	3/-	3/4	...	..	...	...	...	per ft.
B Steam Fire-engines	...	...	...	2/6	2/9	3/-	3/3	3/6	3/9	4/5	5/2	5/10	7/3	,,

Prices, B Quality, include Hand Loops and Straps.

LEATHER SUCTION HOSE.

A Quality has Internal Spiral Galvanized Iron Wire, and is bound outside with Copper Wire.
B ,, ,, ,, ,, ,, and is Copper Riveted.
C ,, ,, ,, Copper Wire, Copper Riveted, and is very heavy and strong.

Inside diameter	1½	1¾	2	2¼	2½	2¾	3	3½	3¾	4	5	6	7	8	Inches.
A equals 3-ply I.R. Hose	2/2	2/5	2/9	3/1	3/5	3/9	4/2	5/-	5/5	5/10	7/6	10/-	12/6	15/-	per ft.
B ,, 4 ,, ,,	2/8	3/-	3/4	3/10	4/3	4/8	5/1	6/-	...	7/1	...	...	...	...	,,
C —	4/11	5/8	6/5	7/7	8/4	9/3	10/6	12/6	15/-	...	...	...	...	...	,,

C Quality with Copper Spiral Hooping can be supplied at lower prices.

LEATHER CRANE PIPES.

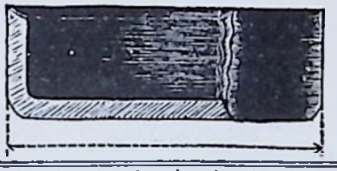
Inside diameter	4	5	6	7	8	9	10	11	12	13	14	15	Inches.
PRICE	3/11	4/8	5/6	6/4	7/1	7/11	8/9	10/3	12/-	14/-	15/-	16/-	per ft.

Leather Hose Strips, per lb.

Hose Fittings, Fasteners, and Copper Rivets and Burrs, see Index.

PUMP CUPS AND RINGS.

CUP LEATHERS.



Diameter	1	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10	12	In.
Plain	-/8	-/9	-/9	-/10	-/11	1/2	1/5	1/9	2/-	2/10	3/11	4/11	6/4	7/6	9/6	Each.
Dressed	-/9	-/10	-/10	-/11	1/2	1/5	1/9	2/-	2/3	3/6	4/7	5/9	7/6	8/6	10/6	,,

Larger sizes quoted on application.

COMPOUND PUMP CUPS.

These Cups are moulded, and are suitable for Hot Liquors.

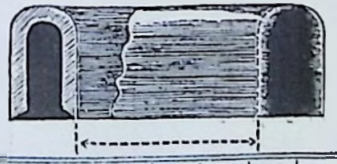
Diam.	1	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10	12	In.
PRICE	-/10	1/-	1/2	1/4	1/6	1/8	2/-	2/6	3/-	4/6	6/-	7/6	9/-	11/-	13/3	Each.

QUILTED CUPS.

Made in Special Canvas, Pressed and Stitched. For Hot Liquor Pumps.

Outside Diam.	2	2½	3	3½	4	5	6	7	8	In.
PRICE	-/10	1/2	1/3	1/5	1/8	2/3	2/9	3/5	3/11	Each.

HYDRAULIC RAM LEATHERS.



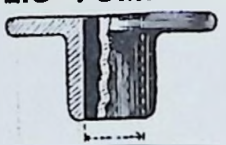
Inside Diam.	2	2½	3	3½	4	4½	5	5½	6	6½	7	8	In.
PRICE	2/6	3/-	3/6	4/-	4/6	5/-	5/9	6/6	7/-	7/6	8/-	9/-	Each.
Inside Diam.	9	10	11	12	14	16	18	20	22	24	26	28	In.
PRICE	10/6	11/6	12/6	13/9	16/-	19/-	22/-	24/-	27/-	30/-	33/-	36/-	Each.

COMPOUND MOULDED RAM RINGS.

Suitable for Hot Liquors.

Price up to 10 inches diameter, 1/- per inch diameter.

HYDRAULIC PUMP LEATHERS.



Inside Diam.	¾	⅞	1	1¼	1½	1¾	2	2¼	2½	2¾	3	4	4½	5	5½	6	In.
PRICE	-/7	-/9	-/10	1/-	1/3	1/5	1/9	1/11	2/1	2/3	2/6	3/6	4/-	4/6	5/-	6/-	Each.

Compound Moulded Hat Rings quoted on application.

BELL'S BELTING SYRUP

Is specially recommended for preserving and renovating the above Leathers.

BELL'S MECHANICAL RUBBER GOODS.

Qualities, and Price per Lb.	No. 1, Extra Red.	A, Grey.	No. 2, Red. B, Grey.	Bell's Special Compound, S S.	C.	M, Special Oil-resisting	Steam, D.	E. Black.
SHEET RUBBER.								
Sheets, 36 to 44 ins. wide :—								
⅛ in. thick and upwards.	7/6	6/6	6/-	5/6	4/6	4/-	2/8	1/10
Under ⅛ in. to 1/16 in. thick ...	7/9	6/9	6/3	5/9	4/9	4/3	2/10	2/-
,, 1/16 in.	8/-	7/-	6/6	6/-	4/9	4/3	3/-	2/2
Insertion Sheet (Cloth & Rubber):—								
⅛ in. thick and upwards.	7/6	6/6	6/-	...	4/6	4/-	2/8	1/10
Under ⅛ in. thick to 1/16 in. thk.	7/9	6/9	6/3	...	4/9	4/3	2/10	2/-
With Brass Wire Gauze	7/6	6/6	6/-	...	4/6	4/-		
WASHERS.								
Flat, for flange joints and man-holes, over 1 in. internal diam., ¼ in. thick and upwards... ...	8/-	7/-	6/6	5/6	...	4/6	3/-	
1 in. internal diameter, above ⅛ in. to ¼ in. thick	8/6	7/6	7/-	6/-	...	4/9	3/6	
1 in. intern diameter, ⅛ in. thk. Thinner in proportion.	8/9	7/9	7/3	6/3	...	5/-	3/9	
If cut from sheet, waste charged in.								
Bevel Washers	8/9	7/9	7/3	6/3	...	5/-	3/9	
Round, for socket joints, over 1 in. internal diameter, and usual size of flanges	7/6	6/9	6/6	6/-	...	...	3/-	
Rough Socket Rings, 2 in. diam. and upwards ... ... Smaller size charged extra.	7/9	7/-	6/6	6/-	4/6			
MOULDED VALVES.								
Round or Rectangular Smooth Surface, all sizes up to 5 ft. diameter, for marine and land engines, air pumps, &c. ... ... These qualities are recommended for resisting oils and grease, No. 1 Red, and M. In ordering Valves, please state if for **Circulating, Air, or Steam.**	7/6	6/6	6/-	5/6	5/-	4/6	3/9	
Ball Valves of solid rubber, 2 in. and upwards	8/6	7/6	6/6					
Ball Valves on metallic and wooden cores, price according to size.								
WHEEL TYRES.								
For trucks in warehouses, &c. ...	8/-	7/-	6/6	...	...	...	3/2	
GAUGE GLASS RINGS.								

Our S S Special Compound will be found the best steam-resisting Rubber in the market.

VULCANIZED INDIA RUBBER MATS.

These Mats, being punched out of solid sheets of Rubber, are most durable and cleanly in use, as all dirt is allowed to drop through. We make them with specially strengthened Border, and unless instructed otherwise, send half-inch thick. If required any particular shape or angle, a paper pattern of full size is required.

Mats with name in centre, 6d. per letter extra.

Best Quality ... .. 2/6 per lb. Second Quality ... ... 2/- per lb.

Patterns Hexagon, Octagon, or Diamond.

SOLID ROUND RUBBER CORD.

For Endless Driving Bands, Springs, &c.

Size. Diameter...	1/16	3/16	¼	5/16	½	9/16	⅝	¾	1	inch.
A Quality	11/9	10/9	10/3	9/-	8/9	8/6	8/3	8/-	7/9	per lb.
B ,, ...	8/9	8/6	8/6	8/-	8/-	7/6	7/6	7/-	7/-	,,

In ordering please say for what purpose intended.

MOULDED INDIA RUBBER TYRES.

For Perambulators, Bath Chairs, and Cab Wheels.

Quality ... ... No. 1 ... 2 ... 3

Price ... ... 5/6 .. 4/6 .. 3/6 per lb.

In ordering please give finished diameter of wheel and width of rim.

Special Tyre Cement for Fixing Tyres, 3/6 per lb.

WRINGING MACHINE ROLLERS.

Covered with India Rubber.

Warranted not to slip away from the Iron Spindle.

A Quality ... ... 5/6 per lb. B Quality ... ... 3/9 per lb.

WATERPROOF COVERS.

For Carts, Vans, and Waggons.

These can be made any size or shape, and will be quoted for on application

PYRAMID OR FLUTED RUBBER.

With or without Canvas Back.

Made in sheets suitable for Stair Treads and Passages in Private Houses, Decks and Ladders in Steamers and Yachts, and Soles for Lawn Tennis and Cricketing Shoes. It gives a very firm foothold, and is very durable. Made about ¼ inch thick.

A Quality .. ... 3/- per lb. B Quality ... ... 2/3 per lb.

BUFFER AND BEARING SPRINGS.

For Locomotive Engines, Carriage Vans, &c.

The prices quoted are for standard shapes, but we can supply any shape at a small additional cost, or make moulds to drawings.

A Quality ... ... 7/6 per lb. B Quality ... ... 4/6 per lb.

C Quality ... ... 2/6 per lb.

SQUEEGEES,

Or Vulcanised India Rubber Brooms, for Pavements, Warehouses, Breweries, Stables, Factories, &c.

Without Handles.			With Handles and Iron Strengthening Stays.		
No. 1	12 inches long.	20/- per doz.	No. 5	18 inches long.	45/- per doz.
2	15 ,,	24/- ,,	6	24 ,,	66/- ,,
3	18 ,,	30/- ,,	7	26 ,,	90/- ,,
4	24 ,,	48/- ,,	8	30 ,,	116/- ,,
			9	33 ,,	130/- ,,
			10	36 ,,	144/- ,,

PRINTERS' BLANKETS, TARPAULINS AND RICK COVERS.

Prices given on application.

INDIA-RUBBER HOSE.

DELIVERY HOSE.

In 60-ft. Lengths.

Made of Vulcanized Rubber, with Plies of strong Canvas, suitable for Brewers, Distillers, Fire Engines, Railway and Contractors' Work, Plumbers, &c.

Internal Diameter.	½	⅝	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	ins.
1 Ply ...	-/7½	-/8½	-/9½	1/1½	1/3½	1/6½	1/9	1/11½	2/2	2/4½	2/7½	2/9½	...	...	...	...	p.ft.
2 ,, ...	-/8½	-/9½	-/11	1/3	1/6	1/9	2/-	2/3	2/6	2/9	3/-	3/3	3/6	3/9	4/-	4/2½	,,
3 ,, ...	-/9½	-/11	1/0½	1/5½	1/8½	1/11½	2/2½	2/6	2/9½	3/1½	3/4½	3/8½	4/-	4/3½	4/7½	4/10½	,,
4 ,, ...	...	1/0½	1/2½	1/7½	1/11	2/2½	2/6½	2/10	3/2	3/6	3/9½	4/1½	4/5½	4/9½	5/2	5/6	,,
5 ,, ...	...	...	...	1/10	2/2	2/6	2/10	3/1½	3/6	3/10	4/2½	4/7½	5/-	5/4½	5/9½	6/2½	,,

SUCTION HOSE.

With Spiral Wire inside.

Internal Diam.	½	⅝	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	ins.
1 Ply	-/7½	-/9	-/10½	1/3	1/7½	1/11½	2/3½	...	...	...	...	...	...	...	...	...	p. ft.
2 ,,	-/9	-/10½	1/-	1/4½	1/9	2/1½	2/6	2/10½	3/3	3/7½	4/-	4/4½	...	...	...	...	,,
3 ,,	...	...	1/1½	1/6	1/11	2/3½	2/8½	3/1½	3/6	3/10½	4/3½	4/9½	5/3½	5/9½	6/3½	6/9½	,,
4 ,,	...	...	...	1/8½	2/1½	2/6	2/10½	3/4½	3/9½	4/2½	4/7½	5/1½	5/7½	6/1½	6/7½	7/2½	,,
5 ,,	...	...	...	...	...	...	...	3/9½	4/2½	4/7½	5/1½	5/7½	6/1½	6/7½	7/2½	7/9½	,,

EMBEDDED SUCTION HOSE.

With Spiral Wire embedded in Rubber.

Internal Diameter.	⅝	¾	1	1¼	1½	1¾	2	2¼	2½	3	3½	4	4½	5	6	ins.
2 Ply	1/1½	1/3½	1/9½	2/2½	2/7½	3/-	3/4½	3/9½	4/3	5/2½	...	...	...	...	...	p.ft.
3 ,, ...	...	1/6	2/-	2/4½	2/10	3/3½	3/9	4/2½	4/8½	5/8½	6/8½	8/10	...	...	...	,,
4 ,, ...	...	...	2/3½	2/8½	3/1½	3/7½	4/1½	4/7½	5/1½	6/1½	7/2½	9/6	10/10	12/3	15/-	,,
5 ,, ...	...	...	...	...	...	...	...	...	...	...	...	10/3	11/9	13/3	16/3	,,

Extra stout make, with special Lining for ALE and BEER, 20 % extra on above prices.

SPECIAL STEAM HOSE.

For Portable Engines and general use. Specially prepared to prevent hardening and cracking through contact with steam or heat.

Internal Diameter.	½	⅝	¾	⅞	1	1¼	1½	1¾	2	2¼	2½	ins.
2 Ply	1/4½	1/6	1/8	1/10½	2/1	2/4	2/7½	2/11	3/3½	3/8½	4/1½	p.ft.
3 ,, ...	1/6	1/8	1/9½	2/-	2/2½	2/7	2/11	3/3½	3/8½	4/-	4/5	,,
4 ,, ...	1/9½	1/11	2/1	2/3	2/5½	2/11	3/3½	3/8½	4/1½	4/6½	5/-	,,
Suction Hose, extra	-/2	-/2	-/3	-/3	-/4	-/4	-/5	-/6	-/7	-/8	-/9	,,

VULCANIZED INDIA-RUBBER TUBING.

Without Plies of Canvas; not intended for pressure. For Gas Lamps and Stoves. In lengths, from 60 to 100 ft. With or without Spiral Wire.

Internal Diameter.	1/8	3/16	¼	5/16	⅜	7/16	½	⅝	¾	⅞	1	in.
B—Grey	-/1½	-/2½	-/3	-/3½	-/4½	-/5½	-/7	-/9½	1/-	1/4	1/9	p.ft.
A—Black or Red ...	-/2	-/3	-/4	-/5	-/6½	-/7½	-/9½	1/-	1/4	1/8	2/1	,,

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INDIA-RUBBER HOSE.

BREWERS' HOSE.

Specially Prepared and Sweetened for ALE AND BEER.

Internal Diameter.	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	ins.
2 Ply	1/0½	1/4½	1/8	1/11½	2/3	2/6	2/9	3/1	3/4	3/7	3/11	4/2	4/5	4/8	per ft.
3 ,, ...	1/3	1/8	1/11½	2/3	2/6	2/9	3/1	3/6	3/10	4/1	4/5	4/9	5/(	5/5	,,
4 ,, ...	1/6	1/11	2/3½	2/9	2/11	3/3	3/7	3/11	4/3	4/8	4/11	5/4	6/-	6/3	,,
5 ,, ...	1/10	2/4	2/9	3/1	3/4	3/9	4/1	4/6	4/10	5/3	5/10	6/3	6/9	7/-	,,

BREWERS' HOSE PIPES.

Made in 3-ft. and 4-ft. Lengths. With or without Insertion for Hand Joints and Cask Cleaning.

Internal Diameter.	⅜	¾	1	1¼	1½	1¾	2	2¼	2½	3	ins.
Grey	-/11	1/2	1/9	2/3	2/9	3/3	3/10	4/6	5/2	6/	per ft.
Best Quality	1/2	1/6	2/-	2/9	3/4	3/10	4/6	5/2	5/10	6/10	,,

HYDRAULIC HOSE.

To stand very HIGH PRESSURE.

½ inch, 4 ply, will stand a Working Pressure of 2000 lbs. } Water pressure
1 ,, 4 ,, ,, ,, 1000 ,, } per square inch

Internal Diameter.	½	⅝	¾	1	1¼	1½	ins.
3 Ply	2/1½	2/5	2/8½	3/3½	3/11	4/6	per ft
4 ,, ...	2/3½	2/8½	3/-	3/7½	4/2½	4/10	,,
5 ,, ...	2/7½	3/-	3/3½	3/11	4/6	5/2	,,
6 ,, ...	2/11	3/3½	3/7½	4/2½	4/10	5/6	,,

TANNED WOVEN HOSE.

Lined with India-rubber, as supplied to the Metropolitan and other Fire Brigades. For Fire Engines, Mills, Breweries, and Steam Packet Companies.

Internal Diameter.	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	ins.
No. 1, Red Rubber Lining	-/9½	-/11	1/1	1/2½	1/4½	1/6½	1/8½	1/11½	2/1½	2/3	2/6	2/9	3/-	per ft.
No. 2, Grey Rubber Lining	-/8½	-/10	/11	1/1½	1/3½	1/5½	1/7½	1/9½	1/11½	2/1	2/2½	2/4	2/8	,,

"SPECIAL" GARDEN HOSE.

Internal Diameter.		½	⅝	¾	1	ins.
Drab	1 Ply	-/5	-/6½	-/7½	-/10½	per ft
	2 ,, ...	/6½	/7½	-/9	1/0½	,,
	3 ,, ...	-/7½	-/9	/10½	1/2½	,,
Red	1 Ply	-/5½	-/7	-/8½	1/-	,,
	2 ,, ...	-/7	-/8½	-/10	1/1½	,,
	3 ,, ...	-/8½	/10	-/11½	1/4½	,,

Price List of Garden Hose Fittings and Reels, see Index.

ARMOURED DELIVERY HOSE.

In 60-ft. Lengths.

Internal diameter	½	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	ins.
2 ply ...	/9½	1/1	1/5½	1/8½	2/-	2/4	2/7½	2/11	3/3	3/6	3/10	per ft.
3 ,, ...	/10½	1/2	1/7	1/11	2/3	2/7	2/11	3/3	3/6	3/10	4/2	,,
4 ,, ...	1/-	1/3½	1/9	2/3	2/5	2/10	3/2	3/6	3/10	4/2	4/7	,,

ARMOURED SUCTION HOSE,

With Spiral Wire.

Internal diameter	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	ins.
2 ply	1/6½	1/11½	2/4	2/9	3/2	3/6	4/-	4/5	4/10	—	per ft.
3 ,, ...	1/7½	2/1½	2/6	3/-	3/4	3/9	4/3	4/8	5/2	6/2	,,
4 ,, ...	1/9½	2/3½	2/8	3/2	3/8	4/-	4/6	5/-	5/6	6/6	,,
5 ,, ...	—	—	—	—	4/-	4/4	4/10	5/4	5/10	7/-	,,

ARMOURED BREWERS' HOSE,

Specially prepared and sweetened for Ale and Beer.

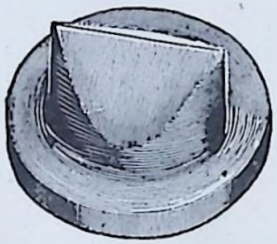
Internal diameter	1	1¼	1½	1¾	2	2¼	2½	2¾	3	ins.
2 ply ...	1/11	2/2	2/6½	3/-	3/3	3/8	4/-	4/5 -	4/8	per ft.
3 ,, ...	2/-	2/5½	2/10	3/3	3/6	4/-	4/5	4/9	5/3	,,
4 ,, ...	2/3½	2/9½	3/3	3/8	4/-	4/6	4/10	5/6	5/9	,,
5 ,, ...	2/8½	3/3	3/8	4/1	4/6	5/-	5/5	5/11	6/4	,,

ARMOURED "SPECIAL" GARDEN HOSE.

Internal diameter		⅜	½	⅝	¾	⅞	1	ins.
Drab	1 ply ..	/6	/7	/8½	/10½	1/-	1/2	per ft.
	2 ply ...	/6½	/8	/9½	/11½	1/1½	1/3½	,,
	3 ply ..	..	/9	/10½	1/1	1/3½	1/5½	,,
Red	1 ply ..	/6½	/7½	/9	/11½	1/0½	1/3	,,
	2 ply ...	/7	/8½	/10½	1/0½	1/2	1/4½	,,
	3 ply ...	..	/9½	/11½	1/1½	1/4	1/6½	,,

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PERREAUX'S PATENT "TWO-LIP" INDIA RUBBER PUMP VALVES.



PATENT FOOT VALVES. No. 1 Strength,

For ordinary Atmospheric Lifts, suitable for House, Garden, Street, Agricultural Pumps, &c.

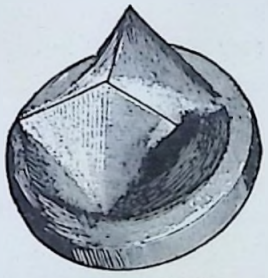
Sizes are .. ... Inches	2½	3	3½	4	4½	5	6	7	8
Price ... . Each	2/6	4/-	6/-	8/-	12/-	16/-	24/-	36/-	48/-
Measurements:	In.	In.	In.	In.	In.	In.	In.	In.	In.
Diameter of Waterway ...	1½	1¾	2⅜	2½	3	3¼	4	4½	5
Diameter of Body	2¼	2¾	3¼	3¾	4¼	4¾	5¾	6¾	7¾
Height of Body	1⅜	1¾	2	2¼	2⅝	3	3⅜	4¼	4¾
Diameter of Flange	4	4½	5	5½	6	7	8	9	10
Thickness of Flange... ...	½	⅝	⅝	¾	¾	⅞	1	1⅛	1¼
Total Height	1⅞	2⅜	2⅜	3	3⅜	3⅜	4⅜	5⅜	6

PATENT FOOT VALVES. No. 2 Strength,

For High Lifts and Pressures, suitable for Force Pumps of Fixed or Portable Steam Engines, Fire Engines, Deep Well Pumps, &c.

Sizes are .. In.	1¼	1½	1¾	2	2⅛	2½	2¾	3	3¼	3½	3¾	4
Price ... ...Each	-/3	-/6	-/9	1/-	2/-	3/-	4/-	5/-	6/-	7/-	8/-	9/-
Measurements:	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
Diam. of Waterway	½	⅝	¾	⅞	1	1⅛	1⅜	1½	1⅝	1¾	1⅞	2
Diameter of Body .	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾
Height of Body ...	11/16	¾	⅞	1	1⅛	1⅜	1½	1⅝	1¾	1⅞	2⅛	2¼
Diameter of Flange	1½	2⅜	2¾	3	3⅜	4	4½	4½	5	5	5¼	5½
Thickness of Flange	3/16	⅜	⅜	½	½	⅝	⅝	¾	¾	¾	⅞	⅞
Total Height	1	1⅜	1¼	1½	1⅜	2	2⅛	2⅜	2½	2⅝	2⅞	3

PERREAUX'S IMPROVED PATENT "THREE-LIP" INDIA RUBBER PUMP VALVES.



Marked "P."

Sizes are .....No,	0	1	2	2½	3	4	5	6	7	7½	8	9
Price each	-/6	1/6	2/6	4/-	6/-	8/-	14/-	20/-	30/-	35/-	40/-	70/-
Measurements:	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
Diameter of Waterway	½	1	1½	1¾	2	2½	3	3½	4	4½	5	6
Diameter of Body .	¾	1½	2¼	2¾	3	3¼	4½	5¼	6	6¼	7½	9
Height of Body ...	⅜	¾	1⅛	1⅜	1½	1⅞	2¼	2⅝	3	3⅛	3¼	4½
Diameter of Flange	1¼	2¼	3¼	4	4	5	5¼	6¼	7¼	8⅜	9½	11
Thickness of Flange	¼	⅜	½	⅝	⅝	¾	⅞	1	1 1/16	1⅛	1 3/16	1¼
Total Height	⅝	1⅜	1⅝	2¼	2⅛	2⅜	3⅛	3⅝	4 1/16	4½	4 15/16	5⅜

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VULCANIZED FIBRE SHEETS.

Red, Grey, or Black. Hard or Flexible.

This material is made from specially prepared vegetable fibres by subjecting them to the action of powerful chemicals and a vulcanizing process, which renders it suitable for many purposes, such as valves for air and circulating pumps, insulating parts in electrical construction, hydraulic packing in cotton presses and other machinery where heavy pressure is encountered, washers and discs for water valves of all kinds, &c., &c.

It is unaffected by contact with hot or cold oil, and is in no way injured by water or ordinary heat.

Hard Sheets	measuring 40 in. × 66 in. made from ·005 to 1¼ in. thick	Red and Grey ...	2/3 per lb.
Hard Sheets	measuring 40 in. × 66 in. made from ·005 to ¼ in. thick	Black	2/6 ,,
Flexible Sheets	measuring 42 in. × 70 in. made from 1/64 to 1 in. thick	Red	2/- ,,

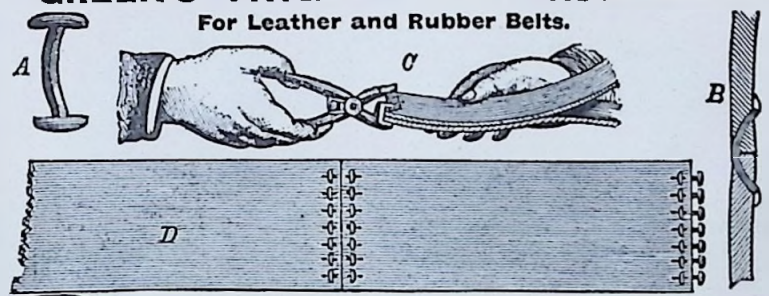
When no colour is specified we supply Red.

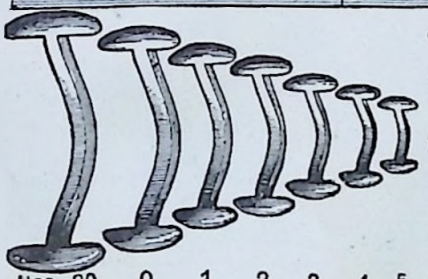
Flexible Fibre Rods. RED.		Flexible Fibre Tubes. RED.	
¼ in. diameter and under ...	-/5 per foot.	All sizes from ¼ in. to 2 in. internal diameter.	
5/16 ,, ,, ...	-/5½ ,,	With Wall 1/16 in. thick ...	6/- per lb.
⅜ ,, ,, ...	-/6½ ,,	,, ,, 3/32 ,, ,, ...	5/4 ,,
7/16 ,, ,, ...	-/8 ,,	,, ,, ⅛ ,, ,, ...	4/6 ,,
½ ,, ,, ...	-/10 ,,	,, ,, 5/32 ,, ,, ...	4/4 ,,
9/16 ,, ,, ...	1/- ,,	,, ,, ¼ ,, ,, ...	4/2 ,,
⅝ ,, ,, ...	1/3 ,,		
¾ ,, ,, ...	1/6 ,,	Walls under 1/16 in. thick are charged at same price as 1/16 in.	
⅞ ,, ,, ...	2/3 ,,		
1 ,, ,, ...	3/- ,,		
1⅛ ,, ,, ...	4/- ,,		
1¼ ,, ,, ...	5/- ,,		

IMPROVED

GREEN'S PATENT BELT FASTENERS.

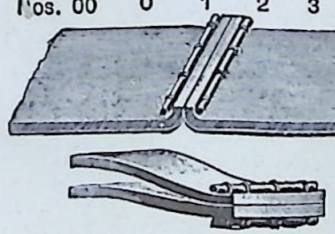
For Leather and Rubber Belts.





Cutters, Large ... . 5/- each.
Do. Small .. .. .. 3/6 ,,
Awls ... ... 6d. ,,

No. 00	... 6/- per box of 100
,, 0	... 5/- ,, ,,
,, 1	... 4/- ,, ,,
,, 2 . ..	... 3/- ,, ,,
,, 3 .. .	... 2/6 ,, ,,
,, 4	... 2/- ,, ,,
,, 5	... 1/6 ,, ,,

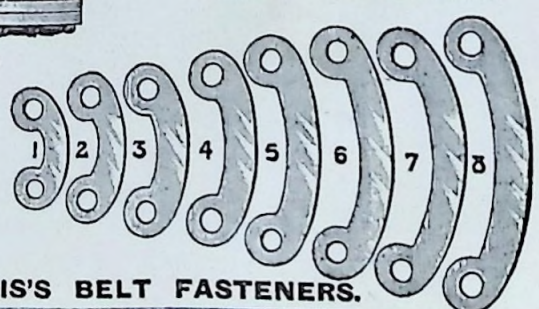


THE "LION" PATENT BUTT JOINT BELT FASTENERS.

PRICE PER GROSS.

No 0	3/-
,, 1	4/-
,, 2	5/-
,, 3	6/
,, 4	8/
,, 5	9/
,, 6	10/-
,, 7	11/-
,, 8	12/-

Pins included.



HARRIS'S BELT FASTENERS.

For Belts ...	1	1¼	1½	1¾	2	2½	3	3½	4	inches wide.
PRICE ..	/8	-/8	-/10	-/10	1/-	1/2	1/4	1/6	2/-	per dozen.
,, ...	6/-	6/-	8/-	8/-	10/-	12/-	14/-	16/-	18/-	per gross.

CAST STEEL HOOKS AND EYES.

Size	3/16	¼	5/16	⅜	½	9/16	⅝	¾	inch.
PRICE	6/6	7/6	8/	12/	24/	32/-	40/-	56/-	per doz. pairs.
,, ...	1/	1/-	1/3	1/6	2/9	3/	3/9	5/6	per pair

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JACKSON'S PATENT BELT FASTENERS.

PLATE FASTENER.



OVAL FASTENER.

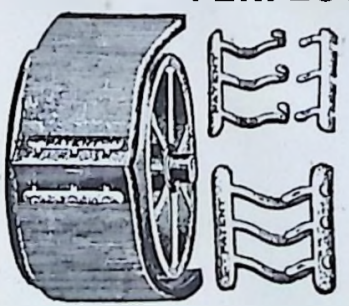


SIZE.	PRICE per Gross.	SIZE.	PRICE per gross.
No. 0	30/-	¼ inch	20/-
,, 1	36/-	5/16 ,,	30/-
,, 2	50/-	⅜ ,,	36/-
,, 3	65/-	⅜ ,, large.	39/-
,, 4	65/-		

JACKSON'S BUTTON FASTENER.

	No. 1.	No. 2.	No. 3.	No. 4.
PRICE per Gross	9/-	10/-	12/-	14/-

THE "PERFECT" BELT FASTENER.



FOR BELTS. Width in inches									
1	1½	1¾	2	2½	3	3½	4	5	6
PRICE per Gross.									
18/-	24/-	27/-	30/-	36/-	42/-	54/-	66/-	96/-	120/-

COPPER RIVETS AND BURRS.

In all sizes, at 1/6 per lb.

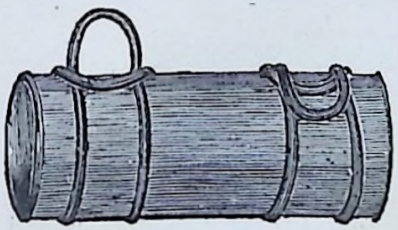
SADLER'S PUNCHES ...	Nos. 0 to 6	No. 7.	No. 8.	No. 10.	No. 12.	No. 14.
PRICE per dozen ...	9/-	12/-	12/-	15/-	16/-	21/-
WAD PUNCHES, Inch	¼	⅜	1	1⅛	1¼	1½	1¾
PRICE per dozen	12/-	24/-	42/6	56/-	60/-	90/-	108/-

THE NEW

PATENT HOSE FASTENER.

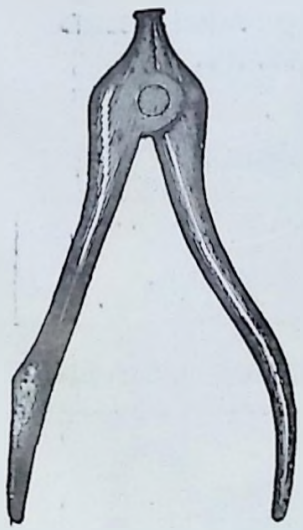
These Patent Fasteners are designed to supersede the old **slow** and **costly** method of attaching Hose to the Unions and Branch Pipes by Copper Wire. The experience of those who have used these Patent Fasteners is such, that we offer them to the trade, feeling fully assured that nothing now in the Market equals them for **security** as well as **speed** in fixing.

They are specially adapted for Garden Hose, Air Brakes, Engine and Tender Hose, Fire-Extincteurs, &c.



DIRECTIONS.

In applying the Patent Fasteners, place the large end under the Hose, and bring the two ends together, carrying the small end through the large, using the wedge end of the pliers to bring the small end of the Fastener through sufficiently to admit the nose of the pliers by which the strap is tightened, making it far superior to any plan yet discovered for attaching Hose to couplings.



No. 1	3⅜ in. long for ½ in. light Hose	1/- per doz.
,, 2	3¾ ,, ,, ½ in. 2-ply ,,	
,, 3	4⅛ ,, ,, ¾ in. 2 ,, ,,	1/6 ,,
,, 4	4¾ ,, ,, ¾ in. 3 ,, ,,	
,, 5	5 ,, ,, 1 in. 2 ,, ,,	2/- ,,
,, 6	5⅛ ,, ,, 1 in. 3 ,, ,,	
,, 7	6 ,, ,, 1¼ in. 2 ,, ,,	2/6 ,,
,, 8	6⅛ ,, ,, 1¼ in. 3 ,, ,,	
,, 9	6¾ ,, ,, 1½ in. 3 ,, ,,	3/- ,,
,, 10	7⅛ ,, ,, 1½ in. 4 ,, ,,	
,, 11	7½ ,, ,, 1¾ in. 3 ,, ,,	3/3 ,,
,, 12	8 ,, ,, 1¾ in. 4 ,, ,,	
,, 13	8½ ,, ,, 2 in. 3 ,, ,,	3/9 ,,
,, 14	9 ,, ,, 2 in. 4 ,, ,,	
,, 15	9½ ,, ,, 2¼ in. 3 ,, ,,	4/- ,,
,, 16	10 ,, ,, 2¼ in. 4 ,, ,,	
,, 17	10½ ,, ,, 2½ in. 3 ,, ,,	4/3 ,,
,, 18	11 ,, ,, 2½ in. 4 ,, ,,	

HOSE PLIERS.

For ½ in. to 1 in. inclusive	2/6
,, 1¼ in. to 2½ in. ,, ...	3/6

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PATENT HOSE FITTINGS.

Suitable for Hose of all descriptions.

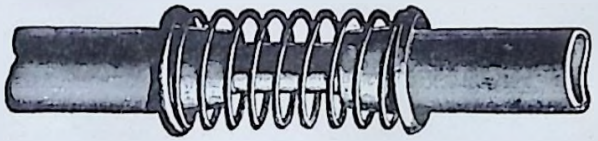
ADVANTAGES.

Two pieces of Hose may be instantly joined together.
No wiring whatever is necessary.
There are no loose parts to get lost or out of order.

INSTRUCTIONS FOR USE.

Compress the Spring, and hold same in the left hand, so as to allow the bulbous tail to protude about an inch; with the right hand pass the Hose well over the Bulb, and then by releasing the Spring, the Hose is instantly secured, as illustrated.

HOSE CONNECTIONS.



½ inch	12/- per dozen	1 inch	28/- per dozen	2 inch	48/- per dozen
⅝ ,,	16/- ,,	1¼ ,,	32/- ,,	2½ ,,	56/- ,,
¾ ,,	20/- ,,	1½ ,,	36/- ,,	2½ ,,	64/- ,,

BRANCH PIPE, WITH JET AND ROSE, AND INSTANTANEOUS COUPLING.



½ inch ..	40/- per dozen .	with Spreaders,	18/- per dozen extra		
⅝ ,, ...	50/- ,, ...	,,	20/- ,, ,,		
¾ ,, ...	60/- ,, ...	,,	22/- ,, ,,		
1 ,, ...	80/- ,, ...	,,	24/- ,, ,,		

TAP UNIONS, WITH INSTANTANEOUS COUPLING.

These Unions enable users to connect and disconnect the Hose from the Tap Union with a minimum loss of time and trouble.

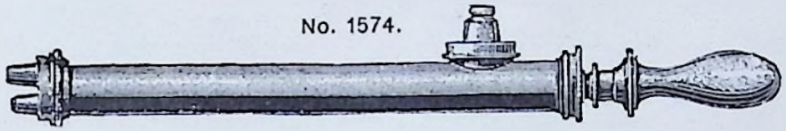


½ inch ...	24/- per dozen	¾ inch ...	36/- per dozen		
⅝ ,, ...	30/- ,,	1 ,, ...	48/- ,,		

For price of Hose see Index.

GARDEN SYRINGES.

No. 1574.



PRICES.

No.	Description.	12 × 1 Inches.	14 × 1¼ Inches.	16 × 1½ Inches.	17 × 1½ Inches.	18 × 1¾ Inches.
972	Lacquered ... per doz.	35/-	45/-	60/-		
	If with two side holders ... extra	5/-	6/-	8/-		
1566	Polished and Lacquered. Best possible quality, extra strong, with filling valves and loose roses				165/-	
1574	Polished and Lacquered (with Reid Ball Valve for quick filling) ...		90/-	110/-		150/-
	If with two side holders... extra		7/-	9/-		12/-
1612	Polished and Lacquered		50/-	65/-		85/-
	If with two side holders... extra		7/-	9/-		12/-

NEW WATER DIRECTORS (Patent.)

No. 1594.

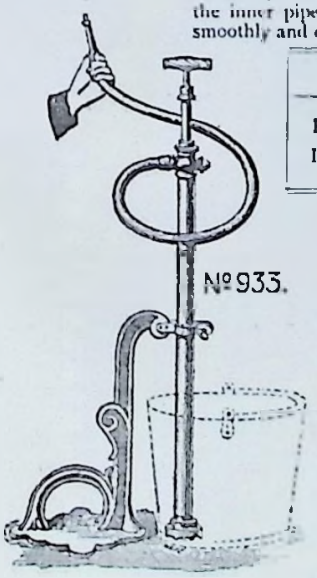


With this simple and effective arrangement a jet or spray may be obtained, or the water entirely shut off, by sliding the outer casing upon the inner pipe or stalk. There is no cock, and the movement is effected smoothly and easily without concussion. There are no loose parts.

Size.	½ in.	⅝ in.	¾ in.
Prices ... ... per doz.	35/-	45/-	60/-
If with Union ... ,,	45/-	60/-	75/-

HANDY GARDEN PUMP.

No. 933.



This is a very cheap, simple, and portable Pump: and its easy application to so many and varied purposes is a great recommendation. Besides the many uses a gardener finds for it, it gives great satisfaction as a washer of plate glass windows, shop and office fronts. With the 1¼ in. barrel it will throw a stream of water 30 feet high.

PRICES.

Barrel.	1 in.	1¼ in
No. 931. With gun metal clip for attaching to bucket	10 6	12 6
No. 933. With cast-iron stand	13 6	17 6

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BEST GREEN AND REFLECTING GAUGE GLASSES.

	External Diameter.	Inches long.										
		10	12	13	14	15	16	17	18	20	22	24
	In.	doz.	doz.	doz.	doz.	doz.	doz.	doz.	doz.	doz.	doz.	doz.
Best Green	⅜ & ½	3/9	4/3	4/6	4/9	5/-	5/6	5/9	6/-	6/6	7/-	7/6
,, ,,	9/16 & ⅝	4/-	4/6	4/9	5/-	5/8	6/-	6/6	6/10	7/6	8/4	9/-
,, ,,	11/16 & ¾	5/-	5/8	6/6	7/2	8/-	8/8	10/-	11/2	11/8	13/2	14/6
,, ,,	13/16 & ⅞	6/6	7/2	8/-	8/8	9/6	10/6	11/3	12/-	13/6	15/-	17/-
,, ,,	1 in.	7/-	8/-	9/-	9/9	10/6	11/3	12/-	13/-	14/6	16/-	18/-
Reflecting	⅜ & ½	5/-	6/-	6/6	7/-	7/6	8/-	8/6	9/-	10/-	11/-	12/-
,,	9/16 & ⅝	5/6	6/6	7/-	7/6	8/-	8/6	9/-	9/6	10/6	11/6	12/6
,,	11/16 & ¾	7/6	8/6	9/-	9/6	10/6	11/-	11/6	12/6	14/-	15/6	17/6
,,	13/16 & ⅞	8/6	9/6	10/-	11/-	12/-	13/-	14/-	15/-	17/-	19/-	21/-
,,	1 in.	10/6	12/6	13/6	14/6	16/-	17/6	19/-	20/6	23/6	27/6	30/6

Intermediate sizes and lengths charged at next higher price.

Best Green Glasses in 6 ft. lengths, 1/6 per lb.

INDIA RUBBER RINGS, ROUND.

⅜ in. and ½ in., 6/- per gross; ⅝ in. and ¾ in., 8/- per gross.

INDIA RUBBER RINGS, SQUARE.

⅜ in. and ½ in., 8/- per gross; ⅝ in. and ¾ in., 10/- per gross.

SPECIAL INDIA RUBBER RINGS FOR BELL'S PATENT ASBESTOS-PACKED WATER GAUGES.

7/16 in. and ½ in.	⅝ in. and ¾ in.	⅞ in. and 1 in.
1/3	1/6	1/9 per dozen.

SPONGE CLOTHS.

Small	14/- per gross.
Medium	18/6 ,,
Large	25/- ,,
Chamois Polishing Cloths	6/6 per dozen.

COTTON WASTE.

	Per cwt.		Per cwt.
Coloured ...	24/-	White ...	36/-
,, best	30/-	,, best	46/-
Grey	36/-	,, Yacht	56/-

Special quotations given for large quantities.

EMERY AND GLASS CLOTH AND PAPER, GLUE, &c.

Emery Cloth...	26/-	28/- ream
,, ,, Fibre-dressed ...	—	36/- ,,
,, ,, tearing into strips	—	48/- ,,
Special Burnishing Cloth ...	—	72/- ,,
Glass Cloth	24/-	26/- ,,
,, ,, tearing into strips	—	72/- ,,
,, Paper	—	16/- ,,

Emery, Corn prepared (all cuts)			22/-	30/-	cwt
Emery Wheels (see index)						
Black Lead			18/-	30/-	36/-	,,
Best prepar. Plumbago			28/-	32/-	40/-	,,
	Scotch.	Cabinet.	Town.	French.		
Glue	60/-	48/-	60/-	56/-	45/-	36/- ,,



CRICKMER'S PISTON RINGS.

These Rings are useful for packing *Glands* where *Piston Rod* is in bad condition through flaws in metal, &c. They are made in one solid ring, and *Piston Rod* must be disconnected from *Crosshead* to pack gland.

In ordering, exact diameter of *Piston Rod* and *Stuffing Box* must be given, and depth of latter.

BEST QUALITY ONLY

3/- per lb.

RED ROPE PACKING,

For Gas, Water, Air, and Steam Joints.

This jointing material is made in ½, ⅝, and ¾ inch diameter, with a wire running through centre, which gives it great strength for Hydraulic and heavy pressures.

PRICE 2/- per lb.

GREASES.

	per cwt.		No. 1	No. 2	per cwt.
Tallow, special refined		Bearing Grease ...			
,, No. 1		Railway ,, ...			
,, No. 2		Cart and Waggon Grease			
ASBESTOLINE, &c., see general Catalogue.		Cog Wheel Grease...			

WHITE LEAD.	£ s. d.	RED LEAD.	£ s. d.
Per cwt.		Per cwt.	

PAINTS, VARNISHES, AND BRUSHES.

Prices on application.

SOAP POWDER.

This is prepared for Drilling, Screwing, Turning, and general work in engineer's or tool shop where oil has been used. It will keep Drills, Tools, and Cutters much cooler, and will maintain their edge better, be found cheaper than soft soap, and does not cause rust.

PRICE 28/- per cwt. In Casks 1 to 5 cwt.

HYDRO-CARBONATED POWDER,

For Case-hardening.

This is for hardening all kinds of Axles, Pins, Bushes, Cutters, Nuts, or any parts subjected to friction, either in mild Steel, Wrought or Malleable Iron. Surface hardness can be obtained, or it can be carried half an inch into the metal. Finished parts can be hardened, as it leaves all articles perfectly clean and free from scale. In use it is free from the objectionable smells caused in using leather, bones, &c., and is much more reliable.

In about 3 cwt. Casks. PRICE 30/- per cwt.

BELL'S IMPROVED

SCOTT'S JOINTING CEMENT.

This is specially adapted for joints of Gas and Water Pipes, Man-holes, &c It is one-third the weight of Red and White Lead, and equal quantity will make better joint.

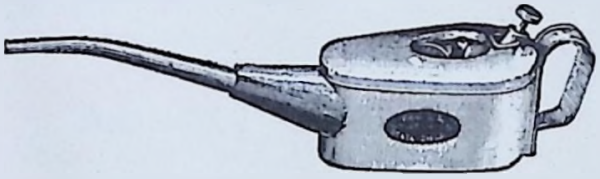
PRICE 28/- per cwt. In Casks 1 to 5 cwt.

For ASBESTOS PUTTY and CEMENT see General Catalogue.

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BRAIME'S PATENT OIL CANS AND LAMPS.

The bodies of these Oil Cans are formed out of one Steel Sheet, without seam or joint; consequently, it is impossible for them to leak or get out of order. They are fitted with Patent Feed-hole, Patent Valve Holder, Steel Spring Valve, and all the latest improvements.



WITH FIXED SPOUTS.

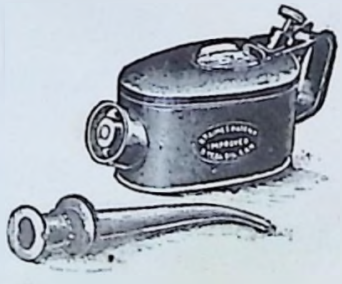
Number.	Capacity.	Length of Spout.	With Steel Seamless Spouts.	With Copper Spouts.	All Copper.	
c	¼ pint.	4½ in.	16/-	17/6	38/-	Per doz.
c1	½ ,,	6 ,,	18/-	19/6	44/-	,,
o2	¾ ,,	6 ,,	18/-	20/6	50/-	,,
o3	⅝ ,,	7 ,,	20/-	21/6	56/-	,,
o4	¼ ,,	8 ,,	24/-	25/6	68/-	,,
o5	1 ,,	9 ,,	30/-	32/6	86/-	,,
o6	1½ ,,	10 ,,	36/-	37/6	104/-	,,

Extra length of Spouts 1/- per doz. extra.

WITH PATENT CHANGEABLE SPOUT.

Number.	Capacity.	Length of Spouts.	With Interchangeable Seamless Tin Spouts.	With Interchangeable Copper Spouts.	All Copper.	Extra Steel Spouts.	Extra Copper Spouts.
			doz.	doz.	doz.	doz.	doz
o8	¼ pint.	4½ in.	20/-	21/6	42/-	1/-	1/-
o9	½ ,,	6 ,,	22/-	23/6	48/-	1/-	2/-
o8	¾ ,,	6 ,,	22/-	23/6	54/-	1/-	2/-
o9	⅝ ,,	7 ,,	24/-	25/6	60/-	1/6	3/-
o10	¼ ,,	8 ,,	28/-	29/6	72/-	1,6	3/-
o11	1 ,,	9 ,,	34/-	35/6	90/-	2/-	4/-
o12	1½ ,,	10 ,,	40/-	41/6	108/-	2/-	4/-

Extra length of Spouts 1/- per doz. extra.



PATENT STEEL REEPER OIL CANS.

Number.	Size.	Prices.
28	2⅛ in. × 2½ in.	8/- per doz.
29	2⅞ in. × 3⅜ in.	12/- ,,
30	3⅜ in. × 4 in.	18/- ,,
31	Joiners.	6/- ,,
32	,,	8/- ,,

PATENT TAPER LOCOMOTIVE OIL CANS.

Length.	With Fixed Spout.	With Changeable Spouts.
24 in.	42/- per doz.	46/- per doz.
30 in.	46/- ,,	52/- ,,
36 in.	50/- ,,	54/- ,,

No. 23.—IMPROVED STEEL TORCH LAMPS.

	With Ordinary Lids.	With Screw Lids.
½ pint, Copper Spouts	27/- per doz.	32/- per doz.
1 ,, ,, ,, ...	32/- ,,	39/- ,,
2 ,, ,, ,, ...	38/- ,,	42/- ,,

WELL'S PATENT "UNBREAKABLE" CAST IRON OIL CANS AND LAMPS.

Pint		Doz.		Doz.
¼	No. 0, with Valve	27/-	No. 0a, without Valve	21/-
½	,, 1, ,,	30/-	,, 2, ,,	21/-
¾	,, 1a, ,,	33/-	,, 2a, ,,	24/-
1	,, 3a, ,,	45/-	,, 3a, ,,	36/-

HORIZONTAL PATTERN.



All with Brass Buttons.



LOCOMOTIVE OIL CANS.

24 in. long, 60/-; 30 in. long, 66/-; 36 in. long, 72/- per dozen.

TORCH LAMPS.



No. 5	½ pint	24/- doz.
,, 5a	¾ ,,	30/- ,,
,, 5b	1 ,,	36/- ,,

If with large wrought-iron Hook, 5/- per doz. extra.



TORCH LAMPS.

No. 18	3 pints	4/6 each
,, 28	6 ,,	9/- ,,

ENGINEERS' HAND LAMPS.



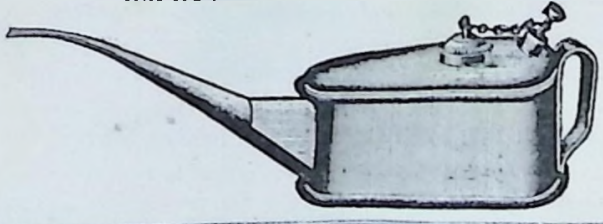
No. 4	½ pint	18/- doz.
,, 4a	¾ ,,	27/- ,,

MOULDERS' LAMPS.



No. 20	21/- per doz.

IMPROVED SPRING OIL CANS.



Size	¼	½	¾	1	1½	pint.
With Tin Spouts ...	12/-	15/-	18/-	21/-	25/-	per doz.
With Copper Spouts	13/-	16/-	19/-	22/-	26/-	,,

ENGINE ROOM LAMPS.

No.	Front Glass.	Japanned.	Brass.
1	6" × 4"	9/- each	16/- each
2	7" × 4½"	10 6 ,,	18/- ,,
3	8" × 5"	12/- ,,	21/- ,,
4	9" × 5¼"	13 6 ,,	24/- ,,

Engine Room Clocks of all descriptions.

Prices quoted on application.

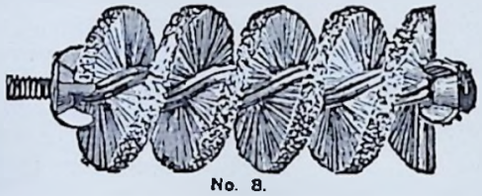
Tallow Kettles.

Funnel Oil Cans and Fillers.

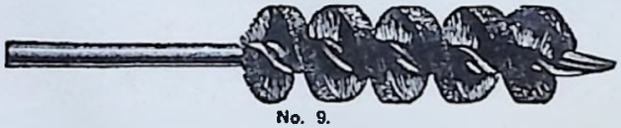
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SPIRAL BOILER TUBE BRUSHES.

Twisted Iron Stems.



No. 8.



No. 9.

Internal Diam. of Tubes.	1 to 2	2¼	2½	2¾	3	3¼	3½	3¾	4	Inches.
No. 8.—Wire, Steel or Brass.	23/-	23/6	24/6	25/6	26/6	27/6	28/-	28/6	29/-	per doz.
,, ,, Iron	18/-	18/6	19/-	19/6	20/-	20/6	21/-	21/6	22/-	,,
,, Bristle or Whalebone	22/6	23/	23/6	23/6	23/6	26/6	32/-	32/-	37/6	,,
No. 9.—Wire, Steel or Brass.	16/-	16/-	16/-	16/-	17/-	20/-	21/-	22/-	23/-	,,
,, ,, Iron	10/-	10/-	10/6	11/-	11/-	11/6	12/-	12/6	13/-	,,
,, Bristle or Whalebone	15/6	15/6	16/-	16/-	16/-	19/-	24/-	25/-	30/-	,,

These Brushes are twisted from two solid Iron Bars, instead of four wires, which makes them very much stronger.

Twisted Wire Handles for Tube Brushes, 4d. per foot run.

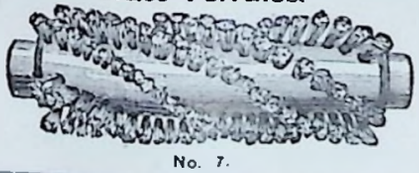
FLUE BRUSHES.

With Galvanized Twisted Wire Handles.

Length of Handle ..	3	4	5	6	7	8	9	10	11	12	13	14	Feet.
Hair, Fibre, or Brass Wire	1/6	1/8	1/10	2/-	2/-	2/3	2/6	2/6	2/9	3/-	3/6	4/-	Each.

BEST DRAWN BRISTLE BRUSHES.

Brass Ferrules.



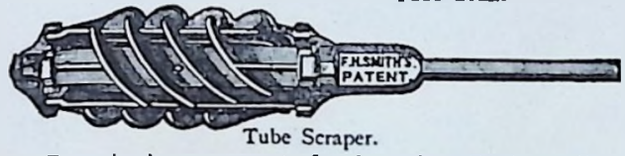
No. 7.

Internal Diam. of Tubes ...	2	2¼	2½	2¾	3	3¼	3½	3¾	4	Inches.
Price	40/-	40/-	40/-	73/6	74/-	74/-	74/-	74/-	74/-	per doz.

SMITH'S SELF-EXPANDING TUBE BRUSHES AND SCRAPERS.



Tube Brush



Tube Scraper.



Welding Piece.

By a simple arrangement of springs, these Brushes or Scrapers expand to tubes as they wear, and so can be worn down to the stock, and are always efficient in work.

Each fitted with welding socket as shown.

Internal Diam. of Tubes ..	2	2¼	2½	2¾	3	3¼	3½	3¾	4	in.
Bristle Brushes, complete ..	70/-	72/-	76/-	78/-	80/-	84/-	86/-	88/-	90/-	per doz.
Extra Brushes (no stems) .	54/-	56/-	60/-	62/-	64/-	68/-	70/-	72/-	76/-	,,
Scrapers	36/-	42/-	46/-	50/-	54/-	58/-	62/-	66/-	70/-	,,

"DUPLEX" BOILER TUBE SCRAPER.

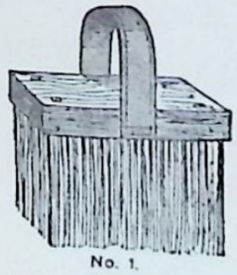


External Diam. of Tubes ..	2	2¼	2½	2¾	3	3¼	3½	3¾	4	in.
Prices	10/-	11/-	12/6	14/-	15/-	16/6	18/-	19/-	21/-	each

FOUNDRY BRUSHES,

For Cleaning Iron and Brass Castings.

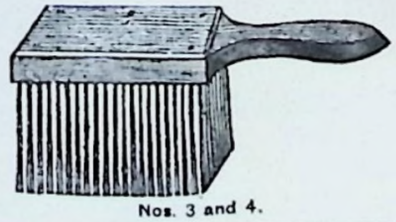
Best Steel Wire.



No. 1.



No. 2.



Nos. 3 and 4.

No. 1	5 rows of wire	3-inch teeth	25/- per dozen
,, 1A	5 ,, ,,	2-inch ,,	20/- ,,
,, 2		4-inch ,,	22/- ,,
,, 2A		3-inch ,,	20/- ,,
,, 3	5 rows of wire	3-inch ,,	24/- ,,
,, 3A	5 ,, ,,	2-inch ,,	21/- ,,
,, 4	6 ,, ,,	4-inch ,,	31/- ,,
,, 4A	6 ,, ,,	3-inch ,,	27/- ,,

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BELL'S BELTING SYRUP.

BELL'S BELTING SYRUP IS THE MOST Effective and Economical.



BELL'S BELTING SYRUP IS THEREFORE THE MOST inexpensive offered.

The materials of which it is made are of the **best quality**, and in use beneficial to Leather, Hair, Cotton, and other materials. It is harmless to Rubber. It is guaranteed not to contain any acids or resin, &c., which are so injurious to Leather.

BELL'S BELTING SYRUP

Makes Slipping impossible.
Prolongs the Life of Belts 300 per cent.
Is not affected by Change of Temperature.
Renovates old Belts and Leather.
Is not affected by Damp.
Is not affected by Steam.

Does not contain anything which is injurious to Belting.

ONE TRIAL WILL INSURE ITS CONSTANT USE.

Sold in Kegs, Drums, and Casks, 7, 14, 28, 56, and 112 lb. and upwards:

PRICES.

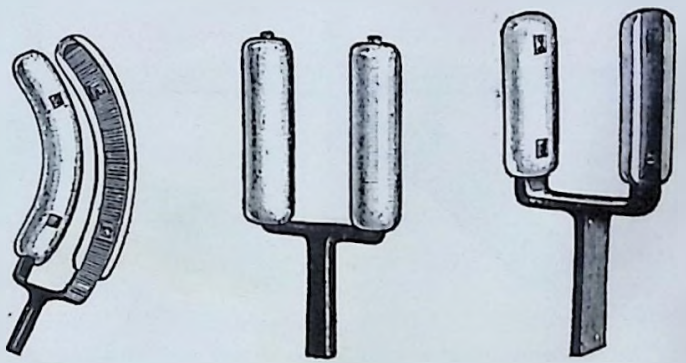
In Kegs, 7 lb. and 14 lb. .. .. .. @ 1/- per lb., Kegs included.
In Drums .. .. 28 lb., 25/-; 56 lb., 48/-; 112 lb., 85/-

Every Package bears Name and Trade Mark.

PORCELAIN BELT GUIDES.

FRICTIONLESS.

FOR THE PROTECTION OF BELTS WHEN RUNNING THROUGH GUIDE FORKS, WHEREBY THEIR DURABILITY IS GREATLY INCREASED.



No. 1 No. 2 No. 3

For fast running Belts, and especially all kinds of textile beltings, the small surface of the ordinary guide fork is very damaging to the edges of the belt, and they are quickly frayed out, and permanent injury is soon done to the entire belt.

The illustrations above represent a protection to the ordinary guide fork by which the life of all belts is considerably increased. Porcelain being so much harder than iron, these guides show no signs of wear when in use for years.

The advantages claimed for these guides are: Absence of wear and tear on the edges of the belt. Increased life of guide fork which, in iron, is quickly cut into. No loss of power and speed by friction. When shifting belt there is no frictional resistance.

PRICES OF THE PORCELAIN FITTINGS.

No. 1.—Semi-circular fittings for curved flat forks, 10 in. long, with 1 in. groove at back, and ¼ in. hole top and bottom to bolt on to forks .. .. per pair 2/6

No. 2.—Tubes for round forks, 7 in. long, 1½ in. diameter, with ½ in., ⅝ in., ¾ in., and ⅞ in. bores, and ¼ in. slot top and bottom to fix to fork with linch pins .. .. .. per pair 2/-

No. 3.—Semi-circular fittings for straight flat forks, 6¼ in. long, with ⅞ in. groove at back, and ¼ in. holes top and bottom to bolt on to forks .. .. per pair 1/6

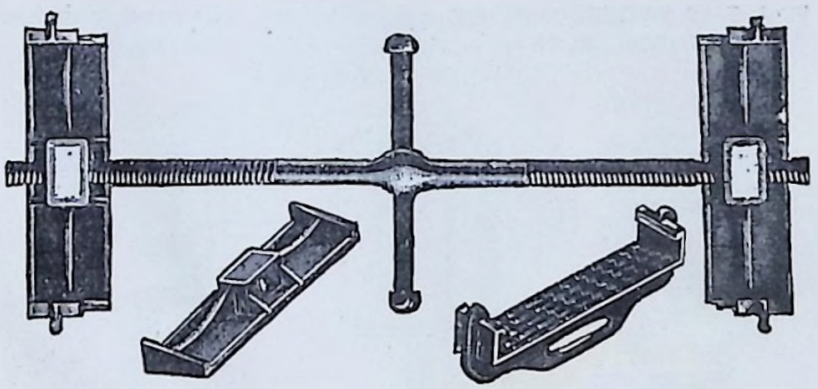
No. 4.—Semi-circular fittings for straight flat forks, 7 in. long, with 1⅜ in. groove at back, and ⅝ in. hole in centre to bolt on to forks .. .. per pair 2/-

The iron forks to carry above can be easily made by any smith, or existing ones will often carry them.

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PATENT BELT STRETCHER

FOR TEXTILE AND HEAVY BELTING.



WEDGE. CLAMP.

The above Belt Stretcher has distinct advantages over others, and if set, in the first place, square upon each end of the belt it cannot fail to bring it up true, the grip on the two ends increasing with the strain.

The action is automatic. The serrated clamp shown above is placed on inner side of belt; the wedge, also shown, is then run into the side grooves of clamp until belt is gripped; the screw, which has a right and left-hand thread, is then run into the wedge nut, and so the belt is stretched and ends gripped firmer.

ADVANTAGES.

Belts stretched in **one quarter** of the time, with less labour.
Even tension, the belt finding its own true position in the Clamps.
The Clamps will immediately grip either a horizontal or vertical Belt.
Lighter in Weight, and therefore much handier to use.

PRICES.

To take Belts up to 6 in. wide, screw 3 ft. long by ⅝ in. diameter	£2 5 0
,, ,, ,, 9 in. ,, ,, 3½ ft. ,, ,, 1 in. ,,	2 12 6
,, ,, ,, 12 in. ,, ,, 3½ ft. ,, ,, 1 in. ,,	3 0 0
,, ,, ,, 15 in. ,, ,, 3½ ft. ,, ,, 1 in. ,,	3 7 6
,, ,, ,, 20 in. ,, 2 ,,ca. 4 ft. ,, ,, 1⅛ in. ,,	4 15 0
,, ,, ,, 24 in. ,, 2 ,,ca. 4 ft. ,, ,, 1⅛ in. ,,	5 5 0

ALL SIZES IN STOCK.

If required the screws can be made to any length at small additional charge.

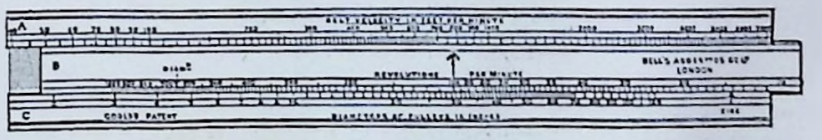
The Stretchers are made of the best material, the Right and Left-hand Screw being of the finest steel and the clamps of Malleable Iron, fitted with Gun-metal Nuts.

PULLEY AND BELTING CALCULATOR.

(PATENT.)



BELTING SIDE.



PULLEY SIDE.

This instrument is a Boxwood Rule, 12 in. × 1½ in. × ¼ in., having a slide fitted into each side, one side more particularly relating to pulleys, and the other side to belting. By its use almost any calculation can be rapidly made respecting the strength of belting, velocity, size of pulleys, &c. It is also divided into inches and centimètres.

A movable index is fitted on belting side, to facilitate calculations at varying loads, from 50 to 120 lb. per inch width of belting. This is necessary, as the formulæ of various authorities differ, which will be seen from the following quotations :—

Molesworth	50 lb.	Bex	58 lb.	E. J. Cowling-Welch	70 lb.
Morin	50 ,,	J. Armour	65 ,,	Daniel Hussey . .	80 ,,
J. A. Cooper (U.S.A.)	55 ,,	Prof. Unwin ..	70 ,,	Prof. Thurston	100 ,,

The movable index once set, the rule calculates throughout on the same basis.

The following are amongst the many useful formulæ it will show :—

PULLEY SIDE.

1.—Given the diameter and speed of a pulley, to find the velocity of periphery or of driving-belt.
2.—Given a required belt velocity and the number of revolutions of pulley, to find the diameter of pulley to attain velocity.
3.—Given a required belt velocity and the diameter of pulley, to find the number of revolutions necessary to attain the velocity.
4.—Given the diameter and speed of a driving pulley, to find the number of revolutions of a driven pulley.
5.—Given the diameter and speed of a driving pulley, and the required speed of a driven pulley, to find the diameter of driven pulley.
6.—Given the diameter of a pulley, to find its circumference.

BELTING SIDE.

7.—Given the velocity of a driving belt, and the horse-power to be transmitted, to find the necessary width of belt.
8.—Given the width and velocity of a driving belt, to find the horse-power it will transmit.
9.—Given the width of a belt, and the horse-power required, to find the necessary velocity.
10.—To find the weight of single or double belting.

Price of Calculating Rule .... 17/- each.
Leather Case for same ..... 1/6 ,,

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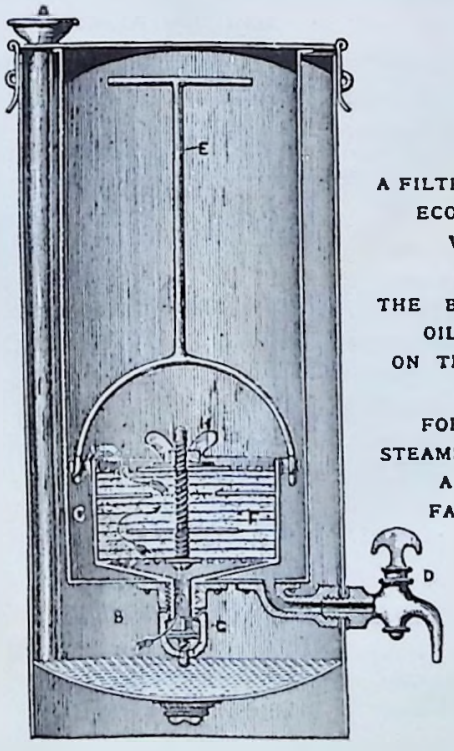
BELL'S IMPROVED
WASTE OIL FILTER.

(PATENT.)

WILL SAVE ITS COST IN 12 MONTHS.

EASILY CLEANED WITHOUT EMPTYING.

FOR USE IN ELECTRIC LIGHT STATIONS, WORK-SHOPS, &c., AND FOR GAS ENGINE AND DYNAMO OILS.



A FILTER OF GREAT ECONOMICAL VALUE.

THE BEST WASTE OIL FILTER ON THE MARKET.

FOR USE IN STEAMSHIPS, MILLS AND ALL FACTORIES.

The above Filter has many distinct claims over any other kind in use; and the advantage of a detachable filter chamber is too well known to need description. The following are a few of its chief features:—For the purpose of repacking, &c., the filter box can be removed and replaced while the outer chamber is full of dirty oil, and the inner chamber of filtered oil, without the two oils intermixing. As soon as the filter box is replaced the filtering process commences.

BELL'S IMPROVED
WASTE OIL FILTER.

(PATENT.)

DESCRIPTION OF ACTION.

For quicker filtration, the waste oil, if very thick, should be thinned down with a little filtered oil, and then poured by means of the funnel and tube **A** into the cylinder **B**; it then passes upwards through the open valve **G** into the filtering cylinder **F**, and, taking a serpentine path up through the filtering material, overflows into the inner cylinder **C**, whence it can be drawn off by means of the cock **D**.

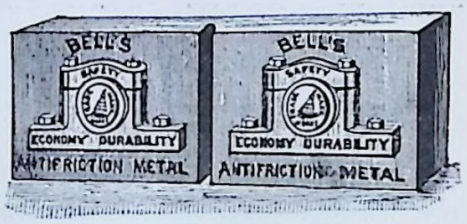
TO CLEAN.—Unscrew the filter cylinder by means of the T handle **E**; this allows the valve **G** to close. Remove from filtered oil cylinder **C**, unscrew the winged nut **H**, and turn entire contents out. Carefully wipe the various parts, and replace the bottom perforated plate. On this bottom plate place strongest spring, then arrange the pads of material as supplied, marked No. 1, and on this place the smaller disc; then the next size spring, and a second pad, marked No. 2, and on this the large annular disc; then the third pad, marked No. 3; and finally the top perforated plate. Screw, by means of the winged nut, the whole together until this top plate is pressed a little way down the cylinder. Owing to the springs being of different strengths the top pads will be compressed more than the bottom pad. Replace filter chamber, and screw down by means of T handle. In doing this, the valve **G** is opened and filtration commences. The top pads may be used several times, as most of the dirt, &c., is removed by the bottom layer of material.

Reference.	Size.		Capacity.		Price.
	Height.	Diameter.	Filtered.	Unfiltered.	
	In.	In.	Galls.	Galls.	£ s. d.
A	20	8½	2	2	2 10 0
B	22	10	3	3	3 2 6
C	24	11	4	4	3 12 6
D	26	13	6	6	4 7 6
E	30	17	12	12	7 0 0

E size contains two filtering cylinders, and is a very powerful Filter.

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BELL'S ANTI-FRICTION METAL.



TRADE MARK (Registered).

Every Ingot bears impression as above, without which none are genuine.

This Metallic Alloy is specially adapted for all purposes of Machinery containing parts subjected to constant wear, and affected by continual and severe friction. It possesses **properties which are not found in other Metals,** and is far more efficacious for the purposes mentioned below than any Alloy yet produced.

The advantages claimed for this Metal are :—

1—**SELF-LUBRICATING PROPERTIES.** It creates a coating of its own Metal on the Shaft or Journal, consequently requiring less lubrication.

2—**IT CAN BE USED BY AN ORDINARY MECHANIC,** for it only requires melting in a Plumber's ladle over a fire or forge, and pouring into the Bearing; it will then be found to **last much longer than the Bearing itself.**

3—**PROTECTION TO THE SHAFT OR JOURNAL.** The coating created **prevents the Bearing from "heating."** A Bearing lined with this Metal has been tested to **4,200 revolutions per minute without the slightest "heating."** This to Mill Owners is of the utmost importance, as the overheating of Bearings is often the cause of serious loss by fire.

4—**REQUIRES NO FITTING.** The Metal after being run round the Shaft in a liquid state, does not require boring, and in the case of Steps it prevents the lifting of Machinery and often stoppage.

PRICE.

No. 1 Alloy, Ingots of 14—28 lb. at £112 per ton.

No. 2 Alloy, for Cast Bearings and Bushes, quoted according to weight.

Special quotations given for quantities.

RE-STARTING INJECTOR.

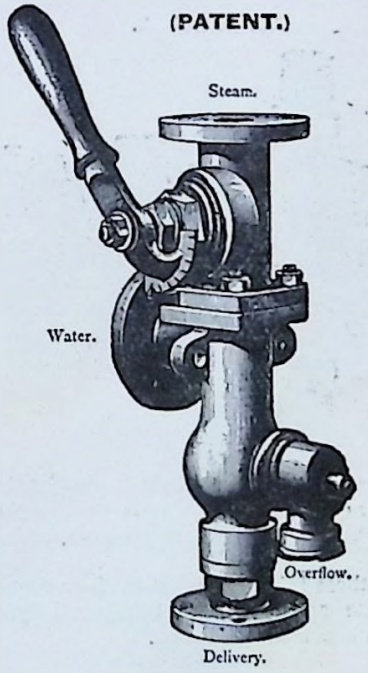
(PATENT.)

ADVANTAGES:—

REQUIRES NO SKILL.

RELIABLE IN USE.

RE-STARTS AUTOMATICALLY.



DUTIES:—

LIFTING OR NON-LIFTING.

WORKS AT PRESSURE BETWEEN 30 lb. & 180 lb. per sq. in.

This Injector may be converted from **right to left;** or *vice versâ,* by simply turning round top part. It should, if possible, be fixed vertically, with steam inlet at top and delivery to boiler at bottom. If fixed horizontally, the internal nozzle flap should be arranged to open upwards or towards one of the sides, but not downwards; this can be examined by removing the overflow valve.

In ordering please state:—

a—**Size** of Injector required.
b—**Working Pressure** of steam used.
c—**Maximum Lift** and Temperature of the Water Supply.
d—Whether the Injector is required with or without extra loose and counter Flanges.

DIMENSIONS.

NUMBER.		2	4	6	7	8	9	10
Dia. of Injector Flanges	Brass ...	2¼ in.	3½ in.	4⅛ in.	4⅛ in.	4½ in.	4½ in.	5¼ in.
	Iron ...	—	—	—	—	5½ in.	5½ in.	6¼ in.
Size of Connecting Pipes		½ in.	1 in.	1¼ in	1¼ in.	1½ in.	1½ in.	2 in.
Delivery per hour ... ... Galls.		100	330	660	860	1,050	1,250	1,590
PRICE, in Brass .. ... £		4 0	5 10	8 5	10 0	11 10	13 0	16 0
,, Iron, with Brass Nozzles, &c.						10 5	11 5	13 10
,, extra set of 3 loose Flanges :—								
,,	for Brass Injector	6/6	10/6	15/6	15/6	20/-	20/-	35/-
	,, Iron ,, ...					40/-	40/-	50/-

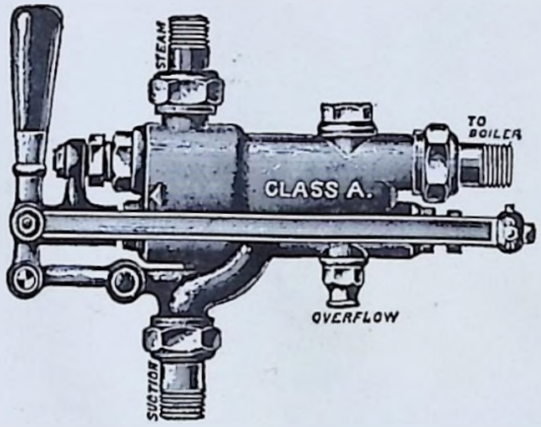
The smaller sizes can be supplied with female thread, or with couplings instead of flanges, at small extra charge.

Nos. 4, 6, and 7 can be made in Iron; prices on application.

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 20 of 298
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THE DUPLEX INJECTOR.

PATTERN A.



This pattern of Injector is specially suitable for **highest steam pressures** and lifting water from 24 feet, for which it is constructed They will work with as much as **100 lb. variation** in steam pressure, and with **hot suction water.**

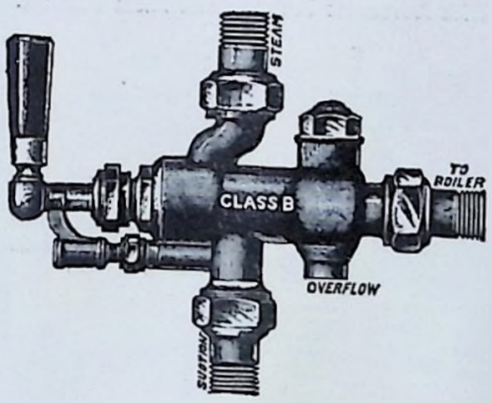
The great feature of these Injectors is that by the action of one handle **both steam and water are regulated proportionately** to their respective requirements, and are in like manner shut off.

PRICE LIST AND CAPACITIES.

Size.	Size Connections.		Gallons per hour.	Approximate Horse-power.	Price, All Gun-metal.
	Suction and Delivery.	Steam.			
3½	¾	¾	85	6	£4 0 0
5	¾	¾	130	10	4 15 0
5½	¾	¾	180	18	5 10 0
7	¾	¾	250	25	6 8 0
9	¾	¾	350	35	7 12 0
9½	1	¾	450	45	8 15 0
11	1	1	575	55	11 0 0
13	1¼	1	725	70	12 10 0
13½	1¼	1¼	900	90	13 10 0
15	1½	1¼	1260	120	16 10 0
15½	1½	1½	1700	150	18 10 0
17	2	1½	2200	200	
17½	2	1½	2800	250	

THE DUPLEX INJECTOR.

PATTERN B.



This Injector is constructed on same lines as Pattern A by which both steam and water are **automatically regulated** by action of one handle only; no valves or cocks are required to either steam or water pipes, the one handle on the **Injector actuating both.**

This pattern is constructed to work with a water lift of not more than 12 ft., and steam pressure not exceeding 120 lb. per square inch.

PRICE LIST AND CAPACITIES.

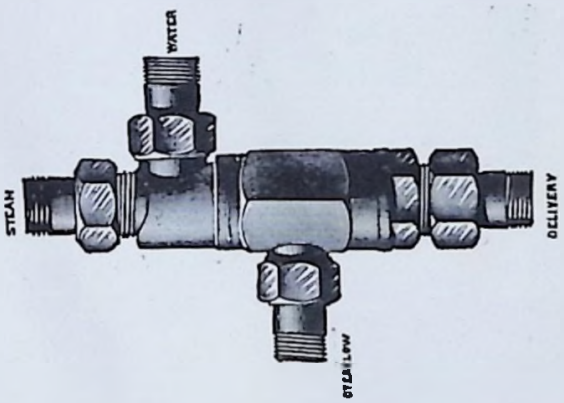
Size.	Size Connections.		Gallons per hour.	Approximate Horse-power.	Price, all Gun Metal.
	Suction and Delivery.	Steam.			
2	¾	¾	40	3	£2 0 0
4	¾	¾	90	6	2 5 0
5	¾	¾	130	9	2 10 0
7	¾	¾	220	16	3 6 0
9	¾	¾	330	25	4 10 0
9½	1	¾	430	40	5 10 0
11	1	1	550	50	6 10 0
13	1¼	1¼	720	60	8 0 0
15	1¼	1¼	920	75	9 5 0
17	1¼	1¼	1260	120	11 10 0
19	1½	1¼	1740	165	13 10 0
21	2	1½	2200	200	16 0 0
23	2	1½	2800	275	18 0 0

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PATENT

INSTANTANEOUS HIGH-LIFTING INJECTOR.

With Automatic Restart and Rigid Nozzles.



ABSOLUTELY CERTAIN IN ACTION.
WORKS IN ANY POSITION.

All sizes lift 8ft. with 50lbs. pressure of Steam, and can be made to lift 20ft. if required (without extra charge).

Higher the lift and less Injecting Power, should be noted. It is, therefore, well to place them as near the water as possible.

DIMENSIONS AND PRICES.

Size	2	3	4	5	6	7	8	9	10	11	12	15	18	20
Prices	70/-	75/-	105/-	120/-	160/-	175/-	225/-	245/-	280/-	310/-	350/-	540/-	720/-	860/-
Internal diam. of Pipes and fittings in ins.	½	½	¾	¾	1	1¼	1¼	1½	1¾	2	2	2½	2¾	3
Nominal H.P. of Boiler ...	7	15	20	30	40	60	80	120	160	200	240	350	500	620

FIXING, WORKING, ADVANTAGES.

Inlets and Outlets are marked respectively Steam, Water, Delivery and Overflow.

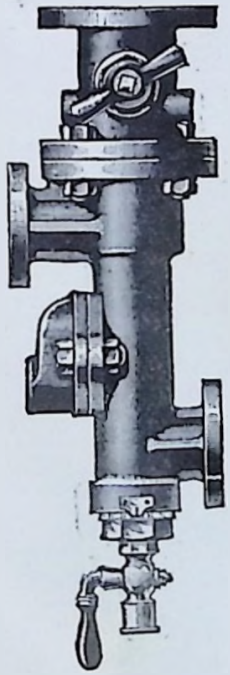
Fittings required are Steam Valve, Water Supply, or Control Cock and Check Valve to boiler.

Injector works equally well in any position. Should be fixed so as to keep steam supply pipe between Boiler and Injector as short as possible.

To work Injector it is only necessary to turn steam and water on full, no matter which first, and then regulate with the Water Cock until issue of water from overflow ceases. These Injectors are of the utmost simplicity, Nozzles being stationary. Range of working pressure of the standard is from 15lbs. to 90lbs. Higher or lower ranges may be had without extra charge.

PATENT

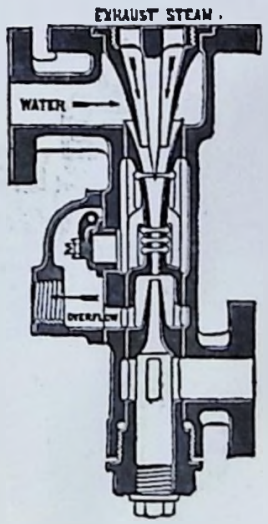
EXHAUST STEAM INJECTOR.



Injector with Wing Valve.

For Feeding Boilers by means of the Waste Steam of Non-condensing Engines.

Thoroughly reliable in action.



Section.

PARTICULARS AND PRICES.

No. of Injector	2½	3	4	5	6	7	8	9	10	11	12
Price	130/-	140/-	160/-	205/-	235/-	295/-	350/-	420/-	480/-	555/-	630/-
Delivery in Gallons per hour	90	150	270	420	600	830	1080	1370	1700	2050	2450
Highest Pressure against which Injector should work... ... in lb.	70	70	75	75	80	80	85	85	90	90	95
Diam. of Exhaust Pipe in inches	1¼	1½	2	2	2½	3	3½	4	4½	5	5½
Diam. of Overflow, Water, and Delivery Pipes ... in inches	½	¾	1	1	1¼	1¼	1½	1½	2	2	2
Wing Valve... ... extra	15/-	16/6	20/-	20/-	26/-	30/6	38/-	45/	55/-	65/-	73/-
Turned Flanges and Bolts... ... per set	9/-	13/-	15/6	15/6	21/-						

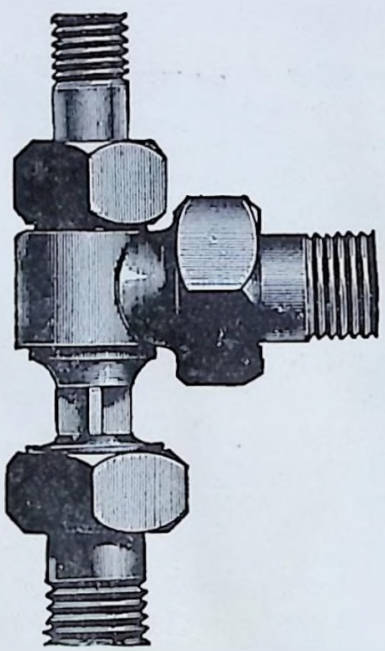
This Injector can be arranged to work against higher pressures than the above at a slight additional cost.

If we are required to decide size of Injector, the following data should be supplied:—Engine: Diam. and number of cylinders; length of Stroke; number of Revolutions per minute. Boiler: Size and number of Boilers to be fed; maximum Working Pressure; and whether heavily or lightly fed.

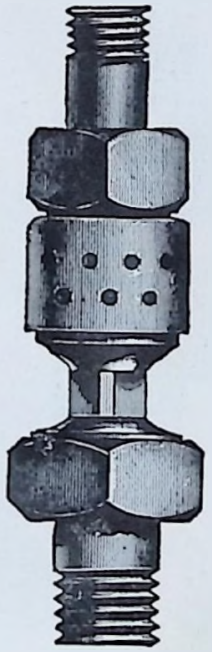
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EJECTORS, "ELEVATOR" PATTERN.

These steam Jet Pumps are Forcing only, or Lifting and Forcing For Water, Acids, or other Liquids; Air or Vacuum. Used also for exhausting Liquor Pans, agitating or drawing Gases through Liquids, assisting Filtration, &c.



Class A 77, and B 78.



Class C 79.

GENERAL REMARKS.

Particular attention is directed to the small size of steam connections as compared with work done in all classes.

Class B is specially recommended for working to feed Injectors for a long lift and supply, 55 feet being attained; water is cool enough to feed Injectors.

These Lifters can be used in series of three, one above another, being capable of raising water 150 feet.

It is absolutely necessary all connections be air-tight.

CAPABILITIES AT 60 LB. PRESSURE.

Class A, No. 77. All sizes lift 15 feet and force 45 feet.
" B, No. 78. " " 20 " " 35 "
" C, No. 79. " force 75 feet.

PARTICULARS AND PRICES.

Sizes.	1	2	3	4	5	6
Price of all Classes	24/-	36/-	56/-	80/-	120/-	170/-
Delivery in gallons per hour, Class A or C.	550	1,500	2,500	5,000	10,000	15,000
Delivery " " Class B	450	1,200	2,000	4,000	8,000	12,000
Size of Steam Pipe, all Classes	½ in.	½ in.	¾ in.	1 in.	1 in.	1¼ in.
Size of Suction and Delivery, all Classes ...	1 in.	1¼ in.	2 in.	2½ in.	3 in.	4 in.

COMMON BILGE EJECTORS

For Raising and Forcing Liquids.



Fig. 80.



Fig. 81.

Guaranteed to Lift and Force, but not to any specified quantity.

PARTICULARS AND PRICES.

Size	1	2	3	4
PRICE, Fig. 80 or 81	14/-	18/-	30/6	45/-
Size of Steam Pipe... .. .. In.	⅜	½	½	¾
Size of Water and Delivery Pipe In.	¾	1	1¼	2

COMBINED STRAINER AND FOOT VALVE

For Lifting Injectors.

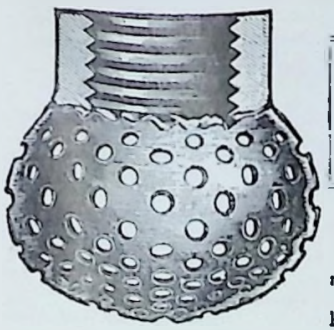


For purifying the water and retaining it in the feed pipe after the Injector has ceased to work, thus preventing loss of steam in exhausting the air from pipe when re-starting.

Size of Pipe ... In.	½	¾	1	1¼	1½	2	2½	3
PRICE	4/-	6/-	7/6	11/-	16/-	25/-	43/-	55/-

ROSES OR STRAINERS

For Lifting Injectors.



Size of Pipe ... In.	½	¾	1	1¼	1½	1¾	2
Diam. of Strainer "	1¾	2	2¼	2½	2¾	3	3½
PRICE ... ... Each	4/-	4/3	4/9	5/3	5/6	7/6	9/-

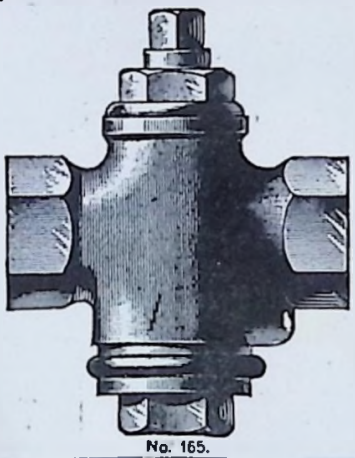
These Strainers are above full area, and are strongly recommended for all suction pipe ends, as they will prevent the Injectors from choking.

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IMPROVED INJECTOR STOP COCKS.

For High Pressure, with Combined Check Valve. Inverted Plug.

Connection with Boiler can be closed while Valve is taken out and repaired or renewed.

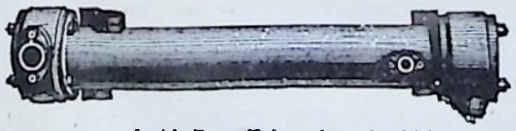


No. 165.

These Cocks can also be had without Valve in Plug.

Sizes—Inches.	½	¾	1	1¼	1½	1¾	2
Plug Cock, without inside Valve, No. 165 ...	5/-	7/-	10/-	16/-	22/-	30/-	36/-
Plug Cock, Stop, and Check, No. 166 ...	10/-	12/-	17/6	22/6	30/-	40/-	48/-

FEED-WATER HEATER.



These Heaters are constructed with Brass Tubes, through which the exhaust steam passes, while the feed-water is made to surround the tubes on its way from the pump to the boiler, thus ensuring the pump having cool water to work.

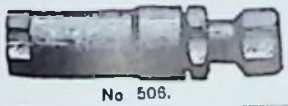
The water reaches the boiler nearly boiling, and hence by the use of this Heater a large economy in fuel is secured.

Their construction allows of their being readily cleaned when dirty water is used, and this assists to preserve the boiler. They can be fixed either vertically or horizontally.

Horse Power ...	1½	2	3	4	5	6	8	10	12	15
PRICE ... £	5	6	6	8	8	10	10	12	12	15

EXPANSION JOINTS.

All Gun-Metal. Screwed Ends.

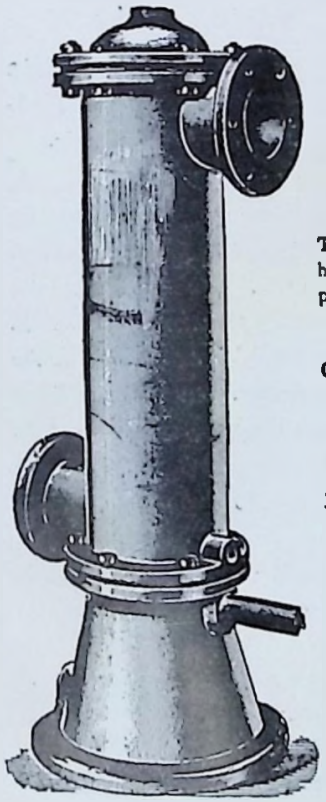


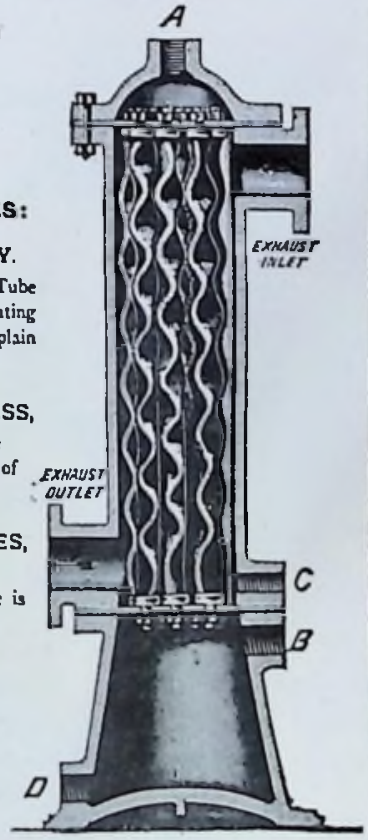
No 506.

Sizes	½	¾	1	1¼	1½	2 inch.
PRICE	4/-	6/6	13/-	16/6	19/-	24/- each.

FEED WATER HEATER.

(PATENT.)





ADVANTAGES:

EFFICIENCY.
The Corrugated Tube has a greater heating power than a plain tube.

COMPACTNESS,
Owing to the smaller number of tubes.

NO LEAKAGES,
As the Corrugated Tube is elastic.

This Feed Water Heater consists of a series of Patent Corrugated Heating Sections, arranged in suitable iron casing, and fixed to plates by strong nipples and nuts. The feed water enters at A and passes down through sections, around which exhaust steam is circulated, into bottom chamber, where it deposits impurities, and passes to boiler by outlet B. A blow-off cock can be fitted at D if desired. C is for carrying off condensed water, to which a Steam Trap should be fitted.

DIMENSIONS.

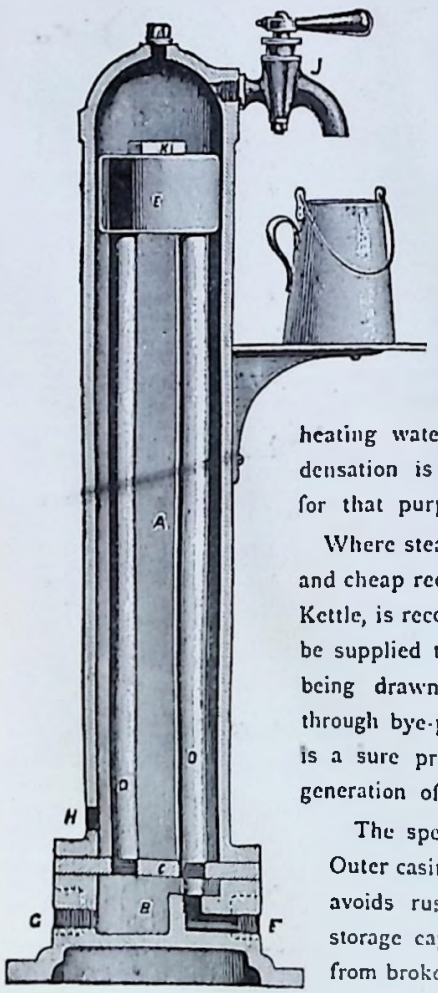
No.	Bore of Pipes. Feed.	Bore of Pipes. Exhaust.	Exhaust Connections are	Total Height.	Water raised per hour from 52° to 180° F.	Appr. I.H.P. at 30 lbs. per I.H.P. per hour.	PRICE. £	s.	d.
	In.	In.	In.	Ins.	lbs.				
1	¾	1¼	Scrd. 1¼ gas.	33½	290	10	5	10	0
2	¾	1¼	,, 1¼ ,,	34	550	19	7	10	0
3	¾	2½	7 diam.	34½	870	29	10	10	0
4	1	2½	7 ,,	35	1,160	39	12	10	0
6	1¼	3½	8 ,,	35½	1,740	58	15	10	0
7	1¼	3½	8 ,,	35½	2,030	68	17	10	0

The figures above are based on steam at 212° F. Larger machines can be quoted for on application.

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STEAM KETTLE AND WATER HEATER.

(PATENT.)



For **providing an immediate and continuous supply of Boiling Water** direct from main.

Kettle consists of iron casing, A, in which are a series of tubes, D, rising from plate C, terminating in chamber E. Steam enters at inlet F, passing to steam chamber E by smaller pipe within one of the tubes, the heat from which radiates through chamber and tubes, thus heating water, which enters at H. The condensation is discharged by outlet G provided for that purpose.

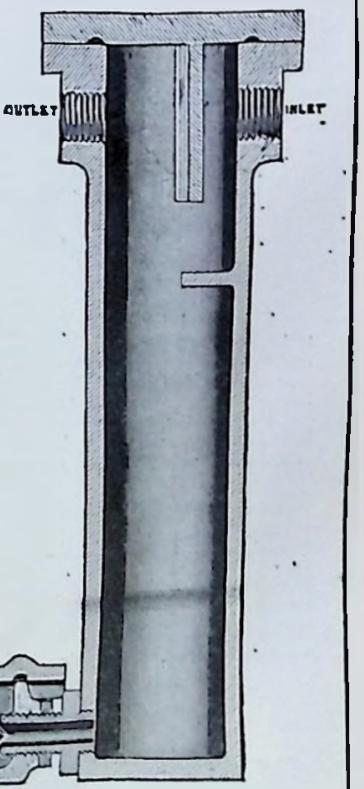
Where steam pressure exceeds 60 lb., a simple and cheap reducing valve, specially made for this Kettle, is recommended. An automatic valve can be supplied to shut off steam when water is not being drawn, and only pass sufficient steam through bye-pass to keep up boiling point. This is a sure preventive against super-heating and generation of steam.

The special features of this Kettle are:— Outer casing of **enamelled cast-iron,** which avoids rust; internal fittings are of brass; storage capacity is very large; **no trouble** from broken joints or coils.

No.	Capacity.	Price.
		£ s. d.
1	With 1 cock, supplies Water for 30 persons in 10 minutes ...	3 10 0
2	,, 1 ,, ,, 75 ,, 15 ,, ...	5 10 0
3	,, 2 ,, ,, 150 ,, 15 ,, ...	8 10 0
4	,, 2 ,, ,, 200 ,, 20 ,, ...	10 0 0

COMBINED SEPARATOR AND STEAM TRAP.

(PATENT.)



The Special Construction of this Combined Separator and Steam Trap renders it a most efficient apparatus for passing clean and dry steam to Engines and other Machines where steam is used either as the prime mover, or for boiling and heating purposes. Frequently Steam Traps only half do their work, owing to the fact that a large body of water is carried by steam past the pipe leading to trap. The Separator is a perfect remedy for this.

Where such cases exist the Separator can be supplied without the Trap.

The Special advantages of this Combined Separator and Steam Trap are:— **It intercepts Water and Dirt; ensures Clean** and **Dry Steam** passing to Engine or other apparatus; "**Knocking**" in Cylinders and Pipes is obviated; the effect of **Priming** is entirely nullified; it prevents injury to Steam Engines and other Machines, and it prevents broken joints.

PRICE COMPLETE.

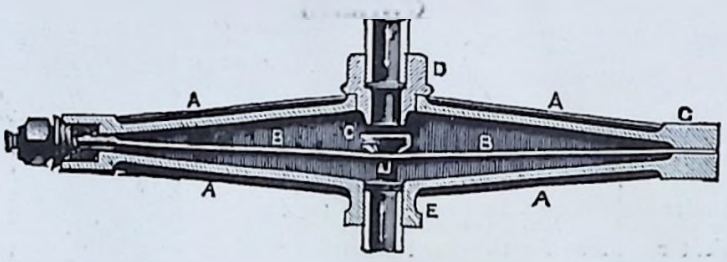
½ in.	¾ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.
30/-	35/-	40/-	50/-	65/-	100/-	120/-	150/-	150/-	240/-	300/-

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STEAM TRAP.

(PATENT.)

EXPANSION TYPE.



This Trap is better described by the section and lettering thereon. A, body, is made in gun metal, with B, expansion bar in steel, cast into Trap at one end, and left adjustable at other, so that the different pressures giving varying temperatures can be dealt with in their discharge. C is valve fixed in bar B, which, by the action of temperature on body A, closes inlet D when free of condense, or opens it as water collects.

FIXING.—The inlet and outlet pipes must be vertical, so as to drain all water out of body A, and in setting the nut at end of Trap, it should be slacked back until a free discharge of steam blows through, then adjust nut until steam is shut off.

PRICES.

No.	Size of Inlet.	Size of Outlet.	Price.
1	⅜ in.	⅜ in.	£0 15 0
2	½ ,,	½ ,,	1 1 0
3	¾ ,,	¾ ,,	1 10 0
4	1 ,,	1 ,,	2 2 0

STEAM TRAP.

(PATENT.)



This Float Trap differs from others by the addition of syphon H, through which the water is discharged, and there is very little pressure under cover B.

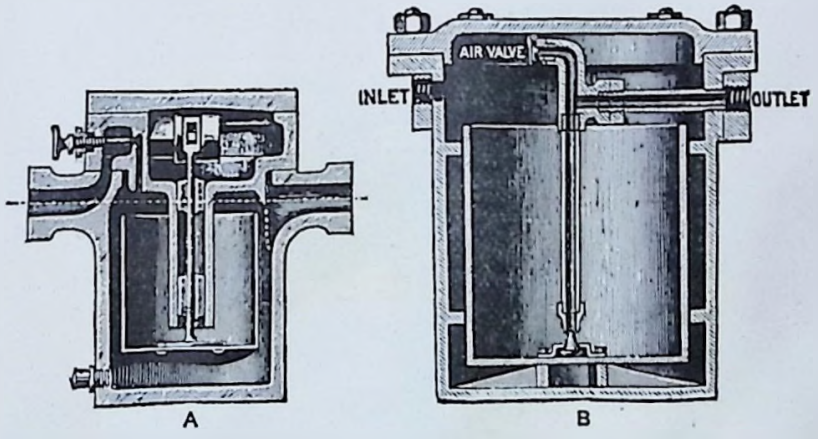
Inlet is by union O, which is connected to valve E, and as a certain quantity of water will always pass through into space N, and from there into M, the ball valve F is lifted, opening valve E more, and pressure ejects water through H into bib P. Cover B can be easily removed, and any dirt cleared out of Trap, or valve examined or replaced.

In starting, water must first be put into Trap to float ball F.

PRICES.

No	Inlet Size.	Extreme Dimensions. Length.	Width.	Height.	Maximum Working Pressure.	Prices.	Prices of Valves (Fig. 3)
	In.	Ft. In.	Ft. In.	Ft. In.	lbs.	£ s. d.	£ s. d.
1	½	1 5	0 7	1 1	100	1 17 6	0 4 0
2	¾	1 7	0 7½	1 2	100	2 5 0	0 5 0
3	1	1 10	0 8½	1 3½	100	2 15 0	0 6 0
4	1¼	2 1	0 9½	1 6	100	3 10 0	0 8 0
5	1½	2 5	0 10½	1 7¼	80	4 5 0	0 10 0
6	2	2 7	1 0½	1 11	80	6 10 0	0 15 0

STEAM TRAPS.



The above, as float Steam Traps, possess the advantages of simplicity; they work without waste of steam, and are capable of discharging the condensation from low pressure steam pipes to a height corresponding to pressure of steam in the trap. Traps consist of cast iron casing, containing an open float. The condensation collects in the Trap, and forces float upwards, and so closes outlet valve. After space around float is full, water overflows and causes float to sink, which opens the outlet. The water is then forced through outlet until the level in the float has fallen sufficiently to cause float to rise again and close the valve. Condensation is thus automatically discharged.

These Traps are suitable for pressures up to 60 lbs. per square inch.

A Trap is provided at outlet with a screw valve, which is operated by connecting rod attached at bottom of float, and passes up through central tube; this also serves to guide the float. A small air valve is also provided, which closes passage between interior of trap and outlet.

B Trap has a brass valve face at bottom of float, and an air valve in the centre of cover. This Trap can also have a Steam Separator fitted at the top to intercept the water which is carried in the steam, through pipes.

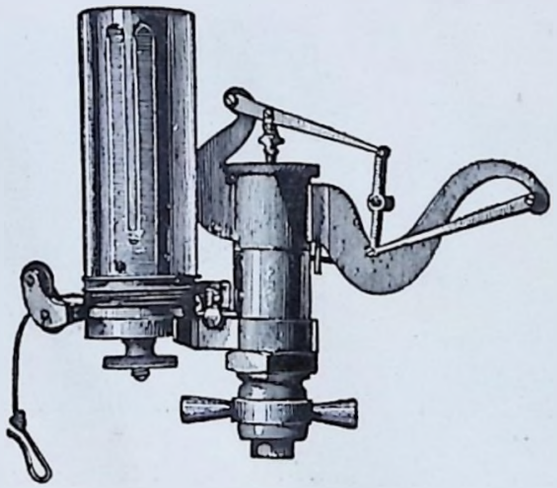
DIMENSIONS.

Size of Inlet.	½	¾	1	1½	2	Inch.
A Pattern	20/-	35/-	55/-			Each.
B Pattern	20/-	30/-	45/-			,,

Prices and particulars of Steam Separator fitted to B pattern sent on application.

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RICHARDS' STEAM-ENGINE INDICATOR.



RICHARDS' INDICATOR has this distinguishing feature, that the throw of the piston is only one-fourth that of the pencil, while the latter still moves in a vertical line.

The springs are made to ten scales, as follows:

No. 1.	{1 inch on the scale represents 1lb. pressure on the square inch, indicates from	—15	to + 10
,, 2.	¼ inch ,, ,, ,, ,,	—15	,, + 22
,, 3.	⅛ inch ,, ,, ,, ,,	—15	,, + 35
,, 4.	1/10 inch ,, ,, ,, ,,	—15	,, + 47
,, 5.	1/12 inch ,, ,, ,, ,,	—15	,, + 60
,, 6.	1/15 inch ,, ,, ,, ,,	—15	,, + 80
,, 7.	1/20 inch ,, ,, ,, ,,	Atmosphere	,, + 100
,, 8.	1/25 inch ,, ,, ,, ,,	,,	,, + 125
,, 9.	1/30 inch ,, ,, ,, ,,	,,	,, + 150
,, 10.	1/50 inch ,, ,, ,, ,,	,,	,, + 175

It will be necessary in sending orders to specify particularly the number of springs required, and the pressure they will have to indicate.

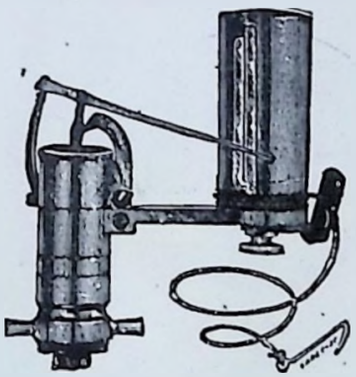
Spring No. 1 has been specially adapted to indicate the vacuum on a large scale in engines or pumps which work at low pressures. The springs showing pressures above 50lbs. will be made to indicate the vacuum also, when so ordered, and springs will be made also to any other scale desired.

PRICES.

Indicator, with one spring	£7 10 0
Indicator, with Detachment Motion	9 0 0
Extra Springs and Scales .. .. each	0 10 0
Paper Cylinder Spring	0 1 6
Arrangement for Oscillating Engines...	0 10 0
Metallic Paper ... . per packet	0 4 0
Extra Stop Cock	0 8 0

CROSBY STEAM ENGINE INDICATOR.

(PATENT.)



Suitable for Electric Light Engines, Steam Launches, Gas Engines, and Oil Engines, running at the highest speeds.

To adapt the Indicator to any pressure, springs are made to the following scale:—

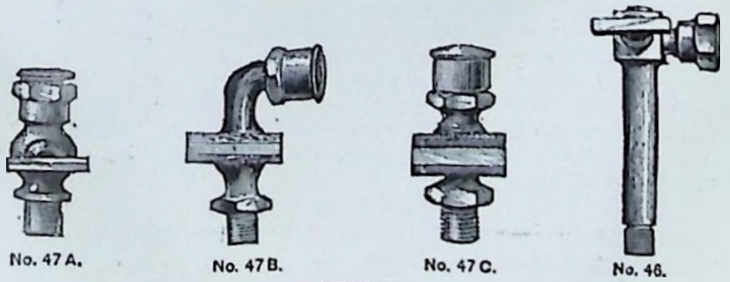
Nos. 4, 8, 10, 12, 16, 20, 24, 30, 40, 50, 60, 80, 100, 120, 150, 180.

In ordering, it is necessary to specify the number of springs required, and the pressure they have to indicate.

PRICES.

Indicator, nickel-plated, complete, with 1 Spring and Scale, 1 Cock, Tools, 50 sheets Metallic Paper, bottle of Oil, hank of Indicator Cord, and Book of Instructions, mounted in velvet-lined walnut Box	£9 0 0
Extra Springs and Scales... ... ... each	0 10 0
,, Cocks ... ... ,,	0 10 0
,, Three-way Cocks ... ... ,,	1 8 0
Metallic Paper ... ... per packet	0 4 0

INDICATOR COCKS.



No. 47A. No. 47B. No. 47C. No. 46.

PRICES.

No. 47A	Straight pattern	4/6 each.
,, 47B	Elbow ,, ...	10/- ,,
,, 47C	Straight ,, ...	8/- ,,
,, 46	Angle ,, ...	6/6 ,,

Patent Asbestos-packed Indicator Cocks can also be supplied.

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SPEED INDICATORS.

(PATENT.)

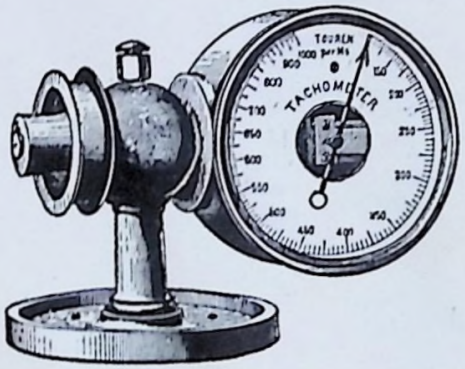


Fig. 11.

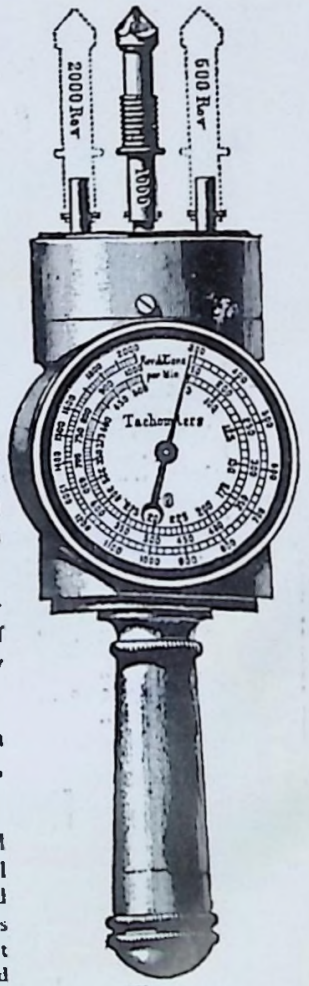


Fig. 12.

These Instruments differ from revolution counters by showing at a glance the **actual revolutions** per minute at which Engine, Dynamo, or other machinery is running, and they are adjusted for showing the **smallest variation** in speed.

Counters, while showing the number of revolutions or strokes during a certain time, do not indicate regularity of speed, which at one portion of the time may be considerably more or less than at another.

Fig 11 is for fixing in any position where it can be driven by a strap. It will accurately register all variations of speed, which in electric installations is most important.

Fig. 12 is for using by hand, the revolutions being counted upon the same principle as above. The three circles on dial correspond and indicate with the three spindles marked respectively 500, 1,000 and 2,000, so that for machines running under 500 revolutions per minute the centre point should be placed on right hand spindle, between 500 and 1,000 revolutions as shown, and if over 1,000 revolutions per minute, on the left hand spindle.

PRICES.

Fig. 11.	With 8-inch Dial, for strap driving	£7 10 0
,, 11A.	,, 6 ,, ,, ...	6 10 0
,, 12.	,, 4 ,, hand use	6 10 0

Figs. 11 and 11A can be fitted with maximum recorder at 10/- extra.

Fig. 12 is packed in leather case complete.

REVOLUTION COUNTERS.

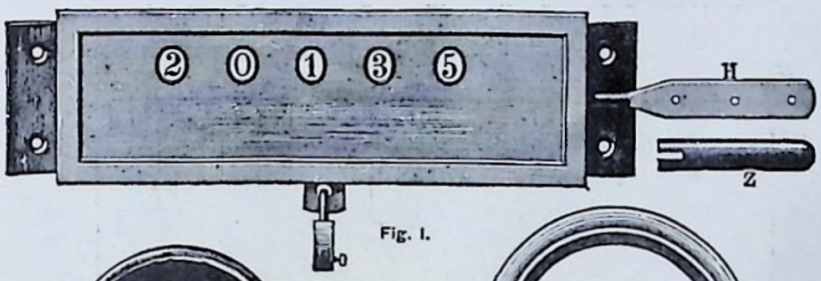


Fig. 1.

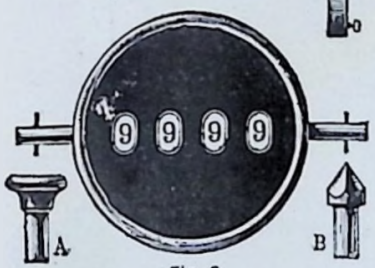


Fig. 6.

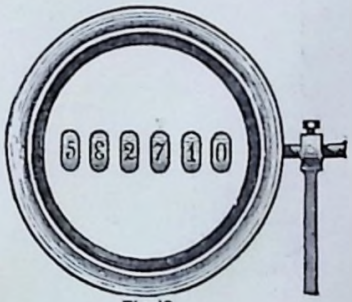


Fig. 10.

The above represent three useful instruments for counting the motion of Engines or any parts of machinery.

Fig. 1 is arranged for **reciprocating or rotary motions** in both directions, and, when properly set, cannot fail to indicate correctly. H is a lever to which a light wire rod should be attached direct to lever, giving **reciprocating motion** to rod, link, crosshead, or part of which the movements are required to be taken. Lever H must be regulated so as to work at an angle of not less than 60°. Cords or strings are unreliable owing to their liability to stretch. Z can be inserted into a hole at back of instrument, and will attach itself direct to pawl pinion, and by this the **rotations** of any desired part can be taken when coupled direct. This instrument can be set back to zero at any time.

Fig. 5 is similar to Fig. 1, but is arranged **for rotary counting only,** and is sent to work **right or left hand as ordered.** Figures cannot be set back.

Fig. 10 is a Counter to be actuated from any moving part attached to lever shown; the revolutions of a shaft may be indicated by a pin or set screw being fixed in end, so as to give eccentric motion to actuate lever.

Fig. 6 is a circular Rotary Counter, arranged to work **either right or left hand**; it cannot be set back. Connections A and B are for taking movements from pointed ends of spindles and centres respectively

PRICES.

Fig.	Action as Described.	Number of Figures on Dial.				
		3	4	5	6	7
1	Without Zero Adjustment. Each.	45/-	50/-	55/-	60/-	65/-
1A	With ,, ,, ,,	50/-	55/-	60/-	65/-	70/-
5	Without ,, ,, ,,	25/-	30/-	35/-	40/-	45/-
10	With ,, ,, ,,	70/-	75/-	80/-	90/-	105/-
6	Without ,, ,, ,,		25/-			
11	,, ,, ,, ,,				30/-	

Figures 6 and 11 are nickel-plated and fitted in case complete.

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ACL Doc 21509 · Page 28 of 298
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BELL'S ASBESTOS

SIGHT FEED LUBRICATOR.

No. 1 (PATENT).

Showing two Modes of Fixing.

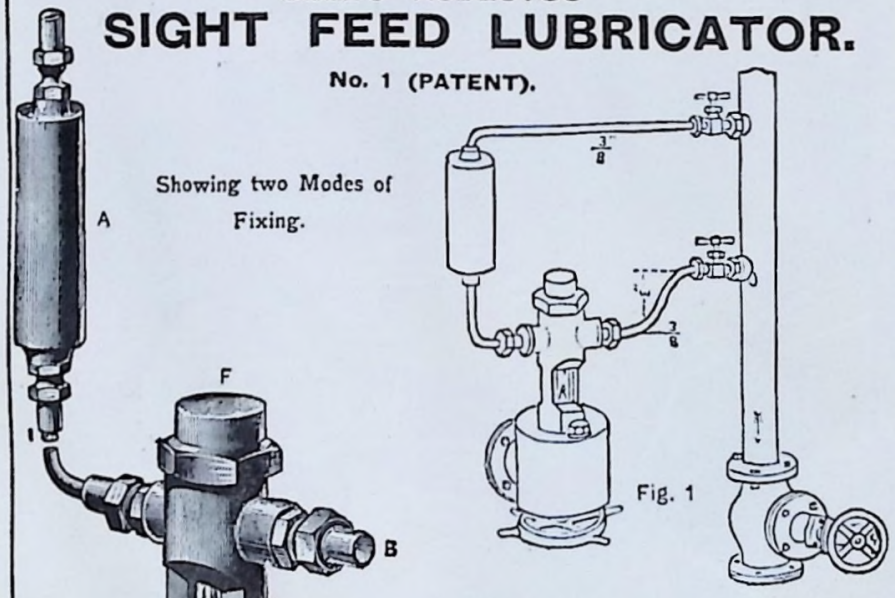


Fig. 2

Fig. 1

A Condenser.
B Oil Delivery Pipe.
C Supporting Flange.
D Oil-filling Plug.
E Glass Tube.
F Top Nut.
G Hand-wheel.
H Pointer.
I Connecting Pipe.

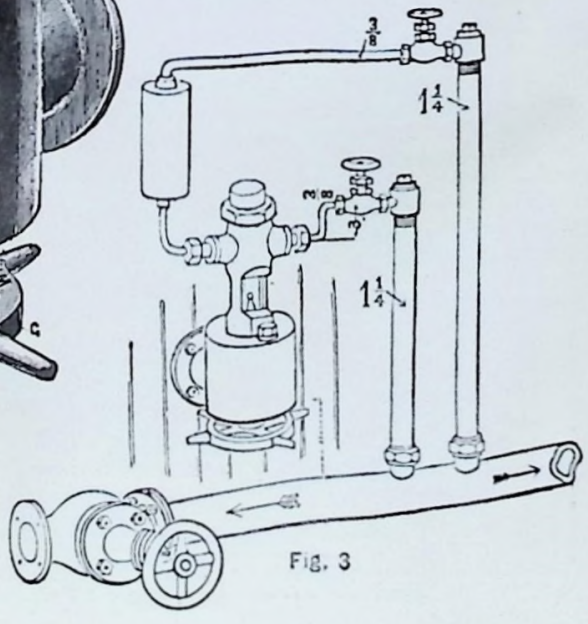


Fig. 3

Outlet B is supplied as shown in sketch (on right side); but, if desired, Condenser A and Outlet B can be reversed.

BELL'S ASBESTOS SIGHT FEED LUBRICATOR

No. 1 PATTERN

EFFECTS A CONSIDERABLE SAVING IN LUBRICANT.

Suitable for every description of Stationary and Marine Engines, Pumps, &c.

This Lubricator, owing to its **simplicity, efficiency,** and **freedom from working parts,** should recommend itself to all. It is worked by water displacement, and **one wheel regulates** all motions; and as only one operation can be effected at a time, accidents to operator, as often happen with other Lubricators, are with this impossible. The feed of Lubricator can be regulated to give from **one drop to any number** per minute, sufficient for the largest Engines in use. The Lubricator being always cool, the lubricant retains its full lubricating properties.

This system of Lubricating Cylinders is acknowledged by all experienced Engineers to be the most advantageous and economical. As friction is reduced to a minimum, the life of piston and cylinder is prolonged, and the uniform working of Engine ensured, and by perpetual lubrication full power is maintained.

PRICES.

Highly finished in best Gun Metal.

Capacity	½	1	2	4	Pints.
Complete with Condenser and Unions ...	90/	110/-	142/-	195/-	each
Special Asbestos Valves for all sizes ...				0/	..

Copper Tubing, Spare Glasses and Rings, and Instruction Card sent with each Lubricator.

Directions for Fixing and Working.

Lubricator may be fixed in any convenient position, at a moderate distance from steam-pipe. Attach to wall, standard, or bracket at Flange **C**. Connections should be on Boiler side of Stop Valve. Connecting Pipe **I**, for attaching Condenser **A**, **is sent of proper length,** to give requisite head of **water.** Oil delivery pipe from **B** should be raised **3 inches** to prevent steam getting into glass and breaking it. Two connections to Steam Pipe are recommended as shown in Figs. 1 and 3.

To Fill.—Turn wheel **G** where engraved **Fill** under pointer **H**, unscrew plug **D**, fill Lubricator, secure plug **D**, then half-fill condenser **A** with **water**; now turn wheel **G** quickly to dot before **water**, then gradually until water is seen rising in glass **E**; when full, open valves on Steam Pipe—**Steam supply first.**

To Feed.—Turn wheel **G** slowly towards **Feed,** and regulate as required.

To Drain.—When Lubricator is empty, turn wheel **G** to **Drain,** loosen plug **D** to admit air, and slacken cap-nut under wheel.

To Re-fill.—**Proceed as before,** unless glass **E** is dirty, then turn to **Feed.**

To Clean Glass.—Turn wheel **G** slowly to **water,** or unscrew top-nut **F** and insert a rag on a stick, replace nut **F** and fill glass **E** with water.

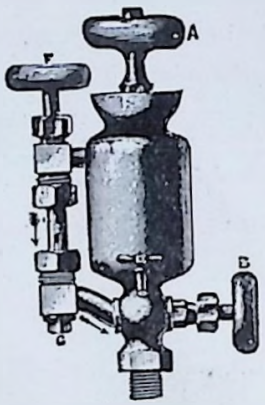
To Fix Glass.—Turn wheel **G** to either dot between motions, shut off valve on Steam Pipe, take off nut **F**, unscrew gland within; after replacing new glass with rings, **fill** with **water,** open valve and re-start.

To Shut-off.—Before steam is shut off fill glass **E** with water, to clear oil from rise in pipe; this prevents oil sucking back, and so making glass dirty.

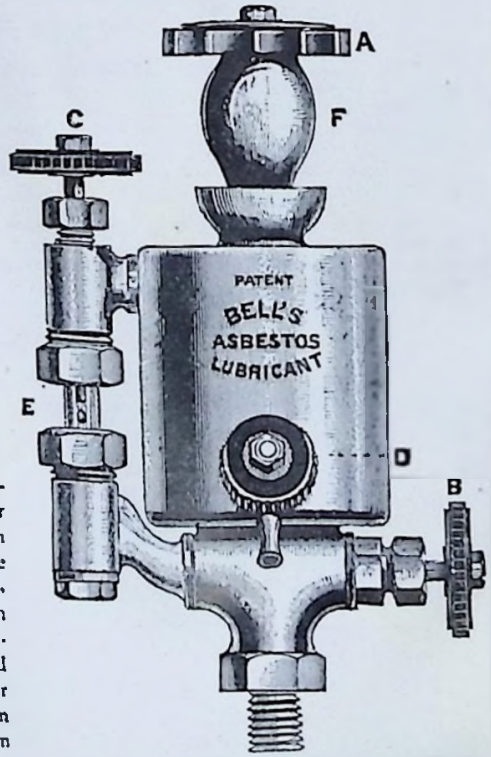
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BELL'S ASBESTOS SIGHT-FEED LUBRICATOR.

No. 2 IMPROVED.



Old Pattern.



This Improved Sight-Feed Lubricator is made of best gun-metal for heavy pressures of steam, and, although having but one connection, it is reliable in its action, and embraces many advantages over any other Single Connection Lubricator. It works by **water displacement**; the steam being admitted by valve **B**, and carried into Condenser **F**, from which the condensed steam falls through an attached tube to bottom of Lubricator, thereby ensuring the drops of oil being free of water. The oil drops of its own gravity, at regular intervals, through sight glass **E**; the requisite number of drops per minute being obtained by regulating valve **C**. When empty of oil, the water is drained off by valve **D**.

Having neither separate condenser, coils, nor connections, the simplicity of this Lubricator recommends it for small Engines, Pumps, &c.

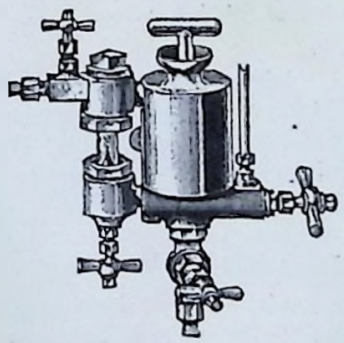
PRICES.

Capacity.	¼	½	1	1½	2	4	8	Pints.
Improved Lubricator.	40/-	50/-	70/-	90/-	110/-	200/-	250/-	Each.
Old Pattern do.		42/-	63/-	84/-	100/-			,,
Brackets for fixing to vertical pipe	7/6	7/6	10/6	10/6	10/6	15/-	15/-	,,
Ends are screwed.	½	½	¾	¾	1	1¼	1¼	Inch Gas

Spare Glasses and Rings and Instruction Tablet are sent with each Lubricator.

BELL'S ASBESTOS PATENT SIGHT-FEED LUBRICATOR.

No. 3 PATTERN.





This Lubricator has been designed, and is most carefully constructed, to meet the requirements of those wanting a first-class article.

It will work at high pressure without the risk of the joints or other parts giving out.

The Coil Condenser is made of 17-ft. best solid drawn copper tube.

The working parts and all valves are made of carefully-mixed bronze

Suitable for Land or Marine Engines.

Each Lubricator is thoroughly tested before being sent out.

PRICES, including Coil Condenser.

½-pint capacity	£5	0	0	each.
1-pint ,, ...	6	0	0	,,
2-pint ,, ...	8	0	0	,,

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SIGHT-DROP BEARING LUBRICATOR.

For Use on Dynamos and High-speed Engines and Bearings.



The advantages of this Cup are:—

Perfect lubrication by having a definite quantity of oil fed automatically to the bearing.

The drops of oil, as shown in sketch can be regulated to the exact quantity required for lubricating bearing or rubbing surfaces to which it is applied.

When this lubricator is once adjusted to the required feed it can be stopped and started again without interfering with the adjustment, which is necessary with all other lubricators of this class, which have to be re-adjusted each time they are started.

Directions for Working

When the cam lever **C** is in a vertical position as shown, regulate the feed by the milled head **A**, which, when being screwed up, opens a cone valve at bottom of cup.

When the required number of drops per minute are obtained, screw down lock-nut **B**.

To stop the feed, place the lever **C** in a horizontal position, and to start feeding again simply raise **C** as before.

If a large quantity of oil is required for a moment when starting machinery pull **C** up so as to open regulating valve, and a stream of oil will flow to bearing.

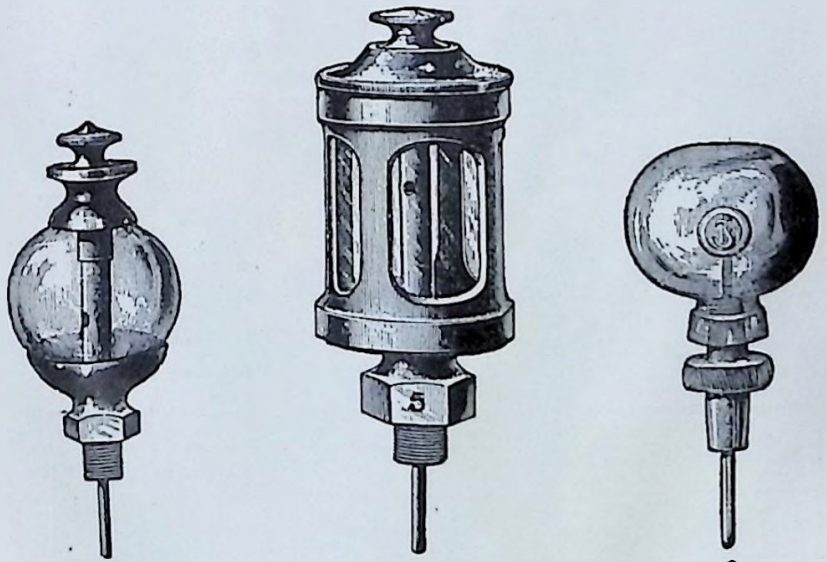
DIMENSIONS AND PRICES.

No.	Glass. Diameter.	Glass. Height.	Shank Screwed.	Price.
1	1⅞ inch	1¼ inch	¼ inch Gas thread	8/- each.
2	2⅛ ,,	2⅛ ,,	⅜ ,, ,,	10/- ,,
3	2⅜ ,,	2⅜ ,,	⅜ ,, ,,	12/- ,,
4	2½ ,,	2½ ,,	½ ,, ,,	15/- ,,
5	3 ,,	3 ,,	½ ,, ,,	20/- ,,
6	3½ ,,	3½ ,,	¾ ,, ,,	25/- ,,

New Glasses can be supplied if required.

NEEDLE LUBRICATORS.

These Lubricators are of Flint Glass, mounted in best Gun Metal of high finish. No Cement is used in making Joints.



A.—MARINE PATTERN.

No	1	2	3	4	5	6	7	8	
Diameter of Cylinder	⅝	¾	1	1¼	2	2½	3	4	inch
Shank Screwed ...	5/16	5/16	⅜	½	⅜	⅜	¾	¾	,, Gas
Capacity	1/16	⅛	¼	1	2	5	8	20	ozs.
Price	2/8	2/11	3/3	4/6	6/-	8/3	11/3	15/-	each.

B.—CRANK PATTERN.

No.	0	1	2	3	4	5	
Diameter of Globe...	1	⅝	2	2½	3	3½	inch
Shank Screwed ...	1/16	⅛	¼	¼	⅜	⅜	,, Gas
Price	2/5	2/6	2/9	3/2	3/9	4/6	each.

New Glass Cylinders or Globes for either of above can be supplied by stating diameter and length required.

C.—GLASS NEEDLE LUBRICATORS.

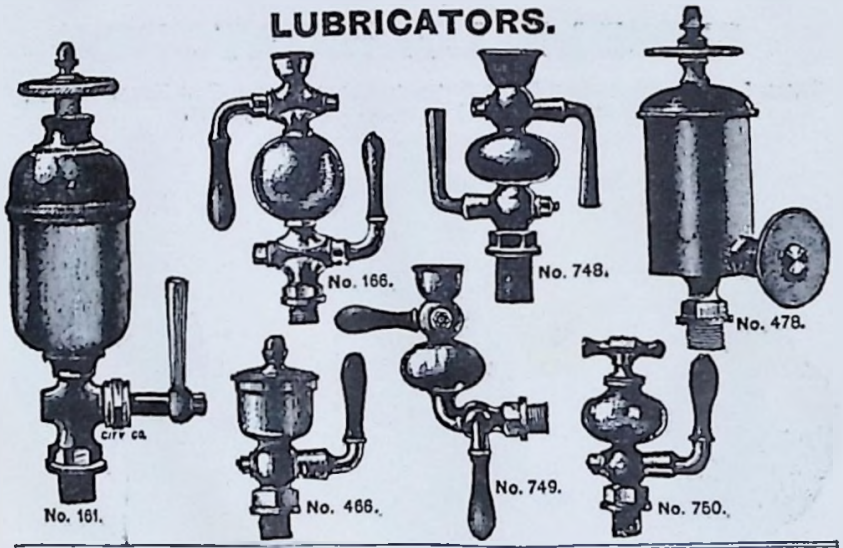
Made in Flint Glass with Wooden Stoppers.

PRICES.

Ordinary Sizes Nos. 1 to 10	4/6 per doz.
Larger Sizes Nos. 01, 0, and 00 ...	7/6 per doz.

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LUBRICATORS.



No. 161. Suet Lubricator.	No.	0	1	2	3	4	5	5½	6	
	Diam. of Cup	1½	2	2½	3	3½	4½	5	6	inches.
	Price	11/6	16/3	23/-	36/-	45/-	55/-	75/-	120/-	each.
No. 478. Suet Lubricator.	Diam.	1½	1¾	2	2½	3	3½	4	5	6	inches.
	Price	8/6	10/-	11/6	15/-	20/6	25	30/-	40/-	50/-	each.

DOUBLE AND SINGLE GREASE CUPS.

Size.	1	1½	2	2½	3	3½	4	inches.
No. 166		7/-	8/6	11/-	13/6	17/6	22/6	each.
No. 748	3/9	4/6	5/9	9/-	12/6	16/6	19/6	"
No. 749		5/6	6/7	10/6	16/6			"
No. 466	2/9	5/3	8/6	11/3	15/-			"
No. 750	2/9	3/9	5/6	7/6	10/-			"

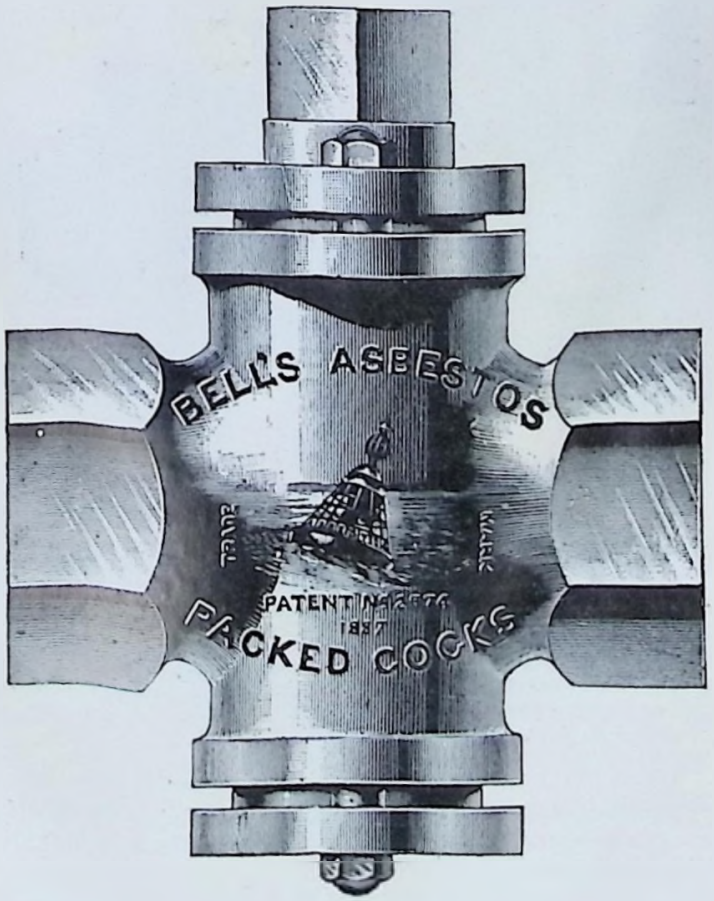
OIL SYPHONS.



Size.		¼	1	1¼	1½	1¾	2	2½	3	inches.
No. 39	Hinged Lid	11/6	13/6	33/-	37/-	45/-	53/-	66/-		per doz.
No. 34	Sliding Lid		14/9	14/9	21/9	28/6	37/-	55/6		"
No. 41	Spring Lid		14/9	20/-	30/-	37/-	46/6			"
No. 33	Screwed Lid	11/6	13/6	14/9	21/9	28/6	37/-	55/6		"
No. 755	Open Top	6/-	7/6	10/6	14/6	14/6	28/6	28/6	48/-	"
No. 8	Spring Top		15/-	20/-	30/-	37/-	46/6			"
No. 752	Sliding Lid	11/6	13/6	14/9	22/-	28/6	37/-	64/-	96/-	"

BELL'S ASBESTOS PACKED COCKS AND WATER GAUGES.

(PATENT.)



Made in Gun Metal, Cast Iron, and Crucible Cast Steel.

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BELL'S ASBESTOS PACKED COCKS.

(PATENT.)

SECTIONS.

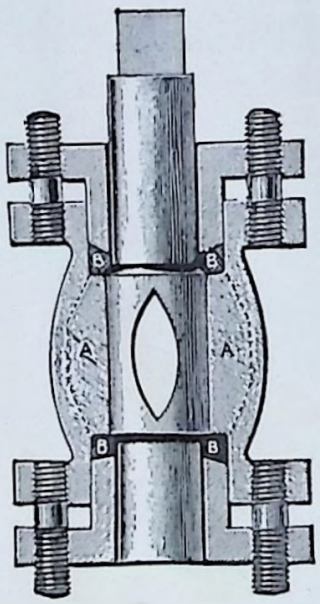


Fig. 1

A Metal Projections on Shell.

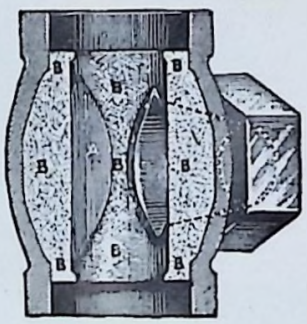


Fig. 2

B Asbestos Fibre Packing.

Fig. 1 is sectional elevation with plug in position, Fig. 2 is a half-section of shell cut at an angle. Parts marked A are metal projections bored to the diameter of plug, and on to which the plug turns when the cock is shut off, so that, whether the cock is open or shut, the Asbestos Packing has no chance of springing out of its place.

Parts marked B show the Asbestos Packing, and by formation of the grooves it will be seen that in screwing down the glands the Asbestos is forced up to the plug; metal friction cannot occur as the plug is parallel, and plug cannot stick.

By removal of the gland, fresh Asbestos Fibre can be added.

Bell's Patent Asbestos Packed Cocks and Water Gauges, introduced by us some years ago, are now so well known, and their reputation so firmly established, as to need little explanation.

Independent of supplying a cock or water gauge, which does not require grinding, and in which there is no metal to metal contact, we cover by our patents a system of adjusting the Asbestos Packing under pressure to take up a leakage which may occur.

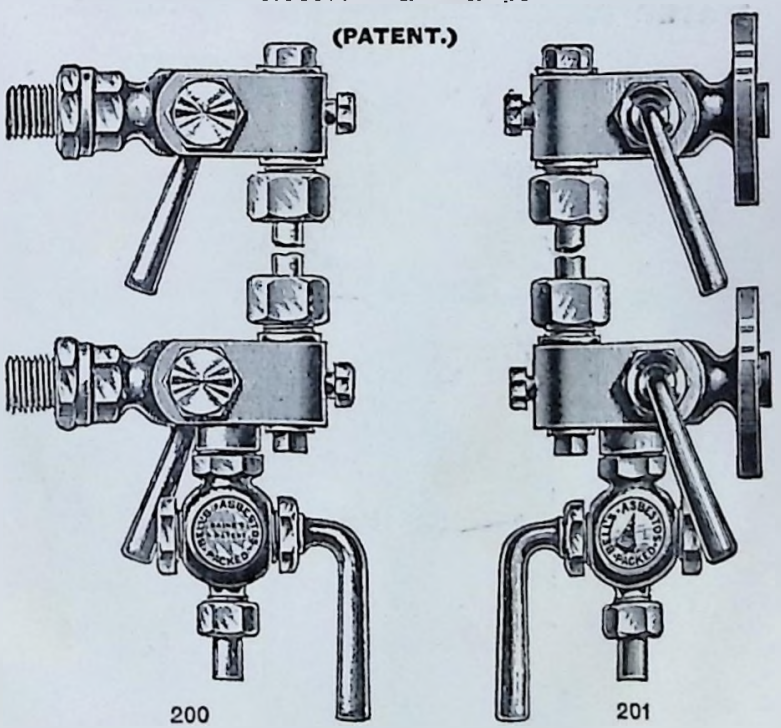
To intending purchasers we can give reference to firms in their district who are using these fittings, as they are working all over the World.

NOTICE IS HEREBY GIVEN:
That the Patent Rights will be rigorously upheld.

BELL'S ASBESTOS PACKED

WATER GAUGES.

(PATENT.)



200 201

Our Improved Automatic Valve placed above the Horizontal Water-way in all sizes above 7/16 in., ensures the instant stoppage of water-flow if glass breaks. This can be removed without disturbing the Tail Cock.

PRICES.

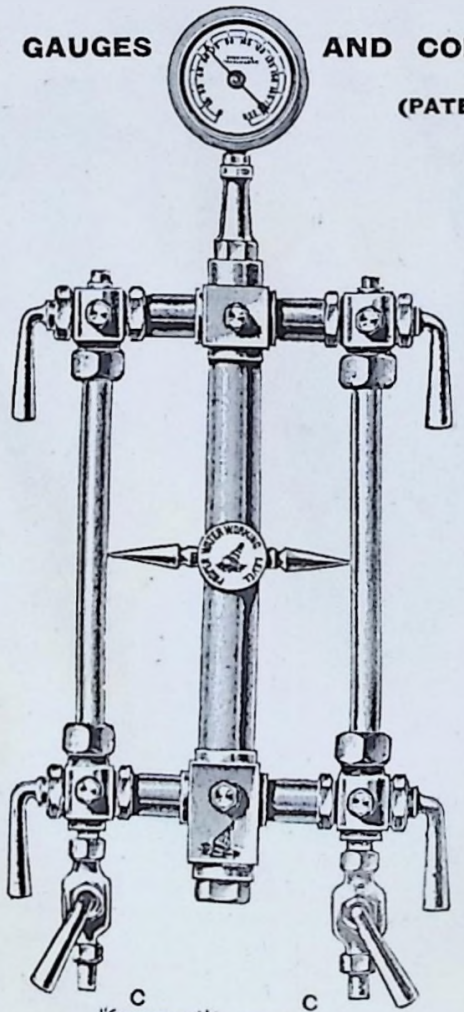
No.	Made of	For attaching to Boiler.	Diameter of Glass. 7/16	1/2	5/8 or 3/4	7/8 or 1	Inch.
200	Gun Metal (polished)	Screwed	35/-	40/-	45/-	55/-	per set.
201	" "	Flanged	40/-	45/-	50/-	60/-	"
200H	" " Extra heavy pattern	Screwed	—	45/-	55/-	—	"
201H	" " " " "	Flanged	—	50/-	60/-	—	"
202	Cast Iron	Screwed	—	35/-	40/-	50/-	"
203	" "	Flanged	—	40/-	45/-	55/-	"
Nos. 200 & 202 / 200H & 202H	are screwed for iron pipe		1/2 in.	3/4 in.	1 in.	1 in.	Gas.
Nos. 201 and 203	have Flanges		3 in.	3 1/2 in.	4 in.	4 1/2 in.	Dia.
Nos. 201H and 203H	" "		—	4 in.	4 1/2 in.	4 1/2 in.	Dia.

Non-Conducting Handles for either pattern, extra 7/- per set.
In ordering state No. and Size. Gun Metal Handles are sent unless ordered otherwise.
All Cast Iron Cocks have Barffed Plugs to prevent rust.

BELL'S ASBESTOS PACKED

WATER GAUGES AND COLUMNS.

(PATENT.)



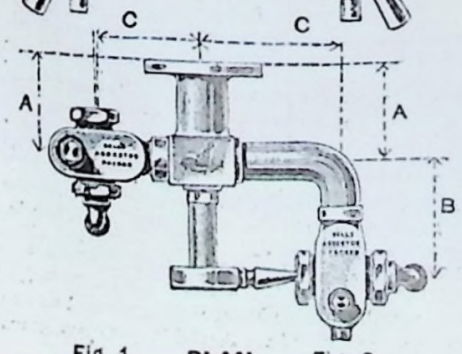
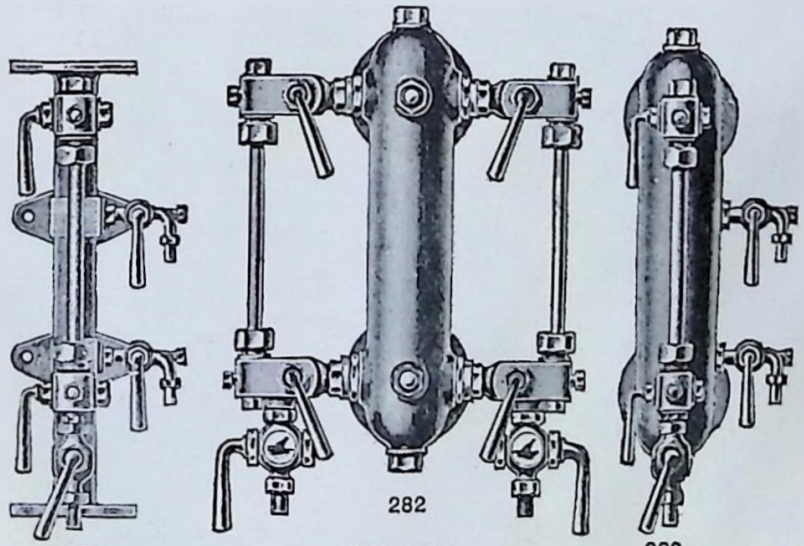


Fig. 1 PLAN Fig. 2

BELL'S ASBESTOS PACKED

WATER GAUGES AND COLUMNS.

(PATENT.)



PRICES.

No. 280. **Gun Metal**, massively made, and mounted with two sets No. 200 Water Gauges, Fig. 1, and connection for Pressure Gauge ... ... per set 180/-

Do. do. Fig. 2 ... ... ,, 185/-

No. 281. **Gun Metal**, mounted with one set No. 200 Water Gauges, and two No. 217 Try Cocks, with flanges at either back or top and bottom as shown, for attaching to boiler ... ... ,, 140/-

No. 282. **Cast Iron Column**, with Gun Metal Cleaning Plugs, and two sets No. 200 Water Gauges mounted, and flanged at back for attaching to boiler ... ... ,, 120/-

No. 283. **Cast Iron Column**, same as No. 282, but with one set No. 200 Water Gauges and two No. 217 Try Cocks attached ... ... ,, 105/-

Indicator as shown on No. 280 ... ... each 15/-

Length over all can be made to suit existing dimensions at slightly advanced prices, but stock patterns are as under :

MEASUREMENTS OF No. 280 COLUMN.

Measurement at	A	B	C	Centres.
Fig. 1	3½ in.	5½ in.	4 in.	14 in. and 19½ in.
Fig. 2	3½ in.	—	5½ in.	do.

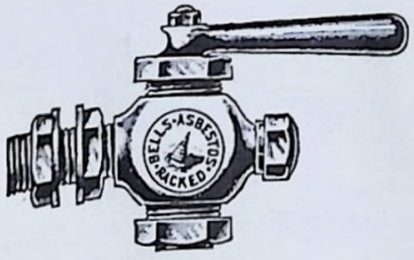
The above prices do not include Pressure Gauge.

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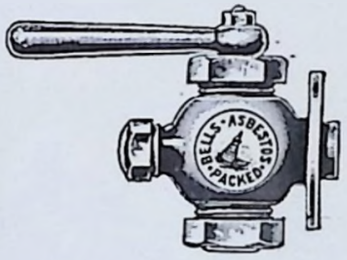
BELL'S ASBESTOS PACKED

BOILER AND CYLINDER COCKS.

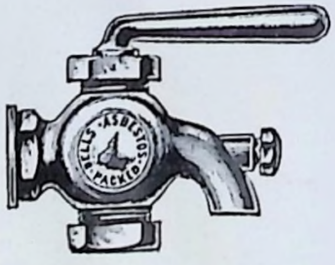
(PATENT.)



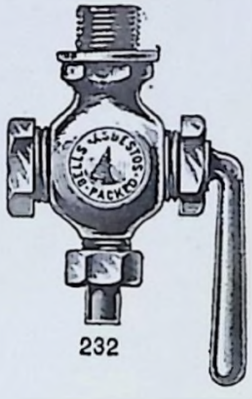
229



230



231



232

PRICES.

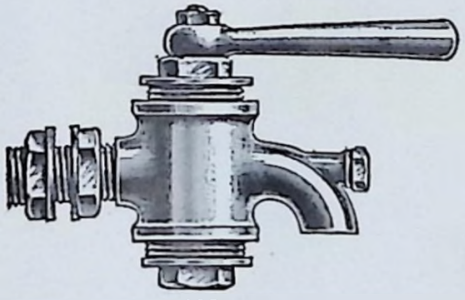
No.	Made of	For Attaching.	Diameter. 7/16 in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.
229	Gun Metal (polished)	Screwed ...	8/-	8/9	9/6	9/6	15/-	15/-
230	" " "	Flanged ...	10/6	11/3	12/-	12/-	17/6	17/6
231	" " "	Female End ...	8/6	9/6	11/-	11/-	16/-	16/-
232	" " "	Screwed Water Gauge Tail Cock ...	9/-	9/6	11/-	11/-	14/-	14/-
All with Screwed Ends are ... (Iron Pipe size)			⅜ in.	½ in.	¾ in.	¾ in.	1 in.	1 in.
All with Flanges are ... ... (Diameter)			3 in.	3½ in.	4 in.	4 in.	4½ in.	4½ in.

Non-conducting Handles extra 2/6 each; and unless these are specified, Gun Metal are sent.
All Union Nuts will be made for Copper Pipe unless ordered otherwise.

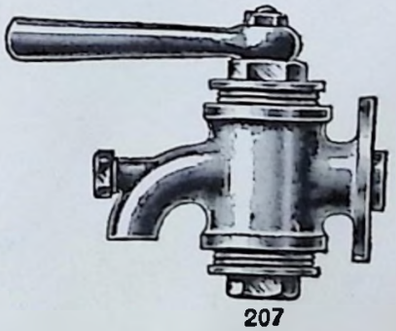
BELL'S ASBESTOS PACKED

BOILER AND CYLINDER COCKS.

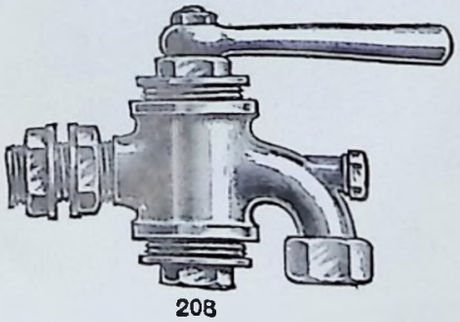
(PATENT.)



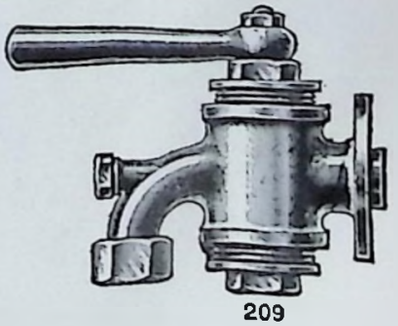
206



207



208



209

PRICES.

No.	Made of	For Attaching	Diameter. 7/16 in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.
206	Gun Metal (Polished)	Screwed	8/6	9/6	11/-	11/-	16/-	16/-
207	" "	Flanged	11/-	12/-	13/6	13/6	18/6	18/6
208	" "	Screwed (with Union)	11/-	12/-	13/6	13/6	18/6	18/6
209	" "	Flanged " "	13/6	14/6	16/-	16/-	21/-	21/-
All with Screwed Ends are ... (Iron pipe size)			⅜ in.	½ in.	¾ in.	¾ in.	1 in.	1 in.
All with Flanges are ... ... (Diameter)			3 in.	3½ in.	4 in.	4 in.	4½ in.	4½ in.

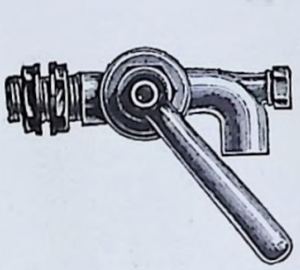
Non-Conducting Handles extra 2/6 each, and unless these are specified Gun Metal are sent.
All Union Nuts will be made for Copper Pipe unless ordered otherwise.

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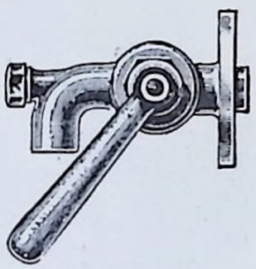
BELL'S ASBESTOS PACKED

BOILER AND CYLINDER COCKS.

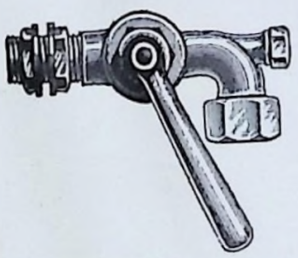
(PATENT.)



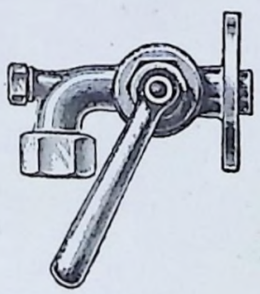
213



214



215



216

PRICES.

No.	Made of	For Attaching.	Diameter.					
			5/16 in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.
213	Gun Metal (Polished)	Screwed	8/6	9/6	11/-	11/-	16/-	16/-
214	,, ,, ...	Flanged	11/-	12/-	13/6	13/6	18/6	18/6
215	,, ,, ...	Screwed (with Union)	11/-	12/-	13/6	13/6	18/6	18/6
216	,, ,, ...	Flanged ,, ,,	13/6	14/6	16/-	16/-	21/-	21/-
All with Screwed Ends are ... (Iron Pipe size)			⅜ in.	½ in.	¾ in.	¾ in.	1 in.	1 in.
All with Flanges are ... ... (Diameter)			3 in.	3½ in.	4 in.	4 in.	4½ in.	4½ in.

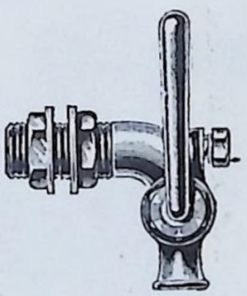
Non-conducting Handles, extra 2/6 each, and unless these are specified Gun Metal are sent.

All Union Nuts will be made for Copper Pipe unless ordered otherwise.

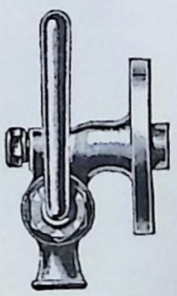
BELL'S ASBESTOS PACKED

BOILER AND CYLINDER COCKS.

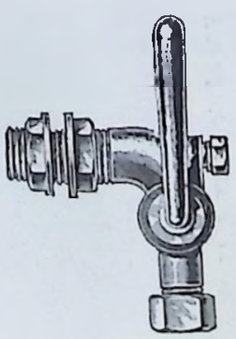
(PATENT.)



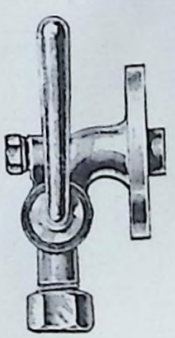
217



218



219



220

PRICES.

No.	Made of	For Attaching.	Diameter.				
			½ in.	⅝ in.	¾ in.	⅞ in.	1 in.
217	Gun Metal (polished)	Screwed	9/6	11/-	11/-	16/-	16/-
218	,, ,, ,,	Flanged	12/-	13/6	13/6	18/6	18/6
219	,, ,, ,,	Screwed (with Union)	12/-	13/6	13/6	18/6	18/6
220	,, ,, ,,	Flanged ,, ,,	14/6	16/-	16/-	21/-	21/-
All with Screwed Ends are ... (Iron Pipe Size)			½ in.	¾ in.	¾ in.	1 in.	1 in.
All with Flanges are ... ... (Diameter)			3½ in.	4 in.	4 in.	4½ in.	4½ in.

Non-conducting Handles, extra 2/6 each; unless so specified Gun Metal are sent.

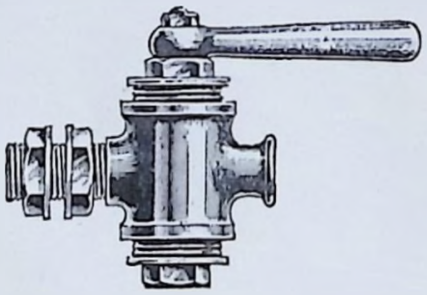
All Union Nuts will be made for Copper Pipe unless ordered otherwise.

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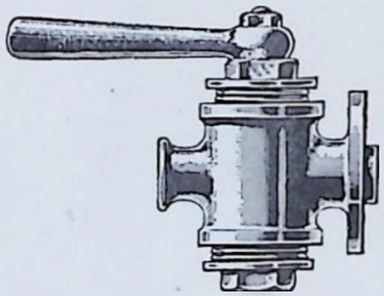
BELL'S ASBESTOS PACKED

BOILER AND CYLINDER COCKS.

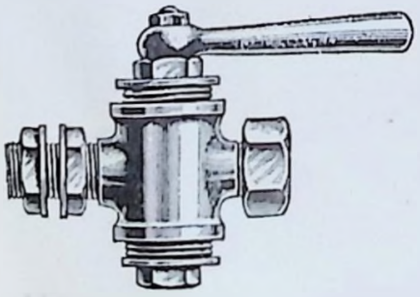
(PATENT.)



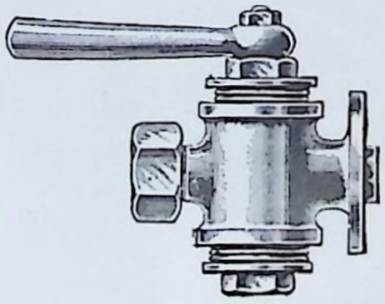
221



222



223



224

PRICES.

No.	Made of	For Attaching.	Diameter.					
			7/16 in	½ in.	⅝ in.	¾ in.	⅞ in.	1 in
221	Gun Metal (Polished)	Screwed	8/-	8/9	10/-	10/-	15/-	15/-
222	,, ,,	Flanged	11/6	12/9	14/-	14/-	18/6	18/6
223	,, ,,	Screwed (with Union)...	11/6	12/9	14/-	14/-	18/6	18/6
224	,, ,,	Flanged	12/-	13/3	15/-	15/-	20/-	20/-
All with Screwed Ends are ... ... (Iron Pipe size)			⅜ in.	½ in.	¾ in.	¾ in.	1 in.	1 in.
All with Flanges are ... ... (Diameter)			3 in.	3½ in	4 in.	4 in.	4½in	4½in

Non-conducting Handles, extra 2/6 each, and unless these are specified Gun Metal are sent.

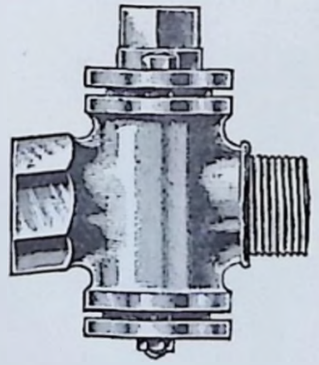
All Union Nuts will be made for Copper Pipe unless ordered otherwise.

Any of the above in **Cast Iron** have Barffed Plugs to prevent rust, at same price.

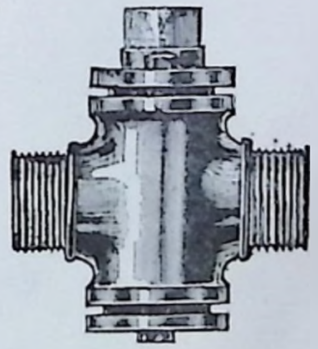
BELL'S ASBESTOS PACKED

MAIN COCKS.

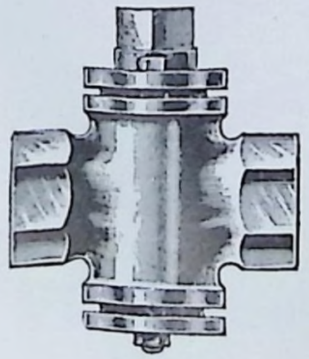
(PATENT.)



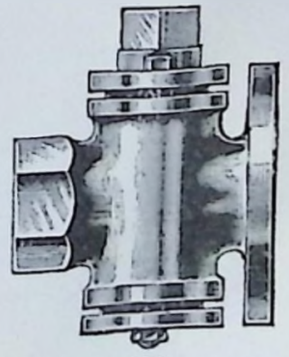
235



236



237



238

PRICES.

No.	Made of	For Attaching.	Diameter in inches.									
			¼	⅜	½	¾	1	1¼	1½	2	2½	3
235	Gun Metal ..	(Screwed, Male and Female ...)	...	...	5/6	8/3	12/6	22/-	27/-	...	...	...
236	,, ,, ...	Screwed, Male	...	...	5/6	8/3	12/6	22/-	27/-	...	...	...
237	,, ,, ...	,, Female ,,	3/6	4/-	5/9	8/6	13/-	22/6	27/6	45/-	80/-	110/-
238	,, ,, ...	(Flanged, and Female Screwed)	...	...	7/-	10/6	16/-	28/6	35/-	55/-	87/6	117/6
All with Flanges are ... (diameter in inches)			...	...	3½	3¼	4½	5	5½	6	7	8
All with Screwed Ends are screwed to Iron Pipe standard ... ... inches			¼	⅜	½	¾	1	1¼	1½	2	2½	3

Gun Metal or Malleable Spanners supplied at small extra cost.

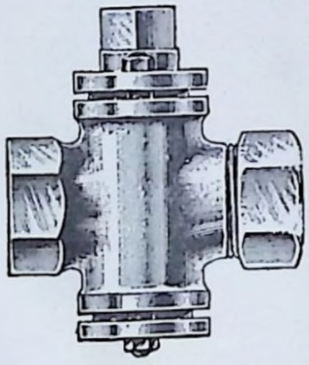
No. 237 Pattern recommended wherever possible, as the male thread shown in 235 and 236 is weak unless Bore is considerably reduced.

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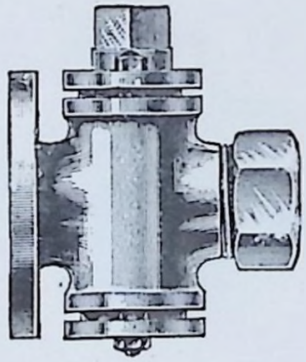
BELL'S ASBESTOS PACKED

UNION AND ANGLE COCKS.

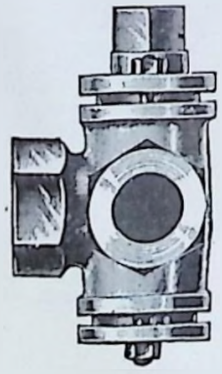
(PATENT.)



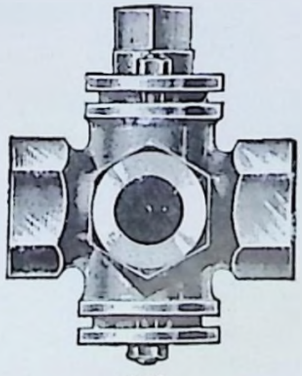
239



240



241



242

PRICES.

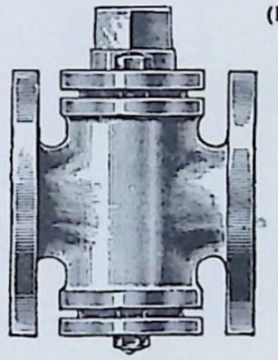
No.	Made of	For Attaching.	¼ in.	⅜ in.	½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.
239	Gun Metal	Screwed & Union	5/-	5/9	7/9	11/6	16/6	27/6	35/-	54/-
240	do.	Flanged & do. ...	...	...	10/-	13/6	19/-	33/-	41/-	62/6
241	do.	Angle Screwed .	...	...	...	10/-	12/-	26/6	32/6	52/6
242	do.	Threeway do. ...	...	...	...	12/6	17/6	30/-	45/-	67/6
All with Flanges are ... (Diameter)			...	...	3½ in.	3¼ in.	4½ in.	5 in.	5½ in.	6 in.
All with Screwed Ends			¼ in.	⅜ in.	½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.

All Screwed Ends are to Iron Pipe Standard.
All Unions made for Iron Pipe as shown in Fig. 239 unless ordered otherwise.
All above are made full area to their size.

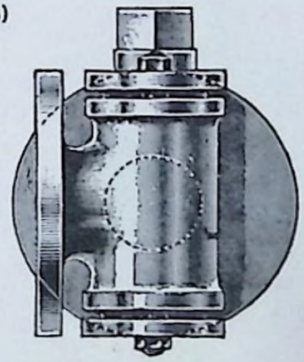
BELL'S ASBESTOS PACKED

MAIN AND ANGLE COCKS.

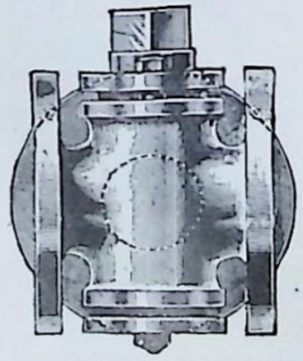
(PATENT.)



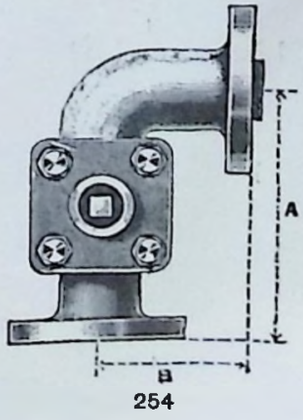
251



252



253



254

PRICES.

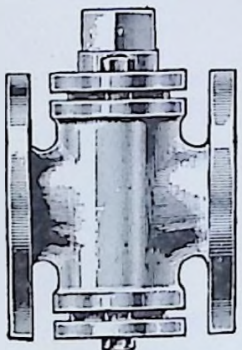
No.	Made of	For Attaching.	½ in.	¾ in.	1 in.	1¼ in	1½in.	2 in.	2½in.	3 in.
251	Gun Metal	Flanged	9/-	11/-	16/6	30/-	37/6	57/6	90/-	120/-
252	Do.	Flanged Angle 2-way	...	12/6	19/-	33/-	42/6	63/6	100/-	122/6
253	Do.	Do. do. 3-way	...	16/6	25/-	42/6	52/6	77/6	120/-	160/-
254	Do.	Flanged Elbow ...	...	...	21/-	35/-	45/-	67/6	105/-	130/-
All with Flanges are ... ... (Diameter)			3½in.	3¾in	4½in.	5 in.	5½in.	6 in.	7 in.	8 in.

Gun Metal or Malleable Spanners supplied. See Index.
All above are made full to their size.

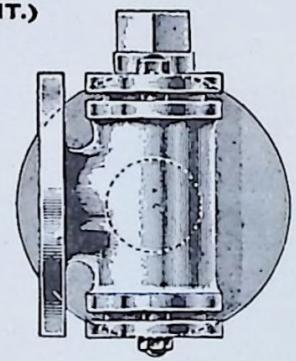
BELL'S ASBESTOS PACKED

IRON MAIN AND ANGLE COCKS.

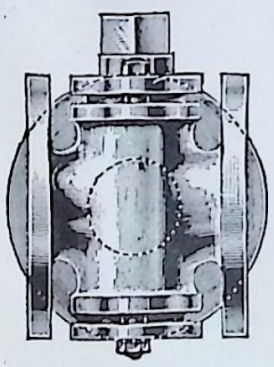
(PATENT.)



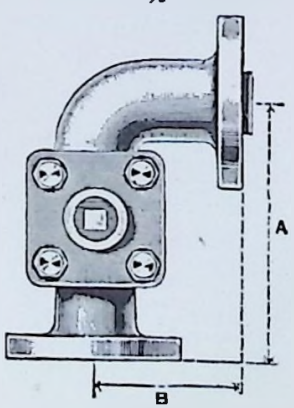
251½.



252½.



253½



254½

PRICES.

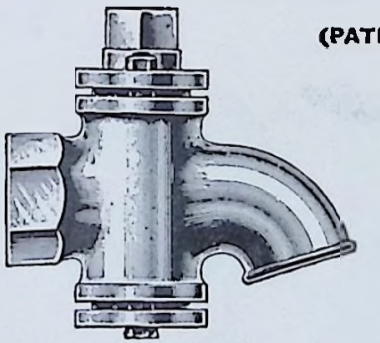
No.	Made of	For attaching.	Diameter in inches. ½	¾	1	1¼	1½	2	2½	3
237½	All Iron ...	Screwed Female	4/6	6/-	8/-	12/-	15/-	25/-	45/-	55/-
237M	Iron & G.M. Plug	Do.	5/-	7/6	10/-	15/-	10/-	33/6	56/6	68/6
251½	All Iron ...	Flanged ...	...	6/6	8/9	13/-	16/-	26/-	46/-	56/-
251M	Iron & G.M. Plug	Do.	...	8/3	11/-	16/6	20/-	32/9	57/6	70/-
252½	Iron	Flanged Angle	...	9/-	11/6	16/-	20/-	30/-	50/-	60/-
252M	Iron & G.M. Plug	Do.	...	11/3	14/3	20/-	25/-	37/6	62/6	75/-
253½	All Iron ..	Flanged 3-way ..	...	9/6	13/6	20/-	25/-	37/6	67/6	75/-
253M	Iron & G.M. Plug	Do.	...	11/6	17/-	25/-	31/-	46/3	80/6	93/-
254½	All Iron ...	Flanged Elbow	...	...	12/6	17/6	21/-	32/-	52/6	62/6
254M	Iron & G.M. Plug	Do.	...	...	16/-	21/6	26/6	40/-	65/9	78/6
	All with Flanges are (diameter in inches)		3½	3¾	4½	5	5½	6	7	8

All No. 237½ Screwed Ends are to Iron Pipe standard.
All Iron Cocks marked with prefix ½ have Barffed Plugs to prevent rust.
All Cocks with prefix M have Cast-Iron Bodies with Gun-Metal Plugs.

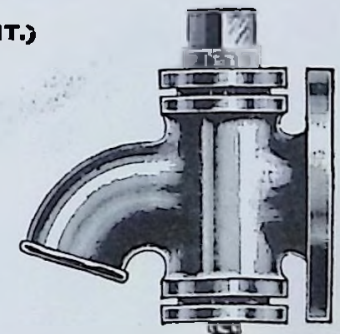
BELL'S ASBESTOS PACKED

BLOW-OFF AND FIRE COCKS.

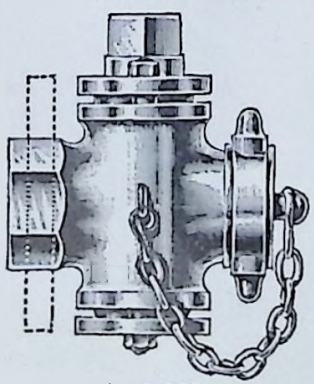
(PATENT.)



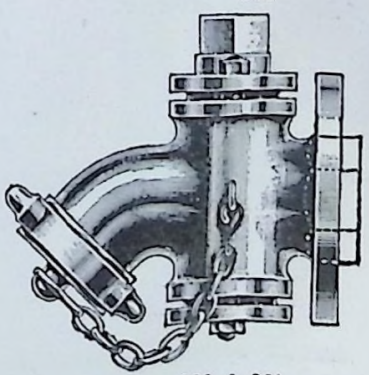
258



259



262 & 263



260 & 261

PRICES.

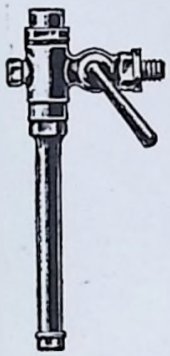
No.	Made of	For Attaching.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.
258	Gun Metal	Screwed Female each	8/6	13/-	23/-	28/6	46/-	82/6	112/6
258½	Cast Iron	,, ,, ,,	6/-	8/-	12/-	15/-	25/6	46/-	56/-
259	Gun Metal	Flanged ... ,,	11/-	16/6	28/-	35/-	55/-	87/6	117/6
259½	Cast Iron	,, ... ,,	6/6	8/9	13/-	16/-	26/-	46/-	56/-
260	Gun Metal*	,, ... ,,	...	...	...	...	63/6	95/-	...
260½	Cast Iron*	,, ... ,,	...	...	...	...	33/6	52/6	...
261	Gun Metal	Screwed Female ,,	...	...	...	...	60/-	92/6	...
261½	Cast Iron*	,, ,, ,,	...	...	...	...	30/-	51/-	...
262	Gun Metal*	,, ,, ,,	...	...	...	...	59/-	87/6	...
262½	Cast Iron	,, ,, ,,	...	...	...	...	30/-	51/-	...
263	Gun Metal	Flanged ... ,,	...	...	...	...	62/6	92/6	...
263½	Cast Iron	,, ... ,,	...	...	...	...	32/6	51/6	...
	* Or *vice versa*, as dotted lines.								
	All with Flanges are ... (Diameter)		3¾ in.	4½ in.	5 in.	5½ in.	6 in.	7 in.	8 in.

Gun Metal or Malleable Iron Spanners supplied; see Index.
No. 258 can be supplied with Male thread.
All Cast-iron Cocks have Barffed Plugs to prevent rust.

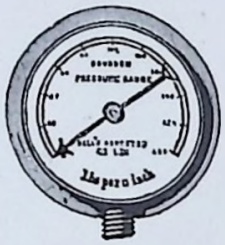
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BELL'S ASBESTOS PACKED

BOILER FITTINGS.



GAUGE SYPHON.



PRESSURE GAUGE.



LEVEL INDICATOR.



GAUGE STANDARD.

BELL'S ASBESTOS PACKED PRESSURE GAUGE SYPHON.

MADE IN GUN METAL.

Small size, screwed ½ in. gas, 12/- each. Large size, screwed ¼ in. gas, 15/- each.
Large size, flanged, 17/6 each.

BELL'S ASBESTOS PACKED PRESSURE GAUGE STANDARD.

MADE IN GUN METAL.

Screwed to ¼ in. gas ... ... 12/- each.

BELL'S BOURDON PATTERN PRESSURE GAUGE.

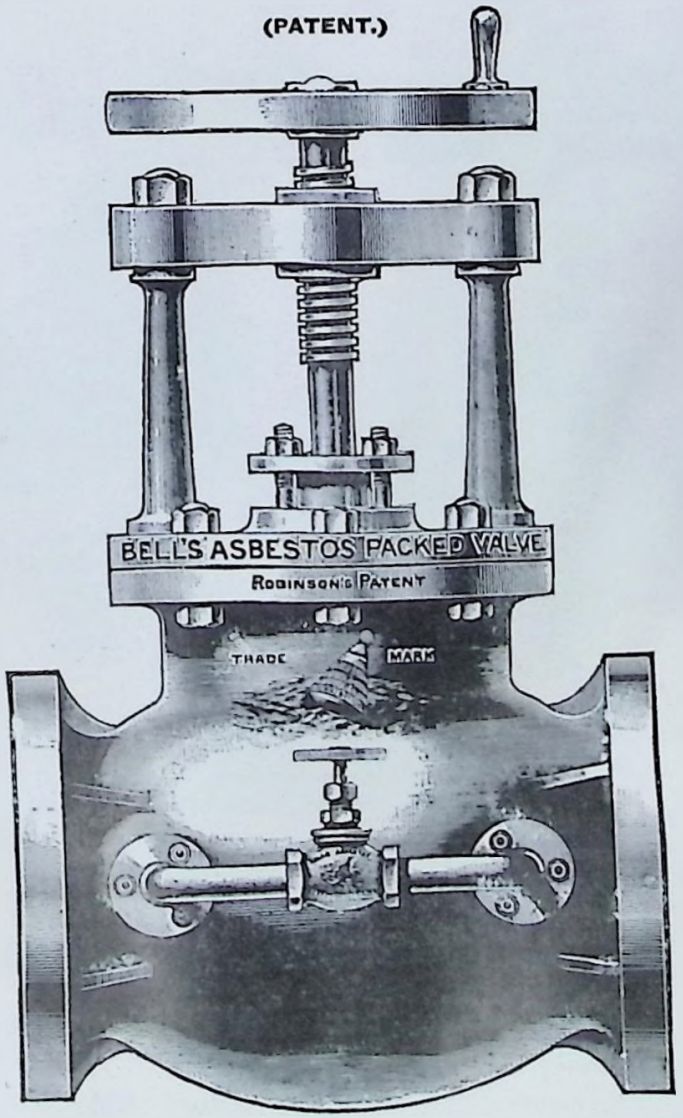
Size.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in. diameter
No. 1	17/3	18/-	21/-	25/-	27/6	42/-	49/-	60/- each.
,, 2	16/-	17/-	19/-	22/6	26/-	39/-	45/-	54/- ,,

All screwed ¼ in. gas up to 7 in. diameter, and ¼ in. gas over that size.
No. 1 Quality is made of specially-selected tube, porcelain or open dials, bevel plate glass.
No. 2 Quality is made of best tubes, enamelled dials, and plain plate glass.
Level Indicators quoted for on application.

BELL'S ASBESTOS FACED

VALVES.

(PATENT.)



Valves made to above in **Cast Iron** for general purposes; in **Crucible Steel** for High Pressure and Chemical work; and in **Gun Metal** as required.

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BELL'S ASBESTOS FACED

VALVES.

(PATENT.)

SECTIONS.

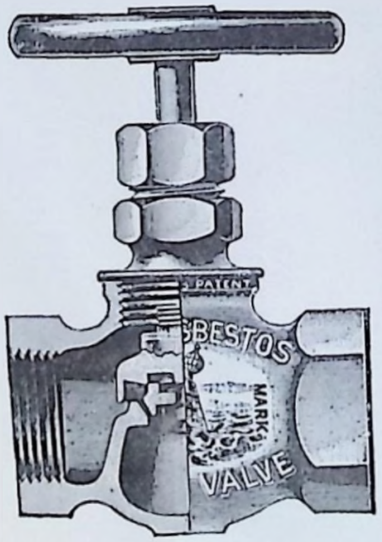


Fig. 3.

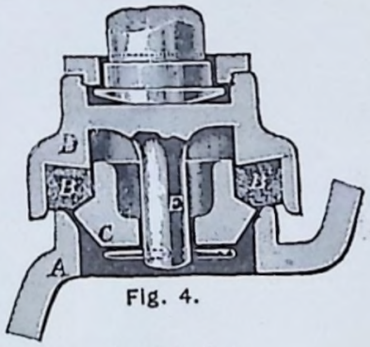


Fig. 4.

A. Valve Seat.
B. Packing Ring.
C. Sliding Cone.
D. Loose Valve.
E. Guide Stud.

Fig. 3 is half section in elevation, and Fig. 4 is full section.

When loose Valve D is screwed down on to seat A the compound Asbestos Ring B is forced on to the round edge lip of A, if D is forced hard down, then sliding cone C comes into contact with angle seat of A, and being forced thereby up into the body of D the Ring B is further compressed and strengthened.

A new ring can be inserted in a few minutes at a nominal cost.

BELL'S PATENT ASBESTOS FACED VALVES are now well known and have established a firm reputation. They have been used extensively for all classes of Steam, Hot and Cold Waters, Hydraulic, Gas and Acid Work. The following list will show that we make all forms in general use in either Gun Metal, Cast Iron, and Steel, and they are respectively suitable to the class of work for which they are required.

We hold large stocks of all kinds of Standard Fittings; and our facilities are such that we can quickly turn out any class in modified form to suit the measurements of existing plants or special requirements.

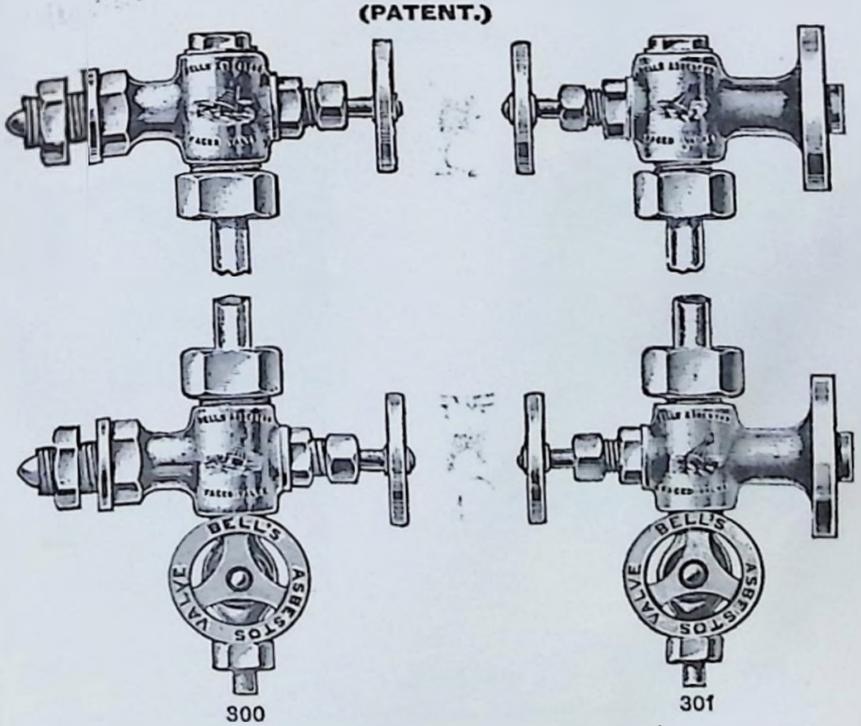
To intending purchasers we can give reference to firms in their district who are using these fittings, as they are working all over the World.

NOTICE IS HEREBY GIVEN
That the Patent Rights will be rigorously upheld.

BELL'S ASBESTOS FACED

VALVE WATER GAUGES.

(PATENT.)



300 301

These **Valve Water Gauges** being made with our compound seats, are much more lasting than others, and can be reseated in a few minutes.

Where water is very impure we recommend them being fitted with cleaning feather, which cleans out the bore each time the valve is operated. In ordering thus add **F** to number.

PRICES.

No	Made of	For attaching.	Diameter of Glass. ½	⅝ or ¾	⅞ or 1	Inch.
300	Gun Metal ... (polished)	SCREWED ...	50/-	55/-	60/-	per set.
301	" " ... "	FLANGED ...	55/-	60/-	65/-	" "
300F	" " ... "	SCREWED ...	55/-	60/-	65/-	" "
301F	" " ... "	FLANGED ...	60/-	65/-	70/-	" "
Nos 300 and 300F are screwed for Iron Pipe			¾ in.	1 in.	1 in.	Gas
Nos 301 and 301F have flanges			3½ in.	4 in.	4½ in.	Dia.

Non-conducting Wheels for either pattern extra 10/- per set.

Made in Steel and Cast Iron, with seats to resist action of chemicals and acids.

Bell's Asbestos Special Compound Seating Rings for any of above, 1s. per doz.

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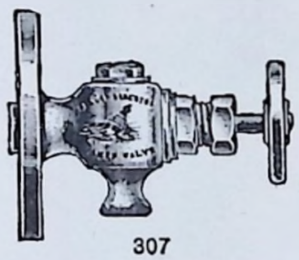
BELL'S ASBESTOS FACED

TEST VALVES

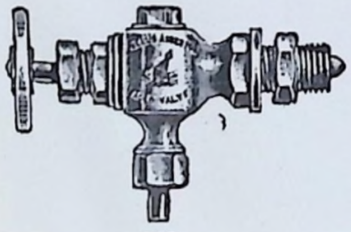
(PATENT.)



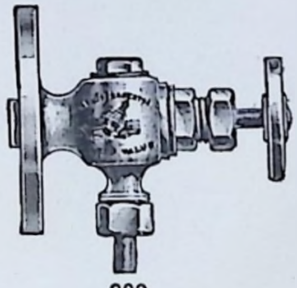
306



307



308



309

PRICES.

No.	Made of	For Attaching	½	⅝ or ¾	⅞ or 1	Inch.
306	Gun Metal (polished) ...	SCREWED	11/6	15/-	25/-	each.
307	" " ...	FLANGED	16/6	20/-	30/-	"
308	" " ...	SCREWED, with Union ...	14/6	18/6	30/-	"
309	" " ...	FLANGED " " ...	18/6	23/6	35/-	"
Where water is very impure we recommend them being fitted with cleaning feather. In ordering thus, add F to number, and add for each size ... ... extra			2/6	2/6	3/-	"
All Screwed Ends are		(Iron Pipe size)	½ in.	¾ in.	1 in.	Gas.
All Flanges			3½ in.	4 in.	4½ in.	Dia.

Non-conducting Wheels for either pattern, extra 3/- each.

Made in Steel and Cast Iron, with seats to resist action of chemicals and acids.

Bell's Asbestos Special Compound Seating Rings to suit any of above, 1/- per doz.

BELL'S ASBESTOS FACED

MAIN AND ANGLE VALVES.

(PATENT.)



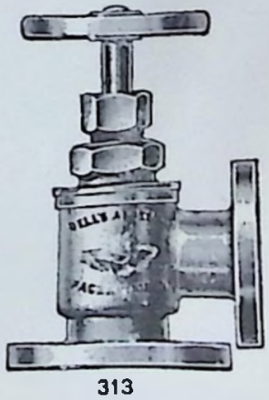
310



311



312



313

PRICES.

No.	Made of	For Attaching.	Diameter in inches.								
			⅜	½	¾	1	1¼	1½	2	2½	3
310	Gun Metal ...	SCREWED ...	7/6	8/6	11/6	15/6	20/6	26/-	39/-	78/-	97/6
311	" " ...	FLANGED ...	—	12/-	16/-	21/6	27/-	33/6	52/-	90/-	114/-
312	" " ...	SCREWED ...	—	11/-	15/-	19/6	26/-	32/6	50/-	—	—
313	" " ...	FLANGED ..	—	15/-	19/6	26/-	32/6	42/6	58/6	98/-	130/-
All with Flanges are (diameter in in.)			...	3½	3¾	4½	5	5½	6	7	8
Bell's Asbestos Special Compound Spare Seating Rings for above, each			1d.	1d.	1d.	1½d.	2d.	3d.	6d.	9d.	1/-

All Screwed are for Iron Pipe Standard.

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BELL'S ASBESTOS FACED

BACK PRESSURE VALVES.

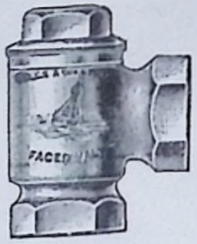
(PATENT.)



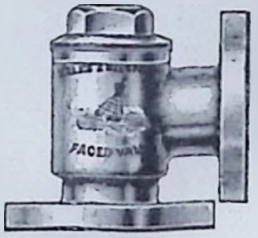
314



315



316



317

PRICES.

No.	Made of	For Attaching.	½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.
314	Gun Metal	Screwed...	7/-	9/6	13/-	17/6	22/-	34/-	72/-	90/-
315	" "	Flanged...	—	13/6	19/-	24/-	30/-	45/6	85/-	105/-
316	" "	Screwed...	8/6	11/-	15/-	20/6	25/-	38/-	—	—
317	" "	Flanged...	—	16/-	20/-	26/-	36/-	52/-	90/-	120/-
Bell's Asbestos Special Compound Seating Rings for above ... ... per dozen			1/-	1/-	1/6	2/-	3/-	6/-	9/-	12/-

Made in Steel and Cast Iron, with seats to resist the action of chemicals and acids.

Flanges and Screwing same sizes as before.

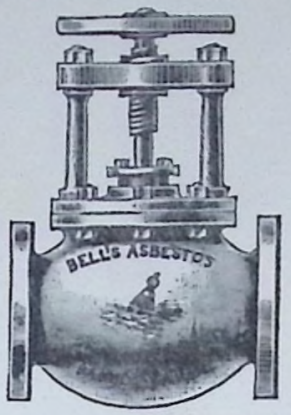
BELL'S ASBESTOS FACED

MAIN AND ANGLE VALVES.

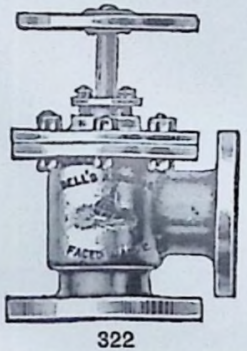
(PATENT.)



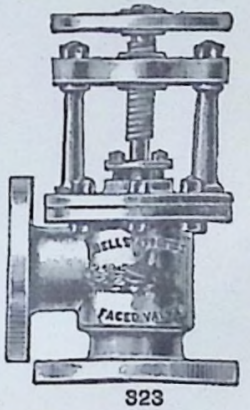
320



321



322



323

PRICES.

No.	Made of	2 in.	2½ in.	3 in.	3½ in.	4 in.	5 in.	6 in.	8 in.	9 in.
320	Cast Iron with Gun-metal parts	42/-	55/-	65/-	81/-	100/-	143/-	156/-	247/-	292/
321	" " " " " "	—	—	—	—	120/-	172/-	187/-	296/-	350/-
322	" " " " " "	45/-	58/6	68/-	88/-	110/-	152/-	169/-	273/-	325/-
323	" " " " " "	—	—	—	—	132/-	182/-	200/-	327/-	390/-
Bell's Asbestos Special Compound Seating Rings for above ... each		6d.	9d.	1/-	1/3	1/6	2/-	2/6	3/-	4/-

Any of above made in Steel to stand the highest pressures, and also with seats to resist the action of chemicals and acids.

Also made in Gun Metal up to any size to order.

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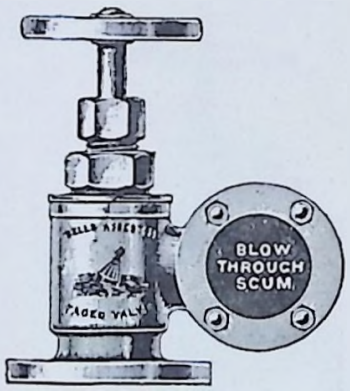
BELL'S ASBESTOS FACED

BOILER FEED AND SCUM VALVES.

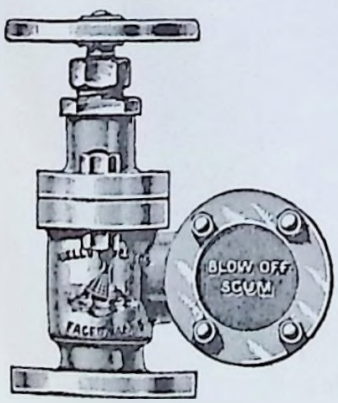
(PATENT.)



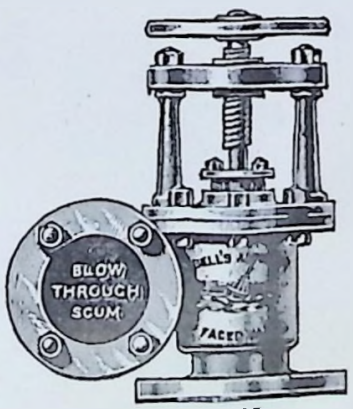
318



319



324



325

The above are combined Stop and Back Pressure Valves, by removal of cover marked for BLOW SCUM, the pipe inside Boiler may be cleaned out.

PRICES.

No.	Made of	½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.
318	Gun Metal ... each	18/-	24/-	32/-	42/-	53/-	—	—
319	" "	—	—	42/-	53/-	69/-	95/-	159/-
324	Cast Iron, G. M. parts...	—	—	—	—	58/-	73/-	95/-
325	" " " " ...	—	—	—	—	70/-	86/-	114/-
	Bell's Asbestos Special Compound Spare Seating Rings for above ... ... each	1d.	1d.	1½d.	2d.	3d.	6d.	9d.

In working these, Valves should be set to give a regular and constant feed, which ensures a more even steam pressure, and is advantageous to life of Boiler.

Nos. 324 and 325 also made in Crucible Steel and Gun Metal to order.

BELL'S ASBESTOS FACED

FIRE HYDRANT VALVES.

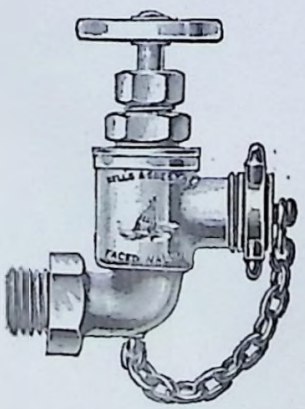
(PATENT.)



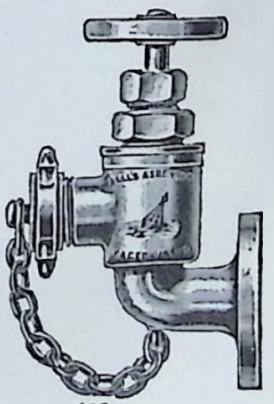
360



361



362



363

PRICES.

No.	Made of	For Attaching.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.
360	Gun Metal, downway...	SCREWED ..	—	—	45/-	82/-	93/-	—
361	" "	FLANGED ..	—	—	55/-	90/-	105/-	—
362	" Elbow	SCREWED ...	—	—	54/-	98/6	111/9	—
363	" "	FLANGED ...	—	—	66/-	108/-	126/-	—
	All with Flanges are ... ... (Diameter)		4½ in.	5 in.	5½ in.	6 in.	7 in.	8 in.

Polished Bright Bodies and Hand-wheels extra.

When caps are required screwed to suit any existing hose fittings, an old union nut should be sent for a screwing gauge.

Any other size or patterns quoted for on application.

Spare Seating Rings, same prices as before.

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 44 of 298
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BELL'S ASBESTOS FACED

BREWERY AND FIRE VALVES.

(PATENT.)



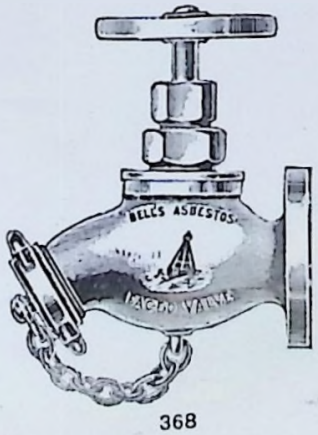
365



366



367



368

PRICES.

No.	Made of	For Attaching.	½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.
365	Gun Metal	Screwed ...	9/-	12/-	16/3	22/-	28/-	41/-	82/6	102/-
366	" "	Flanged ...	12/6	17/-	22/6	28/-	33/-	50/-	87/6	112/-
367	" "	Screwed with cap	11/6	14/9	20/-	26/6	34/-	53/6	92/-	126/-
368	" "	Flanged "	15/-	19/9	26/3	32/6	39/-	62/6	103/-	134/-
216m	Heavy Gun Metal Hose Unions to fit above ...		2/-	2/9	4/-	6/-	7/6	13/6	17/6	25/-
All with Flanges are ...(Diameter)			3½ in.	3¾ in.	4½ in.	5 in.	5½ in.	6 in.	7 in.	8 in.

Spare Seating Rings for above, same prices as before.

Any of above can be made all in Iron or Steel for acids, tar, or ammoniacal liquors.

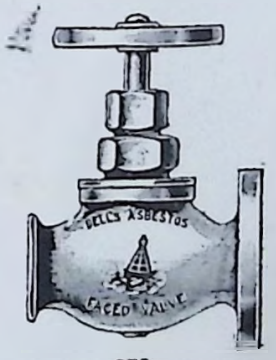
BELL'S ASBESTOS FACED

BREWERY AND FIRE VALVES.

(PATENT.)



374



375



376



377

PRICES.

No.	Made of	For Attaching.	½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.
374	Gun Metal	Screwed	9/-	12/-	16/3	22/-	28/-	41/-	82/6	102/-
375	" "	Flanged	12/6	17/-	22/6	28/-	33/-	50/-	87/6	112/-
376	" "	Screwed with cap	11/6	14/9	20/-	26/6	34/-	53/6	92/-	126/-
377	" "	Flanged "	15/-	19/9	26/3	32/6	39/-	62/6	103/-	134/-
216m	Heavy Gun Metal Hose Unions to fit above ...		2/-	2/9	4/-	6/-	7/6	13/6	17/6	25/-
All with Flanges are...(Diameter)			3½ in.	3¾ in.	4½ in.	5 in.	5½ in.	6 in.	7 in.	8 in.

Spare Seating Rings for above, same prices as before.

Any of above can be made all in Iron or Steel for acids, tar, or ammoniacal liquors.

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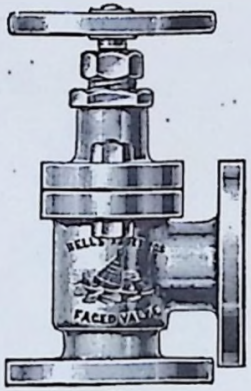
BELL'S ASBESTOS FACED

HYDRAULIC AND MARINE STEAM FITTINGS.

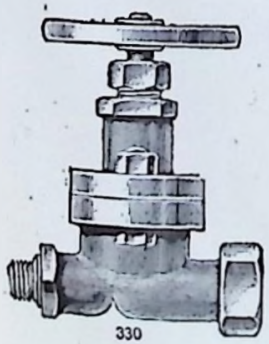
(PATENT.)



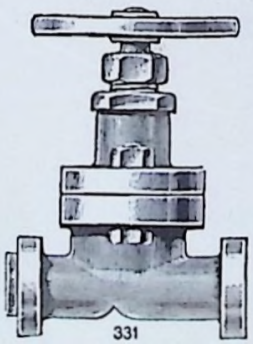
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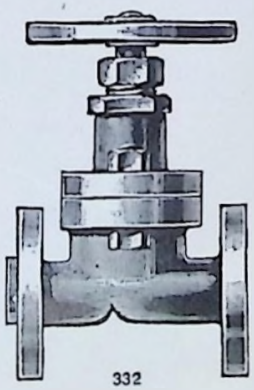
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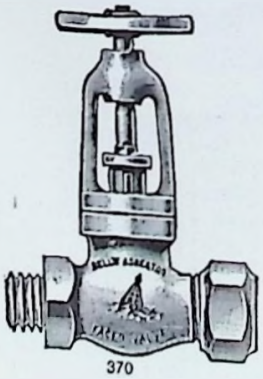
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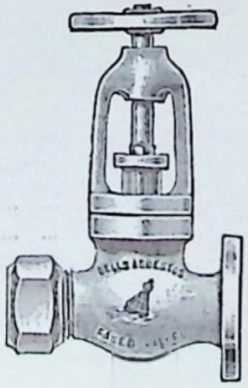
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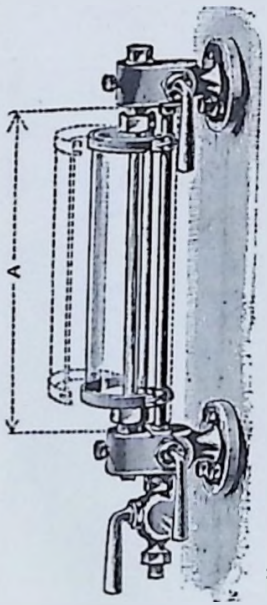
371

Prices quoted on application.

Patterns Nos. 350 and 351 are specially constructed for Marine Work for highest pressures.
Patterns Nos. 330 to 332 are specially constructed for Hydraulic Work. No. 330 can have ends varied as shown, but double hexagon is advised. No. 331 has oval flanges and hydraulic joints, and No. 332 has circular flanges and hydraulic joints. The diameters and length may be varied to suit requirements.
Nos. 370 and 371 are polished bright, and fitted with Brass Hand-wheel, suitable for high-class marine and locomotive work.

BELL'S GAUGE GLASS PROTECTOR.

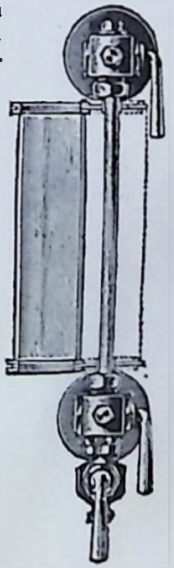
(PATENT.)



Protector closed.

The **increased pressures** in steam boilers, and accidents to employés, caused by the breaking of Gauge Glasses often result in large sums being paid in compensation for injury.

To be efficient, a Gauge Glass Protector must give **little trouble to an attendant** and be a **permanent fixture** to the Gauge Cocks; for if, as in the case of previous Protectors made, the whole has to be removed when renewing a broken glass, the attendant will often lay it aside and not replace it until after he has turned on the Gauge Cocks, thus **incurring considerable risk.**



Protector open.

This GAUGE GLASS PROTECTOR need never be detached from Gauge Cocks, as it is hung on hinges; to get at the glass it is only necessary to throw it open, and immediately close it again after renewing glass. There being **no trouble in opening or closing** the Protector, consequently there is no temptation to an attendant to neglect it.

The **ADVANTAGES CLAIMED** for this Protector are:—

1.—**A clear view** of the Gauge Glass through the Protector.
2.—A Perfect Protection, to an attendant or others, from injury by the breaking of the Gauge Glass.
3.—The **Gauge Glasses last much longer** by being protected from cold draughts of air, which is the chief cause of breakage.

Thus the Protector effects:—

4.—A **Great Saving** in cost of Glasses, and trouble in replacing.
5.—This Protector **can be fitted to existing Gauge Cocks** without alterations to fittings.
6.—It **is not necessary to remove the Protector** in order to renew the Gauge Glass, or to clean the Protector.

In ordering, state distance at "A," between the top and bottom Cocks, and if flat, the width immediately behind the gland nuts, or, if round, give the diameter or shape of fittings.

Distance between Gauge Cocks at A.	Under 12 in.	12 in. and under 18 in.	18 in. and under 22 in.	22 in. and under 26 in.
Price ...	15/6	1 /6	25/6	30/-

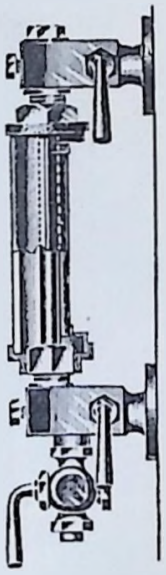
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SIMPLEX AND DOUBLE SAFETY

GAUGE GLASS PROTECTOR

(BERRY & PUTZ'S PATENT).





No drilling or fitting required in fixing.

Can be attached when Boiler is working, by closing gauge taps, and removing gauge glass for about five minutes.

When ordering, please state:—

1st. Length of gauge glass between gland nuts.

2nd. Width of gland nuts across flats.

DESCRIPTION.

A—Gun-metal Sockets, fitting on to gland nuts by set-screws.

B—Thick Glass Shield, toughened and annealed (British Manufacture).

C—Ordinary Gauge Glass, made to answer as a magnifying glass.

D—Lines placed on back of shield, which magnify when seen through water.

E—Showing breadth of Indicator Line, as seen below water level, magnified.

F—Showing breadth of Indicator Line, as seen above water level.

G—Prepared Adhesive Paper fastened to back shield, on which are drawn the magnifying lines, covering the perforated holes and making the inside impervious to dust or cold draughts when working, but allows the pressure to escape when breakage does occur.

H—Perforated Brass Shield which, combined with glass front, completely encircles the gauge glass. The brass shield can be turned round to the front when required.

N B—The Gland Nuts can be tightened without disturbing the Protector.

The advantages claimed for this Protector are that it completely protects the gauge glass from cold draughts. It keeps the inside of Protector and gauge glass free from the dust which is inseparable from a stoke-hole; and also it entirely prevents pieces of broken glass from striking and injuring attendants.

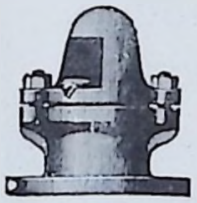
The front half of the gauge glass is surrounded by a half circle of thick toughened glass, of **best English manufacture,** which is joined and lipped over on both edges by a strong perforated brass plate, thus completely surrounding the gauge glass. The glass shield and perforated back are secured in gun-metal sockets, top and bottom, which are held in position on the gland nuts by three blunt set-screws, bearing on same. This attachment enables the attendant **to tighten up the gland nuts of the gauge glass without disturbing the Protector.**

The perforated back plate is lined with adhesive paper, which closes the perforations and renders the inside of the Protector impervious to draughts or dust, but immediately gives way when pressure is formed inside of Protector, thus allowing escape of steam whenever gauge glass breaks.

A Spiral Spring is also provided for encircling gauge glass to hold it together when breakage occurs.

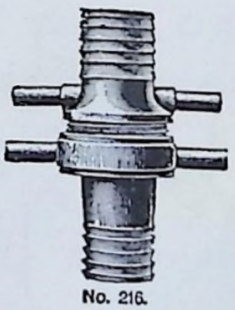
PRICE £1 12s. 6d. each.

FIRE HOSE FITTINGS.





No. 82.



No. 216.



No. 228.



No. 232.

No. 82. Cast Iron Ball Hydrants .... 2½ inch .... 11/6 each.
„ 82. „ „ „ .... 3 „ .... 14/6 „

	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	inch.
No. 216. Gun Metal Hose Unions	2/-	2/8	3/6	4/5	5/8	9/4	11/-	12/6	13/6	20/6	each.
„ 216. Do. Heavy	2/8	3/8	4/6	6/6	7/8	12/6	14/8	16/6	18/-	24/-	„

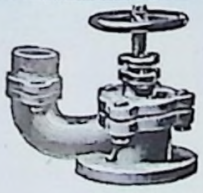
Instantaneous Hose Couplings quoted for on application.

	18	24	30	36	inch.
No. 228. Polished Copper Hand Pipes with Nozzles	15/-	17/6	20/-	25/-	each.

No. 232. Stand Pipes	Single Outlet, Rough ..	66/-	each.
	„ „ Polished..	72/6	„
	Double „ Rough ..	74/-	„
	„ „ Polished..	96/-	„



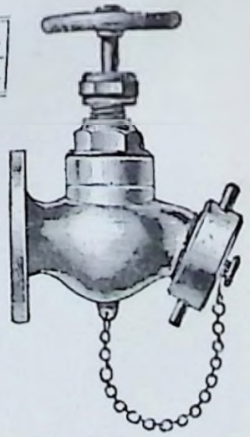
No. 18.



No. 18 A.



No. 18 B.



No. 19.

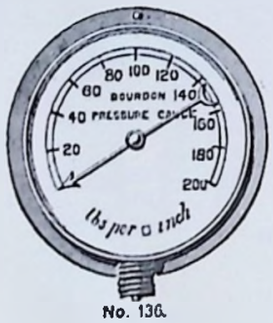
		2	2½	3	4	inch.
No. 18.	Cast Iron Fire Cock	28/6	33/-	44/-	60/-	each.
„ 18A.	„ „ with Gun Metal Nozzles		28/6			„
„ 18a.	Gun Metal „ Rough	43/-	56/-	66/6		„
„ 18a.	„ „ Bright	45/-	58/-	72/-		„
„ 19.	„ „ London Pattern	48/-	62/-	84/-	185/-	„

For Prices of Leather, Canvas, and India-rubber Hoses, see index.

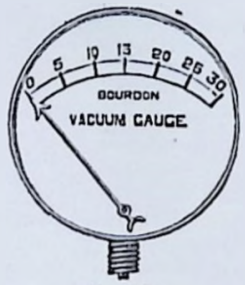
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asbestosclaims.law/library/21509/47

BOURDON'S PATENT
PRESSURE, VACUUM, COMPOUND, WATER AND BLAST GAUGES.

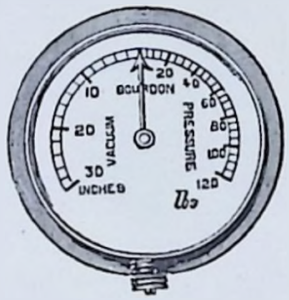
With Plate Glass Fronts.



No. 136.



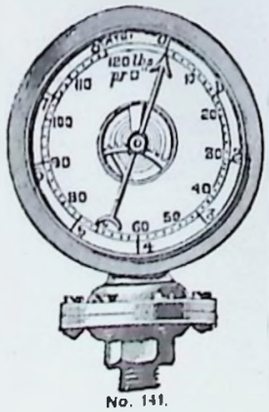
No. 137.



No. 138.

No.		3	4	5	6	7	inch.
136	Pressure, Water or Blast	14/-	14/6,	16/6	20/-	25/-	each.
137	Vacuum	14/-	14/6	16/6	20/-	25/-	,,
138	Compound	16/-	16/6	18/6	22/-	27/-	,,
139	Hydraulic, to 4 tons		60/-	68/-	75/-	90/-	,,
140	Hydraulic, to 10 tons.....		70/-	75/-	80/-	100/-	,,

SCHAFFER'S IMPROVED PRESSURE AND VACUUM GAUGES.

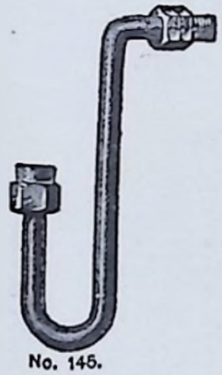

No. 141.

No.		3	4	5	6	7	inch.
141	Iron Case	17/-	18/-	21/-	26/-	32/-	each.
141	Brass Case	21/-	22/-	26/-	32/-	38/-	,,
	If fitted with Wire Guard or Solid Brass Cover, extra	3 6	3 6	3 6	5/-	6 6	,,

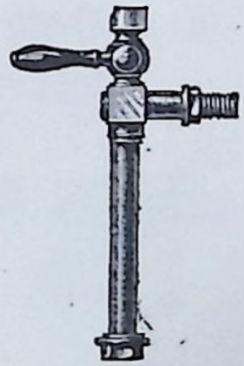
Other Patterns quoted for on application.

All Gauges are carefully tested before being sent out.

PRESSURE GAUGE FITTINGS.


No. 145.


No. 151.


No. 147.


No. 153.


No. 152

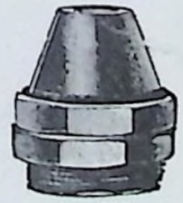

No. 154.

No. 145.	Branch Syphon Pipe	Iron, 2/6; Copper, 6/6 each.
,, 147.	Straight ,, ,, ...	Gun Metal, 15/- ,,
,, 151.	Cock for fixing to wall	,, 5/- ,,
,, 152.	,, ,, ,, heavy pattern ...	,, 7/6 ,,
,, 153.	,, Boiler front joints	,, 4/6 ,,
,, 154.	,, ,, ,, ,, heavy pattern ...	,, 6/6 ,,

IMPROVED FUSIBLE PLUGS.


No. 78A.


No. 250.

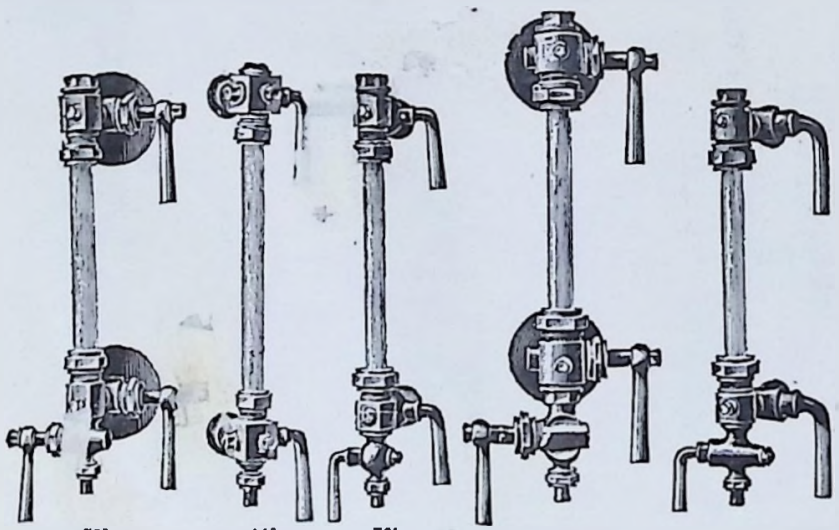

No. 78C.

No.	Size.	1½ inch.	2 inch.
78A.		13/6	22/6 each.
78C.		13/6	22/6 ,,
250	Large	13/6	— ,,
,,	Small	9/6	— ,,

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WATER GAUGES.

Made in Gun Metal with Ground in Plugs.



725 445 721 546 444

PRICES.

No.	For attaching.	⅜	½	⅝	¾	⅞	1	Inch.
721	Screwed ends ...	13/-	14/6	20/-	24/6	31/-	35/6	per Set.
721	Flanged ,, ...	15/-	17/6	22/-	28/-	34/-	39/6	,, ,,
725	Screwed ,, ...	20/6	21/6	28/-	33/-	36/-	42/-	,, ,,
725	Flanged ,, ...	23/-	25/-	30/-	36/6	40/6	47/-	,, ,,
444	Screwed ,, ...	20/6	24/6	31/-	40/-			,, ,,
445	,, ,, ...	15/-	18/-	26/-	29/-			,, ,,
546	,, ,, ...			36/-	45/-	47/-		,, ,,
546	Flanged ,, ...			42/-	50/-	52/-		,, ,,
546	Cast Iron, screwed or flanged				56/-			,, ,,

Nos. 725 and 546 have solid bottoms and packed glands.

Nos. 721 and 725 can be fitted with safety shut-off valve, at 10s. extra. Supplied with brass or ebony handles. Brass sent, unless specified otherwise.

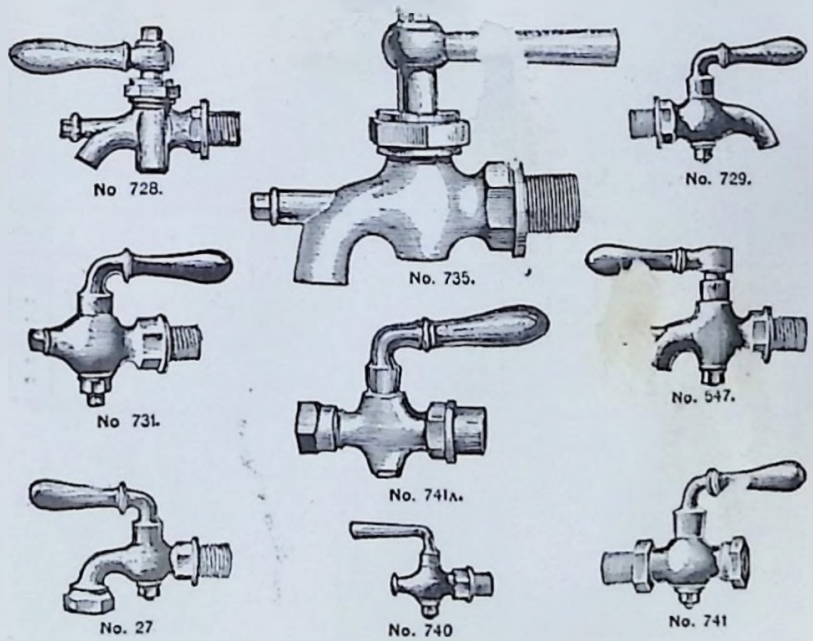
WATER LEVEL INDICATORS.



These are supplied for fixing to front of Boiler, or with an attachment for fixing to columns on receipt of measurements.

GAUGE & CYLINDER COCKS.

Made of best Gun Metal, with Ground-in Plugs.



No.	⅜	½	⅝	¾	⅞	1	inch.
728		3/4	3/7	4/2	5/3	6/9	8/3	10 6	each.
735		4/3	4/10	5/9	7/9	10/3	11,6	13 9	,,
729		2/11	3/4	4/2	4/10	5/9	7/9	10 9	,,
731		3/1	3/7	4/9	6/7	8/6			,,
741A	2/9	3/	3/4	4/3	5/-	6/7		10 3	,,
547			7/-	9/-	9/10	10/9	11/6	12 9	,,
27		3/9	4/5	5/4	6/4	7/3		8 8	,,
740	1/7	1/8	2/9	3/4	4/3	5/8	7/-	8 3	,,
741	1/11	2/3	3/2	3/10	5/7	7/9	8 6	10 3	,,

Screwed Iron Gas Tube sizes. Supplied with Brass or Ebony Handles. Brass sent unless specified otherwise.

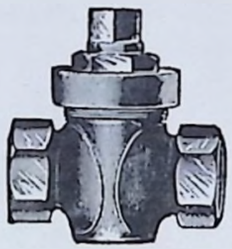
For Bell's Patent Asbestos-packed Cocks, see Index.

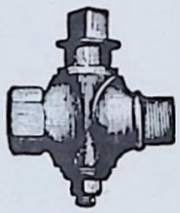
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STEAM COCKS.

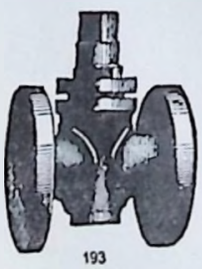
Made of Best Gun Metal. Tested to 200 lbs. Hydraulic Pressure.

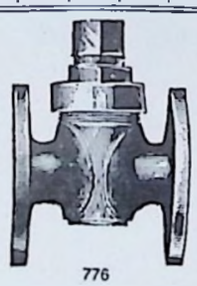

192

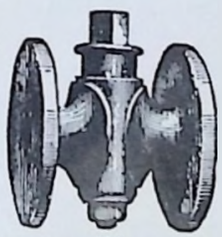

775


779

No.	For attaching	¼	⅜	½	¾	1	1¼	1½	1¾	2	2½	3	inch
192	Screwed Female			3/9	5/3	7/9	10/9	15/-		23/-			each
192H	,, ,,	2/6	3/6	4/9	6/3	9/6	12/9	17/6	22/-	26/9	38/6	77/-	,,
775	,, ,,	2/6	3/-	4/3	6/6	9/6	14/3	17/6	23/-	27/-			,,
775H	,, ,,		3/9	4/9	7/3	10/6	15/3	18/9	24/6	28/9			,,
779	,, Male and			3/6	4/9	7/-	9/9	12/9		20/-			,,
779H	,, Female	2/6	3/3	4/3	6/-	9/-	12/6	16/6	20/6	25/6			,,


193


776


780

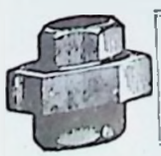
FLANGES MADE TO STANDARD LIST.

No.	For attaching	¼	⅜	½	¾	1	1¼	1½	1¾	2	2½	3	inch
193	Flanged			6/9	8/3	13/-	21/3	28/9	35/6	43/6	61/9	92/6	each
193H	,, ...					18/6	29/3	37/-		61/9	100/6	147/6	,,
776	,, ...	4/-	4/6	6/6	9/6	14/-	20/6	27/-	33/-	42/6			,,
776H	,, ...		5/3	7/-	10/3	15/-	21/9	28/3	34/3	44/-			,,
780	,, ...	3/6	4/6	6/3	9/-	13/3	17/3	21/9	27/-	31/-			,,
780H	,, ...		4/9	6/9	9/6	16/9	23/-	31/-		48/-	74/9	125/-	,,

Numbers with H are Heavy London Pattern, or Bright, as desired.

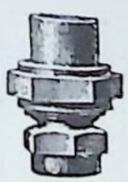
STEAM UNIONS.

No. 576 is same pattern as No. 53, but heavier.


53

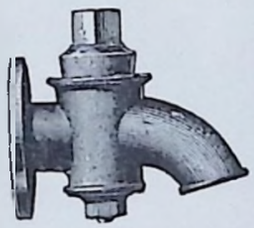
No.	¼	⅜	½	¾	1	1¼	1½	1¾	2	2½	3	inch
53	1/11	1/2	2/-	2/9	3/9	5/3	7/6		10/-	14/3	16/9	each
66	1/2	1/9	2/1	3/3	4/3	7/-	9/3	11/-	12/6			,,
576	1/2	1/9	2/1	3/3	4/3	6/3	8/3	9/6	11/-			,,

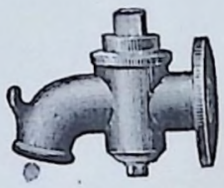
For Bell's Asbestos Packed Cocks, see Index.

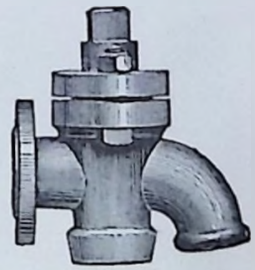

66

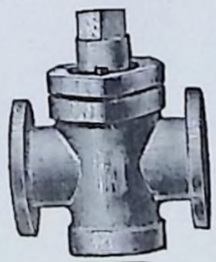
BLOW-OFF COCKS.

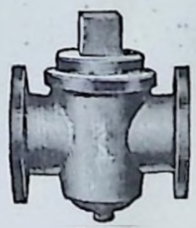
Made of best materials. Tested to 200 lbs. Hydraulic Pressure.


No. 172.


No. 193.


No. 195.


No. 257.


No. 258.

No.		½	¾	1	1¼	1½	2	2½	3	4	inch.
172	G.M., screwed ends ...	5/-	7/6	10/-	12/6	14/9	24/6	49/-			each
172	G.M., flanged ends ...	5/6	8/3	10/9	13/6	16/-	26/6	53/-			,,
193	All Cast Iron					8/6	10/6	14/6	18/6	32/-	,,
193	Cast Iron, G.M. Plug.					12/6	17/6	24/6	38/9	74/-	,,
195	All Cast Iron					14/6	17/6	22/-	30/-	52/-	,,
195	Cast Iron, G.M. Plug.					19/9	24/-	35/6	47/-	81/-	,,
258	All Cast Iron					9/-	11/6	16/-	21/-	36/6	,,
258	Cast Iron, G.M. Plug.					13/-	20/-	27/9	42/-	75/6	,,
257	All Cast Iron					14/6	19/6	24/-	29/6	55/-	,,
257	Cast Iron, G.M. Plug.					20/9	26/-	37/-	45/-	77/-	,,

For Bell's Patent Asbestos-packed Cocks, see Index.

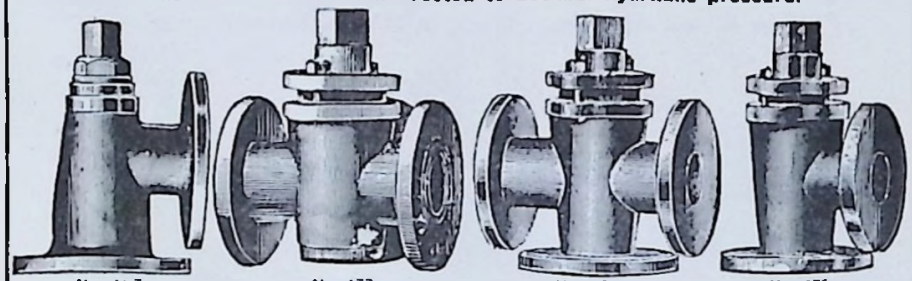
List of Standard Sizes of Flanges for IRON Valves and Cocks.

Size	1½	2	2½	3	3½	4	5	6	7	8	9	inch.
Diameter ...	6	6½	7	7½	8	9	10	12	13	14	15½	,,
Thickness ...	9/16	¾	¾	13/16	⅞	⅞	1	1	1⅛	1⅛	1⅛	,,

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FLANGED STEAM COCKS.

Made of Best Gun Metal. Tested to 200 lbs. Hydraulic pressure.



No. 407. No. 173. No. 174. No. 175.

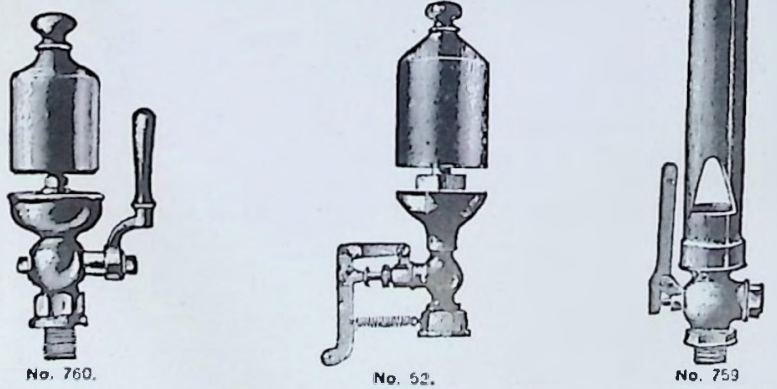
No.		½	¾	1	1¼	2	2½	3	4	inch
407	Angle Cock ...	—	—	34/-	—	44/-	59/6	71/6	—	each
173	Three-way Cock .	22/-	29/6	38/6	45/6	59/6	111/-	130/-	—	,,
174	,, ,,	22/-	29/6	38/6	45/6	59/6	111/-	130/-	—	,,
175	Right Angle ,,	20/-	26/-	33/-	42/-	52/-	94/6	111/-	—	,,

For **Bell's Patent Asbestos-packed Cocks**, see Index.

STEAM WHISTLES.

All made of best Gun Metal. Screwed Gas Tube Thread.

No. 760 made with Ebony or Brass Handle as preferred.



No. 760. No. 52. No. 759

Diameter	½	¾	1	1¼	2	2½	3	3½	4	5	6	inch
No. 760	4/9	6/9	10/-	14/-	18/6	25/6	34/6	52/6	65/-	each
,, 52	—	—	13/6	19/3	24/-	27/6	33/-	50/-	65/-	,,

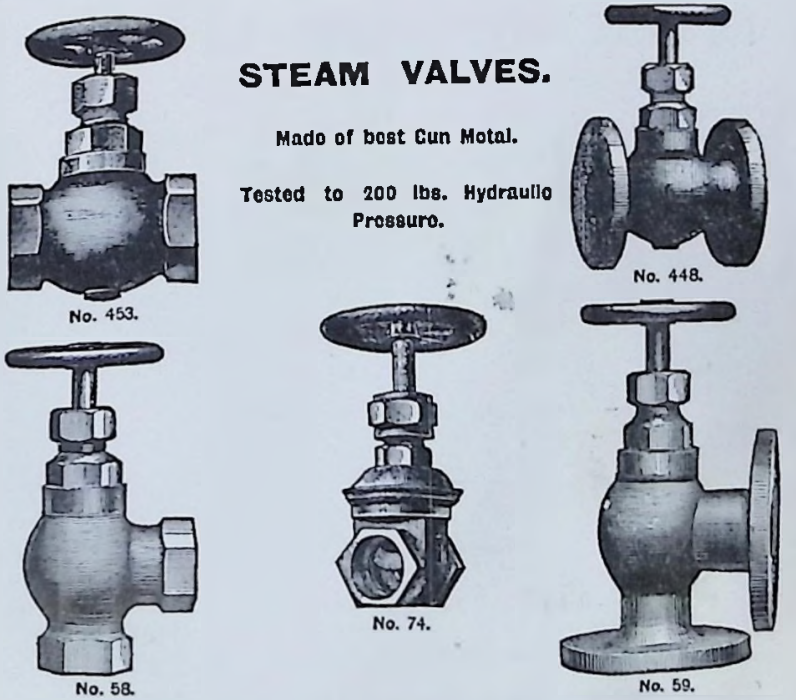
ORGAN PIPE WHISTLE, No. 759.

Diameter / Length	¾ 5	1 5½	1½ 8	1¾ 8½	2 11	2¼ 12	2½ 12½	3 17½	3½ 19	4 20½	inch
Price	7/9	9/9	19/9	21/3	25/9	31/6	34/6	40/6	74/-	95/-	each

STEAM VALVES.

Made of best Gun Metal.

Tested to 200 lbs. Hydraulic Pressure.



No. 453. No. 448. No. 74. No. 58. No. 59.

No.	¼	⅜	½	¾	1	1¼	1½	1¾	2	2½	2½	3	inch.
453	2/6	2/9	3/3	4/6	5/4	7/3	10/-		16/6				each.
453 H	2/9	3/6	4/3	5/6	7/3	10 6	13/9	19/-	23/-	35/-	40/-	45/6	,,
448		5/-	6/6	9/3	11/3	17/9	21/9	29/-	34/-	47/-	51/-	69/6	,,
448 H						26/3	36 9	44/9	53/6	60/-	82/-	,,
58		3/7	4/7	6/5	8/6	11/-	14/-		24/9		38/9	51/-	,,
58 H		5/-	6/6	8/-	12/-	17/6	22/-	28/-	33/-		63/-	84/-	,,
59			6/-	9/6	12/9	18/-	22/6		32/6		59/-	75/-	,,
59 H					20/-	25/-	30/-	38/-	43/-	60/-	73/-	100/-	,,
74 Peet's Valve			5/-	6/6	8/6	11/6	15/-	18/-	20/-		42/-	55/-	,,
74 H			6/6	7/6	10/6	15/-	20/-	25/6	28/6		50/-	76/-	,,
74 F, Flanged ends			7/6	10/-	13/-	18/6	26/-		37/-		70/-	86/-	,,

Numbers with H are Heavy London Pattern or Bright, as desired.

For **Bell's Patent Asbestos-faced Valves** see Index.

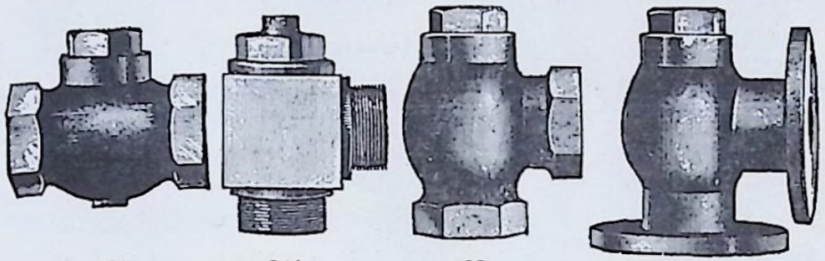
List of Standard Sizes of Flanges for Gun Metal Valves and Cocks.

Size	½	¾	1	1¼	1½	2	2½	2½	3	inch.
Diameter	3	3½	4	4½	5	5½	6	6½	7	7½	,,
Thickness	¼	¼	5/16	5/16	⅜	⅜	7/16	7/16	½	½	,,

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BACK PRESSURE VALVES.

Tested to 200 lbs. per square inch Hydraulic Pressure.



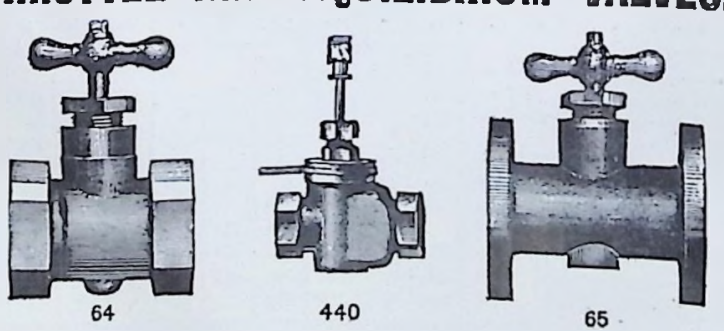
451 341 60 61

MADE OF BEST GUN METAL.

No.	For Attaching ...	⅜	½	¾	1	1¼	1½	1¾	2	2½	3	Inch.
60	Screwed Female ..		3/-	4/9	5/9	7/9	10/9		17/6			Each.
61	Flanged		5/3	8/6	12/-	17/-	21/3		34/-			,,
341	Screwed Male ...		4/9	6/3	8/3	11/3	13/3	16/9	20/-	33/3	47/-	,,
451	,, Female .	1/7	2/9	5/3	5/3	7/6	10/6	13/6	17/-	45/-	57/-	,,

For Bell's Asbestos-Faced Valves, see Index.

THROTTLE AND EQUILIBRIUM VALVES.



64 440 65

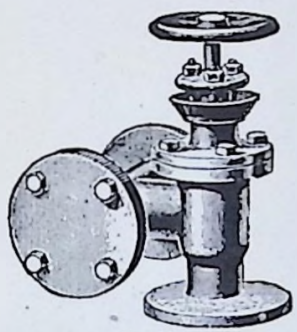
No. 64 is made of Best Gun Metal.
,, 65 ,, ,, Cast Iron, with Best Gun-metal Spindle and Valve.
,, 440 ,, ,, Best Gun Metal.

No.	¾	1	1¼	1½	1¾	2	2¼	2½	3	3½	4	4½	5	5½	Inch.
64		10/3		14/-		16/-		24/-							Each.
65		14/-		15/-	16/6		20/-	23/6	27/6	30/6	34/-	40/-	45/-	54/6	,,
440	9/2	11/6	16/3	21/9		29/-									,,

Flanges made to Standard List.

BOILER FEED VALVES AND SCUM COCKS,

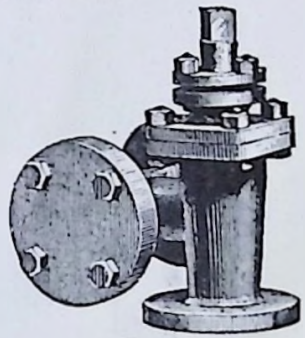
WITH CLEARING BRANCH.



No. 62.

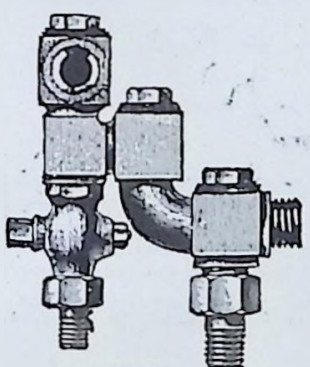
Made of best Gun Metal.

Tested to 200 lbs. Hydraulic Pressure.



No. 63.

No.		1½	2	2½	inch
62	Right Angle Feed Valve, with T Branch for Clearing Way ..	70/-	125/-	185/-	each.
63	Double Gland Scum Cock, with T Branch for Clearing Way ..	80/-	140/-	220/-	,,



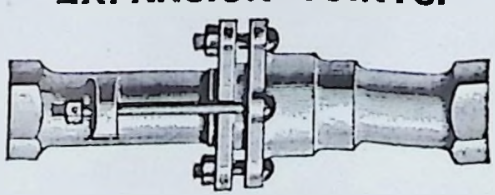
No. 96.

BOILER FEED VALVES,

WITH TEST COCK.

No.		¾	1	inch.
96	Treble	30/-	37/-	each.
97	Double	23/-	28/-	,,

EXPANSION JOINTS.

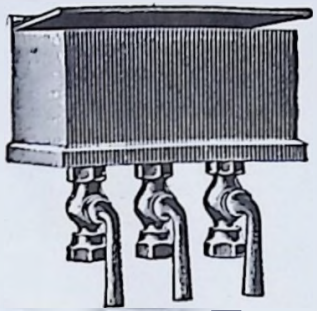


Size.	1	1¼	1½	2	2½	3	4	5	6	inch.
All Gun Metal, screwed ends	30/-	25/-	35/-	60/-						each.
All Gun Metal, flanged ends	25/-	32/6	45/-	75/-						,,
All Iron, flanged ends				25/-	32/6	45/-	60/-	75	90	,,

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 52 of 298
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asbestosclaims.law/library/21509/52

CAST GUN-METAL OIL BOXES

With Coupling Cocks for Oil Pipes.



No.	1	2	3	4	5	
Sizes with Price.	3×3×2½ 2 15/-	4×3×2½ 3 21/6	6×3×2½ 4 31/-	7¼×3×2½ 5 42/-	9×3×2½ 6 51/-	inches Cocks each

These Oil Boxes can be made with any number of Cocks to specification.
A cheaper quality is made in Sheet Brass.

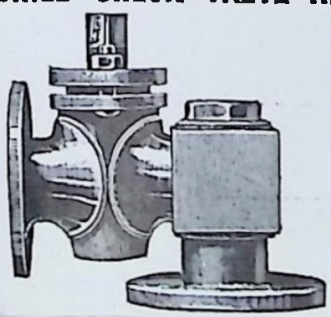
GUN-METAL CLACK BALLS.



Sizes	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½	1⅝	1¾	1⅞	2	inches
Prices	1/1	1/5	2/-	2/4	2/11	3/4	3/9	4/2	4/6	4/10	5/6	6/6	7/-	each

GUN-METAL COMBINED CHECK VALVE AND GLAND COCK.

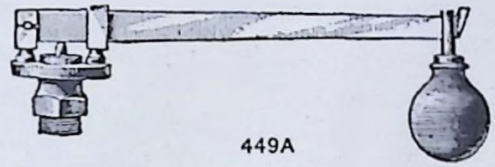
No. 343.



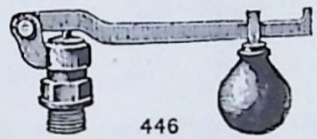
Size	½	¾	1	1¼	1½	2	2½	3	inches
Flanged Screwed	14/- 10/6	18/- 14/3	25/6 20/3	39/6 32/6	55/- 44/6	82/- 67/-	97/- 81/-	121/- 99/-	each ,,

Patent Asbestos-packed Combined Check Valves and Gland Cocks can also be supplied.

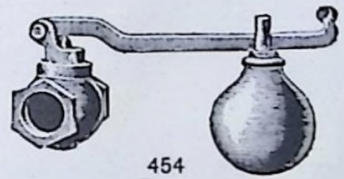
SAFETY AND RELIEF VALVES.



449A



446



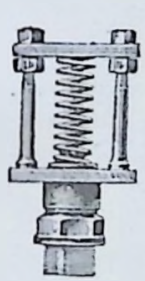
454

PRICES.

No.		½	¾	1	1¼	1½	1¾	2	Inch.
446	G.M. with Malleable Iron Lever ...	5/-	7/6	9/6	12/6	17/-	19/6	24/-	Each.
449A	G.M. with Wrought Iron Lever ...	10/-	11/6	14/6					,,
454	G.M. with Malleable Iron Lever ...	5/6	9/6	11/-	13/	18/6		32/-	,,

Stocked with adjustable weights. Adjusting to specified pressure charged extra.

RELIEF VALVES.



76



447



77

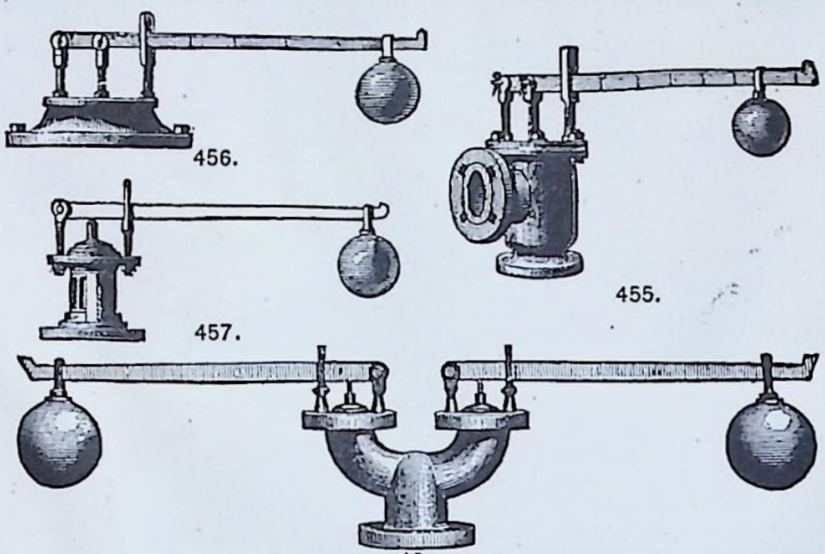
PRICES.

No.		½	¾	1	1¼	1½	2	2½	3	Inch.
76	Screwed M. Open	7/6	9/6	13/-	15/6	19/-	26/-	42/-	66/6	Each.
77	,, ,, Closed	8/6	11/-	14/6	18/-	22/-	29/6	46/6	75/-	,,
447	,, F ,, ...	5/6	8/6	10/6	14/-	18/-	29/-			,,
447A	Flanged...	7/6	12/6	14/0	21/6	26/-	40/-			,,

Made in Best Gun Metal. Springs adjusted to any pressure.

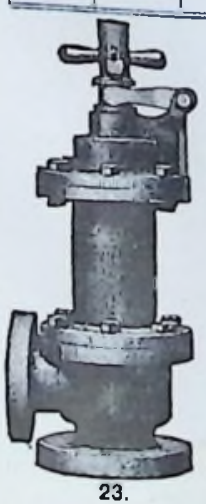
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SAFETY VALVES.



PRICES.

No.	1½	2	2½	3	3½	4	5	Inch.
16	65/-	76/6	86/-	100/-	115/-	137/6		Each.
455	36/-	45/-	50/-	60/-	70/-	80/-	103/-	,,
456	29/-	32/-	36/-	41/		50/-	68/-	,,
457	32/-	35/-	40/-	45/		54/-	73/-	,,


23.

Above have C.I. Bodies and Hollow Balls, for adjusting to different pressures, W.I. Levers, G.M. Valves and Seats.

Adjusting Weights and Marking Levers charged extra.

LOCK-UP SAFETY VALVES.

These Valves are constructed to suit the conditions of Board of Trade.

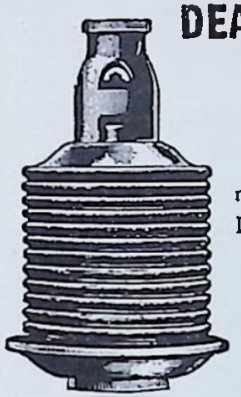
They have Cast-iron Cases, best Gun-metal Seating, Spindle, and Valve.

Springs are adjusted to any required pressure.

PRICE.

Made in one size, 3-inch bore **£11 0 0**

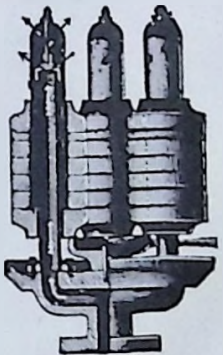
DEAD WEIGHT SAFETY VALVES.


Fig A

These Valves are strongly recommended by all Boiler Insurance Companies.

A Single Dead Weight Valve.

B Half-Sectional View, Group of Three Valves loaded to 75 lbs. pressure.

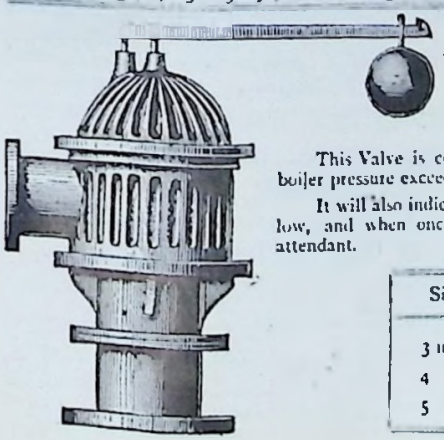

Fig. B

PRICES OF SINGLE VALVES. Fig. A.

Diam. of Valve.	For Valves loaded to pressure in lbs. per square inch.																				lbs.
	25		30		40		50		60		80		100		110		120				
In.	£	s.	£	s.	£	s.	£	s.	£	s.	£	s.	£	s.	£	s.	£	s.			
1¼	2	15	2	16	2	19	3	2	3	4	3	9	3	14	3	16	3	19			each.
2	4	5	4	8	4	12	4	18	5	3	5	13	6	3	6	8	6	13			,,
2½	5	0	5	4	5	12	6	0	6	8	7	4	8	0	8	8	8	16			,,
3	6	0	6	5	6	13	7	3	7	12	8	10	9	8	9	17	10	6			,,
3½	7	0	7	6	7	18	8	10	9	2	10	6	11	10	12	2	12	14			,,
4	8	10	8	18	9	13	10	8	11	3	12	13	14	3	14	8	15	13			,,

PRICES OF GROUP VALVES. Fig. B.

Diam. of Valve.	For Valves loaded to pressure in lbs. per square inch																				lbs.
	50		60		80		90		100		120		140		150		180		200		
In.	£	s.	£	s.	£	s.	£	s.	£	s.	£	s.	£	s.	£	s.	£	s.	£	s.	each.
2	5	10	5	14	6	2	6	6	6	10	6	18	7	6	7	10	8	2	8	10	,,
3	7	7	7	13	8	5	8	11	8	17	9	9	10	1	10	7	11	5	11	17	,,
4	9	9	9	17	10	13	11	1	11	9	12	5	13	1	13	9	14	13	15	9	,,
5	11	11	12	1	13	5	13	11	14	1	15	1	16	1	16	11	18	1	19	1	,,
6	13	13	14	5	15	9	16	1	16	13	17	17	19	1	19	13	—		—		,,



STEAM AND LOW WATER ALARM.

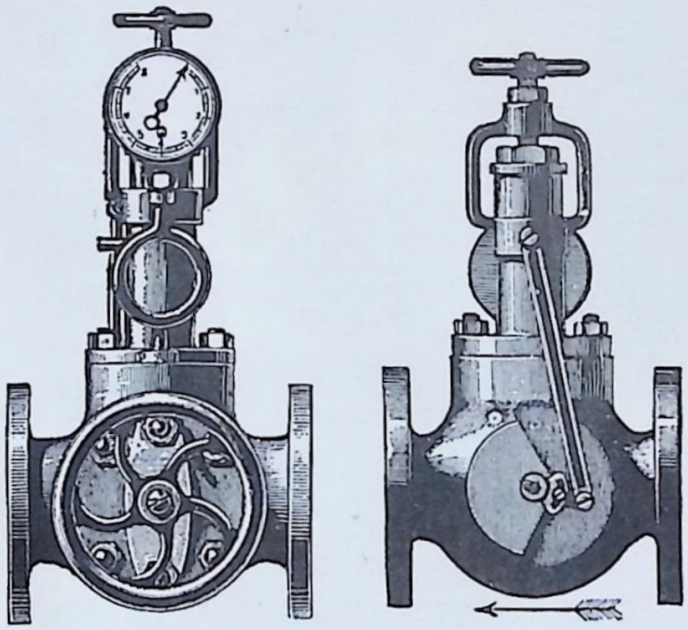
This Valve is constructed to give an indication should the boiler pressure exceed what it is intended to work at.

It will also indicate if the water is either too high or too low, and when once fixed cannot be tampered with by the attendant.

Size.	Prices.		
	£	s.	d
3 inch.	8	10	0
4 ,,	9	0	0
5 ,,	9	10	0

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REDUCING VALVE.



In this Reducing Valve motion of Regulating Piston is transmitted by means of connecting rod to spindle of rotary throttle valve, which is provided with rectangular ports working over similar ports in stop valve. When regulating piston is raised by increase in reduced pressure, the inner rotary valve is caused to turn, and the port passage is throttled accordingly. Combined areas of ports in throttle valve correspond to diameter of valve; steam can therefore pass through valve freely when stop valve is open and regulating piston occupies lowest position. If stop valve is partially closed, rectangular ports of throttle valve are covered radially, and valve opening at lowest position of regulating piston is lessened

The large hand wheel serves to regulate sensitiveness of Reducing Valve; by it the passage can be adjusted according to quantity of steam required to pass through, thereby enabling valve to even operate well with minimum consumption of steam. Valve can be completely closed by hand wheel, a separate stop valve is therefore unnecessary. Reduced pressure can be regulated by small hand wheel while apparatus is in operation. Throttle valve is completely equilibrated. All working parts may be taken out and examined without removing valve from working position.

Diameter of Valve, Ins.	¾	1	1¼	1½	2	2½	3	3½	4
Diameter of Flanges, ins.	3¼	4⅛	4¾	5½	6¼	6⅞	7⅞	8½	9
Length over Flanges, ins.	4¾	5¼	6	7	7⅞	8¼	10¼	11	11¾
PRICE ... .. £	4 10	5 0	5 10	6 0	7 5	8 15	10 10	12 5	14 5

Prices do not include Pressure Gauges.

All above, excepting the two smallest sizes, are now supplied with outside screw and bridge.

LOW WATER ALARM,

WITH FLOAT.

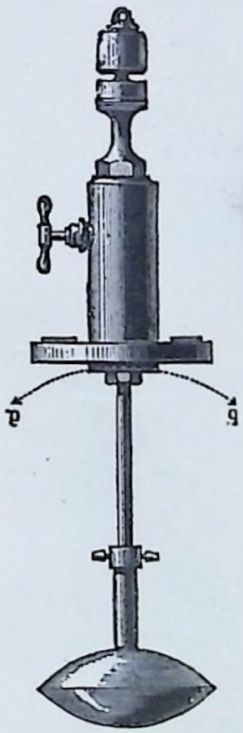


FIG. 1.

ADVANTAGES:

It works in a perfectly frictionless manner, and cannot get out of order. It is a most effective check upon indications of water gauge.

It calls attention of fireman before level of water has fallen to a dangerous extent. It is closed automatically when normal water level is restored. It cannot be interfered with by attendant.

This Low Water Alarm consists essentially of a float attached to a rod, the upper end carrying a brass ball, which, when there is sufficient water in Boiler, is forced upwards against its seating, and closes inlet of steam whistle; but when water falls below proper level, the float draws the ball from seating, and the alarm is consequently sounded. The water is utilised to keep alarm in working order, as the oscillation of rod in every direction caused by motion of float, produces a slight and constant grinding between ball and seating, thus preventing ball from sticking and always ensuring a steam-tight joint.

The Alarm may be tested by turning handle. In this way it can be employed as an ordinary steam whistle.

It is supplied in two sizes, either with round or oval flanges; and also with curved flanges of any required radius at an extra charge.

PRICES AND PARTICULARS.

Pattern	Dimensions							Dia. of Round Flanges	Sizes of Oval Flanges	PRICE
	A.	B.	C.	D.	E.	F.	G.			
	In	In	In.	In.	In	In.	In.	In.	In.	£ s.
Large ..	12¾	⅝	9¾	7	3	2	4⅞	6¼	4⅛ × 7	3 5
Small ..	9	¼	7½	5½	2¼	1½	3⅜	5⅛	3 × 5⅛	2 5

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IRON STEAM VALVES.

CAST IRON Bodies, Best GUN METAL Valves, Seatings, Spindles, and Nuts.



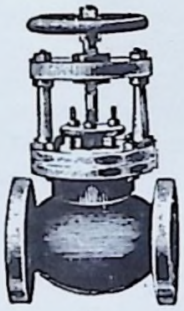
9.



10.



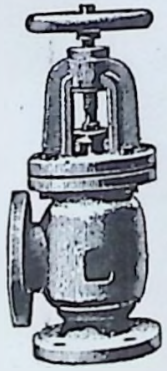
9A.



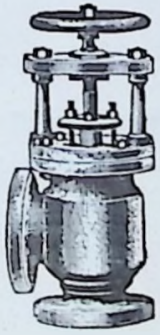
9B.



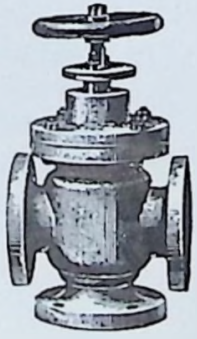
13.



13A.



13B.



14

For Prices and Particulars see opposite page.

For Bell's Patent Asbestos-Faced Valves see Index.

IRON STEAM VALVES.

Cast-Iron Bodies. Best Gun-Metal Valves, Seatings, Spindles, and Nuts.

No. 1 Quality have Turned Facing Pieces on Flanges, Bolt Holes cast in, and Black Handwheels. Suitable for Pressures up to 80 lbs. per square inch.

No. 2 Quality have Flanges faced across and turned on edges. Bright Covers, Glands, and Handwheels. Suitable for Pressures up to 120 lbs. per square inch.

Valves for Pressures up to 150 and 200 lbs. per square inch, quoted for on application.

Nos. 9, 10, 11, 13, and 14 have inside screws working in Gun-metal Nuts.

Nos. 9A, 13A, and 14A have Outside Screws and Bridges cast on Covers.

Nos. 9B, 13B, and 14B have Outside Screws and Wrought-Iron or Steel Turned Pillars and Bridges.

All Valves carefully Finished and Tested to Double Working Pressure.

PRICES.

No.	Quality.	1½	2	2½	3	3½	4	5	6	7	8	9 in.
9	1	18/9	27/-	29/6	35/6	46/8	59/6	82/-	108/-	133/-	178/-	216/-
	2	25/-	35/-	38/8	45/9	58/8	73/3	99/6	128/8	172/8	208/-	259/-
9A	1	32/3	41/-	46/6	52/6	68/9	82/6	108/-	130/-	160/-	208/-	250/-
9B	2	36/-	46/3	53/3	64/9	78/8	98/8	123/6	160/6	206/-	262/-	316/-
10	1	18/9	27/-	29/6	35/6		59/6					
11	1	18/-	20/-	24/6	28/3	36/-	47/6					
13	1	18/9	25/9	30/-	35/-	44/-	54/6	76/-	97/-	136/-	173/6	200/-
	2	25/-	34/-	39/-	45/6	56/-	69/-	94/-	120/-	175/-	205/-	245/-
13A	1	32/3	40/-	47/-	53/-	67/-	78/-	103/-	125/-	165/-	204/-	240/-
13B	2	36/-	45/3	53/9	65/3	77/-	94/-	119/-	155/6	211/-	246/-	306/-
14	1	20/-	27/-	31/6	36/-	49/-	63/6	82/-	105/-	146/-	179/-	225/-
	2	26/6	35/-	40/9	46/-	62/-	77/6	100/-	127/-	186/-	209/-	270/-
14A	1	34/-	41/-	49/-	52/6	73/-	87/-	108/6	130/-	175/-	209/-	261/-
14B	2	37/6	46/6	56/-	65/-	84/-	104/-	124/-	160/6	221/-	264/-	330/-

DIMENSIONS.

No.	Sizes.	1½	2	2½	3	3½	4	5	6	7	8	9	In.
	Dia. of Flanges.....	6	6½	7	7½	8	9	10	12	13	14	15½	In.
9 & 11	Length	8	9	9½	10	12	14	16	18	18	20	22	"
"	Do. (smaller pattern)						12	14	16				"
13	Centre of Body to face of side Flanges		4	4½	5¼	5¾	6½	7¼	8	8¼	9		"
13 & 14	Centre of Body to face of bottom Flanges..		4¼	4½	5⅜	5½	6¼	7½	8¼	9	10		"
14	Length from face to face of side Flanges		8	9	10½	11½	12¼	14½	16	16½	18		"

No. 11 is for confined places, with Short Spindle and Set Screw, without Handwheel.

Any deviations in Lengths and Sizes of Flanges can be made at a small extra cost.

Larger Sizes quoted for to Specification.

For Bell's Patent Asbestos-Faced Valves, see Index.

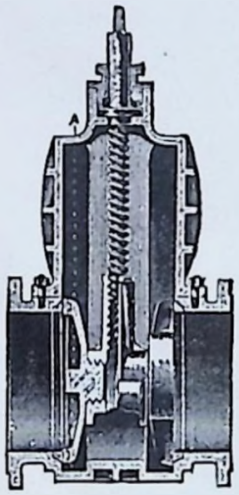
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THE "DENNIS" PATENT
STRAIGHT FULLWAY VALVE,

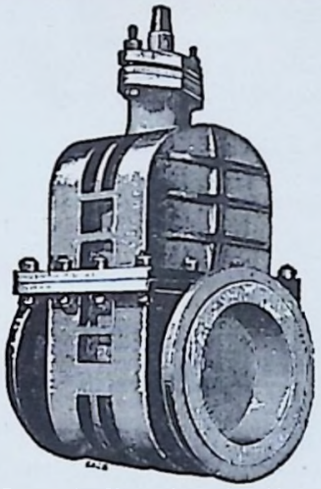
In Cast Iron, with Gun-metal Screws, Valve-faces, and Wearing Surfaces, No. 12 H.

FOR STEAM, WATER, OR GAS.

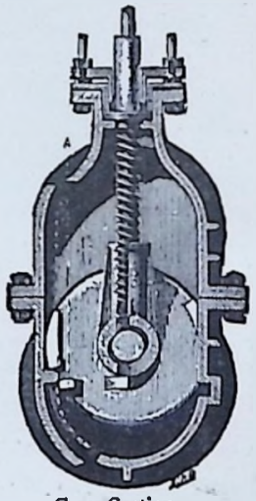
PATENTED IN ALL COUNTRIES.



Longitudinal Section.



Perspective View of Cast-iron Valve, with Gun-metal Wearing Parts.



Cross Section.

This Valve is the only one in the market which gives a straight fullway equal to the area of the pipe itself, and, in the act of closing, clears its seats thoroughly from all dirt, grit, or deposit.

It remains sound and tight in positions where every other description of Cock or Valve has failed.

This Valve can be fixed in any position, the spindle can be taken out, the cap can be removed, the whole interior of the Valve can be examined, and the gland can be packed. Each and all of these operations can be performed without damage or trouble while the Valve is under heavy pressure.

The wearing parts, being interchangeable, can be easily replaced. The new patterns have been strengthened in every part as experience in the working of these Valves has from time to time suggested.

These Valves are fitted with cast-iron wheel handles of fine finish, unless otherwise ordered.

All wearing parts interchangeable, and can be easily replaced.

DESCRIPTION.

Diam. of Valves in ins	With Double Flanges. £ s. d.	With Double Sockets. £ s. d.	With Socket and one Spigot. £ s. d.	Hand Wheels extra. £ s. d.
2	1 15 0	1 15 0	1 15 0	0 2 0
2½	2 0 0	2 0 0	2 0 0	0 2 6
3	2 10 0	2 10 0	2 10 0	0 3 0
4	3 10 0	3 10 0	3 10 0	0 4 0
5	4 5 0	4 5 0	4 5 0	0 5 0
6	0 0 0	6 0 0	6 0 0	0 6 0
7	7 0 0	7 0 0	7 0 0	0 7 0
8	8 10 0	8 10 0	8 10 0	0 8 0
9	9 15 0	9 15 0	9 15 0	0 9 0
10	10 16 0	10 16 0	10 16 0	0 10 0
12	13 16 0	13 16 0	13 16 0	0 12 0

All Valves tested to 400 lbs. hydraulic pressure.

THE "DENNIS" PATENT
STRAIGHT FULLWAY VALVES.

In Gun-metal. For Steam, Water, or Gas.

These Valves are similarly constructed to the cast-iron "Dennis" Valves described on previous page, and are fitted with cast-iron hand-wheels, unless otherwise ordered.

Size	¾	1	1¼	1½	2	2½	3	3½	4 inches
Screwed Ends .	11/6	15/6	20/-	26/-	38/-	76/-	95/-	—	135/- each
Flanged Ends .	16/-	21/6	27/-	35/-	52/-	90/-	114/-	—	165/- ,,

All Valves tested to 400 lb. hydraulic pressure.

These Valves are also made for high pressures and hydraulic work. Prices on application

ROUND LOCOMOTIVE BALANCES.

With Screw and Nut.



	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	11 in.	12 in. range.
50 lb.	15/-	16/-	—	—	—	—	—	— each
60 ,,	15/6	16/6	17/6	—	—	—	—	— ,,
70 ,,	16/-	17/-	18/-	19/6	—	—	—	— ,,
80 ,,	16/6	17/6	18/6	20/-	21/6	—	—	— ,,
90 ,,	17/-	18/-	19/-	20/6	22/-	—	—	— ,,
100 ,,	17/6	18/6	19/6	21/-	22/6	24/-	25/6	27/- ,,
120 ,,	—	20/-	21/6	23/-	24/6	26/-	27/6	29/- ,,
130 ,,	—	21/-	22/6	24/-	25/6	27/-	28/6	30/- ,,
140 ,,	—	22/-	23/6	25/-	26/6	28/-	29/6	31/- ,,
150 ,,	—	24/-	25/6	27/-	28/6	30/-	31/6	33/- ,,
160 ,,	—	25/-	26/6	28/-	29/6	31/-	32/6	34/- ,,
170 ,,	—	26/-	27/6	29/-	30/6	32/-	33/6	35/- ,,
180 ,,	—	28/-	29/6	31/-	32/6	34/-	35/6	37/- ,,
190 ,,	—	29/-	30/6	32/-	33/6	35/-	36/6	38/- ,,
200 ,,	—	31/-	32/6	34/-	35/6	37/-	38/6	40/- ,,

The above prices include Patent Locomotive Balances marked either on Outer or Inner Tube, and Round Locomotive Balances marked on Flat slide.

SMALL LOCOMOTIVE BALANCES

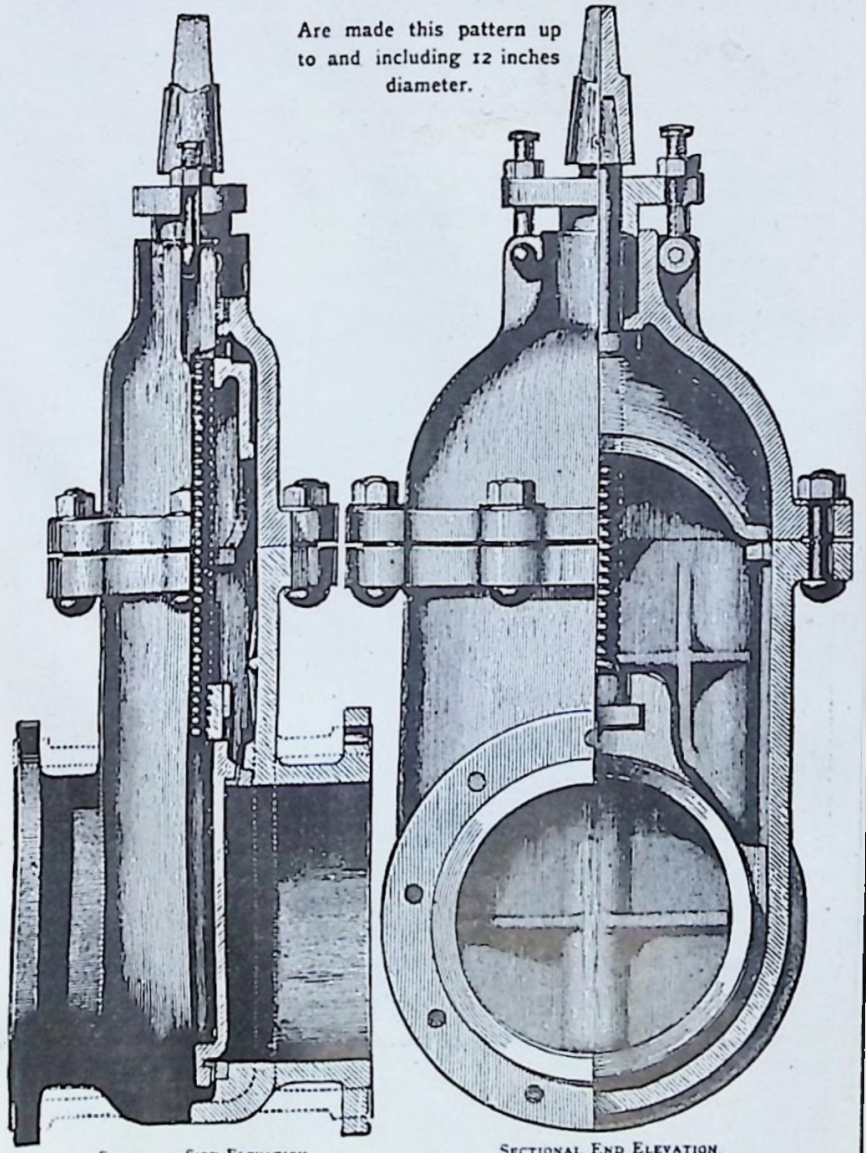
For Portable Engines, &c., with Screw and Nut.

	2½ in.	3 in.	3½ in.	4 in. range.
45 lb.	8/-	8/6	9/-	9/6 each
50 ,,	8/6	9/-	9/6	10/- ,,
60 ,,	9/-	9/6	10/-	10/6 ,,
70 ,,	9/6	10/-	10/6	11/- ,,
80 ,,	10/-	10/6	11/-	11/6 ,,
100 ,,	11/-	11/6	12/-	12/6 ,,
120 ,,	12/-	12/6	13/-	13/6 ,,
150 ,,	13/6	14/-	14/6	15/- ,,

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PATENT SLUICE VALVES

Are made this pattern up to and including 12 inches diameter.



Sectional Side Elevation. Sectional End Elevation

The strains to which the various parts are subjected have been carefully considered, and by avoiding flat surfaces, and thickening the metal at the proper places, great strength is attained without excessive weight.

Water Valves are proved to a pressure equal to a column of water 600 feet, Gas and Sewage Valves to a pressure equal to a column of water 100 feet.

STANDARD LIST OF PATENT SLUICE VALVES.

Diameter of Valve.	Diameter of Flanges	Distance between Centres of Holes.	Length over Facing Strips.	No. of Bolts in Flanges	Prices. Class A	Class B	Class C	Class D	Extras. Spigot and Faucet ends, including Jointing and Bolts.	Unturned Hand Wheel fitted on Spindle.	Dashing Stuffing Gland with Brass at bottom.
In.	In.	In.	In.								
1½	5¼	3⅜	7½	4	28/-	27/-	...	...	3/3	2/-	...
2	6	4¾	8½	4	31/-	29/6	21/-	...	4/-	2/4	2/-
2½	6½	5⅛	9	4	39/-	36/6	26/-	...	4/9	2/4	2/-
3	7	5¼	9½	4	46/6	43/6	33/-	...	6/-	3/-	2/-
3½	8	6⅛	9⅝	4	57/-	53/-	40/-	...	6/9	3/-	2/-
4	8½	6¾	9¾	4	62/-	58/-	42/-	...	7/4	3/-	2/-
5	9½	8⅛	9⅝	5	77/-	72/-	52/-	...	9/6	3/6	2/-
6	11	9¼	10¾	6	93/6	87/6	64/6	100/-	12/-	4/-	2/-
7	12½	10½	11¾	6	113/-	106/-	77/6	123/-	15/-	4/6	2/-
8	13⅜	11⅝	11¾	6	136/-	127/-	92/6	140/-	18/-	6/-	2/6
9	15	12¾	13⅜	7	160/-	150/-	105/-	165/-	22/-	6/-	2/6
10	16	13¾	14	8	185/-	173/-	121/-	185/-	26/6	6/-	2/6
11	17½	15⅛	15⅜	8	210/-	196/-	140/-	205/-	36/-	6/6	2/6
12	18½	16	16¾	9	228/-	212/-	148/-	220/-	40/-	7/-	3/-
13	20	17½	17⅜	10	265/-	247/-	180/-	238/-	45/-	7/-	3/-
14	20¾	18⅛	17⅜	10	310/-	290/-	217/-	260/-	51/-	12/-	3/-
15	21½	19¼	18	11	352/-	329/-	235/-	273/-	65/6	16/-	3/-
16	23½	21	18¾	12	400/-	374/-	266/-	287/-	74/-	23/-	3/-
18	25	22¾	19⅝	12	...	...	307/-	317/-	90/-	...	3/-
20	27½	25 5/16	20¾	13	...	...	343/-	365/-	106/-	...	4/-
21	28½	26¼	21	13	...	...	...	390/-	...	...	...
22	30	27½	22⅛	14	...	...	...	...	...	...	...
24	32	29⅝	22⅝	15	...	...	...	...	...	...	...
27	36	33¼	22⅝	17	...	...	...	...	...	...	...
30	39¾	36½	22⅝	18	...	...	...	...	...	...	...
32	42	38¾	23	19	...	...	...	...	...	...	...
36	45¼	42⅜	23¾	20	..	...	...	...	...	...	...
42	52	48⅜	24½	22	...	...	...	...	...	...	...
48	58½	54¼	32½	26	...	...	...	...	...	...	...

The Prices are the same for Sluice Valves whether made with Faucets or Flanges.

Class A.—Have Four Gun-metal Faces, Two on the Sluice and Two on the Casing, all fitted into turned grooves; also Gun-metal Screw and Nut. **Suitable for first-class Water Works.**

Class B.—In all respects the same as Class A, but with Malleable Iron Screw. **May be used for Water.**

Class C.—Have Cast-iron Faces and Nut, Malleable Iron Screw. **Suitable for Gas or Sewage.**

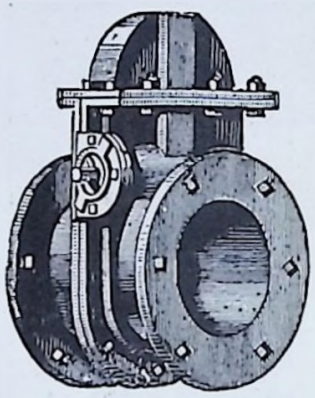
Class D.—Have One Gun-metal Face on the Casing and One on the Valve, Malleable Iron Screw and Brass Nut. Prices include a Column and Screw 5 feet long. If required longer, charge will be from 3/6 to 7/6 per foot extra. **Suitable for the outlet from Reservoirs.**

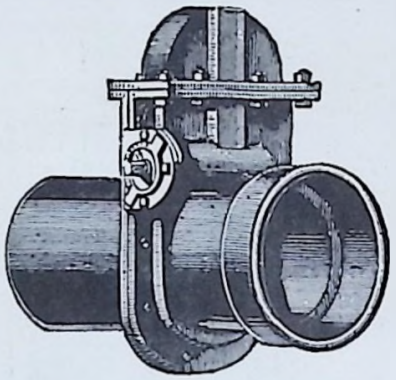
When desired the Spindles in Class C and D can be Electroplated with Nickel at special rates.

Valves about 24 inches quoted for specially. Deviations from the Drawings charged as extra, when not included in Estimates.

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RACK AND PINION GAS VALVES.





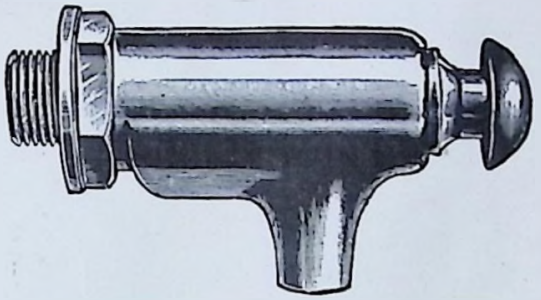
Diameter of Valve.	Price for each Valve.	Spigot and Faucet Ends including Jointing and Bolts.	Diameter of Flanges.	Distance between Centres of Holes.	Length over Flanges.	Number of Bolts in Flanges.	Diameter of Bolts in Flanges.
Inches.		Price per Pair.	Inches.	Inches.	Inches.	—	Inches.
2	24/-	4/-	6½	5⅛	8½	4	⅝
3	30/-	6/-	8	6	10½	4	⅝
4	40/-	8/-	9½	7½	11½	4	⅝
5	47/6	10/6	10½	8½	11¾	4	⅝
6	57/-	12/-	12	9½	11¾	4	⅝
7	70/-	17/-	13	10½	12	6	¾
8	85/-	18/-	14	12	12½	6	¾
9	95/-	20/-	15	13	13	6	¾
10	105/-	25/-	16	14	13½	6	¾
12	130/-	40/-	19	16½	16	6	¾
14	190/-	51/-	21	18½	17	6	⅞
15	217/6	65/6	22	19½	18	6	⅞
16	240/-	74/-	23	20½	18½	8	⅞
18	270/-	90/-	20	23½	20	8	⅞
20	330/-	106/-	28	25½	20½	8	⅞
21	357/-	116/6	29	26½	20½	10	⅞
22	374/-	124/-	30	27½	20½	10	⅞
24			32	29½	20½	10	⅞
26			35	32½	21	10	⅞
27			36	33½	21½	10	⅞
30			38	35½	22½	12	⅞
36			45	42½	23	14	1
48			57	54	31	16	1

In ordering our Improved Rack and Pinion Gas Valves, please state whether they are for use above or below ground, as the Indicator will require to be arranged so as to be seen.

These Valves are fitted with the greatest care; and, both in respect to material and workmanship, are really first class.

SELF-CLOSING VALVE.

(PATENT.)

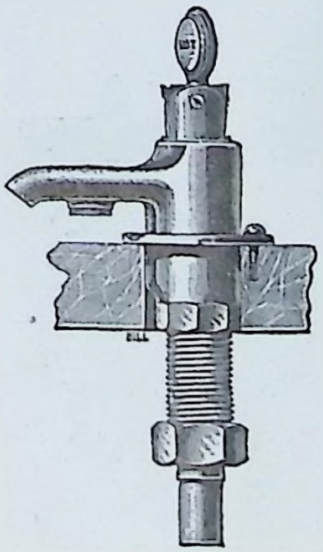


No. 239a.

This Valve is perfectly simple in construction, and is strongly made. It has **no Stuffing Box** and **no Spring**. It may be relied on to close at varying pressures **without causing any concussion** in the pipe.

PRICE.

	½ in.	¾ in.	
Polished Gun-metal, screwed for Iron	7/-	9/9	each.
Do. do. Boss	7/3	10/-	,,
In Circular Cast-iron Casing, forming an excellent Wall Fountain, with ½ in. Valve			15/-
Do. do. ¾ in. do.			18/9



No. 239b.

NON-CONCUSSIVE SELF-CLOSING LAVATORY VALVE.

(PATENT.)

This Valve has **no Stuffing Box** and **no Spring.**

PRICE.

	½ in.	¾ in.	
Polished Gun-metal	11/-	14/-	each.
If Nickel Plated ... ... extra	2/-	2/6	,,

When ordering, please state whether for hot or cold water.

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WHITE METAL ACID VALVES.

(PATENT.)

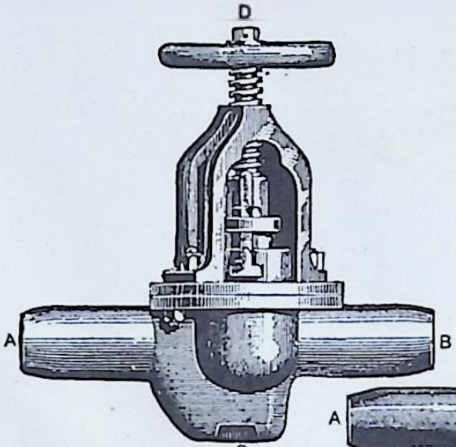


Fig. 1

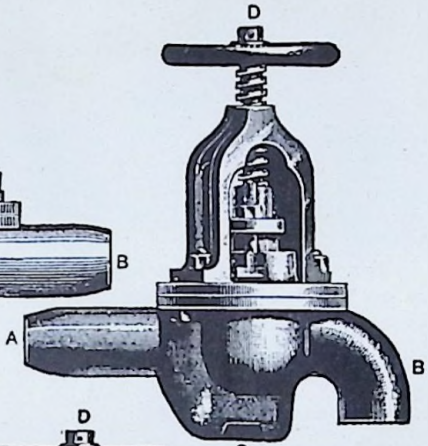


Fig. 3.

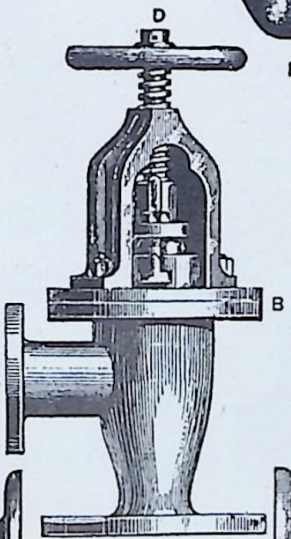


Fig. 5.

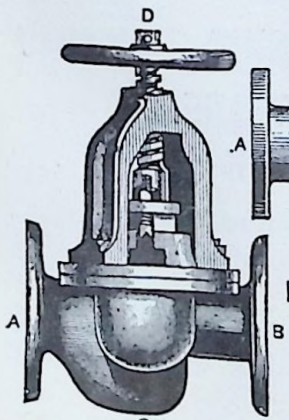


Fig. 2.

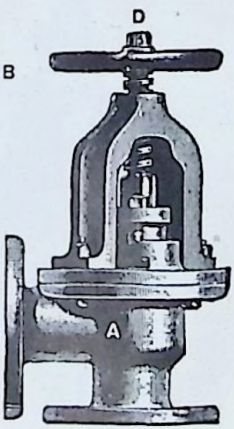


Fig. 4.

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Pages 113 through 128 were not printed in this book. Pages 273 through page 288 were duplicate in book.

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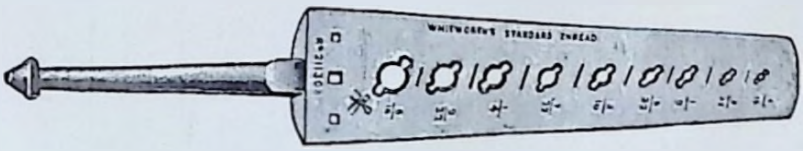
BRASS GAS TAPS AND FLUTED RIMERS, &c.



No. 49 Plug. No. 41. No. 49 Taper.

No.	Size.	¼	⅜	½	⅝	¾	1	1¼	1½	1¾	2	inch.
49	Brass Gas Taps, taper or plug	8/6	10/-	11/6	12/6	17/-	34/-					doz
41	Fluted Rimer for Gas Mains .	1/5	1/9	2/3	2/6	2/9	4/-	5/3	6/9	10/-	12/9	each.
41A	Rimer Tap ,, ,,			4/3	5/-	5/9	7/6	10/6	13/6	20/-	24/-	,,
41B	Drill Rimer Tap ,, .			6/4	7/6	8/6	11/9	15/6	21/3	27/-	32/-	,,

BEST QUALITY SCREW PLATES.



Complete with Taps for all sizes.

Size.	7	8	9	10	11	12	13	14	15	16	holes.
Plain ...	3/6	4/-	4/6	5/6	6/-	7/-	8/6	10/-	11/6	12/6	each.
Notched...	4/6	5/6	6/6	7/6	8/6	10/-	11/6	13/-	15/-	16/6	,,

CIRCULAR OR OBLONG STANDARD WIRE GAUGES.





PRICE, either pattern.

1 to 26	6/6 each.
1 to 36	8/- ,,

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PATENT TWIST DRILLS

WITH STRAIGHT SHANKS.



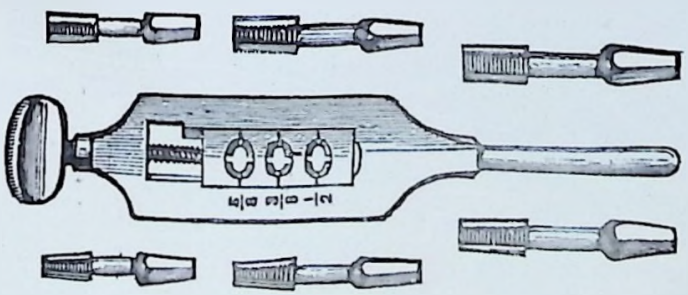
Turned to Whitworth Standard Gauges.

Diam., inches.	Length, inches.	Price, each.	Diam., inches.	Length, inches.	Price, each.	Diam. inches.	Length, inches.	Price, each.
1/16	2½	·/4	11/64	5½	2/1	3/8	9½	5/11
5/64	2½	·/5	7/32	5½	2/3	7/16	9¾	6/4
3/32	2½	·/6	15/64	5½	2/5	29/64	10	7/1
7/64	3½	·/7	1/4	6	2/8	15/32	10	7/7
1/8	3½	·/8	17/64	8	3/4	31/64	10½	8/1
9/64	4	·/10	9/32	8½	3/9	1/2	10½	8/8
5/32	4	1/2	19/64	8½	4/2	33/64	10½	9/3
11/64	4½	1/3	5/16	8½	4/8	17/32	10½	9/10
3/16	4½	1/4	21/64	9	5/1	35/64	10½	10/5
13/64	4½	1/7	11/32	9½	5/6	1	11	11/-
7/32	5	1/11						

STOCKS AND DIES

FOR BRASS OR COPPER TUBE,

With Taper and Plug Taps to each size:



To screw	1/4, 5/16, 3/8	7/16, 1/2, 9/16	5/8, 11/16, 3/4, 13/16	7/8, 15/16, 1, 1 1/16	1 1/8, 1 3/16, 1 1/4, 1 5/16, 1 3/8	1 7/16, 1 1/2, 1 5/8	1 3/4, 1 7/8, 2	2 1/16, 2 1/8, 2 3/16	Brass Tube.
Price ...	25/6	27/-	29/-	33/-	37/-	44/-	50/-	60/-	Per set of Stocks, Dies, and Taps.

PATENT

STRAIGHT-LIP INCREASE TWIST DRILLS.

With Taper Shanks and Grinding Line, turned to Whitworth Standard Gauges.

The Shanks of these Drills are all made same size as the American Drills.



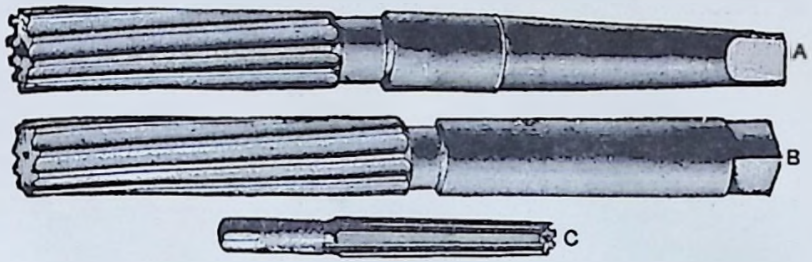
Attention is directed to the Sockets Nos. 1, 2, 3, 4, and 5. By using these all further fitting to Machine is saved.

Diam. inches.	L'ngth inches.	Price. Each. £ s. d.	Socket. No.	Socket. Price.	Diam. inches.	L'ngth inches.	Price. Each. £ s. d.	Socket. No.	Socket. Price.
1/4	6¼	0 2 0	1		1 17/32	14 3/8	0 18 6	4	
9/32	6¼	0 2 1	1		1 9/16	14½	0 19 0	4	
5/16	6¾	0 2 2	1		1 19/32	14¾	1 0 3	4	
11/32	6½	0 2 3	1		1 5/8	14¾	1 1 6	4	
3/8	6½	0 2 5	1		1 21/32	14¾	1 2 9	4	
13/32	7	0 2 7	1	5/- ea.	1 11/16	15	1 4 0	4	
7/16	7¼	0 2 10	1		1 23/32	15¼	1 7 9	4	
15/32	7⅛	0 3 1	1		1 3/4	15¼	1 11 0	4	
1/2	7¾	0 3 4	1		1 25/32	15¼	1 12 0	4	
17/32	8	0 3 8	1		1 13/16	15½	1 12 6	4	
9/16	8¼	0 4 0	1		1 27/32	15¾	1 13 1	4	14/3
19/32	8½	0 4 4	1		1 7/8	15¾	1 13 8	4	each.
5/8	8¾	0 4 9	2		1 29/32	15¾	1 14 7	4	
21/32	9	0 5 2	2		1 15/16	16	1 15 6	4	
11/16	9¼	0 5 7	2		1 31/32	16¼	1 16 9	4	
23/32	9½	0 6 1	2		2	16½	1 18 0	4	
3/4	9¾	0 6 7	2	6/6 ea.	2 1/32	16½	1 19 0	4	
25/32	10	0 7 1	2		2 1/16	16½	2 0 0	4	
13/16	10	0 7 7	2		2 3/32	16½	2 0 10	4	
27/32	10¼	0 8 1	2		2 1/8	16¾	2 1 8	4	
7/8	10¼	0 8 8	2		2 5/32	16¾	2 2 4	4	
29/32	10¼	0 9 3	2		2	16¾	2 3 0	4	
15/16	10½	0 9 10	3		2 3/16	16¾	2 4 0	5	
31/32	10¾	0 10 5	3		2 7/32	17	2 4 6	5	
1	11	0 11 0	3		2 1/4	17	2 7 0	5	
1 1/32	11	0 11 7	3		2 9/32	17	2 10 0	5	
1 1/16	11¼	0 12 2	3		2 5/16	17¼	2 12 0	5	40/-
1 3/32	11¼	0 12 9	3	8/6 ea.	2 11/32	17¾	2 15 0	5	each.
1 1/8	11¾	0 13 4	3		2 3/8	18	2 18 0	5	
1 5/32	11¾	0 14 0	3		2 13/32	18¼	3 3 0	5	
1 3/16	12	0 14 9	3		2 7/16	19	3 5 0	5	
1 7/32	12	0 15 6	3		2 15/32	19	3 13 0	5	
1 1/4	12½	0 16 4	3		2 1/2	20¼	4 0 0	5	
1 9/32	14⅝	0 17 2	4	14/3	2 17/32	20½	4 5 0	5	
1 5/16	14¾	0 18 0	4	each.	3	22	4 10 0	5	

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IMPROVED RIMERS WITH "TWIST FLUTES."

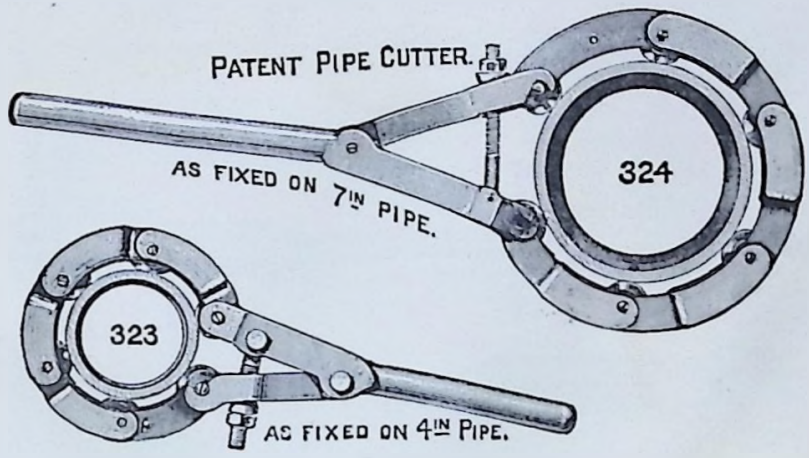
Ground up accurately to Standard Gauge after Hardening.



These Rimers are made parallel on the cutting part, but slightly tapered at the point for entering. Taper Rimers can also be supplied if required, and at same prices, and can also be supplied with straight flutes if preferred, but the "**Twist Flute**" is strongly recommended, as it makes a much smoother and more perfect hole. A is made with Taper Shanks, fitting into Standard Twist Drill Sockets, for use in Drilling Machines. C is the Fine-Fluted Pattern Engineers' Rimer for use with wrench.

Diameter in ins.	A Length Over all.	A Length Flute.	B Length Over all.	B Length Flute.	A or B Price. £	s.	d.	No. of Socket Pattern.	B Price of Socket.	C Price of either Taper or Parallel Pattern. £	s.	d.
1/8										0	2	0
5/32										0	2	0
3/16	4	2	6 3/8	1 13/16	0	5	0	1		0	2	6
5/16	4 1/2	2 1/4	6 3/8	1 13/16	0	5	6	1		0	2	6
3/8	5	2 1/2	6 1/4	2 1/8	0	6	0	1		0	3	0
7/16	5 1/2	2 3/4	7 1/4	2 3/8	0	6	6	1	5/-	0	3	3
1/2	6	3	7 1/4	2 3/8	0	7	3	1		0	3	9
9/16	6 1/2	3 1/4	8 1/4	2 7/8	0	8	0	1		0	4	6
5/8	7	3 1/2	8 1/4	2 15/16	0	8	9	2		0	5	0
11/16	7 11/16	3 13/16	9 1/4	3 3/16	0	9	6	2		0	5	6
3/4	8 1/8	4 1/16	9 1/4	3 7/16	0	10	6	2	6/6	0	6	0
13/16	9 1/16	4 1/2	10	3 9/16	0	11	6	2		0	6	6
7/8	9 11/16	4 13/16	10 1/2	3 13/16	0	12	6	2		0	7	0
15/16	10 1/4	5 1/8	10 1/4	3 1/4	0	13	6	3		0	7	6
1	10 3/8	5 3/16	11	3 7/8	0	14	6	3		0	8	0
1 1/16	11 1/4	5 3/8	11 1/4	4 1/16	0	15	6	3				
1 1/8	11 3/8	5 13/16	11 3/4	4 1/4	0	16	6	3	8/6	0	9	6
1 3/16	12	6	12	4 7/16	0	18	0	3				
1 1/4	12 1/4	6 1/8	12 1/2	4 5/8	0	19	0	3		0	10	6
1 5/16	12 7/16	6 5/16	14 1/4	4 7/8	1	2	0	4				
1 3/8	12 3/8	6 5/16	14 1/2	5 1/8	1	3	0	4		0	12	6
1 7/16	12 11/16	6 3/8	14 1/4	5 1/4	1	5	0	4				
1 1/2	13	6 1/2	15	5 3/8	1	7	0	4		0	14	0
1 9/16	13	6 1/2	15 1/4	5 1/2	1	9	0	4				
1 5/8	13	6 1/2	15 1/2	5 3/8	1	10	6	4		0	16	6
1 11/16	13 1/2	6 3/4	15 1/4	5 3/4	1	12	0	4	14/3			
1 3/4	13 1/2	6 3/4	16	5 15/16	1	13	0	4		0	19	0
1 13/16	13 1/2	6 1/4	16 1/4	6 1/16	1	14	0	4				
1 7/8	14	7	16 1/2	6 3/16	1	15	0	4		1	2	0
1 15/16	14	7	16 1/2	6 3/16	1	16	0	4				
2	14	7	16 1/2	6 3/16	1	17	0	4		1	5	0
2 1/16	14 1/4	7 1/8	18	6 1/4	2	2	0	5		1	10	0
2 1/8	14 1/2	7 1/4	18 1/2	6 1/4	2	8	0	5		1	14	0
2 3/16	14 3/4	7 3/8	19	6 1/2	2	15	0	5		1	18	0
2 1/4	15	7 1/2	19 1/2	6 3/4	3	0	0	5		2	2	0
2 3/8	15 1/4	7 3/8	20	7	3	5	0	5	40/-			
2 1/4	15 1/2	7 1/4	20 1/2	7 1/4	3	10	0	5				
2 7/8	15 3/4	7 7/8	21	7 1/2	3	15	0	5				
3	16	8	21 1/4	7 3/4	4	0	0	5				

PATENT PIPE CUTTER.



This useful tool, like the Chain Pipe Tong, is particularly useful for cutting **Cast** or **Wrought Iron** or **Steel** Pipes, and especially in the **larger sizes**. Owing to the number of cutters acting at one time, its action is **very quick**, and it can be operated in the most **limited space**.

Irregularity in shape of pipe, owing to its flexible formation, will in no way interfere with the working of cutters.

It can be supplied for cutting tubes down to ¼ inch diameter.

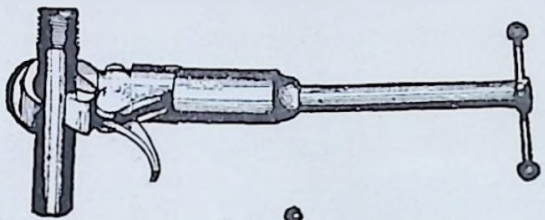
Size.	To Cut Pipes.	Price Complete. £	s.	d.	Number of Cutters.	Extra Cutters each. s.	d.
A	2 to 4	2	0	0	6	1	6
,,	2 to 6	2	15	0	8	1	6
,,	2 to 8	3	10	0	10	1	6
B	5 to 6	2	10	0	5	2	3
,,	5 to 8	3	8	0	7	2	3
,,	5 to 10	3	17	0	8	2	3
,,	5 to 13	4	15	0	10	2	3
C	12 to 14	7	0	0	9	3	3
,,	12 to 18	8	4	0	11	3	3
,,	12 to 22	9	8	0	13	3	3
,,	12 to 24	10	0	0	14	3	3

INSTRUCTIONS FOR USE.

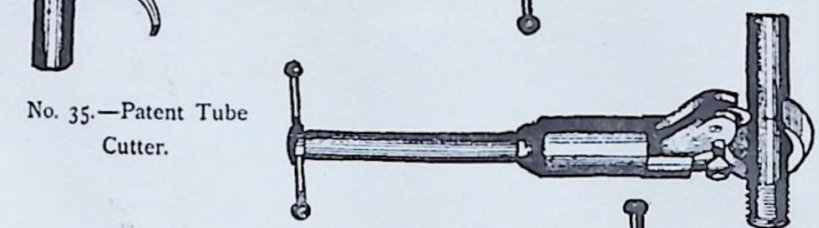
Set wheels in endless track round pipe before cutting, screw up gently, and move lever backwards and forwards until pipe is divided; well oil pins and cutting track.

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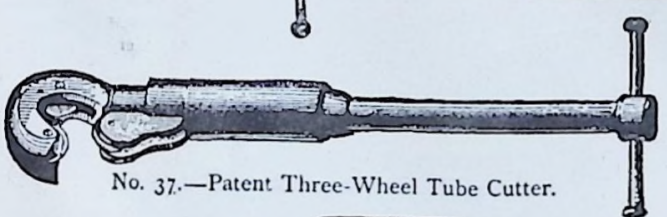
TUBE CUTTERS AND WRENCHES.



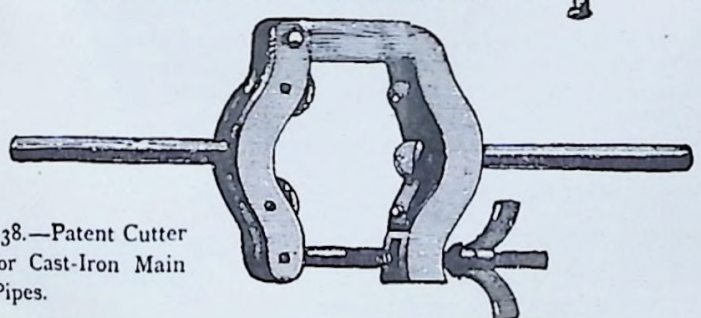
No. 35.—Patent Tube Wrench.



No. 35.—Patent Tube Cutter.



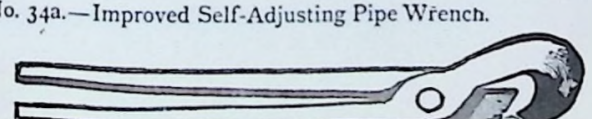
No. 37.—Patent Three-Wheel Tube Cutter.



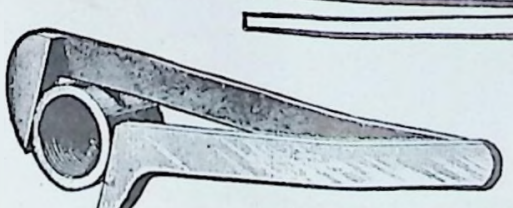
No. 38.—Patent Cutter for Cast-Iron Main Pipes.



No. 34a.—Improved Self-Adjusting Pipe Wrench.



No. 42.—Gas Tongs.



No. 50.—Patent Link Pipe Wrench.

TUBE CUTTERS AND TUBE WRENCHES.

No. 35. PATENT COMBINED TUBE CUTTER AND WRENCH.

This is the most simple and efficient combination yet introduced. With Nos. 1 and 2 all sizes of pipes can be cut off and gripped from ¼ to 2 inches.

The working parts are all enclosed and carefully hardened, and thoroughly tested before sending out. The cuts on opposite page shows its double purpose, and it can be altered from one purpose to another instantly. One Cutter, if carefully used, will cut off thousands of tubes.

No. 1	For ¼ to 1 inch Tubes	16/6 each.	Extra Cutters 1/- each.
,, 2	,, 1¼ to 2 ,, ,, ...	26/- ,,	,, ,, 1/6 ,,
,, 3	,, 2¼ to 3½ ,, ,, ...	36/6 ,,	,, ,, 1/6 ,,

No. 36. PATENT ONE WHEEL TUBE CUTTER.

To Cut	¼ to 1 inch Tubes	12/9 each.	Extra Cutters 1/- each.
,, ,,	1¼ to 2 ,, ,, ...	18/- ,,	,, ,, 1/6 ,,
,, ,,	2¼ to 3½ inch Tubes	29/- ,,	,, ,, 1/6 ,,

No. 37. PATENT THREE WHEEL TUBE CUTTER.

This Cutter works much easier than any other, and for heavy tubes is strongly recommended. It is also much quicker in its action.

To Cut	¼ to 1 inch Tubes	16/6 each.	Extra Cutters 1/- each.
,, ,,	1¼ to 2 ,, ,, ...	26/- ,,	,, ,, 1/6 ,,

No. 38. PATENT THREE WHEEL CUTTER FOR LARGE W.I. AND C.I. MAIN PIPES.

To Cut	2 to 4 inch Tubes	28/- each.	Extra Cutters 1/6 each.
,, ,,	4 to 6 ,, ,, ...	34/- ,,	,, ,, 1/6 ,,
,, ,,	5 to 8 ,, ,, ...	40/- ,,	,, ,, 1/6 ,,

No. 34a. IMPROVED SELF-ADJUSTING TUBE WRENCH.

Sizes	⅛ to ⅓	¼ to ⅜	½ to 1¼	1 to 2	1¼ to 2¼	1½ to 3	Inch Pipe and Socket
	5/6	7/-	9/-	12/-	18/-	22/-	each.

No. 42. BEST W.I. GAS TONGS.

Sizes	¼	⅜	½	¾	1	1¼	1½	1¾	2	2¼	2½	Inches.
For Pipes	17/-	21/6	25/6	30/-	35/-	42/-	56/-	60/-	65/-	73/-	82/-	per doz.
,, Socket	25/-	26/-	30/-	35/-	42/-	53/-	59/-	64/-	72/-	81/-	90/-	,,

No. 50. PATENT ADJUSTABLE TUBE WRENCH.

Length over all.	5	8	12	15	18	24	Inches.
Jaws open ...	1¼	2	3	3½	4	5	Inches dia.
Price	1/8	2/8	4/-	5/-	6/-	8/-	per pair.

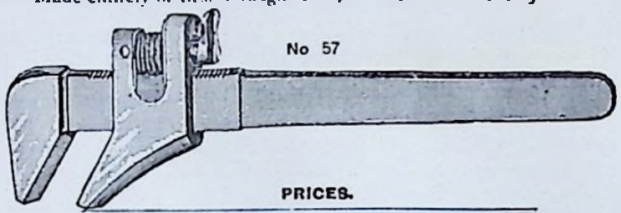
(A complete set of 6 sizes, 26/-).

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SPANNERS AND WRENCHES.

PATENT QUICKLY-ADJUSTED SPANNER.

Made entirely of Best Wrought-Iron, with Case-Hardened Jaws.



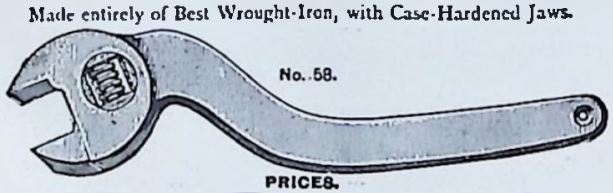
No 57

PRICES.

Sizes	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.	20 in.
Jaws open..	1¼ in.	1⅝ in.	1¾ in.	2 in.	2⅜ in.	2⅝ in.	2¾ in.
Each	7/9	9/6	11/-	12 9	14/6	16/-	17/9

CLYBURN SPANNER.

Made entirely of Best Wrought-Iron, with Case-Hardened Jaws.



No. 58.

PRICES.

Sizes	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.
Jaws open..	⅝ in.	¾ in.	1 in.	1⅛ in.	1⅜ in.	1¾ in.	2 in.
Each	5/-	6/-	7/6	9/6	12/6	14/-	16,6

BUDDING SPANNER.

Made entirely of Best Wrought-Iron, with Case-Hardened Jaws.



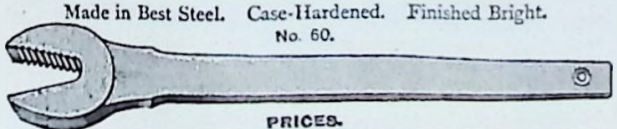
No 59.

PRICES.

Sizes	6 in.	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.	20 in.	22 in.	24 in.
Jaws open..	1 in.	1⅛ in.	1⅜ in.	1¾ in.	2 in.	2¼ in.	2⅝ in.	2¾ in.	3 in.	3⅛ in.
Each	6/-	7/-	8/6	10/-	11/6	13/-	14/6	16/-	18/-	20/-

UNIVERSAL WRENCH.

Made in Best Steel. Case-Hardened. Finished Bright.



No. 60.

PRICES.

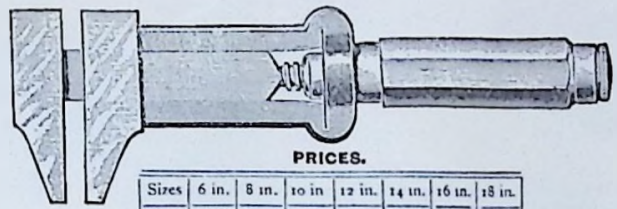
To admit ..	⅛ to ½	½ to 1	1 to 1¾	1½ to 2	2 to 3	inches.
Price	2/6	4/6	6/6	12/-	22/6	each.

Complete set, 45/-

COACH WRENCHES.

BEST DOUBLE RAILWAY COACH WRENCH.

No. 60.

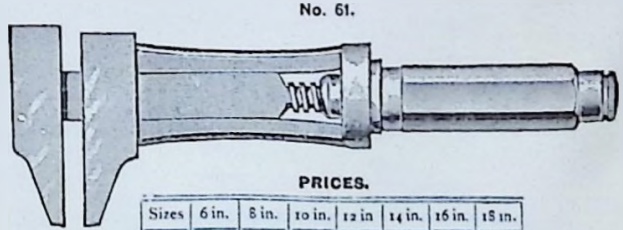


PRICES.

Sizes	6 in.	8 in.	10 in	12 in.	14 in.	16 in.	18 in.
Each	9/3	10/-	11/9	13/3	14/9	18/-	21/6

BEST DOUBLE COACH WRENCH.

No. 61.

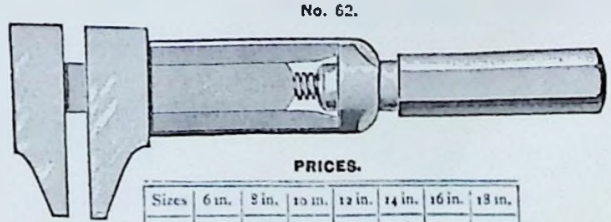


PRICES.

Sizes	6 in.	8 in.	10 in.	12 in	14 in.	16 in.	18 in.
Each	6/6	7/3	9/-	10/6	12/6	15/3	18/6

DOUBLE COACH WRENCH.

No. 62.

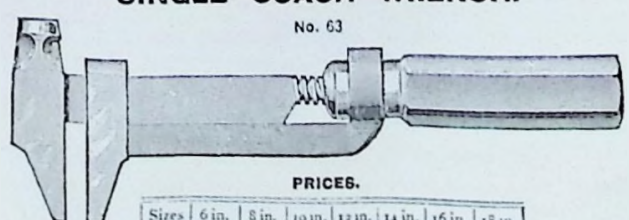


PRICES.

Sizes	6 in.	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.
Each	5/3	5/9	6/6	7/6	10/-	13/3	16/6

SINGLE COACH WRENCH.

No. 63

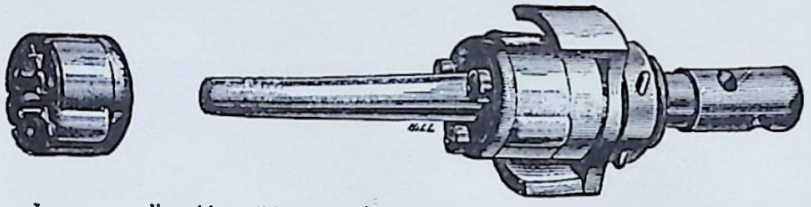


PRICES.

Sizes	6 in.	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.
Each	2/6	2/10	3/3	4/6	5/3	6/6	8/-

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IMPROVED DUDGEON'S PATENT TUBE EXPANDER.

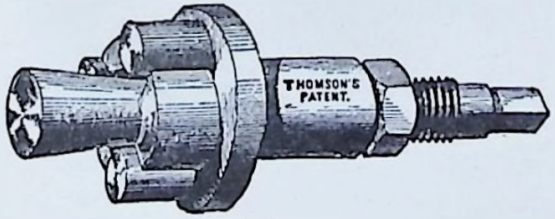


In recommending this well-known tool we guarantee all ours to be of the very best material and workmanship throughout.

Size	1	1¼	1⅜	1½	1⅝	1¾	1⅞	2	2¼	2½	2¾	3	3¼	3½	3¾	4	in
PRICE	15/-	15/-	15/-	15/-	17/6	18/9	18/9	21/-	25/-	30/-	35/-	40/-	43/9	50/-	55/-	60/-	each

These sizes refer to external diameter of Tubes.

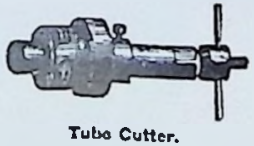
THOMSON'S PATENT TUBE EXPANDER, TUBE CUTTER, & FERRULE EXTRACTOR.



Ferrule Extractor



Tube Expander.



Tube Cutter.

PRICE OF EACH TOOL.

Size ..	1¼	1¾	1½	1⅝	1¾	1⅞	2	2¼	2½	2¾	3	3¼	3½	3¾	4	inches
PRICE	40/-	45/-	50/-	55/-	60/-	65/-	75/-	85/-	90/-	95/-	95/-	100/-	100/-	105/-	105/-	each

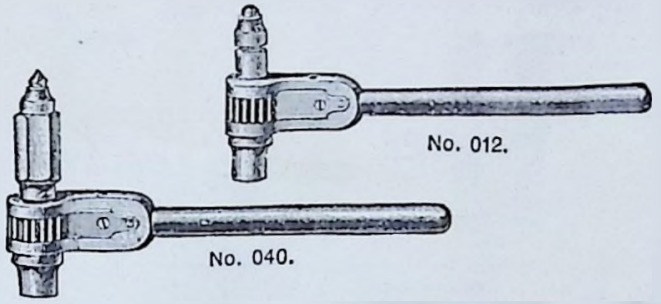
These sizes refer to external diameter of Tubes.

RATCHET SPANNER,

For use with Square-head Mandril

Size	¼	⅜	1	1¼	1½	1¾	2	2¼	2½	inches
PRICE	14/-	18/-	22/-	26/-	30/-	36/-	40/-	45/-	50/-	each

RATCHET BRACES.



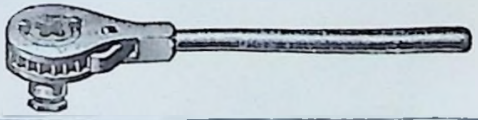
Size.	10	12	14	16	18	20	24	30	inch.
PRICE, either pattern.	10/-	12/-	14/-	16/-	18/-	20/-	24/-	30/-	each.

BEST CAST STEEL DRILLS for above :—
Assorted, ¼ in. to 1 in., 12/- ; 1⅛ in. to 1½ in., 15/- per dozen.

PATENT DOUBLE ACTION RATCHET GAS STOCK.

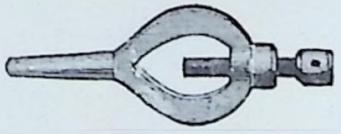
With Solid Dies for Screwing Gas Tubing, at once going over.

This Stock being single-ended, and having a Right and Left Hand Feed-motion, is specially suitable for screwing Tubing fixed in confined positions.



Sizes: To Screw	¼, ⅜, 1	⅜, 1, 1¼	1, 1¼, 1½	1¼, 1½, 2	inch.
PRICE, exclusive of Taps.	60/-	80/-	100/-	120/-	per set.

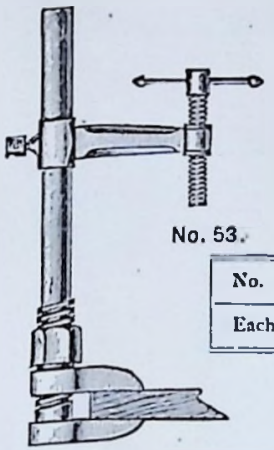
LATHE CARRIER.



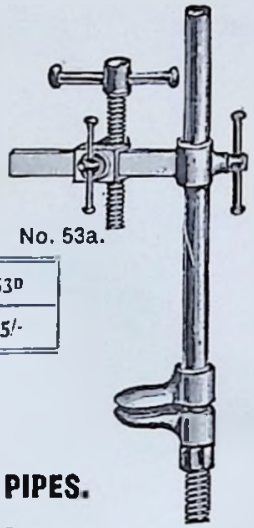
To take ...	½	¾	1	1¼	1½	1¾	2	2½	3	3½	4	5	6	ins. diam.
PRICE	2/-	2/6	3/-	4/-	5/-	6/-	8/-	10/-	12/-	15/-	18/-	21/-	25/-	each.

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DRILLING PILLARS.



No. 53.



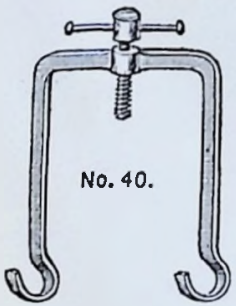
No. 53a.

PRICES.

No. ...	53	53A	53B
Each...	40/-	30/-	35/-

No. 53B is similar to No. 53A, but has larger Pillar.

CRAMP FOR DRILLING MAIN PIPES.



No. 40.

PRICES.

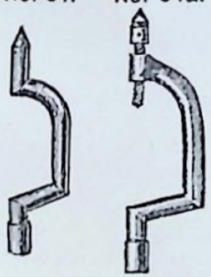
Sizes ...	2 to 4 in.	4 to 6 in.	5 to 8 in.
Each ..	21/-	28/6	36/-

WITH No. 54 CRANK BRACE.

Sizes ...	2 to 4 in.	4 to 6 in.	5 to 8 in.
Each ...	30/-	37/6	45/-

CRANK BRACES.

No. 54. No. 54a.



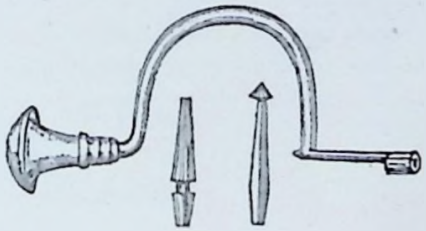
PRICES.

No. ..	54	54A
Each .	9/-	11/6

Drills charged according to size.

BEST IRON BRACE.

No. 48.



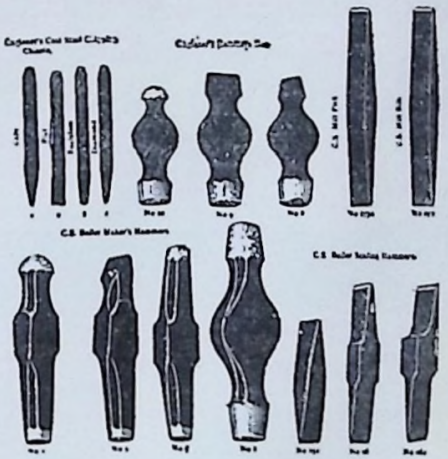
PRICES.

No. 48 Braces	Rimers.	Countersinks.
Per doz.. 55/-	17/-	8/6

Drills for above up to ¾ in., 10/- per doz.

HAND HAMMERS AND CHISELS.

BEST WARRANTED

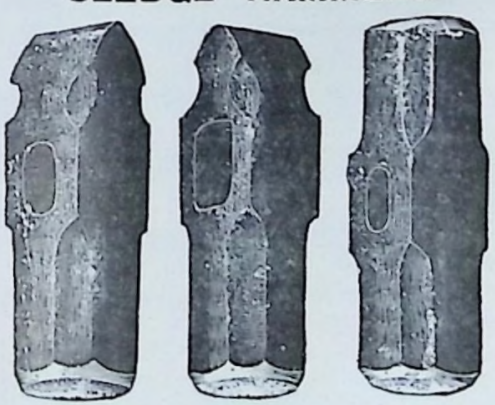


ENGLISH MAKE.

Engineers' Hand Hammers,	solid Cast Steel, Nos. 22, 9, and 8 ...	1/- per lb.
,, ,, ,,	Iron and Steel, ,, ,, ...	6d. ,,
Boiler Makers' ,,	solid Cast Steel, Nos. 2, 3, 5, and 8 ...	1/- ,,
Boiler Sealing ,,	,, ,, Nos. 05A, 06, and 06A	1/- ,,
Mill Bills and Picks	,, ,, Nos. 077, and 077A ...	1/- ,,
Engineers' Chipping Chisels	,, ,, Nos. 1, 2, 3, and 4 ...	1/- ,,

SLEDGE HAMMERS.

BEST WARRANTED

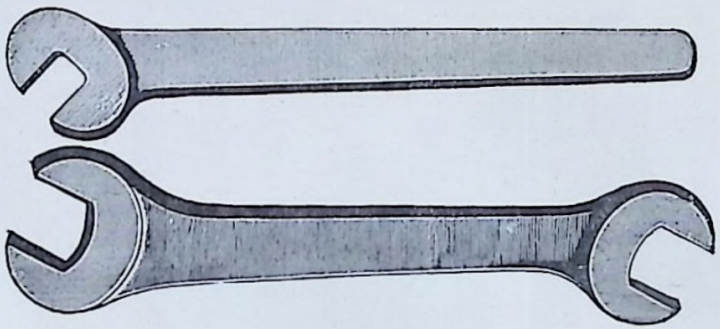


ENGLISH MAKE.

Sledge Hammers,	solid Cast Steel	1/- per lb.
,, ,,	Iron and Steel	6d. ,,

Special quotations for large quantities.

SOLID DROP-FORGED WROUGHT STEEL
SINGLE AND DOUBLE-ENDED SPANNERS.



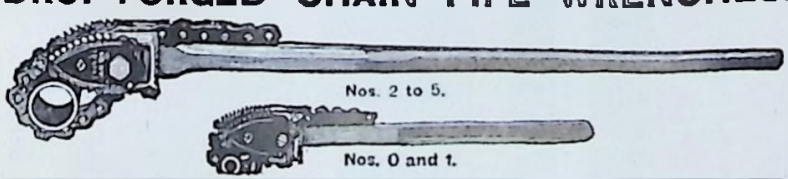
SINGLE-ENDED.

Size of Whitworth Nuts..	5/16	3/8	1/2	5/8	3/4	7/8	1	in.
PRICE of Spanners	8/-	9/-	11/-	16/-	22/-	30/-	42/-	doz.

DOUBLE-ENDED.

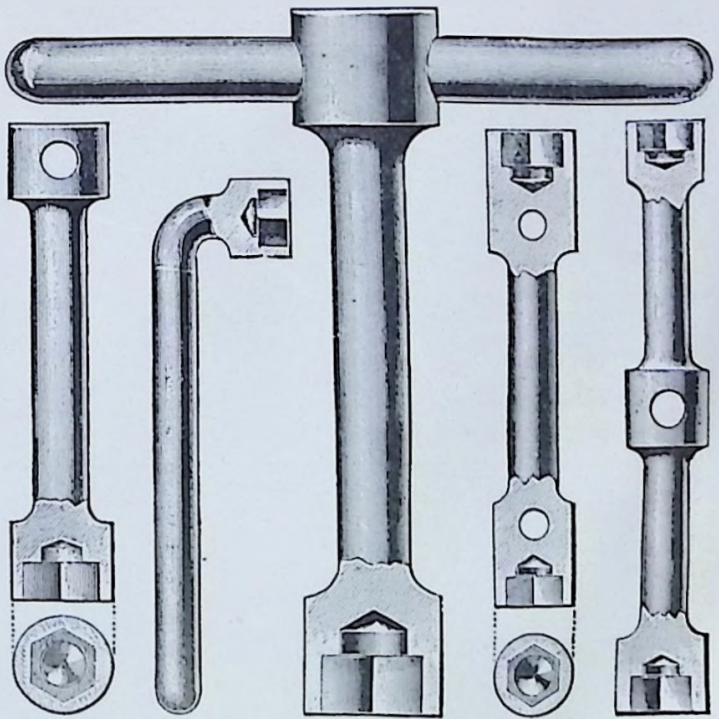
Size of Whitworth Nuts.	5/16 × 1/4	1/4 × 5/16	1/4 × 3/8	5/16 × 3/8	3/8 × 7/16	3/8 × 1/2	1/2 × 3/8	3/8 × 3/4	3/4 × 7/8	in.
PRICE ...	5/9	6/3	7/-	7/6	9/-	10/9	12/6	19/-	24/-	doz.
Size of Whitworth Nuts.	7/8 × 1	1 × 1 1/8	1 1/8 × 1 1/4	1 1/4 × 1 3/8	1 3/8 × 1 1/2	1 1/2 × 1 5/8	1 5/8 × 1 3/4	1 3/4 × 1 7/8	1 7/8 × 2	ins.
PRICE ...	30/6	43/-	54/-	62/6	77/-	91/-	97/-	116/-	135/-	doz.

PATENT
DROP-FORGED CHAIN PIPE WRENCHES.



No.	Capacity.	Length.	Price. Each.	Extra Chain. Each.	Extra Jaws. Per Pair.
0	1/8 to 3/4 in.	12 1/2 in.	10/6	3/3	4/3
1	7/8 to 1 1/2 in.	20 in.	14/6	4/3	7/6
2	1/4 to 2 1/2 in.	27 in.	23/-	6/3	11/6
3	3/4 to 4 in.	37 in.	31/6	10/6	16/9
4	1 1/2 to 8 in.	50 in.	46/-	16/9	23/-
5	2 to 14 in.	64 in.	75/-	25/-	31/6

IMPROVED BOX SPANNERS.



These Spanners are **machined out of solid steel**; they are well and strongly made to fit Whitworth Nuts; and can be made for other purposes if required.

By using these Spanners the following advantages are gained:—A perfect fit, extra strength, no defective welds, no damage to the nuts, no slipping off the nuts when in awkward positions, cheapness, high finish, and durability.

PRICES.

SINGLE ENDED.

Standard size of Whitworth Nuts. Inches.	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2
All Black. ... ... Each	1/-	1/2	1/6	1/10	2/2	3/-	4/-	5/6	7/6	8/6	10/-	11/-	12/-
" ... ... "	1/4	1/6	1/10	2/2	3/1	3/11	4/11	6/5	8/5	10/3	11/9	12/9	13/9

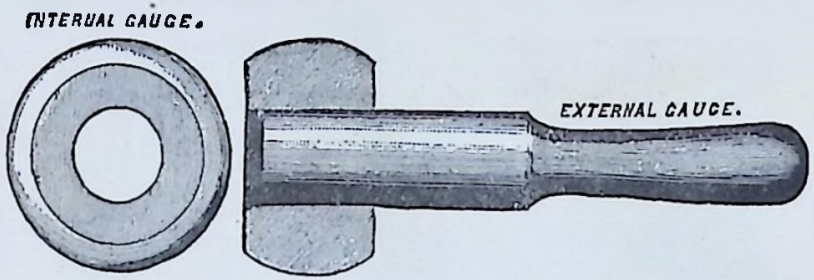
With Bright Boss and Head, 3d. to 1/- each extra, according to size.
If Bright all over, 6d. to 2/- each extra, according to size.

DOUBLE ENDED.

Size of Whitworth Nuts.	No. 4.			No. 5.		
	All Black.	Bright Bosses.	All Bright.	All Black.	Bright Bosses.	All Bright.
3/8 in. and 1/2 in. combined. Each	2/3	2/6	3/-	2/9	3/6	3/10
1/2 " " 3/4 " " "	4/6	5/-	5/8	5/-	5/9	6/6
7/8 " " 1 " " "	8/9	9/6	10/-	9/6	10/6	11/6

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STANDARD CYLINDRICAL GAUGES.



These Gauges are accurately made to the standard measure of the realm, and are guaranteed to have been tested by the Whitworth Measuring Machine to one ten-thousandth part of an inch. All Gauges up to and including 2 inch diameter are made of Steel, properly hardened and ground.

PRICES.

COMPLETE SETS OF INTERNAL AND EXTERNAL GAUGES.	£ s. d.
1/8 inch to 1 inch, advancing by 1/8 inch—8 sizes	9 3 0
1 1/8 " 2 " " 1/16 " 8 "	20 3 0
1/4 " 1 " " 1/16 " 15 "	17 1 0
1 1/16 " 2 " " 1/16 " 16 "	40 6 0
2 1/8 " 3 " " 1/8 " 8 "	18 9 0
2 1/4 " 3 " " 1/4 " 4 "	9 9 0
3 1/8 " 4 " " 1/8 " 8 "	27 3 0
3 1/4 " 4 " " 1/4 " 4 "	13 18 0

Any of the above sets can be fitted into Oak or Deal Cases, and sets differently arranged can be quoted for to specification.

SINGLE SIZES IN PAIRS: INTERNAL AND EXTERNAL.								
1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	inch.
16/-	16/-	16/-	17/-	18/-	19/-	20/-	21/-	per pair.
3/4	11/16	3/4	13/16	7/8	15/16	1		inch.
22/-	24/-	20/-	28/-	30/-	33/-	35/-		per pair.
1 1/16	1 1/8	1 3/16	1 1/4	1 5/16	1 3/8	1 7/16	1 1/2	inch.
38/-	38/-	41/-	41/-	44/-	44/-	47/-	47/-	per pair.
1 9/16	1 5/8	1 11/16	1 3/4	1 13/16	1 7/8	1 15/16	2	inch.
50/-	50/-	56/-	56/-	61/-	61/-	66/-	66/-	per pair.
2 1/8	2 1/4	2 3/8	2 1/2	2 5/8	2 3/4	2 7/8	3	inch.
39/-	41/-	43/-	45/-	47/-	49/-	51/-	54/-	per pair.
3 1/8	3 1/4	3 3/8	3 1/2	3 5/8	3 3/4	3 7/8	4	inch.
57/-	60/-	63/-	66/-	69/-	72/-	76/-	80/-	per pair.

Larger Sizes, or any Gauges, made for Foreign standards.

STANDARD STEP GAUGE.



The accuracy of these Gauges is guaranteed. They are tested by a Whitworth Measuring Machine to the standard of the realm.

Prices given below are for sizes found most useful in workshop use, but they can be made to any measure of English or foreign standards, and also marked with the English equivalent, if so desired. Prices on application.

Sizes up to and including 2 inches diameter are made in steel, and hardened.

PRICES.

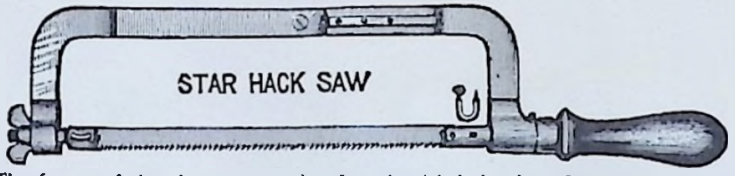
	£ s. d.
1 gauge, containing 6 sizes, 3/16 to 1/2 inch, advancing by 1/16 inch	1 7 0
1 " " 8 " 9/16 " 1 " " 1/16 "	1 17 6
1 " " 8 " 1 1/16 " 1 1/2 " " 1/16 "	3 0 0
1 " " 8 " 1 9/16 " 2 " " 1/16 "	3 14 0
1 " " 7 " 1/4 " 1 " " 1/8 "	1 15 0
1 " " 8 " 1 1/8 " 2 " " 1/8 "	3 10 0
1 " " 8 " 2 1/8 " 3 " " 1/8 "	3 12 0
1 " " 8 " 3 1/8 " 4 " " 1/8 "	5 0 0

L

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HAND HACK-SAW FRAMES,

FOR METAL.



The frames of the above are made of steel, nickel-plated, and can be used in four different directions.

PRICE, No. 1, to take 6-in. to 9-in. blades ... 4/6 each.
No. 0, ,, 10-in. ,, 12-in. ,, ... 5/6 ,,

HACK-SAW BLADES, suitable for the above.

Length ...	6	7	8	9	10	11	12 in.
PRICE ...	3/-	3/3	3/6	4/-	5/-	6/-	7/6 per doz.

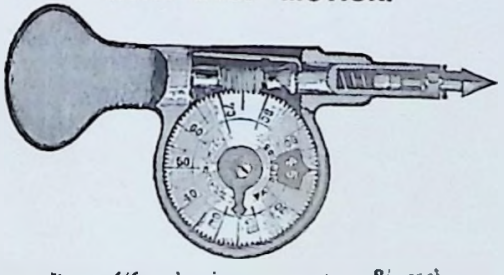
HEAVY PATTERN

HAND HACK-SAW FRAMES.

Size	6	8	9	10	12 in.
PRICE	5/-	5/3	5/6	6/-	7/- each.
Blades	8/6	8/6	8/6	9/-	12/- per doz.

PATENT SPEED-INDICATOR,

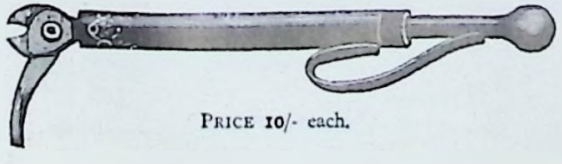
WITH STOP MOTION.



PRICE 6/6 each; in morocco case, 8/- each.

THE "VICTOR" NAIL-PULLER,

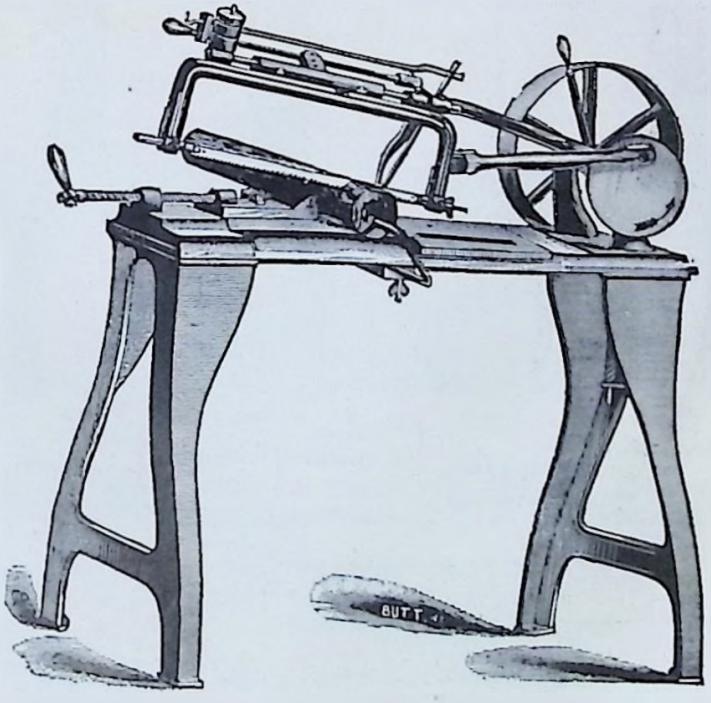
FOR EXTRACTING NAILS WITHOUT DAMAGING CASE.



PRICE 10/- each.

PATENT HACK-SAW MACHINE

FOR POWER.



This machine is designed for cutting Iron and Steel up to 4½ inches diameter; or Tubing, Brass, &c., with extra fine tooth blades. Metal can be cut by this machine more rapidly than in a lathe or cutting-off machine, and at less expense than by cutting by hand with a chisel. No attention is required after machine is started, for when piece has been cut off the saw stops automatically.

It should be driven at a speed of about 45 to 50 revolutions per minute.

PRICE.

	£ s. d.
Complete with 6 Blades	5 10 0
Adjustable Rest for long work, extra	7 6

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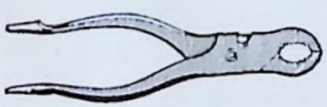
BEST QUALITY GAS PLIERS, &c.


No. 2.


No. 11.


No. 11b


No 11c


No. 43a.


No. 43b.

No.	Sizes.	6	7	8	9	10	inches.
2	Improved Cutting Pliers	25/-	38/-	50/-	70/-	95/-	Per dozen.
2A	Do. with Burner Hole	28/-	41/-	53/-	73/-	98/-	,,
11	Bell-Hangers' Pliers	26/-	46/-				,,
11B	Telegraph Pliers, Wide Hole... ...	26/-	40/-	52/-			,,
11C	Do. do.	26/-	40/-	52/-			,,
43A	Improved Gas Pliers, with Wire-cutter, Screw-driver, and Pipe-opener combined	34/-	38/-				,,
43B	Do. do. Two-hole ...	...	...	41/-	45/-	48/-	,,
	Tinman's Snips	24/-	26/-	28/-	30/-	36/-	,,

BEST QUALITY LANCASHIRE CALLIPERS AND WING COMPASSES.

No.	Sizes.	4	5	6	8	10	12	16	20	ins.
31	Egg and Pocket Callipers ...	12/-	15/-	18/-	24/-	30/-	36/-			Doz.
31B	Inside Callipers	12/-	15/-	18/-	24/-	30/-	36/-			,,
29	Inside and Outside Callipers	24/-	27/-	31/-	54/-	72/-				,,
33	Wing Compasses	21/-	21/-	24/-	30/-	36/-	54/-	68/-	74/-	,,

PATENT ALL-STEEL WRENCHES, PIPE TONGS AND GAS PLIERS.

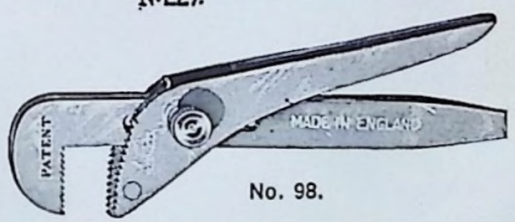
"Foot P[illegible]" Brand.

POCKET WRENCHES, 5¾ in. long.



No 227.

No.		Per doz.
227	Rough Black, opens from 3/16 in. to 1½ in.	13/6
96	Fine Black ,, 3/16 in. to 1½ in.	18/-
95	Bright ,, 3/16 in. to 1½ in.	22/-
97	Nickled Plated ,, 3/16 in. to 1½ in.	25/-

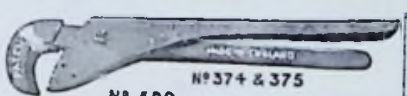


No. 98.

No. 98. WRENCHES FOR MACHINISTS, SMITHS, &c.

No.		Per doz.
98	Black, 9 in. long. Opens from ¼ in. to 2½ in.	33/-
132	Bright, 9 in. ,, ,, ¼ in. to 2½ in.	42/-
209	Black, 12 in. ,, ,, ½ in. to 3½ in.	54/-
256	Bright, 12 in. ,, ,, ½ in. to 3½ in.	72/-

SPECIAL TONGS FOR PIPES.



Nº 374 & 375

Nº 509.

No.		Doz.
374	Black, 21 in. long, to take ¼ in. to 2½ in.	156/-
375	Black, 30 in. ,, ,, 1 in. to 3½ in.	240/-
509	Black, 15 in. ,, ,, ½ in. to 1½ in.	84/-

COMBINATION PLIERS, 6 in. long.



Nº 123 Nº 127.

No		Per doz.
127	Frosted Nickel Plated ..	14/6
123	Half Bright	12/6
82	Black	12/-



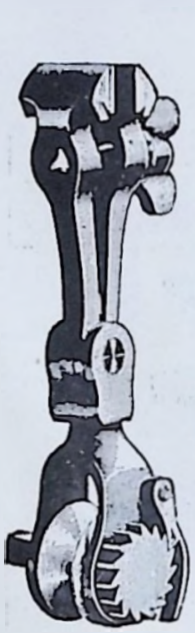
Nº 372.

WROUGHT STEEL PLIERS.

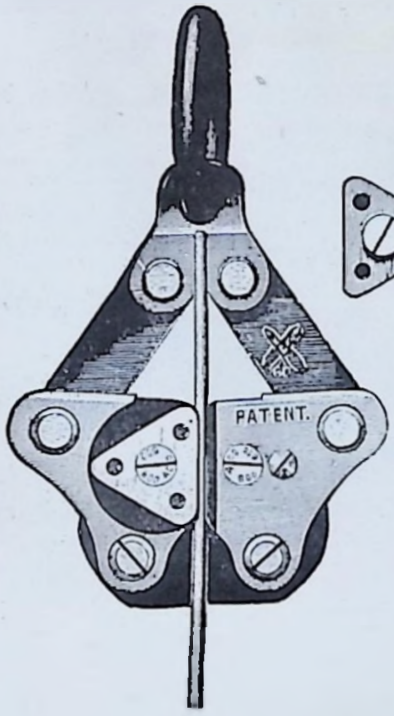
No.		Per doz.
372	5 in. Flat Nose	12/-
373	5 in. Round Nose	12/-

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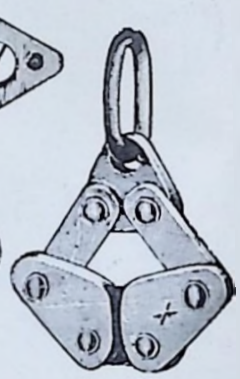
BEST QUALITY TELEGRAPH TOOLS.



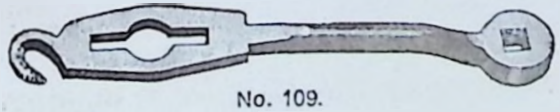
No. 102.



No. 3460.



No. 107.



No. 109.

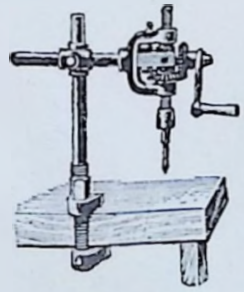
PARTICULARS AND PRICES.

No. 102	Solid Steel Draw Vice with Ratchet	20/- each.
,, 3460	Patent Draw Tongs	20/- ,,
,, 107	Dutch Draw Tongs	4/9 ,,
,, 109	Key for No. 102 Vice	2/- ,,

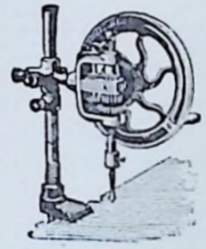
Prices of other patterns on application. For prices of Pliers, &c., see Index.

PORTABLE RADIAL DRILLING MACHINES.

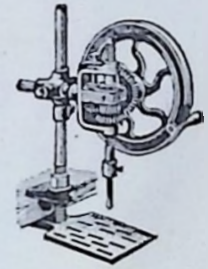
These Machines will take the place of the ordinary ratchet brace; they are much quicker in action and easier to fix, and will drill at any angle with much greater accuracy. The feed motion is self-acting, simple, effective, and easily understood, and has a quick adjustable motion for getting drill to and from work. Handle can be fixed in three different positions



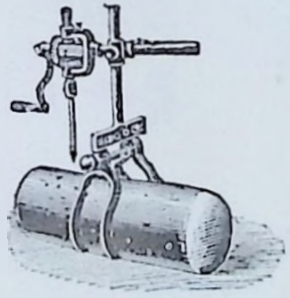
A



B



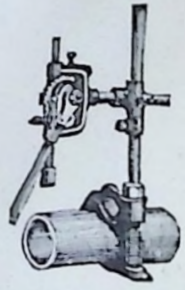
D



F



E



G

DIMENSIONS AND PRICES.

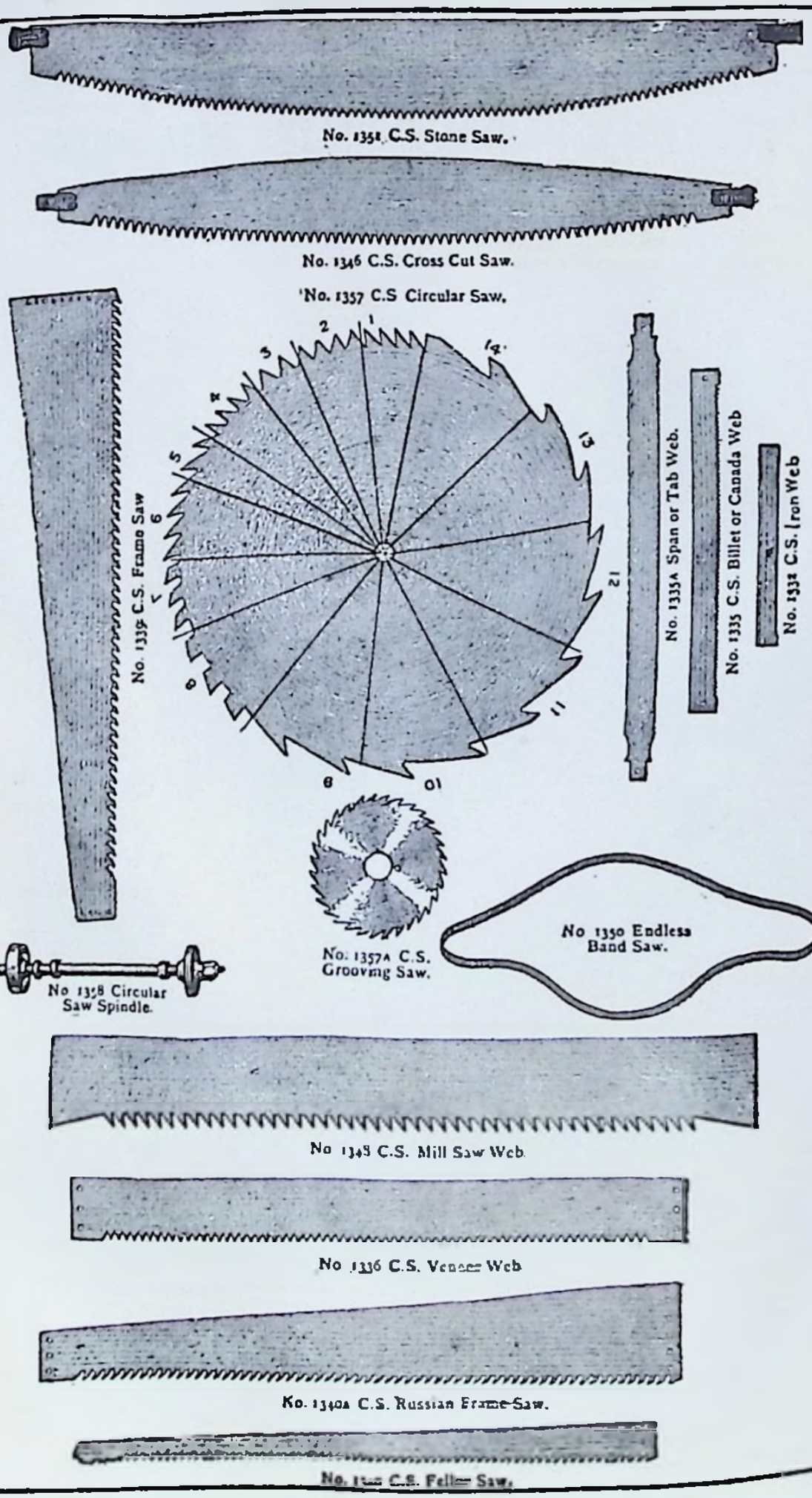
No.	Will drill up to.	Depth will drill.	A As above. £ s. d.	B Fly Wheel extra.	C As B, no wheel. Table extra.	D Fly Wheel and Table extra.	E As above, extra.	F Pipe Clips, extra.	G Ratchet Gear extra.
1	1½ in. dia.	6 ins.	5 10 0	15/-	20/-	35/-	20/-	50/-	35/-
2	¾ ,,	6 ,,	4 15 0	10/-	15/-	25/-	20/-	40/-	32 6
3	½ ,,	3 ,,	4 0 0	7 6	10/-	17 6	—	—	25/-
4	⅜ ,,	2 ,,	3 10 0	7 6	10/-	17 6	—	—	—

Each Machine is complete with six Drills and Spanners. For prices of Twist Drills, see Index.

Clips of F will take from 4 to 14 in dia., and Clips of G 9½ in., 6½ in., and 3½ in.

Prices of B, D, G include same handles as A; and C, D, E, F, G include ordinary clamps as on B.

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SAWS.

No. 1357. CAST STEEL CIRCULAR SAWS.

(Warranted to run true.)

Diameter .. inches	4	4½	5	6	7	8	9	10	12	14	16	18	20	22	24	26	28
Thickness B. Wire Gauge									17	17T	16	15	14	14T	13	13	12
PRICE each	4/6	5/-	6/-	7/-	8/-	9/6	11/-	13/-	16/-	20/-	24/-	30/-	36/-	42/-	48/-	56/-	66/-
Diameter .. inches	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	
Thickness B. Wire Gauge	12	12	12T	11	11	11T	10K	10	9E	9	8E	8	7	6	5E	5	
PRICE each	76/-	88/-	104/-	120/-	145/-	160/-	180/-	215/-	240/-	270/-	380/-						

In ordering Circular Saws, describe the shape of tooth by number of the series, and give the distance from point to point of tooth. Also give diameter of centre hole and thickness of plate B.W.G. If above gauge given, prices advance proportionately.

No. 1357A. CIRCULAR GROOVING SAWS.

Lathe-turned and cut to any form of tooth or any diameter.

Thickness	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	1	inch.
PRICE ..	2/9	3/-	3/3	3/6	3/9	4/-	4/3	4/6	5/-	5/6	6/-	6/6 per in. diameter.

No. 1356. SAW SPINDLE AND PEDESTAL.

No. 1359. SAW SPINDLE AND FRAME.

Diameter	1	1⅛	1¼	1⅜	1½	1¾	2	2⅛	2½	2⅝	3	inches.
1358 PRICE	80/-	90/-	100/-	110/-	125/-	150/-	180/-	220/-	260/-	310/-	360/-	each.
1359	200/-	210/-	220/-	240/-	260/-	280/-	310/-	350/-	390/-	350/- 400/-		..

No. 1360. PATENT ENDLESS BAND SAWS.

Size to	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½	1⅝	1¾	1⅞	2 in. wide
PRICE, sharp'd & joined	2/9	2/8	2/4	2/6	2/9	3/3	3/8	4/1	4/7	5/-	5/6	6/-	6/6 per yd.

These prices are for 19 B.W.G.; thicker sizes are charged extra

No. 1348. CAST STEEL MILL SAW WEBS,

FOR CUTTING DEAL PLANKS AND TIMBER.

Length .. 3½ 4 4½ feet			
	15 B.W.G.		
Up to 4 in. wide ..	9/6	11/-	12/-
,, 4½ in. ,, ..	10/-	11/6	12/6
,, 5 in. ,, ..	10/6	12/-	13/-

Length . 5 5½ feet		
	14 B.W.G.	
Up to 6 in. wide ..	18/6	20/6 22/-
,, 6½ in. ,, ..	19/6	21/6 23/-
,, 7 in. ,, ..	20/6	22/- 24/-

Length . 6½ 7 feet		
	13 B.W.G.	
Up to 7 in. wide ..	26/6	28/6 each
,, 7½ in. ,, ..	28/-	29/6 ,,
,, 8 in. ,, ..	29/6	32/- ,,

FRAME SAWS.

Length .. .. feet	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10	
1339 Cast Steel, PRICE, each	16/6	17/6	19/6	22/-	24/-	26/-	28/-	33/-	39/-	46/-	54/-	62/-	72/-	
1340 ,, warranted, ,,	19/-	21/-	23/-	26/-	29/-	32/-	35/-	40/-	46/-	50/-	58/-	66/-	76/-	
1340 ,, Russian, ,,			19/-	22/-	24/-	26/-	30/-							

Frame Saws exceeding 12 inches heel advance 2/- per inch extra. If set, 6d. each; if set and sharpened, 1/6 extra, net.

VENEER WEBS.

Length	3½	4	4½	5	5½	6	feet
1336 C.S. Veneer Webs	10/-	12/-	14/-	16/-	18/-	20/-	each.
1337 ,, ,, without teeth ..							

Above 4½ inches wide, to advance 1/6 per ½ inch extra gross.

No. 1340. FELLOE OR TURNING SAWS.

Length	4½	5	5½	6	6½	7	feet.
PRICE	9/-	10/-	12/-	14/-	16/-	18/-	each

No. 1335. BILLET OR CANADA WED SAWS.

Length	28	30	32	34	36	39	42	45	48	51	54	57	60	inches.
PRICE	35/-	39/-	44/-	46/-	54/-	61/-	66/-	79/-	103/-	109/-	113/-	133/-	140/-	per doz.

No. 1335A. SPAN OR TAB WED SAWS.

Length	12	14	16	18	20	22	24	26	28	30	32	34	36	inches.
PRICE	28/-	31/-	34/-	37/-	30/-	33/-	36/-	39/-	42/-	45/-	48/-	51/-	54/-	per doz.

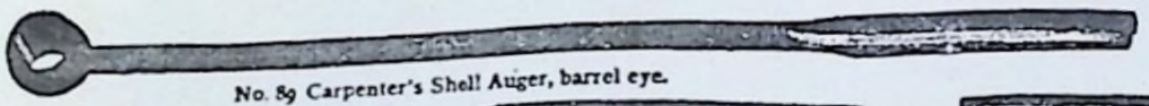
No. 1332. WEDS FOR CUTTING IRON OR BRASS.

Length	8	9	10	11	12	13	14	15	16	inches.
PRICE	10/-	11/-	12/-	13/-	14/-	15/-	16/-	17/-		per doz.

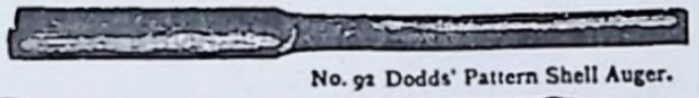
CROSS-CUT SAWS (for Timber and Stone).

Length .. .. feet	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10
1345 Cross-cut C.S., PRICE, each	13/-	15/-	18/-	19/-	22/-	24/-	26/-	30/-	39/-	45/-	54/-	62/-	72/-
1347 ,, warranted, ,,	14/-	16/-	19/-	20/-	24/-	25/-	28/-	34/-	42/-	48/-	58/-	66/-	76/-
1351 Stone Saw, ,,			24/-	25/-	28/-	31/-	34/-	38/-	43/-				

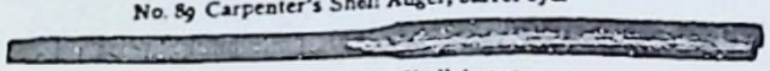
AUGERS AND BITS.



No. 89 Carpenter's Shell Auger, barrel eye.



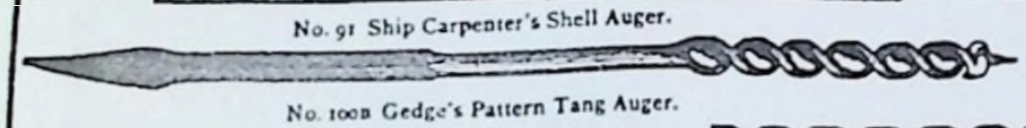
No. 92 Dodds' Pattern Shell Auger.



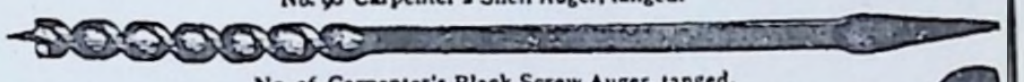
No. 91 Ship Carpenter's Shell Auger.



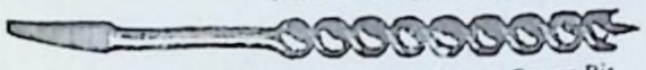
No. 90 Carpenter's Shell Auger, tanged.



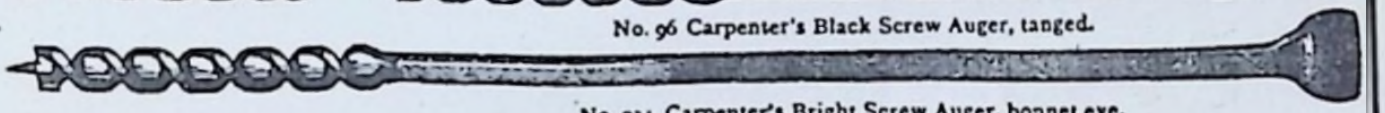
No. 100B Gedge's Pattern Tang Auger.



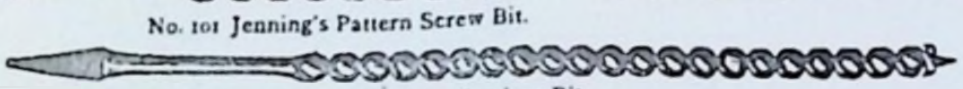
No. 96 Carpenter's Black Screw Auger, tanged.



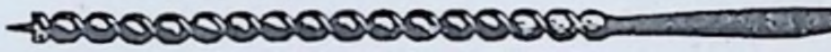
No. 101 Jenning's Pattern Screw Bit.



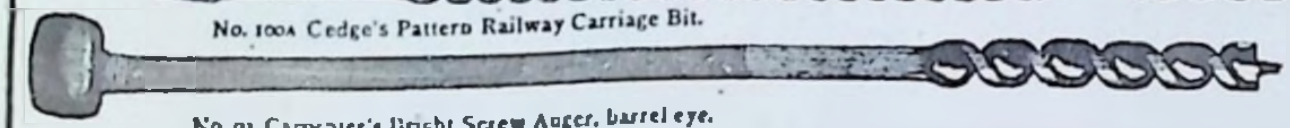
No. 93A Carpenter's Bright Screw Auger, bonnet eye.



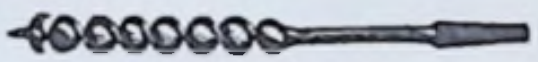
No. 100A Gedge's Pattern Railway Carriage Bit.



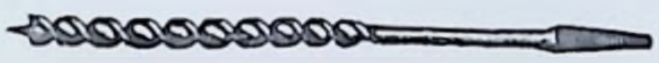
No. 103 Leadbeater's Pattern Black Wagon Bit.



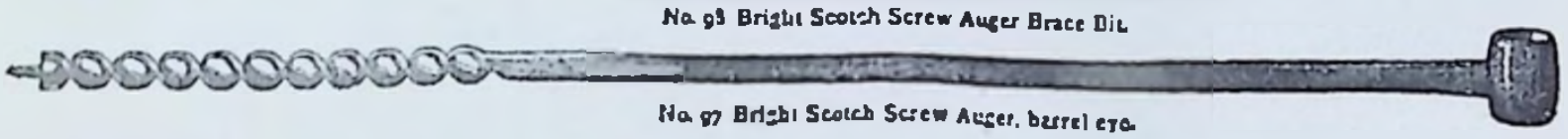
No. 93 Carpenter's Bright Screw Auger, barrel eye.



No. 93 Gedge's Pattern Screw Bit



No. 98 Bright Scotch Screw Auger Brace Bit.



No. 97 Bright Scotch Screw Auger, barrel eye.

CARPENTERS' AUGERS, 1 in., 18 in. LONG UP TO EYE.

						⅛	⅙	⅜	¼	⅝	1	1⅛	1¼	1⅜	1½	1⅝	1¾	1⅞	2	2¼	2½	2¾	3	inches.
89	Carpenters' Shell Auger, barrel eye, 12 in.-shank					14/6	14/6	16/-	19/6	21/-	24/-	26/6	32/-	35/-	40/-	43/-	50/6	55/-	65/-						per dozen.
89A	Ditto	ditto	bonnet do	ditto		12/6	12/6	14/-	17/6	19/-	21/6	24/-	29/6	32/6	37/6	40/6	48/-	52/-	62/-						,,
90	Ditto	ditto	tanged			9/-	9/-	10/6	13/6	15/-	17/-	18/6	23/-	25/-	30/-	32/-	38/6	42/-	51/-						,,
91	Ship Carpenters' Shell Auger					11/6	11/6	13/-	16/-	18/6	21/6	25/6	28/-	31/-	36/6	39/-	44/-	48/-	60/-						,,
92	Dodd's Pattern Shell Auger					9/-	9/-	10/6	13/6	15/-	17/-	18/6	23/-	25/-	30/-	32/-	38/6	42/-	51/-						,,
93	Carpenters' Bright Screw Auger, barrel eye, 12-in. shank					20/6	20/6	22/6	25/6	28/-	31/6	35/6	40/-	46/-	51/6	56/6	61/6	72/-	78/-						,,
93A	Ditto	ditto	ditto	bonnet do.	ditto	18/6	18/6	20/6	23/6	26/-	29/-	33/-	37/6	43/6	49/-	54/-	59/-	69/-	75/-						,,
94	Ditto	Black	ditto	barrel do.	ditto	18/-	18/-	19/6	22/-	24/6	28/-	31/6	35/-	38/6	44/6	49/-	53/6	63/-	69/-						,,
94A	Ditto	ditto	ditto	bonnet do.	ditto	16/-	16/-	17/6	20/-	22/6	25/6	29/-	32/6	36/-	42/-	46/6	51/-	60/-	66/-						,,
95	Ditto	Bright	ditto	tanged	..	15/6	15/6	16/6	19/6	22/-	24/6	27/6	31/-	36/-	41/-	45/6	49/6	59/-	64/-						,,
96	Ditto	Black	ditto	ditto	..	13/-	13/-	14/-	16/-	18/6	21/-	23/6	26/-	28/6	34/-	38/-	41/6	50/-	55/-						,,
	Any of the above with Bright Noses					3/-	3/-	3/6	4/-	4/6	5/-	5/6	6/-	6/6	7/-	7/6	8/-	9/-	10/-					per	doz. extra.
97	Bright Scotch Screw Auger, barrel eye					23/-	23/-	26/-	31/6	34/6	39/-	43/6	50/-	53/6	60/-	64/-	72/-	77/-	85/-	126/-	160/-	220/	284/-	per dozen.	
97A	Ditto	ditto	bonnet do.			21/-	21/-	24/-	29/6	32/6	36/6	41/-	47/6	51/-	57/6	61/6	69/6	74/-	82/-						,,
97B	Black	ditto	barrel do.			20/6	20/6	23/6	28/-	31/6	36/-	38/6	42/-	51/-	56/-	59/-	67/-	73/6	80/-						,,
97C	Ditto	ditto	bonnet do.			18/6	18/6	21/6	26/-	29/6	33/6	36/-	39/6	48/6	53/6	56/6	64/6	70/6	77/-						,,
97D	Bright	ditto	tanged			18/-	18/-	20/6	25/6	28/6	32/-	35/6	41/-	43/6	49/6	53/-	60/-	64/-	71/-						,,
97E	Black	ditto	ditto			15/6	15/6	18/-	22/-	25/6	29/-	30/6	33/-	41/-	45/6	48/-	55/-	60/6	66/-						,,
	Any of the above with Bright Noses					4/-	4/-	4/6	5/-	5/6	6/-	6/6	7/-	7/6	8/-	9/-	10/-	11/-	12/-	per	doz.	extra			,,
	Any of the above with Trace Spur, or Nicker					3/-	3/-	3/-	3/5	3/6	4/-	4/6	5/-	6/-	7/-	8/-	9/-	11/-	12/-						,,

BRACE AUGER BITS, BRIGHT AND BLACK.

Augers above length named in List charged extra per inch.

						¼	5/16	⅜	7/16	½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1	1 1/16	1 1/8	1 3/16	1 ¼	1 5/16	1 ⅜	inches.
98	Bright Scotch Screw Auger Brace Bits, ¼ in., 8 in. long					18/-	18/-	18/-	18/-	18/-	20/-	22/-	24/-	24/-	25/6	27/-	30/-	30/-	34/-	38/-	43/-	48/-			per dozen.
	Black insides and bright on edge					16/6	16/6	16/6	16/6	16/6	18/-	20/-	22/-	22/-	23/-	24/6	27/-	27/-	30/6	34/6	39/-	44/-			,,

GEDGE'S, JENNING'S, AND LEADBEATER'S PATTERN AUGERS AND BITS.

																										ins
						¼	5/16	⅜	7/16	½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1	1 1/16	1 1/8	1 3/16	1 ¼	1 5/16	1 ⅜	1 7/16	doz.
99	Gedge's Pattern Screw Bits, ¼ in., 8 in. long					20/-	20/-	20/-	20/-	20/-	22/-	24/-	26/-	28/-	29/-	30 6	32 6	35/-	37/-	39/-	42/-	44/-	49/-	54/-		,,
100	Do.	do.	Dowell Bits, 1½ in., and 4 in. long			20/-	20/-	20/-	20/-	20/-	22/-	24/-	25/-	28/-	29/-	30 6	32 6	35/-								,,
100A	Do.	do.	Railway Carriage Bits, 1 in., 10 in. barrel					35/6	36/-	38/-	39/-	40 6	41 6	43/-	45/-	47/-	42/-	52/-	54/6	59/-	62/6	65/6	75/6	78/-		,,
100B	Do.	do.	Tang Augers, 1 in., with 6-in. twist or screw					24/-	24/-	24/-	28/-	28/-	32 6	32 6	34 6	34 6	39/-	39/-	42/-	45/-	47/6	50/-	54/-	58/-	72/-	,,
100C	Do.	do.	Eyed Auger, 12 in. shank, 1 in., 6 in. screw or twist					31 6	31 6	31 6	35 6	35 6	41 6	42 6	43 6	43 6	49/-	49/-	52 6	56 6	61 6	65/-	69/-	73/6	90/-	,,
100D	Do.	do.	Scotch Augers, 1 in., 8 in. screw or twist, 17-in. shank, barrel-eyed, full length up to eye, 25 in.					37/-	37/-	37/-	41 6	41 6	49 6	49 6	54 6	54 6	62/-	62/-	67/-	67/-	77/6	77/6	83/6	92,6	108/-	,,
101	Jenning's Pattern Screw Bits					24/-	24/-	24/-	26/-	28/-	31/-	34/-	37/-	40/-	44/-	47/-	50/-	53/6		70/-		80/-	90/-	100/-	124/-	,,
102	Do.	do.	Dowell Screw Bits			24	24	24/-	26,	28	31/-	34/-	37/-	40/-	44/-	47.	50	53 6		70/-		80/-	90/-	100/-	124/-	,,
103	Leadbeater's Pattern Black Wagon Bits, bright edges, 1 in., 10-in. barrel or twist					27/6	27/6	27 6	28/-	30/-	31/-	32 6	33 6	34 6	35 6	37/-	38 6	41/-	43/-	46 6	48/6	52/-	20/-	68/-	164/-	,,
103A	Leadbeater's Pattern Wagon Bits, bright all through, 1 in., 10-in. barrel or twist					32 6	32 6	32 6	33/-	35/-	36/-	37/6	38 6	39 6	41 6	43/-	45/-	48/-	50/-	56/6	56/6	60/-	70/-	80/-	204/-	,,
103B	Gedge's Pattern Nose Black Wagon Bits, bright edge, 10-in. barrel					30 6	30 6	30 6	30 6	32 6	33 6	35/-	36/-	37/-	38/-	40/-	42/-	44 6	47/-	50/-	52/6	56/6	65/-	74/-	184/-	,,
103C	Do.	do.	Nose Bright Wagon Bits			34 6	34 6	34 6	35/-	37	38/-	39 6	40 6	42/-	44/-	46/-	42/-	52/-	53 6	58/-	60/6	64/6	74/-	80/-	204/-	,,

Bell's Asbestos Co., Limited, Southwark, London. 155

FILES AND RASPS.

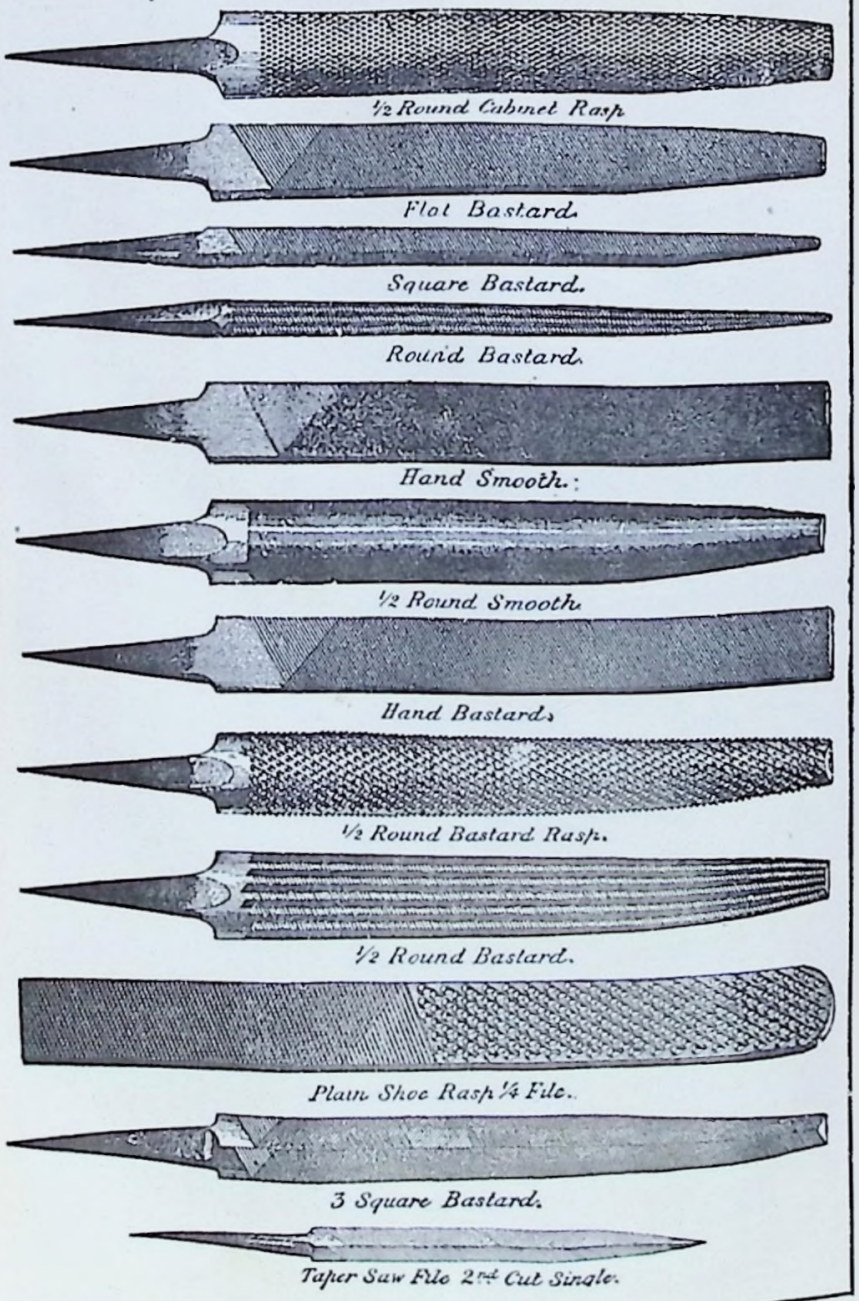
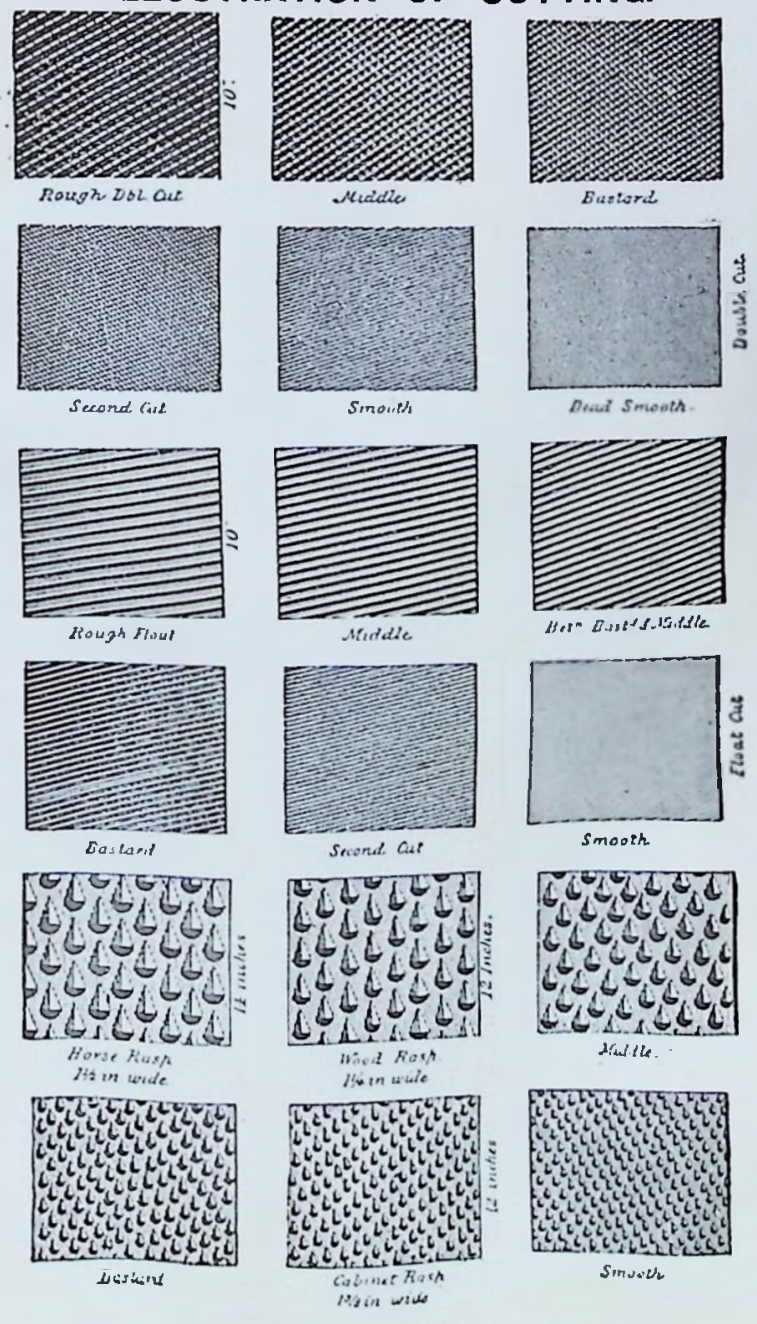


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FILES.

Flat, Half-round, Square, Round, Entering, Taper Cotter, Horse, Shoe, Flat, and Half-round Rasps. Mill Saws, one or two Square Edges, Single and Double Cut. Topping Files, Single and Double, left at Point, and Safe Edges.

In.	Rough and Bastard. Per Doz. £ s. d.	2nd Cut, Flat and ½ Round Gunstock & Round Rasps. Per Doz. £ s. d.	Smooth and Cabinet Files and Rasps. Per Doz. £ s. d.	Dead Smooth and extra Smooth Cabinets. Per Doz. £ s. d.
1-4	0 4 9	0 5 6	0 6 9	0 10 3
4½	0 5 3	0 6 0	0 7 6	0 11 3
5	0 5 9	0 6 9	0 8 3	0 12 6
5½	0 6 3	0 7 6	0 9 0	0 13 6
6	0 7 0	0 8 3	0 9 6	0 14 6
6½	0 7 6	0 8 9	0 10 6	0 15 9
7	0 8 6	0 9 9	0 11 6	0 17 6
7½	0 9 6	0 10 9	0 12 3	0 18 6
8	0 10 6	0 12 0	0 13 6	1 0 0
8½	0 11 0	0 12 9	0 14 6	1 2 0
9	0 12 0	0 13 6	0 15 6	1 3 6
9½	0 13 6	0 15 3	0 17 0	1 5 6
10	0 15 0	0 17 0	0 19 0	1 8 6
10½	0 16 6	0 18 6	1 0 6	1 11 0
11	0 18 0	1 0 0	1 3 0	1 15 0

In.	Rough and Bastard. Per Doz. £ s. d.	2nd Cut, Flat and ½ Round Gunstock & Round Rasps. Per Doz. £ s. d.	Smooth and Cabinet Files and Rasps. Per Doz. £ s. d.	Dead Smooth and extra Smooth Cabinets. Per Doz. £ s. d.
11½	1 0 0	1 2 0	1 5 0	1 18 0
12	1 1 6	1 4 0	1 6 6	2 0 0
12½	1 3 0	1 5 6	1 8 0	2 2 0
13	1 5 0	1 7 0	1 10 0	2 5 0
14	1 10 0	1 13 0	1 16 0	2 14 0
15	1 16 0	1 19 0	2 2 0	3 3 0
16	2 3 0	2 7 0	2 12 0	3 18 0
17	2 10 0	2 15 0	3 3 0	4 14 0
18	3 0 0	3 5 0	3 14 0	5 11 0
19	3 8 0	3 15 0	4 4 0	6 6 0
20	4 1 0	4 9 0	4 19 0	7 9 0
21	4 13 0	5 1 0	5 13 0	8 10 0
22	5 6 0	5 15 0	6 8 0	9 12 0
23	6 1 0	6 12 0	7 6 0	11 0 0
24	7 0 0	7 11 0	8 6 0	12 10 0

EXTRAS.—All above 24 in., 20s. per in. extra. Flat Files, double cut on the edge, to advance ½ in. Topping, Square Cut Edges, to advance ½ in. Mill Saw, two Round Edges, advance ½ in. Feather Edge and Knife Files, to advance ½ in.

Three-square, Hand, Equalling one Safe Edge, Parallel Cotter, Pillar, Needle, Round-off, Bone, Pettance, one Round Edge Flat, Extra Thin Flat and Warding, and Flat and High Back Half-round.

In.	Rough and Bastard. Per Doz. £ s. d.	2nd Cut. Per Doz. £ s. d.	Smooth. Per Doz. £ s. d.	Dead Smooth. Per Doz. £ s. d.
1-4	0 5 3	0 6 0	0 7 6	0 11 3
4½	0 5 9	0 6 9	0 8 3	0 12 6
5	0 6 3	0 7 6	0 9 0	0 13 6
5½	0 7 0	0 8 3	0 9 6	0 14 6
6	0 8 6	0 9 9	0 11 6	0 17 6
6½	0 9 6	0 10 9	0 12 3	0 18 6
7	0 10 6	0 12 0	0 13 6	1 0 0
7½	0 11 0	0 12 9	0 14 6	1 2 0
8	0 12 0	0 13 6	0 15 6	1 3 6
8½	0 13 6	0 15 3	0 17 0	1 5 6
9	0 15 0	0 17 0	0 19 0	1 8 6
9½	0 16 6	0 18 6	1 0 6	1 11 0
10	0 18 0	1 0 0	1 3 0	1 15 0
10½	1 0 0	1 2 0	1 5 0	1 18 0
11	1 1 6	1 4 0	1 6 6	2 0 0

In.	Rough and Bastard. Per Doz. £ s. d.	2nd Cut. Per Doz. £ s. d.	Smooth. Per Doz. £ s. d.	Dead Smooth. Per Doz. £ s. d.
11½	1 3 0	1 5 6	1 8 0	2 2 0
12	1 5 0	1 7 0	1 10 0	2 5 0
12½	1 8 0	1 10 0	1 13 0	2 10 0
13	1 10 0	1 13 0	1 16 0	2 14 0
14	1 16 0	1 19 0	2 2 0	3 3 0
15	2 3 0	2 7 0	2 12 0	3 18 0
16	2 10 0	2 15 0	3 3 0	4 14 0
17	3 0 0	3 5 0	3 14 0	5 11 0
18	3 8 0	3 15 0	4 4 0	6 6 0
19	4 1 0	4 9 0	4 19 0	7 9 0
20	4 13 0	5 1 0	5 13 0	8 10 0
21	5 6 0	5 15 0	6 8 0	9 12 0
22	6 1 0	6 12 0	7 6 0	11 0 0
23	7 0 0	7 11 0	8 6 0	12 10 0
24	7 19 0	8 12 0	9 8 0	14 2 0

EXTRAS.—All above 24 in., 20s. per in. extra. Pit Files and Tanged Horse Rasps, to advance 1 in. Round-off, with points, to advance 1 in. Needle exceeding breadth of Hand Files, as Equalling cut on both edges. Equalling and Cutter Files, extra thin, to advance 1 in.

Hand and Equalling cut both Edges, or with one Double Cut Edge, Flat with two Round Edges. Lock, Arch, Rifler, Tumbler, Oval Saw Files, Cant, Taper Cross, Bellied Three Square. Double Tanged Mill Saw, Topping two Round Edges.

In.	Rough and Bastard. Per Doz. £ s. d.	2nd Cut. Per Doz. £ s. d.	Smooth. Per Doz. £ s. d.	Dead Smooth. Per Doz. £ s. d.
1-4	0 6 3	0 7 6	0 9 0	0 13 6
4½	0 7 0	0 8 3	0 9 6	0 14 6
5	0 7 6	0 8 9	0 10 6	0 15 9
5½	0 8 6	0 9 9	0 11 6	0 17 6
6	0 9 6	0 10 9	0 12 3	0 18 6
6½	0 10 6	0 12 0	0 13 6	1 0 0
7	0 11 0	0 12 9	0 14 6	1 2 0
7½	0 12 0	0 13 6	0 15 6	1 3 6
8	0 13 6	0 15 3	0 17 0	1 5 6
8½	0 15 0	0 17 0	0 19 0	1 8 6
9	0 16 6	0 18 6	1 0 6	1 11 0
9½	0 18 0	1 0 0	1 3 0	1 15 0
10	1 0 0	1 2 0	1 5 0	1 18 0
10½	1 1 6	1 4 0	1 6 6	2 0 0
11	1 3 0	1 5 6	1 8 0	2 2 0

In.	Rough and Bastard. Per Doz. £ s. d.	2nd Cut. Per Doz. £ s. d.	Smooth. Per Doz. £ s. d.	Dead Smooth. Per Doz. £ s. d.
11½	1 5 0	1 7 0	1 10 0	2 5 0
12	1 7 0	1 10 0	1 13 0	2 10 0
12½	1 10 0	1 13 0	1 16 0	2 14 0
13	1 13 0	1 16 0	1 19 0	3 3 0
14	1 19 0	2 3 0	2 8 0	3 18 0
15	2 6 0	2 11 0	2 18 0	4 14 0
16	2 15 0	3 0 0	3 7 0	5 11 0
17	3 4 0	3 10 0	3 19 0	6 18 0
18	3 14 0	4 2 0	4 11 0	8 0 0
19	4 7 0	4 15 0	5 6 0	9 0 0
20	5 0 0	5 8 0	6 0 0	10 6 0
21	5 14 0	6 3 0	6 16 0	11 16 0
22	6 11 0	7 1 0	7 16 0	13 14 0
23	7 10 0	8 1 0	9 2 0	15 12 0
24	8 8 0	9 2 0	10 8 0	

EXTRAS.—All above 24 in., 20s. per in. extra. Hand and Equalling with 1 Round Edge, advance ½ in.; with 2 Round Edges, advance 1 in.; if double cut, 2 in. Two-tanged Mill Saw, 1 Round Edge, advance ½ in.; 2 Round Edges, advance 1 in.

SAW FILES.

Inches	TAPER SAW FILES. Single Cut Single. Per Doz. £ s. d.	Double Cut Double. Per Doz. £ s. d.	Smooth Single. Per Doz. £ s. d.	PIT SAW FILES AND GULLETING. Single Cut Single. Per Doz. £ s. d.	Double Cut Double. Per Doz. £ s. d.	Blunt, Segment Saw Files, and Taper cut to Point. Bastard Single or Double Cut Single. Per Doz. £ s. d.	Blunt, and Cut Double, Gin Saw, and Band Saw, and Cut Single. Per Doz. £ s. d.
1 to 3½	0 4 0	0 4 9	0 5 6	0 4 9	0 5 9	0 5 0	0 6 6
4	0 4 6	0 5 3	0 6 0	0 5 3	0 6 3	0 5 6	0 7 6
4½	0 5 0	0 6 0	0 6 3	0 5 9	0 6 9	0 6 6	0 8 6
5	0 5 6	0 6 6	0 7 0	0 6 6	0 7 6	0 7 6	0 9 6
5½	0 6 6	0 7 6	0 8 0	0 7 6	0 8 6	0 8 6	0 10 6
6	0 7 6	0 8 6	0 9 0	0 8 6	0 9 6	0 9 6	0 12 0
6½	0 8 6	0 9 6	0 10 0	0 9 6	0 10 6	0 10 6	0 13 6
7	0 9 6	0 11 0	0 11 0	0 10 6	0 12 0	0 12 0	0 15 6
7½	0 10 6	0 12 0	0 12 6	0 12 0	0 13 6	0 13 6	0 17 6
8	0 12 0	0 13 6	0 14 0	0 13 6	0 14 6	0 15 6	0 19 6
8½	0 13 6	0 15 0	0 15 6	0 14 6	0 16 6	0 17 6	1 1 6
9	0 15 6	0 17 6	0 17 0	0 16 6	0 17 6	0 19 6	1 4 0
9½	0 17 6	0 19 6	0 19 6	0 18 0	0 19 6	1 1 6	1 6 0
10	0 19 6	1 1 0	1 1 0	1 0 0	1 2 0	1 4 0	1 9 0
11	1 4 0	1 6 0	1 6 0	1 5 0	1 7 0	1 7 0	1 14 0
12	1 9 0	1 11 0	1 11 0	1 10 0	1 12 0	2 0 0	
13	1 14 0	1 17 0	1 17 0	1 16 0	1 19 0		
14	2 0 0	2 3 0	2 3 0	2 3 0	2 6 0		

REAPER KNIFE FILES.

In.	PLAIN AND SWAGED. Single. Per Doz. £ s. d.	Double. Per Doz. £ s. d.	KNIFE SHAPE. Single. Per Doz. £ s. d.	Double. Per Doz. £ s. d.	CANT SHAPE. Single. Per Doz. £ s. d.	Double. Per Doz. £ s. d.
7	0 8 6	0 9 0	0 8 6	0 9 6	0 12 6	0 13 6
8	0 9 3	0 10 0	0 9 6	0 10 6	0 13 6	0 14 9
9	0 11 6	0 12 9	0 11 9	0 13 3	0 16 3	0 17 6
10	0 13 6	0 15 6	0 13 9	0 16 0	0 19 0	1 1 3

EXTRAS.

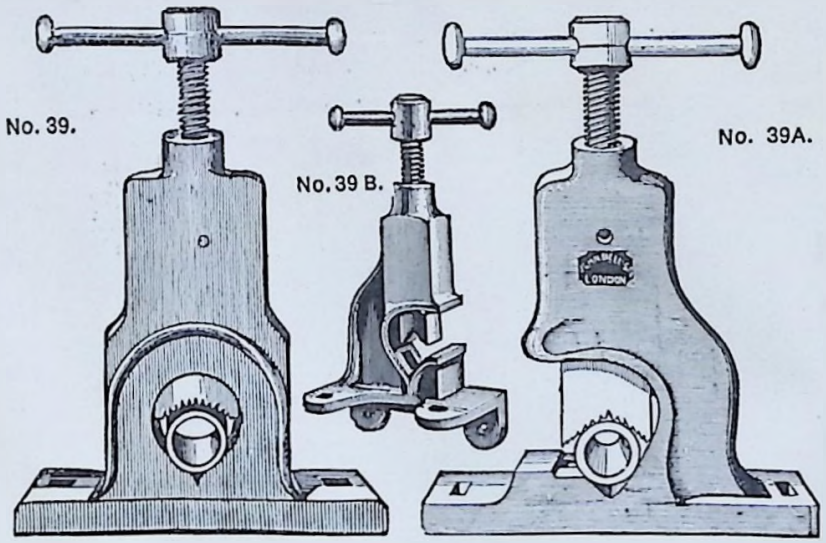
Rubbers, Rough and Bastard ..... 1/3 per lb.
Do. Second Cut ..... 1/5 "
Do. Smooth ..... 1/7 "

	Rough and Bastard.	2nd Cut.	Smooth.
1 lb. Rubber	1/3 per lb.	1/9 per lb.	1/10 per lb.
2 " do.	1/5 "	1/6 "	1/7 "
3 " do.	1/4 "	1/5 "	1/6 "

Strong Flat Files and Half-thicks, Rough and Bastard ..... 1/5 "
Strong Flat Files & Half-thicks, Second Cut 1/7 "
Files made extra strength to advance in proportion.
All quarter inches, the price of the next size above.
Round, Half-Round, and Cross Files, Double Cut Second Cut, to advance half an inch.
Do. Double Cut Smooth, to advance 1 inch.
Flat, Three-square and Hand Files, Rough and Middle Cut above 14 inches, 6d. per dozen extra to Bastard Cut.

New Cut Files to advance 1 inch.
Strong Flat Files and Half-thicks, Smooth Bastard 1/9 per lb.
Three-square and Half-round 1d. per lb. extra to Flat Files.
Horse Mouth Rasps, 3/- each.
Bread Rasps, handled, 30/- per dozen.
Single Improved Shoe Rasps, ½-inch on Flat price.
Double do. do. 1 do.
Last Makers' Rasps, to advance 2 inches.
Saddle Tree Rasps, to advance 3 inches.
All Parallel Files to advance 1 inch on their respective descriptions.
Taper Saw Files, Double Cut Smooth, to advance ½ inch on Single Smooth.
Frame Equalling Saw Files, 3 inches on Pit Saw Price.
Taper Pit Saw Files, and Cut Single, advance ½-inch on Pit Saw File Price.

TUBE VICES.

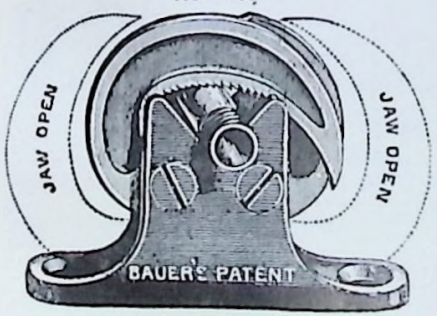


PRICES.

For Tubes. Inches ...	⅛ to ¾	⅛ to 1	¼ to 1¼	¼ to 2	¼ to 3	1 to 4	2 to 6
Numbers	1	2	3	4	5	6	7
No. 39. Each... ...	...	...	12/6	18/-	27/-	...	...
,, 39A. ,, ...	...	...	12/6	18/-	27/-	50/-	100/-
,, 39B. ,, ...	8/6	10/-	...	...	...	...	...

SELF-GRIPPING TUBE VICE.

No. 40.

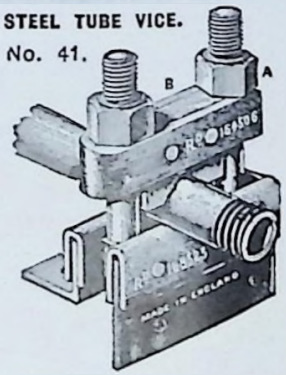


PRICES.

For Tubes ...	¼ to 1¼ in.	¼ to 2¼ in.
Numbers ...	8	9
Each	7/6	15/-

SHEET STEEL TUBE VICE.

No. 41.



PRICES.

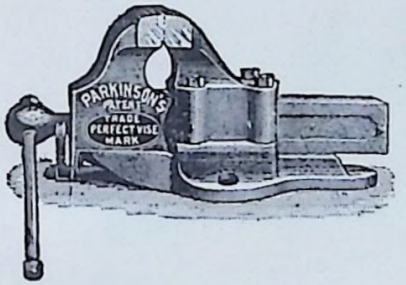
For Tubes ...	⅛ to 1½ in.	½ to 3 in.
Numbers ...	10	11
Each	9/-	21/-

For Pipe Clamps for attaching to ordinary Vices, see Index.

PATENT "PERFECT" VICE.

This Vice combines all the advantages of the continuous screw vice, with the quickness and economy of the sudden-grip vice, giving at the same time increased gripping power.

ENGINEERS' VICE.



No.	Width of Jaw.	Opening.	Weight.	Price.
	In.	In.	lbs.	£ s. d.
5	3½	4	34½	1 8 0
6	3½	4½	43	1 14 0
7	4½	5	61	2 0 0
8	5½	6½	77	2 6 0
8A	6	6½	80	2 12 0
9	6½	8½	113	2 18 0
9A	7	9½	171	4 0 0
9B	8½	12	263	7 10 0
9B	8½	12	269	8 0 0
With Adjustable Front Pillar ..				
Portable Stands .. ..extra				2 7 6

PLANING MACHINE VICE.



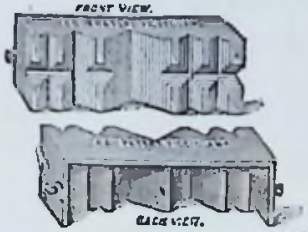
No.	Width of Jaw.	Opening.	Weight.	Price.
	In.	In.	lbs.	£ s. d.
13	6½	9	120	4 15 0
14	5¼	8½	60	4 0 0
15	10	15	366	8 0 0

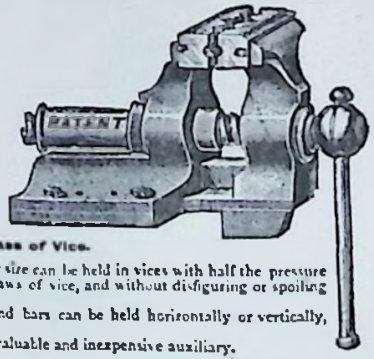
SHAPING MACHINE VICE.



No.	Width of Jaw.	Opening.	Weight.	Price.
	In.	In.	lbs.	£ s. d.
12	5¼	5½	56	3 5 0

PATENT DETACHABLE VICE CLAMP.





Suitable for any class of Vice.

With this valuable invention, tubes or round bars of any size can be held in vices with half the pressure formerly required, and without any risk of straining the jaws of vice, and without disfiguring or spoiling the article worked upon.

The detachable jaws are so constructed that tubes and bars can be held horizontally or vertically, affording great facility in their manipulation.

Everyone who uses a vice should be supplied with this valuable and inexpensive auxiliary.

PRICES.

Suitable for Jaws of Vices ..	3	3½	4	4½	5	5½	6	inch.
Price	3/9	4/6	5/-	6/-	6/9	7/6	8/9	each.

They can be fitted to any intermediate size of vice by adjusting the set pins.

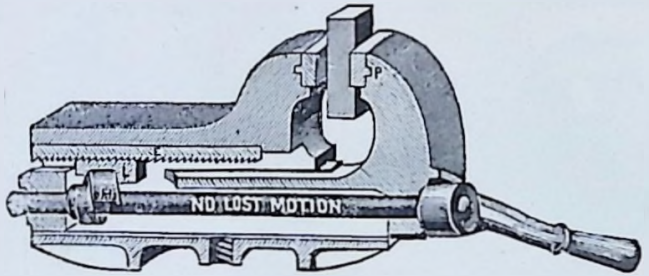
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THE

"INSTANTANEOUS GRIP" VICE

For Engineers, Machinists, Brass Finishers, &c.



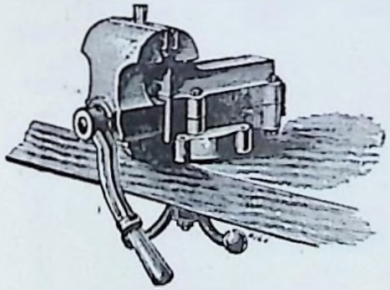
SECTIONAL VIEW.

This view shows the Steel Racks E and L engaged, and the work firmly fastened between the jaws. By raising the handle to a vertical position, the Cam H drops Rack L out of engagement with Rack E; the Loose Jaw is then at liberty to be moved in or out to suit any work within the scope of the Vice.

The method of fixing the Steel Jaws enables them to be removed for re-cutting, or Lead or Copper Jaws can, if required, be fitted in their place.

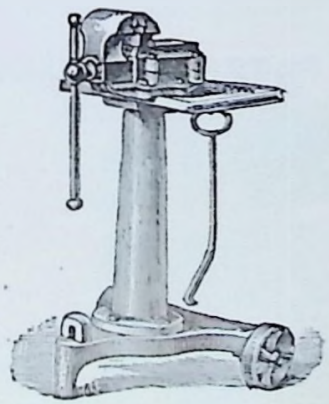
FITTER'S BENCH VICE.

(All engaging parts Steel.)



Size.	Width of Jaw.	Opens.	PRICE. £ s. d.
No. 0 E	3 inches	3 inches	1 8 0
No. 01 E	4 ,,	4 ,,	1 18 6
No. 1 E	5 ,,	5 ,,	2 8 0
No. 2 E	6 ,,	6½ ,,	2 15 6
No. 3 E	7 ,,	8½ ,,	4 0 0

PORTABLE VICE.

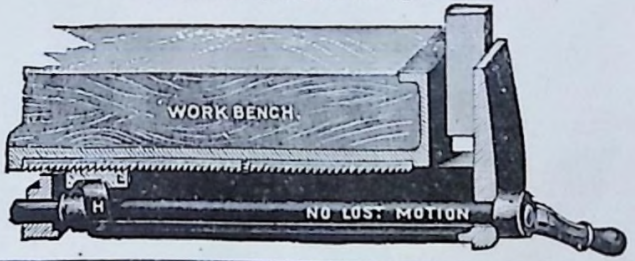


Size.	Width of Jaw.	Opens.	PRICE. £ s. d.
No. 1 S...	5 inches	5 inches	4 10 0
No. 2 S...	6 ,,	6½ ,,	5 5 0
No. 3 S...	7 ,,	8½ ,,	6 0 0

THE "INSTANTANEOUS GRIP" VICE.

For Joiners, Cabinet Makers, and Pattern Makers.

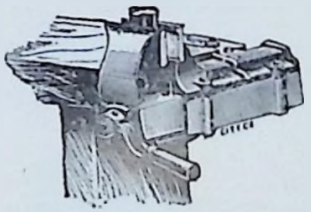
Works on same principle as the Engineer's vice.



Size.	Width of Jaws.	Opens.	Iron Racks with Cast Teeth.	Steel Racks with Machine Cut Teeth.
No. 0 J Amateur's	7½ in.	6 in.	12 6	15 6
No. 1 J Joiner's without Bench Hook	9 ,,	12 ,,	14/-	17/-
No. 1 J Joiner's with ditto	9 ,,	12 ,,	15/-	18/-
No. 1½ J Joiner's without ditto ..	10½ ,,	13 ,,	17/-	20/-
No. 1½ J Joiner's with ditto	10½ ,,	13 ,,	18/-	21/-

Jaws drilled to receive Wood Facings.

COACH-BUILDER'S VICE.



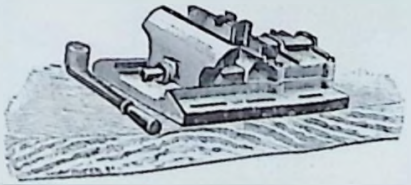
No. 2 J.



No. 3 J.

Size.	Width of Jaws.	Opens.	PRICE.
No. 2 J To bolt at end of table	4½ in.	9 in.	33/-
No. 3 J To bolt on top of table	4¾ ,,	9 ,,	33/-

DRILLING, PLANING, OR SHAPING MACHINE VICE.

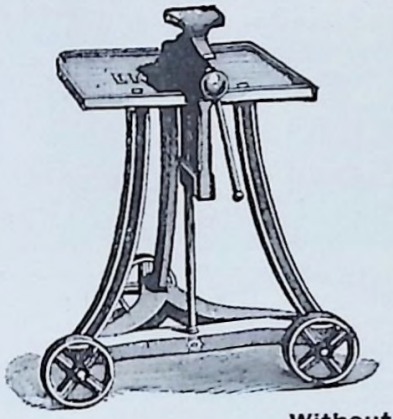


Size.	Width of Jaws.	Opens.	PRICE.
No. 6 E	3½ inches	6½ inches	£3 15 0
No. 7 E	6 ,,	8½ ,,	4 15 0
No. 8 E	9 ,,	8½ ,,	5 10 0
No. 9 E	12 ,,	8½ ,,	6 10 0

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IMPROVED PORTABLE BENCH VICES

COMPLETE.

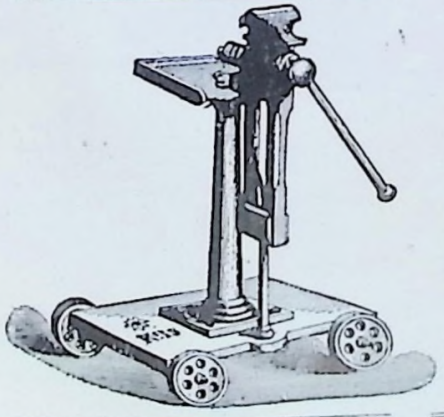


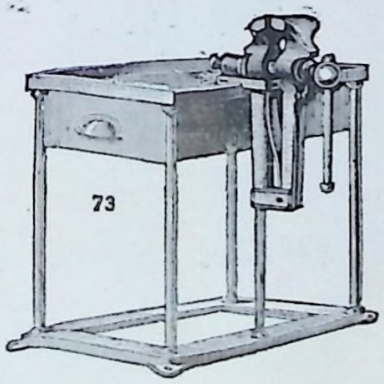
With Wheels.

No.		Price. £ s. d.
14E	Fitted with 6 in. Vice	4 2 6
14F	,, 5 ,,	3 15 0
14G	,, 4½ ,,	3 5 0
14H	,, 3½ ,,	2 12 0

Without Wheels.

No.		Price. £ s. d.
14	Fitted with 6-in. Vice	3 12 6
14A	,, 4½ ,,	2 15 0
14B	,, 3½ ,,	2 5 0

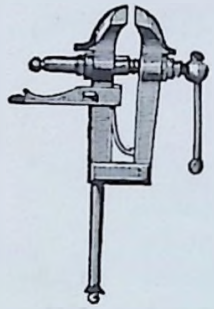




No.		Price. £ s. d.
13	Fitted with 4½-in. Vice	3 12 6
	,, 5 ,,	4 0 0
	,, 5½ ,,	4 10 0
	,, 6 ,,	5 5 0

No.		Price. £ s. d.
73	Fitted with 6-in. Vice	4 5 0
73A	,, 5 ,,	3 16 0
73B	,, 4½ ,,	3 5 0

If fitted with drawer 15/- extra.



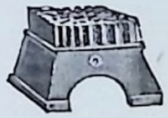
ORDINARY PATTERN STAPLE LEG VICE

With Solid Box.

Best quality	56/- per cwt.
Second quality	45/- ,,

CAST IRON SWAGE BLOCKS AND STANDS.

Swage Blocks	16/- per cwt.
Stand	16/- ,,



Sizes in inches.	Average Weight of Blocks.
13 × 13 × 4½	1¼ cwt.
14 × 14 × 4½	1½ ,,
16 × 16 × 6	2½ ,,
20 × 20 × 7	4½ ,,

ANVILS.



Best quality	35/- per cwt.
Second quality	28/- ,,
Cast Iron Stands ...	16/- ,,

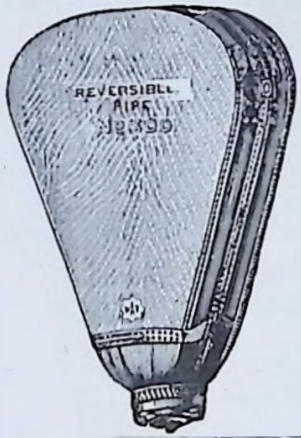
SMITHS' TOOLS.

Hot and Cold Sets	1/- per lb.
Set Hammers	1/- ,,
Top and Bottom Swages	1/- ,,
Square and Round Punches	1/- ,,
Top and Bottom Fullers	1/- ,,
Tongs (Close or Open Mouth) and Firing Tools	9d. ,,

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REVERSIBLE PIPE SMITH'S BELLOWS.

No. 300.



With Patent "Reversible Pipe," for Exportation.

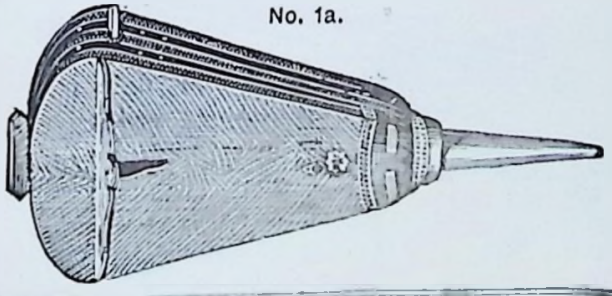
By reversing or inserting the pipe in the Bellows, they contain less than one half the usual shipping measurement, while they are not liable to damage during exportation.

Size ...	16	18	20	22	24	26	28	30	32 inches.
PRICE.	32/-	38/-	46/-	54/-	64/-	75/-	84/-	100/-	115/- per pair.
Size ...	34	36	38	40	42	44	46	48	50 inches.
PRICE.	137/-	176/-	220/-	276/-	330/-	390/-			per pair.

ORDINARY

LONDON PATTERN SMITH'S BELLOWS.

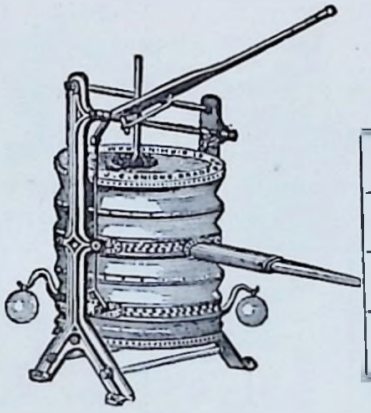
No. 1a.



Size ..	16	18	20	22	24	26	28	30	32 inches.
PRICE.	32/-	38/-	46/-	54/-	64/-	75/-	84/-	100/-	115/- per pair.
Size ..	34	36	38	40	42	44	46	48	50 inches.
PRICE.	137/-	176/-	220/-	276/-	330/-	390/-			per pair.

Best warranted, extra leather and nailed.
" " double nailed.
In ordering, please state which quality.
Galvanized ironwork and packing charged extra.

FORGES.



PATENT DOUBLE-BLAST CIRCULAR BELLOWS.

Mounted in Iron Frame complete.

No. 9.

Size...	18	20	22	24	26	28	inches.
PRICE	115/-	132/-	154/-	176/-	198/-	230/-	per pair.
Size...	30	32	34	36	38	40	inches.
PRICE	268/-	300/-	375/-	400/-			per pair.

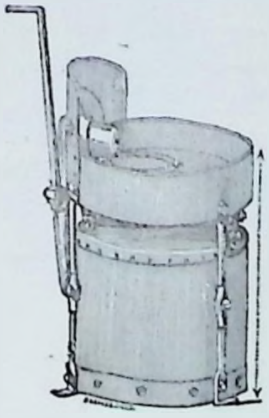
Weights charged extra.



IMPROVED SINGLE-BLAST DECK OR RIVET FORGE.

No 4.

No.	Width.	Height.	Diameter Bellows.	PRICE.
	ft. in.	ft. in.	in.	£ s. d.
4A	1 6	2 4	16	2 12 0
4	1 8	2 4	18	2 15 0
4B	1 10	2 4	20	3 3 0
4F	2 0	2 10	22	3 10 6
4C	2 2	2 10	24	4 4 0

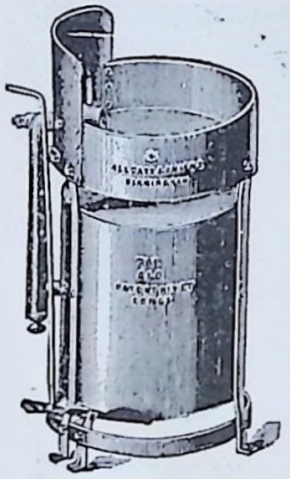


PATENT CIRCULAR IRON-ENCASED RIVET FORGE.

No.	Diameter Bellows.	Height.	PRICE.
	in.	in.	£ s. d.
A33	20	32	4 15 0
A34	22	32	5 0 0
A35	24	32	5 12 0
A36	26	32	6 5 0
A37	28	32	7 0 0

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FORGES.



Light Pattern

PATENT CIRCULAR IRON-ENCASED RIVET FORGE.

No.	Diam. Bellows.	Pan.	Price.
	in.	in.	£ s. d.
1	16	18	2 5 0
2	18	20	2 7 6
3	20	22	2 10 0

"BRANSTON" PATENT RIVETING FORGE,

Rotary Motion.



No	Diam. of Pan.	Height.	Price.
	in.	in.	£ s. d.
A 260	20	30	3 15 0
A 261	24	32	4 10 0

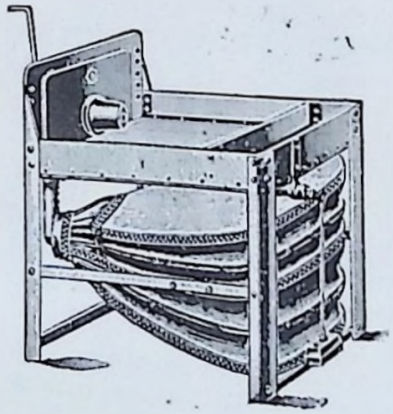
If fitted with Patent Fire Screen, Water Cistern, or Tool Chest, the price will be extra.

HORSESHOE DOUBLE-BLAST TREADLE BELLOWS.

Suitable for Braziers, Brassfounders, Cycle Makers, &c.

Bellows Chamber	10 inches wide	£2 0 0
do.	12 ,, ,,	2 5 0
do.	14 ,, ,,	2 10 0
do.	16 ,, ,,	2 17 6

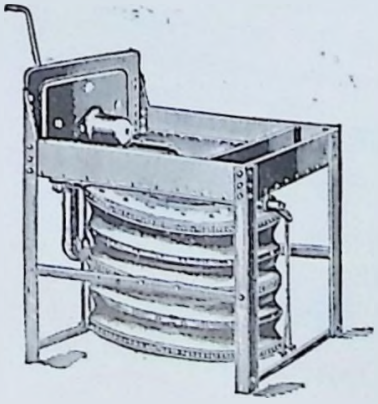
FORGES.



IMPROVED WROUGHT-IRON PORTABLE FORGE.

No. 12c.

No.	Length.	Width.	Height.	Price.
				£ s. d.
12C	29 in.	24 in.	34 in.	4 10 0
12A	33 in.	27 in.	34 in.	5 17 0
12D	34 in.	30 in.	36 in.	7 10 0

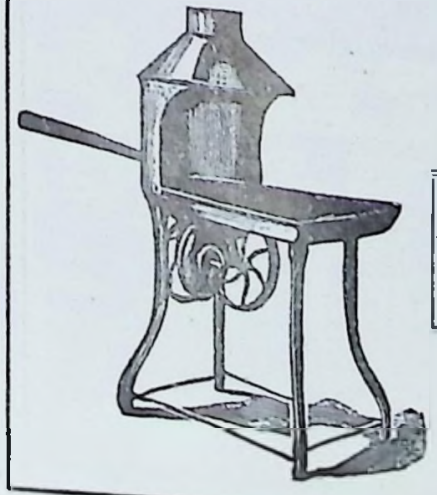


IMPROVED WROUGHT-IRON PORTABLE FORGE.

No. 19.

With Circular Bellows.

No.	Length.	Width.	Height.	Price.
				£ s. d.
19	29 in.	24 in.	34 in.	5 10 0
19-1	33 in.	27 in.	34 in.	7 0 0
19-2	35 in.	30 in.	34 in.	8 0 0



IMPROVED PORTABLE AMERICAN FORGE.

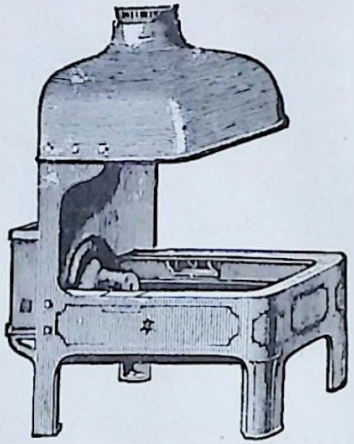
No.	Diam. of Pan.	Diam. of Blower.	Height.	Price.
				£ s. d.
1	21 in.	10 in.	33 in.	4 10 0
2	22 × 33	10 in.	56 in.	5 10 0

No. 1 Forge is made with Circular Pan and without Hood.

No. 2 Forge is made with Hood.

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FORGES.



IMPROVED PATTERN SMITH'S HEARTH.

No. A 80.

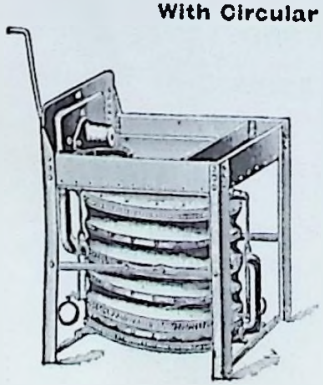
These Iron Hearths combine all the latest improvements and possess great superiority over the old-fashioned brick-built ones, besides occupying much less room. They are constructed partly of Wrought and Cast Iron, and are provided with Water Bosh and Tue Iron, Smith's Hearth, Back, and movable gaps.

No	Size of Hearth Plate.	Height.	Price. £ s. d.
A78	3 ft. 0 in. × 3 ft. 0 in..	6 ft.	10 7 6
A79	3 ft. 6 in. × 3 ft. 6 in.	6 ft.	12 0 0
A80	4 ft. 0 in. × 4 ft. 0 in.	6 ft.	13 15 0

Prices of other sizes on application.

EXTRA POWERFUL WROUGHT-IRON PORTABLE FORGE.

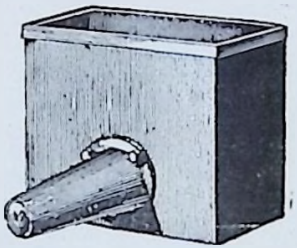
With Circular Double-Blast Bellows.



No. A 225.

No.	Length.	Width.	Height.	Price. £ s. d.
A224	30 in.	23 in.	34 in.	6 15 0
A225	30 in.	25 in.	34 in.	7 15 0
A226	34 in.	27 in.	34 in.	9 10 0
A227	36 in.	31 in.	34 in.	11 10 0

Weights charged extra.



IMPROVED WATER BOSH AND TUE IRON,

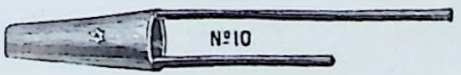
Complete.

No. 15.

No.	Length.	Depth.	Width.	Length of Tue Iron.	Price. £ s. d.
	In.	In.	In.	In.	
15W	19	18	7	13	1 5 0
15	21	21	7½	14	1 10 0
15A	24	23	9	15	1 17 6
15B	27	25	10½	16	2 7 6
15D	27	25	10½	20	2 15 0
15M	30	24	12	18	3 5 0

IMPROVED WROUGHT-IRON WATER TUE IRONS,

With Pipes complete.

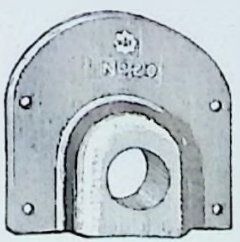


Size	12	14	16	18	20	24 inches.
Price	15/-	17/6	20/-	22/6	25/-	30/- each.

IMPROVED SMITHS' HEARTH-BACKS,

With Nuts, Pins, and Plates, complete.

No. 20.



No.	Height.	Width.	Price. £ s. d.
	In.	In.	
20	18	19	0 12 0
20A	15	16	0 10 0
20B	13	14	0 7 6
20C	12	13	0 6 0

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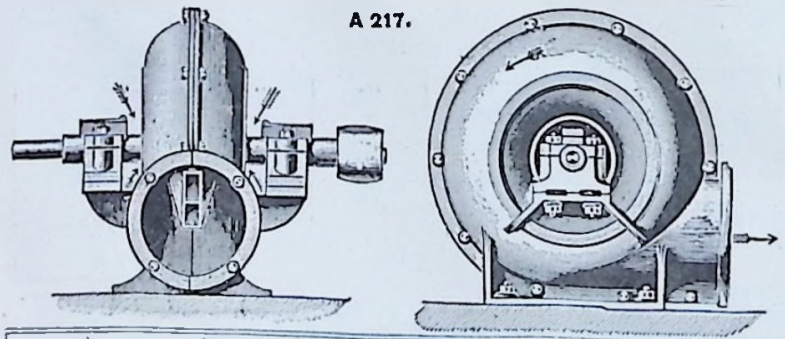
IMPROVED

SILENT BLOWING, EXHAUSTING, AND VENTILATING FANS.

These Fans are of very best workmanship and material, with steel spindles and extra long bearings. They are thoroughly well fitted, and have strong and heavy cases. The connecting ends are flanged for bolting up. Will work with the least possible power.

IMPROVED SILENT BLOWING FANS.

A 217.

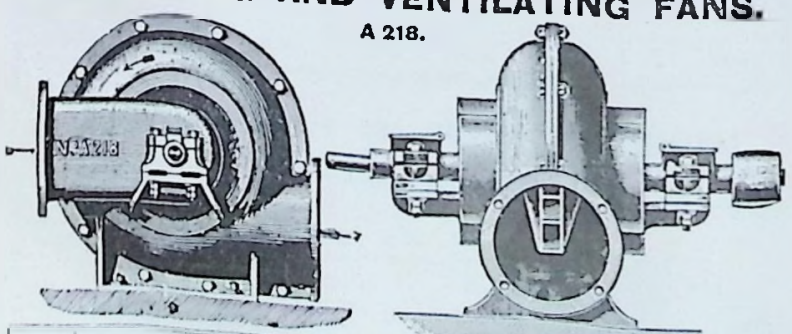


Fires to blow.	Diam. of Revolving Fan.	Diam. of Discharge.	Tons melted per hour.	Revolutions per minute.	Diam. of Pulleys.	Width of Straps.	Price
1	9 inch	2½ inch			1½ inch		£1 16 0*
2	10 ,,	3½ ,,			2 ,,		3 0 0
4	10 ,,	5 ,,		4000 to 4500	2 ,,		3 10 0
6	12 ,,	6 ,,		3500 ,, 4200	3 ,,		4 10 0
8	15 ,,	8 ,,	1	3000 ,, 4000	4 ,,	1½	5 10 0
12	17½ ,,	9 ,,	1½	2800 ,, 3500	5 ,,	2¼	7 0 0
16	20 ,,	10 ,,	2	2500 ,, 3300	6 ,,	3	9 0 0
24	25 ,,	12 ,,	3	2000 ,, 2500	8 ,,	3½	13 0 0
32	30 ,,	14 ,,	5	1500 ,, 2000	9 ,,	3½	16 0 0

* These are based upon 1¼ in. holes in Tue Irons

EXHAUSTING AND VENTILATING FANS.

A 218.



Sizes.	Diameter of Revolving Fan.	Diam. of Discharge.	Diam. of Pulleys.	Width of Straps.	Revolutions per minute.	Cubic ft. air per minute.	Price.
1	10 inch	5 inch	2 inch	1½ inch	4000		
1½	12 ,,	6 ,,	3 ,,	2 ,,	3300	500	£4 10 0
2	15 ,,	8 ,,	4 ,,	2¼ ,,	2500	750	5 10 0
2½	17½ ,,	9 ,,	5 ,,	2½ ,,	2300	1000	7 0 0
3	20 ,,	10 ,,	6 ,,	3 ,,	1500	1500	9 0 0
4	25 ,,	12 ,,	8 ,,	3 ,,	2000	2000	11 10 0
5	30 ,,	14 ,,	9 ,,	3¼ ,,	1700	3000	15 10 0
				3½ ,,	1400	4000	20 0 0

GRINDSTONE TROUGHS AND FITTINGS.

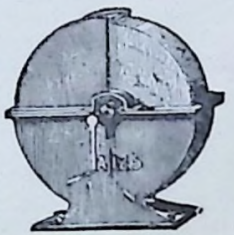
These Troughs are fitted with all the latest improvements.

Spindles are of Wrought Iron, turned, and fitted with screwed nuts, collars, and plates for fixing Stones, and we can recommend them for all purposes.

TROUCHS for fixing on Bench.



WITHOUT HOOD.



WITH HOOD.

WITHOUT HOOD.		
No.	Stone.	Price.
A 110	6 in. diam....	6/-
A 113	12 ,, ...	12/-
A 115	16 ,, ...	17/-
A 116	18 ,, ...	26/-
A 117	20 ,, ...	35/-
WITH HOOD.		
No.	Stone.	Price.
A 122	12 in. diam....	14 6
A 123	14 ,, ...	17/-
A 124	16 ,, ...	22/-
A 125	18 ,, ...	32/-
A 126	20 ,, ...	40/-

TROUCHS ON STANDS.

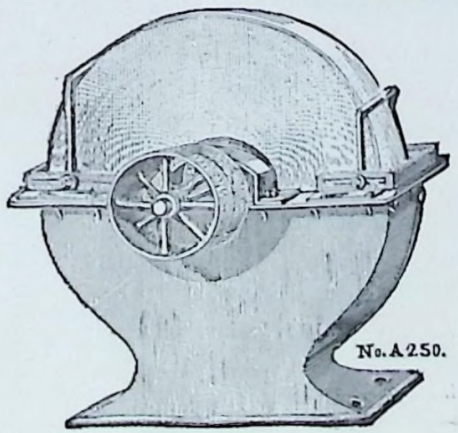




WITHOUT HOOD.		
No.	Stone.	Price.
A 118	18 in. diam....	36/-
A 119	20 ,, ...	42/-
WITH HOOD.		
No.	Stone.	Price.
A 120	18 in. diam....	40/-
A 121	20 ,, ...	48/-

If fitted with Treadle, 5/- extra.

ENGINEERS' GRINDSTONES AND TROUGHS.



No. A 250.

STONES, BEST YORKSHIRE QUALITY.

No.	Size of Stone.	Width of Stone.	Price with Handle and Treadle.	Price with Fast and Loose Pulleys.
	ft. in.	in.		
A 247	2 0	3½	85/-	90/-
A 248	2 6	4	105/-	112/-
A 249	3 0	4	135/6	145/-
A 250	3 6	5	—	195/-
A 251	4 0	6	—	237/6

The first three sizes are fitted with Hoods.

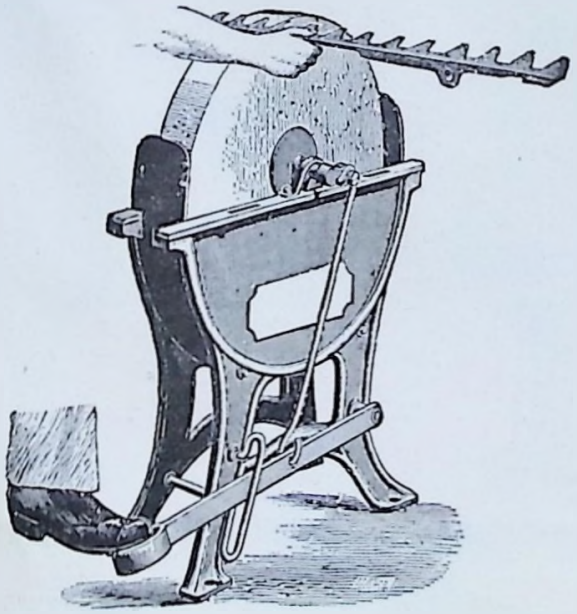
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ARMENIAN GRINDSTONES.

To work by Hand, Foot, or Power.

Mounted in Iron Frames, well painted and varnished.

These Grindstones are fitted with turned wrought Spindles and Plates screwed on, to ensure their keeping true, wood wedges being entirely dispensed with. Each Stone is turned up true on its own spindle.



G2 Grindstone, 24 in. by 4 in. Iron Frame, with Handle and Treadle complete.

PARTICULARS AND PRICES.

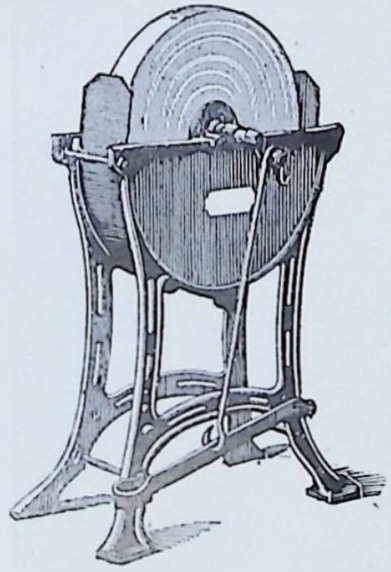
		£	s.	d.
B 4	21 in. by 4 in. Stone, with Anti-friction Rollers	2	0	0
G	24 in. by 4 in. ditto, with Bearings	2	4	0
G 2	24 in. by 4 in. ditto, with Anti-friction Rollers	2	6	0
D S	24 in. by 5 in. ditto, with extra strong Iron Frame and Anti-friction Rollers	2	15	0
H	26 in. by 4½ in. Stone, with Anti-friction Rollers	3	0	0
	Fast and Loose Pulleys fitted to the above ... per pair extra			
N W	24 in. by 4½ in. Stone, in solid Wrought Iron Frame, and with Fast and Loose Pulleys	3	10	0

ARMENIAN GRINDSTONES.

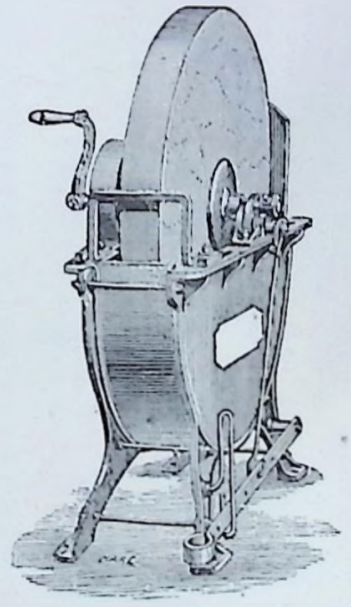
To work by Hand, Foot, or Power.

Mounted in Iron Frames, well painted and varnished.

These Grindstones are fitted with turned wrought Spindles and Plates, screwed on to insure their keeping true, wood wedges being entirely dispensed with. Each Stone is turned up true on its own spindle.



B Grindstone, 18 in. by 2½ in.



F Grindstone, 36 in. by 5 in.

PARTICULARS AND PRICES.

		£	s.	d.
B	18 in. by 2½ in. Stone	1	7	0
B 2	18 in. by 3½ in. ditto	1	9	0
B 6	18 in. by 2½ in. ditto, with Anti-friction Rollers	1	10	0
B 7	18 in. by 3½ in. ditto, ditto	1	12	0
	Fitted with Fast and Loose Pulleys... ...per pair extra			
K	28 in. by 4½ in. Stone	3	5	0
E	30 in. by 4½ in. ditto	4	0	0
E 1	30 in. by 6 in. ditto	4	15	0
F	36 in. by 5 in. ditto, with Pulley for power and Tool Rest	5	10	0
F 1	36 in. by 8 in. ditto, ditto ditto ...	6	5	0

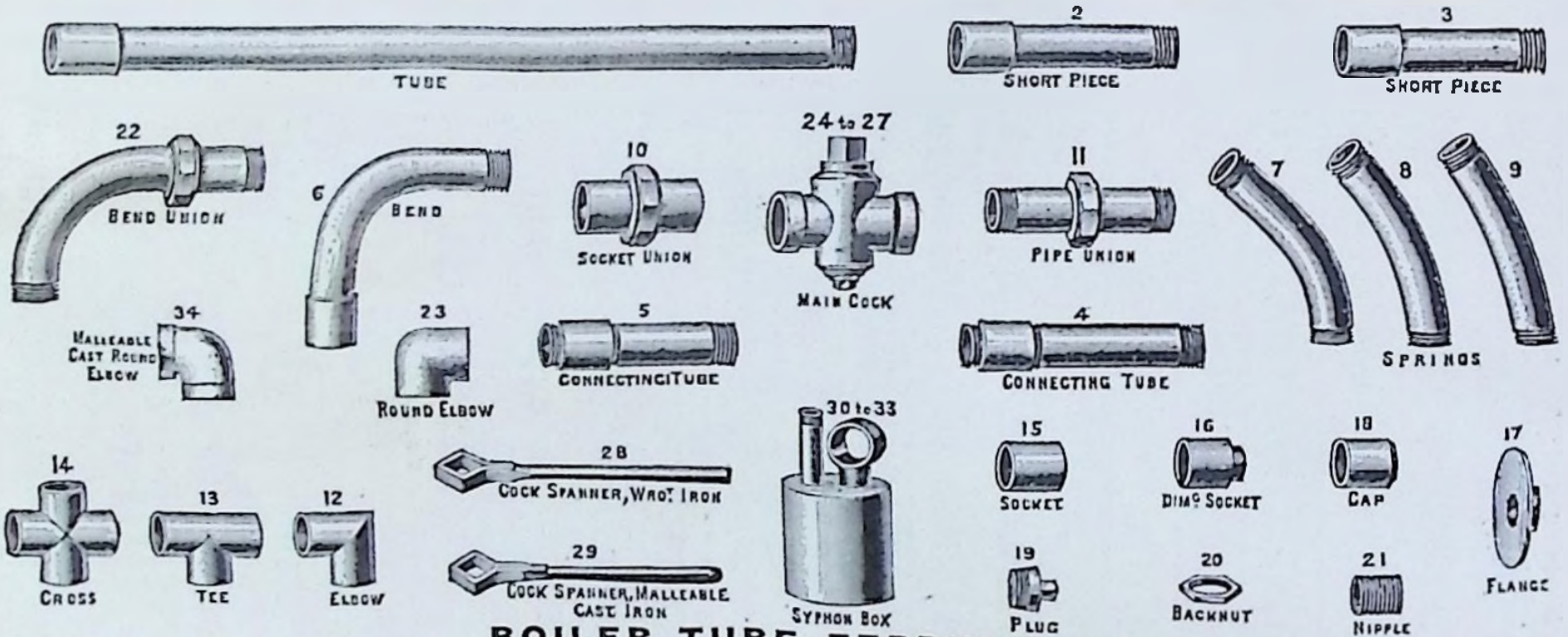
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UNMOUNTED GRINDSTONES.

Best Yorkshire or Newcastle Grits.						Fine Blue Bilston Grit.					
Size.		Price.	Size.		Price.	Size.		Price.	Size.		Price.
Inches.	Inches.	Each.	Inches.	Inches.	Each.	Inches.	Inches.	Each.	Inches.	Inches.	Each.
3 by	1¼	1/4	46 by	6	49/-	3 by	1¼	1/4	46 by	6	84/-
4 ,,	1¼	1/4	46 ,,	7	51/-	4 ,,	1¼	1/4	46 ,,	7	90/-
6 ,,	1½	1/4	46 ,,	8	53/-	6 ,,	1½	1/4	46 ,,	8	96/-
7 ,,	1½	1/8	48 ,,	6	52/-	7 ,,	1½	1/10	48 ,,	6	96/-
8 ,,	1½	1/10	48 ,,	7	54/-	8 ,,	1½	2/2	48 ,,	7	102/-
9 ,,	1½	2/-	48 ,,	8	56/-	9 ,,	1½	2/4	48 ,,	8	108/-
10 ,,	1½	2/2	48 ,,	9	58/-	10 ,,	1½	2/8	48 ,,	9	114/-
10 ,,	2	2/2	48 ,,	10	60/-	10 ,,	2	3/-	48 ,,	10	120/-
12 ,,	2	2/6	50 ,,	6	60/-	12 ,,	2	3/2	50 ,,	6	108/-
12 ,,	3	2/8	50 ,,	8	64/-	12 ,,	3	3/8	50 ,,	8	120/-
14 ,,	3	3/2	50 ,,	10	68/-	14 ,,	3	4/10	50 ,,	10	132/-
15 ,,	3	3/6	52 ,,	8	70/-	15 ,,	3	5/4	52 ,,	8	132/-
16 ,,	3	3/10	52 ,,	9	72/-	16 ,,	3	5/8	52 ,,	10	104/-
16 ,,	4	4/2	52 ,,	10	74/-	16 ,,	4	5/8	54 ,,	6	132/-
18 ,,	3	4/8	54 ,,	7	76/-	18 ,,	3	6/6	54 ,,	7	138/-
18 ,,	5	5/6	54 ,,	9	80/-	18 ,,	6	8/2	54 ,,	9	150/-
18 ,,	6	6/2	54 ,,	10	82/-	20 ,,	4	8/6	54 ,,	10	156/-
20 ,,	3	5/4	56 ,,	8	92/-	20 ,,	5	9/2	56 ,,	8	156/-
20 ,,	4	5/8	56 ,,	10	102/-	22 ,,	4	10/-	56 ,,	10	168/-
22 ,,	3	5/10	60 ,,	7	110/-	22 ,,	5	9/6	60 ,,	7	174/-
22 ,,	4	6/2	60 ,,	8	114/-	24 ,,	3	10/4	60 ,,	8	180/-
24 ,,	3	6/8	60 ,,	9	118/-	24 ,,	4	11/2	60 ,,	9	186/-
24 ,,	4	7/2	60 ,,	10	122/-	24 ,,	6	11/2	60 ,,	10	192/-
24 ,,	6	8/-	62 ,,	8	128/-	26 ,,	4	12/6	62 ,,	8	186/-
26 ,,	4	8/8	62 ,,	10	140/-	26 ,,	5	13/-	62 ,,	10	204/-
26 ,,	5	6/2	62 ,,	12	150/-	30 ,,	4	18/-	62 ,,	12	216/-
30 ,,	4	13/-	64 ,,	7	132/-	30 ,,	5	20/-	64 ,,	7	198/-
30 ,,	5	14/6	64 ,,	9	144/-	30 ,,	6	22/-	64 ,,	9	210/-
30 ,,	6	16/-	64 ,,	10	150/-	32 ,,	4	24/-	64 ,,	10	216/-
32 ,,	4	17/-	66 ,,	8	150/-	32 ,,	5	27/-	66 ,,	8	216/-
32 ,,	6	21/-	66 ,,	10	162/-	32 ,,	6	30/-	66 ,,	10	228/-
36 ,,	4	24/-	66 ,,	12	176/-	36 ,,	4	36/-	66 ,,	12	240/-
36 ,,	5	26/-	68 ,,	8	168/-	36 ,,	5	39/-	68 ,,	8	228/-
36 ,,	6	28/-	68 ,,	9	176/-	36 ,,	6	42/-	68 ,,	9	234/-
40 ,,	4	32/-	68 ,,	12	198/-	40 ,,	4	50/-	68 ,,	12	252/-
40 ,,	5	34/-	70 ,,	7	172/-	40 ,,	5	54/-	70 ,,	7	234/-
40 ,,	6	36/-	70 ,,	9	188/-	40 ,,	6	58/-	70 ,,	9	246/-
42 ,,	5	36/-	70 ,,	12	218/-	42 ,,	5	58/-	70 ,,	12	264/-
42 ,,	6	38/-	72 ,,	8	200/-	42 ,,	6	62/-	72 ,,	8	234/-
42 ,,	7	40/-	72 ,,	9	210/-	42 ,,	7	66/-	72 ,,	9	242/-
42 ,,	8	42/-	72 ,,	10	220/-	42 ,,	8	70/-	72 ,,	10	250/-
46 ,,	5	47/-	72 ,,	12	240/-	46 ,,	5	78/-	72 ,,	12	266/-

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ILLUSTRATIONS OF WROUGHT-IRON TUBES AND FITTINGS.



BOILER TUBE FERRULES.

Outside diam. at large end	1⅜	1⅝	1¾	1⅞	2	2⅛	2¼	2⅜	2½	2⅝	2¾	2⅞	3	3⅛	3¼	3⅜	3½	3⅝	3¾	3⅞	4
Thickness, I.W.G. ...	14	13	12	12	12	11	11	11	11	11	11	10	10	10	10	9	9	9	8	8	8
Length in Inches ...	1	1⅛	1 3/16	1 3/16	1 3/16	1 3/16	1 3/16	1 3/16	1¼	1¼	1¼	1¼	1¼	1 5/16	1 5/16	1 5/16	1 5/16	1⅜	1⅜	1⅜	1⅜
Iron, price per 100 ...	10/-	10/-	10/6	11/-	12/-	13/-	14/-	15/-	16/-	17/-	18/-	19/-	20/6	22/-	23/6	25/-	26/6	28/-	29/6	33/-	34/6
Steel, price per 100 ... One Gauge thinner than Iron	13/6	15/-	16/6	18/6	20/-	22/-	24/6	26/6	30/-	33/-	36/6	40/-	43/-	46/-	50/-	53/-	56/-	60/-	64/-	66/-	69/-

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WROUGHT IRON TUBE AND FITTING LIST.

	Inside Diameter in inches ...	⅛	¼	⅜	½	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4
1	Tubes, from 2 to 14 ft. per ft.	-/2	-/2⅓	-/3	-/4¼	-/6	-/8½	1/-	1/3	1/6	1/9	2/7	3/3	4/-	4/6	5/6	7/-
2	Do. 12 to 23½ in. each	-/4	-/5	-/7	-/9	1/-	1/4	1/8	2/-	2/6	3/-	4/6	6/3	7/6	9/-	11/6	14/6
3	Do. 3 to 11½ in. ... ,,	-/2	-/3	-/4	-/6	-/8	-/11	1/1	1/4	2/-	2/3	4/-	4/9	6/-	7/-	8/-	9/-
4	Connecting Tube, 12 to 23½ in. ,,	-/5	-/7	-/9	-/11	1/2	1/6	2/-	2/6	3/3	4/-	5/6	7/-	8/6	10/-	12/6	15/6
5	Do., 3 to 11½ in. ,,	-/4	-/5	-/6	-/8	-/10	1/-	1/3	2/-	2/6	3/-	4/6	5/6	6/6	7/6	8/6	10/-
6	Bends and Lamp Bends ... ,,	-/5½	-/6½	-/7	-/8	-/11	1/3	1/9	2/3	3/3	4/3	6/6	10/-	12/-	16/-	25/-	32/6
7, 8, 9	Springs, various elevations... ,,	-/4	-/5	-/6	-/7	-/9	-/11	1/4	1/8	2/6	3/3	5/6	7/6	10/-	12/-	19/-	26/-
10, 11	Socket or Pipe Unions, Wt. Iron ,,	...	2/-	2/6	3/-	4/-	5/6	6/9	8/-	9/-	10/-	12/-	14/-	16/-	18/-	22/-	28/-
12	Elbows, Equal or Diminished ,,	-/6	-/6½	-/7	-/8	-/10	1/2	1/9	2/3	3/-	3/6	5/6	8/6	11/-	14/-	22/-	28/-
13	Tees do. ... ,,	-/6	-/6½	-/7	-/9	1/-	1/3	1/9	2/6	3/-	3/9	6/-	9/6	12/6	16/6	24/-	30/-
14	Crosses do. ... ,,	1/2	1/4	1/4	1/11	2/4	3/-	4/-	4/8	6/-	7/-	14/-	21/4	28/-	40/-	56/-	66/8
15	Sockets, Plain ... ... ,,	-/1½	-/1½	-/2	-/3	-/3½	-/4	-/6	-/7	-/9	1/-	1/6	2/6	3/-	3/6	5/-	6/-
16	Do., Diminished ... ,,	...	-/3	-/4	-/5	-/6	-/7	-/9	-/11	1/1	1/3	2/-	3/-	4/-	5/-	7/-	9/-
17	Flanges ... ... ,,	-/8	-/9	-/10	1/-	1/2	1/4	1/6	1/9	2/-	2/6	3/9	5/-	6/9	8/6	10/-	11/6
18, 19	Caps and Plugs ... ... ,,	-/2	-/3	-/3	-/4	-/5	-/6	-/8	-/10	1/-	1/3	2/-	2/6	3/6	4/9	7/-	10/-
20, 21	Backnuts and Nipples ... ,,	-/1	-/2	-/2	-/3	-/3½	-/4	-/6	-/8	-/10	1/-	1/9	2/3	3/-	3/6	4/6	5/6
22	Union Bends or Elbows ... ,,	...	2/6	3/-	3/9	5/-	6/3	8/6	10/-	11/6	13/6	16/-	19/-	22/-	25/-	30/-	36/-
23	Elbows, round backed, Wt. Iron.,,	-/7	-/7	-/8	-/9	1/-	1/4	1/11	2/6	3/4	3/10	6/6	10/-	13/-	16/-	25/-	32/-
24	Iron Main Cocks ... ... ,,	2/3	2/3	2/9	3/6	4/6	6/6	8/6	11/-	14/-	18/-	27/-	36/-	44/-	50/-	75/-	90/-
25	Do. do., Brass Plugs ,,	...	...	4/6	5/6	7/6	10/6	15/-	19/6	25/-	32/-	47/-	60/-	90/-	110/-	140/-	190/-
26	Do. do., Roundway ,,	...	...	3/6	4/-	5/6	7/6	10/-	13/-	17/6	22/-	38/-	54/-	62/-	70/-	100/-	160/-
27	Do. do., do ,Brass Plugs ,,	...	...	5/-	6/6	9/-	13/-	19/-	28/-	36/-	42/-	60/	85/-	105/-	120/-	180/-	280/-
28	Spanners for Cocks, Wt. Iron ,,	...	...	1/-	1/4	1/8	2/-	2/4	3/-	3/6	4/-	4/9	6/-	7/6	9/-	12/-	14/-
29	Do. do., Mble. Cast ,,	...	...	-/7	-/8	-/10	1/2	1/8	2/2	2/9	3/3	4/9	6/-	7/6	9/-	12/-	14/-
30	Syphon Boxes, 1 quart ... ,,	...	...	...	11/-	12/-	13/-	14/-	15/-	15/6	16/-	18/-	...	...	...	...	...
31	Do. do., 2 do. ... ,,	...	...	...	...	16/-	17/-	18/-	19/-	21/-	23/-	25/-	30/-	35/-	40/-	...	...
32	Do. do., 3 do. ... ,,	...	...	...	...	20/-	22/-	24/-	25/-	26/6	28/-	32/	35/-	40/-	45/-	50/-	56/-
33	Do. do., 4 do. ... ,,	...	...	...	...	21/-	23/-	25/-	27/-	29/-	31/-	34/-	38/-	42/-	47/-	54/-	60/-
34	Malleable Cast Round Elbows	-/6	-/6½	-/7	-/8	-/10	1/2	1/9	2/3	3/-	3/6	5/6	9/-	12/-	15/-	30/-	40/-

N.B.—Tubes of intermediate diameters will be charged at same price as next larger size.

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LAP-WELDED BOILER TUBES.

PRICE PER FOOT.

Ext. Dia. in inches ..	1¼	1⅜	1½	1⅝	1¾	1⅞	2	2⅛	2¼	2⅜	2½	2⅝
Imp. Wire Gauge	13	13	13	13	13	13	12	12	12	11	11	11
Dec. in inches	·092	·092	·092	·092	·092	·092	·104	·104	·104	·116	·116	·116
Usual Wire Gauge ..	-/9½	-/9½	-/9½	-/9½	-/10	-/10½	-/11½	1/0½	1/0½	1/2	1/3½	1/2½
1 extra Gauge ..	-/10½	-/10½	-/10½	-/10½	-/11	-/11½	1/1	1/1½	1/2½	1/3½	1/4½	1/4½
2 extra Gauges	-/11½	-/11½	-/11½	1/-	1/0½	1/0½	1/2½	1/3	1/3½	1/5½	1/5½	1/6½
3 extra Gauges	1/0½	1/0½	1/0½	1/1½	1/2½	1/2	1/4	1/4½	1/5	1/7	1/7½	1/8½
4 extra Gauges	1/2½	1/2½	1/2½	1/2½	1/3	1/3½	1/5½	1/6½	1/7	1/9	1/9½	1/10½
3/16 in. thick	1/6	1/6	1/6	1/6½	1/7	1/7½	1/8	1/9	1/9½	1/10	1/10½	2/-
¼ in. thick	1/11	1/11	1/11	2/-	2/1	2/2	2/3	2/4	2/4½	2/5	2/6	2/8
5/16 in. thick	..	..	..	..	..	..	2/10	2/11½	3/1	3/2	3/3	3/5
3/8 in. thick	..	..	..	..	..	..	3/7	3/10	4/-	4/1	4/3	4/6
7/16 in. thick	..	..	..	..	..	..	4/5	4/8	4/11	5/1	5/4	5/8
½ in. thick	..	..	..	..	..	..	5/3	5/8	6/-	6/2	6/6	6/10

Ext. Dia. in inches ..	2¾	2⅞	3	3⅛	3¼	3⅜	4	4⅛	4¼	4⅜	5	5⅛
Imp. Wire Gauge	11	11	11	10	10	10	9	9	9	8	8	8
Dec. in inches	·116	·116	·116	·128	·128	·128	·144	·144	·144	·160	·160	·160
Usual Wire Gauge ..	1/3½	1/4½	1/5	1/8	1/10	1/11½	2/4½	2/7½	2/9½	3/4	3/7	3/11
1 extra Gauge ..	1/5½	1/6	1/7	1/10½	2/0½	2/2	2/7½	2/10½	3/1	3/8	3/11	4/3
2 extra Gauges	1/7½	1/8½	1/9	2/1	2/3	2/5	2/10½	3/2	3/4	4/-	4/3	4/8
3 extra Gauges	1/9	1/10½	1/11	2/3½	2/5½	2/7½	3/1	3/5	3/8	4/5	4/8	5/2
4 extra Gauges	1/11½	2/0½	2/1½	2/5½	2/8	2/10½	3/5	3/9	4/-	4/10	5/1	5/7
3/16 in. thick	2/1	2/2	2/3	2/5	2/7½	2/9½	3/-	3/4	3/7	3/11	4/2	4/7
¼ in. thick	2/9	2/11	3/-	3/3	3/6	3/9	4/1	4/6	4/10	5/6	5/9	6/3
5/16 in. thick	3/7	3/9	3/11	4/2	4/7	4/11	5/4	5/11	6/3	7/1	7/6	8/1
3/8 in. thick	4/8	5/-	5/2	5/7	6/1	6/7	7/1	7/10	8/4	9/6	10/-	10/6
7/16 in. thick	5/11	6/3	6/6	7/1	7/8	8/4	9/-	10/-	10/6	11/10	12/6	13/3
½ in. thick	7/2	7/6	8/-	8/9	9/6	10/3	11/2	12/2	13/-	14/6	15/6	16/6

Ext. Dia. in inches ..	5¼	5⅜	6	6⅛	6¼	6⅜	7	7⅛	7¼	7⅜	8	8⅛
Imp. Wire Gauge	7	7	7	7	7	7	7	5	5	5	5	3
Dec. in inches	·176	·176	·176	·176	·176	·176	·176	·212	·212	·212	·212	·252
Usual Wire Gauge ..	4/6	4/11	5/2	5/10	6/1	6/7	6/10	8/9	9/1	9/5	9/9	12/3
1 extra Gauge	4/11	5/4	5/7	6/4	6/7	7/2	7/5	9/7	9/11	10/3	10/7	13/5
2 extra Gauges	5/5	5/11	6/2	7/-	7/3	7/10	8/2	10/4	10/8	11/-	11/5	14/6
3 extra Gauges	5/10	6/5	6/9	7/7	7/11	8/7	8/11	11/4	11/9	12/2	12/7	..
4 extra Gauges	6/7	7/1	7/5	8/4	8/8	9/4	9/8	12/3	12/9	13/2	13/7	..
3/16 in. thick	4/10	5/3	5/6	6/1	6/6	7/-	7/3	..	..	..	..	..
¼ in. thick	6/7	7/1	7/5	8/1	8/8	9/4	9/8	10/4	10/8	11/-	11/5	12/3
5/16 in. thick	8/6	9/1	9/6	10/0	11/-	11/8	12/1	12/9	13/3	13/8	14/2	15/2
3/8 in. thick	11/-	11/8	12/3	13/3	13/9	14/4	15/-	15/6	16/-	16/6	17/3	18/-
7/16 in. thick	14/-	14/9	15/6	16/9	17/4	18/-	18/9	19/6	20/3	21/-	21/9	22/3
½ in. thick	17/3	18/-	19/-	20/6	21/3	22/3	23/-	24/-	24/9	25/9	26/6	27/6

Ext. Dia. in Inches	8½	8⅝	9	9⅛	9¼	9⅜	10	10⅛	10¼	10⅜	10½	11	11½	12
Imp. Wire Gauge ..	3	3	3	3	3	3	3	2	2	2	1	1	1	1
Dec. in inches ..	·252	·252	·252	·252	·252	·252	·252	·276	·276	·276	·300	·300	·300	·300
Usual Wire Gauge ..	12/7	13/-	13/4	14/9	15/2	15/6	16/-	18/-	18/6	20/6	21/-	22/-	23/-	..
1 extra Gauge ..	13/10	14/4	14/9	16/1	16/8	17/1	17/6	19/6	20/-	..	..	..	..	..
2 extra Gauges	15/-	15/6	16/-	17/6	18/-	18/6	19/-	..	..	..	..	..	..	..
3 extra Gauges	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4 extra Gauges	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3/16 in. thick ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
¼ in. thick	12/7	13/-	13/4	14/9	15/2	15/6	16/-	18/-	18/6	20/6	21/-	22/-	23/-	24/-
5/16 in. thick	15/8	16/2	16/7	18/3	18/9	19/4	15/10	20/6	21/-	23/6	24/-	25/6	26/6	28/6
3/8 in. thick	18/6	19/3	19/9	21/9	22/6	23/-	24/6	24/6	25/-	25/6	26/-	27/1	28/6	30/-
7/16 in. thick	21/-	21/9	24/6	26/-	26/9	27/6	28/3	29/-	29/9	30/6	31/3	32/9	34/-	4-/6
½ in. thick	28/3	29/3	30/3	31/-	32/-	32/10	33/9	34/6	35/6	36/6	37/6	39/-		

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TUBULAR SCREWED STAYS, INCLUSIVE OF 11 INCHES OF SCREWING.

Ext. Dia. in inches..	1⅝	1⅝	1¾	1⅞	2	2⅛	2¼	2⅜	2½	2⅝	2¾
Three-sixteenths in. thick per ft.	1/8	1/8½	1/9	1/9½	1/10	1/11	1/11½	2/-	2/0½	2/2	2/3
Quarter in. thick ,,	2/1	2/2	2/3	2/4	2/5	2,6	2/6½	2/7	2/8	2/10	2/11
Five-sixteenths in. thick ,,	..	..	..	.	3/-	3/1½	3/3	3/4	3/5	3/7	3/9
Three-eighths in. thick ,,	..	..	..	..	3/9	4/-	4/2	4/3	4/5	4/8	4/10
Seven-sixteenths in. thick ,,	..	..	..	..	4/7	4/10	5/1	5/3	5/6	5/10	6/1
Half in. thick ,,	..	..	..	.	5/5	5/10	6/2	6/4	6/8	7/-	7/4

Ext. Dia. in inches..	2⅞	3	3⅛	3⅛	3¼	4	4¼	4½	4¾	5	
Three-sixteenths in. thick per ft.	2/5	2/6	2/8	2/10	3/0½	3/4	3/8	3/11	4/3	4/6	
Quarter in. thick ,,	3/2	3/3	3/6	3/9	4/-	4/5	4/10	5/2	5/10	6/1	
Five-sixteenths in. thick ,,	4/-	4/0	4/5	4/10	5/2	5/8	6/3	6/7	7/5	7/10	
Three-eighths in. thick ,,	5/3	5/5	5/10	6/4	6/10	7/5	8/2	8/8	9/10	10/4	
Seven-sixteenths in. thick ,,	6/6	6/9	7/4	7/11	8/7	9/4	10/4	10/10	12/2	12/10	
Half in. thick ,,	7/9	8/3	9/-	9/9	10/6	11/6	12/6	13/4	14/10	15/10	

SCREWED NUTS, SWELLING STAYS, & SCREWING STAYS BEYOND 11 IN.

Ext. Dia. of Stays in inches ..	1⅝	1⅝	1¾	1⅞	2	2⅛	2¼	2⅜	2½	2⅝	2¾
Screwed Nuts, each	-/8	-/9	-/10	-/11	1/-	1/1	1/2	1/3	1/5	1/6	1/7
Swelling Stays, ¼ in. per End ..	-/6	-/6	-/7	-/7	-/8	-/8	-/10	-/10	-/10	-/10	1/-
Screwing Stays, per Lin. inch ..	-/1	-/1	-/1½	-/1½	-/1½	-/1½	-/2	-/2	-/2½	-/2½	-/2½

Ext. Dia. of Stays in inches ..	2⅞	3	3⅛	3⅛	3¼	4	4¼	4½	4¾	5	
Screwed Nuts, each	1/9	1/10	2/3	2/8	3/-	3/5	3/9	4/2	4/8	5/3	
Swelling Stays, ¼ in. per End ..	1/-	1/-	1/2	1/2	1/4	1/4	1/6	1/8	1/10	2/-	
Screwing Stays, per Lin. inch ..	-/3	-/3	-/3	-/3½	-/3½	-/4	-/4	-/5	-/5	-/5	

PRICES FOR THICKENING UP ENDS OF TUBES TO ⅜ IN. FOR 2½ IN. UP.

Ext. Dia. of Tube	1⅝	1⅝	1¾	1⅞	2	2⅛	2¼	2⅜	2½	2⅝	2¾
Price per End, Tubes ⅜ in. thick	4/-	4/4	4/8	5/-	5/4	5/8	6/-	6/4	6/8	7/-	7/3
,, ,, ,, ⅜ in. thick	3/-	3/2	3/4	3/6	3/8	3/10	4/-	4/3	4/6	4/9	5/-
,, ,, ,, 5/16 in. thick	2/9	2/11	3/1	3/3	3/5	3/7	3/9	4/-	4/3	4/6	4/9

Ext. Dia. of Tube	2⅞	3	3⅛	3⅛	3¼	4	4¼	4½	4¾	5	
Price per End, Tubes ⅜ in. thick	7/8	8/4	..	..	..	..	..	..	..	..	
,, ,, ,, ⅜ in. thick	5/3	5/6	6/2	6/9	7/4	7/10	8/6	9/6	10/6	11/6	
,, ,, ,, 5/16 in. thick	5/-	5/3	5/8	6/1	6/8	7/-	7/6	8/6	9/6	10/6	

NOTE.—Any tubes over 5/16 in. thick to be charged at same price as that given for 5/16 in. thick.
When the length of the thickened end exceeds 2½ inches, 1/8 shall be added to above prices for every half-inch of extra length.

PRICES OF IRON COLLARS WELDED ON TUBES, AND TURNING AND FACING COLLARS AND WELDING IN ENDS OF TUBES.

Diameter of Tube in inches ..	2	2⅛	2⅛	2¼	3	3¼	3½	3¾	4	4¼	4½	4¾	5
Length of Collar in inches ..	2	2	2	2	2½	2½	2½	2½	2½	2½	2½	2½	2½
Price each, for ⅜ in. thick ..	1/4	1/6	1/8	2/10	2/1	2/4	2/7	2/10	3/1	3/4	3/8	4/-	4/4
,, for ½ in. thick ..	2/7	2/9	2/11	3/1	3/4	3/7	3/10	4/1	4/4	4/7	4/-	4/4	4/8
Turning and Facing Collars ..	1/3	1/4	1/6	1/8	1/11	2/2	2/5	2/8	2/11	3/2	3/5	3/10	4/2
Welding in Ends	1/4	1/6	1/8	2/10	2/1	2/4	2/7	2/10	3/1	3/4	3/8	4/-	4/4

NOTE.—Every half-inch increased length of Collar up to 3 inches diameter, 7d. per half-inch; and larger diameters, 10d. per half-inch extra.

NOTES.

Tubes of intermediate diameters will be charged at the same price as the next larger size.
Tubes of an intermediate thickness will be charged at the next higher price.
Tubes thinner than the list gauge will be charged at the price of the usual list gauge.
Maximum length 18 feet, or 5½ metres.
Lengths in excess of maximum length to be charged at 2½ less gross discount for every foot or part of a foot, or every 300 m/m or part of 300 m/m.
No extra charge for tubes swelled or reduced 1/16 at one end and 3 inches up.
Extra swelling or reducing, 12s. per 100 ends per 1/16 inch for tubes up to 4 inches diameter for 3 inches long.
Swelling tubes of larger diameter charged extra.
When no thickness is specified, orders will be supplied the wire gauge named on first line.

MALLEABLE UNIONS.


Fig. 1.

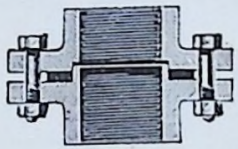

Section.


Fig. 2.

PRICE PER PAIR.

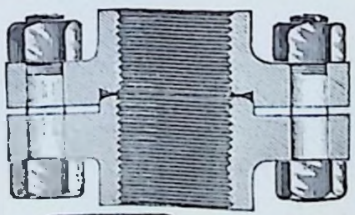
Screwed to Standard W.I. Pipe Sizes, and fitted with Bolts and Asbestos Jointing.

Size of Pipe ...	¼	⅜	½	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4 in.
Fig. 1	1/2	1/4	1/6	1/7	2/2	2/7	2/11	3/1	3/2						
Fig. 2			1/8	1/9	2/4	2/9	3/3	3/5	3 6	6/-	6 6	8/-	9/6	12 6	14/6

REDUCING UNIONS.

These Unions are exceedingly useful, serving the purpose of a Union and Reducing Socket in one fitting. Prices of large end same as above.

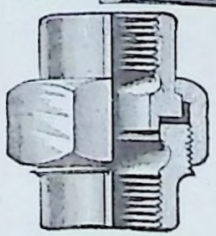
Fig. 1	½ × ¼	¾ × ¼	¾ × ½	1 × ¾	1 × ¾	1 × ½	1¼ × ¾	1¼ × ½	1¼ × ¾	1¼ × 1	1½ × ¾	1½ × 1	in.
	1¼ × 1	1½ × 1	2 × 1	2 × 1¼	2 × 1½								
Fig. 2	¾ × ¼	¾ × ½	¾ × ¾	1 × ¾	1 × ¾	1 × ½	1¼ × ¾	1¼ × ½	1¼ × ¾	1¼ × 1	1½ × ¾	1½ × 1	in.
	1½ × 1	1½ × 1¼	2 × 1	2 × 1¼	2 × 1½	2½ × 1½	2½ × 2	3 × 2	3 × 2½	4 × 2½	4 × 3		



MALLEABLE HYDRAULIC UNIONS.

PRICE.

Sizes ...	½	¾	1	1¼	1½	2 in.
Fig. 1 ...	2/-	2,6	3/-	3/6		
Fig. 2 ..	...	...	...	...	6/-	8/-



"CAP PATTERN" MALLEABLE UNIONS.

PRICE.

Sizes	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4 in.
Each	-/8	-/10	-/11	1/2	1/6	2/-	2,6	3/9	6/-	8/-	12 6	16/6



MALLEABLE HEXAGON TAPER NIPPLES.

PRICE PER DOZEN.

¼	⅜	½	¾	1	1¼	1½	2	2½	3	4 in
3/-	3/-	3/-	3 9	4 6	6/-	9/-	12/-	33/-	39/-	66/-



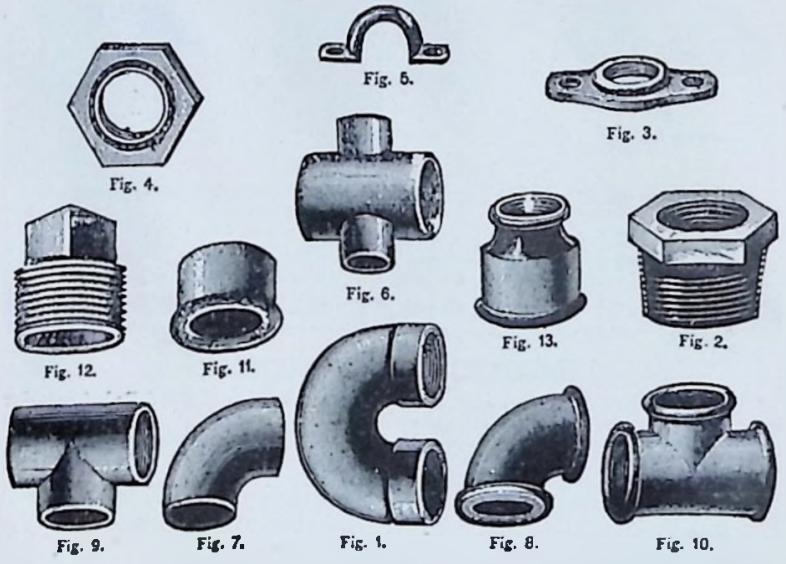
REDUCING NIPPLES.

Prices, taken at largest end, same as above.

½ × ¼	¾ × ¼	¾ × ½	1 × ¾	1 × ½	1 × ¾	1¼ × ¾	1¼ × 1	1½ × ¾	1½ × 1	in
1¼ × 1	1½ × 1	1½ × 1¼	2 × 1	2 × 1¼	2 × 1½											

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MALLEABLE GAS AND STEAM FITTINGS.

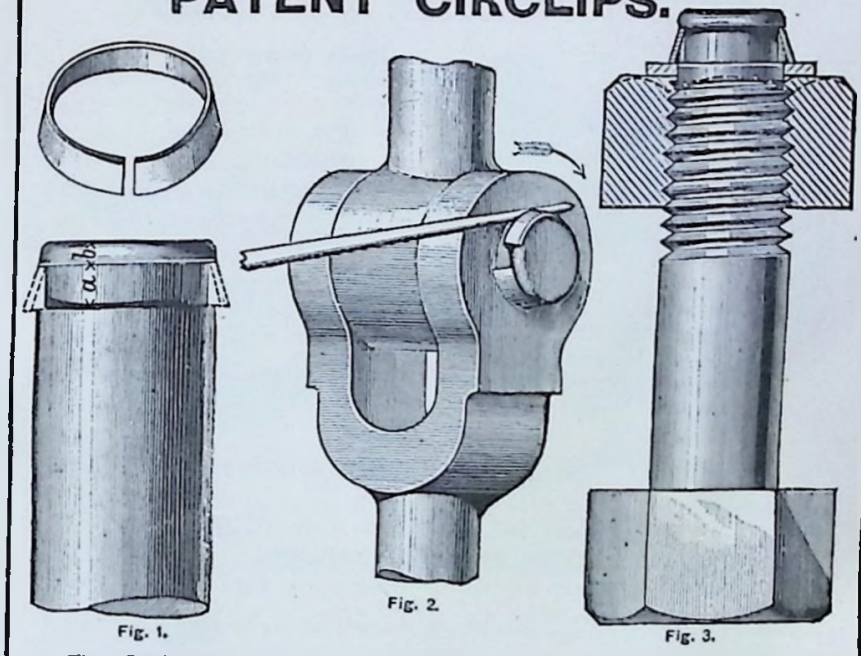


PRICES.

Fig.	Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3 in.
1	Return Bends			-/6	1/3	1/9	2/8	3/-	5/6	8/-	11/-
2	Reducing Bushings ...		-/2	-/2½	-/3	-/4	-/5	-/7	-/10	1/3	2/-
3	Flanges	-/4	-/5	-/6	-/8	-/11	1/-	1/4	1/9	3/-	4/-
4	Backnuts	-/0½	-/1	-/1½	-/2	-/2	-/3	-/4	-/6		
5	Straps	-/0¾	-/1	-/1	-/1½	-/1½	-/2½	-/2½	-/3½		
6	Crosses	-/2½	-/3½	-/4½	-/6	-/8	1/2	1/5	2/1		
7	Elbows	-/2	-/2½	-/3	-/4½	-/6	-/9	1/-	1/8		
8	Elbows, strong beaded			-/5½	-/7½	-/11	1/4	1/10	2/11	6/4	8/6
9	Tees	/2	-/2¾	-/4	-/5	-/6	-/9	1/1½	1/8		
10	Tees, strong beaded ...			-/7	-/9	-/11	1/4	2/-	3/-	8/-	10/10
11	Caps	-/1	-/1½	-/2	-/2½	-/3					
12	Plugs		-/1½	-/2	-/2	-/2½	-/3½	-/4	-/6	-/10½	
13	Reducing Sockets ...		-/2	-/2½	-/3	-/3½					

The Bushings, Elbows, Tees, Crosses, and Sockets may be had "reducing" to smaller sizes.

PATENT CIRCLIPS.



These Circlips are elastic split hoops, conical in form. They are intended as a **substitute for loose collars, set-screws, and washers, taper and split pins, &c.**, and **have greater holding power, and will not run back like nuts.** They are fixed in shallow grooves and no holes are required. They are not injured by being repeatedly removed and **will outlast dozens of split pins.** They are neat in appearance, can be **easily replaced,** and have **no projections.**

Fig. 1 gives perspective view of Circlip. Fig. 2 gives perspective view of joint pin held in position, and shows how Circlip can be removed by a pointed instrument such as a mechanic's scriber, which, after having been forced into the position shown, is to be pushed round in direction indicated by arrow. **The scriber must not be kept under the Circlip.** Fig. 3 shows application of Circlip, in combination with ordinary washer, for retaining a bolt-nut in position.

PRICES PER GROSS.

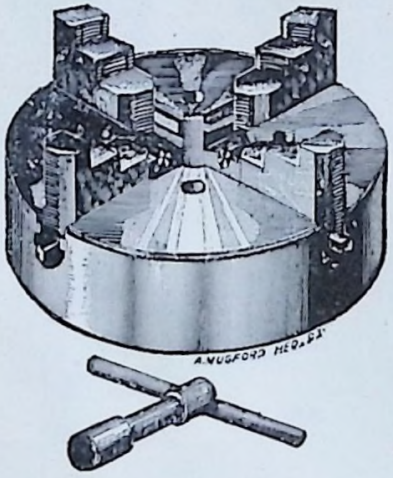
Diameter of Shaft, Spindle, or Stud.	Circlips.		Diameter of Shaft, Spindle, or Stud.	Circlips.		Diameter of Shaft, Spindle, or Stud.	Circlips.	
	Steel.	Phosphor Bronze.		Steel.	Phosphor Bronze.		Steel.	Phosphor Bronze.
in.			in.			in.		
3/16	3/9	4/1	9/16	4/8	5/10	1 5/16	7/4	11/6
¼	3/9	4/1	⅝	4/8	5/10	1 ⅜	8/-	13/2
5/16	3/9	4/4	11/16	5/-	6/11	1 7/16	8/8	17/4
⅜	4/-	4/6	¾	5/4	7/5	1 ½	9/4	20/4
7/16	4/4	4/8	7/8	6/-	8/8	1 9/16	11/3	—
½	4/4	5/3	1	6/8	10/4	1 ⅝	13/6	—

Directions for forming grooves for the Circlips:—
Width of groove (*a*) = width of Circlip.
Do. collar (*b*) = half-width do.
Depth of groove = thickness do.

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NEW INDEPENDENT JAW CHUCK.

With Reversible Jaws.



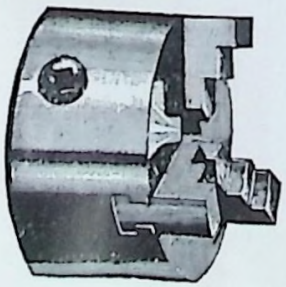
This is the best Independent Chuck now made. It is well proportioned in all its parts, and very strong. The screws are of steel, with long bearings at each end, the out end being thoroughly hardened after being fitted for the wrench. The jaws are also of steel, well hardened, and in all sizes can be run out and reversed. The body is of the finest quality cast iron, and all sizes over 16 in. have slots through the face, so that they can be used as face-plates if required.

Wrench and Bolts are provided with each Chuck.

PRICES AND PARTICULARS.

Size.	Weight.	Diam. of Hole.	Price.	Size.	Weight.	Diam. of Hole.	Price.
			£ s. d.				£ s. d.
4 inch.	5 lb.	1 in.	2 18 6	18 in.	143 lb.	4 in.	9 4 0
6 ,,	12 ,,	1¼ ,,	3 15 0	20 ,,	190 ,,	4 ,,	10 10 0
8 ,,	25 ,,	1⅞ ,,	4 12 0	22 ,,	216 ,,	4¾ ,,	11 18 0
10 ,,	35 ,,	2 ,,	5 10 0	24 ,,	254 ,,	4¾ ,,	13 11 0
12 ,,	61 ,,	3 ,,	6 5 0	26 ,,	340 ,,	5½ ,,	17 4 0
14 ,,	84 ,,	3 ,,	7 2 0	28 ,,	373 ,,	5½ ,,	20 16 0
16 ,,	114 ,,	3 ,,	8 0 0	30 ,,	454 ,,	6 ,,	25 0 0

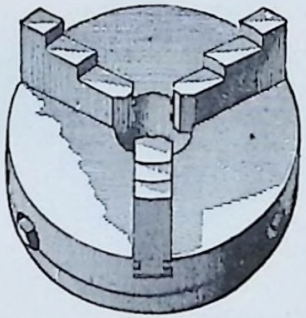
AMATEUR'S GEARED SCROLL CHUCK.



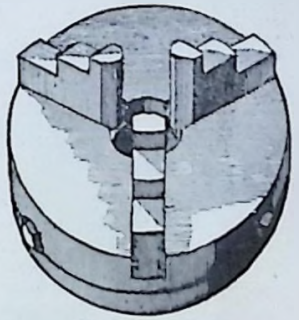
This is a new design of Chuck for Foot Lathes and light work. Each Chuck has one socket pinion which projects only slightly beyond the outside. The 2 in. size is made either for fitting a taper plug or face-plate. The 2½ in. is for face-plate only.

Diam.	Weight.	Price with one Set of Jaws.	Price with two Sets of Jaws.
2 inch.	1½ lb.	25/- each.	32/-
2½ ,,	2 ,,	30/- ,,	35/6

CUSHMAN'S AMERICAN
GEARED SCROLL CHUCKS.



With No. 1 Jaws.



With No. 2 Jaws.

These Chucks have been constantly improved, and owing to their accuracy, construction, and durability, are now one of the best universal Chucks for general use.

The working parts are made of forged steel, and every attention is paid to the mechanical construction.

All are now made with three pinions, an advantage over the old style, as a Chuck so made will outwear any other. It not only makes a handier Chuck to use by having a pinion always within reach, but the Chuck is more perfectly balanced, an advantage when required for high-speed Machines.

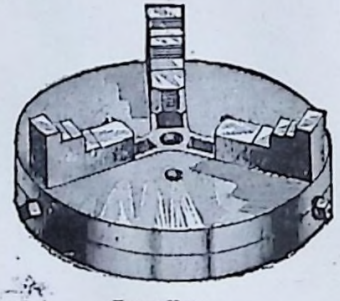
A Steel Key is supplied with each Chuck, also Screws for attaching to Face Plate.

Chucks with No. 1 Jaws, No. 2 Jaws, and with two sets of Jaws (Nos. 1 and 2) are kept in stock. Unless otherwise ordered, Chucks with No. 1 Jaws are sent.

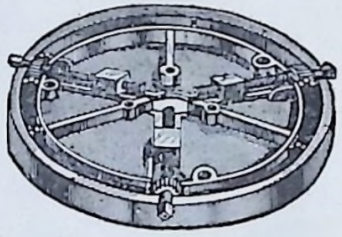
DIMENSIONS AND PRICES.

Diameter.	Diameter of Hole.	Weight.	Price, One Set Jaws.	Price, Two Sets Jaws.	Extra Sets of Jaws ordered without Chuck.
In.	In.				
2½	⅝	2 lbs.	£1 11 0	£1 17 6	10/-
3	⅝	3 ,,	2 2 0	2 10 0	12/6
4	⅝	6 ,,	2 10 0	3 0 0	15/6
5	¾	10 ,,	3 3 0	3 15 0	20/-
6	1 1/16	14 ,,	3 15 0	4 10 0	23/-
7½	2	22 ,,	4 3 0	5 0 0	28/-
9	2½	36 ,,	5 0 0	6 0 0	37/6
10½	3	51 ,,	5 12 6	6 15 0	45/-
12	3	62 ,,	6 5 0	7 10 0	50/-
15	3½	78 ,,	8 10 0	10 0 0	65/-

HORTON'S PATENT CHUCKS.



FRONT VIEW.



BACK VIEW (OPEN).

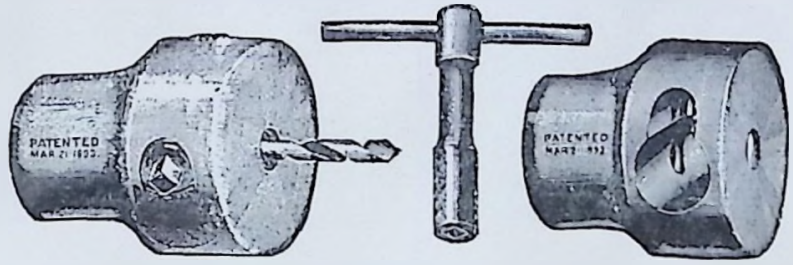
The jaws of this Patent Universal Chuck are moved simultaneously by means of geared screws and a circular rack, which is enclosed in a deep groove or recess in back plate, the centre faces of both front and back plates making a perfectly tight casing for the gearing, so that no dirt, &c., can get to them to cause injury. When rack is taken out it makes a superior *Independent Jaw Chuck*. The jaws are made solid, of the very best wrought iron, and thoroughly case-hardened. The geared screws and circular rack are of a special steel.

All Horton's Chucks are made on these lines, but vary in form and detail to suit different requirements.

PARTICULARS AND PRICES.

With 3 Jaws.			With 4 Jaws.		
Diameter.	Weight.	PRICE.	Diameter.	Weight.	PRICE.
inches.	lbs.	£ s. d.	inches.	lbs.	£ s. d.
6	12	5 5 0	6	14	6 10 0
9	22	7 0 0	9	24	8 10 0
12	40	9 0 0	12	43	11 10 0
15	56	10 10 0	15	60	13 0 0
18	68	12 10 0	18	75	15 0 0
21	88	16 0 0	21	105	19 0 0
24	101	20 0 0	24	115	24 0 0
30	197	34 0 0	30	230	40 0 0
36	330	46 0 0	36	345	57 0 0
42	487	54 0 0	42	515	65 0 0

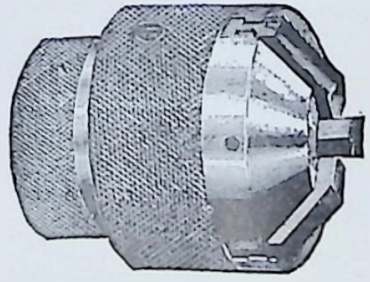
HORTON'S IMPROVED DRILL CHUCKS.



This Chuck can be recommended for its simplicity and strength. The body is composed of one piece, and there are but few parts to get out of order. Jaws and screws are thoroughly hardened; and the former are so constructed that teeth on bite come opposite each other, thus avoiding the danger of injuring the Drill. Nos. 5 and 6 are fitted for face-plates.

PARTICULARS AND PRICES.

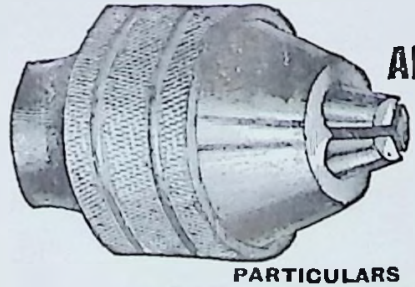
Size.	Holds Drills	Diam. of Body.	PRICE.	Size.	Holds Drills	Diam. of Body.	PRICE.
No.	in.	in.		No.	in.	in.	
1	0 to ¼	1⅜	29/6	4	0 to 1	3½	42/-
2	0 ,, ⅜	2⅛	33/6	5	0 ,, 1½	5¼	75/-
3	0 ,, ¾	2 15/16	37/6	6	0 ,, 2	6½	84/-



IMPROVED ACME DRILL CHUCK.

This Chuck, which is made of steel, is self-tightening, and is true and firm. It holds Drills from 0 to ½ inch.

PRICE 17/6



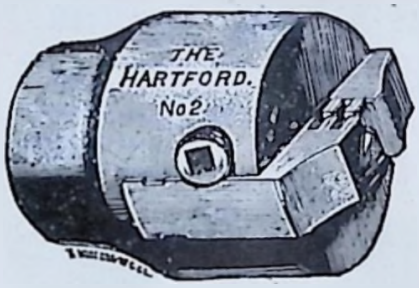
THE ALMOND DRILL CHUCK.

This Chuck is thoroughly and accurately made, and possesses all the features of a high-class tool.

PARTICULARS AND PRICES.

No.	Holding Drills	PRICE.
1	0 to 3/16 in.	22/-
2	0 ,, 5/16 ,,	22/-
3	0 ,, ½ ,,	36/-

THE HARTFORD DRILL CHUCK.



This is a most useful Chuck, as, in addition to drills, it holds reamers, taps, &c., by the round or square part, and does not injure the tools in any way.

PARTICULARS AND PRICES.

No.	Diam.	Length.	Capacity.	Price.
0	1¼ in.	2½ in.	0 to ⅛ in.	£1 4 0
1	2⅛ "	2½ "	0 " ½ "	1 8 0
2	2⅞ "	3¼ "	0 " ¾ "	1 12 0

STEEL LATHE DOGS.

Heavy Pattern.



PARTICULARS AND PRICES.

No. 1	..	⅛ inch Bore	..	1/8 each	No. 12	..	2 inch Bore	..	5/- each
" 2	..	3/16 " "	..	2/1 "	" 14	..	2½ " "	..	6/1 "
" 4	..	¼ " "	..	2/6 "	" 15	..	3 " "	..	6/8 "
" 6	..	5/16 " "	..	2/11 "	" 16	..	3½ " "	..	7/6 "
" 8	..	⅜ " "	..	3/4 "	" 17	..	4 " "	..	8/9 "
" 10	..	7/16 " "	..	3/11 "	" 18	..	4½ " "	..	11/6 "
" 11	..	½ " "	..	4/7 "	" 19	..	5 " "	..	13/9 "

STEEL LATHE DOGS.

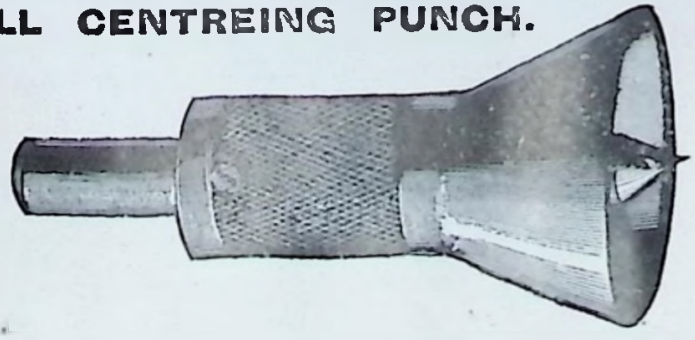
Light Pattern for Amateurs, &c.

No. 1	..	⅛ inch Bore	..	1/6 each	No. 3	..	¼ inch Bore	..	2/- each
" 2	..	5/32 " "	..	1/9 "	" 4	..	5/16 " "	..	2/6 "

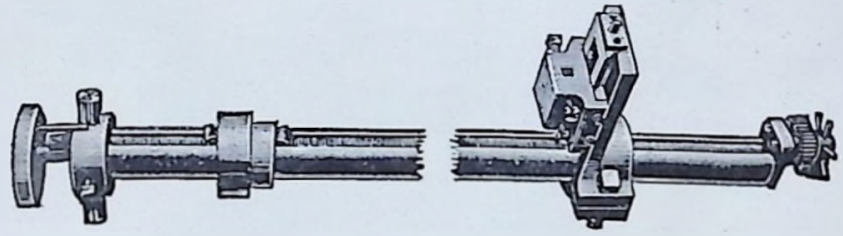
BELL CENTREING PUNCH.

This is a full-size illustration of a handy and useful tool, having a capacity up to 1½ inch.

Price 5/- each.



BORING BARS.



These Boring Bars are provided with **self-acting feed** motion by means of a star wheel. It is suitable either for working in a lathe or a horizontal machine It is made in **steel from 3 in. to 8 in.** diameter, and in cast iron above 8 in.

The price of each Bar includes the nut on the feed screw. To this all sizes of Boring Heads can be fixed.

Boring Heads of all sizes and Facing Arms are supplied with the Bars if required, at extra prices.

DIMENSIONS.

Bar.		Diameter of Boring Head.	Facing Arm to face in diameter.	Price.		
Diameter.	Length.			Bar.	Boring Head including Cutters	Facing Arm.
In.	Ft.	In.	In.	£ s. d.	£ s. d.	£ s. d.
3	6	6	12	6 5 0	2 16 0	2 16 0
4	8	8	12	8 5 0	3 15 0	3 15 0
5	10	12	20	12 10 0	4 14 0	4 14 0
6	10	14	20	13 15 0	5 15 0	5 15 0
7	12	16	20	15 0 0	6 12 0	6 12 0
8	12	20	30	17 10 0	7 10 0	7 10 0
10	12	24	30	20 0 0	9 2 0	9 2 0
12	14	28	60			
16	16	32	60			

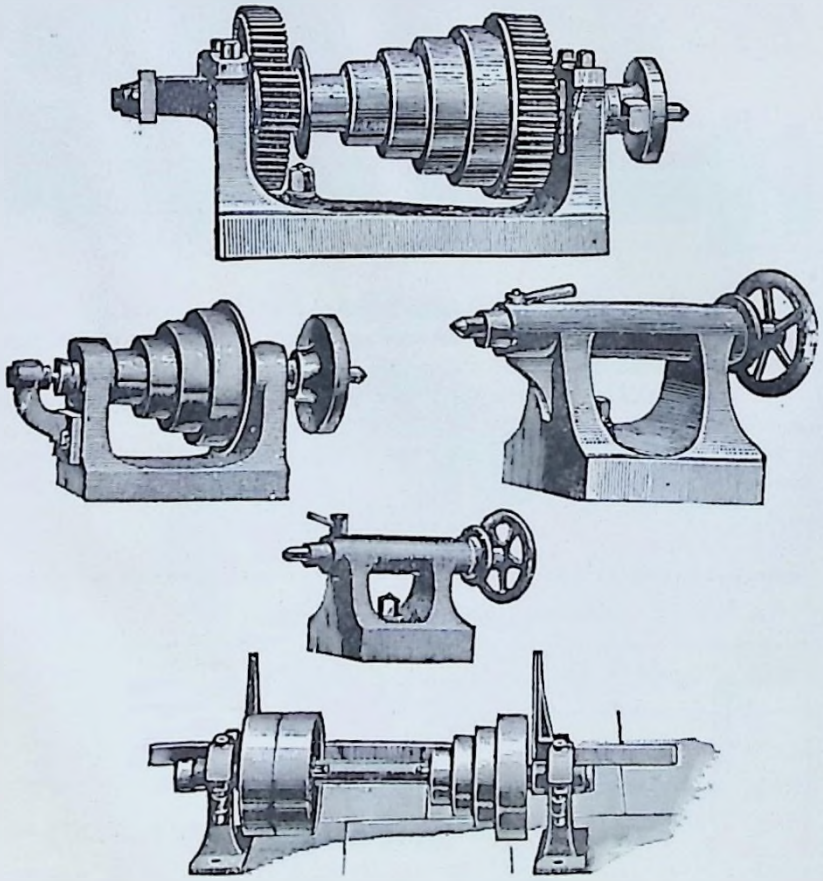
BORING MACHINES.

Boring Machines differ so much, owing to the work for which they are required, that we do not illustrate any, but on receipt of particulars shall be pleased to send full details.

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PARTS OF LATHES.

FAST AND LOOSE HEAD STOCKS.



The Double-geared fast Head Stocks are fitted with steel spindles, gun-metal bearings and parallel or conical adjustable bushes.

PRICES, INCLUDING OVERHEAD MOTION.

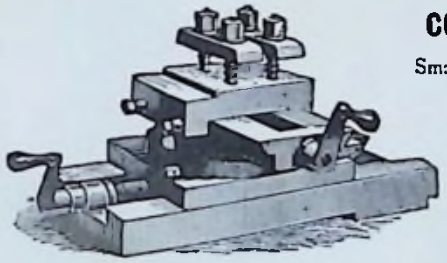
Size of Lathe	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.	14 in.
	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Double-geared Fast and Loose Head Stocks, per pair	8 2	9 15	13 0	17 2				
Single-speed ditto, ditto	6 10	8 2	9 15	12 5	14 13	16 5		

PARTS OF LATHES.



ECCENTRIC HAND RESTS.

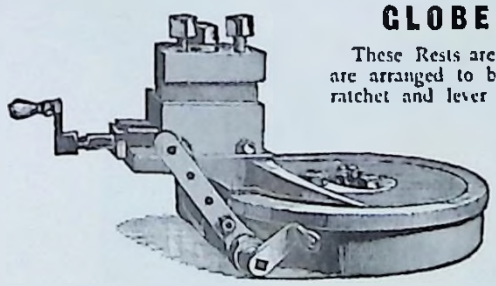
Sizes of Lathes, and Prices.						
5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
32/- each.	39/6 each.	39/6 each.	47/6 each.	47/6 each.	56/- each.	63/6 each.



COMPOUND SLIDE RESTS.

Small sizes are fitted with cast-iron swivel tool-holders.

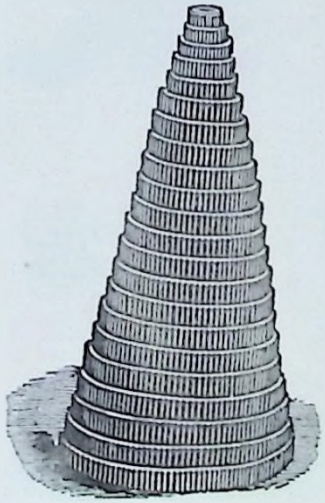
Sizes of Lathes, and Prices.						
5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
95/- each.	126/6 each.	142/6 each.	158/- each.	206/- each.	253/- each.	348/- each.



GLOBE TURNING REST.

These Rests are for turning Governor Balls, &c., and are arranged to be worked by hand, or self-acting by ratchet and lever from overhead motion; they can be adapted to fit any Lathe bed, or carriage of a self-acting Lathe.

Sizes of Lathes, and Prices.			
6 in.	8 in.	10 in.	12 in.
6 13 6 each.	9 6 8 each.	12 13 6 each.	16 0 0 each.

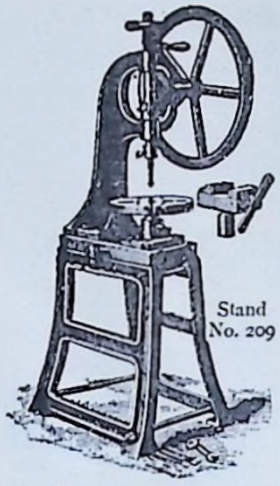


LATHE CHANGE WHEELS.

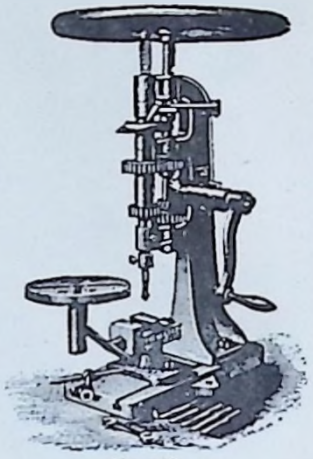
These are supplied in sets of 22 Wheels. They are bored, turned on bosses and rims, keyways cut, and teeth cleaned by machine.

Pitch of Teeth.	Price.	
	As above.	With Teeth cut from Solid Metal.
	£ s. d.	£ s. d.
¼ in.	2 2 6	5 0 0
5/16 "	2 6 8	6 10 6
⅜ "	3 0 0	8 13 4
7/16 "	4 13 4	9 13 4
½ "	6 2 6	14 13 4
⅝ "	10 0 0	

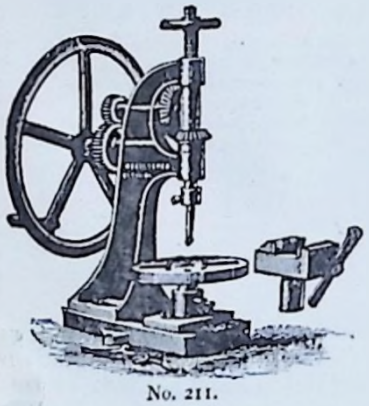
HAND AND POWER DRILLS.



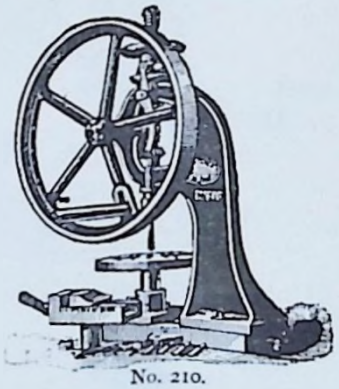
Nos. 200, 201, 202.



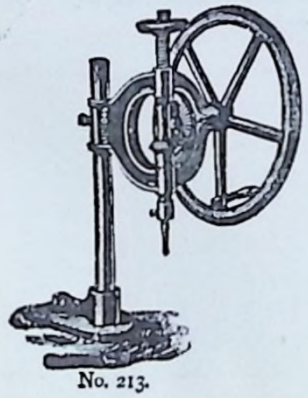
No. 208.



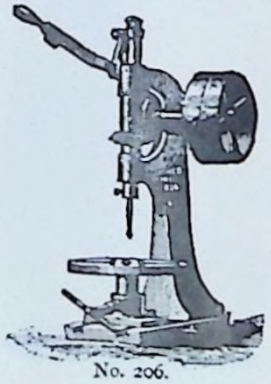
No. 211.



No. 210.



No. 213.



No. 206.

BENCH DRILLING MACHINES.

No.	Capacity. Hole drilled.	Capacity. Centre to frame.	Capacity. Feed.	Capacity. Diam. of Table.	Height	Weight	Prices. With Table and Vice	Prices. With Table	Prices. Cast Iron Stands.	Prices. Fast and Loose Pulleys.
	In.	In.	In.	In.	In.	Lb.	£ s. d.	£ s. d.	£ s. d.	s. d.
200	¾	5	2½	9½	27	100	3 16 6	3 7 6	1 2 6	10 9
201	1	6	3½	11½	31	150	5 8 0	4 14 6	1 7 0	14 6
202	1¼	7	4½	13½	37	250	8 2 0	7 4 0	1 11 6	18 0
206	1¼	7	3	13½	36	252	8 2 0	7 4 0	1 11 6	Included
207	¾	5	2½	9½	27	100	4 5 6	3 17 6	1 2 6	do.
208	1¼	6½	4	11½	42	258	10 16 0	9 18 0	1 11 6	18 0
210	¾	5	2½	9½	27	100	4 5 6	3 16 6	1 2 6	10 9
211	⅝	5	2½	9½	27	110	4 10 6	4 7 6	1 2 6	10 9
212	¾	5	2½	No Table	27	90	£2 17 6		—	10 9
213	½	4½	2		18	28	£1 17 9		—	—
213A	¾	7½	2½	,,	24	70	£3 3 0		—	—
213B	1	8½	3	,,	30	116	£4 3 0		—	—
214	¾	7½	2½	,,	27	80	£3 15 6		—	—

Six Drills and a set of Spanners sent with each Machine (with No. 213, four Drills).

Machines can be supplied **without** Table, Pedestal, and Foot Plate, at the following reduction in prices.

For Machine to drill .. .. up to	¾ inch.	1 inch.	1¼ inch.
Table	5/9	8/-	11/6
Pedestal	2/9	3/6	5/-
Foot Plate	5/3	6/6	8/3

All connecting parts of Machines are planed true, ensuring accuracy in drilling.

The Pedestal and Table can be removed to admit larger work, and when placed in the slots of the Plate is again central with the Drill. The Table can be taken out of the Pedestal and the Vice put in and secured in any position by one steel set screw; the leg of this Vice is turned, and is free to revolve in the Pedestal; by this means holes may be drilled round a circle or curve, or in a line, as desired.

Nos. 200 and 201 are Quick Speed Drilling Machines. The Pinion Wheels are with a distance Bush, which prevents the teeth of the wheels from being broken, and work more smoothly. **No. 201** is similar to **No. 200**, but stronger.

No. 202 is an Extra Strong Drilling Machine, designed for heavy work. The Machine is similar in design to **No. 200.**

Nos. 206 and 207 are Lever Feed Machines designed for drilling or Countersinking.

No. 208 is a **Self-Feed Machine.** It is fitted with **Double Gear Wheels,** by which means either a quick or slow speed can be obtained, or the power multiplied for large holes by simply sliding the Spindle Tooth Wheel in or out of gear with the other wheels.

No. 210 is a **Self-Feeding Machine** with Fly Wheel suitable for hand or power.

No. 211 is a very **Quick Speed Machine** fitted with extra wheels, giving a speed of 4 to 1.

No. 212 is **No. 200** fixed to a wall by an angle plate, changeable to a stand or bench.

No. 213 is a small **Radial Pillar Drilling Machine;** it is very light, strong, and portable. By means of the set pin it can be raised or lowered on the pillar to suit any kind of work.

No. 213a is stronger. No. 213b is very strong.

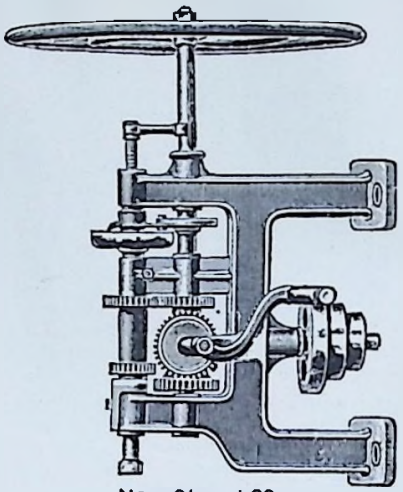
No. 214 is similar **to No. 213,** but **specially designed for Drilling Pipes** up to 6 in. diameter.

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ACL Doc 21509 · Page 96 of 298
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WALL DRILLING MACHINES.



No. 9.



Nos. 21 and 22.



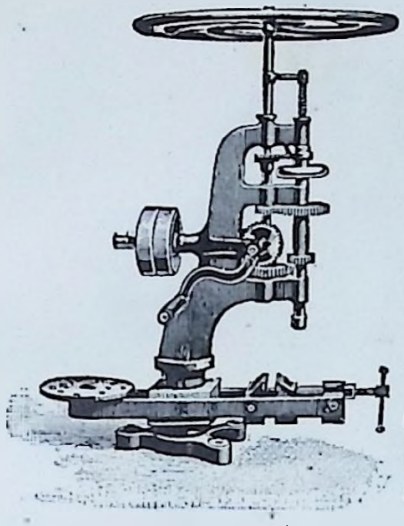
No. 20.

Nos. 9 and 20 are Single Speed Machines for hand power. Nos. 21 and 22 are Double Geared, with self-acting Feed motion, adapted for hand or power.

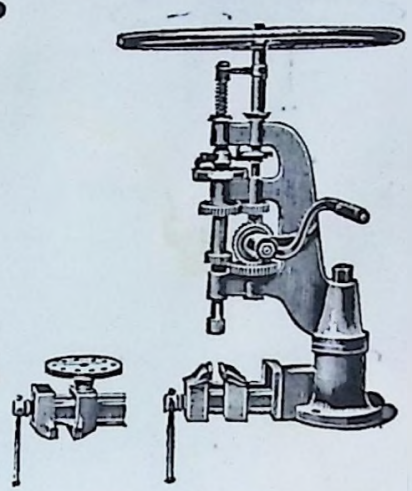
PRICES.

No.	Will drill up to	Diameter of Wheel.	Approximate Weight.	Price.	With Fast and Loose Pulleys or Cone.	With Cone for Steam Power (without fly wheel); also Transmission Cone.
	In.	In.	lb	£ s. d.	£ s. d.	£ s. d.
9	⅝	20	75	1 9 0		
20	⅝	20	81	1 7 0		
20	⅝	23½	95	1 8 0		
21	1 3/16	33½	265	5 3 0	5 13 0	
22	1 9/16	39½	375	5 17 0	6 16 0	6 12 0

BENCH DRILLING MACHINES.



Nos. 30, 31, and 32.



Nos. 27, 28, 29, 46, and 48.

Machines Nos. 27, 28, 29, 46, and 48 are double geared, with self-acting feed-motion, and adjustable vice made to fit up in four different positions. These machines are made to swing round on base; and fast and loose pulleys can be fitted to handle shaft if required for power.

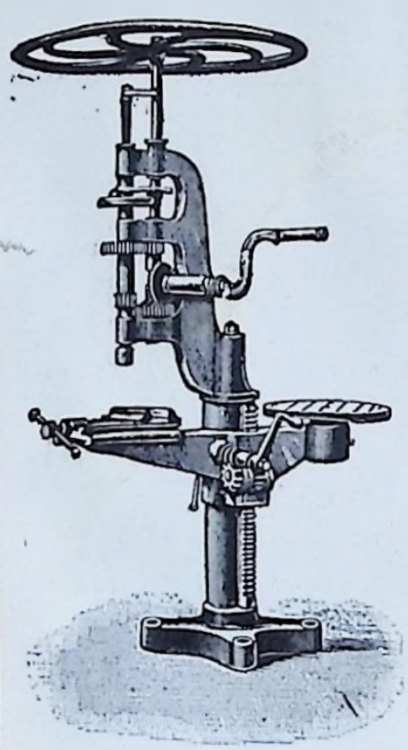
Nos. 30, 31, and 32 are double geared, with self-acting feed-motion, revolving parallel vice and drawer, and can be made with table to revolve in all directions.

When desired for power, fast and loose pulleys are fitted at back of arm as shown in Illustration.

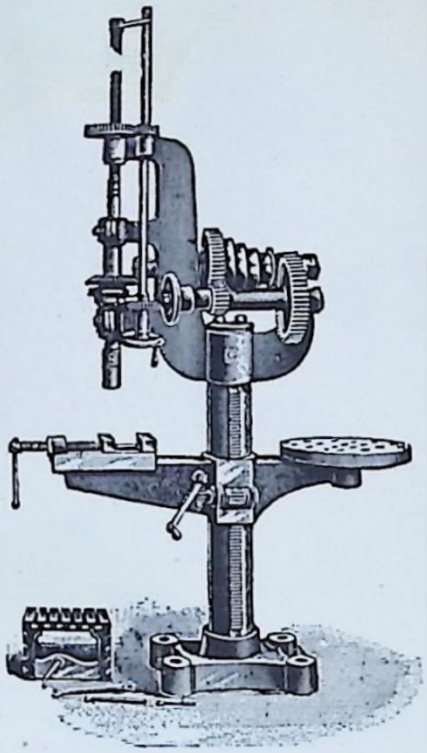
No.	Drill up to	Diameter of Wheel.	Approximate Weight.	Price. As above.	Price. With Fast and Loose Pulleys.	No.	Drill up to	Diameter of Wheel.	Approximate Weight.	Price. As above.	Price. With Fast and Loose Pulleys.	Price. Extra Table to revolve in any direction.
	In.	In.	Lbs.	£ s. d.	£ s. d.		In.	In.	Lbs.	£ s. d.	£ s. d.	£ s. d.
48	1	31½	242	5 3 0	5 12 0	29	2	43½	540	8 9 0	9 8 0	
46	1 3/16	33½	309	5 17 0	6 9 0	30	1	31½	322	6 16 0		0 19 0
27	1⅜	37½	353	6 12 0	7 4 0	31	1 3/16	33½	441	7 [illegible] 0	8 7 0	1 3 0
28	1 9/16	39½	441	7 10 0	8 5 0	32	1 9/16	39½	664	11 [illegible] 0	12 9 0	1 8 0

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PILLAR DRILLING MACHINES.



Nos. 42, 43, and 44.



Nos. 61, 62, and 63.

These very useful and cheap Drilling Machines are fitted with revolving parallel vice and table, rising and falling on pillar by rack and pinion, and automatic feed motion.

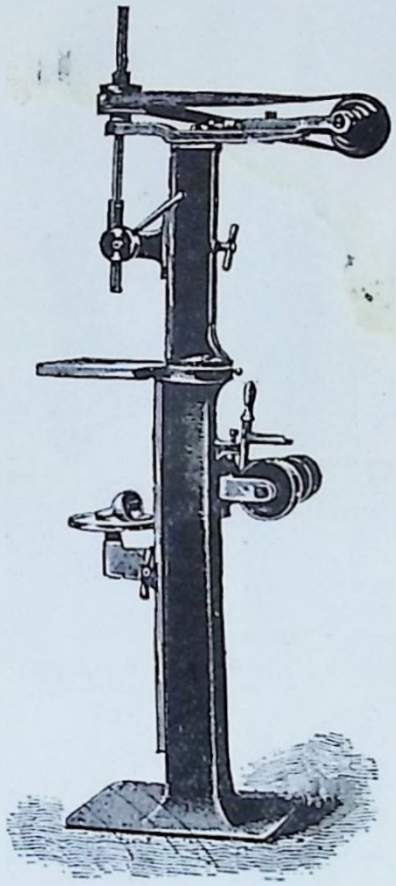
Nos. 42, 43, and 44 can be fitted with fast and loose pulleys to handle if required for power.

Nos. 61, 62, and 63, for power only, are provided with back-gear and cone, with best gun-metal bushed bearings.

No	Drill up to	Approximate Weight.	Price. As above.	Price. With Cone or Pulleys.	Price. Transmission Cone.	No	Drill up to	Approximate Weight.	Price. As above.	Price. With square box table instead of vice.	Price. With square box table and vice.	Price. Transmission Cone.
	In.	Cwts.	£ s.	£ s.	Extra.		In.	Cwts.	£ s.	£ s.	£ s.	Extra.
42	1⅜	5¼	11 10	12 5	15/-	61	2⅜	10½				25/-
43	1⅝ / 2⅜*	7	12 18	13 18	20/-	62	2 9/16	12				25/-
44	2 / 2 9/16*	9	15 10	16 10	20/-	63	3⅛	22½				25/-

* Will drill up to these sizes if pulleys or cones are used.

HIGH SPEED SENSITIVE DRILLING MACHINE



This Machine has, among others, the following advantages: it is specially adapted for drilling holes up to ½ in.; the spindle nose is bored to No. 1 Morse Twist Drill Taper; the spindle can be raised or lowered at will 12 in.; a depth stop is provided.

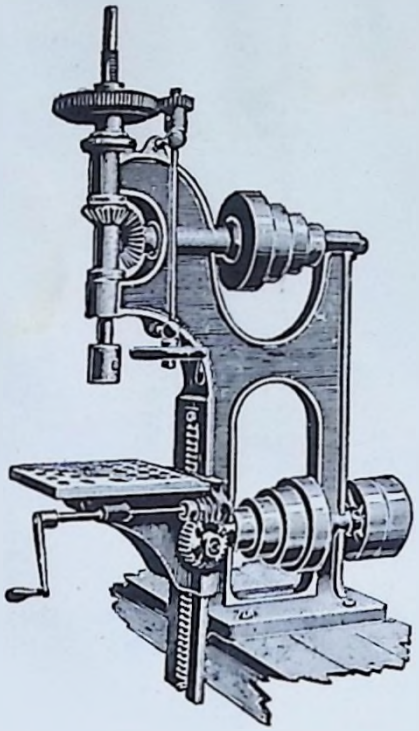
All pulleys are turned inside and out, **to ensure steadiness in running.** It is fitted with fast and loose pulleys and strap fork.

DIMENSIONS.

Will drill extreme length.	Centre of Spindle to face of column.	Fast and loose Pulleys	Approximate Weight.	Price.
3 ft. 6 in.	5 in.	4¼ in. × 1⅜ in.	240 lbs.	£15

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SINGLE SPEED DRILLING MACHINE.



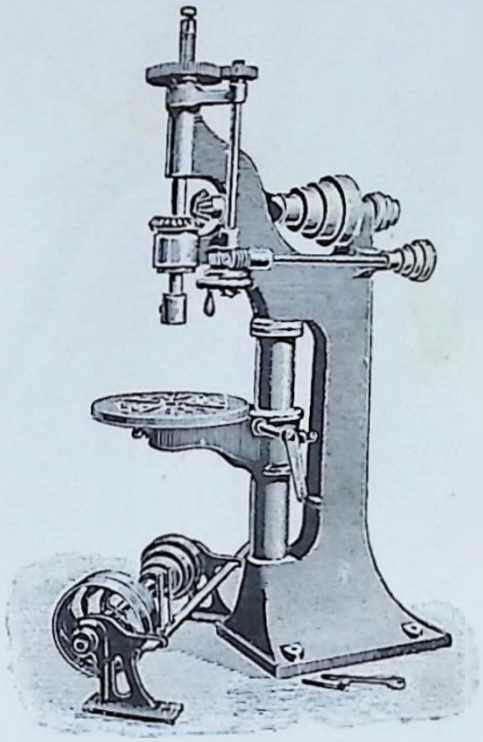
This Machine is designed to fix on a bench, or, if preferred, on a cast-iron stand. It is fitted with a **steel spindle** having hand feed by screw, and steel-wearing faces adjustable by lock nuts. The table is square and is made to rise and fall on a planed face by rack and pinion. The **machine is very rigid** and self-contained, and is complete with fast and loose pulleys, strap fork and shifter, screw-keys, &c

DIMENSIONS.

Will admit in diam.	Diam. of Spindle.	Will Drill		Size of Table.	Speed Cone.	Approximate weight, no Stand.	Price.			
		Diam.	Deep.				As above.	With Stand.	With self-acting Feed Motion.	With Wheel and Handle.
in.	in.	in.	in.	in.	4 speed ×	cwt.		extra	extra	extra
18	1¼	1	6	13½ square.	1½ wide	5	£14	£1 18 0	£1 7 6	£0 18 0

For list of Twist Drills and Sockets, see Index.

DRILLING MACHINE.



Above is made with **Single and Double Gear.** The frame is of box pattern and **very rigid**; and the table is circular moving on a turned pillar. The Machine is fitted with a steel spindle having conical gun-metal bearings with **adjustment for taking up the wear.** Variable self-acting feed-motion with improved **instantaneous disengaging motion.**

Each Machine is complete with overhead motion, strap-bar and fork, screw-keys, &c.

Note.—When Machine is double-geared frame is slightly altered.

Will admit in Diameter.	Diameter of Spindle.	Will Drill		Diameter of Table.	Speed Cone.	Weight.	Price.	
		Diameter.	Deep.				Single-geared.	Double-geared.
In.	In.	In.	In.	In.	4-speed ×	Cwts.	£	£
24	1¼	1½	8	20	2½ in. belt.	11½		

For list of Twist Drills and Sockets, see Index.

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PILLAR DRILLING MACHINES.

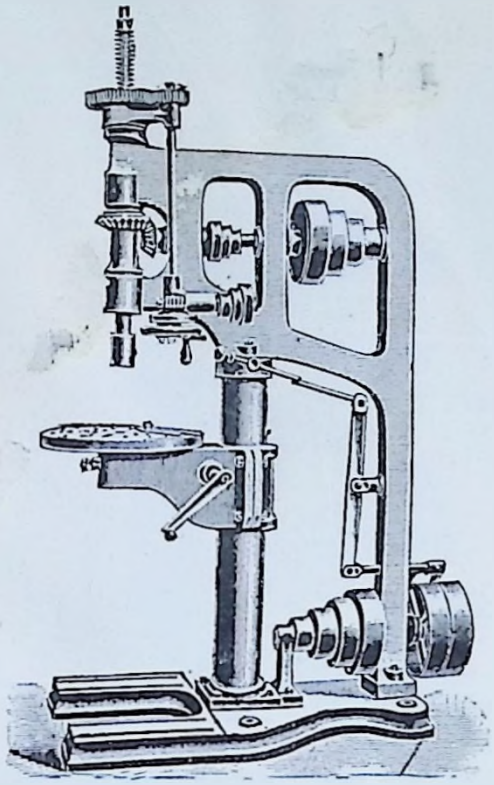


Illustration represents a strong and durable Machine, having circular **table** which can be **raised or lowered** on turned pillar, and swing to sides **clear of base**; self-acting **variable feed-motion** with improved disengaging motion. Spindles are of steel, having hardened steel end thrust and adjusting nuts for taking up wear. Base-plate has **T** slots, and a pit can be made between for receiving long articles. Machine being self-contained requires **no countershaft.** Wrought-iron case-hardened screw-keys are provided with each machine.

DIMENSIONS.

Admits in Diam.	Admits in Height.		Fall of Spindle.	Diameters of			
	On Table.	On Base-plate.		Steel Spindle.	Table.	Pillar.	Driving Pulleys.
In.	Ft. in.	Ft. in.	In.	In.	In.	In.	In.
30	2 8	3 6	10	2	20	6	12

Approx. Weight.	4-speed Cone.		Gear.	Price.	
	Width.	Diam. of largest.		As specified.	With Plain Bearings.
Cwt.	In.	In.		£	£
15	2½	11	Single		
20	2½	11	Double		

PILLAR DRILLING MACHINES.

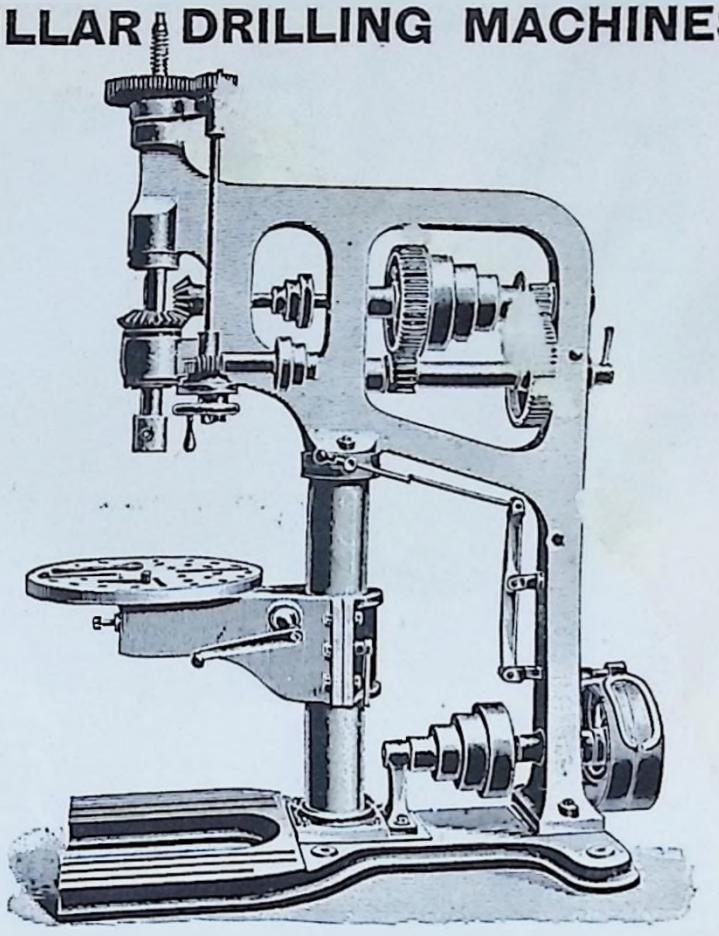


Illustration represents 36 in. and 42 in. Machines, which have **powerful frames**, and are strong and durable; are provided with circular tables which can be raised or lowered on turned pillar, and swing to sides **clear of base**; **self-acting variable feed disengaging motions.** Spindles are of steel, having **hardened steel end thrust** and adjusting nuts for taking up wear. Bearing for spindle has a large gun-metal bush bored out to receive coned sleeve of driving-wheel, and bush is fitted with adjusting nuts. Machines being **self-contained** require **no countershaft.** Wrought-iron case-hardened screw-keys are provided with each machine.

Admits in Diameter.	Admits in Height.				Fall of Spindle.	Diameters of			Approximate Weight.
	On Table.		On Base plate.			Steel Spindle.	Table.	Driving Pulleys.	
In.	Ft.	In.	Ft.	In.	In.	In.	In.	In.	Cwt.
36	2	4	3	10	12	2⅛	32	15	28
42	2	4	3	10	12	2¼	38	15	32

36-in. Machine, as specified .. .. £ : : If plain bearings .. .. £ : :
42-in. .. .. £ : : .. .. .. £ : :

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PILLAR DRILLING MACHINES.

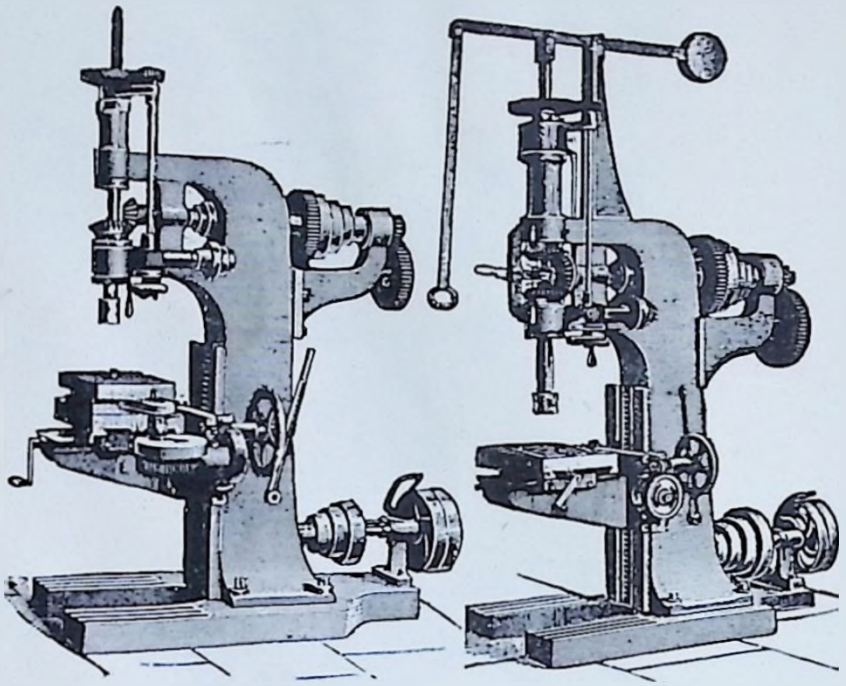


Fig. 1 Fig. 2.

These Special Drilling Machines are Double Geared and have **Compound Tables**; the frame is box pattern, with planed V slides in front. Table rises and falls by worm gear and handle, and has carefully-fitted Slides, planed T slots on top, and large hinged joint at side so that it can be swung clear of any large work; when in use table is bolted to saddle, which slides in front of standard. Spindle is of steel, working in conical gun-metal bearings, with adjustable wearing nuts. The variable self-acting feed motion can be instantaneously engaged or disengaged while cut is on and will not stick. Driving motion is double geared and self contained, with speed cone, fast and loose pulleys, strap fork and shifter, screw keys, &c., complete.

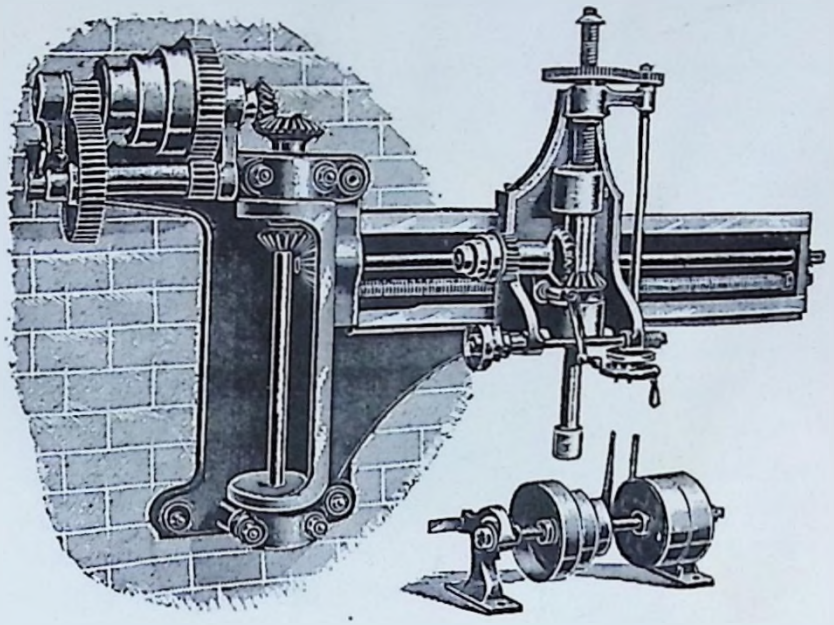
Fig. 1 shows **Machine provided with Self-acting Slot Drilling Attachment**, and will cut keyways up to 12 in. long × 1½ in. wide

Fig. 2 shows **Machine provided with Tapping Arrangement**. Spindle is balanced and motion is reversible. Screw used for self-acting feed motion can be instantly detached from nut, leaving spindle free to follow tap which is secured into it; when tap is through hole, spindle is reversed by lever in front; this withdraws tap from hole.

Admits			Diam. Steel Spindle	Size of Table.	4-Speed Cone.		Pulley.		Approx. Weight	Price.
In Diam.	On Table.	On Base.			Largest Diam.	Width.	Diam.	Width.		
In.	In.	In.	In.	In. In.	In.	In.	In.	In.	Cwts.	
30	24	36	2	20 × 14	10½	2¼	12	3	28	£
36	28	40	2½	24 × 16	11	2¾	15	3¼	34	£
42	28	40	2½	24 × 16	11	2¾	15	3¼	37	£

If as Fig. 1, with Slot-drilling Attachment, Price extra to either size, £
,, Fig. 2, with Tapping Arrangement ,, ,, ,, £

WALL RADIAL DRILLING MACHINES.



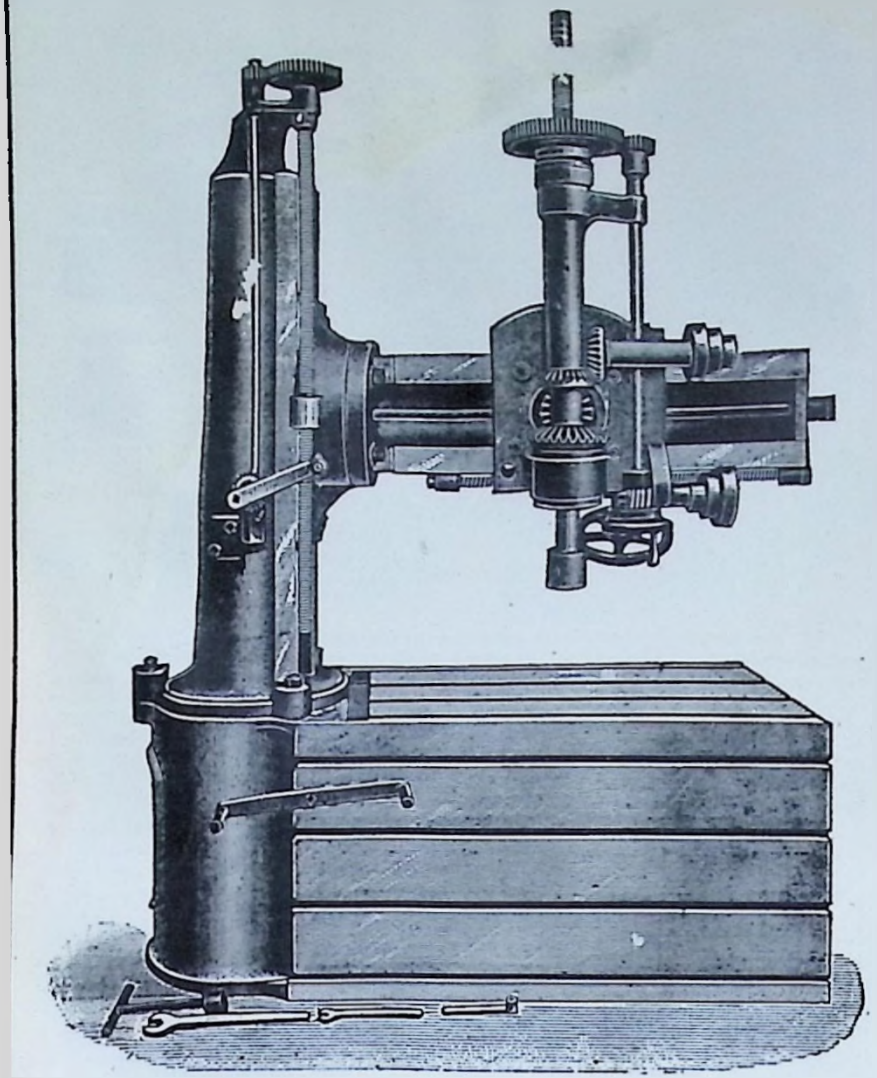
The above machine is suitable for fixing to an ordinary wall, as shown, or to a pillar. The wall plate carries the driving cone and wheels, which can be arranged either at top or bottom, also two large bearings. Radial arm has two trunnions cast upon it, turned to fit bearings, firmly secured by caps and bolts. Drill head on arm is adjusted by handle, which is placed close to spindle. Handle revolves a nut wheel on fixed screw; this gives quick hand traverse, and secures drill in position. Spindle is of steel, with self-acting variable feed, hardened steel end thrust bearings, and slides through driving-wheel, which has long-coned sleeve revolving in gun-metal bearing, with adjustable nuts. Feed screw has adjustable nuts for taking up wear. Each machine is complete with overhead motion and screw-keys.

No.	Radius will bore.	Spindle.		Arm.			Cone.		
		Diam.	Vertical Feed.	Length from centre of Trunnion.	Width on Face.	Travel of Saddle.	No. of Speeds.	Largest Diam.	Width.
	Ft. In.	In.	In.	Ft. In.	In.	Ft. In.		In.	In.
1	4 5	2¼	12	5 0	14	2 8	3	10¾	2⅜
2	6 0	2½	16	6 7	15¼	4 0	3	12½	3⅛
3	6 3	2¾	16	7 0	17	4 0	4	12	3⅛
4	7 3	3½	18	8 0	20	4 10	5	14	3⅛

No.	Approx. weight.		PRICE.	
	Double Geared.	Single Geared.	Double Geared.	Single Speed.
	Cwts.	Cwts.	£	£
1	20	18½		
2	26	24		
3	36	—		Not made.
4	60	—		

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RADIAL DRILLING MACHINE.



For Dimensions and Particulars, see opposite page.

RADIAL DRILLING MACHINE.

This Machine [illegible]ive box bed, with T slots planed out of the solid metal, on top and one side. A[illegible] pillar with trunnion of large diameter is fitted into the box bed, and secured by t[illegible]n any position; the pillar may be revolved through a complete circle by a handle placed in the front of the bed. The arm is rigidly fitted to the pillar by a flat slide with adjustment for taking up the wear, and has hand motion for raising or lowering. It is also made universal as shown in illustration. The drill carriage is adjustable on the arm by a revolving nut on a fixed screw worked by a handle near the spindle. The spindle is steel and is driven by a wheel which has a long coned sleeve revolving in adjustable gun-metal bearings, which with the hardened steel end thrust bearings of the spindle and feed screw have adjustable nuts for taking up the wear. Drill carriage can also be made universal to revolve on a planed face so as to drill at any angle. Spindle has a variable self-acting feed motion, with improved arrangement for engaging and disengaging while machine is working. The driving motion is double geared, with four-speed cone, and can be fixed at end or back of bed as ordered. Complete overhead motion and screw-keys are supplied with machines.

DIMENSIONS.

Length of Arm.	Arm will raise and lower.	Traverse of Head on Arm.	From top of table to Spindle Nose.	Dimensions of Bed.			Diam. of Spindle.	Fall of Spindle.
				Length.	Width.	Depth.		
Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	In.	In.
4 6	2 7	2 2	2 8	5 11	2 4	2 4	2½	14

Will Bore		4-Speed Cone.		Appx. Weight.	Price.		
At a radius of	Diam. holes up to.	Width.	Diam. of largest.		As above.	If fitted with Universal Arm.	If fitted with universal Head and Arm.
Ft.	In.	In.	In.	Cwts.	£	£	£
4	10	2½	10½	42			

For list of Twist Drills and Sockets, see Index.

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RADIAL DRILLING MACHINE.

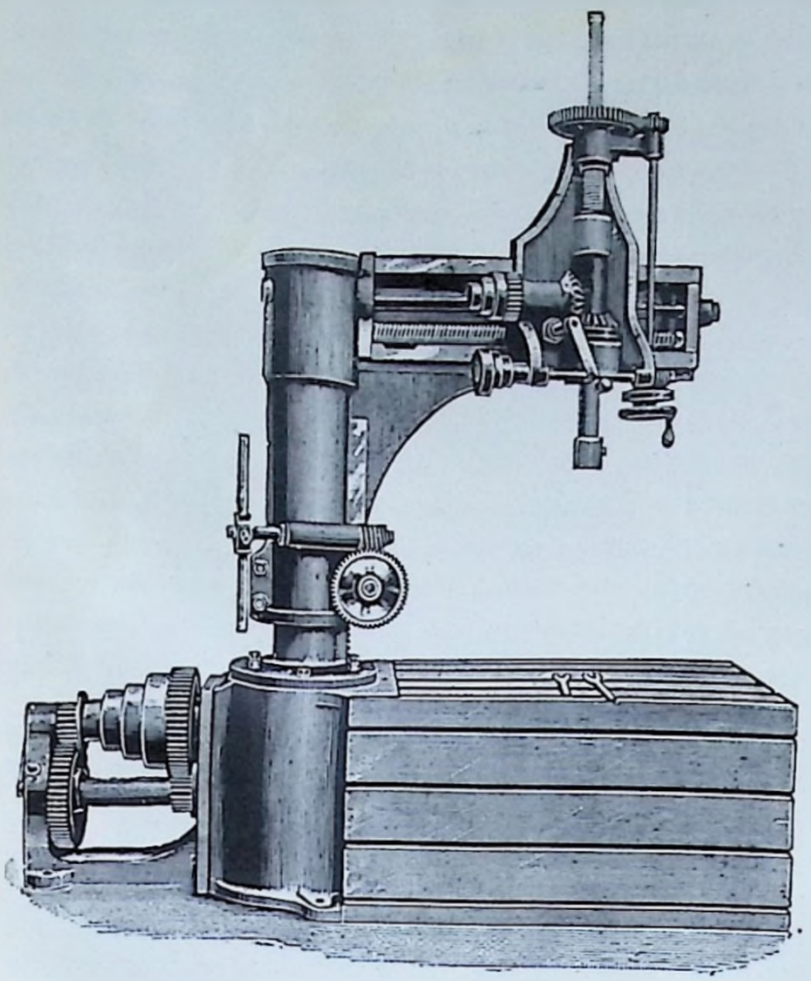


Illustration of Machines Nos. 1 and 2.

For Dimensions and Particulars, see opposite page.

RADIAL DRILLING MACHINES.

These Machines consist of a **strong box base** with T slots planed out of the solid metal in the top and one side. The **arm revolves** on a turned pillar firmly fixed into the base; it has a hand motion for raising and lowering, and will revolve through the entire circle. The drill carriage is moved along the arm by a revolving nut on a fixed screw, and is worked by a handle near the spindle. This motion gives a **quick travel** of the head, and also fixes it in position for work.

The **steel spindle** is driven by a wheel which has a long coned sleeve revolving in a gun-metal **adjustable bearing.** This and the **hardened steel end thrust** bearings of the spindle have adjusting nuts for taking up the wear.

The driving motion is **double geared** with four-speed cone, and is provided with complete overhead motion and belt shifter.

DIMENSIONS.

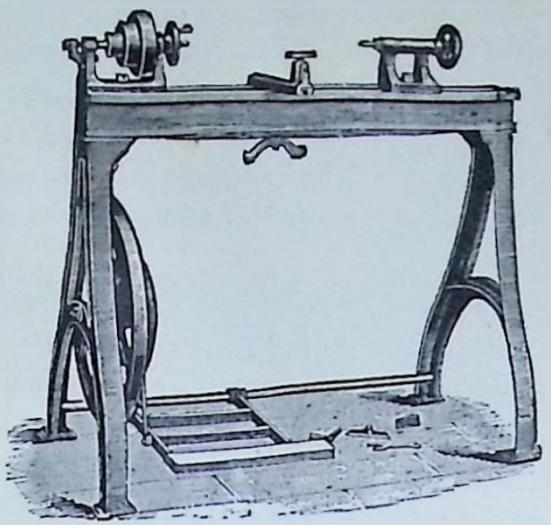
No.	Length of Arm.	To bore at a Radius of	Arm will raise and lower	Traverse of Head on Arm	Dimensions of Bed.		
					Length.	Width.	Depth.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
1	3 7	3 1	1 3	1 6	4 9	2 4	2 4
2	4 8	4 1	1 6	2 2	6 5	2 9	2 2

No.	From top of Table to Spindle Nose.	Fall of Spindle.	Diameter of Spindle.	Diameter of Pillar.	Approximate Weight.	Price.
	Ft. In.	Ft. In.	Ft. In.	In.	Cwts.	
1	3 6	1 0	0 2	7	36	£
2	4 0.	1 6	0 2½	9	50	£

For List of Twist Drills and Sockets, see Index.

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HAND-TURNING LATHE.



This Lathe is designed to sell at a low price, and to meet the requirements of light turning and drilling where a more expensive tool is not necessary

It is well made; 4 inch centres; 3 feet girder; ribbed bed on iron standards; and can be supplied for foot or machine, or both.

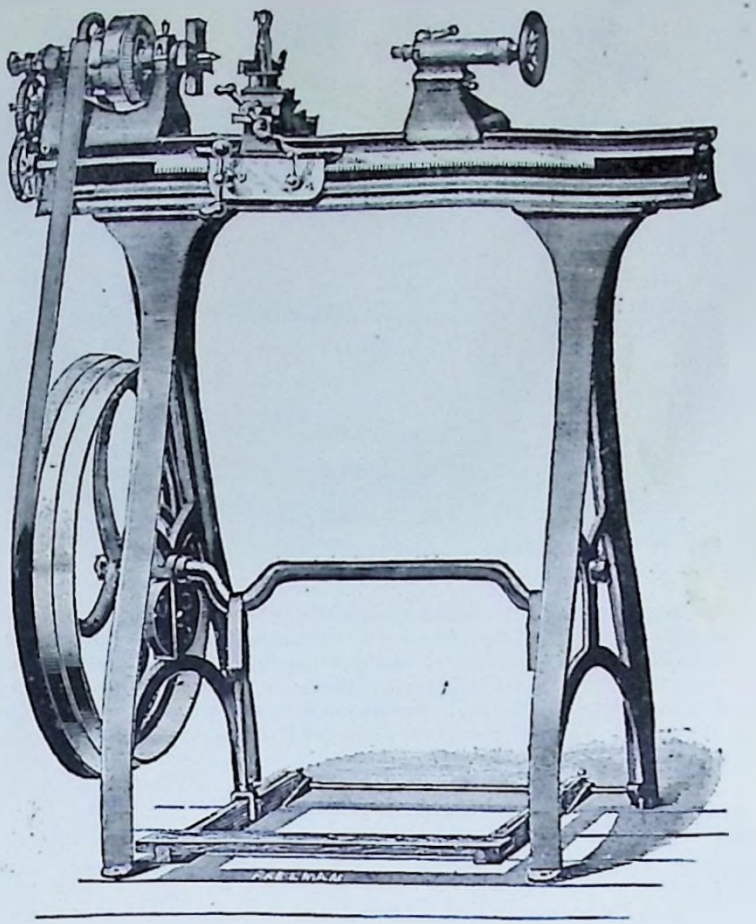
The driving wheel of the foot mechanism is arranged to give a great range of speed without much variation in the action of the foot in treading.

A hand-rest for wood and metal turning; centres for wood and metal; carrying plate and wrench are provided.

Price for foot power	£8 10 0
„ „ steam power	8 10 0
„ „ Counter Shaft .. .. .. extra	1 15 0

SCREW-CUTTING FOOT LATHE.

LIGHT PATTERN.

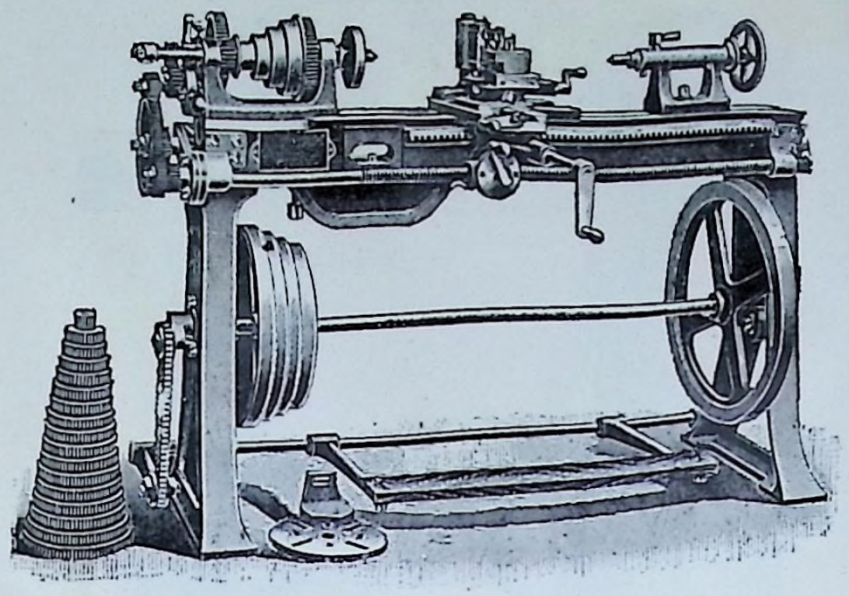


The above represents a Light Pattern Foot-Power Lathe, suitable for amateurs, &c. It has 4½ inch centres, and will turn work 25 inches long. The Headstock has a hollow spindle, allowing rods ⅜ inch to pass through the head and be held in a chuck. The Cone Pulleys are 2½, 3½, and 4 inches diameter, giving a good variety of speed. It is back-geared, feeds either to right or left, and cuts screws right or left without change of gear.

	With Plain Rest	With Compound Rest.
Price of Lathe ...	£	£

The Lathe can be supplied with a Large Face Plate and Centre Rest at a small extra cost.

SCREW-CUTTING FOOT LATHES.



The above represents a very strong and accurate class of Foot-power Lathes, provided with back following stay, tool board, face-plate, driver-plate, treadle with **anti-friction bearings** and heavy **balanced fly-wheel** and cone. Foot motion may be fitted with wrought iron, double throw crank, if so ordered. Double geared head-stocks with machine-cut wheels, conical or parallel bearings as required, and steel spindle. Carriage has quick hand traverse by rack and pinion, slide rest arranged to surface or turn conical and indexed to set at any angle. Guide screw is fitted with double clam nuts of gun metal.

DIMENSIONS.

Height of Centres.	Bed			Admit between Centres.	Gap.		Cone for Foot Motion.			Guide Screw ¼ in. Pitch.
	Length.	Width.	Depth.		Width.	Depth.	No. of Speeds.	Largest Diameter.	Width.	
In.	Ft.	In.	In.	Ft. In.	In.	In.	—	In.	In.	In.
3½	3½	5¼	4	1 9	4¼	4	3	18	1⅛	1
4½	4½	6	4⅜	2 5	5	4¼	3	18¼	1 3/16	1⅛
5	5	6½	5½	2 7	5¼	4¾	4	18¼	1 3/16	1¼
6	6	8	5½	3 3	7½	6¾	4	25	1 9/16	1⅜

Height of Centres.	Approximate Weight.	Sliding, Surfacing and Screw-cutting.	Sliding and Screw-cutting.	Sliding and Surfacing.	Extra for Overhead Motion.	Extra per Foot of Bed.
In.	Cwts.	£	£	£	£	£
3½	5	Not made with Back-shaft.				
4½	7½					
5	11					
6	14					

TREBLE-GEARED FOOT LATHES.

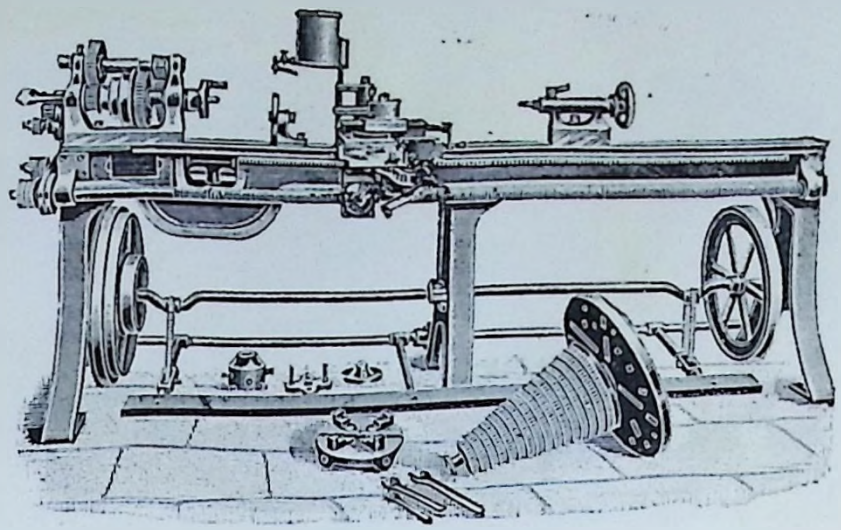


Illustration represents a class of Lathes suitable for turning either **iron, wood, or brass,** and have self-acting motions throughout. The beds are fitted with gap plates and bolted to two standards, having roller bearings for crank shaft and parallel capped bearings for treadle shaft. **Treble-geared head-stocks,** fitted with steel spindles, parallel or conical gun-metal bearings, as desired, or if ordered, with hardened steel spindles and bearings. Carriages have quick hand traverse by rack and pinion, and receives self-acting sliding and surfacing motions by back shaft. Compound slide rests indexed at base for conical turning. Guide screws have double clam nuts of gun-metal. Each lathe complete with overhead motion, 22 change wheels, tool board, face-plate, driver-plate, screw-keys, &c.

DIMENSIONS.

Height of Centres.	Bed.			Admit between Centres.	Gap.		3 Speed Cone for Foot Motion.		Guide Screw × ¼ in. Pitch.
	Length.	Width.	Depth.		Width.	Depth.	Largest Diam.	Width.	
In.	Ft.	In.	In.	In.	In.	In.	In.	In.	In.
5	5	6¼	5½	30	5¼	4¾	18	1½	1¼
6	6	8½	6	36	7½	6	25½	1½	1½

Height of Centres.	App. Weight.	Complete as above.	Extra with hardened steel spindle and bearings.	Extra with Boring Collar.	Extra with Clement's Driver.	Extra with large Face-plate.	Extra per foot of Bed.
In.	Cwts.	£	£	£	£	£	£
5	11½						
6	15½						

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SCREW CUTTING LATHES.

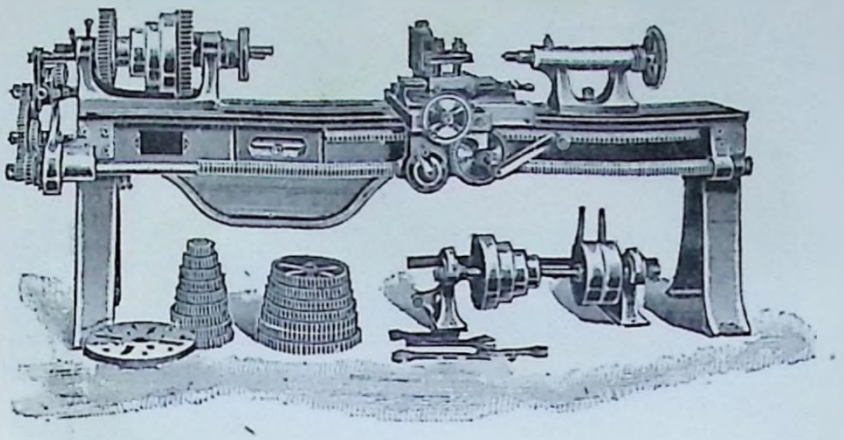


Illustration of 8 in. size.

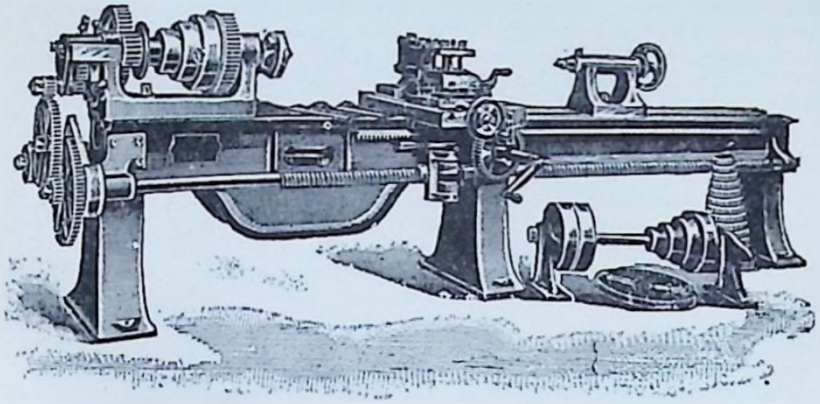
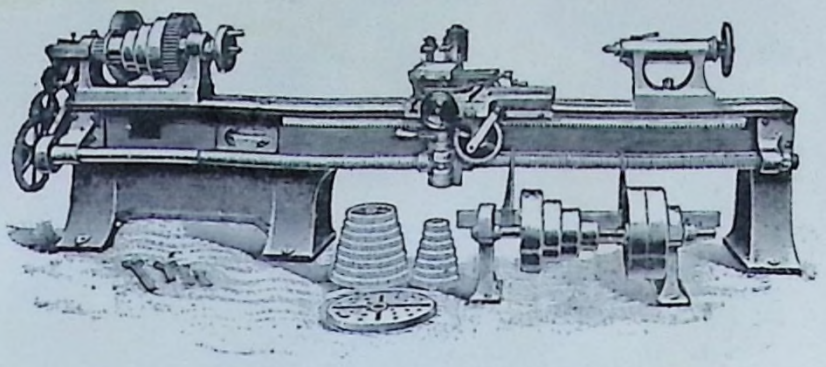


Illustration of 9 in. size.

For full specification and particulars see opposite page.

SCREW-CUTTING LATHES.



Above have strong gap-beds, and may be made with a **Box Gap-bed**, as shown in illustration. Fast head-stocks are double geared, with **machine-cut gear wheels.** Steel spindle runs in gun-metal bearings, either parallel or conical as desired. Carriage has self-acting sliding and surfacing motions by back-shaft, quick hand traverse by rack and pinion, **compound slide rest, arranged to turn conical,** and **indexed at base,** to set to any angle and back following stays. Leading screw is accurately cut and fitted with **double clam nuts** of gun-metal, and reversing motion for turning right and left hand screws. Guide screw and back-shaft will **clear largest diameter** gap will take in. Each lathe is complete with face-plate, driving-plate, overhead motion, screw-keys, and full set twenty-two change wheels, &c.

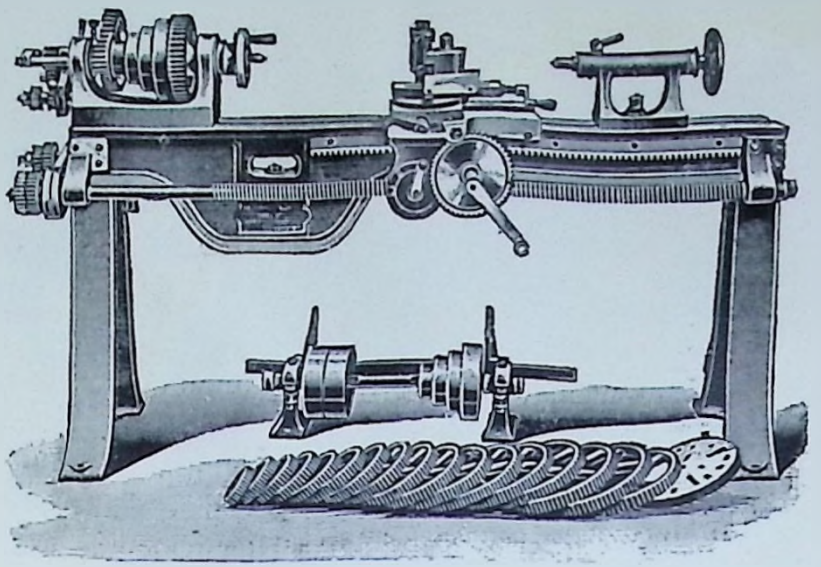
DIMENSIONS.

Height of entres.	Bed.			Admit between Centres.	Gap.		4-speed Cone.		Diam. Leading Screw, half-inch pitch.	Approx. weight.
	Length.	Width.	Depth.		Width.	Depth.	Width.	Diam. largest speed.		
In.	Ft.	In.	In.	In.	In.	In.	In.	In.	In.	Cwt.
8	8	12	8¼	52	13	8	2⅛	10½	1¾	21
9	12	13½	9	96	13	10	2⅜	11½	2	30
10	12	15	10½	90	15	10½	3⅛	12½	2⅛	35

Height of Centres.	Complete as above.	Screw cutting only.	Sliding and Surfacing only.	Loose Head to Slide Taper.	Large Face-plate for Gap.	Extra per foot of Bed.	Extra if with Box Gap-bed.
In.	£	£	£	£	£	£	£
8							
9							
10							

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SCREW-CUTTING LATHES.



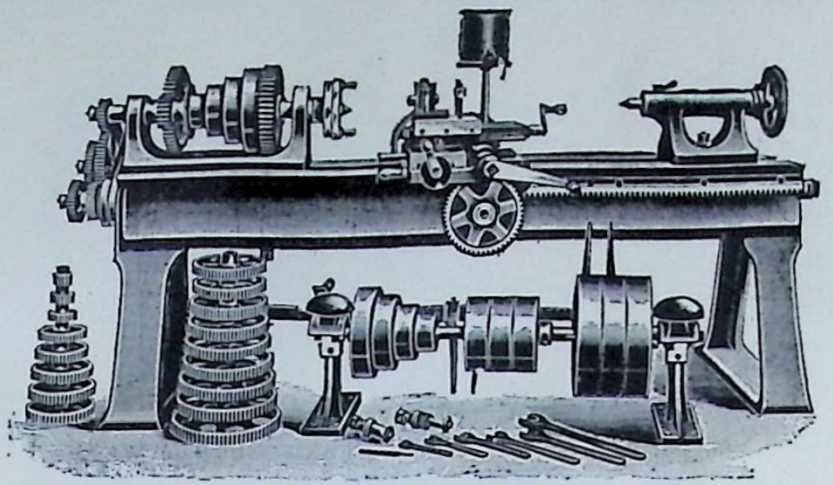
The above are of most **improved design** and **best construction.** The wheels of headstock are **machine cut**, and spindle runs in either parallel or conical gun-metal bearings as desired. If not specified conical bearings are fitted. Carriage has quick hand traverse by rack and pinion, and carries compound slide rest arranged for **turning conical** and **indexed at the base.** Rest can be easily removed and T or hand-rest substituted. Leading screw is accurately cut and fitted with double clam nuts of gun-metal, and reversing motion for cutting right and left-hand screws. Each Lathe is **complete** with overhead motion, face-plate, driving-plate, screw-keys, full set 22 change wheels, teeth of which are cleaned by machine, &c.

DIMENSIONS.

Height of Centres.	Bed. Length.	Bed. Width.	Bed. Depth.	Admit between Centres.	Gap. Width.	Gap. Depth.	Leading Screw ½ in Pitch.	Cone. No. of Speeds.	Cone. Width.	Cone. Dia. largest Speed.	Appr. Weight.
In.	Ft. in.	In.	In.	In.	In.	In.	In.		In.	In.	Cwts.
3½	3 6	5¼	4	21	4¼	4	1	3	1⅝	4¾	4
4½	4 6	6	4⅞	29	5	4¼	1⅛	3	1 5/16	5¾	7
5	5 0	6½	5⅛	31	5¼	4¾	1¼	4	1 5/16	6½	8
6	6 0	8	5½	39	7½	6¼	1⅜	4	1 9/16	8	11
7	6 0	10½	7½	33	9	7	1⅜	4	1¾	9¼	15

Height of Centres.	Complete as above.	Sliding and Screw-cutting only.	Sliding and Surfacing only.	Extra per foot of Bed.
In.	£	£	£	£
3½	Not made with Back-shaft.			
4½				
5				
6				
7				

SPECIAL HIGH CLASS LATHES.



These Machines are of the **highest class workmanship**, and of best material. **All** sliding parts are **accurately surfaced.** Fast head-stocks are double-geared with **machine cut wheels**, and fitted with steel spindles with **hardened necks** running in **hardened steel bearings.** Leading screws are of steel, accurately cut, fixed inside bed, and covered with top of bed, and fitted with double-clam nuts of gun-metal; handles for working them are conveniently fixed in front of carriage. Carriages have **quick hand traverse** by rack and pinion, and receive self-acting, sliding, and surfacing motions from strong back shaft. **Speed of surfacing screws can be altered** for scroll-cutting. All parts are **specially strong** and arranged so as to adapt lathes for use on **most accurate** kind of work, and to produce the largest quantity possible. Complete with overhead motion, Clement's driver, face-plate, full set change wheels, back following stays, water can, stand, screw-keys, &c.

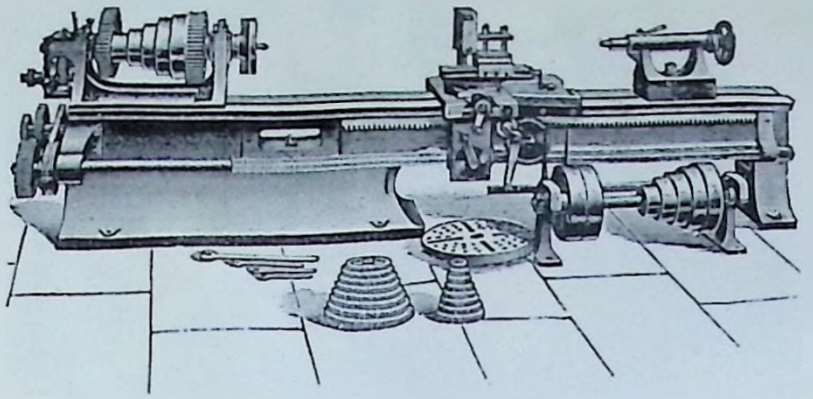
DIMENSIONS.

Height of Centres	Bed. Length.	Bed. Width.	Bed. Depth.	Admits between Centres.	4-speed Cone. Width.	4-speed Cone. Diam. of largest.	Leading Screw. Diam.	Leading Screw. Pitch.	Approx. Weight.
In.	Ft.	In.	In.	In.	In.	In.	In.	In.	Cwts.
5	5	10	7	26	1⅜	7	1⅜	¼	11
6	6	12	8	32	1⅜	8⅜	1⅜	¼	16
7	7	13¼	9	39	2⅜	10	2	¼	24
8	8	14½	10	46	2⅜	11½	2⅛	¼	32
9	9	16	11	51	2⅜	13¼	2¼	¼	40
10	10	18	13	56	3⅛	15	2½	½	52

Centres.	As above.	Screw Cutting only.	Extra per foot of Bed.	Extra with Gap Bed.	Extra Machine cut Change Wheels.
In.	£	£	£	£	£
5					
6					
7					
8					
9					
10					

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POWERFUL SCREW-CUTTING LATHES.



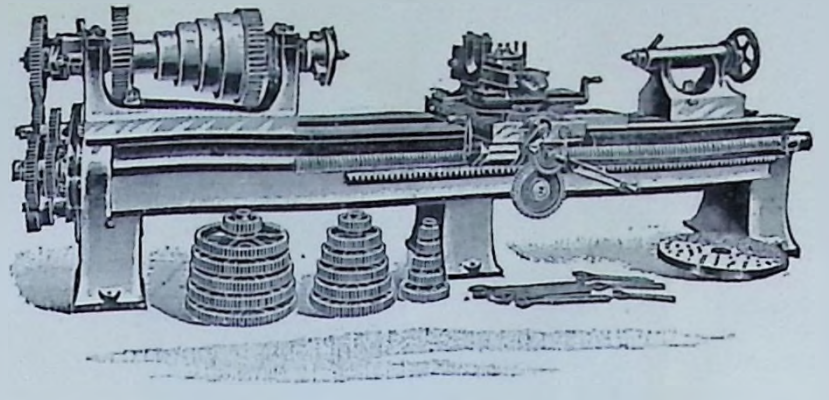
Above are of **very strong construction**, having **Box Gap-beds**. Head-stocks are double-geared with carefully fitted wheels (No. 1 size are machine cut) Spindle runs in parallel gun-metal or phosphor-bronze bearings. The self-acting, sliding and surfacing motions are obtained by a back shaft driven by change wheels from headstock. Leading screw is accurately cut and fitted with double-clam nuts of gun-metal. Carriage has a **quick hand traverse** by rack and pinion, and carries **compound slide-rest indexed at base**, and arranged to turn conical Each Lathe is complete with overhead motion, face-plate, driving-plate, back following stay, screw-keys, and change wheels. The illustration shows bed supported by one standard; longer beds are supported by two or three, according to length

DIMENSIONS.

Height of Centres.	Bed. Length.	Bed. Width.	Bed. Depth.	Admit between Centres.	Gap admits. In Diam.	Gap admits. In Width.	5-speed Cone. Width.	5-speed Cone. Dia largest Speed.	Approximate Weight.
In.	Ft.	In.	In.	Ft.	In.	In.	In.	In	Cwt.
12	20	18	12	14½	48	20	3⅛	14	70
14	20	22	13	13¼	54	20	3⅛	16½	105
16	20	22	13	13	58	20	3⅛	21	114
18	20	24	16	12¼	64	24	4	22¼	140
24	20	30	18	11	72	24	5	26	240

Height of Centres.	Complete as above.	Screw-cutting and Hand-Surfacing only.	Self-acting, Sliding and Surfacing only.	Back-shaft driven by Cone and Belt.	Extra per foot of Bed.
In.	£	£	£	Extra, £	£
12					
14					
16					
18					
24					

POWERFUL SCREW-CUTTING LATHES.



The above represents a pattern of very substantial and accurate Lathes. Beds are of Box form. Fast head-stocks are fitted with steel spindles running in large size bearings of phosphor bronze; can be made either parallel or conical with adjusting nuts. Teeth of head-stock wheels **are cut from the solid.** Sliding and surfacing motions are obtained by means of a grooved back-shaft, which can be driven by change wheels or belt, as shown in illustration. Screw-cutting motion is obtained by change wheels from headstock; screw is fitted with double-clam nuts of phosphor bronze. Carriages have quick hand travel by rack and pinion, fitted with compound slide-rest, with circular base for conical turning; and back following stay. Each Lathe is provided with complete overhead motion, 22 change-wheels, face-plate, driver-plate, and screw-keys.

DIMENSIONS.

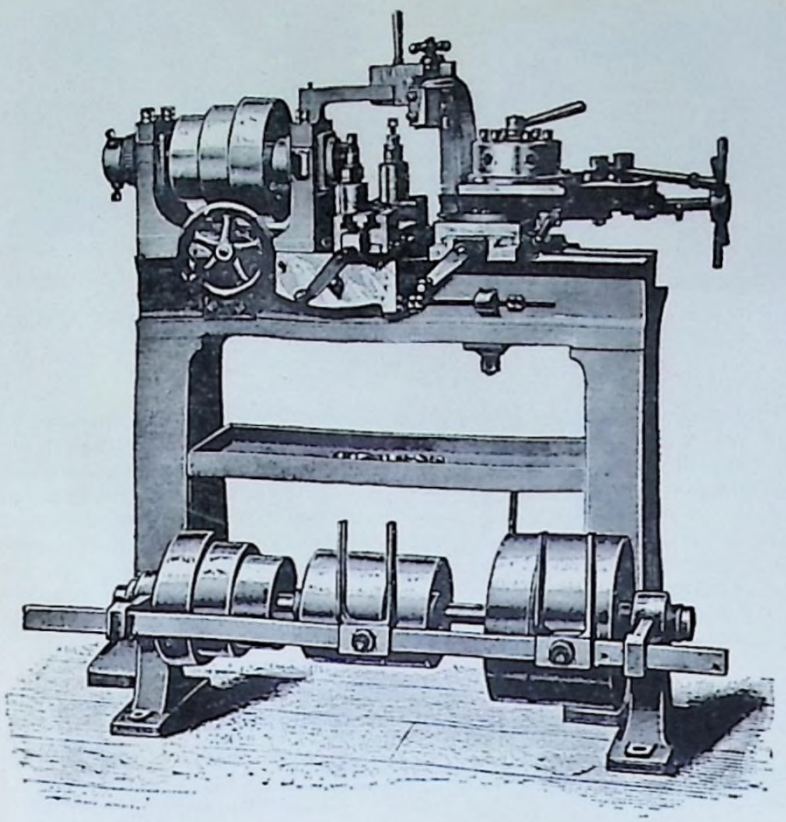
Height of Centres.	Bed. Length.	Bed. Width.	Bed. Depth.	Admit between Centres. Ft.	Admit between Centres. In.	Cone. No. of Speeds.	Cone. Largest Diam.	Cone. Width.	Appr. Weight.
In.	Ft.	In.	In.	Ft.	In.		In.	In.	Cwts.
10	12	15	10½	7	6	4	12½	3⅛	33
10½	12	16	10½	7	4	4	13⅛	3⅛	40
12	15	18	12	9	6	5	14	3⅛	60
12½	15	20	14	9	0	5	16	3⅜	75
14	18	22	15	10	6	5	18½	4⅛	100
16	20	24	16	12	4	5	22½	4⅛	120

Height of Centres.	Complete as above.	Sliding and Surfacing only.	Sliding and Screw-Cutting only.	Extra per foot of Bed.
In.	£	£	£	£
10				
10½				
12				
12½				
14				
16				

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HOLLOW SPINDLE LATHE.

With Chasing attachment and Traversing Cut-off Slide.



This illustrates No. 1 Machine.

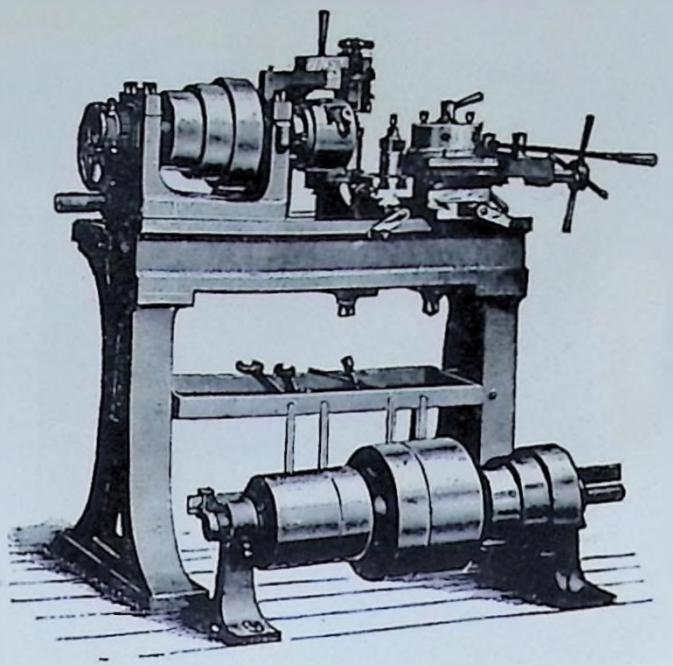
DIMENSIONS.

No.	Height of Centre.	Length of Bed.	Hole through Spindle.	Chuck to take	Speed Cones.	Approx. Weight.	PRICE.
	In.	Ft In.	In.	In.		Cwt.	£
1	7	3 6	2 1/16	1/4 to 2	3-speed × 2 1/4 in. belt.	10 1/2	
2	7	3 6	2 1/16	1/4 to 2	3-speed × 2 1/4 in. belt.	10 1/2	

For description of above see next page.

HOLLOW SPINDLE LATHE

WITH CHASING ATTACHMENT.



This illustrates No 2 Machine.

Specification of Hollow Spindle Lathes.

These Lathes have **hollow steel spindle** running in best gun-metal parallel bearings, and are fitted with self-centreing chuck, and also have a steady chuck at tail end of spindle, to support the bar.

Compound slide rests, with capstan for six tools, can be set to any angle for taper work; and has a **stop** in bottom slide to ensure holes in turret being exactly **concentric** with spindle of headstock.

The longitudinal slides are operated by both **lever** and **screw**, the latter being provided with a pilot wheel for heavy cutting. Either of these can be used **independently** of each other by engaging or disengaging the nut. The screw can be used for heavy cuts, and the lever for **quickly withdrawing** the tool, thus saving time winding back the screw. Where power is not so requisite the screw can be disengaged and the lever used as required.

Chasing or screwing arms are provided to these Lathes, a master thread of any required pitch being attached to a stud connected with the back shaft.

Sliding tool-holders are also provided with an adjustable stop, attached to regulate depth of cut.

Countershafts have **two sets** of pulleys for reversing, or to give six changes of speed.

The above are mounted on a massive planed bed, with two standards, and tray, backboard, and screw keys.

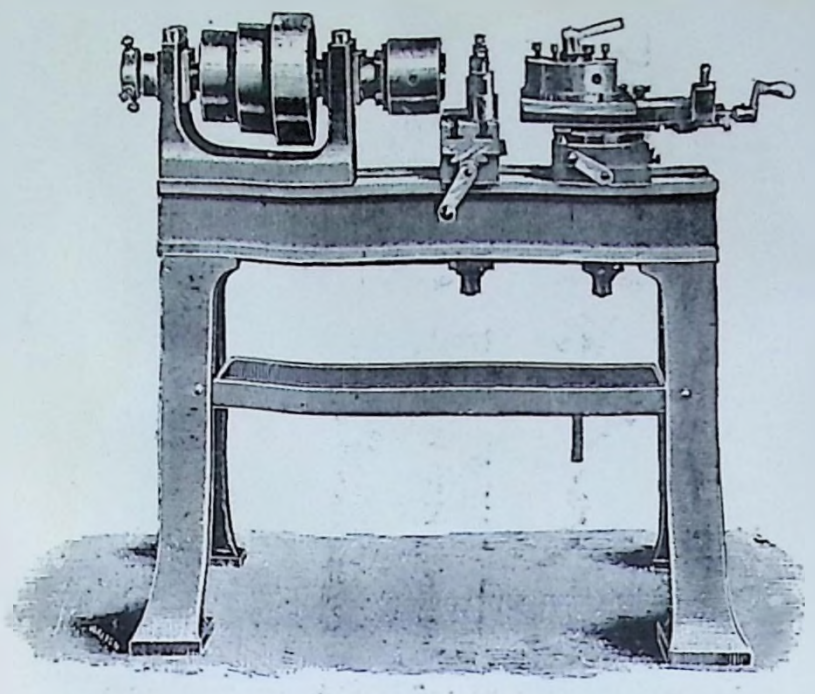
The No. 1 and No. 2 Lathes differ as under:—

No. 1 has a **traversing cutting-off slide** fitted to this Lathe, actuated by hand wheel, screw gearing and screw, having a movement of 11 in. which can be regulated by a stop as shown. It has also a **duplex slide**, with adjustable front and back, tool holders and stop.

No. 2 has no traversing slide, but is fitted with **duplex cutting-off slide**, which has adjustable front and back, tool holders and stop.

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HOLLOW SPINDLE LATHE.



No. 3.

The specification of Lathe illustrated above is the same as for Nos. 1 and 2 Lathes described, of same class; but no chasing or screwing arm is provided.

No.	Height of Centre.	Length of Bed.	Hole through Spindle.	Chuck to take	Speed Cones.	Approximate Weight.	PRICE complete.
	In.	Ft. in.	In.	In.		Cwt.	£
3	7	3 6	2 1/16	1/4 to 2	3-speed × 2 1/4 in. belt.	10 1/2	
3	7	3 6	1 9/16	1/4 to 2	3-speed × 2 1/4 in. belt.	10 1/2	

HOLLOW SPINDLE LATHE.

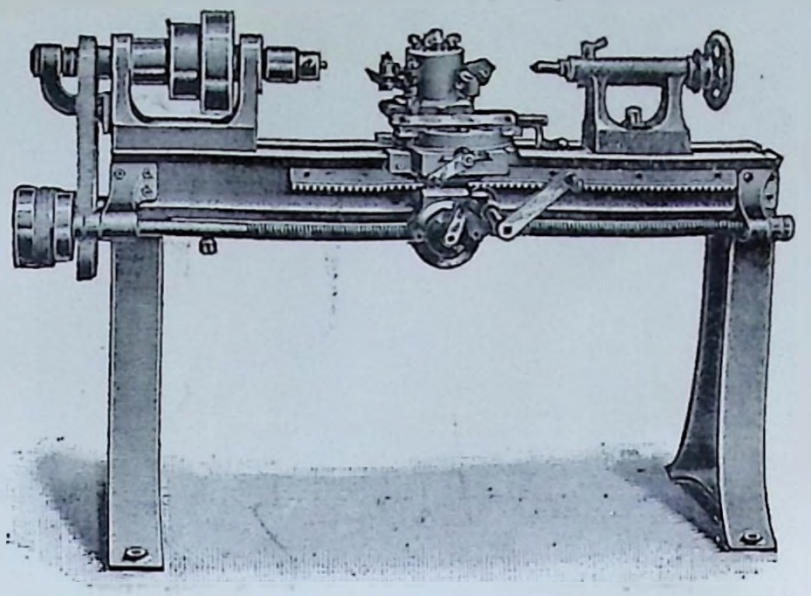


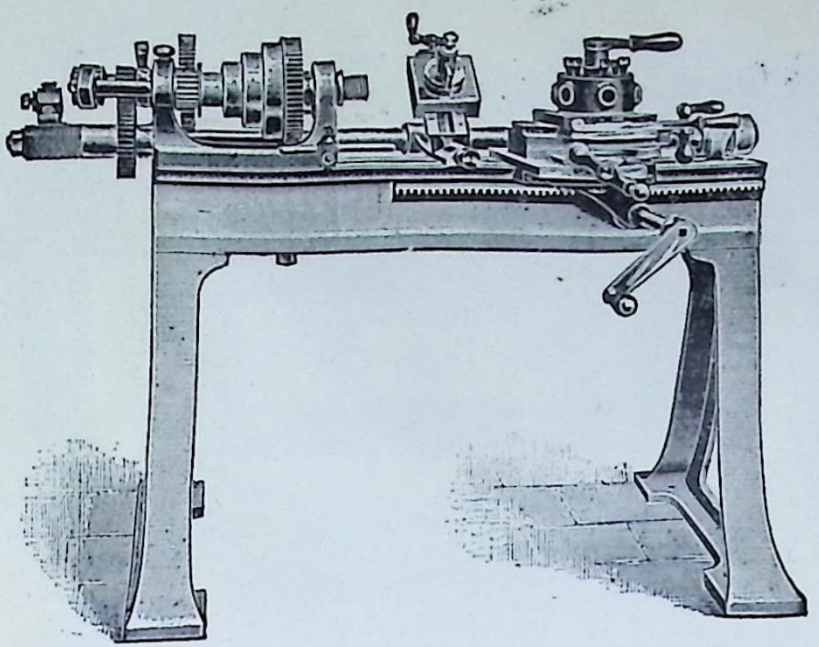
Illustration shows a **Hollow Spindle Capstan** Lathe, suitable for various kinds of work. This tool is accurately and substantially made. The carriage has a self-acting motion by a screw driven by cones and belt, and a quick hand traverse by rack and pinion. The single speed fast head-stock has a steel spindle running in conical gun-metal bearings. The **Capstan Rest carries five tools**; each can be fixed in working position by revolving the rest, when a **spring lever** engages in a notch and so fixes the tool. It is complete with overhead motion, water-can, screw-keys, &c.

DIMENSIONS.

Height of Centres.	Diam. Hole through Spindle.	Bed.			Admit between Centres.	3-speed Cone.		Appr. Weight.	Price.
		Length.	Width.	Depth.		Largest Diam.	Width.		
In.	In.	Ft.	In.	In.	In.	In.	In.	Cwts.	£
7	1 1/16	5	8	5 1/2	23	8 1/2	2 1/4	9	

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BRASS FINISHERS' LATHES.



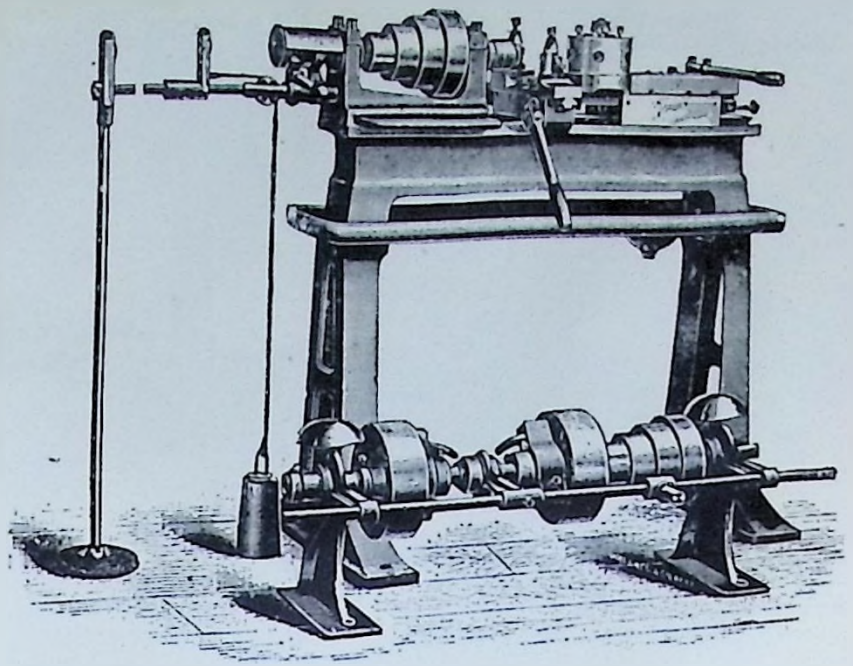
The above represents a tool suitable for **turning, boring, and chasing** all kinds of brass finishers' work. It is accurately and strongly made; and complete with overhead motion. one sample screw and die, screw-keys, &c. Bed carries a double-geared head-stock with **machine-cut wheels** and has a **hollow spindle** running in gun-metal bearings. Carriage moves on bed by rack and pinion, with compound slide rest indexed and arranged to set at any angle for taper turning, and has a **revolving capstan** for five tools. Chasing apparatus consists of a strong shaft at back of lathe, to which is fitted a lever carrying nut or die working into a guide screw driven from spindle. A slide rest carrying chasing tool, is fitted to shaft, and arranged to turn over to back of lathe and at same time to throw die out of guide screw This enables the saddle and capstan rest to be brought up to work for turning, boring or chasing straight or taper work.

DIMENSIONS.

Height of Centres.	Bed.			Dia. Hole through Spindle.	Dia. Hole in Capstan Head.	Appr. Weight.	Price.		
	Length.	Width	Depth.				Complete as above	Extra with Loose Head	Extra per foot of Bed.
In.	Ft.	In.	In.	In.	In.	Cwts.			
5½	5	6¾	5½	1 1/16	⅞	8½	£	£	£
6½	6	8	5½	1 3/16	1⅛	10½	£	£	£
7½	6	10½	7½	1 5/16	1⅛	14	£	£	£

WIRE FEED CAPSTAN LATHE

(AUTOMATIC).



This Lathe is adapted for making Screws, Studs, Nuts, Fittings, and a great variety of light repetition work from the bar. The steel spindle is driven by 4-speed cone to take 2 in. belt, the end thrust being taken by a **ball-thrust collar.** An **Automatic self-feeding** arrangement is provided, by means of which the bar is fed through the spindle and chuck without stopping lathe. One **outward** stroke of lever releases chuck from bar, which feeds forward; the **return** stroke tightens grip, the bar being centrally held by a spring collet, which does not mark bar. **The turret** is bored to receive six tools, and **revolves automatically** with backward stroke of lever; the forward stroke brings next tool into operation. The slide is fitted with adjustable stop to regulate traverse. The duplex cutting-off slide is operated by a lever and rack and pinion; has front and back tool posts with **improved** wedge tool adjustment, also adjustable stops.

Height of Centre.	Length of Bed.	Diameter of Turret.	Diameter of holes in Turret.	Largest stock admitted through Wire Feed.	Size of Pulleys on Countershaft.	Speed of Counter shaft.	Approximate Weight.
In.	Ft. In.	In.	In.	In.	In.		Cwt.
5	3 6	6	⅞	¼ diameter	9 × 3	200	7

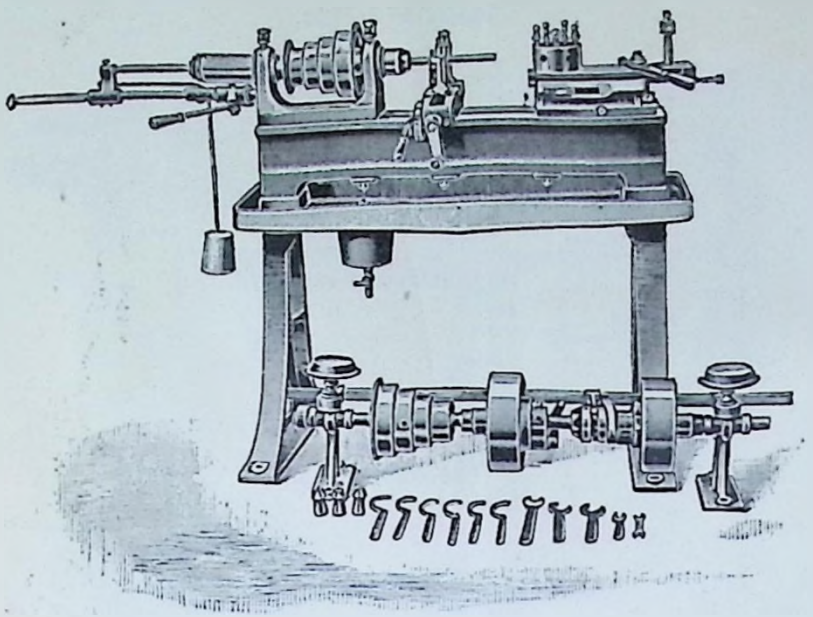
Price, as illustrated, with one spring collet, countershaft and screws, £

" if without Automatic Turret, £

" " " " and Wire Feed, £

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STUD AND SCREW LATHE.



This is a special tool for turning studs and screws to the greatest advantage. The head-stock has a steel spindle running in conical bearings. The **spindle is hollow** and fitted with an **improved cone chuck**, and has also an **automatic motion** for pushing rods forward. The **turret** rest has six holes for tools and **revolves automatically** with back motion of the lever. A transverse slide carrying **two tools for cutting off** the studs is worked by a lever or a screw, and has **wedge adjustments** for raising each tool, and this, and also turret rests, are provided with **adjustable stops**. Overhead motion included has friction cones for **starting or stopping instantaneously.** Lathe is also fitted with **water trough** under the bed.

DIMENSIONS.

Height of Centres.	Bed.			Speed Cone.	Chuck to take	Approx. Weight.	Price.
	Length.	Depth.	Width.				
5½ in.	3 ft. 6 in.	6 in.	6½ in.	4 speeds 1¼ in.	⅜ to ¼ in. diameter.	9 cwt.	£

STUD-SCREWING LATHES.

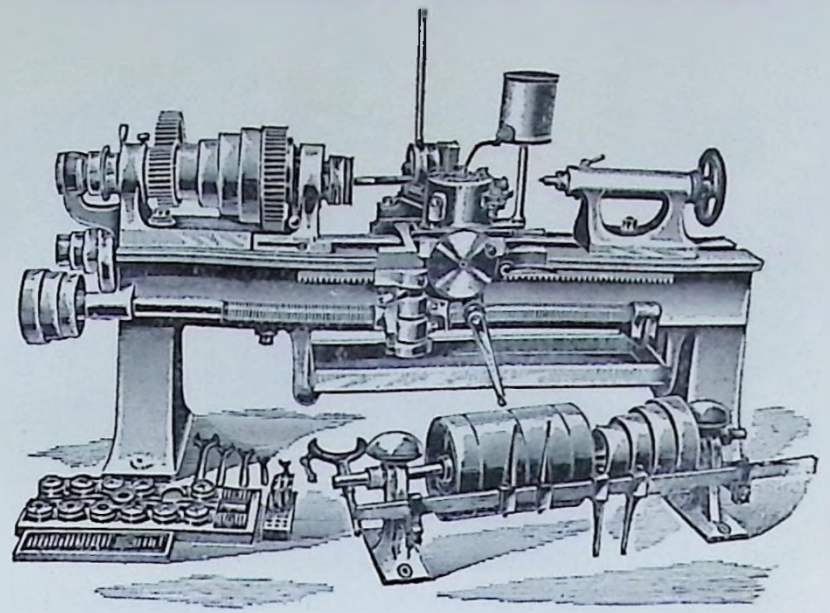


Illustration represents Nos. 1 and 2, special Capstan Rest Screwing Lathes. The head-stocks are single or double geared, with **machine-cut** wheels, hollow spindles and **extra large necks.** Spindle nose is fitted with **powerful gripping chuck conical holders**, and stop to hold spindle fast, self-acting and hand-feed motions, and **capstan rest for five tool-holders.** By revolving rest any tool is brought quickly to work, and fastened by spring catch. **Die-box for screwing** is at back of carriage, and arranged to be immediately fixed in position for screwing, and turned back out of the way when not used. **Sliding motion** by belt-driven screw. Lathes have five tool-holders and ten sample tools, tool-board, cast-iron trough, with draw-off tap, water can and stand, overhead motion, screw keys, &c.

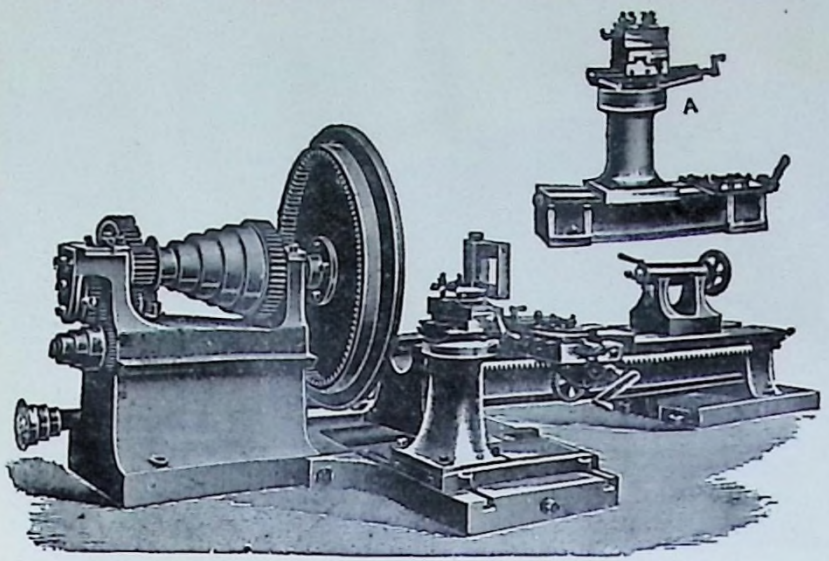
DIMENSIONS.

Gear.	Heights of Centres.	Bed.			Admit between Centres.	Dia. Spindle Hole.	Cones.			Approximate Weight.
		Length.	Width.	Depth.			Speeds.	Dia. of largest	Width.	
	In.	Ft. In.	In.	In.	In.	In.		In.	In.	Cwt.
Single	6	5 0	10½	7	24	1¼	3	9½	3½	14
Double	6	5 0	10½	7	21	1¼	4	9½	2¾	15
Single	7½	6 0	12	9	30	1⅜	4	13½	2¾	18
Double	7½	6 8	12	9	30	1⅜	4	13½	2¾	20.

Gear.	Height of Centres.	With 4 sets screw tools ⅛ to ¼ in., and 7 sets conical holders for black iron, 7/16 to 1 3/16 in.	With 6 sets conical holders for bright iron, ⅛ to 1 in.	With 5 sets screw tools ⅛ to 1 in., and 9 sets conical for black iron, 7/16 to 1 5/16 in.	With 9 sets conical holders for bright iron, ⅛ to 1¼ in.	Screw Tools, per set.
	In.	£	Extra, £	£	Extra, £	Extra, £
Single	6					
Double	6					
Single	7½					
Double	7½					

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ACL Doc 21509 · Page 112 of 298
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DOUBLE AND TREBLE GEARED LATHES.



The Machines illustrated above are arranged to turn large diameters without **having a pit** below base-plate. The fast head-stock has steel spindle, phosphor-bronze parallel bearings, loose head-stock arranged for taper turning Self-acting, sliding and surfacing motions by back-shaft. Carriage has quick hand traverse by rack and pinion; compound slide-rest, and back following stay. **Bed moves** on planed base-plates by screw and ratchet. For **turning large diameters** it can be adjusted on plate as shown, or on loose cross-bed as illustration marked A. Self-acting motion to slide by lever and ratchet. Screw-cutting arrangement also provided, if desired. Each lathe is supplied with complete overhead motion, strap guide, shifting lever, two face-plates, one driver plate, rocking shaft for self-acting motion to pillar rest, and wrought-iron case-hardened screw keys.

DIMENSIONS.

Centres.		Sliding Bed.			Diameter.		Width Gap from front Face-plate.	4-speed Cone.		Appr. Weight.
Height.	Admit Gap closed.	Length.	Width.	Depth.	Face-plate.	Can be turned.		Width.	Diam. of largest.	
In.	Ft.	Ft.	In.	In.	Ft.	Ft.	Ft.	In.	In.	Cwts.
12	7¼	10	18	12	4	5½	3½	4	14	95
14	7½	10	22	13	5	6	3½	4¼	16½	140
16	7½	10	22	13	5	6½	3½	4⅜	21	150

Height of Centres.	Sliding and Surfacing.		Extra if Screw-cutting with full set Change Wheels.	Extra per foot of Bed.	Extra for Loose Cross-bed.
	Treble Geared.	Double Geared.			
In.	£	£	£	£	£
12					
14					
16					

HEAVY SHAFT TURNING LATHE.

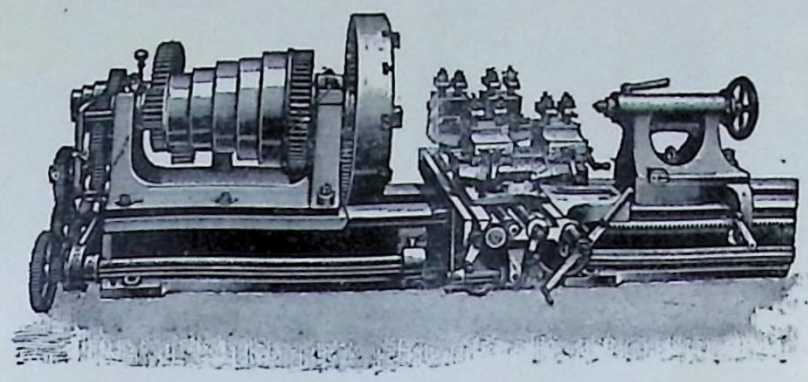


Illustration represents a powerful **Treble-geared, Self-acting, Sliding, Surfacing and Screw-cutting Lathe,** suitable for the heaviest kind of engineering work, such as heavy shafts, mill rolls, hydraulic rams, propeller shafts, &c. Bed is of **massive construction.** Head-stock is **treble geared** and has a speed cone for broad belt. May be used either **treble, double,** or **single geared.** Spindle is steel. Carriage has **self-acting,** sliding and surfacing motions from back-shaft driven by change wheels from head-stock. **Leading screw** is of **steel.** Quick hand traverse is obtained by rack and pinion. **Two compound slide rests,** each carrying two tools, adjusted from front. Loose head-stock arranged for **taper turning.** All sliding parts are **accurately surfaced.** Long Lathes can be fitted with **two carriages** carrying **four tools** each. Each Lathe is provided with complete overhead motion, screw-keys, and other requisites.

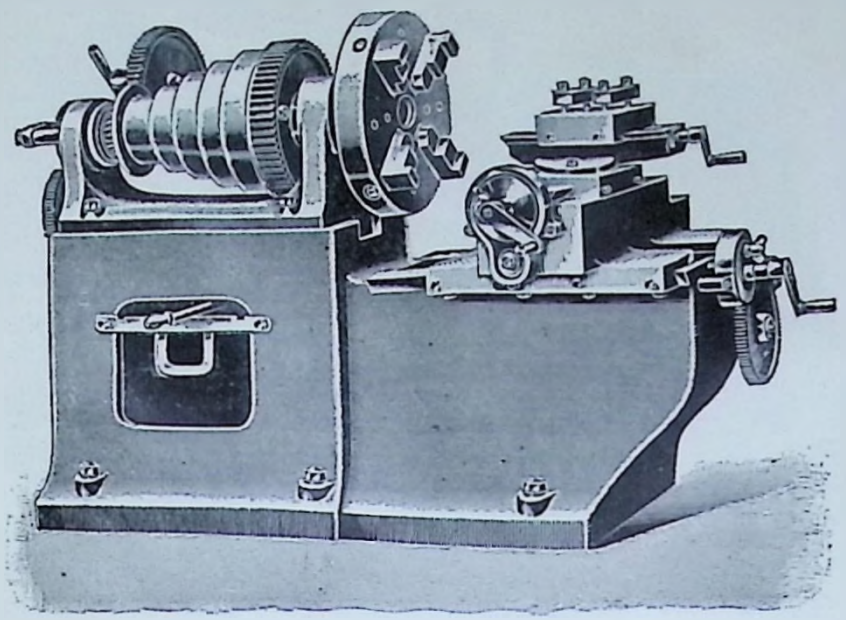
DIMENSIONS.

Height of Centres.	Bed.			Admit between Centres.	5-speed Cone.			Dia. Leading Screw ⅛in. Pitch.	Dia. Spindle Neck.	Dia. Face-plate.	App. Weight.
	Length.	Width.	Depth.		Largest.	Smallest	Width.				
In.	Ft.	In.	In.	Ft.	In.	In.	In.	In.	In.	Ft. In.	Tons.
24	25	30	18	16	26	16	5½	3½	7	3 8	16
30	30	36	22	18½	36	24	6¾	4	12	5 0	27

Height of Centres.	Sliding and Surfacing only.	Extra for Screw-Cutting.	Extra additional Carriage with 4 Tool Rests.	Extra Face-plate, fitted with 4 Gripping Jaws.	Extra per foot of Bed.
In.	£	£	£	£	£
24					
30					

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SURFACING AND BORING LATHE.

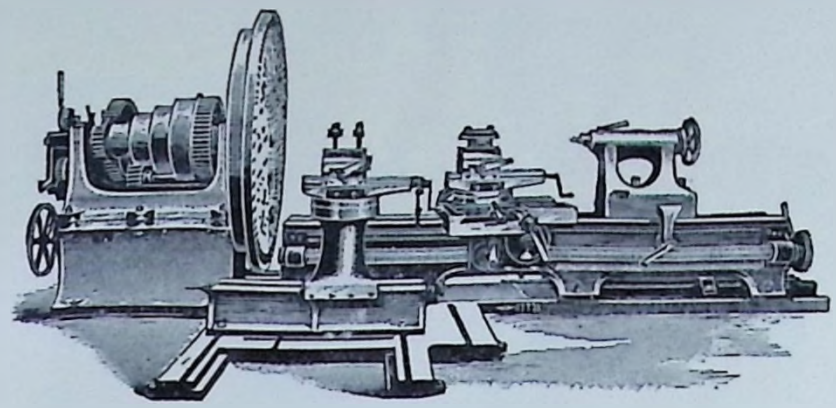


Above are fitted with **machine-cut wheels,** independent four-jawed chucks and link motion for **self-acting feed** of slide rests. Double-geared. Head-stocks have steel spindles running in conical phosphor-bronze bearings. Beds are of box form, with accurately planed and surfaced slides, fitted with strong **compound slide rests, indexed at base,** and arranged for turning conical. Carriages receive **self-acting motion** from screw inside bed by lever and ratchet from rocking shaft overhead; this can also be applied to slide rests. If so ordered, carriages are made with continuous feed motion from change wheels driven from head-stocks, then having three different speeds of feed, each of which can be **instantaneously engaged or disengaged** by hand lever in front without stopping machine. Complete overhead motion, screw-keys &c., are supplied.

DIMENSIONS.

Height of Centres.	Will swing clear of bed and saddle	Bed.		Cone.	Chuck.	Approx. Weight.	Price.	
		Width.	Admits between chuck and rest.				As above.	With continuous Feed Motion
In.	In.	In.	In.		In.	Cwt.	£	£
12½	30	15	18	4-speed × 3½ in.	20 dia.	32	£	£
15	36	18	24	5 ,, × 3½ in.	30 ,,	40	£	£

TREBLE GEARED BREAK LATHES.



The above represents a powerfully constructed Lathe, adapted for **very heavy work** and turning large diameters; designed to work **single, double, or treble geared.** Face-plates are driven by internal wheel and pinion when treble gear is used. Head-stock has steel spindle, phosphor bronze bearings, front bearing is of large diameter to prevent vibrations of face plate. Loose head-stock arranged for taper turning, adjusted by handle and pinion working in rack. Self-acting, sliding, and surfacing motions by back shaft. Carriage fitted with compound slide-rest, indexed at base for conical turning, back following stay, and has quick hand traverse by rack and pinion. Bed moves on planed base-plates by screw and ratchet. Base-plate nearest face-plate arranged to slide out, uncovering pit to admit large diameters; this carries cross-bed fitted with compound slide rest. Self-acting motions obtained by lever and ratchet driven overhead. Loose cross-bed allows full width gap will take in to be turned, and can be placed parallel with face-plate for surfacing any diameter running over base-plate. Leading screw is driven by back shaft, and carried by loose bed. Each Lathe is complete with overhead motion, strap guide and fork, rocking shaft for feed of slide-rest on pillar, wrought iron case-hardened screw-keys, &c.

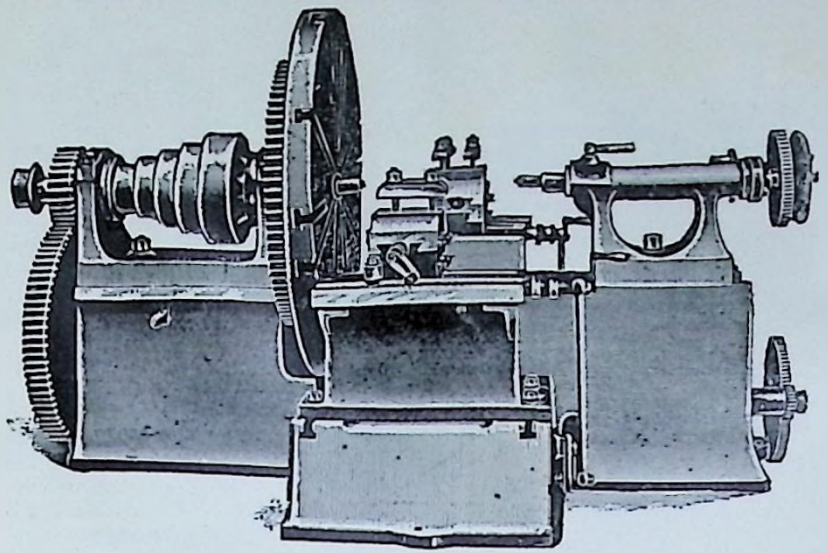
DIMENSIONS.

Centres.		Sliding Bed.			Diameter.			Gap opens from Face Plate.	Cone.		
Height.	Admit Gap Closed.	Length.	Width.	Depth.	Face Plate.	Can be turned over Base Plate.	Can be turned in pit.		No. of Speeds.	Width.	Dia. of Largest.
In.	Ft. In.	Ft.	In.	In.	Ft.	Ft. In.	Ft.	Ft.		In.	In.
18	6 9	10	24	16	6	7 0	10	6	4	5	22
24	8 6	12	30	18	7	8 3	12	6	4	6½	26
30	10 6	15	36	22	9	9 8	14	6	5	6½	36
36	10 6	15	36	22	10	10 8	15	6	5	6½	36
40	10 6	15	48	22	10½	11 4	15½	6	5	6½	36

Height of Centres.	Approx. Weight.	Sliding, Surfacing, and Screw-Cutting.	Sliding and Surfacing.	Extra per Foot of Bed.
In.	Tons.	£	£	£
18	10			
24	17			
30	36			
36	39			
40	46			

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PULLEY TURNING LATHES.



ABOVE REPRESENTS LATHE NO. 2.

These Machines **will bore, boss, turn, and face Pulleys or Wheels at one setting.** Either one or two rests may be fitted to Lathes as required, each rest being provided with motion for rounding face of Pulley, self-acting sliding motion; these are adjustable to size of work, and adjustable swivel motion set to any angle for turning Rope Pulleys or Car Wheels. **Hollow Spindles** are of cast iron, running in very large gun-metal bearings Cones give quick speed for boring and turning bosses; wheels working into face-plate give suitable speeds for largest diameters turned. Loose Headstock is adjustable on bed.

No. 1 Machine is very powerful and **Treble-geared**, and has internal gear at back of face-plate on front side of Headstock, so as to apply power as near the cutting tool as possible, and to adapt it to turn large diameters. The loose Headstock has a transverse motion, and carries tool holder for turning bosses. It has also self-feeding motion for boring.

Nos. 2 and 3 Machines are Double-geared as shown in illustration.

No.	Will turn Pulleys.		Spindles.				Transverse travel of Rests.	Dia. of Face Plate
	Diam.	Width.	Front Bearing. Diam.	Front Bearing. Length.	Diam. in Loose Headstock.	Dia. admits in Hollow Spindle.		
	In.	In.	In.	In.	In.	In.	In.	In.
1	84	30	12	10	4	3	30	72
2	60	30	8½	7	4	3	30	60
3	42	15	7	6	2½	2	16	45

No.	5-Speed Cone.		Approx. Weight.	Price.	
	Largest Diam.	Width.		With one Slide Rest.	With two Slide Rests.
	In.	In.	Tons.	£	£
1	22	4½	7½		
2	22	4	5		
3	14½	3	2½		

WHEEL CUTTING MACHINE.

For Fixing on Stand or to Bench.

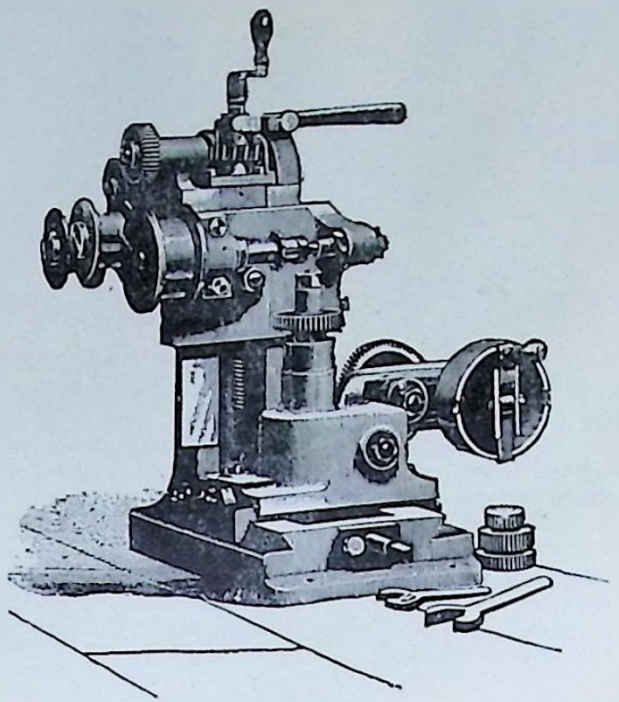


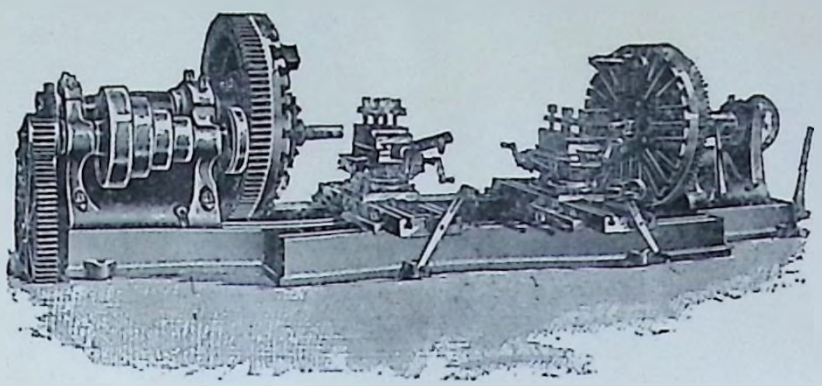
Illustration represents a small, self-contained Wheel Cutting Machine, which is provided with self-acting vertical feed motion, dividing box, and change wheels, and will cut the following numbers of teeth:—15, 20, 25, 27, 30, 33, 35, 40, 45, 50, 54, 60, 63, 66, 70, 80, 90, 108, 110, 112, and 126.

DIMENSIONS.

Will cut Wheels up to		Width of Driving Belt.	Approximate weight.	Price, Complete.
Diameter.	Pitch.			
In.	In.	In.	Cwts.	£
10	⅜	1¾	2	

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DOUBLE-WHEEL LATHES.



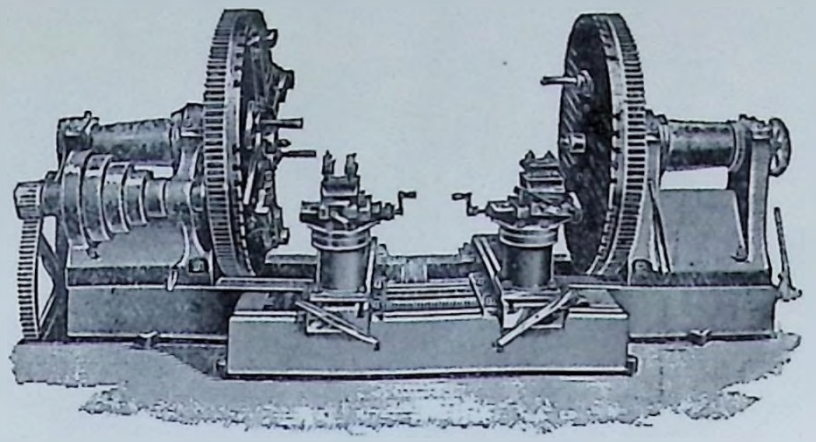
These Lathes are adapted for turning a pair of **tramcar or railway wheels** at the same time, on their own axles, each wheel being driven by the gearing of the Lathe; they will turn **two tyres at the same time**, or turn a wheel or bore a tyre upon one face-plate while boring or bossing a wheel upon the other. Fitted with two headstocks, spindles revolve in cast-iron parallel bearings, face-plates **geared externally** on the back, and driven by pinions which can be disengaged separately. Fast headstock has additional **quick-speed internal gear**, allowing face-plates to run at different speeds. Loose headstock is moved on bed by screw and ratchet lever, fitted with **steel spindle** for carrying centre. Compound slide rests are self-acting both ways by ratchet motion from overhead, fitted with extra adjustable swivel motion to set to tyre. Each rest is adjustable on bed by rack and pinion. Face-plate on fast headstock is fitted with four jaws and two drivers. The two centres are arranged for outside crank pins. Each Lathe is complete with overhead driving and feed motions, screw-keys, &c.

DIMENSIONS.

Centres.		Largest Diam. Wheel can be turned.	Diam. of Face-plate.	Bed.				4-speed Cone.	
Height.	Length between.			Length.	Depth.	Width where Saddles fit.	Width where Heads fit.	Largest Diam.	Width.
Ft. In.	Ft.	Ft. In.	Ft. In.	Ft.	In.	Ft. In.	Ft. In.	Ft. In.	In.
1 5	7	2 10	2 10	13½	9	2 11	2 0	1 1½	4
1 9⅛	9	3 6	3 7½	16½	10	3 5	2 4	1 6½	4½
2 2	9	4 2	4 3½	16½	12	3 5	2 4	1 6½	4½
2 3½	9	4 6	4 6	17½	14	3 10	2 7	1 10	4½
2 6½	9	5 0	5 0	17½	14	4 4	2 7	1 10	4½

Height of Centres.	Approximate Weight.	Prices.		
		With Two Compound Slide Rests.	With Four Compound Slide Rests.	Four extra Jaws to bolt on Face-plate.
Ft. In.	Cwt.	£	£	£
1 5	105			
1 9⅛	140			
2 2	180			
2 3½	210			
2 6½	225			

DOUBLE WHEEL LATHES.



These Lathes are adapted for turning and boring large size **Railway wheels**; to turn a pair of wheels on their own axles, each wheel being driven by the gearing of the lathe; will turn **two tyres at the same time**, or turn a wheel or bore a tyre upon one face-plate, while boring or bossing a wheel upon the other. Fitted with two head-stocks, spindles revolve in cast-iron parallel bearings, face-plates **geared externally** on the back and driven by pinions which can be disengaged separately. Fast headstock has additional **quick speed internal gear**, allowing face-plates to run at different speeds. Loose headstock is moved on bed by screw and rachet lever; and fitted with **steel spindle** for carrying centre. Compound slide rests are self-acting both ways by rachet motion from overhead, fitted with extra adjustable swivel motion to set to tyre. Each rest is adjustable on bed by rack and pinion; face-plate on fast headstock is fitted with four jaws and two drivers. The two centres are arranged for outside crank pins. Each Lathe is complete with overhead driving and feed motions, screw-keys, &c.

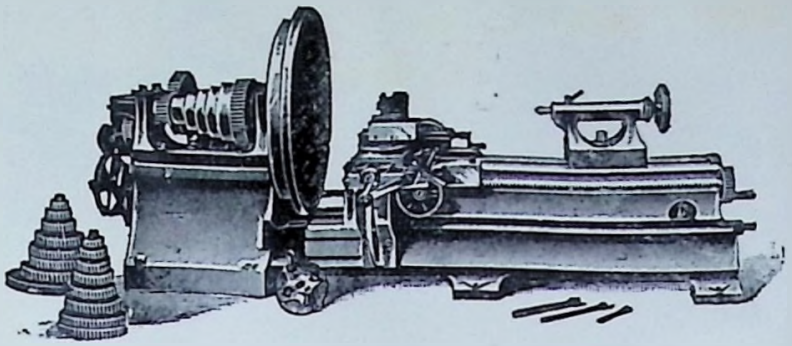
DIMENSIONS.

Centres.		Largest diam. wheel can be turned.	Diam. of Face-plate.	Bed.				5-speed Cone.	
Height.	Length between.			Length.	Depth.	Width where Saddles fit.	Width where Heads fit.	Largest diam.	Width.
Ft. in.	Ft.	Ft.	Ft.	Ft. in.	In.	Ft. in.	Ft. in.	In.	In.
2 9¼	9	5½	5½	19 7	18½	4 6	2 11	26	5
3 0½	9	6	6	19 7	18½	4 11	2 11	26	5
3 3½	9	6½	6½	19 7	18½	5 2	2 11	26	5
3 6½	9	7	7	19 7	18½	5 5	2 11	26	5
4 1	9	8	8	21 3	20½	6 9	4 0	42	6¼

Height of Centres.	Appr. Weight.	With Two Compound Slide Rests.	With Four Compound Slide Rests.	Four Extra Jaws to bolt on Face-plate.
Ft. in.	Cwts.	£	£	£
2 9¼	312			
3 0½	322			
3 3½	376			
3 6½	430			
4 1	730			

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TREBLE-GEARED BREAK LATHE.



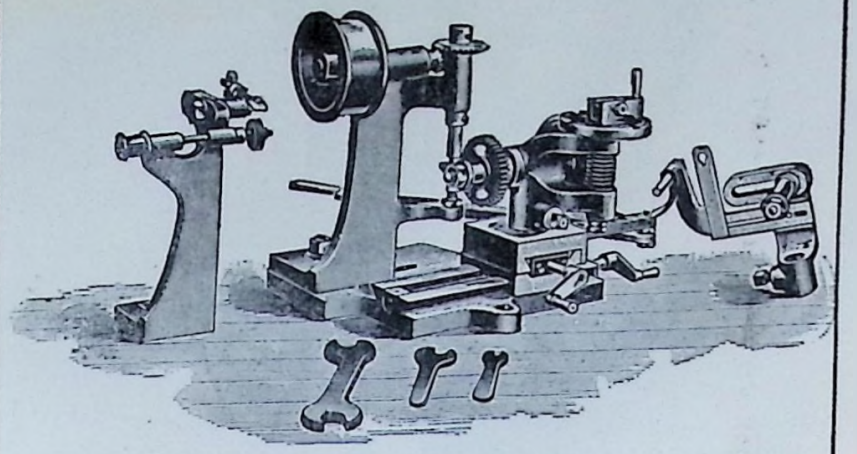
The above shows an extra strong and powerful Lathe. The upper bed slides on foundation bed. Back shaft gives motion for **sliding and surfacing**, and also for screw cutting at end of sliding bed. Screw is placed inside bed Nut box has double clam nuts of phosphor bronze, handle is placed in a convenient position in front of carriage, which is fitted with compound slide rest **indexed at base** for taper turning, also back following stay. Fast head stock is fitted with steel spindle, running in phosphor bronze **bearings of large diameter** to prevent vibrations of face-plates, which is provided with internal wheel at back. The strong bracket fixed in T slots in front of bed below gap, supports carriage when in use for turning large diameters; can be easily detached when turning lighter work. **Treble-geared** face-plate can be easily removed and ordinary face-plate or Clement's driver substituted. Complete overhead motion, 22 change wheels, Clement's driver, and screw-keys are provided with each lathe.

DIMENSIONS.

Height of centres.	Dimensions of Beds.						Admit between centres.	Dia. of Face-plate.	Gap.	
	Foundation.			Sliding.					Opens out from Face-plate.	Admits in diameter.
	Length.	Width.	Depth.	Length.	Width.	Depth.				
In.	Ft.	In.	In.	Ft.	In.	In.	Ft. in.	Ft.	In.	Ft.
12	12	18½	10½	7	18	13¼	6 2	4	12	4

Leading Screw. ¼ in. pitch.	5-speed cone.		Appr. Weight.	PRICE.		
	Largest diam.	Width.		Complete as above.	Sliding and Surfacing only.	Extra per foot of Bed.
In.	In.	In.	Tons.	£	£	£
2½	14	3⅛	5			

CUTTER MAKING & SHARPENING MACHINE.



This Machine will make almost any kind of **straight toothed cutter**, such as **surface** cutters, **grooving** and **side cutters**, also all sorts of **angle and bevel** cutters; with it any number of divisions can be cut that will divide 240. The dividing head is mounted on **compound slides**, and can be swivelled round on top slide; this enables it to be put into almost any desired position. The head carrying spindle and having small cutter for cutting out teeth in the blanks is driven by bevel wheels from pulley, and can be **adjusted** slightly in **horizontal** and **transverse** directions; for sharpening up cutters, this head can be taken off, and one carrying small emery wheel fixed in its place. Dividing head can also be replaced for one carrying cutter to be sharpened, and has a catch to drop into teeth of cutter for holding and dividing it; this can be regulated for different sizes. Compound slides can be quickly moved by hand lever, thus drawing cutter across emery wheel and renewing cutting edge without the expense of annealing, re-cutting, and hardening. The Machine is complete with screw keys, one sample cutting tool, and emery wheel.

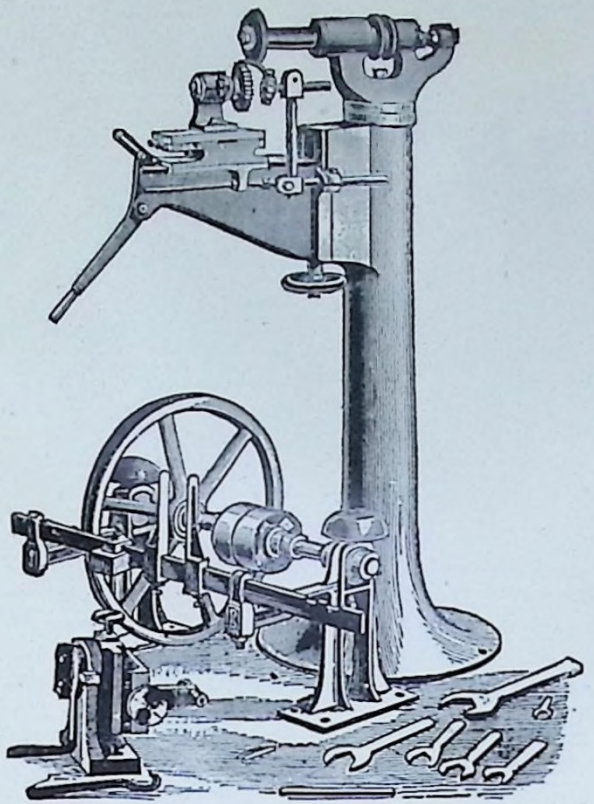
Above is a most useful and handy addition to the Milling Machines now used by almost all classes of Engineers.

DIMENSIONS.

Will make cutters up to:		PULLEY.		Approximate Weight.	PRICE.
Diameter.	Width.	Diameter.	Belt.		
In.	In.	In.	In.	Cwts.	
8	3	5	1¼	1½	

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CUTTER GRINDING MACHINE.

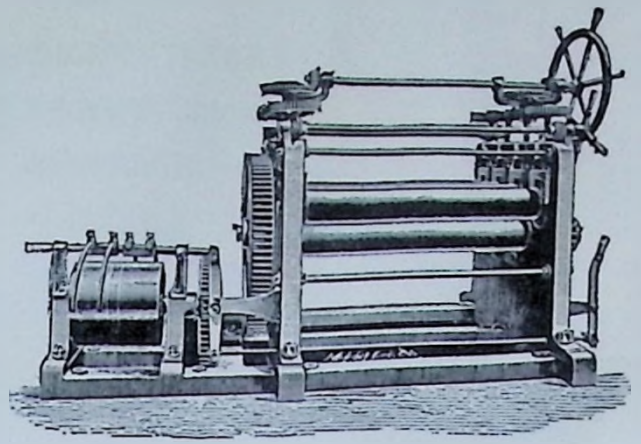


This Machine consists of standard carrying swivel headstock, fixed in centre by bolt. Steel Spindle runs in hardened bearings. Table has longitudinal and transverse slides; first is worked by lever, the latter by screw and handle. On both sides of pillar are supports for side rods, carrying fingers, which are nipped by thumb-screws in any position. Machine will grind all special cutters required for milling, and has attachment for grinding cutters with semi-circular circumferences. Cutters with teeth in straight or curved lines may be sharpened to keen edge, perfectly true. Overhead motion and screw-keys included.

DIMENSIONS.

Will grind Cutters up to			Approximate weight.	Price, Complete.
Diameter.	Width.	Diameter Semi-circular Cutters.		
In.	In.	In.	Cwts.	£
8½	6	9	4½	

PLATE-ROLLING MACHINES.

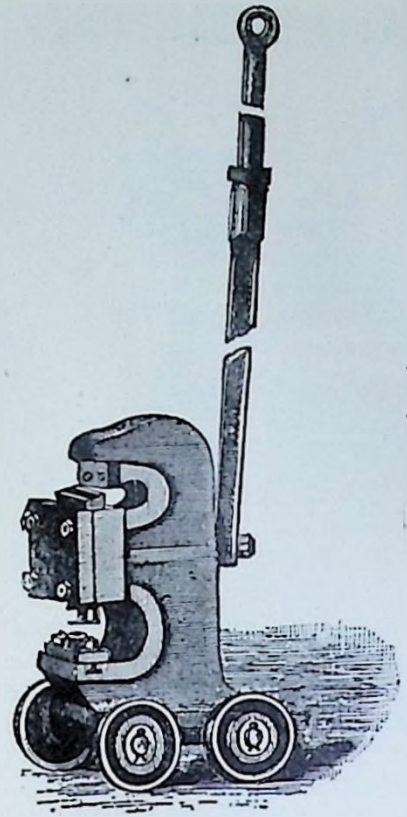


This Plate Straightening and Flattening Machine produces a **perfectly flat surface,** and is specially useful in cases where plates require to be painted, such as in Gas Holders, Deck Houses, Locomotive Tenders, &c. It consists of six cast iron and one steel roller, the former being made with a wrought-iron shaft, which forms the bearings at each end. They are driven by **steel pinions,** and the four top rollers have **vertical adjustment,** the two end rollers having also **independent** vertical adjustment. Machine has **reversing motion,** and is fitted with fast and loose pulleys, strap fork and shifter; or with Steam Engine with reversing motion. Illustration represents small-size machine; the large sizes differ slightly in construction. All the rollers can be made of steel if desired.

DIMENSIONS.

No.	For Plates up to		Appr. Weight without Steam Engine.	Price.	
	Width.	Thickness.		Without Steam Engine.	Extra for Steam Engine.
	Ft.	In. In.	Tons.	£ s. d	£ s. d.
1	4½	13 W.G. to ¼	4		
2	4¾	⅛ ,, ⅜	6		
3	5	⅛ ,, ½	8½		
4	6	¼ ,, ¾	12		
5	6	⅜ ,, 1	15		
6	8	½ ,, 1⅛	28		

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LEVER PUNCHING AND SHEARING MACHINE.

Strong Cast-iron Body, mounted on four wheels, and fitted with Wrought-iron Lever complete.

To punch ½ inch diameter hole through ½ inch plate, and shear ½ inch iron plate.

Price, £11 0 0



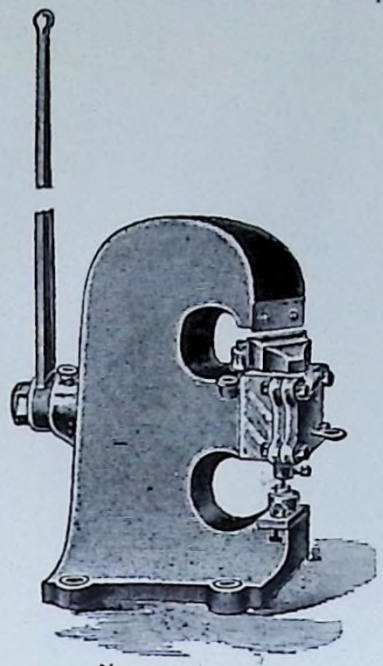
LEVER PUNCHING MACHINE.

This convenient tool will be found useful in any workshop. It is fitted with Shear and Guide

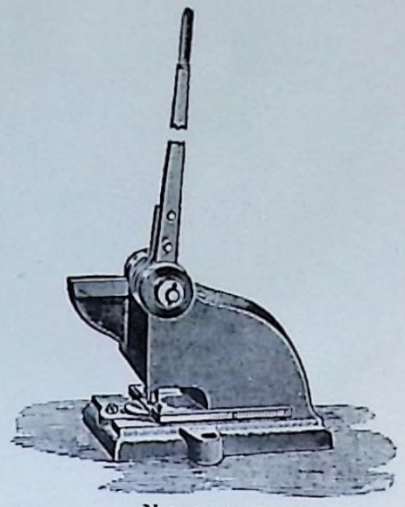
DIMENSIONS AND PRICES.

No.	To Punch.	Distance from Frame	Weight.	PRICE £ s. d.
21	⅛ in. diam., ⅛ in deep	2 in.	35 lbs.	1 10 0
22	¼ ,, ¼ ,,	2⅛ ,,	60 ,,	1 18 0
23	5/16 ,, 5/16 ,,	3 ,,	90 ,,	2 14 0
24	⅜ ,, ⅜ ,,	3½ ,,	147 ,,	3 10 0
25	7/16 ,, ⅜ ,,	3⅞ ,,	225 ,,	5 0 0

LEVER PUNCHING & SHEARING MACHINES.



Nos. 31 and 32.



Nos. 21 to 29a.

Machines Nos. 21 to 30 are fitted with shear and guide, and moveable die-bearer. Lever of Nos. 21 to 25 falls and shears at back, and in Nos. 26 to 29A falls and shears in front. Nos. 31 and 32 are fitted with shear at an angle to frame, which enables bars to be cut on square or plates cornered.

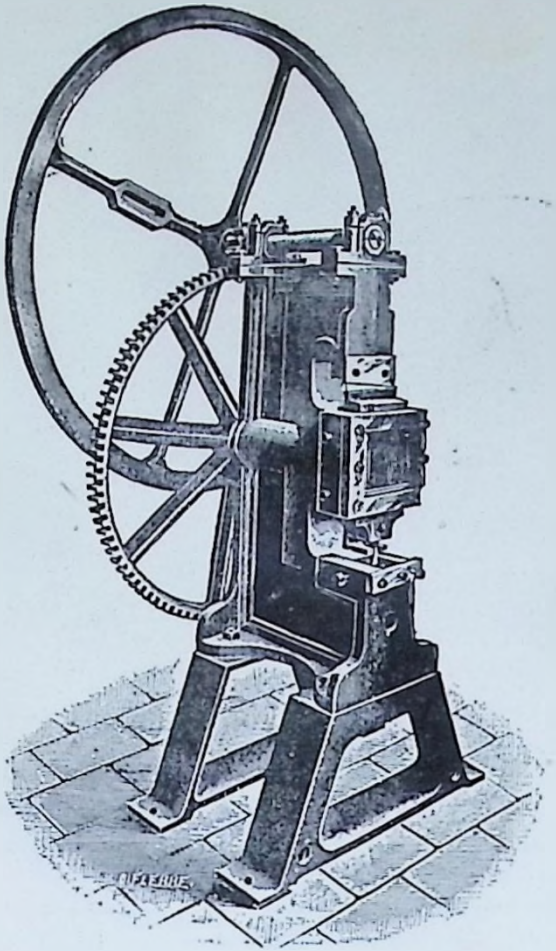
These machines are very powerful and strongly made, and they will be found most useful in any workshop.

No.	To Punch Diam.	To Punch Deep.	Approx. Weight.	Price. Without Shear.	Price. With Shear.	No.	To Punch Diam.	To Punch Deep.	Approx. Weight.	Price. Without Shear.	Price. With Shear.	Price. With Shear and Guide
	In.	In.	lb.	£ s. d.	£ s. d.		In.	In.	lb.	£ s. d.	£ s. d.	£ s. d.
21	⅛	⅛	35	..	1 7 0	26	¼	¼	60	2 2 0	2 10 0	2 13 0
22	¼	¼	60	..	1 14 0	27	5/16	5/16	95	2 14 0	3 3 0	3 6 0
23	5/16	5/16	99	..	2 8 0	28	⅜	⅜	137	3 7 0	3 17 0	4 3 0
24	⅜	⅜	147	2 17 9	3 1 0	29	7/16	⅜	225	4 7 0	4 17 0	5 3 0
25	7/16	⅜	225	4 0 0	4 4 0	29A	9/16	7/16	337	5 10 0	6 11 0	6 16 0
31	7/16	5/16	142	£8 9 0		32	9/16	⅜	609	£11 15 0		

Machines Nos. 31 and 32 are fitted with shear at an angle to frame, which enables bars to be cut on square or plates cornered.

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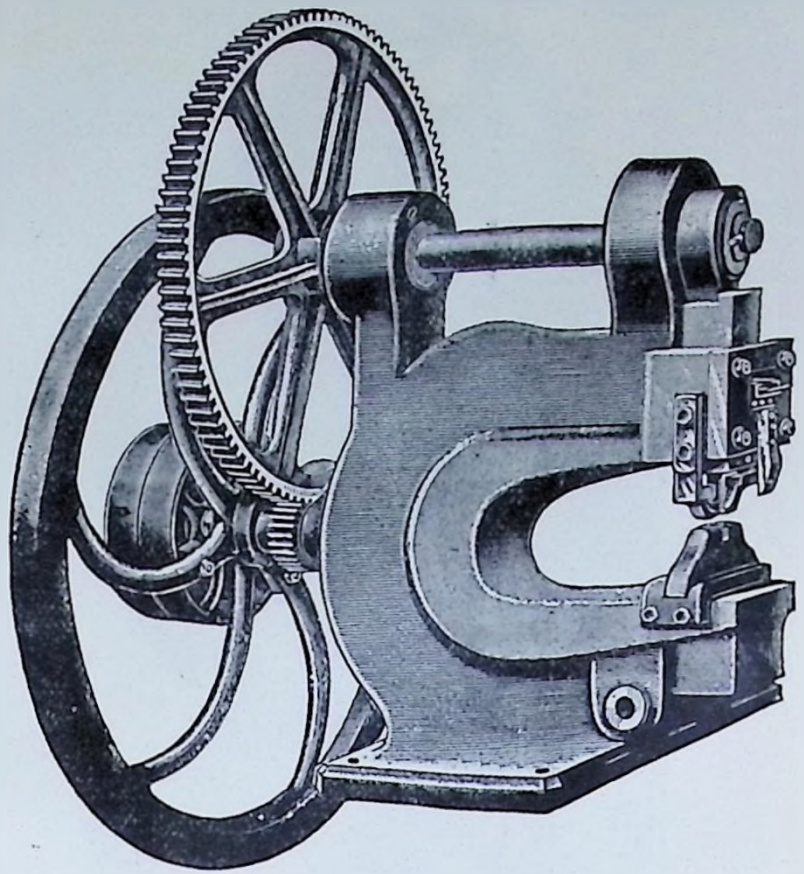
PUNCHING AND SHEARING MACHINE.



This Machine is suitable for Boiler and General Smiths' Shops, and is well adapted for Gate, Fencing, and all kinds of Sheet Iron Work. It is carefully designed and strongly constructed, and will punch and shear with the greatest ease. Each Machine is provided with one punch and die, pair of shear blades, and hand handle for fly-wheel.

Will Punch		Will Shear	Depth of Gap.		Approximate Weight.	Price.
Hole.	Plate.		Punch.	Shear.		
⅝ in.	⅝ in.	⅝ in.	6⅛ in.	6 in.	15 cwt.	£

PUNCHING AND SHEARING MACHINES.



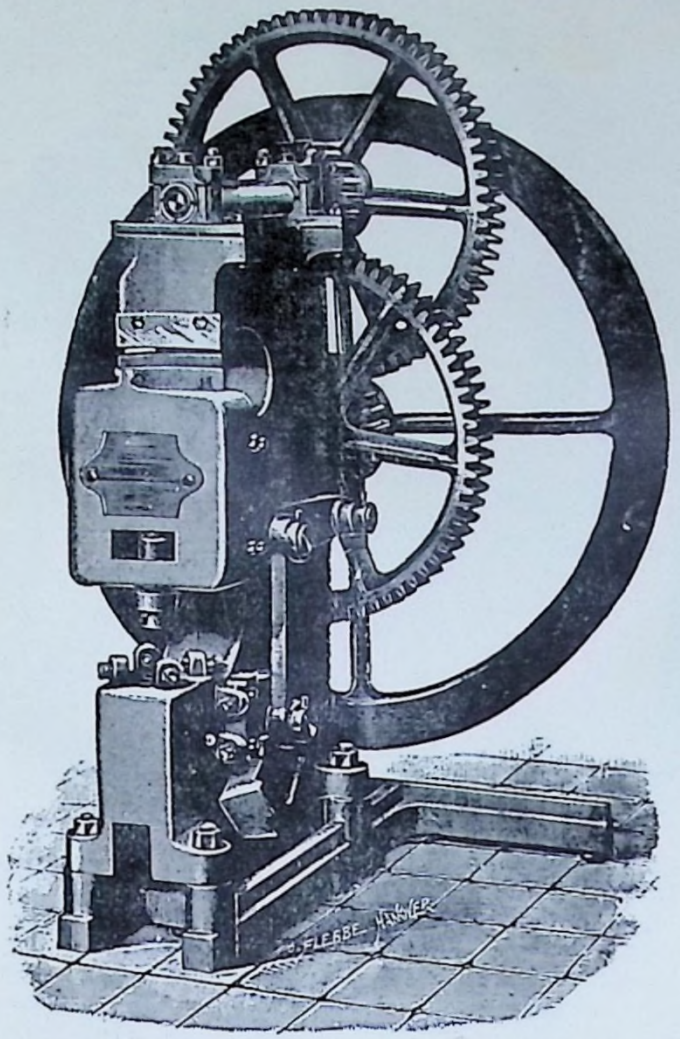
DIMENSIONS.

No.	Will Punch		Will Shear			Approximate Weight.	Price			
	Diameter Hole Through	In Centre of	Square Iron.	Flat Iron.	Angle Iron.		To Punch only.	To Shear only.	To Punch and Shear Square and Flat Iron.	To Punch and Shear Square, Flat and Angle Iron
	In.	In.	In.	In.	In.	Cwts.	£	£	£	£
40	⅞ × ⅜	13	1 3/16	2 3/16 × ⅜	1 ⅛	8				
41	9/16 × 9/16	17 ¼	1	2 ¼ × 9/16	1 ¼	12				
42	9/16 × 9/16	33 5/16	1	2 ¼ × 9/16	1 9/16	16				
43	11/16 × 11/16	31 5/16	1 3/16	2 ¼ × 11/16	2 3/16	24				
44	¾ × ¾	39 ¼	1 ⅜	3 ⅛ × ¾	2 9/16	37				
45	1 1/16 × 1 1/16	40 ¼	1 9/16	3 ⅛ × 11/16	3 ⅛	55				

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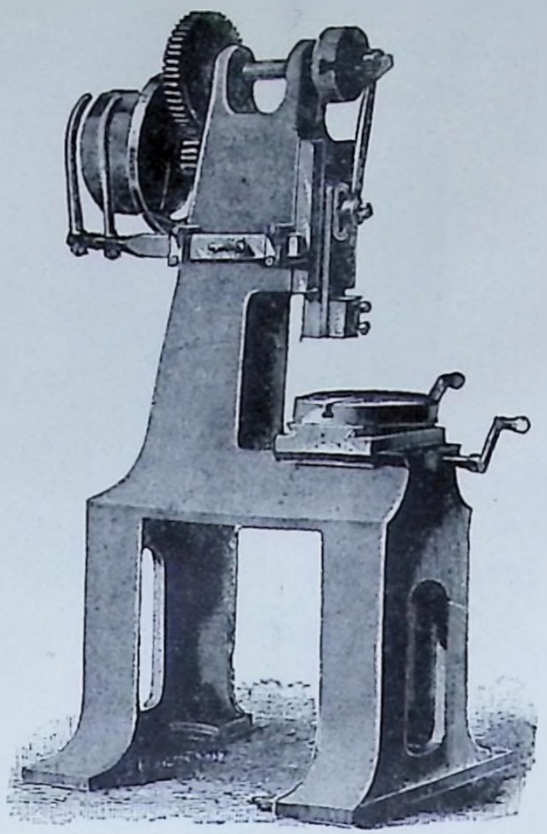
PUNCHING AND SHEARING MACHINE.



This powerfully-geared hand-power Punching and Shearing Machine is suitable for Engineers, Iron Stores, and Shipyards. Specially arranged for cutting Angle, Bar, and Sheet Iron with great ease. Shears are set at angle for cutting long lengths. Complete with one Punch and Die, pair of Shear Blades, and handle for fly-wheel.

Will Punch		Will Shear		Depth of Gap		Approximate Weight.	Price.	Extra with Angle Iron Cutter.
Hole.	Plate.	Plate.	Angle Iron	Punch.	Shear.			
¾ in.	¾ in.	¾ in.	¼ in.	8 in.	9 in.	36 cwt.	£	£

5-in. STROKE SLOTTING MACHINE.



The above illustration represents a useful **Geared** Slotting Machine, for light work. It is fitted with **compound slides**, fast and loose pulleys, flywheel, and strap fork complete. All screws are of **steel**, and of large diameter

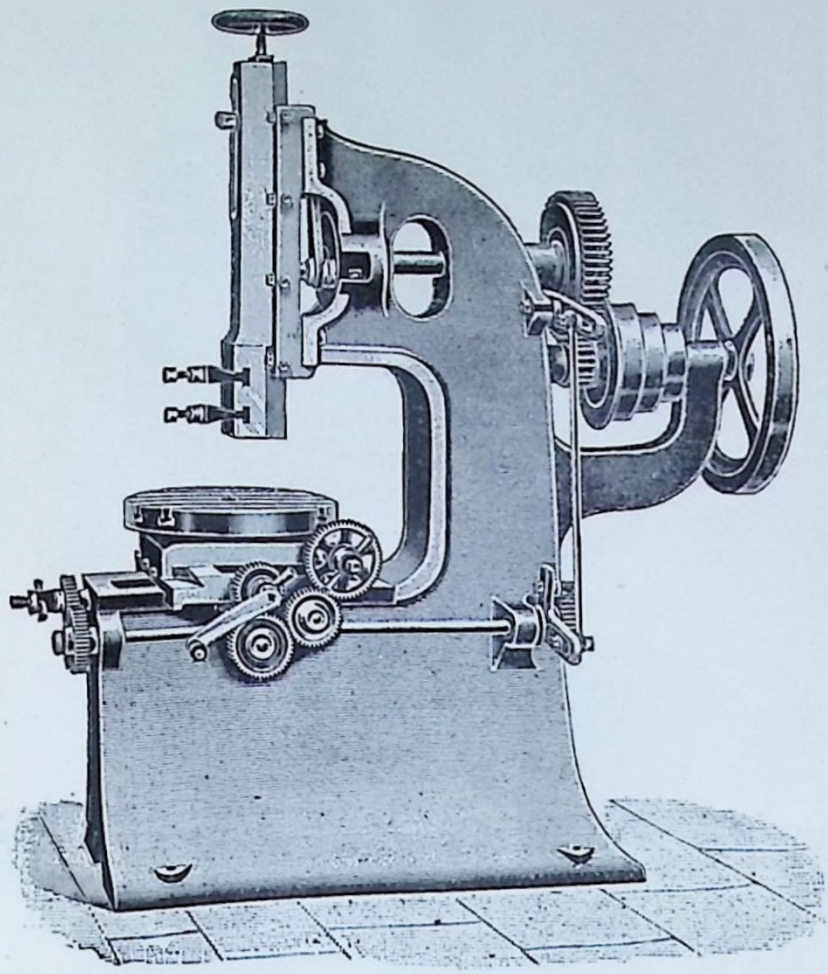
DIMENSIONS.

Diameter of Table.	Will take in.		Traverse.		Approximate Weight.	Price.	
	Diameter.	Depth.	Longitudinal.	Transverse.		Complete.	Extra for Circular Motion.
12 in	13 in.	8 in.	6 in.	8½ in.	8½ cwt.	£	£

If with cone pulley and overhead motion, instead of fast and loose pulleys and strap fork, £1 12s. 6d. extra.

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SLOTTING MACHINES.



Above illustration represents all three sizes shown.

For Prices and Particulars, see opposite page.

SLOTTING MACHINES.

These are strongly geared, and have adjustable rams working in long continuous bearings. They are **self-acting** in the **longitudinal, transverse,** and **circular cuts,** and are fitted with compound table and variable stroke. The feeds are **adjustable independently** of each other. The throw disc is recessed into the body of the machine, and is graduated to facilitate setting to the length of the stroke. The worm wheel for machine table is **machine-cut,** and each machine is provided with complete overhead motion, belt-shifter, and screw-keys

If required, the table can be fitted with an improved **canting motion.** The upper part of the table is then secured by two bolts, and when these are loose, it may be turned half-way round, and secured in that position; and it will be found that a **cant of ⅛ of an inch** is given to the table, and when it is again turned back it is level. At each position it is **quite solid on the bed,** requiring no wedges or screws to set up with.

If required, a quick return motion may be fitted to ram.

DIMENSIONS.

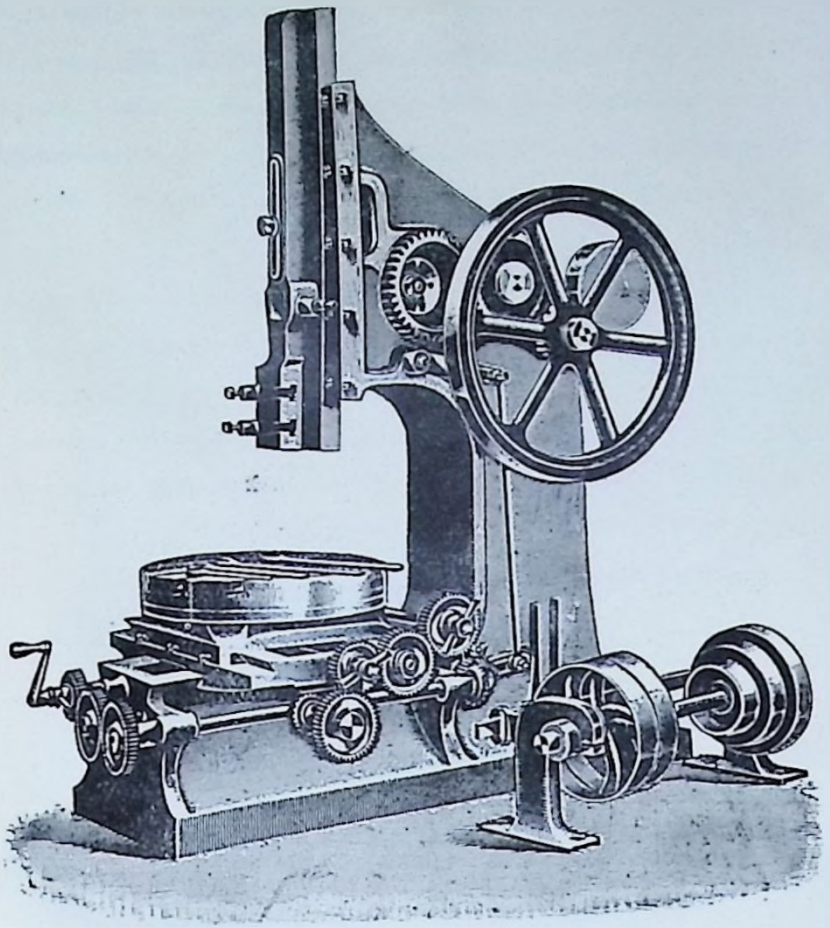
Length of Stroke.	Will admit on top of Table.		Traverse Table Slides.		Diam. of Round Table.	3-speed Cone.		Ram.	
	Diam.	Depth.	Longitudinal.	Transverse.		Diam. of largest Speed.	Width.	Length.	Vertical Adjustment.
In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	In.	In.	Ft. In.	Ft. In.
6	2 0	0 7	1 2	0 8½	1 3½	9½	2⅛	2 3½	0 6½
8	3 0	1 0	1 2	0 10	1 8	11½	2¾	2 11	0 11
10	3 6	1 4	1 5	1 2	2 0	14	3¼	3 6	1 0

Length of Stroke.	Driving Pulleys		Approximate Weight.	Price.		
	Diam.	Width.		As above.	Extra with Canting Table.	Extra with Quick Return Motion to Ram.
In.	In.	In.	Cwts.	£	£	£
6	12	2½	19			
8	12	3	28			
10	15	3	38			

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SLOTTING MACHINES.

(PATENT.)



Above illustration stands for all four sizes.

For Prices and Particulars see opposite page

SLOTTING MACHINES.

(PATENT.)

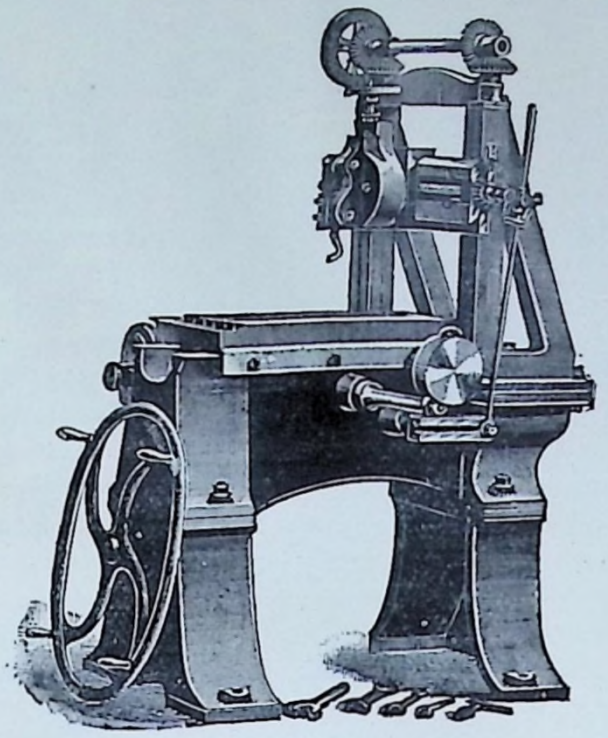
In this improved Machine, overhanging studs in connecting rod are done away with, and all adjustable parts are brought within **easy reach** of workmen. The balanced lever is placed inside frame, and working in **bearings on both sides** of it are two driving-wheels with large bosses, in which are fitted two eccentrics, made fast and loose with the wheels by a strong bolt passing through them and through slot in balanced lever. On bolt is placed block that slides in slot of lever, so when wheels revolve in bearings the eccentrics and bolt are carried with them, giving motion to lever in accordance with position of eccentrics and bolt. **Stroke is adjusted** by loosening bolt and turning fly-wheel round until a point on eccentric cones is opposite required stroke on wheel, which is **indexed.** Improved **canting motion** for table is provided; the upper part of table is secured by two strong bolts, when loosened this part is turned half-way round, secured in that position, a **cant of one-eighth of an inch** is given to table for **tapering key-ways**; when table is turned back it is then level, being at each position quite solid on bed; there are **no screws or wedges** to secure it; tables have **self-acting feed motions** both ways, also **self-acting circular** motion. Ram is adjusted in height by screw and handle on side, and tool has **quick return stroke** balanced by lever. All dangerously large driving-wheels are done away with, **power** of machine being **fully maintained** by double train of wheels; all bearings for shafts are inside frame. Complete overhead motion and screw-keys are provided with each machine.

DIMENSIONS.

No.	Length of Stroke.	Admits in		Traverse of Slides.		Approximate Weight.	Price.
		Diameter.	Depth.	Longitudinal.	Transverse.		
	In.	In.	In.	In.	In.	Cwt.	
1	12	48	21	19	16	65	£
2	14	54	21	19	16	75	£
3	15	60	24	30	24	97	£
4	20	72	32	36	30	150	£

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SMALL PLANING MACHINES.



No. o Machine.

The above class of Planing Machines are suitable for Hand or Steam Power, and they are especially adapted to be easily worked by hand for planing small articles in an expeditious manner. The power machines are worked by bevel gearing, with quick return motion to table. The cross slide is provided with one tool box, and is adjustable to any height, and has self-acting horizontal cut.

Machines are complete with fast and loose pulleys and hand-working flywheel.

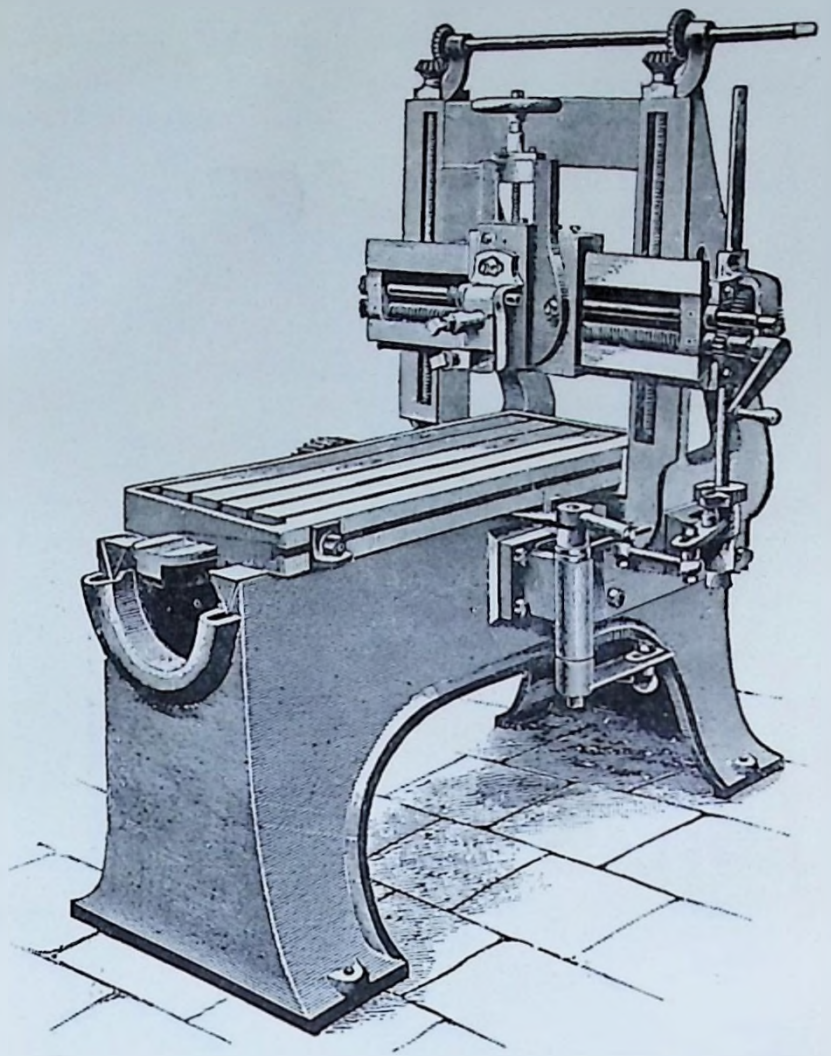
Machines Nos. oo and o can be supplied with or without Stand.

Machine No. 1 has Frame and Stand cast in one.

DIMENSIONS.

No.	Will Plane.			Approximate Weight.		Price.	
	Length.	Width.	Height.	With Stand.	Without Stand.	With Stand.	Without Stand.
	In.	In.	In.	Cwts.	Cwts.	£	£
oo	16	12	8	6¾	6	19	17
o	23¾	16	12	10½	11½		
1	31¾	20	16	17¾			

PLANING MACHINE.



The bed of this Machine has flat top, and is angled inside, to which table is fitted, with adjustable strip to take up wear. It is self-acting in horizontal, angular, and vertical cuts, and quick return motion.

DIMENSIONS.

Will plane			Length of Bed.	Table.		Diam. of Pulleys.	Approx. Weight.	Price.
Length.	Width.	Depth.		Length.	Width.			
In. 36	In. 20	In. 18	In. 54	In. 41	In. 17½	In. 15	Cwts. 23½	£

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PLANING MACHINE.

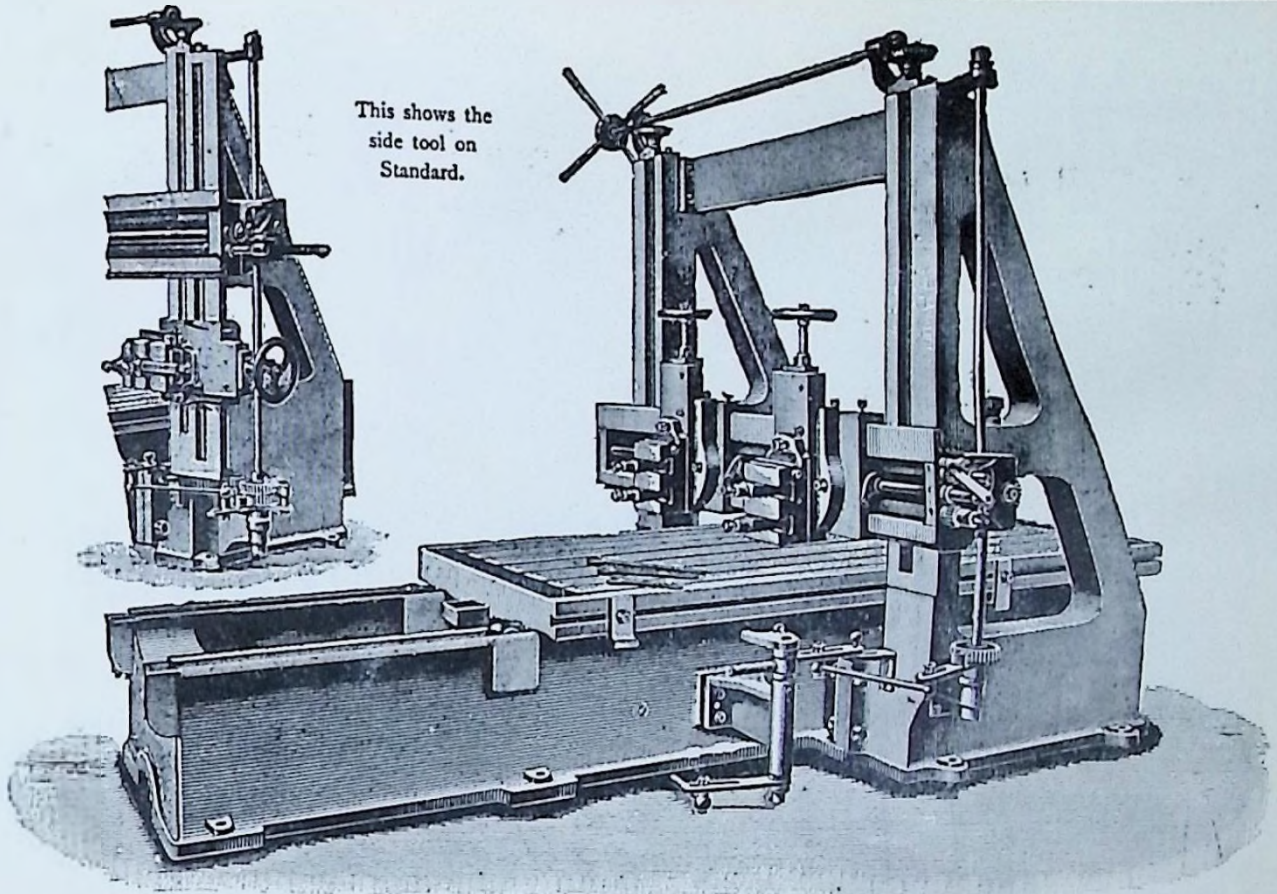


Illustration of Machines Nos. 1, 2, and 3.

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POWERFUL PLANING MACHINES.

These Machines have **massive beds** and standards carrying cross slides arranged to carry one or two tool boxes, and having **self-acting horizontal, vertical, and angular cuts.**

They may also be fitted with a separate side standard and tool box with **self-acting vertical feed.**

This addition is very useful for planing the ends of articles which are too long to go between the standards, and also for **plate edge planing**; or the machine can be fitted with an extra tool box with self-acting down feed to one or both standards of the machine.

The table is driven by a rack which receives its motion from a large intermediate wheel driven by a pinion, an arrangement which **reduces the wear** and makes much **smoother work.**

It has **slow cutting** and **quick return** motions and is provided with self-acting oilers, screw keys, &c.

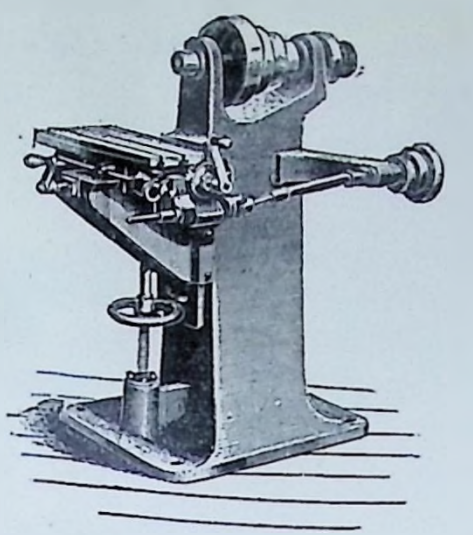
Will Plane	Bed		Width of Table.	Approximate Weight.	Price.				
	Length.	Between Centres of V's.			With One Tool Box.	With Two Tool Boxes.	Per Foot longer to be Planed.	For separate Standard and Tool Box with S.A. Down Feed.	For Tool Box on Standard of Machine.
Ft. Ft. Ft.	Ft.	Ft. In.	Ft. In.	Tons.	£	£	Extra £	£	Extra £
12 × 4 × 4	18	2 9	3 9	8½					
12 × 4½ × 4½	18	2 9	3 9	9					
12 × 5 × 5	18	2 9	4 3	9¾					

These machines may have **flat sides** for the table at the same prices.

They can also have tables **driven by powerful screw** with adjustable nuts to take up the wear. Price extra for each size, £

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SINGLE-GEARED MILLING MACHINE.

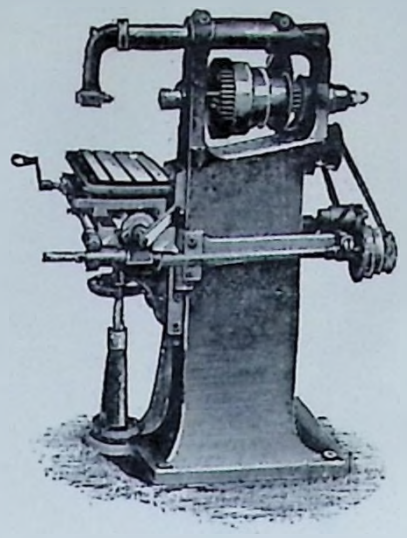


This Machine has conical steel spindle, with reverse cones for adjustment, the nose of spindle being bored taper and slot cut through to cover up mandrils, thus enabling the Machine to **run in either direction.** The slides and table are **heavy** and have **large** wearing surfaces; the latter has a sud channel all round, with drawing-off pipe. The **automatic feed** is strong and simple, with worm and wheel, **machine cut** from the solid, the worm running in oil. All screws of **steel**, and of large diameters, the screw for transverse-slide having two starts to allow the table to be run back quickly by hand. This slide is self-acting and self-stopping, at any part of its traverse, by means of an adjustable stop.

Size of Table.	Traverse.			Approximate Weight.	Prices, with Overhead Motion.		
	Transverse.	Longitudinal.	Vertical.		Complete as shown.	With Overhung Arm.	If without Automatic Feed.
					£	£	Less £
21in. × 8in.	13 in.	6½ in.	14 in.	9½ Cwt.			

Cone pulley has four speeds for 2½ in. belt; largest diameter is 10 in.

DOUBLE-GEARED MILLING MACHINE.



This Machine has conical steel spindle, with reverse cones for adjustment, the nose of spindle being bored taper and slot cut through to cotter up mandrils, thus enabling the machine to **run in either direction.** The tail pin runs in oil.

The overhanging arm is secured at back and front, and can be instantaneously withdrawn.

The slides and table are **heavy** and have **large** wearing surfaces, the latter has a sud channel all round, with pipe for drawing off the suds.

The **automatic feed** is strong and simple, with worm and wheel, **machine cut** from the solid. The worm running in oil.

All screws are **Steel** and of large diameters, the screw for transverse slide having two starts to allow the table to be run back quickly by hand. This slide is self acting and self-stopping at any part in its traverse, by means of an adjustable stop.

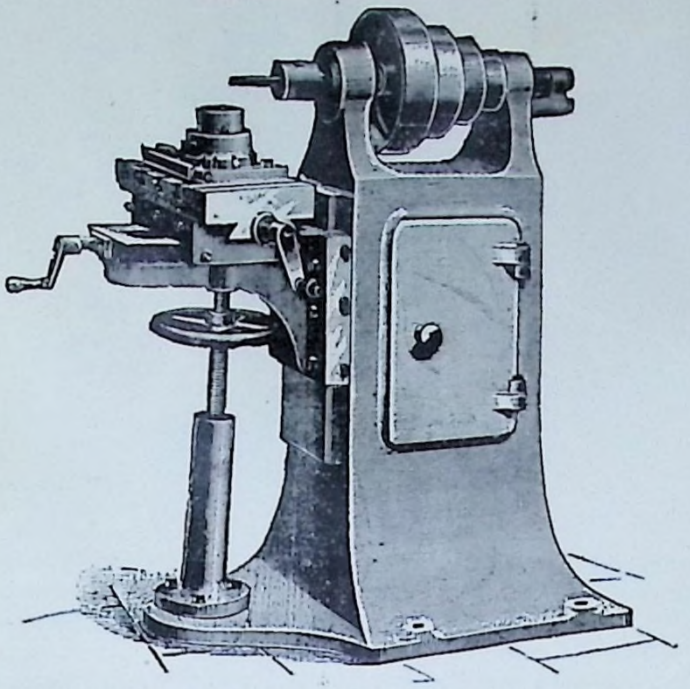
Size of Table.	Traverse.			Approx. Weight.	Prices with overhead Motion.			
	Transverse.	Longitudinal.	Vertical.		Complete with back gear.	Without arm.	Single geared for 3 in. belt.	If without Automatic Feed.
					£	£	£	Less £
20 × 8½ in.	13 in.	6 in	12 in.	14 cwt.				

Cone pulley has 3 speeds for 2½ in. belt.

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MILLING MACHINES.

SINGLE AND DOUBLE.



These Machines will be found specially valuable for quickly shaping all kinds of Brass Work, and where a number of small surfaces have to be shaped. Tables have planed T slots, with Adjustable Horizontal and Vertical Slides, and Dividing Attachment for four, six, and eight side articles.

Double Machine will shape two sides of work at once, having two independent heads, with V slides adjustable by screw.

Machines are complete with Overhead Motion, Screw Keys, and Cutter to each head.

DIMENSIONS—SINGLE MACHINE.

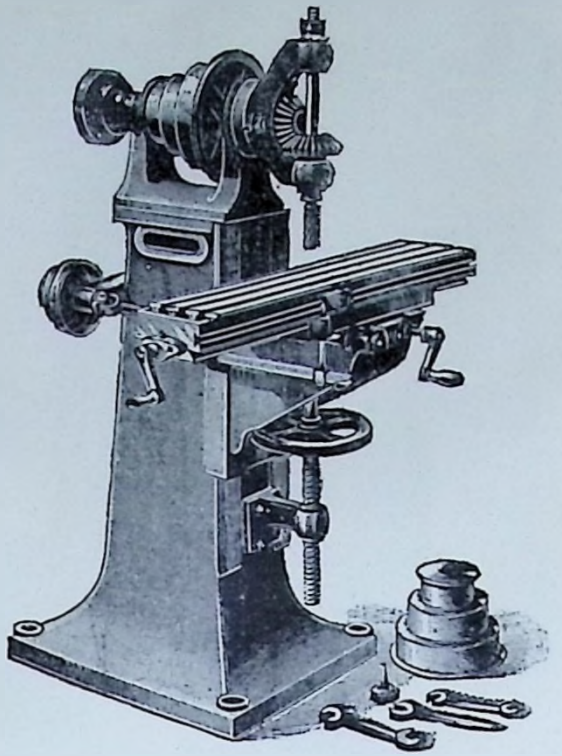
Table		Turret.		4-Speed Cone.		Appr. Weight.	Price.	
Horizontal Traverse each way.	Rise and Fall.	Diam. of Hole.	Diam. Hole in Bush.	Largest Diam.	Width.		As above.	Without Dividing Attachment.
In.	In.	In.	In.	In.	In.	Cwts.	£	£
7	9	2¼	1	11½	2⅜	11½		

DIMENSIONS—DOUBLE MACHINE.

Table.		Turret.		Heads open between Spindles	Pulleys.		Appr. Weight.	Price.	
Horizontal Traverse.	Rise and Fall.	Diam. of Hole.	Diam. Hole in Bush.		Diam.	Width.		As above.	Without Dividing Attachment.
In.	In.	In.	In.	In.	In.	In.	Cwts.	£	£
6	8	2¼	1	8	6	3	14		

MILLING MACHINE.

HORIZONTAL AND VERTICAL.



No. 1 Machine.

The above Machine is specially designed for **Horizontal and Vertical Milling** and Boring, which changes can be effected simply by removing the Vertical bracket, shown in illustration, and attaching cutter in usual way for horizontal milling.

The table is regulated in height by hand wheel and screw from underneath.

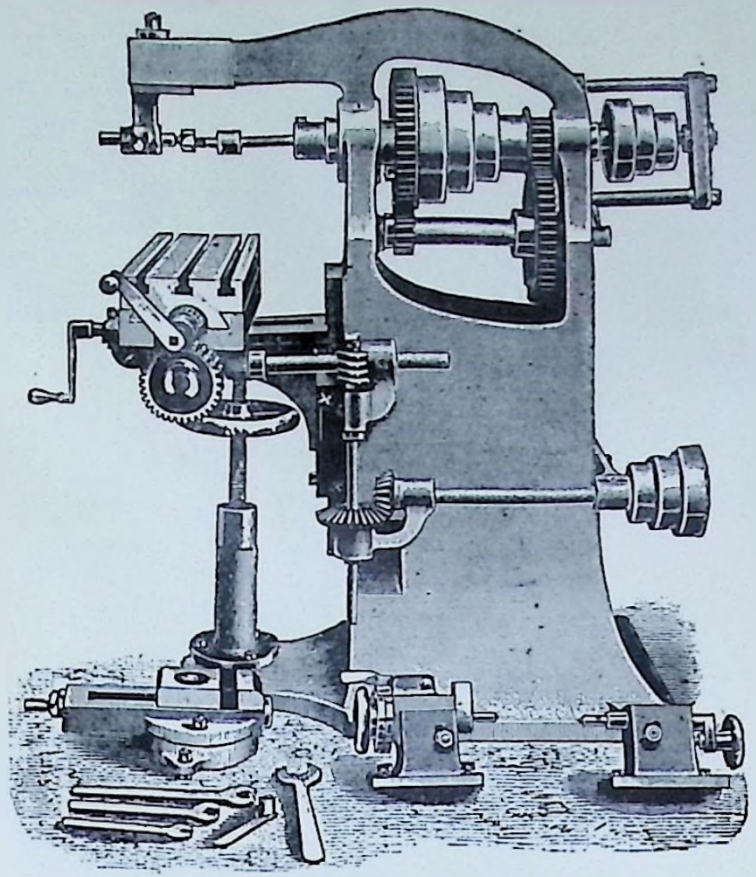
Machine has self-acting traverse motion with three different speeds, and strike out lever to disengage same at any point.

DIMENSIONS.

No.	Traverse.			Approximate Weight.	Price.	
	Longitudinal.	Transverse.	Vertical.		As above.	If without self-acting motion.
	In.	In.	In.	Cwts.	£	£
1	23⅛	6	10	7		
1A	29⅜6	7	10	6¼		

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MILLING MACHINES.



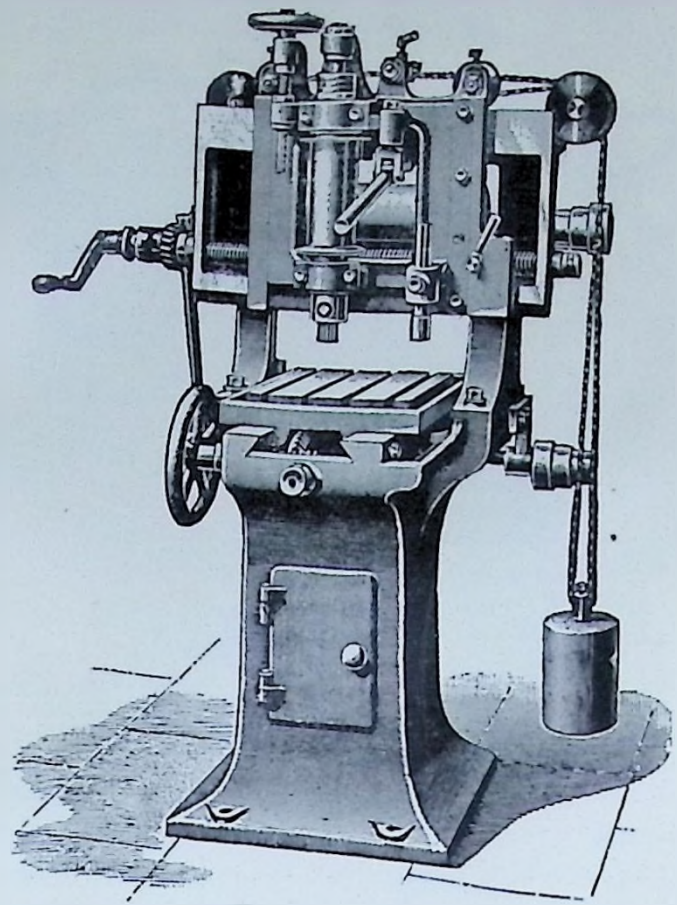
The above is a valuable Machine for milling all kinds of small work, adapted for Cycle Manufacturers, Gunsmiths, Locksmiths, Electrical Engineers, &c. It is made with **machine-cut double gear**, as shown, or **single gear**. If fitted with dividing head and back centre will divide wheels or milling cutters, and is useful for milling nuts, &c. Table is provided with **self-acting** longitudinal travel with three speeds of feed motion to each speed of cutter. Machine has **steel** spindle running in **adjustable** conical gun-metal bearings, and is complete with overhead motion and screw-keys.

DIMENSIONS.

Particulars of Table.						4-Speed Cone.			Appx. Weight.	
Length.	Width.	Self-Acting Travel.	Transverse Travel.	Greatest Depth from Top to Spindle.	Will Rise and Fall	Width of Belt. Double Gear.	Width of Belt. Single Gear.	Largest Diam.	Double Gear.	Single Gear.
In.	In.	In.	In.	In.	In.	In.	In.	In.	Cwt.	Cwt
24	9½	18	7	12	9	2	2½	11½	17	15

Double-Geared Machine.	Single-Speed Machine.	Extra for Dividing Heads up to 30, or more, as ordered.	Extra for Vice to admit 6 in. with 4½ Jaws, and Swivel Base.
£	£	£	£

MILLING AND PROFILING MACHINE.



These Machines are of the best workmanship and materials of the highest class, they are specially designed for milling or shaping to a pattern all kinds of engineers' and brass finishers' work, such as links, cams, flanges, &c., &c. The Table and Cutter are provided with **self-acting feed motions**, and also hand-feed motions for irregular-shaped work. The self-acting motion to table is by **machine-cut rack and pinion**. Cutter spindle revolves in adjustable phosphor-bronze bearings, with adjustable hardened steel end thrust bearings, and is **adjustable vertically** by screw and hand-wheel. The profiling motions of cutter-head and table can be worked in either direction by hand lever. Near cutter spindle is an adjustable feeler, which is held against the copy by means of weights. Machines are complete with overhead motion, screw-keys, and one sample cutter.

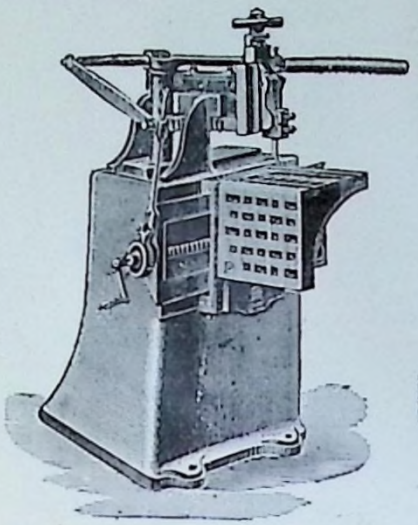
DIMENSIONS.

Table.			Cutter.		Will Admit		Approx. Weight.	Price.
Self-acting Traverse.	Length.	Width.	Traverse on Slide.	Vertical Adjustment.	Between Standards.	Under Spindle Nose.		
In.	In.	In.	In.	In.	In.	In.	Cwts.	£
15	17	14	9	6	18	6	18	

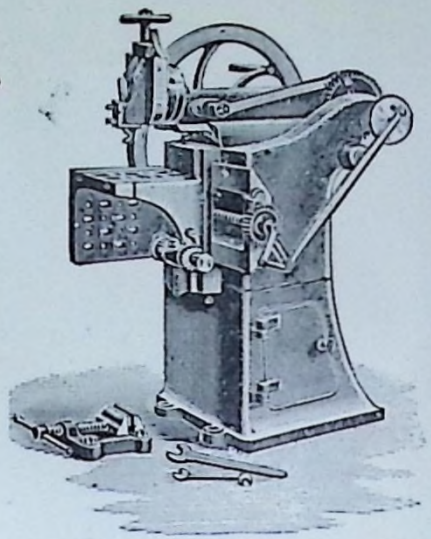
Particulars of larger size Machines will be sent on application.

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 129 of 298
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SHAPING MACHINES.



No. 44.



No. 44A.

No. 44 Machine is fitted with lever and self-acting motion for hand power, rising and falling table, or vice, as desired.

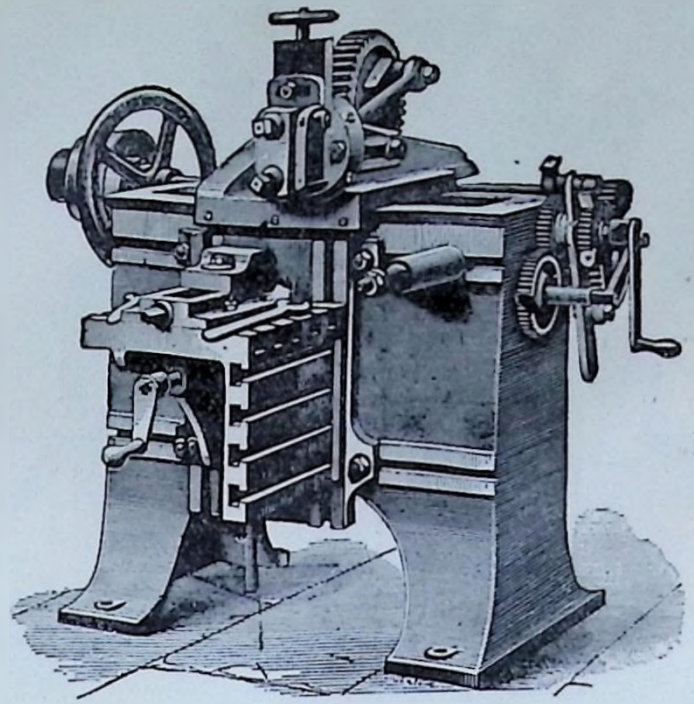
No. 44A Machine is fitted with variable stroke, for hand and steam power, self-acting and quick return motion, adjustable tool carriage for planing angles and down cutting, and rising and falling table, or vice, as desired. This Machine can also be fitted with automatic circular motion for external curves. Although these Machines are very low in price, the quality and material is of the best, they are well-finished, strongly and accurately made.

DIMENSIONS.

No.	Stroke.	Traverse.	Approximate Weight.	Price. With rising and falling vice.	With Socket-stand.	With small vice over table.	With automatic circular motion.	As above.
	In.	In.	Cwts.	£	£	£	£	£
44	6	14	8½					
44A	6 11/16	16	10½					

SHAPING MACHINE.

6-INCH STROKE.



The above is a very handy Machine, with a **variable stroke**, driven by cone wheel and pinion. The head traverses along bed by a screw, and has **variable self-acting surfacing cut**. The ram is indexed and fitted with slides for down and angle cutting. The table has planed T slots on top and side, and is adjustable horizontally on bed by bolts sliding in T slots, and vertically by screw and bevel wheels, with handle for working them in front. A **self-acting circular motion** is provided for external curves. Machine is complete with overhead motion, parallel vice, and screw keys.

DIMENSIONS.

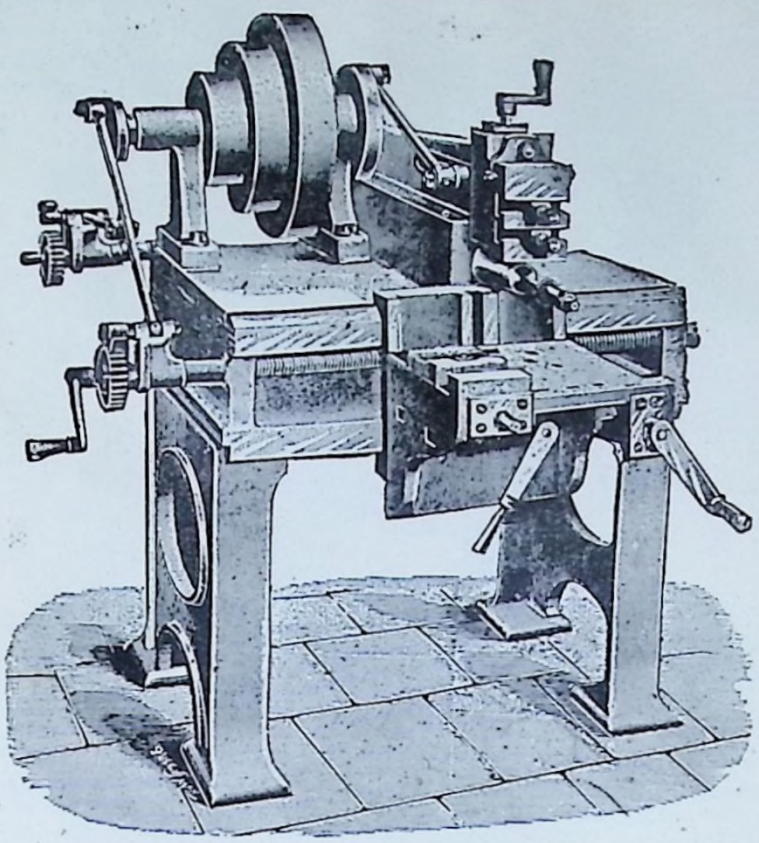
Maximum Length of Stroke.	Traverse of Head.	Length of Bed.	Admits on Top of Table.	Size of Table.	Approximate Weight.	Price. As above.	Nut-Shaping Attachment.	to Special Nut Shaping Mandrils with Collars.
In.	In.	In.	In.	In.	Cwts.		Extra.	Extra.
7	22	33	12	14 × 13 × 12	13	£	£7	£6 5

Larger Machines quoted for on application.

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SHAPING MACHINE.

WITH FIXED HEAD.

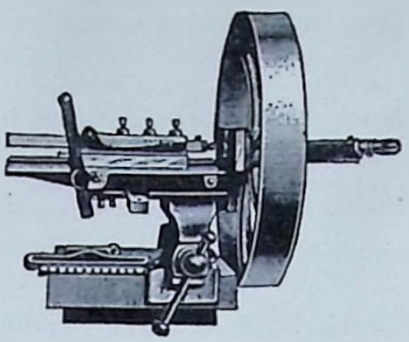


The above is of simple construction and, working at **quick speed,** is adapted for shaping quantities of small articles of same size and shape, and is a most useful adjunct to an engineering fitting shop. It has **fixed head** and **traversing table** on strong bed, with **adjustable stroke,** provided with long ram and adjustable slot. Table with planed and perforated top with fixed vice, also side plate with vice as shown; table is adjustable vertically, and has variable **self-acting traverse.** Tool-box, swivels for angular work, and self-acting motion for circular work; is fitted with mandrel and pair of cones. Machine is complete with overhead motion, handles, screw-keys, &c.

Stroke.	Traverse.	Length of Bed.	Table admits under Tool.	Will shape distance from Frame.	3-Speed Cone.		Approx. Weight.	Price.
					Diameters.	Belt.		
In.	Ft. In.	Ft. In.	In.	In.	In. In. In.	In.	Cwts.	£
6	2 10	3 6	12.	12	16×12×8	2½	14	

PATENT SLOTTING AND KEYWAY-CUTTING MACHINES.

For Steam or Hand Power.



Can be worked by man or boy.

Will produce excellent work with expedition.

Will do better work in one-tenth the time than skilled mechanic with hammer, chisel, and file.

Equal to Shaping or Slotting Machine for ordinary purposes.

Will cut keyways parallel or taper as desired.

Can be fixed to Bench or Standard, and for large Pulleys or Fly-wheels can be fixed to work itself.

Description.	A	B	C	D
Length of Stroke in inches ...	8	12	16	24
Will Cut Keyway	1 in. wide	1½ in. wide	2½ in. wide	3 in. wide
Approximate Weight for Hand.	1 cwt.	1½ cwt.	3 cwt. 1 qr.	—
,, ,, for Steam.	—	7¼ cwt.	10 cwt.	25 cwt.
Price for Hand	£11 10s.	£17	£25	—
,, Steam	—	£29	£39	£60

This Machine differs from the ordinary Slotting Machine, inasmuch as it will cut keyways in articles of any diameter; and along with this, its lightness, portability, and easy working, which are great and important advantages, make it a desirable acquisition in large and small workshops. Its cheapness brings it within the reach of all users.

An important feature in this Machine is the arrangement by which the tool clears itself in the return stroke, and immediately resumes its firm and rigid position on returning towards the article to be cut; by this arrangement the wear on the tool is reduced, and the cutting edge preserved, which is favourable to the performing of good work, and with a minimum power.

In slotting articles with a small hole, our special **Patented Split Mandril,** which is supplied as an extra, is very desirable when large quantities are to be cut with holes of the same diameters. By the use of this Mandril several articles can be fixed and cut together, and no setting is required; this is a great saving in such work as slotting change-wheels.

The first cost is less than a quarter of any other Machine, and owing to few working parts cost of maintenance will be next to nothing.

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EMERY WHEELS.

In these Emery Wheels the grains of emery are consolidated by a special process, which developes the cutting properties in the best possible manner; they are especially recommended for freedom from glazing, durability, and rapidity of cutting.

Flanges for mounting Emery Wheels should not be less than half the diameter of the Wheels, and Insertion Rubber Washers should be used between wheels and flanges.

Emery Wheels should be frequently and carefully examined.

SPEEDS FOR EMERY WHEELS.

The following have been found to be the best and most effective speeds at which Emery Wheels should be run.

Diameter and Revolutions per Minute.

Up to 6 in.	7 to 9 in.	10 to 12 in.	14 in	16 in.	18 in.	20 in.	22 in.	24 in.	28 in.	30 in	32 in.	36 in.
2,500	2,000	1,600	1,300	1,200	1,000	900	800	750	650	600	580	550

EMERY WHEEL MACHINES.

These Machines have been designed and constructed, complete with Emery Wheels, in a variety of patterns suitable for various trades. All shafts are of steel, running in long bearings of improved form, which only require oiling about once every three months. A countershaft is recommended for driving these Machines, but to suit various requirements and convenience, they are fitted up in two ways, one with fast and loose pulleys on wheel shaft, and the other with fast pulley only on wheel shaft and countershaft at back of Machine.

Full particulars respecting improved self-oiling bearings are sent with each Machine.

In ordering Emery Wheels, please state **purpose for which they are to be used**; whether **coarse, medium, or fine**; and if to be used **wet or dry.**

PRICES OF EMERY WHEELS.

From 10 in. to 36 in. diameter.

Price **ONE SHILLING** per lb.

Approximate Weight of Wheels, one inch thick:—

10 in.	11 in.	12 in.	14 in.	15 in.	16 in.	18 in.	20 in.	22 in.	24 in.	28 in.	30 in.	32 in.	36 in.	Diam.
8¼	10	12	16¼	19	21	28	33	40	48	66	75	86	108	lbs.

From 2 in. × ¼ in. to 9 in. × 3 in.

Diameter in Inches.	Thickness in Inches.														Over 3 ins. thick.
	¼	⅜	½	⅝	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	per lb.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
2	0 4	0 4	0 5	0 5	0 6	0 8	0 10	1 0	1 0	1 0	1 3	1 3	1 6	1 6	2 0
2¼	0 5	0 5	0 6	0 8	0 10	1 0	1 0	1 0	1 0	1 0	1 3	1 3	1 6	1 6	2 0
2½	0 6	0 6	0 8	0 8	0 10	1 0	1 0	1 0	1 0	1 0	1 3	1 6	1 6	1 6	2 0
3	0 6	0 6	0 8	0 8	0 10	1 0	1 3	1 6	1 9	2 0	2 0	2 0	2 0	2 3	1 6
3¼	0 8	0 8	0 9	0 9	1 0	1 4	1 6	1 6	1 9	2 0	2 0	2 3	2 3	2 6	1 6
3½	0 8	0 8	0 10	0 10	1 0	1 4	1 6	1 6	2 0	2 0	2 3	2 6	2 9	3 0	1 6
3¾	0 10	0 10	1 0	1 0	1 3	1 6	1 9	1 9	2 0	2 0	2 6	2 6	3 0	3 0	1 6
4	0 10	0 10	1 0	1 3	1 6	1 9	2 0	2 0	2 6	2 9	3 3	3 9	4 0	4 3	1 3
4½	0 10	1 0	1 3	1 6	1 9	2 0	2 3	2 6	2 9	3 0	3 3	3 9	4 0	4 3	1 3
5	1 0	1 3	1 6	1 9	2 0	2 6	3 0	3 6	4 0	4 6	5 0	5 6	6 0	6 6	1 0
6	1 3	1 9	2 3	2 6	3 0	3 6	4 0	4 6	5 3	6 0	6 9	7 6	8 3	9 0	1 0
7	1 6	1 9	2 6	3 0	3 9	4 6	5 6	6 6	7 3	8 0	9 0	10 0	11 0	12 0	1 0
8	2 0	2 8	3 2	3 10	4 6	5 6	6 9	8 0	9 3	10 6	11 9	13 0	14 3	15 6	1 0
9	2 9	3 3	4 0	5 0	6 0	7 0	8 9	10 6	12 3	14 0	15 9	17 6	19 3	21 0	1 0

Any sizes between the above will be charged at the same rate as the next size larger or thicker. All wheels are made with square edges; but if required round, bevel, or other shaped edges, a slight extra charge is made for turning.

CUP OR DISH WHEELS.

6 in., 8 in., and 10 in. diam. ... ... 1/6 per lb.
12 in. and 14 in. ... ... 1/3 ,,
16 in. and above ... ... 1/- ,,

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SPECIAL SAFETY EMERY WHEELS.



This special shape Safety Emery Wheel is securely fastened to iron plate by an improved method. It is made round on the side, that is, half-an-inch fuller in the centre than at the edge, as shown above. This plan has had a long and successful trial, and will be found to render great safety for running at high speeds.

The above shape of wheel is made only in 24 inch and 28 inch diameters, and can be fitted if desired on the B, BB, C and CC machines at slight extra cost.

Full particulars will be sent on application.

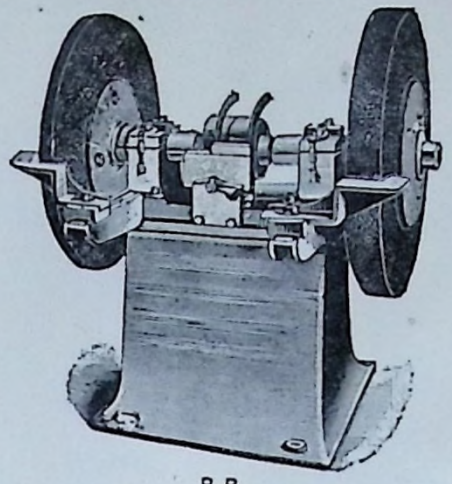
FLANGES, OR WASHER PLATES.

These are made of cast-iron, turned all over and balanced, bored to fit any size of shaft, and drilled for bolts or set screws.

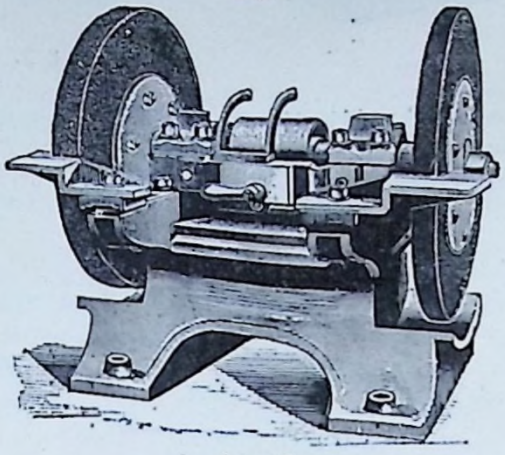
Suitable for Emery Wheels.		Diameter of Flanges.	Price, Per Pair.	Suitable for Emery Wheels.		Diameter of Flanges.	Price, Per Pair.
Diameter.	Hole.			Diameter.	Hole.		
8 in.	2 in.	4 in.	£0 4 6	18 in.	6 in.	9 in.	£0 18 0
8 ,,	3 ,,	5 ,,	0 6 0	20 ,,	8 ,,	11 ,,	1 5 0
10 ,,	3 ,,	5 ,,	0 6 0	22 ,,	8 ,,	11 ,,	1 5 0
10 ,,	4 ,,	6 ,,	0 7 6	24 ,,	10 ,,	13 ,,	1 15 0
12 ,,	4 ,,	6 ,,	0 7 6	28 ,,	12 ,,	15 ,,	2 10 0
12 ,,	5 ,,	7 ,,	0 9 0	30 ,,	12 ,,	15 ,,	2 10 0
14 ,,	6 ,,	8 ,,	0 12 0	32 ,,	16 ,,	20 ,,	4 0 0
16 ,,	6 ,,	8 ,,	0 12 0	36 ,,	16 ,,	20 ,,	4 0 0

Prices include Bolts and Rubber Insertion Washers.

EMERY WHEEL MACHINES.



B B



A and B

The above are strong and powerful Machines, specially designed for large Works, and suited for fettling and dressing castings, grinding wrought-iron and steel work, and for general purposes. The spindles are of steel, running in specially long self-oiling bearings Machines are complete with fast and loose pulleys, strap guide, and adjustable rests.

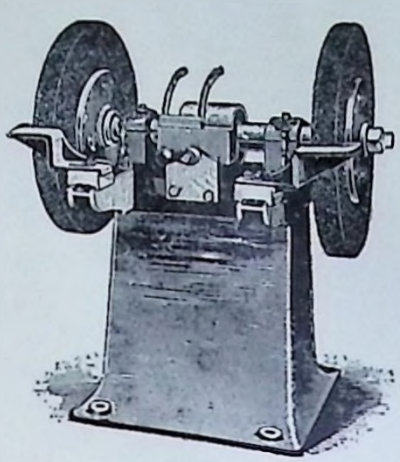
DIMENSIONS.

Machine	Diameter of Spindle.	Length of Bearings.	Size of Pulleys.	No. 1. Size of Emery Wheels.		Prices.	No. 2. Size of Emery Wheels.		Prices.
	In.	In.	In.	In.	In.	£	In.	In.	£
A	3	14	10 × 5½	36 × 4	36 × 2½		32 × 4	32 × 2½	
B	2½	12	9 × 4¼	30 × 4	30 × 2½		28 × 4	28 × 2½	
BB	2½	12	9 × 4¼	30 × 4	30 × 2½		28 × 4	28 × 2½	

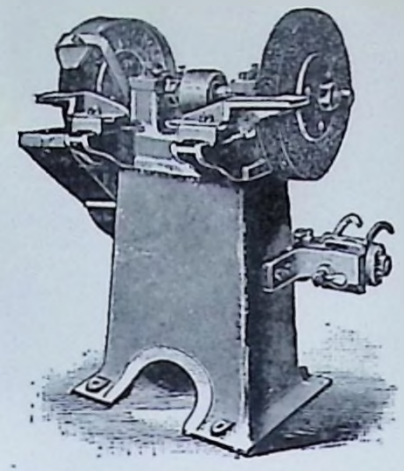
Prices of Machines with other thicknesses of wheels sent on application.

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EMERY WHEEL MACHINES.



C



D D.

These are strong and substantial Machines, suitable for all kinds of general work in Machine Shops, Shipbuilding Yards, and will be found invaluable to Coach and Wagon Builders for grinding up wrought-iron work, steel, &c., such as scrolls, stays, rods, and other parts. They are fitted with steel spindles which run in specially long self-oiling bearings, and with adjustable rests.

Machine C is very similar in design to the C C Machine, and is of rather heavier construction. Both patterns are provided with fast and loose pulleys and strap guide.

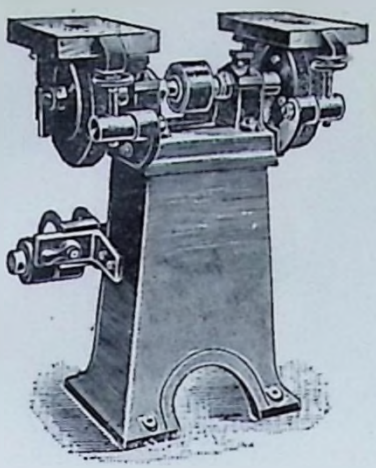
Machine D D is very useful, having an Emery Wheel for ordinary grinding at one end, and a Special Wheel for tool grinding, with Water Trough and Guard, at the other end. It has fast pulley only on wheel shaft, with countershaft at back of Machine.

DIMENSIONS.

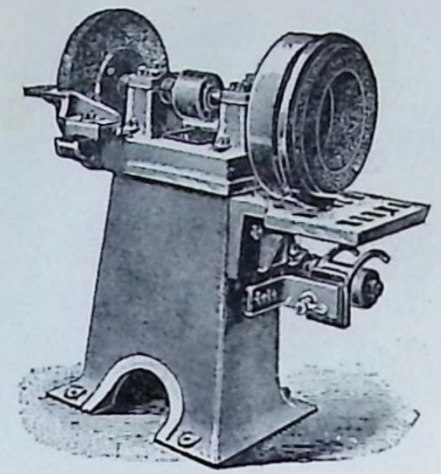
Machine.	Diameter of Spindle.	Length of Bearings.	No. 1. Size of Emery Wheels.		Price.	No. 2. Size of Emery Wheels.		Price.
	In.	In.	In.	In.	£ s. d.	In.	In.	£ s. d.
C	2	10	24 × 2½	24 × 1½		20 × 2½	20 × 1½	
C C	2	10	24 × 2½ Ordinary.	24 × 1½ Grinding.		20 × 2½	20 × 1½	
D D	1½	6	18 × 2	16 × 2	17 10 0			

Prices of Machines with other thicknesses of wheels sent on application.

EMERY WHEEL MACHINES.



E E



D

Both of the above are very handy and useful machines, specially designed for the Fitting Shop, for dressing and grinding fancy, light and heavy castings, and articles such as bolt-heads, nuts, keys, &c., which can be faced up very quickly, and perfectly true. They have fast pulleys only on wheel shaft, with countershaft at back of machine. They are fitted with steel spindles, which run in specially long self-oiling bearings.

Machine E E has planed tables over wheels, on which work can be rested while dressing or grinding small beading, &c. The Emery Wheels project through the tables, which, when not required, can be turned back, and the wheels used for ordinary grinding purposes. Tables are adjustable, and as the wheels wear down they can be lowered by the hand-wheel screw in front and the pillar and screw at back.

Machine D has planed and slotted bracket at side under the Face Wheel, on which a slide-rest can be fixed for holding articles. This Face Wheel is secured firmly between flanges, and with a wrought iron shield round in addition. At the other end of shaft is a suitable wheel for grinding on the edge, and is provided with adjustable rest.

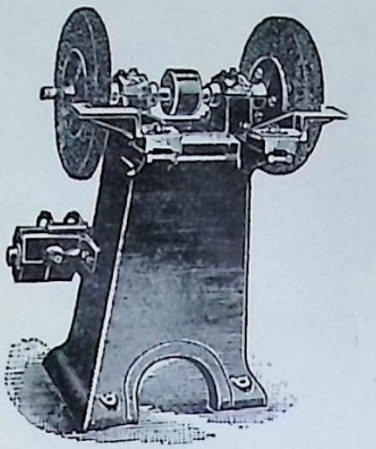
DIMENSIONS.

Machine.	Diameter of Spindle.	Length of Bearings.	Size of Pulleys.	Size of Emery Wheels.		Price.
	In.	In.	In.	In.	In.	£ s. d.
D	1½	6	5	16 × 2	14 × 4 × 2 face	18 10 0
E E	1½	7	5	14 × 2	14 × 2	19 10 0

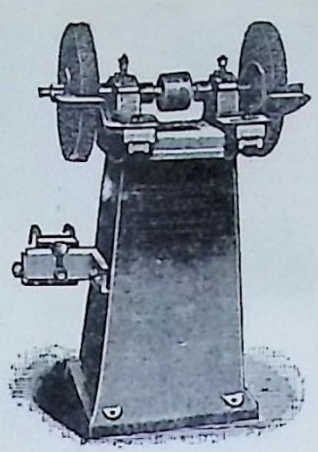
Prices of Machines with other thicknesses of Wheels sent on application.

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EMERY WHEEL MACHINES.



E



E F

These Machines are specially designed for Engineers, Iron and Brass Founders, &c., for fettling and dressing small castings, grinding up steel and wrought iron work, &c., and will be found invaluable in fitting and repairing shops. They are fitted with steel spindles, which run in specially long self-oiling bearings, adjustable hand rests, and strap guides.

Machines E and EF, as illustrated above, can be supplied without the counter-shaft at back, but with fast and loose pulleys on Wheel shaft.

Machine EF is similar in design to the E Machine, but is of lighter construction, and takes smaller size Emery Wheels.

Machine FF is a very useful tool in a Foundry or Engineer's shop, as two workmen can use it at the same time, on account of the extra width between the Wheels. It is constructed on the same lines as the E Machine, and has one fast pulley only on Wheel shaft, but if desired, can be fitted with countershaft as above; or it can be supplied without stand.

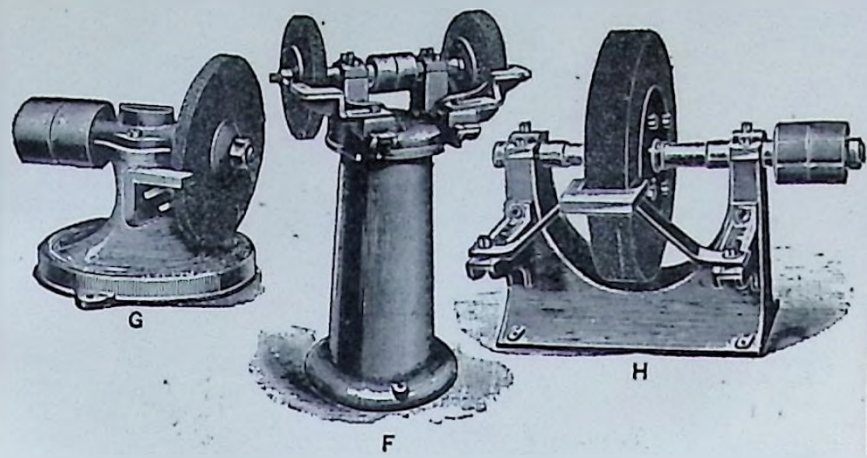
DIMENSIONS.

Machine	Diam. of Spindle.	Length of Bearing.	Size of Pulleys.	No. 1 Size of Emery Wheels.		Price.			No. 2 Size of Emery Wheels.		Price.			Counter-shaft extra.		
	In.	In.	In.	In.	In.	£	s.	d.	In.	In.	£	s.	d.	£	s.	d.
E	1½	6	5 × 3¼	18 × 2½	18 × 1½	15	0	0	16 × 2½	16 × 1½	14	0	0	2	0	0
EF	1 5/16	6	4 × 2¼	14 × 2	14 × 1¼	9	10	0	12 × 2	12 × 1¼	9	0	0	2	0	0
FF	1½	6	4 × 2¼	14 × 1½	14 × 1½	10	10	0	12 × 1½	12 × 1½	10	0	0	2	0	0

Machine FF, without stand, deduct £2.

Prices of Machines with other thicknesses of Wheels sent on application

EMERY WHEEL MACHINES.



G F H

The above Machines are adapted for fettling, dressing, and grinding small and light articles. They are suitable for Cycle Manufacturers, Brass Founders, Sewing Machine Makers, &c. All are provided with steel spindles, which run in specially long self-oiling bearings and adjustable rests.

Machine G is small, light, and cheap; it has a circular base, and can be bolted down on a bench with two ¼-in or ⅜-in. screws.

Machine F can be supplied without stand, and can then be fixed on any convenient place, such as the vice-bench, where it will be found a very useful tool

Machine H is recommended for fixing on a stone, and will be found exceedingly useful where the workman has to put a lot of pressure on the articles he is grinding.

DIMENSIONS.

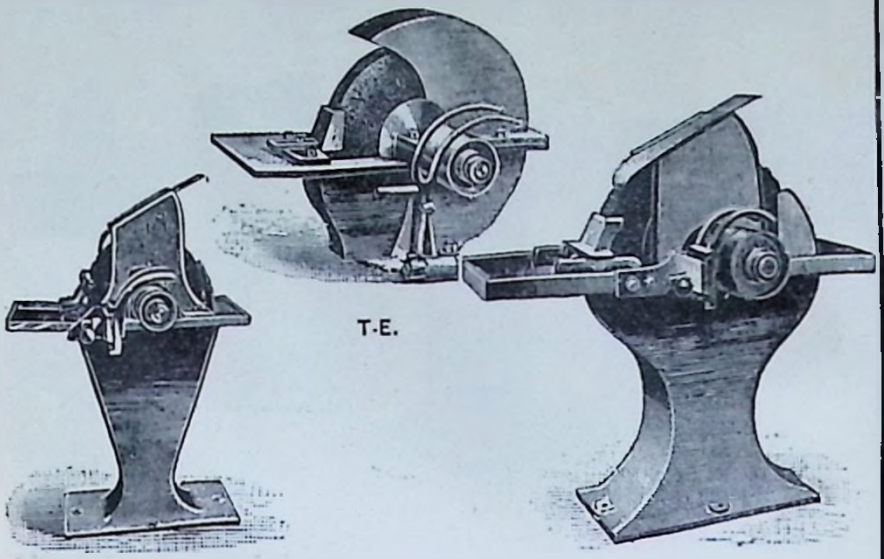
Machines.	Diameter of Spindle.	Length of Bearings.	Size of Pulleys.	No. 1. Size of Emery Wheels.		Price.			No. 2. Size of Emery Wheels.		Price.		
	In.	In	In	In.	In.	£	s	d.	In.	In	£	s.	d.
G	¾	7	3 × 2	9 × 1		2	0	0					
F	1 5/16	6	4 × 2¼	14 × 1½	14 × 1½	9	0	0	10 × 1½	10 × 1½	8	0	0
H	1¾	7	6 × 3¼	22 × 3		12	10	0	20 × 2½		10	10	0

Machine F without stand, No 1 size wheels, £8; No. 2 size wheels, £7. This Machine can also be supplied with two 12-in. × 1½-in. wheels, with stand, £8 10s.; without stand, £7 10s.

Prices of Machines with other thicknesses of wheels sent on application.

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EMERY TOOL-GRINDING MACHINES.



These Machines are specially designed for use in works, where they will be found invaluable. The wheels are of special manufacture, and adapted for grinding all kinds of light and heavy tools. They are provided with covers, as shewn above, to prevent the water flying about. The spindles are of steel and run in specially long self-oiling bearings. Machines are complete with adjustable rests, which are fixed so that tools can be ground at either side of wheel, also fast and loose pulleys and strap guide.

Machine T-E. will be found a very handy and useful tool for Brass Finishers, Cycle Manufacturers, &c. It can easily be bolted on the end of a Lathe bed, to bench, or other convenient place.

Machine T-C. is illustrated above. T-B. is slightly heavier, and will take larger Emery Wheels.

Machine T-A. is a specially strong Machine adapted for grinding the largest and heaviest tools; suitable for large Engineering Works, Iron and Brass Foundries, Shipbuilding yards, &c.

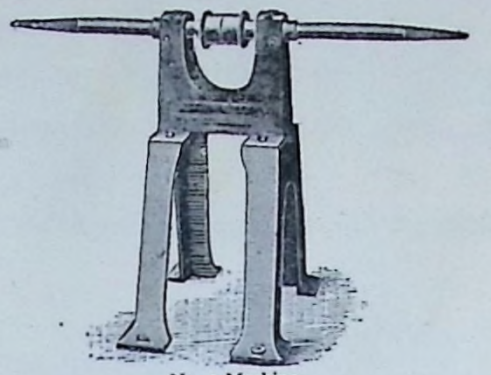
Machines can be fitted with a centrifugal Pump if desired, at small extra cost.

DIMENSIONS.

Machine.	Diameter of Spindle.	Size of Pulleys.	Size of Emery Wheels.	Price. As above.	Price. With Centrifugal Pump.
	In.	In.	In.	£ s. d.	£ s. d.
T-E.	⅝	4 × 2¼	12 × 1½	5 5 0	6 15 0
T-D.	1½	5 × 2½	14 × 2 15 × 2	12 0 0 12 10 0	13 10 0 14 0 0
T-C.	1¼	6 × 3¼	18 × 2½ 20 × 2½	17 0 0 18 0 0	18 10 0 19 10 0
T-B.	2	7 × 3¼	24 × 3		
T-A.	3	9 × 4¼	36 × 4		

Prices of Machines with other thicknesses of wheels sent on application.

POLISHING MACHINES.

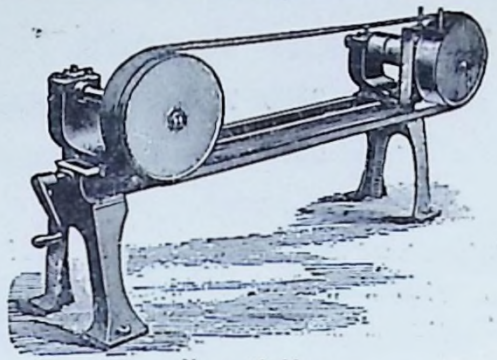


No. 1 Machine.

Above is adapted for any kind of Buffing wheels. The shaft is of steel, running in specially long self-oiling bearings, and is made extra long so that articles can be kept clear of machine. Each end is screwed with taper screw. If desired, one or two pairs of fast and loose washers can be fitted at small extra cost.

DIMENSIONS.

Diameter of Spindle.	Length of Bearings.	Size of Pulleys.	Price. On Stand.	Price. Without Stand.
1½ in.	6 in.	4 × 2¼ in.	£5 0 0	£4 10 0



No. 2. Machine.

This will be found invaluable to Brass Finishers, Cycle Manufacturers, &c., for polishing irregular surfaces of metal by means of endless belt covered with emery. Machine consists of planed bed with fast headstock at one end and loose headstock at other end, adjustable by handle and screw to regulate strap to required tension. If desired, a flanged pulley can be fitted instead of plain strap pulley and guide.

DIMENSIONS.

Length of Bed.	Size of Strap Drums.	Fast and Loose Pulleys.	Price Complete. Without Straps.	Price Complete. If with Flanged Pulley.
5 ft. 4 in.	14 × 4 in.	5 × 3¼ in.	£16 0 0	£16 10 0

Straps are extra, charged according to width.

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DIAMOND TOOLS.

For turning Emery Wheels. This is the only quick and practical way, as solid wheels can be turned to any desired shape in a very short time.

When turning with a diamond, the Emery wheel should run about 80 feet per minute.

Price from 60/- each, according to size of Diamond.



EMERY WHEEL DRESSER

For trueing, shaping, or backing Emery Wheels, while running at full speed.

Price, including one extra set of Cutters, 13/6

EMERY BLOCKS

FOR GRANITE AND MARBLE POLISHERS

These Blocks are made round or square, and any size.

PRICES.

Blocks weighing 1 lb. each and heavier .. .. -/10 per lb.
" " ½ lb. " " under 1 lb. .. .. 1/- "
" under ½ lb. ... ... Special Prices.

SELF-OILING BEARINGS.

Supplied with all our Emery Wheel Machines.

Special attention is called to these Bearings. Machines fitted with them only require oiling about once every three months.

Full particulars are sent with each Machine

WESTON'S DIFFERENTIAL PULLEY BLOCKS.

These Blocks are the simplest and cheapest in the market, and possess the invaluable quality of not "running down" under any circumstances whilst the load is suspended.

Note.—For actual work we always recommend one size larger than the maximum loads to be lifted.

WESTON'S BLOCKS WITH AND WITHOUT GUIDES.

Tested to	¼	½	¾	1	1½	2	3	4	Tons.
Blocks...	6/-	8/6	11/6	13/6	20/-	27/6	36/-	52/-	per set.
With Guides	8/-	12/6	14/6	17/6	25/-	32/-	45/-	65/-	"
Bright Chain	-/5	-/5	-/6	-/7	-/8	-/9	-/10	-/11	per ft.



WESTON'S BLOCK WITH SPOCKET WHEEL.

Tested to Tons.	Blocks, per set. £ s. d.	Bright Chain, per foot.	Hand Chain, per foot.
1½	1 15 0	-/8	-/6
2	2 5 0	-/9	-/7
3	3 0 0	-/10	-/8
4	3 15 0	-/11	-/8

WESTON'S BLOCK WITH GEAR.

Tested to Tons.	Blocks, per set. £ s. d.	Bright Chain, per foot.	Hand Chain, per foot.
2	2 15 0	-/9	-/6
3	3 5 0	-/10	-/6
4	4 0 0	-/11	-/6
5	5 10 0	1/-	-/7
6	7 0 0	1/3	-/7
8	9 0 0	1/6	-/7
10	12 0 0	1/9	-/8
12	18 0 0	3/-	-/8

In ordering, state whether Blocks are required with or without Chain Guides. Blocks with Guides are sent, unless otherwise ordered.

The length of Chain required is about four times the height of lift.

The lengths of Chains required for Spocket or Gear Blocks are twice the height of lift, plus six feet for the Lift Chain, and twice the height of lift only for the Hand Chain.

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 137 of 298
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PICKERING'S
PATENT QUICK HOIST.



Specially adapted for Grocers, Bakers, Millers, Corn and Flour Stores, Dairies, Granaries, &c., &c.

This is an extremely useful and simply-constructed Hoist. Since their introduction many thousands have been sold, and have given great satisfaction.

It will be seen that **the Hoists are of the simplest construction**, having two wheels of different diameters connected together, the smaller one carrying the lift-chain, and the larger one the endless hand-chain; by this arrangement **great power is obtained.**

The difference in size of the wheels is in all cases as great as can be had, compatible with **quick working.**

The quantity of work done in a given time by these Hoists, as compared with the old method, is nearly doubled, because **the empty chain descends simultaneously with the raising of the load.**

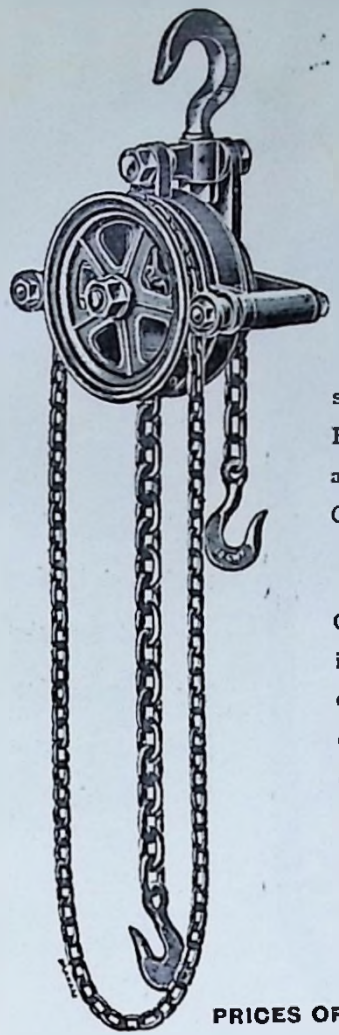
The 15 cwt. Hoist is similar to the 10 cwt., but is provided with a bottom block.

No.	Tested to cwts.	PRICE, with Ordinary Brake. £ s. d.	Lift or Hand Chain, per foot.
A	2½	1 5 0	-/7
B	5	1 10 0	-/7
C	7½	1 15 0	-/8
D	10	2 0 0	-/8
E	15	2 7 6	-/8

If without Brake, 10/- less.

The Chain required is three times the height of Lift, with the exception of the 15 cwt. size, which is four times.

DIFFERENTIAL PULLEY BLOCKS.



ADVANTAGES.

SELF-SUSTAINING. RIGID FRAMING.
NO OVERHAULING FOR FRESH LOAD
CONTINUOUS HAND CHAIN.
WORKS AT ANY ANGLE.

These Pulley Blocks are of new design and specially suitable for Engineers, Millwrights, Builders, Contractors, Railway, Gas, Water, and Mining Companies, Home and Foreign Governments.

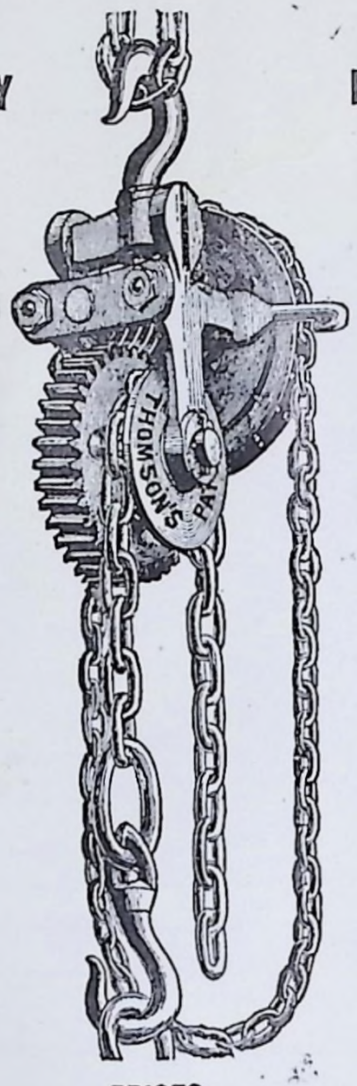
They work quicker and easier than Endless Chain Blocks. The power, being obtained through internal gearing, enables the load and hauling chain to be independent, and therefore they cannot lock. A hook is provided at each end of the lift chain, which is used alternately, thus distributing the wear on working parts, and doubling their durability. The hooks are marked to indicate the load they are intended to carry.

PRICES OF BLOCKS, INCLUDING CHAINS.

Tested to Cwts.	10	20	30	40	60	80
Complete with Chains, for 8 ft. Lift ...	45/-	65/-	75/-	85/-	125/-	185/-
,, ,, 10 ft. ,, ...	48/6	70/-	81/-	91/6	133/-	194/-
,, ,, 12 ft. ,, ...	52/-	75/-	87/-	98/-	141/-	203/-
,, ,, 15 ft. ,, ...	57/3	82/-	96/-	107/9	157/-	212/-
,, ,, 20 ft. ,, ...	66/-	95/-	111/-	124/-	173/-	239/-
Extra Chain per foot of Lift (Equal 3 ft. Chain)	1/9	2/6	3/-	3/3	4/-	4/6

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PATENT SELF-SUSTAINING SCREW PULLEY BLOCK.



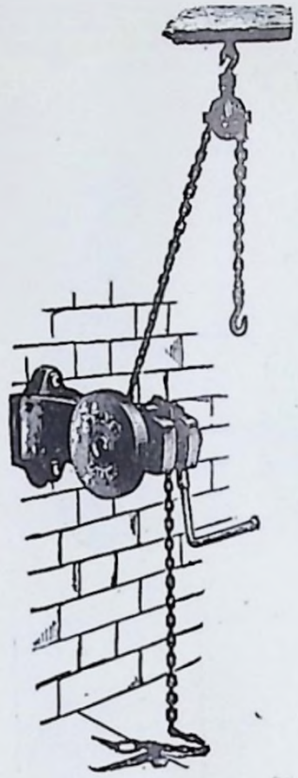
The adoption of the Screw principle renders this Pulley Block well worthy of the attention of Engineers, Contractors, Shippers and Warehousemen, &c., who wish to combine great lifting power with but small expenditure of labour, and absolute safety. The Screw Pulley Block stands unrivalled for both **Lifting** and **Self-Sustaining Power, Simplicity, Lightness** and Durability.

PRICES.

Block to carry	Cwt.			Tons.										
	5	10	15	1	1½	2	3	4	5	6	7	8	10	
Price	31/6	42/-	47/6	52/6	68/6	84/-	105/-	126/-	157/6	210/-	242/-	284/-	364/-	each set
Hand chain	7½d	7½d	7½d	7½d	8½d	8½d	9½d	10½d	1/3	1/3	1/3	1/3	1/3	per foot
Lift chain ...	7½d	3½d	9½d	10½d	12½d	1/1	1/3	1/7	1/11	2 6	3/2	3 8	4/9	,, ,,

WALL AND PILLAR CRAB HOISTS.

(WARD'S PATENT.)



Wall Crab Hoists.

These Hoists are suitable for

WAREHOUSES,
GOODS SHEDS,
CELLARS,
COACH HOUSES,
FACTORIES,
DOCKYARDS,
HOTELS,
BUTCHERS,
CORN MILLS,
BUILDERS,
BREWERIES,
GROCERS.

In ordering, state Height of Lift required. If not stated, all Hoists are sent with Chain suitable for 10-feet Lift.

The Length of Chain required is twice the height of Lift.



Pillar Crab Hoist.

SIZES AND PRICES.

Tested to	Wall Crab.	Pillar Crab.	Bright Chain, per Foot.	Top Pulley.
	£ s. d.	£ s. d.		
2½ Cwt.	2 0 0	2 5 0	5d.	3/6
5 ,,	3 0 0	3 7 6	7d.	5/-
10 ,,	4 10 0	5 0 0	9d.	9/-
20 ,,	6 10 0	7 0 0	11d	11/-

These Hoists are extremely simple, compact and handy, and are suitable for any height of Lift, as the Chain merely passes through them instead of accumulating on a barrel.

They have a **Self-Acting Brake** which releases as the load is being raised, sustains it afterwards, and only permits of lowering by winding backwards.

When desired the empty chain may be lowered quickly by disengaging the pawl.

A very slight effort is required in lowering, accelerated speed is impossible, **the load is under perfect control, and the handle can never "fly round,"** though suddenly loosened when the load is in suspension.

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LONDON PATTERN PULLEY BLOCKS.

Each plate of the Blocks forms a support for the centre shaft, besides protecting the Pulley from damage. The actual width of the groove is from one-sixteenth of an inch to one-eighth of an inch more than list, so that 16 in. × 3¼ in. is really 16 in. × 3⅜ in., and so on, to allow for new rope being larger. The 10 in. × 2 in. and larger sizes are made with rings and shackle, instead of hooks. These Blocks have turned shafts, bright pulleys, and are bored.

Snatch Block No. 1 is made as shown, with open side.

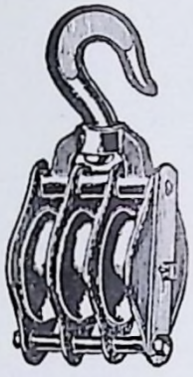
Snatch Block No. 1A is made with fixed sides.



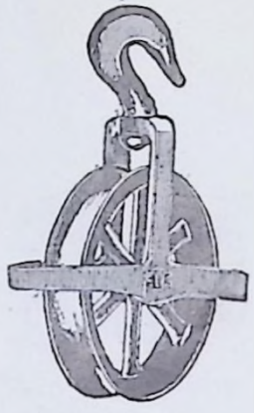
No. 1.—Snatch Block.



Two-Sheave.



Three-Sheave.



Gin-Block.

Diameter of Sheave ... in. / Width of Groove ... "	2½ / ⅜	3½ / ½	4 / ⅝	4½ / ¾	5 / ⅞	6 / 1	7 / 1¼	8 / 1½
Price, Snatch No. 1	3/6	5/-	5/6	6/6	8/6	10/-	12/6	16/-
Do. Snatch No 1A	4/6	7/-	8/-	9/6	11/6	13/6	16/-	21/-
Do. 1 Sheave	3/-	3/6	3/9	5/3	6/3	7/6	9/6	12/6
Do. 2 Sheaves	4/-	5/-	5/9	7/3	9/6	11/6	16/-	22/6
Do. 3 Sheaves	5/-	6/-	7/6	9/6	13/-	16/-	22/-	32/-
Do. 4 Sheaves	6/6	7/6	9/-	13/-	16/6	21/-	31/-	45/-
Spare Iron Sheaves ... each	-/3	-/4	-/6	-/10	1/3	1/6	2/6	3/3
Brass Sheaves ... per Sheave	1/-	1/6	2/3	3/9	5/-	6/3	8/6	12/6
Block will take Chain Diameter	...	...	...	3/16	¼	5/16	⅜	7/16

Diameter of Sheave ... in. / Width of Groove ... "	9 / 1¼	10 / 2	11 / 2¼	12 / 2½	14 / 2¾	15 / 3	16 / 3¼
Price, Snatch No. 1	24/-	42/-	50/-	75/-	95/-	115/-	145/-
Do. Snatch No. 1A	30/-	45/-	60/-	84/-	105/-	130/-	160/-
Do. 1 Sheave	20/-	30/-	45/-	60/-	80/-	100/-	115/-
Do. 2 Sheaves	32/-	50/-	90/-	105/-	126/-	150/-	175/-
Do. 3 Sheaves	42/6	70/-	115/-	140/-	170/	200/-	240/-
Do. 4 Sheaves	65/-	95/-	140/-	165/-	200/-	260/-	300/-
Spare Iron Sheaves ... each	4/3	6/-	8/-	10/-	14/-	17/-	20/-
Brass Sheaves ... per Sheave	18/9	32/-					
Block will take Chain Diameter	½	9/16	⅝	11/16	¾	13/16	⅞

For Brass Sheave Blocks, add to price of Blocks price of Brass Sheaves less that of Iron Sheaves.

For Galvanized Blocks, add 20 per cent. to above list prices.

GIN BLOCKS OR RUBBISH PULLEYS.

The actual width of groove is from 1/16th of an inch to 1/8th of an inch more than list, to allow for new ropes being larger

Diameter of Pulley ... ins.	2½	3½	4	4½	6	7	8	9
Width of Groove ... ins.	⅜	½	⅝	¾	1	1¼	1⅝	1⅝
Weight ... ... lb.	1¼	1¼	2½	4	8	13	10	12
Price ... ... each	2/3	2/6	2/9	3/-	4/6	5/6	6/9	7/-
Diameter of Pulley ... ins.	10	11	12	14	16	18	20	22
Width of Groove ... ins.	1⅝	1⅝	1⅝	1⅜	1½	1½	1⅝	1⅝
Weight ... . lb.	14	17	20	31	38	44	58	64
Price ... . each	7/6	8/-	10/-	10/6	13/6	15/6	18/6	21/-

TABLE SHOWING RELATIVE POWERS OF WROUGHT-IRON PULLEY BLOCKS.

Diameter of Sheave .. ins. / Width of Groove ... ins.	2½ × ⅜	3½ × ½	4 × ⅝	4½ × ¾	5 × ⅞	6 × 1	7 × 1¼	8 × 1½
Each Sheave will lift cwts.	1	3	5	7	10	12	18	27

Diameter of Sheave ... ... ins. / Width of Groove ... ... ins.	9 × 1¼	10 × 2	11 × 2¼	12 × 2½	14 × 2¾	15 × 3	16 × 3¼
Each Sheave will lift ... ... cwts.	35	48	60	75	90	105	120

To ascertain the size and number of Sheaves required to lift a given weight, divide the weight to be lifted by any weight in the above table; the result will give the number of Sheaves and sizes of blocks required.

EXAMPLE.—If 60 cwt. is to be lifted, either of the following combinations will be suitable:—

A pair of 3 and 3 Sheaves, ⅞ in. at 10 cwts. per Sheave
Or a pair of 2 and 3 Sheaves, 1 in., at 12 " " " } equals 60 cwts.

NOTE.—We do not bind ourselves to the exact powers given above, but they are approximately correct.

In ordering, it is always advisable to leave a sufficient margin.

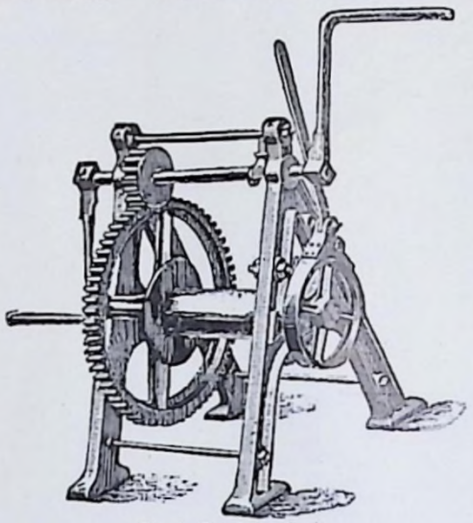
Contractors' Heavy Pattern Pulley Blocks quoted for on application.

See also Weston and Pickering Pulley Blocks (for pages, see index.)

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IMPROVED HOISTING CRABS.

Single and Double Purchase.



With Cast-Iron Sides.

Single Purchase Crab.

These Crabs are strongly made, of best materials and workmanship, and can be confidently recommended. The Barrel and Gearing are of cast iron; all Shafts and Handles are of wrought iron.

DIMENSIONS—SINGLE PURCHASE.

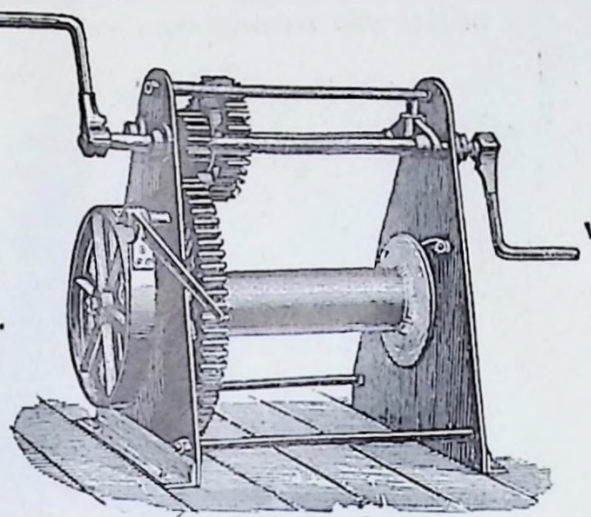
No.	Lifting Power.		Chain.	Price.			Extras.	
	With 2 and 3 Sheave Blocks.	Direct from Barrel.	"B.B." Tested. Diam.	Without Brake.	With Lever Brake.	With Screw Brake.	Brass Bushing.	Chain, per Foot.
	Tons.	Cwts.	In.	£ s. d.	£ s. d.	£ s. d.		
1001	2	8	¼	2 12 0	3 0 0	3 7 0	13/-	-/5
1002	3	12	5/16	2 16 0	3 4 0	3 11 0	13/-	-/5½
1003	4	16	⅜	3 5 0	3 14 0	4 1 0	14/-	-/6
1004	5	20	7/16	3 15 0	4 4 0	4 11 0	15/-	-/7½
1005	6	25	7/16	5 0 0	5 10 0	6 0 0	16/-	-/7½

DIMENSIONS—DOUBLE PURCHASE.

No.	Lifting Power.		Chain.	Price.			Extras	
	With 2 and 3 Sheave Blocks.	Direct from Barrel.	"B.B." Tested. Diam.	Without Brake.	With Lever Brake.	With Screw Brake.	Brass Bushing.	Chain, per Foot.
	Tons.	Cwts.	In.	£ s. d.	£ s. d.	£ s. d.		
1010	4	16	⅜	3 10 0	4 0 0	4 10 0	17/-	-/6
1011	5	20	7/16	4 0 0	4 12 0	5 2 0	18/-	-/7½
1012	6	25	7/16	5 4 0	5 17 0	6 7 0	19/-	-/7½
1013	8	32	½	5 12 0	6 7 0	6 17 0	20/-	-/9
1014	9	36	9/16	6 0 0	6 17 0	7 7 0	21/-	-/10
1015	10	40	9/16	6 13 0	7 10 0	8 10 0	22/-	-/10
1017	12	50	⅝	7 5 0	8 3 0	9 3 0	24/-	1/-
1018	14	55	11/16	8 12 0	9 10 0	10 10 0	28/-	1/2
1019	15	60	¾	9 8 0	10 8 0	11 8 0	30/-	1/3
1020	18	70	¾	14 15 0	16 0 0	17 0 0	36/-	1/3
1021	20	80	13/16	16 15 0	18 0 0	19 0 0	38/-	1/5

IMPROVED HOISTING CRABS.

Single and Double Purchase.



With Wrought-Iron Sides.

Double Purchase Crab.

These Crabs are strongly made, of best materials and workmanship, and can be confidently recommended, especially for Export orders, as there is no risk of breakage. All Shafts and Handles are of wrought iron, and the Bearings for Shafts are carefully fitted into the plates.

DIMENSIONS—SINGLE PURCHASE.

No.	Lifting Power.		Chain.	Price.			Extras.	
	With 2 and 3 Sheave Blocks.	Direct from Barrel.	"B.B." Tested Diam.	Without Brake.	With Lever Brake.	With Screw Brake.	Brass Bushing.	Chain, per foot.
	Tons.	Cwts.	In.	£ s. d.	£ s. d.	£ s. d.		
1001A	2	8	¼	3 17 0	4 5 0	4 12 0	13/-	-/5
1002A	3	12	5/16	4 1 0	4 9 0	4 16 0	13/-	-/5½
1003A	4	16	⅜	4 14 0	5 3 0	5 10 0	14/-	-/6
1004A	5	20	7/16	5 5 0	5 14 0	6 1 0	15/-	-/7½
1005A	6	25	7/16	6 10 0	7 0 0	7 10 0	16/-	-/7½

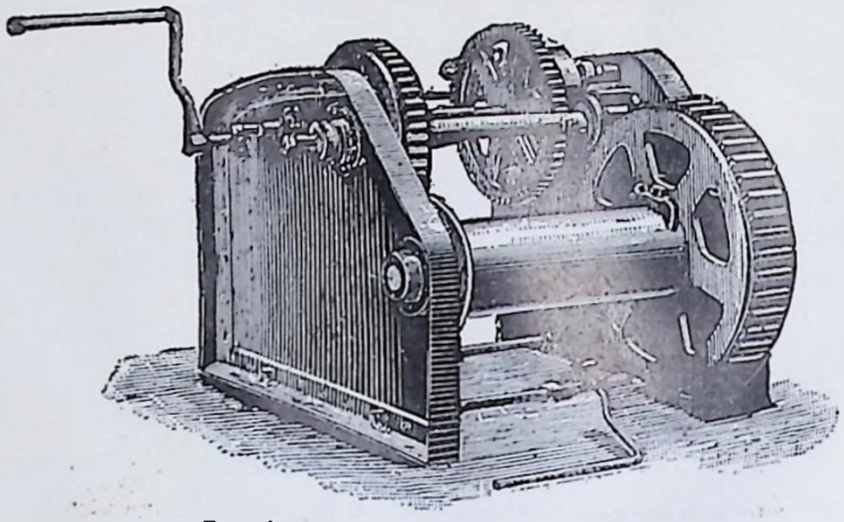
DIMENSIONS—DOUBLE PURCHASE.

No.	Lifting Power.		Chain.	Price.			Extras.	
	With 2 and 3 Sheave Blocks.	Direct from Barrel.	"B.B." Tested Diam.	Without Brake.	With Lever Brake.	With Screw Brake.	Brass Bushing.	Chain, per foot.
	Tons.	Cwts.	In.	£ s. d.	£ s. d.	£ s. d.		
1010A	4	16	⅜	5 5 0	5 15 0	6 5 0	17/-	-/6
1011A	5	20	7/16	5 10 0	6 8 0	6 18 0	18/-	-/7½
1012A	6	25	7/16	7 2 0	7 15 0	8 5 0	19/-	-/7½
1013A	8	32	½	7 11 0	8 6 0	8 16 0	20/-	-/9
1014A	9	36	9/16	8 0 0	8 17 0	9 7 0	21/-	-/10
1015A	10	40	9/16	8 13 0	9 10 0	10 10 0	22/-	-/10
1017A	12	50	⅝	9 7 0	10 5 0	11 5 0	24/-	1/-
1018A	14	55	11/16	10 14 0	11 12 0	12 12 0	28/-	1/2
1019A	15	60	¾	11 10 0	12 10 0	13 10 0	30/-	1/3
1020A	18	70	¾	16 17 0	18 2 0	19 2 0	36/-	1/3
1021A	20	80	13/16	18 15 0	20 0 0	21 0 0	38/-	1/5

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WROUGHT-IRON CRABS.

Double and Treble Purchase.



From photograph of Treble Purchase, 15 Tons Size.

The above are constructed to meet a demand for a **strong** and **reliable** Crab Winch for Contractors' use.

Barrels of large diameter, and in cast iron, turned for spur wheel, and bored for wrought-iron shaft.

Gearing well proportioned, in cast iron, bored and keyed in position.

Shafts are in wrought iron, accurately turned to fit bearings.

Bearings are all machined and brass bushed.

Side Frames are wrought iron, framed and stiffened with angle iron.

Tie Rods are wrought iron, with solid collars and screwed ends.

Brake. Powerful Band-Screw Brake to second motion shaft.

Handles in wrought iron, fitting either of the motion shafts, according to weight to be lifted.

DIMENSIONS.

	Will lift direct, Tons.	Barrel: Diam., in inches.	Barrel: Length between, in inches.	Approximate Weight, Cwts.	Price. £
Treble Purchase.	6	9	30	18	
	8	10	33	23	
	10	11	33	29	
	12	11	33	33	
	15	12	36	37	
	20	15	42	68	
Double Purchase.	3	7½	30	11	
	4	8	30	14	
	5	9	30	17	
	6	9	30	20	

FRICTION CRAB.

Brass Bushed Bearings.

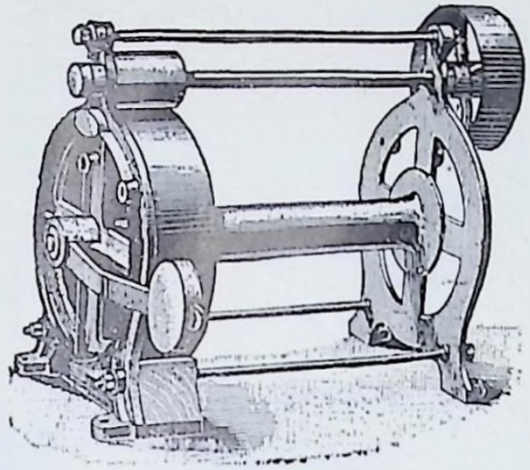


Illustration of 5-cwt. size.

The above will be found invaluable, where a **small amount of power** is available, for raising **light loads** at a **quick speed** in Mills, Warehouses, Breweries, &c., and is especially suitable for Builders and Contractors.

The arrangement is so simple that a **single lever** controls all motions.

To raise the load, the weighted lever is lifted until the driving wheel comes in contact with the friction pinion, when the load immediately ascends. As soon as the lever is released the driving wheel seats itself in the friction block, and the load remains stationary.

The lowering is effected by slightly lifting the driving wheel of the face of the brake block, and the load descends quickly or slowly as desired by the operator.

DIMENSIONS.

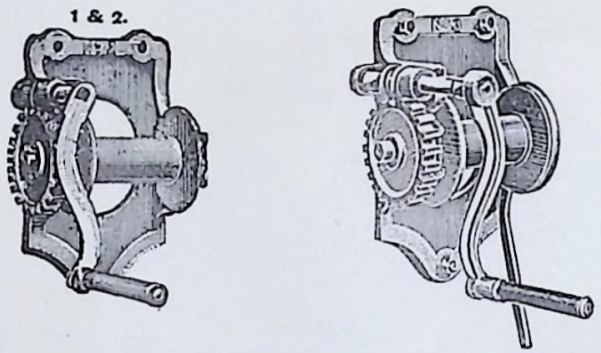
Will lift direct Cwts.	Barrel: Diam. in inches.	Barrel: Length in inches.	"B.B." Tested Chain. Diam. in inches.	Best Hemp Rope. Circum. in inches.	Price. Crab. £	"B.B." Tested Chain per foot.	Best Hemp Rope per foot.
3	5¼	20	¼	2¼	8	-/6	-/4
5	6	22	¼	3¼	10	-/6	-/5
10	6½	24	5/16	4¼	17	-/6½	-/11
20	7⅜	27	5/16	6½		-/8	1/8

The above can be made with Barrels of large diameter for use with Wire Rope at an extra cost.

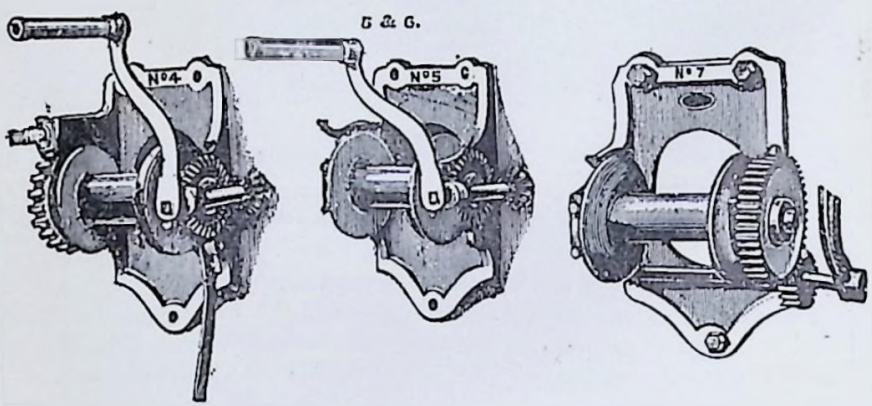
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WORM AND GEARED HOISTS.

1 & 2.



5 & 6.



The demand for a cheap and strong Hoist has suggested the introduction of the above class. All gearing is as cast, and bearings are in frames. All patterns are self-sustaining or fitted with brake.

PRICES, MEASUREMENTS, AND LIFTS.

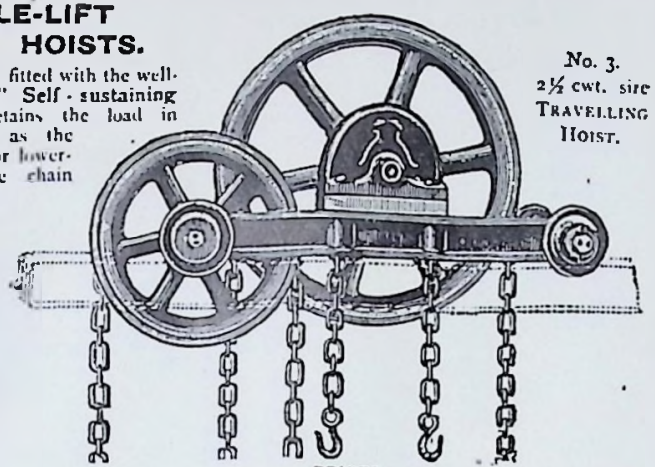
No.	To Lift.		Size.			Price.
	Weight.	Feet per Minute.	Frame.	From Wall	Barrel.	
	Cwt.		Ins.	Ins.	Ins.	£ s. d.
1	5	3	16 × 12	10	2½ × 6	1 14 0
2	10	2	24 × 18	16	4 × 10	2 13 0
3	10	2	24 × 18	16	4 × 9	3 7 0
4	10 & 3	3 & 13	24 × 22	16	3 × 9	4 6 0
5	3	13	24 × 18	16	4 × 10	3 0 0
6	3	7	16 × 12	10	2½ × 6	1 14 0
7	3	15	24 × 22	10	3 × 9	3 7 0

Steel wire rope or chain for above 8d. per foot. Bolts for 9-inch wall, 5s. Suitable jib crane to work with above quoted on application.

DOUBLE-LIFT SAFETY HOISTS.

These Hoists are fitted with the well-known "Weston" **Self-sustaining Brake,** which retains the load in position as soon as the action of raising or lowering ceases. The chain has a hook at each end, so that there is a hook **always ready** for a fresh load. A great saving of time is thereby effected.

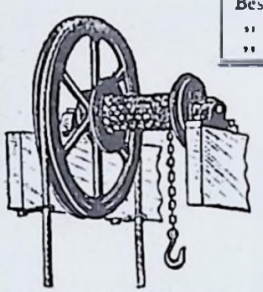
This Hoist is also used as a Cage Lift, for either one or two Cages. In the latter instance the two ends of chain must be separated by means of guide pulleys.



No. 3. 2½ cwt. size Travelling Hoist.

PRICES.

No.	Tested to Cwts.	2½	5	10	15	20
1	Cage Lift	47/-	80/-	170/-	300/-	
2	,, with Spur Gearing ...	...	120/-	230/-	300/-	
3	Travellers	95/-	140/-	260/-		
	Best Load Chain, per ft.	-/5	-/7	-/9	1/1	1/3
	,, Hand Rope ,, ...	-/3	-/3	-/5	-/5	-/6
	,, ,, Traversing Chain, per ft. .	...	...	-/6	-/7	-/7



If required to lift 5 cwt., a Single-sheave Pulley Block can be added, and double quantity of chain is necessary.

SAFETY HOISTS.

This Hoist is perfectly self-sustaining, and should the hand-rope be "let go," the load would remain in position. Lowering is effected by reversing motion of hand-rope. A similar pattern is also made for rapid lowering, the load being released by reversing the action of the main wheel. The descent can be regulated by wheel as the rope remains stationary.

PRICE.

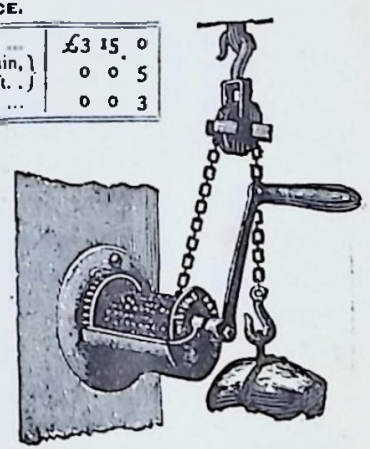
To lift 2½ cwts. ...	£3 15 0
"BB" Tested Chain, with Hook, per ft. .	0 0 5
Hand Rope, per ft. ...	0 0 3

SAFETY BRACKET HOISTS.

These are very useful little Hoists for Barns, Stables, &c., and can be readily fixed to walls or woodwork. The load remains stationary when handle is stopped; it is impossible for load to run back of its own accord. A rapid lowering pattern is also made, and works in a similar manner to that described above.

PRICE.

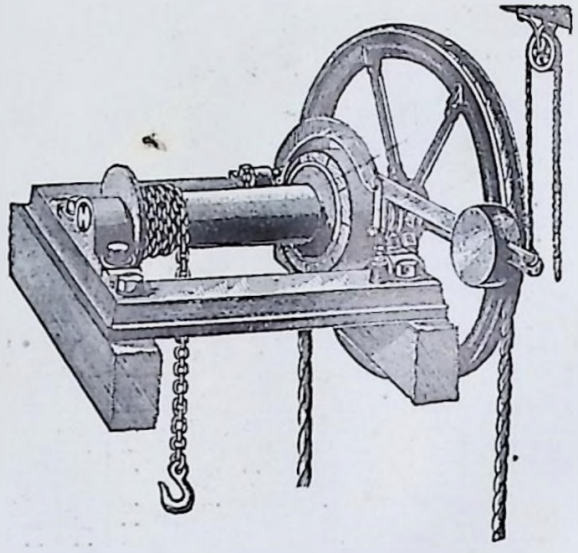
To lift 2½ cwts....	£1 15 0
Single-sheave Block to lead to load	0 3 9
"BB" Tested Chain, with Hook, per ft.	0 0 5



If required to lift 5 cwts., a second Single-sheave Block can be added.

WAREHOUSE HAND HOIST.

Self-sustaining, Safe, Silent, and operated from any position.



This Hoist is arranged to be worked by any one, and its construction is such that it **cannot fail.** The endless hauling rope, working in a V groove, is for lifting loads only. The brake is released by an **automatic motion** while lifting, but is always on pulley when stationary

For lowering, the brake lever cord only is used, and **will regulate** the speed as may be required.

This type of Hoist is highly recommended for general warehouse work; it can be fixed on roof beams, or bolted to the ceiling; the machine is **self-contained on frame;** any ordinary joiner can fix it. It is equally suitable for raising loads through hatchways, as illustrated, or for use over a cathead pulley projecting beyond the building

The load being self-sustained during hoisting, the man can raise it with greater ease than with the common Hoist of this class; the brake rope being led to where goods are landed, the operator has **full control in handling and lowering** the load.

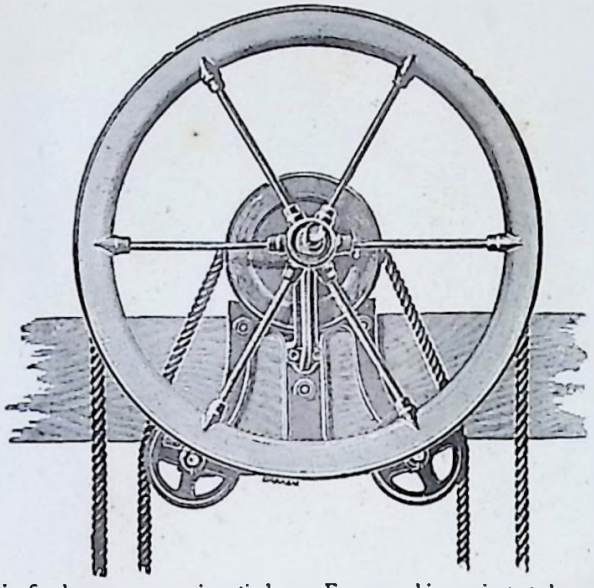
DIMENSIONS.

To lift.	Power and Speed.	Hoist only.	Chain or Steel Rope.	Hemp Rope.
		£ s. d.		
3 cwt.	7 to 1	7 0 0	7d. per foot.	4d. per foot.
5 ,,	10 ,, 1	9 0 0	7d. ,, ,,	4d. ,, ,,

For silent and smooth working we recommend steel wire rope in place of chain, as shown above. If lengths are given we send all ropes spliced and fixed ready for working.

SINGLE AND DOUBLE

SELF-SUSTAINING SERVICE LIFT.



This is one of the most **compact, efficient, and reliable service lifts.** It is an invaluable acquisition in any public or private building where a speedy conveyance of household commodities is a necessity. The machine being **self-sustaining,** fragile ware can be carried free from any risk of damage. There being **no brake-rope,** or other contrivance besides the usual endless hand-rope for lifting, lowering, and sustaining the load, any inexperienced person can work these lifts safely. The gearing is complete on one plate, and has no detached parts; the whole is fixed on one carrying timber. Every machine is in tested working order when leaving works.

The cages are of special construction, and neat artistic design; each being fitted with phosphor-bronze slip guides. The upright guides are of best seasoned pine, grooved, rebated, and braced together ready for erection. Ropes supplied are of the highest quality; finest white flax or cotton at a small extra cost.

PRICES.

Maximum Weight Lifted.	Length of Guides.	Ordinary Sizes of Cages which may be varied						Price of Single Lift Complete.	Price of Double Lift Complete.	Extra for Additional Height per foot.	Price for Machine only.
		Single Cages			Double Cages						
		Width.	Depth.	Height.	Width.	Depth.	Height.				
lbs.	Ft.	In.	In.	In.	In.	In.	In.	£ s.	£ s.	s. d.	£ s.
28	18	15	15	24	12	15	24	10 0	13 0	3 0	5 0
56	18	18	18	27	15	18	27	12 10	15 0	3 0	6 0
80	18	24	24	30	18	24	30	15 0	18 0	3 3	7 10
112	18	27	27	36	24	27	36	18 0	..	3 6	9 0

Any other size or special arrangement will be quoted for.

Special Quotations for improved Hydraulic and Electric Power Service Lifts.

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PATENT TWIST DRILLS

WITH STRAIGHT SHANKS.



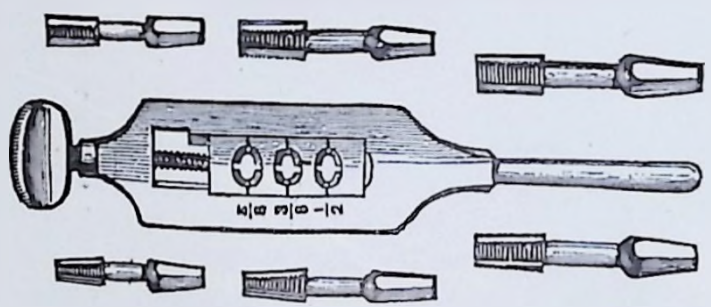
Turned to Whitworth Standard Gauges.

Diam., inches.	Length, inches.	Price, each.	Diam., inches.	Length, inches.	Price, each.	Diam. inches.	Length, inches.	Price, each.
1/16	2½	-/4	1/4	5½	2/1	3/8	9½	5/11
3/32	2½	-/5	9/32	5½	2/3	7/16	9½	6/4
1/8	2¾	-/6	5/16	5¾	2/5	15/32	10	7/1
5/32	3½	-/7	11/32	6	2/8	1/2	10	7/7
3/16	3½	-/8	3/8	8	3/4	17/32	10½	8/1
7/32	4	-/10	13/32	8½	3/9	9/16	10½	8/8
1/4	4	1/2	7/16	8½	4/2	19/32	10½	9/3
9/32	4½	1/3	15/32	8½	4/8	5/8	10½	9/10
5/16	4½	1/4	1/2	9	5/1	21/32	10½	10/5
11/32	4¾	1/7	17/32	9½	5/6	1	11	11/-
3/8	5	1/11						

STOCKS AND DIES

FOR BRASS OR COPPER TUBE,

With Taper and Plug Taps to each size:



To screw	¼, ⅜, ½.	⅝, ¾, ⅞	1, 1¼, 1½, 1¾	2, 2¼, 2½, 2¾	3, 3¼, 3½, 3¾, 4	4½, 5, 5½	6, 6½, 7	7½, 8, 8½	9, 9½, 10	Brass Tube.
Price...	25/6	27/-	29/-	33/-	37/-	44/-	50/-	60/-		Per set of Stocks, Dies, and Taps.

PATENT

STRAIGHT-LIP INCREASE TWIST DRILLS.

With Taper Shanks and Grinding Line, turned to Whitworth Standard Gauges.

The Shanks of these Drills are all made same size as the American Drills.



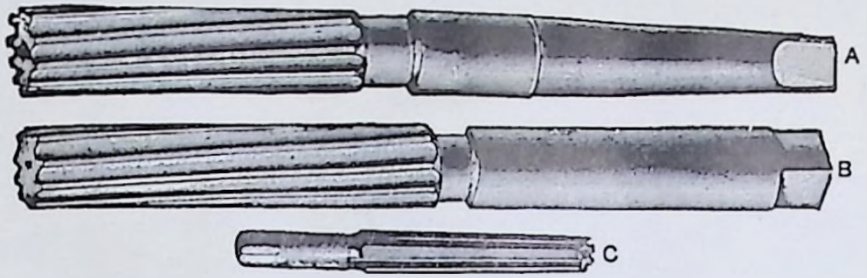
Attention is directed to the Sockets Nos. 1, 2, 3, 4, and 5. By using these all further fitting to Machine is saved.

Diam. inches.	L'ngth inches.	Price. Each. £ s. d.	Socket. No.	Socket. Price.	Diam. inches.	L'ngth inches.	Price. Each. £ s. d.	Socket. No.	Socket. Price.
1/4	6 1/8	0 2 0	1		1 1/32	14 3/4	0 18 6	4	
9/64	6 1/4	0 2 1	1		1 1/16	14 1/2	0 19 0	4	
5/32	6 3/8	0 2 2	1		1 3/32	14 1/2	1 0 3	4	
11/64	6 1/2	0 2 3	1		1 1/8	14 3/4	1 1 6	4	
3/16	6 5/8	0 2 5	1		1 5/32	14 7/8	1 2 9	4	
13/64	7	0 2 7	1	5/- ea.	1 3/16	15	1 4 0	4	
7/32	7 1/4	0 2 10	1		1 7/32	15 1/4	1 7 9	4	
15/64	7 1/2	0 3 1	1		1 1/4	15 1/2	1 11 6	4	
1/4	7 3/4	0 3 4	1		1 9/32	15 3/4	1 12 0	4	
17/64	8	0 3 8	1		1 5/16	15 3/4	1 12 6	4	
9/32	8 1/4	0 4 0	1		1 11/32	15 3/4	1 13 1	4	14/3
19/64	8 1/2	0 4 4	1		1 3/8	15 3/4	1 13 8	4	each.
5/16	8 1/4	0 4 9	2		1 13/32	15 3/4	1 14 7	4	
21/64	9	0 5 2	2		1 7/16	16	1 15 6	4	
11/32	9 1/4	0 5 7	2		1 15/32	16 1/4	1 16 9	4	
23/64	9 1/2	0 6 1	2		1 1/2	16 1/2	1 18 0	4	
3/8	9 3/4	0 6 7	2	6/6 ea.	1 17/32	16 3/4	1 19 0	4	
25/64	10	0 7 1	2		1 9/16	16 1/4	2 0 0	4	
13/32	10	0 7 7	2		1 19/32	16 1/4	2 0 10	4	
27/64	10 1/4	0 8 1	2		1 5/8	16 1/4	2 1 8	4	
7/16	10 1/2	0 8 8	2		1 21/32	16 1/4	2 2 4	4	
29/64	10 1/4	0 9 3	3		2	16 1/4	2 3 0	4	
15/32	10 1/2	0 9 10	3		2 1/32	16 1/4	2 4 0	5	
31/64	10 3/4	0 10 5	3		2 1/16	17	2 4 6	5	
1	11	0 11 0	3		2 1/8	17	2 7 0	5	
1 1/32	11	0 11 7	3		2 3/16	17	2 10 0	5	
1 1/16	11 1/4	0 12 2	3		2 1/4	17 1/4	2 12 0	5	40/-
1 3/32	11 1/4	0 12 9	3	8/6 ea.	2 5/16	17 1/4	2 15 0	5	each.
1 1/8	11 3/4	0 13 4	3		2 3/8	18	2 18 0	5	
1 5/32	11 3/4	0 14 0	3		2 7/16	18 1/4	3 3 0	5	
1 3/16	12	0 14 9	3		2 1/2	19	3 5 0	5	
1 7/32	12	0 15 6	3		2 9/16	19	3 13 0	5	
1 1/4	12 1/4	0 16 4	3		2 5/8	20 1/4	4 0 0	5	
1 9/32	14 1/8	0 17 2	4	14/3	2 3/4	20 1/4	4 5 0	5	
1 5/16	14 1/4	0 18 0	4	each.	3	22	4 10 0	5	

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IMPROVED RIMERS WITH "TWIST FLUTES."

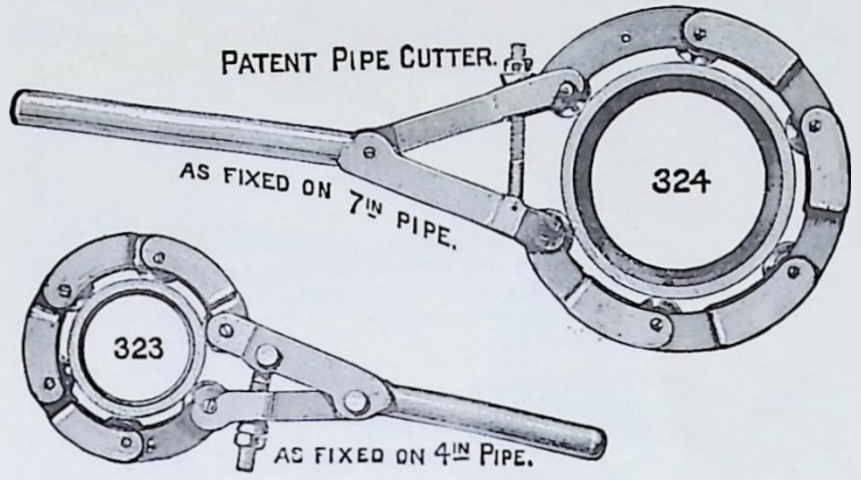
Ground up accurately to Standard Gauge after Hardening.



These Rimers are made parallel on the cutting part, but slightly tapered at the point for entering. Taper Rimers can also be supplied if required, and at same prices, and can also be supplied with straight flutes if preferred, but the "**Twist Flute**" is strongly recommended, as it makes a much smoother and more perfect hole. **A** is made with Taper Shanks, fitting into Standard Twist Drill Sockets, for use in Drilling Machines. **C** is the Fine-Fluted Pattern Engineers' Rimer for use with wrench.

Diameter in ins.	A Length Over all.	A Length Flute.	B Length Over all.	B Length Flute.	A or B Price. £ s. d.	No. of Socket Pattern.	B Price of Socket.	C Price of either Taper or Parallel Pattern. £ s. d.
3/16								0 2 0
3/16								0 2 0
1/4	4	2	6 1/8	1 13/16	0 5 0	1		0 2 6
5/16	4 1/2	2 1/4	6 3/8	1 13/16	0 5 6	1		0 2 6
3/8	5	2 1/2	6 3/4	2 1/8	0 0 0	1	5/-	0 3 0
7/16	5 1/2	2 3/4	7 1/4	2 3/8	0 6 6	1		0 3 3
1/2	6	3	7 3/4	2 5/8	0 7 3	1		0 3 9
9/16	6 1/2	3 1/4	8 1/4	2 7/8	0 8 0	1		0 4 6
5/8	7	3 1/2	8 3/4	2 15/16	0 8 9	2		0 5 0
11/16	7 11/16	3 13/16	9 1/4	3 3/16	0 9 6	2		0 5 6
3/4	8 3/8	4 3/16	9 3/4	3 7/16	0 10 6	2	6/6	0 6 0
13/16	9 1/16	4 1/2	10	3 11/16	0 11 6	2		0 6 6
7/8	9 11/16	4 13/16	10 1/2	3 13/16	0 12 6	2		0 7 0
15/16	10 1/4	5 1/8	10 3/4	3 3/4	0 13 6	3		0 7 6
1	10 3/4	5 7/16	11	3 7/8	0 14 6	3		0 8 0
1 1/16	11 1/4	5 5/8	11 1/4	4 1/16	0 15 6	3	8/6	0 9 6
1 1/8	11 3/8	5 13/16	11 3/4	4 1/4	0 16 6	3		
1 3/16	12	6	12	4 7/16	0 18 0	3		
1 1/4	12 1/4	6 1/8	12 1/2	4 5/8	0 19 0	3		0 10 6
1 5/16	12 7/16	6 3/16	14 1/4	4 7/8	1 2 0	4		
1 3/8	12 3/8	6 5/16	14 1/2	5 1/8	1 3 0	4		0 12 6
1 7/16	12 13/16	6 3/8	14 1/4	5 1/4	1 5 0	4		
1 1/2	13	6 1/2	15	5 3/8	1 7 0	4		0 14 0
1 9/16	13	6 1/2	15 1/4	5 1/2	1 9 0	4		
1 5/8	13	6 1/2	15 1/2	5 5/8	1 10 6	4		0 16 6
1 11/16	13 1/2	6 3/4	15 3/4	5 3/4	1 12 0	4	14/3	
1 3/4	13 1/2	6 3/4	16	5 13/16	1 13 0	4		0 19 0
1 13/16	13 1/2	6 3/4	16 1/4	6 1/16	1 14 0	4		
1 7/8	14	7	16 1/2	6 3/16	1 15 0	4		1 2 0
1 15/16	14	7	16 1/2	6 3/16	1 16 0	4		
2	14	7	16 1/2	6 3/16	1 17 0	4		1 5 0
2 1/16	14 1/4	7 1/8	18	6 1/4	2 2 0	5		1 10 0
2 1/8	14 1/2	7 1/4	18 1/2	6 5/8	2 8 0	5		1 14 0
2 3/16	14 3/4	7 3/8	19	6 3/4	2 15 0	5		1 18 0
2 1/4	15	7 1/2	19 1/2	6 3/4	3 0 0	5	40/-	2 2 0
2 5/16	15 1/4	7 5/8	20	7	3 5 0	5		
2 3/8	15 1/2	7 3/4	20 1/2	7 1/4	3 10 0	5		
2 7/16	15 3/4	7 7/8	21	7 1/2	3 15 0	5		
3	16	8	21 1/2	7 1/4	4 0 0	5		

PATENT PIPE CUTTER.



This useful tool, like the Chain Pipe Tong, is particularly useful for cutting **Cast** or **Wrought Iron** or **Steel** Pipes, and especially in the **larger sizes.** Owing to the number of cutters acting at one time, its action is **very quick,** and it can be operated in the most **limited space.**

Irregularity in shape of pipe, owing to its flexible formation, will in no way interfere with the working of cutters.

It can be supplied for cutting tubes down to ¾ inch diameter.

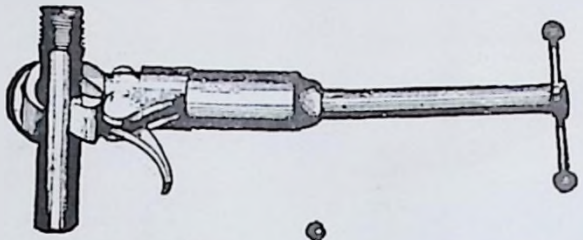
Size.	To Cut Pipes.	Price Complete. £ s. d.	Number of Cutters.	Extra Cutters each. s. d.
A	2 to 4	2 0 0	6	1 6
,,	2 to 6	2 15 0	8	1 6
,,	2 to 8	3 10 0	10	1 6
B	5 to 6	2 10 0	5	2 3
,,	5 to 8	3 8 0	7	2 3
,,	5 to 10	3 17 0	8	2 3
,,	5 to 13	4 15 0	10	2 3
C	12 to 14	7 0 0	9	3 3
,,	12 to 18	8 4 0	11	3 3
,,	12 to 22	9 8 0	13	3 3
,,	12 to 24	10 0 0	14	3 3

INSTRUCTIONS FOR USE.

Set wheels in endless track round pipe before cutting, screw up gently, and move lever backwards and forwards until pipe is divided; well oil pins and cutting track.

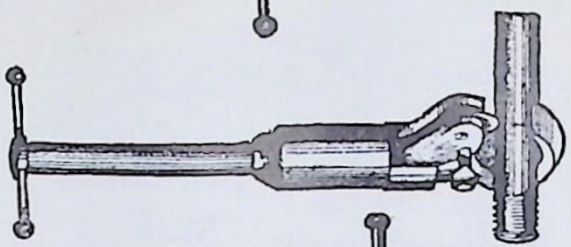
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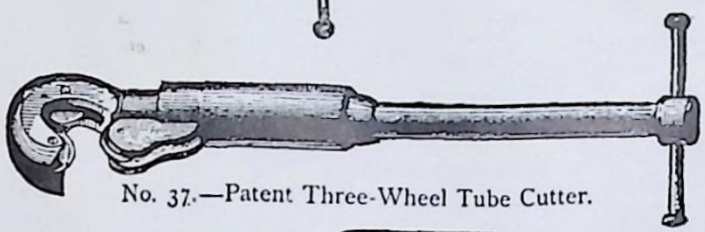
TUBE CUTTERS AND WRENCHES.



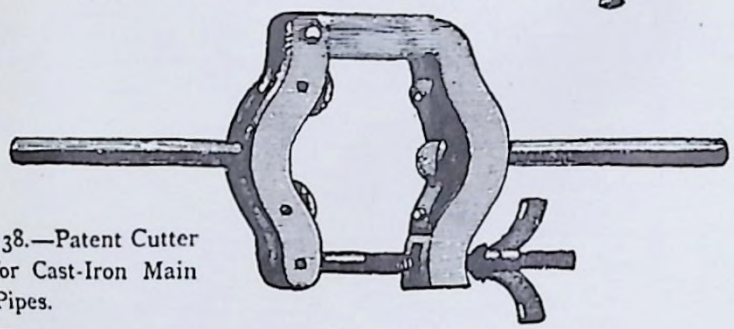
No. 35.—Patent Tube Wrench.

No. 35.—Patent Tube Cutter.

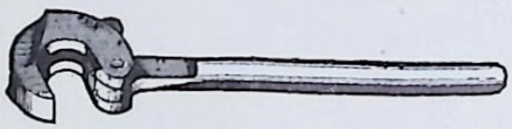




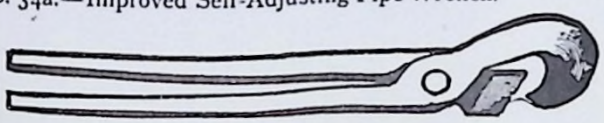
No. 37.—Patent Three-Wheel Tube Cutter.



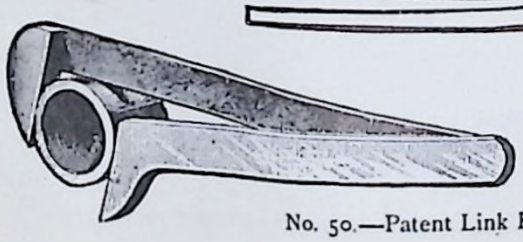
No. 38.—Patent Cutter for Cast-Iron Main Pipes.



No. 34a.—Improved Self-Adjusting Pipe Wrench.



No. 42.—Gas Tongs.



No. 50.—Patent Link Pipe Wrench.

TUBE CUTTERS AND TUBE WRENCHES.

No. 35. PATENT COMBINED TUBE CUTTER AND WRENCH.

This is the most simple and efficient combination yet introduced. With Nos. 1 and 2 all sizes of pipes can be cut off and gripped from ¼ to 2 inches.

The working parts are all enclosed and carefully hardened, and thoroughly tested before sending out. The cuts on opposite page shows its double purpose, and it can be altered from one purpose to another instantly. One Cutter, if carefully used, will cut off thousands of tubes.

No. 1	For ¼ to 1 inch Tubes	16/6 each.	Extra Cutters 1/- each.
,, 2	,, 1¼ to 2 ,, ,, ...	26/- ,,	,, ,, 1/6 ,,
,, 3	,, 2¼ to 3½ ,, ,, ...	36/6 ,,	,, ,, 1/6 ,,

No. 36. PATENT ONE WHEEL TUBE CUTTER.

To Cut	¼ to 1 inch Tubes	12/9 each.	Extra Cutters 1/- each.
,, ,,	1¼ to 2 ,, ,, ...	18/- ,,	,, ,, 1/6 ,,
,, ,,	2¼ to 3½ inch Tubes	29/- ,,	,, ,, 1/6 ,,

No. 37. PATENT THREE WHEEL TUBE CUTTER.

This Cutter works much easier than any other, and for heavy tubes is strongly recommended. It is also much quicker in its action.

To Cut	¼ to 1 inch Tubes	16/6 each.	Extra Cutters 1/- each.
,, ,,	1¼ to 2 ,, ,, ...	26/- ,,	,, ,, 1/6 ,,

No. 38. PATENT THREE WHEEL CUTTER FOR LARGE W.I. AND C.I. MAIN PIPES.

To Cut	2 to 4 inch Tubes	28/- each.	Extra Cutters 1/6 each.
,, ,,	4 to 6 ,, ,, ...	34/- ,,	,, ,, 1/6 ,,
,, ,,	5 to 8 ,, ,, ...	40/- ,,	,, ,, 1/6 ,,

No. 34a. IMPROVED SELF-ADJUSTING TUBE WRENCH.

Sizes	⅛ to ½	¼ to ¾	½ to 1¼	1 to 2	1¼ to 2½	1½ to 3	Inch Pipe and Socket
	5/6	7/-	9/-	12/-	18/-	22/-	each.

No. 42. BEST W.I. GAS TONGS.

Sizes	¼	⅜	½	¾	1	1¼	1½	1¾	2	2¼	2½	Inches.
For Pipes	17/-	21/6	25/6	30/-	35/-	42/-	56/-	60/-	65/-	73/-	82/-	per doz.
,, Socket	25/-	26/-	30/-	35/-	42/-	53/-	59/-	64/-	72/-	81/-	90/-	,,

No. 50. PATENT ADJUSTABLE TUBE WRENCH.

Length over all.	5	8	12	15	18	24	Inches.
Jaws open ..	1¼	2	3	3½	4	5	Inches dia.
Price	1/8	2/8	4/-	5/-	6/-	8/-	per pair.

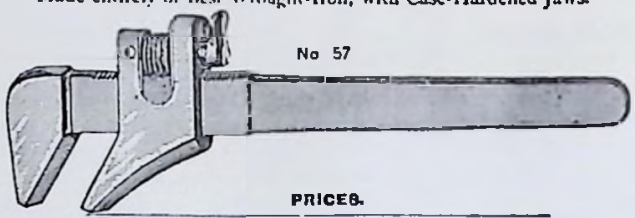
(A complete set of 6 sizes, 26/-).

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SPANNERS AND WRENCHES.

PATENT QUICKLY-ADJUSTED SPANNER.

Made entirely of Best Wrought-Iron, with Case-Hardened Jaws.

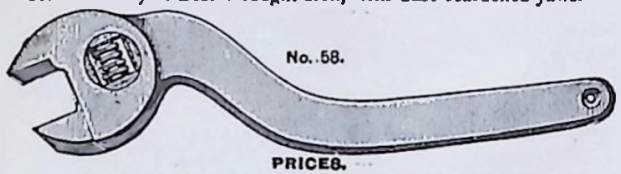


PRICES.

Sizes	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.	20 in.
Jaws open ..	1¼ in.	1½ in.	1¾ in.	2 in.	2¼ in.	2½ in.	2¾ in.
Each	7/9	9/6	11/-	12 9	14/6	16/-	17/9

CLYBURN SPANNER.

Made entirely of Best Wrought-Iron, with Case-Hardened Jaws.



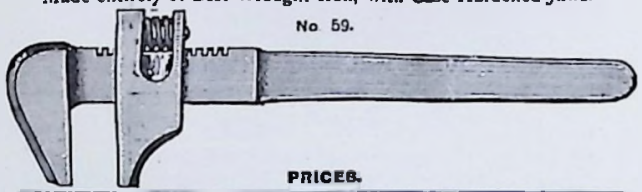
PRICES.

Sizes	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.
Jaws open ..	¾ in.	¾ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 in.
Each	5/-	6/-	7/6	9/6	11/6	14/-	16/6

BUDDING SPANNER.

Made entirely of Best Wrought-Iron, with Case-Hardened Jaws.

No 59.



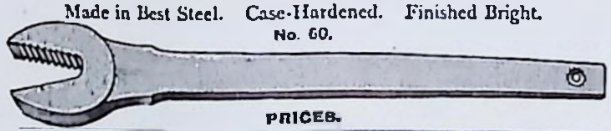
PRICES.

Sizes	6 in.	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.	20 in.	22 in.	24 in.
Jaws open ..	1 in.	1¼ in.	1½ in.	1¾ in.	2 in.	2¼ in.	2½ in.	2¾ in.	3 in.	3¼ in.
Each	6/-	7/-	8/6	10/-	12/6	13/-	14/6	16/-	18/-	20/-

UNIVERSAL WRENCH.

Made in Best Steel. Case-Hardened. Finished Bright.

No. 60.



PRICES.

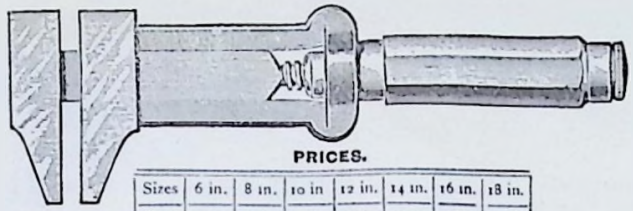
To admit ..	⅛ to ⅛	⅛ to 1	1 to 1¾	1½ to 2	2 to 3	inches.
Price	2/6	4/6	6/6	12/-	22/6	each.

Complete set, 45/-

COACH WRENCHES.

BEST DOUBLE RAILWAY COACH WRENCH.

No. 60.

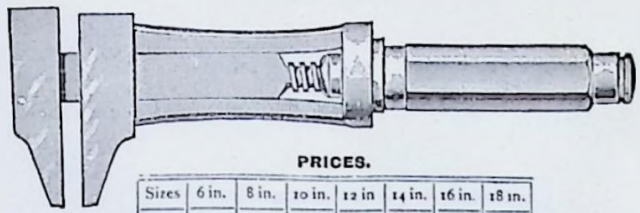


PRICES.

Sizes	6 in.	8 in.	10 in	12 in.	14 in.	16 in.	18 in.
Each	9/3	10/-	11/9	13/3	14/9	18/-	21/6

BEST DOUBLE COACH WRENCH.

No. 61.

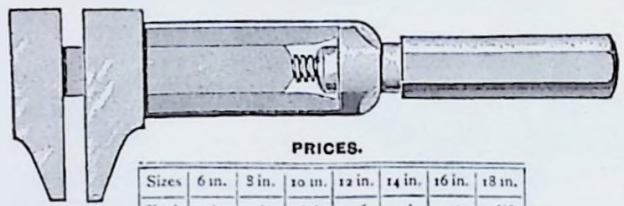


PRICES.

Sizes	6 in.	8 in.	10 in.	12 in	14 in.	16 in.	18 in.
Each	6/6	7/3	9/-	10/6	12/6	15/3	18/6

DOUBLE COACH WRENCH.

No. 62.

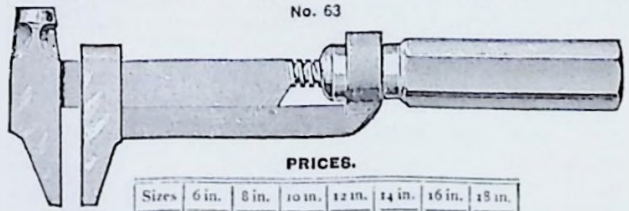


PRICES.

Sizes	6 in.	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.
Each	5/3	5/9	6/6	7/6	10/-	13/3	16/6

SINGLE COACH WRENCH.

No. 63

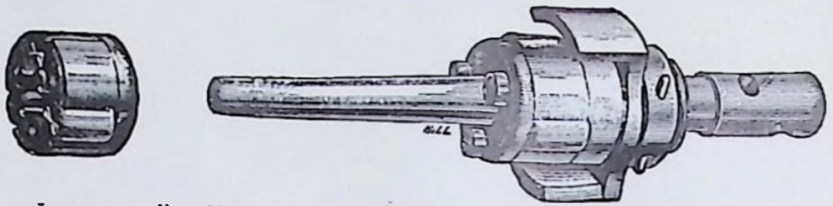


PRICES.

Sizes	6 in.	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.
Each	2/6	2/10	3/8	4/6	5/3	6/6	8/-

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IMPROVED DUDGEON'S PATENT TUBE EXPANDER.

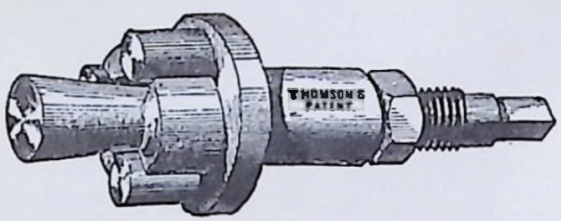


In recommending this well-known tool we guarantee all ours to be of the very best material and workmanship throughout.

Size	1	1¼	1⅜	1½	1⅝	1¾	1⅞	2	2¼	2½	2¾	3	3¼	3½	3¾	4	in
Price	15/-	15/-	15/-	15/-	17/6	18/9	18/9	21/-	25/-	30/-	35/	40/-	43/9	50/-	55/-	60/-	each

These sizes refer to external diameter of Tubes.

THOMSON'S PATENT TUBE EXPANDER, TUBE CUTTER, & FERRULE EXTRACTOR.



Ferrule Extractor



Tube Expander.



Tube Cutter.

PRICE OF EACH TOOL

Size ..	1¼	1⅜	1½	1⅝	1¾	1⅞	2	2¼	2½	2¾	3	3¼	3½	3¾	4	inches
Price	40/-	45/-	50/-	55/-	60/-	65/-	75/-	85/-	90/-	95/-	95/-	100/-	100/-	105/-	105/-	each

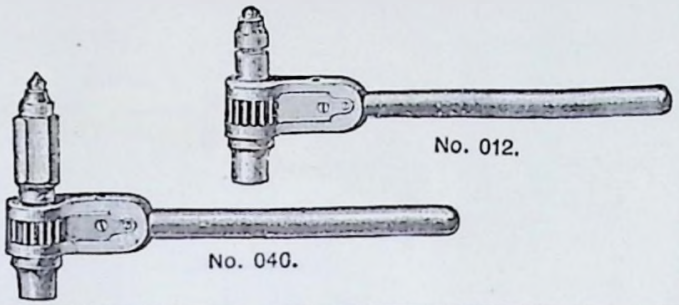
These sizes refer to external diameter of Tubes.

RATCHET SPANNER,

For use with Square-head Mandril.

Size	¼	⅜	½	⅝	¾	⅞	1	1¼	1½	inches
Price	14/-	18/-	22/-	26/-	30/-	36/-	40/-	45/-	50/-	each

RATCHET BRACES.



Size.	10	12	14	16	18	20	24	30	inch.
Price, either pattern.	10/-	12/-	14/-	16/-	18/-	20/-	24/-	30/-	each.

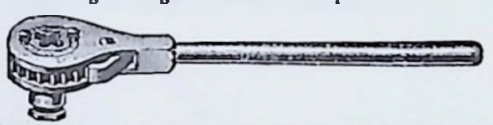
BEST CAST STEEL DRILLS for above :—

Assorted, ¼ in. to 1 in., 12/- ; 1⅛ in. to 1½ in., 15/- per dozen.

PATENT DOUBLE ACTION RATCHET GAS STOCK.

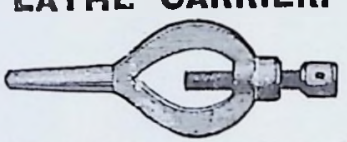
With Solid Dies for Screwing Gas Tubing, at once going over.

This Stock being single-ended, and having a Right and Left Hand Feed-motion, is specially suitable for screwing Tubing fixed in confined positions.



Sizes: To Screw	½, ¾, 1	¾, 1, 1¼	1, 1¼, 1½	1¼, 1½, 2	inch.
Price, exclusive of Taps.	60/-	80/-	100/-	120/-	per set.

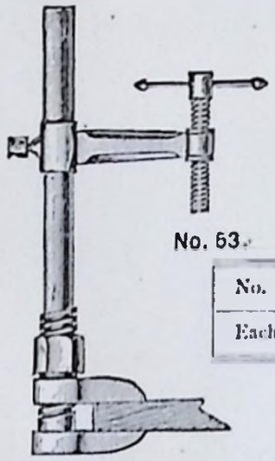
LATHE CARRIER.



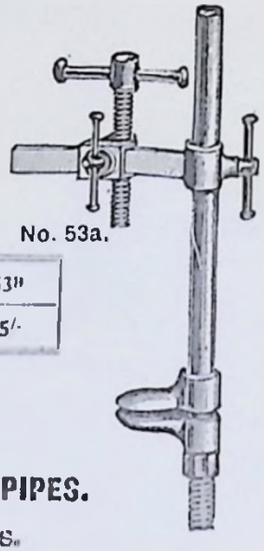
To take ...	½	¾	1	1¼	1½	1¾	2	2½	3	3½	4	5	6	ins. diam.
Price	2/-	2/6	3/-	4/-	5/-	6/-	8/-	10/-	12/-	15/-	18/-	21/-	25/-	each.

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DRILLING PILLARS.



No. 53.



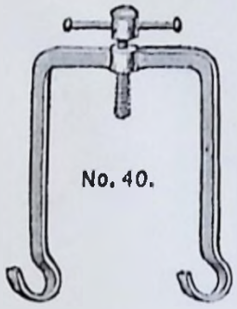
No. 53a.

PRICES.

No. ...	53	53A	53B
Each...	40/-	30/-	35/-

No. 53B is similar to No. 53A, but has larger Pillar.

CRAMP FOR DRILLING MAIN PIPES.



No. 40.

PRICES.

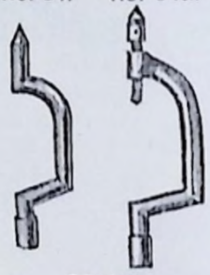
Sizes ...	2 to 4 in.	4 to 6 in.	5 to 8 in.
Each ..	21/-	28/6	36/-

WITH No. 54 CRANK BRACE.

Sizes ...	2 to 4 in.	4 to 6 in.	5 to 8 in.
Each ...	30/-	37/6	45/-

CRANK BRACES.

No. 54. No. 64a.



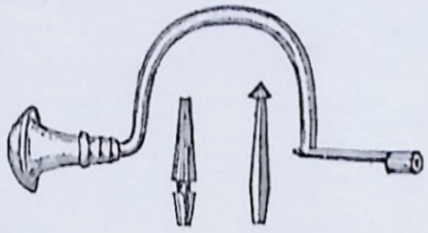
PRICES.

No. ..	54	54A
Each .	9/-	11/6

Drills charged according to size.

BEST IRON BRACE.

No. 48.



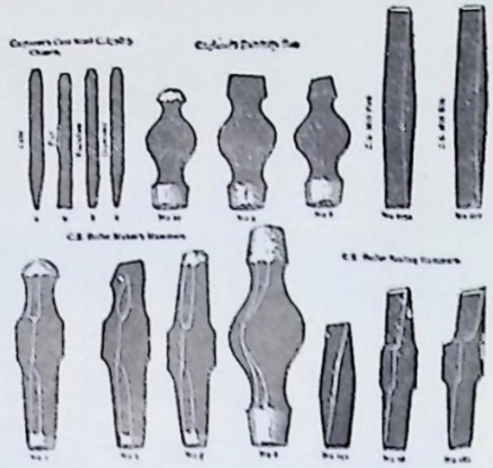
PRICES.

No. 48 Braces	Rimers.	Countersinks.
Per doz.. 55/-	17/-	8/6

Drills for above up to ¼ in., 10/- per doz.

HAND HAMMERS AND CHISELS.

BEST WARRANTED

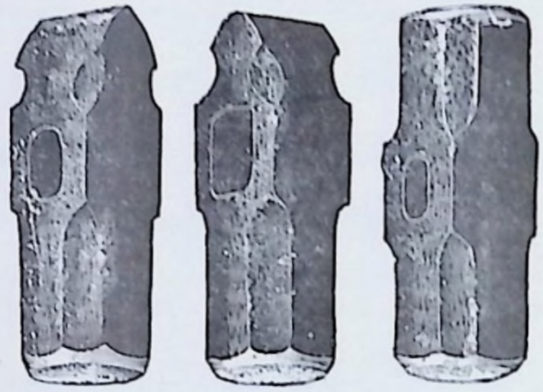


ENGLISH MAKE.

Engineers' Hand Hammers, solid Cast Steel, Nos. 22, 9, and 8 ...		1/- per lb.
,, ,, ,, Iron and Steel, ,, ,, ...		6d. ,,
Boiler Makers' ,, solid Cast Steel, Nos. 2, 3, 5, and 8 ...		1/- ,,
Boiler Scaling ,, ,, ,, Nos. 05A, 06, and 06A		1/- ,,
Mill Bills and Picks ,, ,, Nos. 077, and 077A ...		1/- ,,
Engineers' Chipping Chisels ,, ,, Nos. 1, 2, 3, and 4 ...		1/- ,,

SLEDGE HAMMERS.

BEST WARRANTED

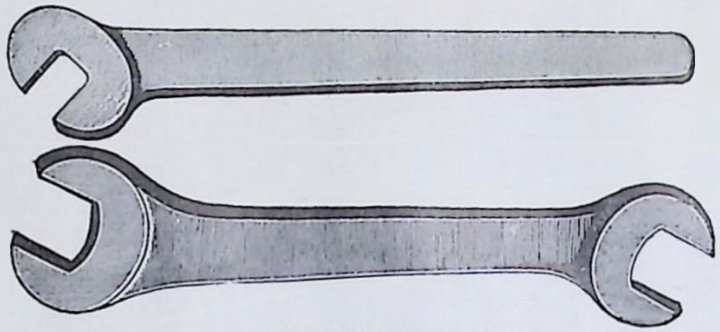


ENGLISH MAKE.

Sledge Hammers, solid Cast Steel		1/- per lb.
,, ,, Iron and Steel		6d. ,,

Special quotations for large quantities.

SOLID DROP-FORGED WROUGHT STEEL
SINGLE AND DOUBLE-ENDED SPANNERS.



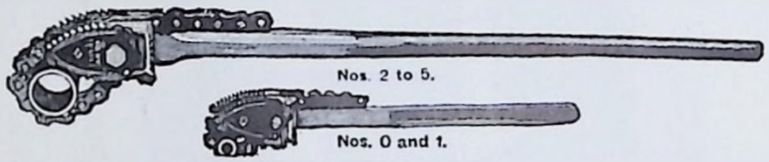
SINGLE-ENDED.

Size of Whitworth Nuts..	5/16	3/8	1/2	5/8	3/4	7/8	1	in.
PRICE of Spanners	8/-	9/-	11/-	16/-	22/-	30/-	42/-	doz.

DOUBLE-ENDED.

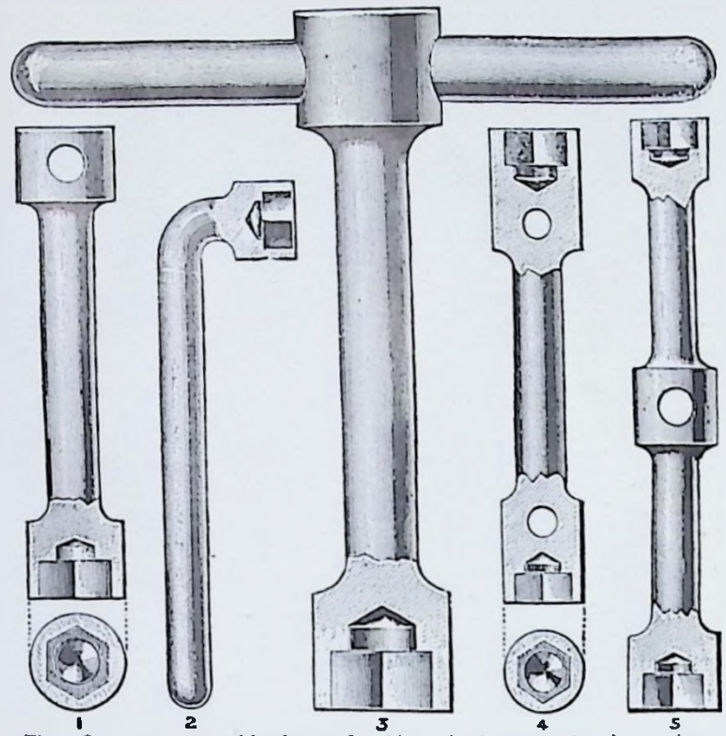
Size of Whitworth Nuts.	3/16 × 1/4	1/4 × 5/16	1/4 × 3/8	5/16 × 3/8	3/8 × 7/16	3/8 × 1/2	1/2 × 5/8	5/8 × 3/4	3/4 × 7/8	in.
PRICE ...	5/9	6/3	7/-	7/6	9/-	10/9	12/6	19/-	24/-	doz.
Size of Whitworth Nuts.	7/8 × 1	1 × 1 1/8	1 1/8×1 1/4	1 1/4×1 3/8	1 3/8×1 1/2	1 1/2×1 5/8	1 5/8×1 3/4	1 3/4×1 7/8	1 7/8 × 2	ins.
PRICE ...	30/6	43/-	54/-	62/6	77/-	91/-	97/-	116/-	135/-	doz.

PATENT
DROP-FORGED CHAIN PIPE WRENCHES.



No.	Capacity.	Length.	Price. Each.	Extra Chain. Each.	Extra Jaws. Per Pair.
0	1/8 to 3/4 in.	12 1/2 in.	10/6	3/3	4/3
1	3/4 to 1 1/2 in.	20 in.	14/6	4/3	7/6
2	1/4 to 2 1/2 in.	27 in.	23/-	6/3	11/6
3	1/4 to 4 in.	37 in.	31/6	10/6	16/9
4	1 1/2 to 8 in.	50 in.	46/-	16/9	23/-
5	2 to 14 in.	64 in.	75/-	25/-	31/6

IMPROVED BOX SPANNERS.



These Spanners are **machined out of solid steel**; they are well and strongly made to fit Whitworth Nuts; and can be made for other purposes if required.

By using these Spanners the following advantages are gained:—A perfect fit, extra strength, no defective welds, no damage to the nuts, no slipping off the nuts when in awkward positions, cheapness, high finish, and durability.

PRICES.

SINGLE ENDED.

Standard size of Whitworth Nuts. Inches.	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	1	1 1/8	1 1/4	1 3/8	1 1/2
All Black. ... ... Each	1/-	1/2	1/6	1/10	2/2	3/-	4/-	5/6	7/6	8/6	10/-	11/-	12/-
,, ... ,,	1/4	1/6	1/10	2/2	3/1	3/11	4/11	6/5	8/5	10/3	11/9	12/9	13/9

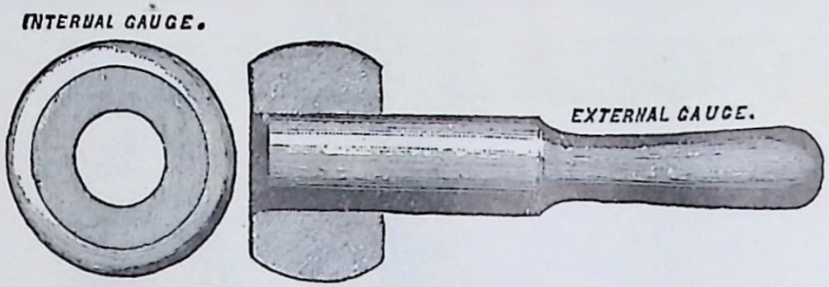
With Bright Boss and Head, 3d. to 1/- each extra, according to size.
If Bright all over, 6d. to 2/- each extra, according to size.

DOUBLE ENDED.

Size of Whitworth Nuts.	No. 4.			No. 5.		
	All Black.	Bright Bosses.	All Bright.	All Black.	Bright Bosses.	All Bright.
3/8 in. and 1/2 in. combined. Each	2/3	2/6	3/-	2/9	3/6	3/10
5/8 ,, ,, 3/4 ,, ,, ,,	4/6	5/-	5/8	5/-	5/9	6/6
7/8 ,, ,, 1 ,, ,, ,,	8/9	9/6	10/-	9/6	10/6	11/6

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STANDARD CYLINDRICAL GAUGES.



These Gauges are accurately made to the standard measure of the realm, and are guaranteed to have been tested by the Whitworth Measuring Machine to one ten-thousandth part of an inch. All Gauges up to and including 2 inch diameter are made of Steel, properly hardened and ground.

PRICES.

COMPLETE SETS OF INTERNAL AND EXTERNAL GAUGES.	£	s.	d.
1/8 inch to 1 inch, advancing by 1/8 inch—8 sizes	9	3	0
1 1/8 " 2 " " 1/8 " 8 "	20	3	0
1/16 " 1 " " 1/16 " 15 "	17	1	0
1 1/16 " 2 " " 1/16 " 16 "	40	6	0
2 1/8 " 3 " " 1/8 " 8 "	18	9	0
2 1/4 " 3 " " 1/4 " 4 "	9	9	0
3 1/8 " 4 " " 1/8 " 8 "	27	3	0
3 1/4 " 4 " " 1/4 " 4 "	13	18	0

Any of the above sets can be fitted into Oak or Deal Cases, and sets differently arranged can be quoted for to specification.

SINGLE SIZES IN PAIRS· INTERNAL AND EXTERNAL.

1/8 16/-	3/16 16/-	1/4 16/-	5/16 17/-	3/8 18/-	7/16 19/-	1/2 20/-	9/16 21/-	inch. per pair.
5/8 22/-	11/16 24/-	3/4 26/-	13/16 28/-	7/8 30/-	15/16 33/-	1 35/-		inch. per pair.
1 1/16 38/-	1 1/8 38/-	1 3/16 41/-	1 1/4 41/-	1 5/16 44/-	1 3/8 44/-	1 7/16 47/-	1 1/2 47/-	inch. per pair.
1 9/16 50/-	1 5/8 50/-	1 11/16 56/-	1 3/4 56/-	1 13/16 61/-	1 7/8 61/-	1 15/16 66/-	2 66/-	inch. per pair.
2 1/8 39/-	2 1/4 41/-	2 3/8 43/-	2 1/2 45/-	2 5/8 47/-	2 3/4 49/-	2 7/8 51/-	3 54/-	inch. per pair.
3 1/8 57/-	3 1/4 60/-	3 3/8 63/-	3 1/2 66/-	3 5/8 69/-	3 3/4 72/-	3 7/8 76/-	4 80/-	inch. per pair.

Larger Sizes, or any Gauges, made for Foreign standards.

STANDARD STEP GAUGE.



The accuracy of these Gauges is guaranteed. They are tested by a Whitworth Measuring Machine to the standard of the realm.

Prices given below are for sizes found most useful in workshop use, but they can be made to any measure of English or foreign standards, and also marked with the English equivalent, if so desired. Prices on application.

Sizes up to and including 2 inches diameter are made in steel, and hardened.

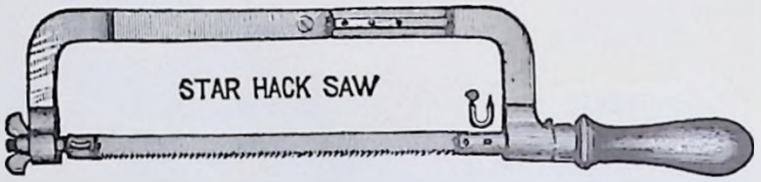
PRICES.

	£	s.	d.
1 gauge, containing 6 sizes, 3/16 to 1/2 inch, advancing by 1/16 inch	1	7	0
1 " " 8 " 9/16 " 1 " " 1/16 "	1	17	6
1 " " 8 " 1 1/16 " 1 1/2 " " 1/16 "	3	0	0
1 " " 8 " 1 9/16 " 2 " " 1/16 "	3	14	0
1 " " 7 " 1/4 " 1 " " 1/8 "	1	15	0
1 " " 8 " 1 1/8 " 2 " " 1/8 "	3	10	0
1 " " 8 " 2 1/8 " 3 " " 1/8 "	3	12	0
1 " " 8 " 3 1/8 " 4 " " 1/8 "	5	0	0

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 152 of 298
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HAND HACK-SAW FRAMES,

FOR METAL.



The frames of the above are made of steel, nickel-plated, and can be used in four different directions.

PRICE, No. 1, to take 6-in. to 9-in. blades ... 4/6 each.
No. 0, ,, 10-in. ,, 12-in. ,, ... 5/6 ,,

HACK-SAW BLADES, suitable for the above.

Length ...	6	7	8	9	10	11	12 in.
PRICE ...	3/-	3/3	3/6	4/-	5/-	6/-	7/6 per doz.

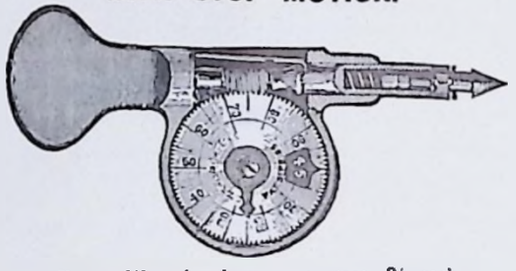
HEAVY PATTERN

HAND HACK-SAW FRAMES.

Size	6	8	9	10	12 in.
PRICE	5/-	5/3	5/6	6/-	7/- each.
Blades	8/6	8/6	8/6	9/-	12/- per doz.

PATENT SPEED-INDICATOR,

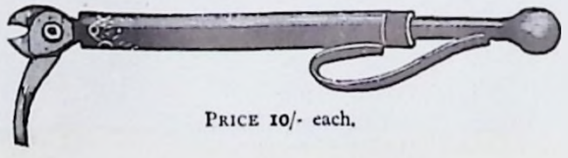
WITH STOP MOTION.



PRICE 6/6 each; in morocco case, 8/- each.

THE "VICTOR" NAIL-PULLER,

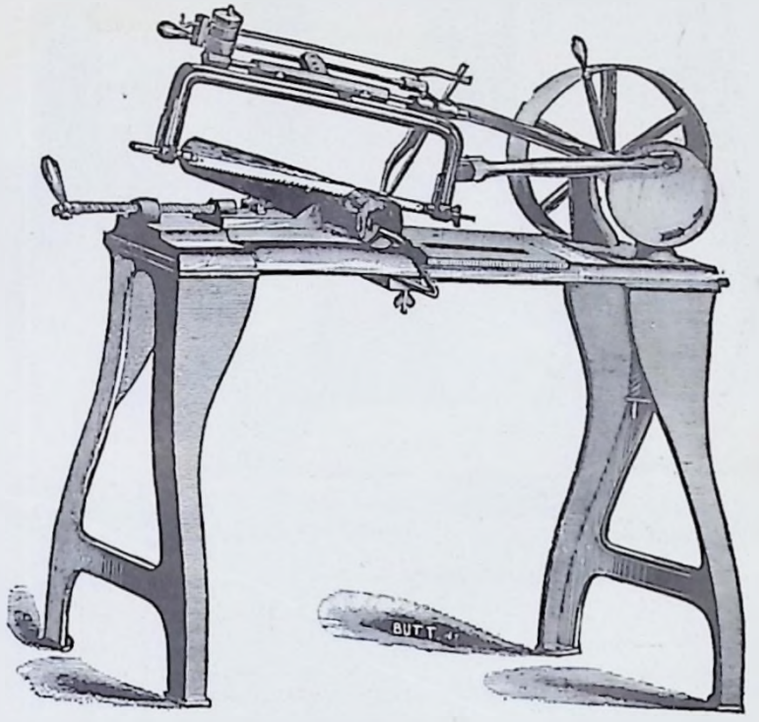
FOR EXTRACTING NAILS WITHOUT DAMAGING CASE.



PRICE 10/- each.

PATENT HACK-SAW MACHINE

FOR POWER.



This machine is designed for cutting Iron and Steel up to 4½ inches diameter; or Tubing, Brass, &c., with extra fine tooth blades. Metal can be cut by this machine more rapidly than in a lathe or cutting-off machine, and at less expense than by cutting by hand with a chisel. No attention is required after machine is started, for when piece has been cut off the saw stops automatically.

It should be driven at a speed of about 45 to 50 revolutions per minute.

PRICE.

	£ s. d.
Complete with 6 Blades	5 10 0
Adjustable Rest for long work, extra	7 6

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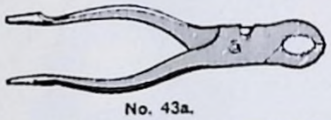
BEST QUALITY GAS PLIERS, &c.

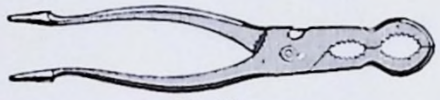

No. 2.


No. 11.


No. 11b


No. 11c


No. 43a.


No. 43b.

No.	Sizes.	6	7	8	9	10	inches.
2	Improved Cutting Pliers	25/-	38/-	50/-	70/-	95/-	Per dozen.
2A	Do. with Burner Hole	28/-	41/-	53/-	73/-	98/-	,,
11	Bell-Hangers' Pliers	26/-	46/-				,,
11B	Telegraph Pliers, Wide Hole... ...	26/-	40/-	52/-			,,
11C	Do. do.	26/-	40/-	52/-			,,
43A	Improved Gas Pliers, with Wire-cutter, Screw-driver, and Pipe-opener combined	34/-	38/-				,,
43B	Do. do. Two-hole ...	...	..	41/-	45/-	48/-	,,
	Tinman's Snips	24/-	26/-	28/-	30/-	36/-	,,

BEST QUALITY LANCASHIRE CALLIPERS AND WING COMPASSES.

No.	Sizes.	4	5	6	8	10	12	16	20	ins.
31	Egg and Pocket Callipers ...	12/-	15/-	18/-	24/-	30/-	36/-			Doz.
31B	Inside Callipers	12/-	15/-	18/-	24/-	30/-	36/-			,,
29	Inside and Outside Callipers	24/-	27/-	31/-	54/-	72/-				,,
33	Wing Compasses	21/-	21/-	24/-	30/-	36/-	54/-	68/-	74/-	,,

PATENT ALL-STEEL WRENCHES, PIPE TONGS AND GAS PLIERS.

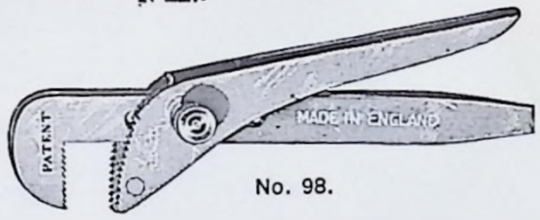
"Foot P[illegible]" Brand.

POCKET WRENCHES, 5¾ in. long.



No 227.

No.		Per doz.
227	Rough Black, opens from 5/16 in. to 1½ in.	13/6
96	Fine Black ,, 5/16 in. to 1½ in.	18/-
95	Bright ,, 5/16 in. to 1½ in.	22/-
97	Nickled Plated ,, 5/16 in. to 1½ in.	25/-

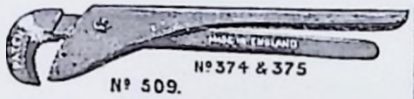


No. 98.

No. 98. WRENCHES FOR MACHINISTS, SMITHS, &c.

No.		Per doz.
98	Black, 9 in. long. Opens from ½ in. to 2⅝ in.	33/-
132	Bright, 9 in. ,, ,, ½ in. to 2⅝ in.	42/-
209	Black, 12 in. ,, ,, ⅝ in. to 2½ in.	54/-
259	Bright, 12 in. ,, ,, ⅝ in. to 2⅝ in.	72/-

SPECIAL TONGS FOR PIPES.



No 374 & 375

No 509.

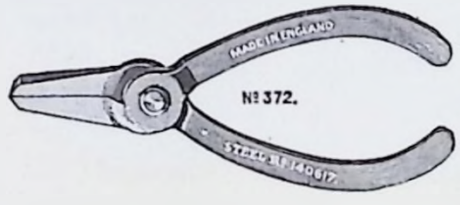
No.		Doz.
374	Black, 21 in long, to take ¾ in. to 2½	156/-
375	Black, 30 in. ,, ,, 1 in. to 3½	240/-
509	Black, 15 in. ,, ,, ½ in. to 1½	84/-

COMBINATION PLIERS, 6 in. long.



No 123 No 127.

No		Per doz.
127	Frosted Nickel Plated ..	14/6
123	Half Bright	12/6
82	Black	12/-



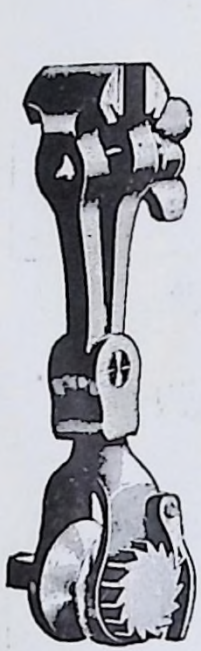
No 372.

WROUGHT STEEL PLIERS.

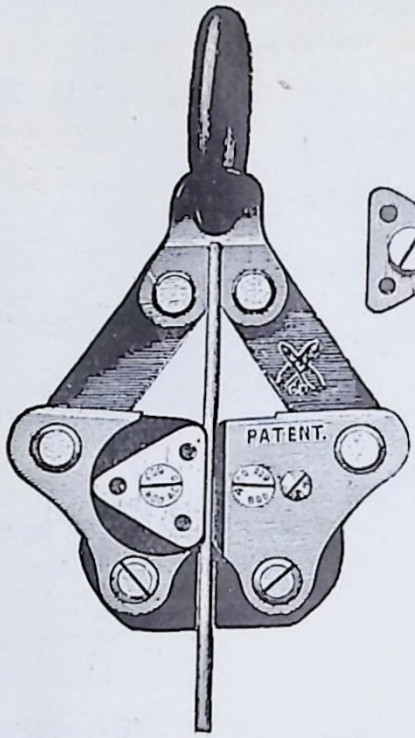
No.		Per doz.
372	5 in. Flat Nose	12/-
373	5 in. Round Nose	12/-

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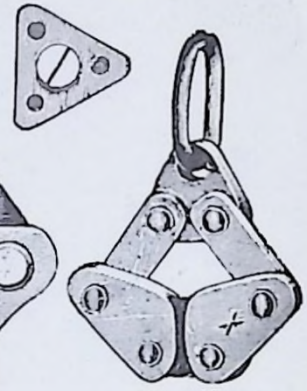
BEST QUALITY TELEGRAPH TOOLS.



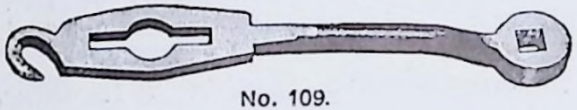
No. 102.



No. 3460.



No. 107.



No. 109.

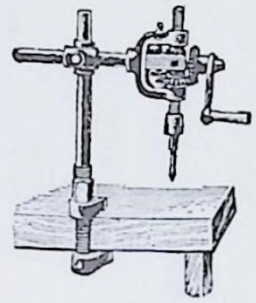
PARTICULARS AND PRICES.

No. 102	Solid Steel Draw Vice with Ratchet	20/- each.
,, 3460	Patent Draw Tongs	20/- ,,
,, 107	Dutch Draw Tongs	4/9 ,,
,, 109	Key for No. 102 Vice	2/- ,,

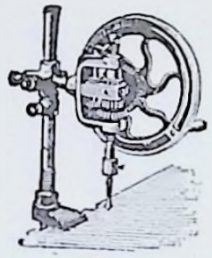
Prices of other patterns on application. For prices of Pliers, &c., see Index.

PORTABLE RADIAL DRILLING MACHINES.

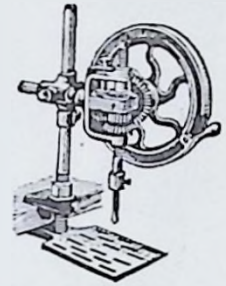
These Machines will take the place of the ordinary ratchet brace; they are much quicker in action and easier to fix, and will drill at any angle with much greater accuracy. The feed motion is self-acting, simple, effective, and easily understood, and has a quick adjustable motion for getting drill to and from work. Handle can be fixed in three different positions



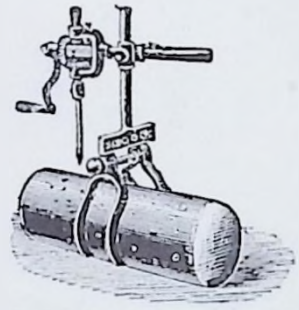
A



B



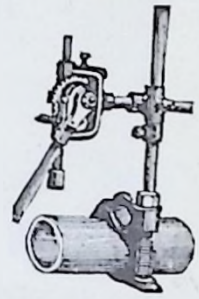
D



F



E



G

DIMENSIONS AND PRICES.

No.	Will drill up to.	Depth will drill.	A As above. £ s. d.	B Fly Wheel extra.	C As D, no wheel. Table extra	D Fly Wheel and Table extra.	E As above, extra.	F Pipe Clips, extra.	G Ratchet Gear extra.
1	1½ in. dia.	6 ins.	5 10 0	15/-	20/-	35/-	20/-	50/-	35/-
2	¼ ,,	6 ,,	4 15 0	10/-	15/-	25/-	20/-	40/-	32 6
3	½ ,,	3 ,,	4 0 0	7 6	10/-	17 6	—	—	25/-
4	⅜ ,,	2 ,,	3 10 0	7 6	10/-	17 6	—	—	—

Each Machine is complete with six Drills and Spanners. For prices of Twist Drills, see Index

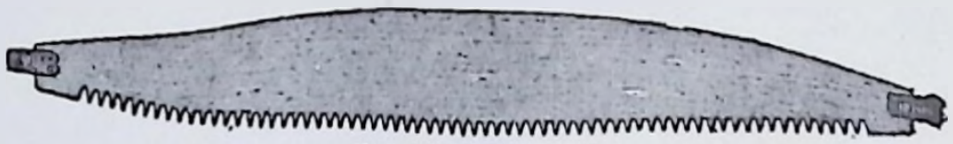
Clips of F will take from 4 to 14 in dia., and Clips of G 9½ in., 6½ in., and 3½ in.

Prices of B, D, G include same handles as A; and C, D, E, F, G include ordinary clamps as on B.

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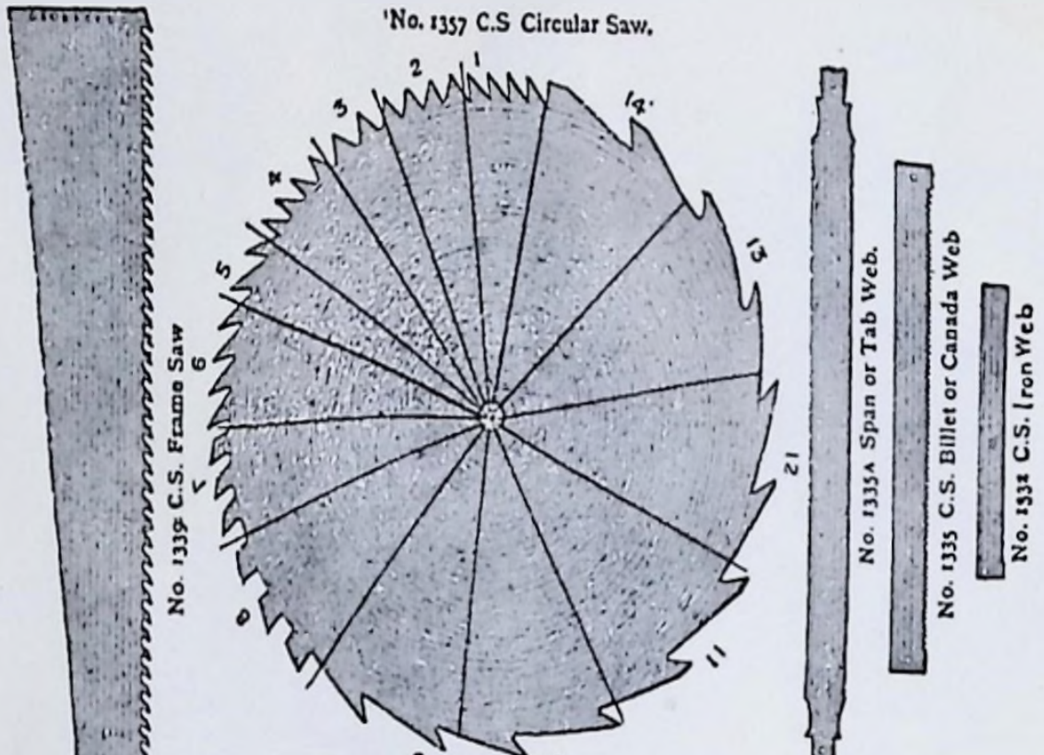


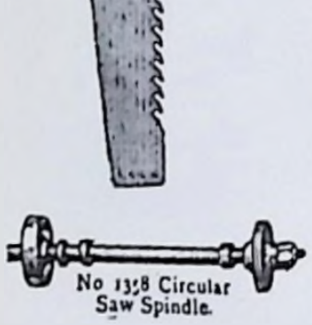
No. 1351 C.S. Stone Saw.



No. 1346 C.S. Cross Cut Saw.

No. 1357 C.S Circular Saw.





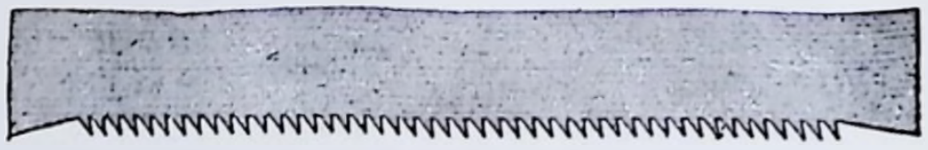
No 1338 Circular Saw Spindle.



No. 1357A C.S. Grooving Saw.



No 1350 Endless Band Saw.



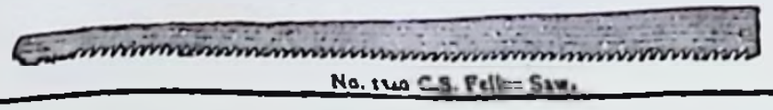
No 1343 C.S. Mill Saw Web



No 1336 C.S. Veneer Web



No. 1340A C.S. Russian Frame Saw.



No. 1340 C.S. Felloe Saw.

SAWS.

No. 1357. CAST STEEL CIRCULAR SAWS.

(Warranted to run true.)

Diameter .. inches	4	4½	5	6	7	8	9	10	12	14	16	18	20	22	24	26	28
Thickness B. Wire Gauge									17	17T	16	15	14	14T	13	13	12
PRICE each	4/6	5/-	6/-	7/-	8/-	9/6	11/-	13/-	16/-	20/-	24/-	30/-	36/-	42/-	48/-	56/-	66/-
Diameter .. inches	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	
Thickness B. Wire Gauge	12	12	12T	11	11	11T	10E	10	9E	9	8E	8	7	6	5E	5	
PRICE each	76/-	88/-	104/-	120/-	145/-	160/-	180/-	215/-	240/-	270/-	380/-						

In ordering Circular Saws, describe the shape of tooth by number of the series, and give the distance from point to point of tooth. Also give diameter of centre hole and thickness of plate B.W.G. If above gauge given, prices advance proportionately.

No. 1357 A. CIRCULAR GROOVING SAWS.

Lathe-turned and cut to any form of tooth or any diameter.

Thickness	3/32	3/16	5/32	3/16	7/32	1/4	9/32	5/16	3/8	7/16	1	inch.
PRICE ..	2/9	3/-	3/3	3.6	3/9	4/-	4/3	4.6	5/-	5.6	6/-	6.6	per in. diameter.

No. 1356. SAW SPINDLE AND PEDESTAL.
No. 1359. SAW SPINDLE AND FRAME.

Diameter	1	1⅛	1¼	1⅜	1½	1⅝	2	2⅛	2¼	2⅜	3	inches.
1358 PRICE	80/-	90/-	100/-	110/-	125/-	150/-	180/-	220/-	260/-	320/-	360/-	each.
1359	100/-	110/-	120/-	140/-	160/-	180/-	210/-	250/-	300/-	350/-	400/-	..

No. 1350. PATENT ENDLESS BAND SAWS.

Size to	⅛	3/16	¼	5/16	⅜	1	1⅛	1¼	1⅜	1½	1⅝	1¾	1⅞	2	in. wide
PRICE, sharp'd & joined	2/9	2/9	2/6	2/6	2/9	3/3	3/6	4/-	4/7	5/-	5/6	6/-	6.6	per 3d.

These prices are for 19 B.W.G.; thicker sizes are charged extra

No. 1348. CAST STEEL MILL SAW WEBS.

FOR CUTTING DEAL PLANKS AND TIMBER.

Length .. 3½ 4 4½ feet	Length . 5 5½ feet	Length . 6½ 7 feet
15 B.W.G.	14 B.W.G.	13 B.W.G.
Up to 4 in. wide .. 9/6 11/- 12/-	Up to 6 in. wide .. 18.6 20.6 22/-	Up to 7 in. wide .. 26.6 28.6 each
,, 4½ in. ,, .. 10/- 11.6 12.6	,, 6½ in. ,, .. 19.6 21.6 23/-	,, 7½ in. ,, .. 28/- 29.6 ,,
,, 5 in. ,, .. 10.6 12/- 13/-	,, 7 in. ,, .. 20.6 22/- 24/-	,, 8 in. ,, .. 29.6 31/- ,,

FRAME SAWS.

Length .. .. feet	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10
1339 Cast Steel, PRICE, each	16.6	17.6	19.6	21/-	24/-	26/-	28/-	33/-	39/-	46/-	54/-	62/-	72/-
1340 ,, warranted, ,,	19/-	21/-	23/-	26/-	29/-	32/-	35/-	40/-	46/-	50/-	58/-	66/-	76/-
1340 ,, Russian, ,,			19/-	21/-	24/-	26/-	30/-						

Frame Saws exceeding 11 inches heel advance 2/- per inch extra. If set, 6d. each; if set and sharpened, 1.6 extra, net.

VENEER WEBS.

Length	3½	4	4½	5	5½	6	feet
1336 C.S. Veneer Webs	10/-	12/-	14/-	16/-	18/-	20/-	each.
1337 ,, ,, without teeth ..							

Above 4½ inches wide, to advance 1,6 per ½ inch extra gross.

No. 1340. FELLOE OR TURNING SAWS.

Length	4½	5	5½	6	6½	7	feet.
PRICE	9/-	10/-	12/-	14/-	16/-	18/-	each

No. 1335. BILLET OR CANADA WED SAWS.

Length	28	30	32	34	36	39	42	45	48	51	54	57	60	inches.
PRICE	35/-	39/-	44/-	46/-	54/-	61/-	66/-	79/-	103/-	109/-	113/-	123/-	140/-	per doz.

No. 1335 A. SPAN OR TAD WED SAWS.

Length	12	14	16	18	20	22	24	26	28	30	32	34	36	inches.
PRICE	18/-	21/-	24/-	27/-	30/-	33/-	36/-	39/-	42/-	45/-	48/-	51/-	54/-	per doz.

No. 1332. WEDS FOR CUTTING IRON OR BRASS.

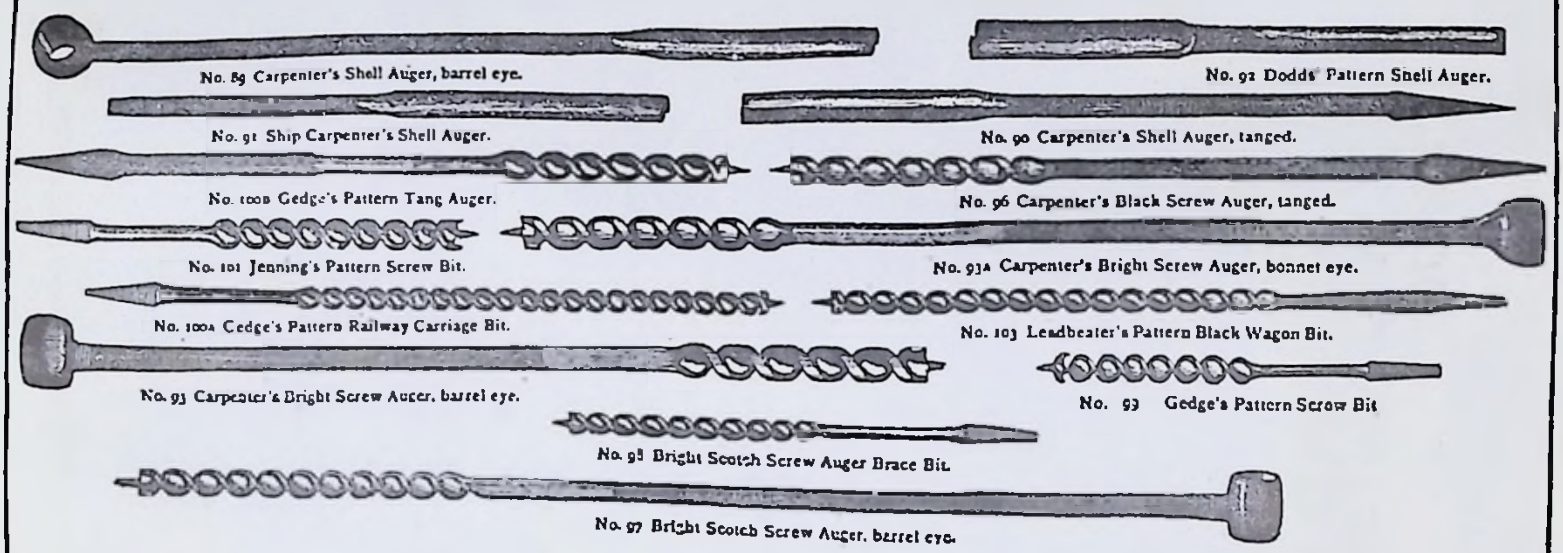
Length	8	9	10	11	12	13	14	15	inches.
PRICE	10/-	11/-	12/-	13/-	14/-	15/-	16/-	17/-	per doz.

CROSS-CUT SAWS (for Timber and Stone).

Length .. .. feet	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10
1346 Cross-cut C.S., PRICE, each	13/-	15/-	18/-	19/-	22/-	24/-	26/-	33/-	39/-	45/-	54/-	62/-	72/-
1347 ,, warranted, ,,	14/-	16/-	19/-	20/-	24/-	25/-	28/-	34/-	42/-	48/-	58/-	66/-	76/-
1351 Stone Saw, ,,			44/-	25/-	28/-	32/-	34/-	38/-	48/-				

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AUGERS AND BITS.



CARPENTERS' AUGERS, 1 in., 18 in. LONG UP TO EYE.

		3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/8	2 1/4	3	inches.
89	Carpenters' Shell Auger, barrel eye, 12 in. shank	14/-	16/-	19/6	21/-	24/-	26/6	32/-	35/-	40/-	43/-	50/6	55/-	65/-		per dozen.
89A	Ditto ditto bonnet do ditto	12/6	14/-	17/6	19/-	21/6	24/-	29/6	32/6	37/6	40/6	48/-	52/-	62/-		"
90	Ditto ditto tanged	9/-	9/-	10/6	13/6	15/-	17/-	18/6	23/-	25/-	30/-	32/-	38/6	42/-	51/-	"
91	Ship Carpenters' Shell Auger	12/6	12/6	13/-	16/-	18/6	21/6	25/6	28/-	32/-	36/6	39/-	44/-	48/-	60/-	"
92	Dodd's Pattern Shell Auger	9/-	9/-	10/6	13/6	15/-	17/-	18/6	23/-	25/-	30/-	32/-	38/6	42/-	51/-	"
93	Carpenters' Bright Screw Auger, barrel eye, 12-in. shank	20/6	20/6	22/6	25/6	28/-	31/6	35/6	40/-	46/-	51/6	56/6	61/6	72/-	72/-	"
93A	Ditto ditto ditto bonnet do. ditto	18/6	18/6	20/6	23/6	26/-	29/-	33/-	37/6	43/6	49/-	54/-	59/-	69/-	75/-	"
94	Ditto Black ditto barrel do. ditto	18/-	18/-	19/6	22/-	24/6	28/-	31/6	35/-	38/6	44/6	49/-	53/6	63/-	69/-	"
94A	Ditto ditto ditto bonnet do. ditto	16/-	16/-	17/6	20/-	22/6	25/6	29/-	32/6	36/-	42/-	46/6	51/-	60/-	66/-	"
95	Ditto Bright ditto tanged	15/6	15/6	16/6	19/6	22/-	24/6	27/6	31/-	36/-	41/-	45/6	49/6	59/-	64/-	"
96	Ditto Black ditto ditto	13/-	13/-	14/-	16/-	18/6	21/-	23/6	26/-	28/6	34/-	38/-	41/6	50/-	55/-	"
	Any of the above with Bright Noses	3/-	3/-	3/6	4/-	4/6	5/-	5/6	6/-	6/6	7/-	7/6	8/-	9/-	10/-	"
97	Bright Scotch Screw Auger, barrel eye	23/-	23/-	26/-	31/6	34/6	39/-	43/6	50/-	53/6	60/-	64/-	72/-	77/-	85/-	per doz. extra.
97A	Ditto ditto bonnet do.	21/-	21/-	24/-	29/6	32/6	36/6	41/-	47/6	51/-	57/6	61/6	69/6	74/-	82/-	per dozen.
97B	Black ditto barrel do.	20/6	20/6	23/6	28/-	31/6	35/-	38/6	42/-	51/-	56/-	59/-	67/-	73/6	80/-	"
97C	Ditto ditto bonnet do.	18/6	18/6	21/6	26/-	29/6	33/6	36/-	37/6	48/6	53/6	56/6	64/6	70/6	77/-	"
97D	Bright ditto tanged	18/-	18/-	20/6	25/6	28/6	32/-	35/6	41/-	43/6	49/6	53/-	60/-	64/-	72/-	"
97E	Black ditto ditto	15/6	15/6	18/-	22/-	25/6	29/-	30/6	33/-	42/-	45/6	48/-	55/-	60/6	68/-	"
	Any of the above with Bright Noses	4/-	4/-	4/6	5/-	5/6	6/-	6/6	7/-	7/6	8/-	9/-	10/-	11/-	12/-	"
	Any of the above with Trace Spur, or Nicker	3/-	3/-	3/-	3/5	3/6	4/-	4/6	5/-	6/-	7/-	8/-	9/-	11/-	12/-	"

per doz. extra

BRACE AUGER BITS, BRIGHT AND BLACK. Augers above length named in List charged extra per inch.

		3/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/8	1 1/4	1 3/8	1 1/2	inches.
98	Bright Scotch Screw Auger Brace Bits, ½ in., 8 in. long	18/-	18/-	18/-	18/-	18/-	20/-	22/-	24/-	24/-	25/6	27/-	28/-	30/-	34/-	38/-	43/-	48/-	per dozen.
	Black insides and bright on edge	16/6	16/6	16/6	16/6	16/6	18/-	20/-	22/-	23/-	23/-	24/6	27/-	27/-	30/6	34/6	39/-	44/-	"

CEDGE'S, JENNING'S, AND LEADBEATER'S PATTERN AUGERS AND BITS.

		3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/8	2 1/4	2 3/8	2 1/2	ins
99	Gedge's Pattern Screw Bits, ½ in., 8 in. long	20/-	20/-	20/-	20/-	20/-	22/-	24/-	26/-	28/-	29/-	30/-	32/6	35/-	37/-	39/-	42/-	44/-	49/-	54/-							doz.
100	Do. do. Dowell Bits, 3/4 in., and 4 in. long	20/-	20/-	20/-	20/-	20/-	22/-	24/-	25/-	28/-	29/-	30/-	32/6	35/-													"
100A	Do. do. Railway Carriage Bits, 1 in., 10 in. barrel			35/6	36/-	38/-	39/-	40/6	42/6	43/-	45/-	47/-	49/-	52/-	54/6	59/-	62/6	65/6	75/6	78/-							"
100B	Do. do. Tang Augers, 1 in., with 6-in. twist or screw			31/6	31/6	31/6	31/6	31/6	32/6	32/6	34/6	34/6	36/-	39/-	49/-	52/6	56/6	61/6	68/-	69/-	73/6	90/-	104/-	134/-	174/-		"
100C	Do. do. Eyed Auger, 12 in. shank, 1 in., 6 in. screw or twist			37/-	37/-	37/-	41/6	41/6	41/6	41/6	43/6	43/6	49/-														"
100D	Do. do. Scotch Augers, 1 in., 8-in. screw or twist, 17-in. shank, barrel-eyed, full length up to eye, 25 in.																										"
101	Jenning's Pattern Screw Bits	24/-	24/-	24/-	26/-	28/-	31/-	34/-	37/-	40/-	44/-	47/-	50/-	53/6	57/6	61/6	65/6	75/6	83/6	92/6	108/-	124/-	164/-	214/-			"
102	Do. do Dowell Screw Bits	24/-	24/-	24/-	26/-	28/-	30/-	34/-	37/-	40/-	44/-	47/-	50/-	53/6													"
103	Leadbeater's Pattern Black Wagon Bits, bright edges, 1 in., 10-in. barrel or twist	27/6	27/6	27/6	28/-	30/-	32/-	32/6	33/6	34/6	35/6	37/-	38/6	41/-	43/-	46/6	48/6	51/-	60/-	63/-							"
103A	Leadbeater's Pattern Wagon Bits, bright all through, 1 in., 10-in. barrel or twist	32/6	32/6	32/6	33/-	35/-	36/-	37/6	38/6	39/6	42/6	43/-	45/-	48/-	50/-	54/6	55/6	60/-	70/-	80/-							"
103B	Gedge's Pattern Nose Black Wagon Bits, bright edge, 10-in. barrel	32/6	32/6	32/6	32/6	32/6	33/6	35/-	36/-	37/-	38/-	40/-	42/-	44/6	47/-	50/-	52/3	56/-	65/-	74/-							"
103C	Do. do. Nose Bright Wagon Bits	34/6	34/6	34/6	35/-	37/-	38/-	39/6	40/6	42/-	44/-	46/-	48/-	51/-	53/6	58/-	60/5	64/6	75/-	80/-							"

FILES AND RASPS.

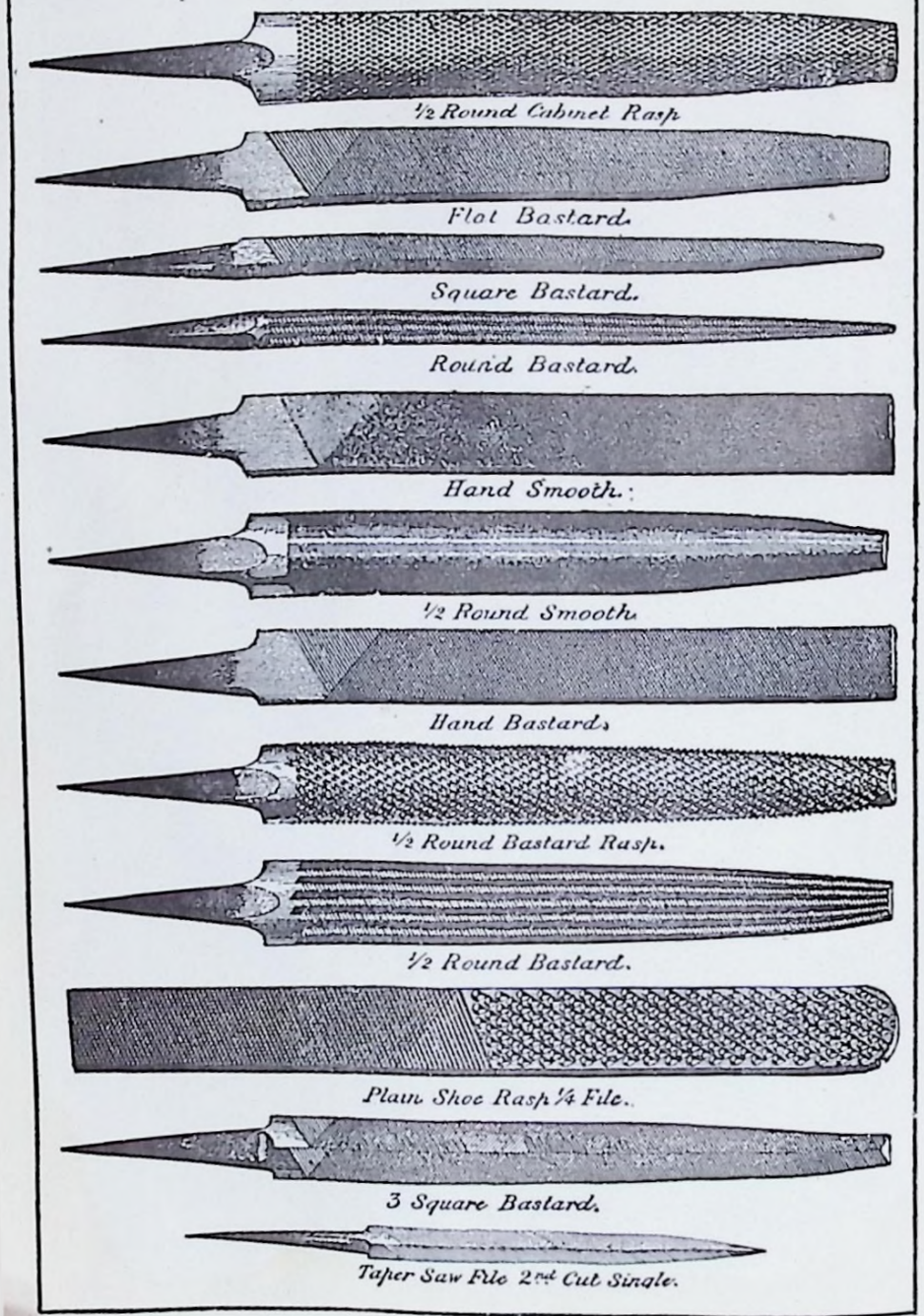
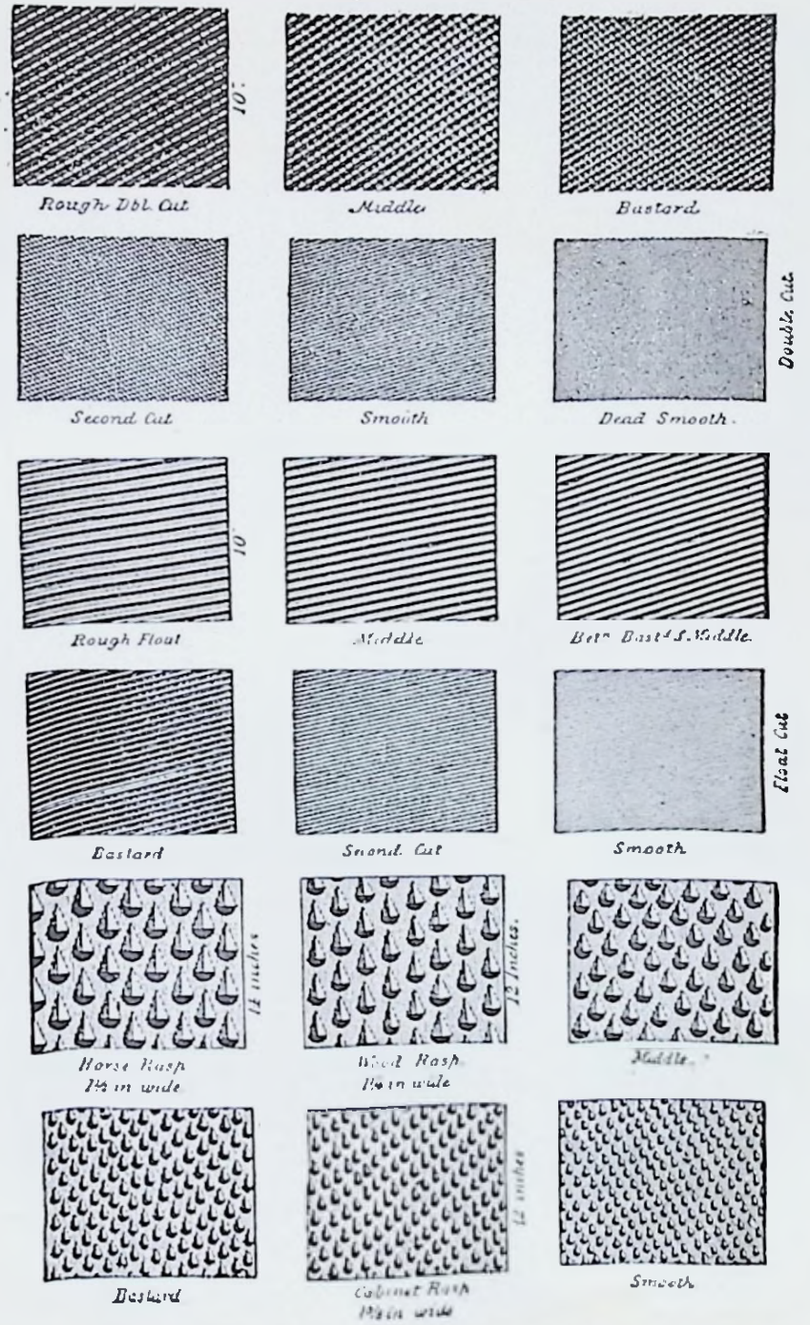


ILLUSTRATION OF CUTTING.



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FILES.

Flat, Half-round, Square, Round, Entering, Taper Cotter, Horse, Shoe, Flat, and Half-round Rasps. Mill Saws, one or two Square Edges, Single and Double Cut. Topping Files, Single and Double, left at Point, and Safe Edges.

In.	Rough and Bastard. PER DOZ. £ s. d.	2nd Cut, Flat and ½-Round Gunstock & Round Rasps PER DOZ. £ s. d.	Smooth and Cabinet Files and Rasps PER DOZ. £ s. d.	Dead Smooth and extra Smooth Cabinets PER DOZ. £ s. d.	In.	Rough and Bastard. PER DOZ. £ s. d.	2nd Cut, Flat and ½-Round Gunstock & Round Rasps PER DOZ. £ s. d.	Smooth and Cabinet Files and Rasps. PER DOZ. £ s. d.	Dead Smooth and extra Smooth Cabinets PER DOZ. £ s. d.
1–4	0 4 9	0 5 6	0 6 9	0 10 3	11½	1 0 0	1 2 0	1 5 0	1 18 0
4½	0 5 3	0 6 0	0 7 6	0 11 3	12	1 1 6	1 4 0	1 6 6	2 0 0
5	0 5 9	0 6 9	0 8 3	0 12 6	12½	1 3 0	1 5 6	1 8 0	2 2 0
5½	0 6 3	0 7 6	0 9 0	0 13 6	13	1 5 0	1 7 0	1 10 0	2 5 0
6	0 7 0	0 8 3	0 9 6	0 14 6	14	1 10 0	1 13 0	1 16 0	2 14 0
6½	0 7 6	0 8 9	0 10 6	0 15 9	15	1 16 0	1 19 0	2 2 0	3 3 0
7	0 8 6	0 9 9	0 11 6	0 17 6	16	2 3 0	2 7 0	2 12 0	3 18 0
7½	0 9 6	0 10 9	0 12 3	0 18 6	17	2 10 0	2 15 0	3 3 0	4 14 0
8	0 10 6	0 12 0	0 13 6	1 0 0	18	3 0 0	3 5 0	3 14 0	5 11 0
8½	0 11 0	0 12 9	0 14 6	1 2 0	19	3 8 0	3 15 0	4 4 0	6 6 0
9	0 12 0	0 13 0	0 15 6	1 3 6	20	4 1 0	4 9 0	4 19 0	7 9 0
9½	0 13 6	0 15 3	0 17 0	1 5 6	21	4 13 0	5 1 0	5 13 0	8 10 0
10	0 15 0	0 17 0	0 19 0	1 8 6	22	5 6 0	5 15 0	6 8 0	9 12 0
10½	0 16 6	0 18 6	1 0 6	1 11 0	23	6 1 0	6 12 0	7 6 0	11 0 0
11	0 18 0	1 0 0	1 3 0	1 15 0	24	7 0 0	7 11 0	8 6 0	12 10 0

EXTRAS.—All above 24 in., 20s. per in. extra. Flat Files, double cut on the edge, to advance ½ in. Topping, Square Cut Edges, to advance 1 in. Mill Saw, two Round Edges, advance ½ in. Feather Edge and Knife Files, to advance ¼ in.

Three-square, Hand, Equalling one Safe Edge, Parallel Cotter, Pillar, Needle, Round-off, Bone, Pottance, one Round Edge Flat, Extra Thin Flat and Warding, and Flat and High Back Half-round.

In.	Rough and Bastard. PER DOZ. £ s. d.	2nd Cut. PER DOZ. £ s. d.	Smooth PER DOZ. £ s. d.	Dead Smooth. PER DOZ. £ s. d.	In.	Rough and Bastard. PER DOZ. £ s. d.	2nd Cut. PER DOZ. £ s. d.	Smooth. PER DOZ. £ s. d.	Dead Smooth PER DOZ. £ s. d.
1–4	0 5 3	0 6 0	0 7 6	0 11 3	11½	1 3 0	1 5 6	1 8 0	2 2 0
4½	0 5 9	0 6 9	0 8 3	0 12 6	12	1 5 0	1 7 0	1 10 0	2 5 0
5	0 6 3	0 7 6	0 9 0	0 13 6	12½	1 8 0	1 10 0	1 13 0	2 10 0
5½	0 7 0	0 8 3	0 9 6	0 14 6	13	1 10 0	1 13 0	1 16 0	2 14 0
6	0 8 6	0 9 9	0 11 6	0 17 6	14	1 16 0	1 19 0	2 2 0	3 3 0
6½	0 9 6	0 10 9	0 12 3	0 18 6	15	2 3 0	2 7 0	2 12 0	3 18 0
7	0 10 6	0 12 0	0 13 6	1 0 0	16	2 10 0	2 15 0	3 3 0	4 14 0
7½	0 11 0	0 12 9	0 14 6	1 2 0	17	3 0 0	3 5 0	3 14 0	5 11 0
8	0 12 0	0 13 6	0 15 6	1 3 6	18	3 8 0	3 15 0	4 4 0	6 6 0
8½	0 13 6	0 15 3	0 17 0	1 5 6	19	4 1 0	4 9 0	4 19 0	7 9 0
9	0 15 0	0 17 0	0 19 0	1 8 6	20	4 13 0	5 1 0	5 13 0	8 10 0
9½	0 16 6	0 18 6	1 0 6	1 11 0	21	5 0 0	5 15 0	6 8 0	9 12 0
10	0 18 0	1 0 0	1 3 0	1 15 0	22	6 1 0	6 12 0	7 6 0	11 0 0
10½	1 0 0	1 2 0	1 5 0	1 18 0	23	7 0 0	7 11 0	8 6 0	12 10 0
11	1 1 6	1 4 0	1 6 6	2 0 0	24	7 19 0	8 12 0	9 8 0	14 2 0

EXTRAS.—All above 24 in., 20s. per in. extra. Pin Files and Tanged Horse Rasps, to advance 1 in. Round-off, with points, to advance 1 in. Needle exceeding breadth of Hand Files, as Equalling cut on both edges. Equalling and Cotter Files, extra thin, to advance 1 in.

Hand and Equalling cut both Edges, or with one Double Cut Edge, Flat with two Round Edges. Lock, Arch, Rifler, Tumbler, Oval Saw Files, Cant, Taper Cross, Bollied Three Square. Double Tanged Mill Saw, Topping two Round Edges.

In.	Rough and Bastard. PER DOZ. £ s. d.	2nd Cut. PER DOZ. £ s. d.	Smooth. PER DOZ. £ s. d.	Dead Smooth. PER DOZ. £ s. d.	In.	Rough and Bastard. PER DOZ. £ s. d.	2nd Cut. PER DOZ. £ s. d.	Smooth PER DOZ. £ s. d.	Dead Smooth. PER DOZ. £ s. d.
1–4	0 6 3	0 7 0	0 9 0	0 13 6	11½	1 5 0	1 7 0	1 10 0	2 5 0
4½	0 7 0	0 8 3	0 9 6	0 14 6	12	1 7 0	1 10 0	1 13 0	2 10 0
5	0 7 6	0 8 9	0 10 6	0 15 9	12½	1 10 0	1 13 0	1 16 0	2 14 0
5½	0 8 6	0 9 9	0 11 6	0 17 6	13	1 13 0	1 16 0	1 19 0	2 19 0
6	0 9 6	0 10 9	0 12 3	0 18 6	14	1 19 0	2 3 0	2 8 0	3 10 0
6½	0 10 6	0 12 0	0 13 6	1 0 0	15	2 6 0	2 11 0	2 18 0	4 6 0
7	0 11 6	0 12 9	0 14 6	1 2 0	16	2 15 0	3 0 0	3 7 0	5 2 0
7½	0 12 6	0 13 6	0 15 6	1 3 6	17	3 4 0	3 10 0	3 19 0	5 18 0
8	0 13 6	0 15 3	0 17 0	1 5 6	18	3 14 0	4 2 0	4 11 0	6 18 0
8½	0 15 0	0 17 6	0 19 0	1 8 6	19	4 7 0	4 15 0	5 6 0	8 0 0
9	0 16 6	0 18 6	1 0 6	1 11 0	20	5 0 0	5 8 0	6 0 0	9 0 0
9½	0 18 0	1 0 0	1 3 0	1 15 0	21	5 14 0	6 3 0	6 16 0	10 6 0
10	1 0 0	1 2 0	1 5 0	1 18 0	22	6 11 0	7 1 0	7 16 0	11 16 0
10½	1 1 6	1 4 0	1 6 6	2 0 0	23	7 10 0	8 1 0	9 2 0	13 14 0
11	1 3 0	1 5 6	1 8 0	2 2 0	24	8 8 0	9 2 0	10 8 0	15 12 0

EXTRAS.—All above 24 in., 20s. per in. extra. Hand and Equalling with 1 Round Edge, advance ½ in., with 2 Round Edges, advance 1 in.; if double cut, 2 in. Two-tanged Mill Saw, 1 Round Edge, advance ½ in.; 2 Round Edges, advance 1 in.

SAW FILES.

Inches	TAPER SAW FILES. 2nd Cut Single. Per Doz. £ s. d.	2nd Cut Double. Per Doz. £ s. d.	Smooth Single. Per Doz. £ s. d.	PIT SAW FILES AND GULLETING. 2nd Cut Single. Per Doz. £ s. d.	2nd Cut Double. Per Doz. £ s. d.	Blunt, Segment Saw Files, and Taper cut to Point. Bastard Single or 2nd Cut Single. Per Doz. £ s. d.	Blunt, 2nd Cut Double, Gin Saw, and Band Saw, 2nd Cut Single. Per Doz. £ s. d.
1 to 3½	0 4 0	0 4 9	0 5 6	0 4 9	0 5 9	0 5 0	0 6 6
4	0 4 6	0 5 3	0 6 0	0 5 3	0 6 3	0 5 6	0 7 6
4½	0 5 0	0 6 0	0 6 3	0 5 9	0 6 9	0 6 6	0 8 6
5	0 5 6	0 6 6	0 7 0	0 6 6	0 7 6	0 7 6	0 9 6
5½	0 6 6	0 7 6	0 8 0	0 7 6	0 8 6	0 8 6	0 10 6
6	0 7 6	0 8 6	0 9 0	0 8 6	0 9 6	0 9 6	0 12 0
6½	0 8 6	0 9 6	0 10 0	0 9 6	0 10 6	0 10 6	0 13 6
7	0 9 6	0 11 0	0 11 0	0 10 6	0 12 0	0 12 0	0 15 6
7½	0 10 6	0 12 0	0 12 6	0 12 0	0 13 6	0 13 6	0 17 6
8	0 12 0	0 13 6	0 14 0	0 13 6	0 14 6	0 15 6	0 19 6
8½	0 13 6	0 15 0	0 15 6	0 14 6	0 16 0	0 17 6	1 1 6
9	0 15 6	0 17 0	0 17 0	0 16 0	0 17 6	0 19 6	1 4 0
9½	0 17 6	0 19 6	0 19 6	0 18 0	0 19 6	1 1 6	1 6 6
10	0 19 6	1 1 0	1 1 0	1 0 0	1 2 0	1 4 0	1 9 0
11	1 4 0	1 6 0	1 6 0	1 5 0	1 7 0	1 9 0	1 14 0
12	1 9 0	1 11 0	1 11 0	1 10 0	1 12 0	1 14 0	2 0 0
13	1 14 0	1 17 0	1 17 0	1 16 0	1 19 0	2 0 0	
14	2 0 0	2 3 0	2 3 0	2 3 0	2 6 0		

REAPER KNIFE FILES.

In.	PLAIN AND SWAGED. Single. Per Doz. £ s. d.	PLAIN AND SWAGED. Double. Per Doz. £ s. d.	KNIFE SHAPE. Single. Per Doz. £ s. d.	KNIFE SHAPE. Double. Per Doz. £ s. d.	CANT SHAPE. Single. Per Doz. £ s. d.	CANT SHAPE. Double. Per Doz. £ s. d.
7	0 8 6	0 9 0	0 8 6	0 9 6	0 12 6	0 13 6
8	0 9 3	0 10 0	0 9 6	0 10 6	0 13 6	0 14 9
9	0 11 6	0 12 9	0 11 9	0 13 3	0 16 3	0 17 6
10	0 13 6	0 15 6	0 13 9	0 16 0	0 19 0	1 1 3

EXTRAS.

Rubbers, Rough and Bastard ..... 1/3 per lb.
Do. Second Cut ..... 1/5 ,,
Do. Smooth ..... 1/7 ,,

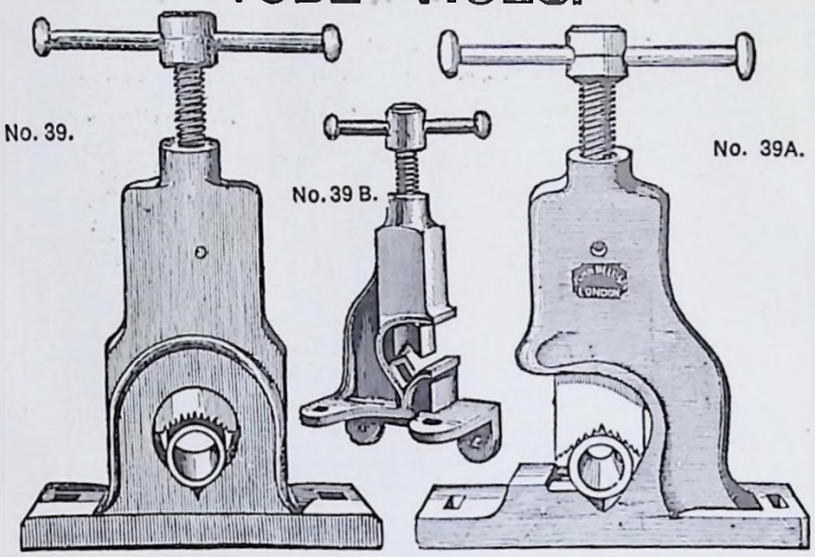
	Rough and Bastard.	2nd Cut.	Smooth.
1 lb. Rubber	1/8 per lb.	1/9 per lb.	1/10 per lb.
2 ,, do.	1/5 ,,	1/6 ,,	1/7 ,,
3 ,, do.	1/4 ,,	1/5 ,,	1/6 ,,

Strong Flat Files and Half-thicks, Rough and Bastard ..... 1/5 ,,
Strong Flat Files & Half-thicks, Second Cut 1/7 ,,
Files made extra strength to advance in proportion.
All quarter inches, the price of the next size above.
Round, Half-Round, and Cross Files, Double Cut Second Cut, to advance half an inch.
Do. Double Cut Smooth, to advance 1 inch.
Flat, Three-square and Hand Files, Rough and Middle Cut above 14 inches, 6d. per dozen extra to Bastard Cut.

New Cut Files to advance 1 inch.
Strong Flat Files and Half-thicks, Smooth Bastard 1/9 per lb.
Three-square and Half-round 1d. per lb. extra to Flat Files.
Horse Mouth Rasps, 5/- each.
Bread Rasps, handled, 30/- per dozen.
Single Improved Shoe Rasps, ½-inch on Flat price.
Double do. do. 1 do.
Last Makers' Rasps, to advance 2 inches.
Saddle Tree Rasps, to advance 3 inches.
All Parallel Files to advance 1 inch on their respective descriptions.
Taper Saw Files, Double Cut Smooth, to advance ½ inch on Single Smooth.
Frame Equalling Saw Files, 3 inches on Pit Saw Price.
Taper Pit Saw Files, and Cut Single, advance ½ inch on Pit Saw File Price.

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TUBE VICES.

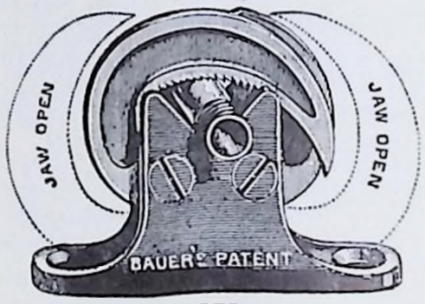


PRICES.

For Tubes. Inches ...	⅛ to ¼	⅛ to 1	¼ to 1¼	¼ to 2	¼ to 3	1 to 4	2 to 6
Numbers	1	2	3	4	5	6	7
No. 39. Each... ...	...	...	12/6	18/-	27/-	...	...
,, 39A. ,, ...	...	...	12/6	18/-	27/-	50/-	100/-
,, 39B. ,, ...	8/6	10/-	...	...	...	...	...

SELF-GRIPPING TUBE VICE.

No. 40.

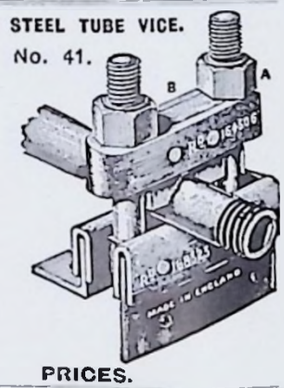


PRICES.

For Tubes ...	¼ to 1¼ in.	¼ to 2¼ in.
Numbers ...	8	9
Each	7/6	15/-

SHEET STEEL TUBE VICE.

No. 41.



PRICES.

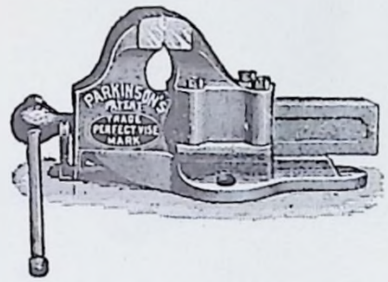
For Tubes ...	⅛ to 1½ in.	½ to 3 in.
Numbers ...	10	11
Each	9/-	21/-

For Pipe Clamps for attaching to ordinary Vices, see Index.

PATENT "PERFECT" VICE.

This Vice combines all the advantages of the continuous screw vice, with the quickness and economy of the sudden-grip vice, giving at the same time increased gripping power.

ENGINEERS' VICE.



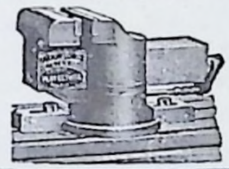
No.	Width of Jaw.	Opening.	Weight.	Price.
	In.	In.	lbs.	£ s. d.
5	3½	4	34½	1 8 0
6	3½	4½	43	1 14 0
7	4½	5	61	2 0 0
8	5¼	6½	77	2 6 0
8A	6	6½	80	2 12 0
9	6½	8½	112	2 18 0
9A	7	9½	171	4 0 0
9B	8½	12	268	7 10 0
9B	8½	12	269	8 0 0
With Adjustable Front Pillar ..				
Portable Stands .. ..extra				2 7 6

PLANING MACHINE VICE.



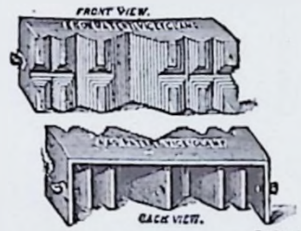
No.	Width of Jaw.	Opening.	Weight.	Price.
	In.	In.	lbs.	£ s. d.
13	6½	9	120	4 15 0
14	5¼	8½	60	4 0 0
15	10	15	366	8 0 0

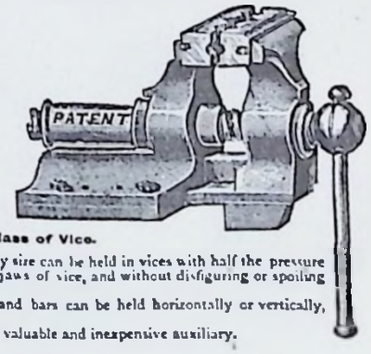
SHAPING MACHINE VICE.



No.	Width of Jaw.	Opening.	Weight.	Price.
	In.	In.	lbs.	£ s. d.
12	5¼	5½	56	3 5 0

PATENT DETACHABLE VICE CLAMP.





Suitable for any class of Vice.

With this valuable invention, tubes or round bars of any size can be held in vices with half the pressure formerly required, and without any risk of straining the jaws of vice, and without disfiguring or spoiling the article worked upon.

The detachable jaws are so constructed that tubes and bars can be held horizontally or vertically, affording great facility in their manipulation.

Every one who uses a vice should be supplied with this valuable and inexpensive auxiliary.

PRICES.

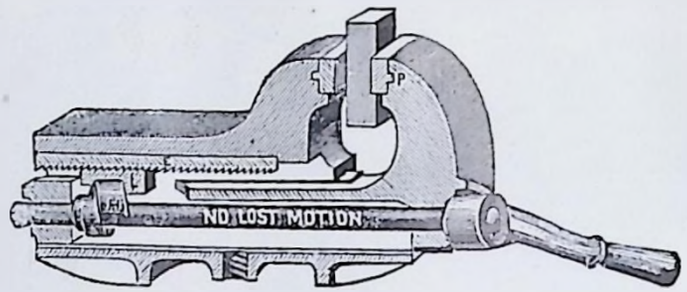
Suitable for Jaws of Vices	3	3½	4	4½	5	5½	6	Inch.
Price	3/9	4/6	5/-	6/-	6/9	7/6	8/9	each.

They can be fitted to any intermediate size of vice by adjusting the set pins.

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THE "INSTANTANEOUS GRIP" VICE

For Engineers, Machinists, Brass Finishers, &c.



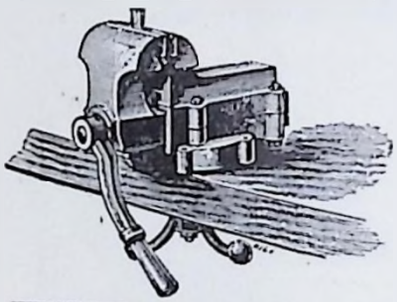
SECTIONAL VIEW.

This view shows the Steel Racks E and L engaged, and the work firmly fastened between the jaws. By raising the handle to a vertical position, the Cam H drops Rack L out of engagement with Rack E; the Loose Jaw is then at liberty to be moved in or out to suit any work within the scope of the Vice.

The method of fixing the Steel Jaws enables them to be removed for re-cutting, or Lead or Copper Jaws can, if required, be fitted in their place.

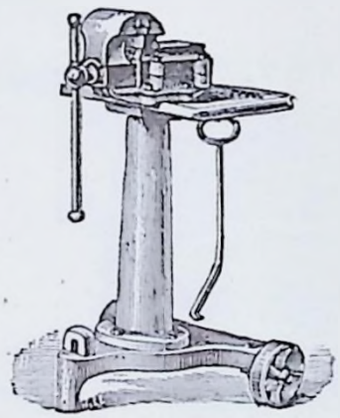
FITTER'S BENCH VICE.

(All engaging parts Steel.)



Size.	Width of Jaw.	Opens.	Price. £ s. d.
No. 0 E	3 inches	3 inches	1 8 0
No. 01 E	4 ,,	4 ,,	1 18 6
No. 1 E	5 ,,	5 ,,	2 8 0
No. 2 E	6 ,,	6½ ,,	2 15 6
No. 3 E	7 ,,	8½ ,,	4 0 0

PORTABLE VICE.

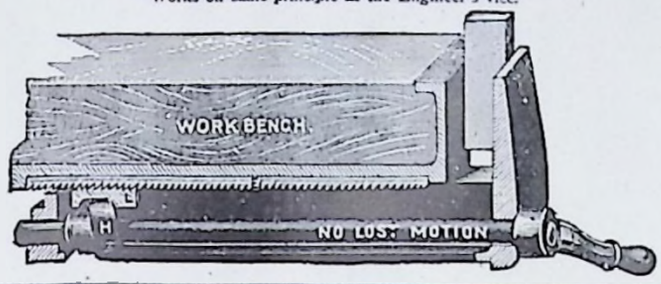


Size.	Width of Jaw.	Opens.	Price. £ s. d.
No. 1 S...	5 inches	5 inches	4 10 0
No. 2 S...	6 ,,	6½ ,,	5 5 0
No. 3 S...	7 ,,	8½ ,,	6 0 0

THE "INSTANTANEOUS GRIP" VICE.

For Joiners, Cabinet Makers, and Pattern Makers.

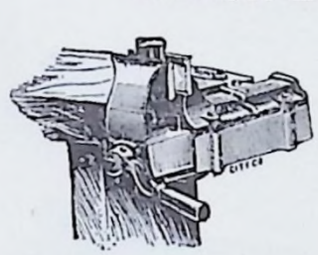
Works on same principle as the Engineer's vice.



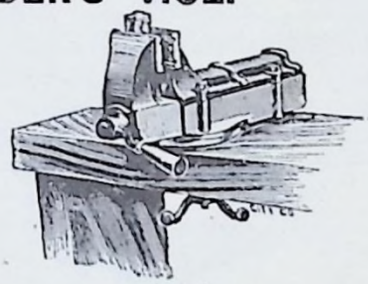
Size.	Width of Jaws.	Opens.	Iron Racks with Cast Teeth.	Steel Racks with Machine Cut Teeth.
No. 0 J Amateur's	7½ in.	6 in.	12/6	15/6
No. 1 J Joiner's without Bench Hook	9 ,,	12 ,,	14/-	17/-
No. 1 J Joiner's with ditto	9 ,,	12 ,,	15/-	18/-
No. 1½ J Joiner's without ditto	10½ ,,	13 ,,	17/-	20/-
No. 1½ J Joiner's with ditto	10½ ,,	13 ,,	18/-	21/-

Jaws drilled to receive Wood Facings.

COACH-BUILDER'S VICE.



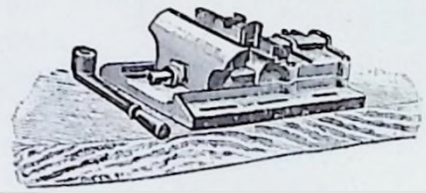
No. 2 J.



No. 3 J.

Size.	Width of Jaws.	Opens.	Price.
No. 2 J To bolt at end of table	4½ in.	9 in.	33/-
No. 3 J To bolt on top of table	4¾ ,,	9 ,,	33/-

DRILLING, PLANING, OR SHAPING MACHINE VICE.

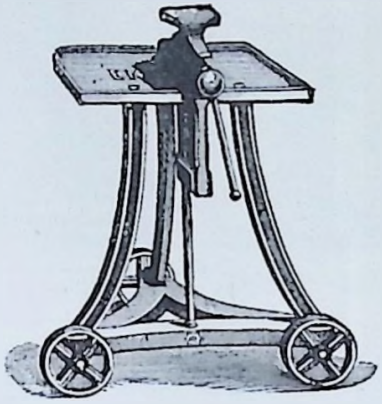


Size.	Width of Jaws.	Opens.	Price.
No. 6 E	5½ inches	6½ inches	£3 15 0
No. 7 E	6 ,,	8½ ,,	4 15 0
No. 8 E	9 ,,	8½ ,,	5 10 0
No. 9 E	12 ,,	8½ ,,	6 10 0

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IMPROVED PORTABLE BENCH VICES

COMPLETE.

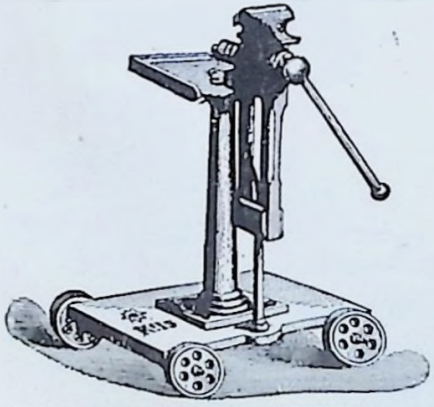


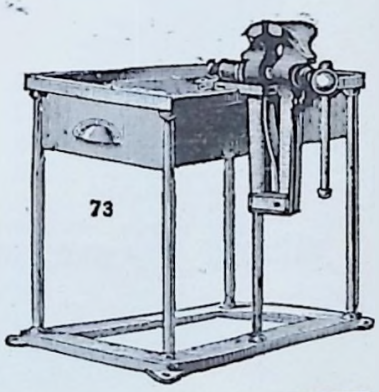
With Wheels.

No.		Price. £ s. d.
14E	Fitted with 6 in. Vice	4 2 6
14F	,, 5 ,,	3 15 0
14G	,, 4½ ,,	3 5 0
14H	,, 3½ ,,	2 12 0

Without Wheels.

No.		Price. £ s. d.
14	Fitted with 6-in. Vice	3 12 6
14A	,, 4½ ,,	2 15 0
14B	,, 3½ ,,	2 5 0

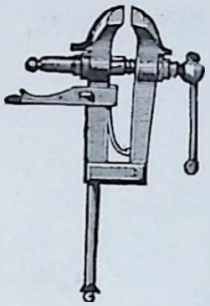




No.		Price. £ s. d.
13	Fitted with 4½-in. Vice	3 12 6
	,, 5 ,,	4 0 0
	,, 5½ ,,	4 10 0
	,, 6 ,,	5 5 0

No.		Price. £ s. d.
73	Fitted with 6-in. Vice	4 5 0
73A	,, 5 ,,	3 16 0
73B	,, 4½ ,,	3 5 0

If fitted with drawer 15/- extra.



ORDINARY PATTERN STAPLE LEG VICE

With Solid Box.

Best quality	56/- per cwt.
Second quality	45/- ,,

CAST IRON SWAGE BLOCKS AND STANDS.

Swage Blocks	16/- per cwt.
Stand	16/- ,,



Sizes in inches.	Average Weight of Blocks.
13 × 13 × 4½	1¼ cwt.
14 × 14 × 4½	1½ ,,
16 × 16 × 6	2½ ,,
20 × 20 × 7	4½ ,,

ANVILS.



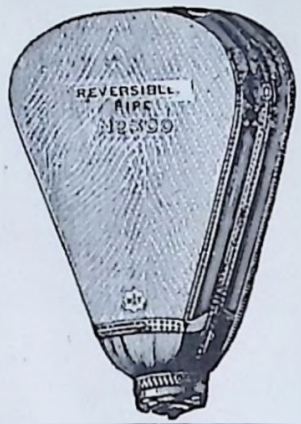
Best quality	35/- per cwt.
Second quality	28/- ,,
Cast Iron Stands ...	16/- ,,

SMITHS' TOOLS.

Hot and Cold Sets...	1/- Per lb.
Set Hammers	1/- ,,
Top and Bottom Swages	1/- ,,
Square and Round Punches	1/- ,,
Top and Bottom Fullers	1/- ,,
Tongs (Close or Open Mouth) and Firing Tools ...	9d. ,,

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REVERSIBLE PIPE SMITH'S BELLOWS.



No. 300.

With Patent "Reversible Pipe," for Exportation.

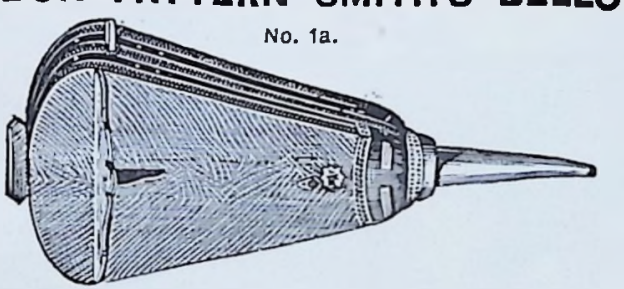
By reversing or inserting the pipe in the Bellows, they contain less than one half the usual shipping measurement, while they are not liable to damage during exportation.

Size ...	16	18	20	22	24	26	28	30	32 inches.
PRICE.	32/-	38/-	46/-	54/-	64/-	75/-	84/-	100/-	115/- per pair.
Size ...	34	36	38	40	42	44	46	48	50 inches.
PRICE.	137/-	176/-	220/-	276/-	330/-	390/-			per pair.

ORDINARY

LONDON PATTERN SMITH'S BELLOWS.

No. 1a.

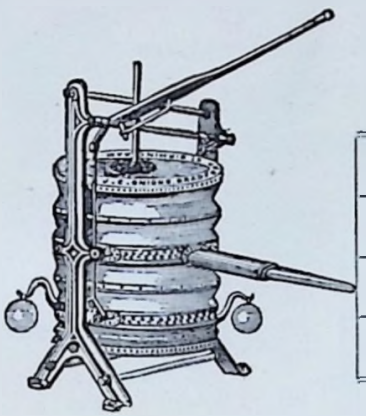


Size ..	16	18	20	22	24	26	28	30	32 inches.
PRICE.	32/-	38/-	46/-	54/-	64/-	75/-	84/-	100/-	115/- per pair.
Size ..	34	36	38	40	42	44	46	48	50 inches.
PRICE.	137/-	176/-	220/-	276/-	330/-	390/-			per pair.

Best warranted, extra leather and nailed.
" " double nailed.
In ordering, please state which quality.

Galvanized ironwork and packing charged extra.

FORGES.



PATENT DOUBLE-BLAST CIRCULAR BELLOWS.

Mounted in Iron Frame complete.

No. 9.

Size...	18	20	22	24	26	28	inches.
PRICE	115/-	132/-	154/-	176/-	198/-	230/-	per pair.
Size...	30	32	34	36	38	40	inches.
PRICE	268/-	300/-	375/-	400/-			per pair.

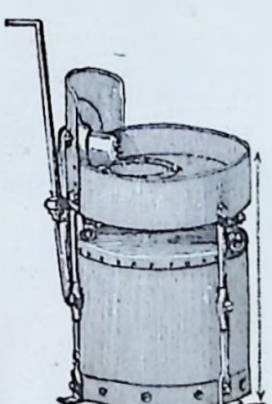
Weights charged extra.



IMPROVED SINGLE-BLAST DECK OR RIVET FORGE.

No 4.

No.	Width.	Height.	Diameter Bellows.	PRICE.
	ft. in.	ft. in.	in.	£ s. d.
4A	1 6	2 4	16	2 12 0
4	1 8	2 4	18	2 15 0
4B	1 10	2 4	20	3 3 0
4F	2 0	2 10	22	3 10 6
4C	2 2	2 10	24	4 4 0

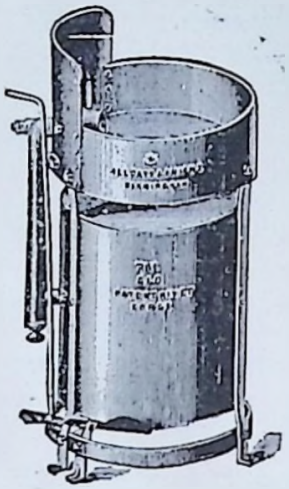


PATENT CIRCULAR IRON-ENCASED RIVET FORGE.

No.	Diameter Bellows.	Height.	PRICE.
	in.	in.	£ s. d.
A33	20	32	4 15 0
A34	22	32	5 0 0
A35	24	32	5 12 0
A36	26	32	6 5 0
A37	28	32	7 0 0

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FORGES.



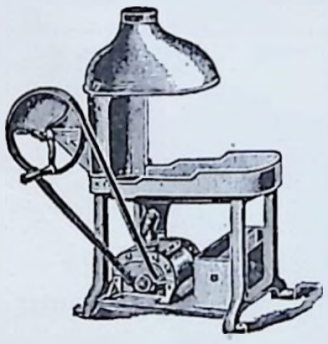
Light Pattern

PATENT CIRCULAR IRON-ENCASED RIVET FORGE.

No.	Diam. Bellows.	Pan.	Price.
	in.	in.	£ s. d.
1	16	18	2 5 0
2	18	20	2 7 6
3	20	22	2 10 0

"BRANSTON" PATENT RIVETING FORGE,

Rotary Motion.



No	Diam. of Pan.	Height.	Price.
	in.	in.	£ s. d.
A 260	20	30	3 15 0
A 261	24	32	4 10 0

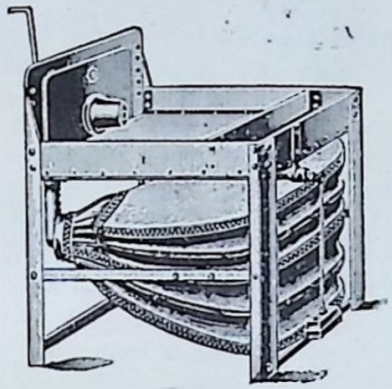
If fitted with Patent Fire Screen, Water Cistern, or Tool Chest, the price will be extra.

HORSESHOE DOUBLE-BLAST TREADLE BELLOWS.

Suitable for Braziers, Brassfounders, Cycle Makers, &c.

Bellows Chamber	10 inches wide	£2 0 0
do.	12 ,, ,,	2 5 0
do.	14 ,, ,,	2 10 0
do.	16 ,, ,,	2 17 6

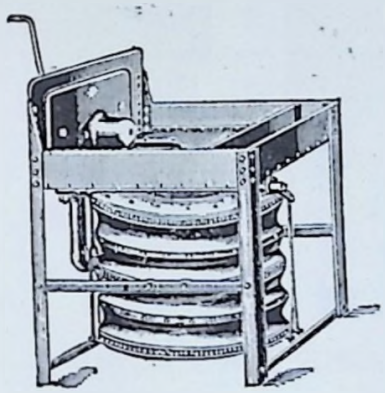
FORGES.



IMPROVED WROUGHT-IRON PORTABLE FORGE.

No. 12c.

No.	Length.	Width.	Height.	Price.
				£ s. d.
12C	29 in.	24 in.	34 in.	4 10 0
12A	33 in.	27 in.	34 in.	5 17 0
12D	34 in.	30 in.	36 in.	7 10 0

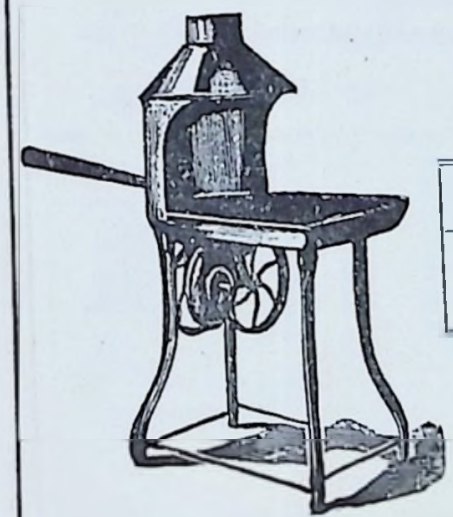


IMPROVED WROUGHT-IRON PORTABLE FORGE.

No. 19.

With Circular Bellows.

No.	Length.	Width.	Height.	Price.
				£ s. d.
19	29 in.	24 in.	34 in.	5 10 0
19-1	33 in.	27 in.	34 in.	7 0 0
19-2	35 in.	30 in.	34 in.	8 0 0



IMPROVED PORTABLE AMERICAN FORGE.

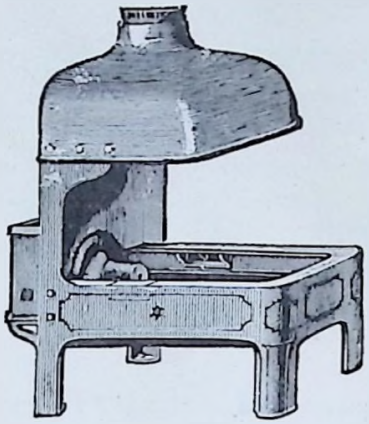
No.	Diam. of Pan.	Diam. of Blower.	Height.	Price.
				£ s. d.
1	21 in.	10 in.	33 in.	4 10 0
2	22 × 33	10 in.	56 in.	5 10 0

No. 1 Forge is made with Circular Pan and without Hood.

No. 2 Forge is made with Hood.

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FORGES.



IMPROVED PATTERN SMITH'S HEARTH.

No. A 80.

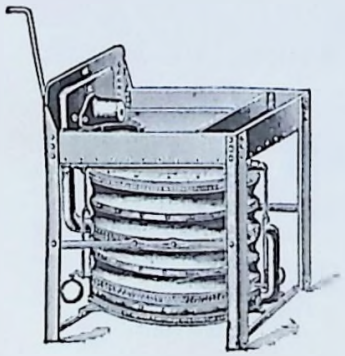
These Iron Hearths combine all the latest improvements and possess great superiority over the old-fashioned brick-built ones, besides occupying much less room. They are constructed partly of Wrought and Cast Iron, and are provided with Water Bosh and Tue Iron, Smith's Hearth, Back, and movable gaps.

No	Size of Hearth Plate.	Height.	Price.
			£ s. d.
A78	3 ft. 0 in. × 3 ft. 0 in..	6 ft.	10 7 6
A79	3 ft. 6 in. × 3 ft. 6 in.	6 ft.	12 0 0
A80	4 ft. 0 in. × 4 ft. 0 in.	6 ft.	13 15 0

Prices of other sizes on application.

EXTRA POWERFUL WROUGHT-IRON PORTABLE FORGE.

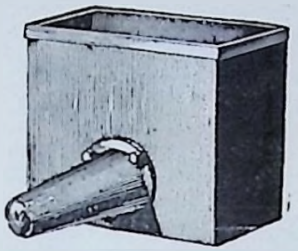
With Circular Double-Blast Bellows.



No. A 225.

No.	Length.	Width.	Height.	Price.
				£ s. d.
A224	30 in.	23 in.	34 in.	6 15 0
A225	30 in.	25 in.	34 in.	7 15 0
A226	34 in.	27 in.	34 in.	9 10 0
A227	36 in.	31 in.	34 in.	11 10 0

Weights charged extra.



IMPROVED WATER BOSH AND TUE IRON,

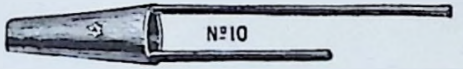
Complete.

No. 15.

No.	Length.	Depth.	Width.	Length of Tue Iron.	Price.
	In.	In.	In.	In.	£ s. d.
15W	19	18	7	13	1 5 0
15	21	21	7½	14	1 10 0
15A	24	23	9	15	1 17 6
15B	27	25	10½	16	2 7 6
15D	27	25	10½	20	2 15 0
15M	30	24	12	18	3 5 0

IMPROVED WROUGHT-IRON WATER TUE IRONS,

With Pipes complete.

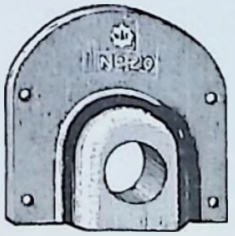


Size	12	14	16	18	20	24 inches.
Price	15/-	17/6	20/-	22/6	25/-	30/- each.

IMPROVED SMITHS' HEARTH-BACKS,

With Nuts, Pins, and Plates, complete.

No. 20.



No.	Height.	Width.	Price.
	In.	In.	£ s. d.
20	18	19	0 12 0
20A	15	16	0 10 0
20B	13	14	0 7 6
20C	12	13	0 6 0

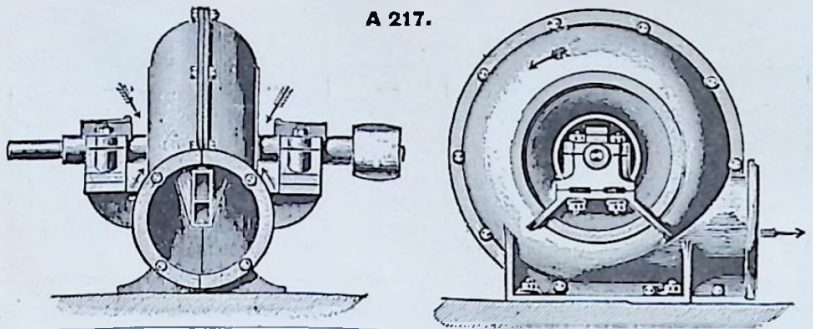
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IMPROVED
SILENT BLOWING, EXHAUSTING, AND VENTILATING FANS.

These Fans are of very best workmanship and material, with steel spindles and extra long bearings. They are thoroughly well fitted, and have strong and heavy cases. The connecting ends are flanged for bolting up. Will work with the least possible power.

IMPROVED SILENT BLOWING FANS.

A 217.

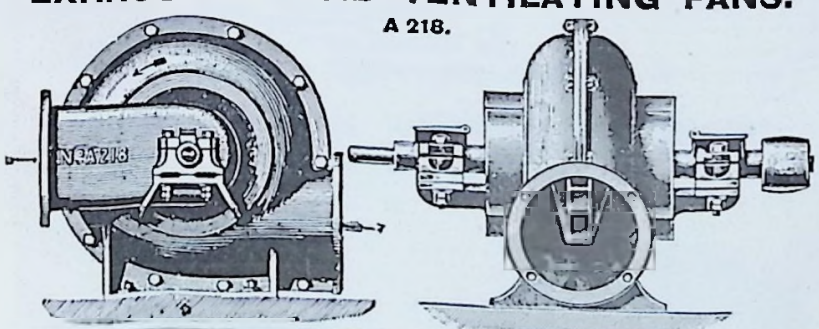


Fires to blow.	Diam. of Revolving Fan.	Diam. of Discharge.	Tons melted per hour.	Revolutions per minute.	Diam. of Pulleys.	Width of Straps.	Price
1	9 inch	2½ inch			1½ inch		£1 16 0
2	10 ,,	3½ ,,			2 ,,		3 0 0
4	10 ,,	5 ,,		4000 to 4500	2 ,,		3 10 0
6	12 ,,	6 ,,		3500 ,, 4200	3 ,,		4 10 0
8	15 ,,	8 ,,	½	3000 ,, 4000	4 ,,	1½	5 10 0
12	17½ ,,	9 ,,	1½	2800 ,, 3500	5 ,,	2½	7 0 0
16	20 ,,	10 ,,	2	2500 ,, 3300	6 ,,	3	9 0 0
24	25 ,,	12 ,,	3	2000 ,, 2500	8 ,,	3½	13 0 0
32	30 ,,	14 ,,	5	1500 ,, 2000	9 ,,	3½	16 0 0

* These are based upon 1¼ in. holes in Tue Irons

EXHAUSTING AND VENTILATING FANS.

A 218.



Sizes.	Diameter of Revolving Fan.	Diam. of Discharge.	Diam. of Pulleys.	Width of Straps.	Revolutions per minute.	Cubic ft. air per minute.	Price.
1	10 inch	5 inch	2 inch	1½ inch	4000	500	£4 10 0
1½	12 ,,	6 ,,	3 ,,	2 ,,	3300	750	5 10 0
2	15 ,,	8 ,,	4 ,,	2½ ,,	2500	1100	7 0 0
2½	17½ ,,	9 ,,	5 ,,	2½ ,,	2300	1500	9 0 0
3	20 ,,	10 ,,	6 ,,	3 ,,	2000	2100	11 10 0
4	25 ,,	12 ,,	8 ,,	3½ ,,	1700	3000	15 10 0
5	30 ,,	14 ,,	9 ,,	3½ ,,	1400	4000	20 0 0

GRINDSTONE TROUGHS AND FITTINGS.

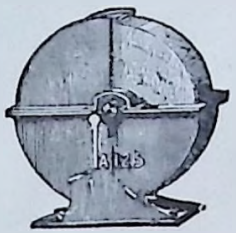
These Troughs are fitted with all the latest improvements.

Spindles are of Wrought Iron, turned, and fitted with screwed nuts, collars, and plates for fixing Stones, and we can recommend them for all purposes.

TROUGHS for fixing on Bench.



WITHOUT HOOD.

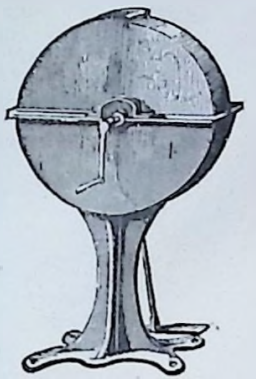


WITH HOOD.

WITHOUT HOOD.		
No.	Stone.	Price.
A 110	6 in. diam....	6/-
A 113	12 ,, ...	12/-
A 115	16 ,, ...	17/-
A 116	18 ,, ...	26/-
A 117	20 ,, ...	35/-
WITH HOOD.		
No.	Stone.	Price.
A 122	12 in. diam....	14/6
A 123	14 ,, ...	17/-
A 124	16 ,, ...	22/-
A 125	18 ,, ...	32/-
A 126	20 ,, ...	40/-

TROUGHS ON STANDS.

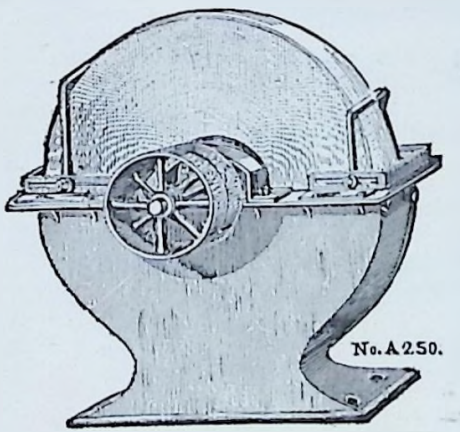




WITHOUT HOOD.		
No.	Stone.	Price.
A 118	18 in. diam....	36/-
A 119	20 ,, ...	42/-
WITH HOOD.		
No.	Stone.	Price.
A 120	18 in. diam....	40/-
A 121	20 ,, ...	48/-

If fitted with Treadle, 5/- extra.

ENGINEERS' GRINDSTONES AND TROUGHS.



STONES, BEST YORKSHIRE QUALITY.

No.	Size of Stone.	Width of Stone.	Price with Handle and Treadle.	Price with Fast and Loose Pulleys.
	ft. in.	in.		
A 247	2 0	3½	85/-	90/-
A 248	2 6	4	105/-	112/-
A 249	3 0	4	135/6	145/-
A 250	3 6	5	—	195/-
A 251	4 0	6	—	237/6

The first three sizes are fitted with Hoods.

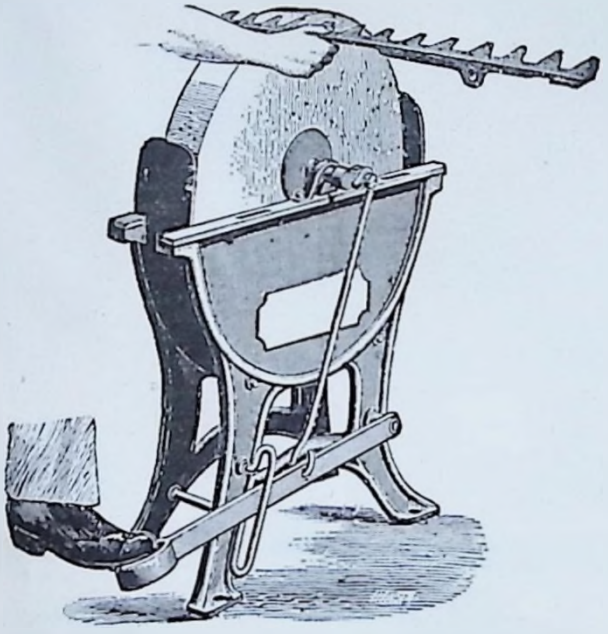
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ARMENIAN GRINDSTONES.

To work by Hand, Foot, or Power.

Mounted in Iron Frames, well painted and varnished.

These Grindstones are fitted with turned wrought Spindles and Plates screwed on, to ensure their keeping true, wood wedges being entirely dispensed with. Each Stone is turned up true on its own spindle.



G2 Grindstone, 24 in. by 4 in. Iron Frame, with Handle and Treadle complete.

PARTICULARS AND PRICES.

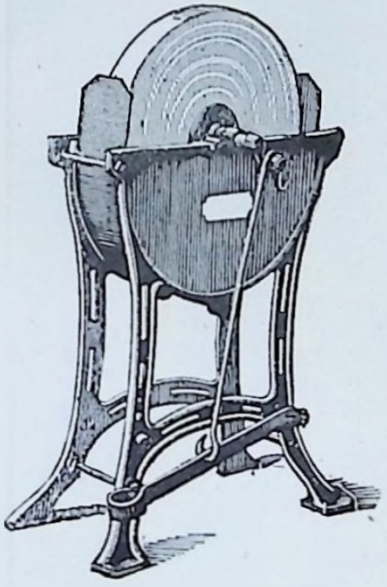
		£	s.	d.
B 4	21 in. by 4 in. Stone, with Anti-friction Rollers	2	0	0
G	24 in. by 4 in. ditto, with Bearings	2	4	0
G 2	24 in. by 4 in. ditto, with Anti-friction Rollers	2	6	0
D S	24 in. by 5 in. ditto, with extra strong Iron Frame and Anti-friction Rollers	2	15	0
H	26 in. by 4½ in. Stone, with Anti-friction Rollers	3	0	0
	Fast and Loose Pulleys fitted to the above ... per pair extra			
N W	24 in. by 4½ in. Stone, in solid Wrought Iron Frame, and with Fast and Loose Pulleys	3	10	0

ARMENIAN GRINDSTONES.

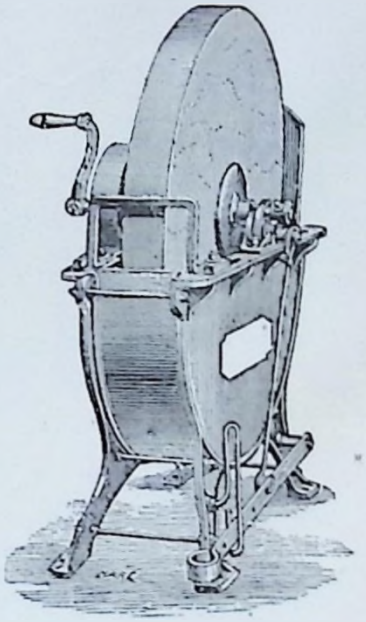
To work by Hand, Foot, or Power.

Mounted in Iron Frames, well painted and varnished.

These Grindstones are fitted with turned wrought Spindles and Plates, screwed on to insure their keeping true, wood wedges being entirely dispensed with. Each Stone is turned up true on its own spindle.



B Grindstone, 18 in. by 2½ in.



F Grindstone, 36 in. by 5 in.

PARTICULARS AND PRICES.

		£	s.	d.
B	18 in. by 2½ in. Stone	1	7	0
B 2	18 in. by 3½ in. ditto	1	9	0
B 6	18 in. by 2½ in. ditto, with Anti-friction Rollers	1	10	0
B 7	18 in. by 3½ in. ditto, ditto	1	12	0
	Fitted with Fast and Loose Pulleys... ...per pair extra			
K	28 in. by 4½ in. Stone	3	5	0
E	30 in. by 4½ in. ditto	4	0	0
E 1	30 in. by 6 in. ditto	4	15	0
F	36 in. by 5 in. ditto, with Pulley for power and Tool Rest	5	10	0
F 1	36 in. by 8 in. ditto, ditto ditto ...	6	5	0

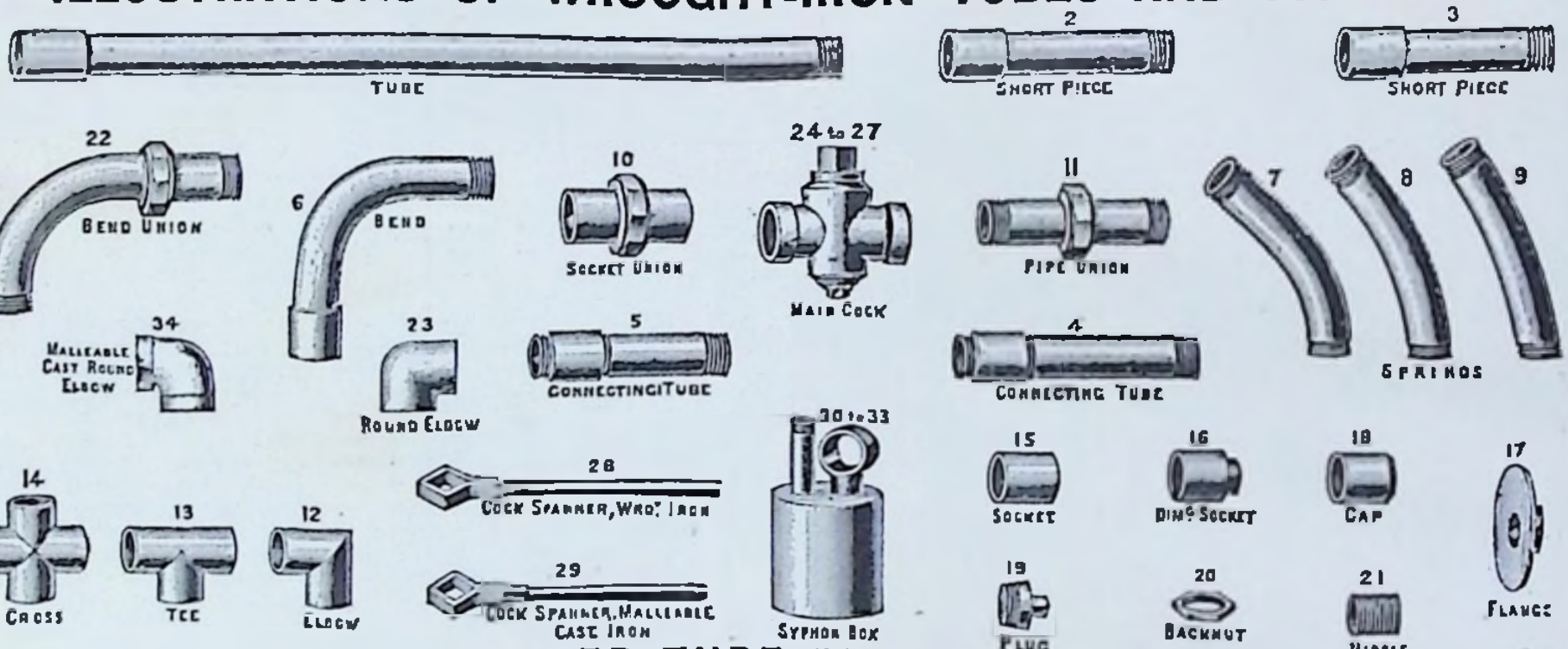
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UNMOUNTED GRINDSTONES.

Best Yorkshire or Newcastle Grits.						Fine Blue Bilston Grit.					
Size.		Price.	Size.		Price.	Size.		Price.	Size.		Price.
Inches.	Inches.	Each.	Inches.	Inches.	Each.	Inches.	Inches.	Each.	Inches.	Inches.	Each.
3 by	1¼	1/4	46 by	6	49/-	3 by	1¼	1/4	46 by	6	84/-
4 ,,	1¼	1/4	46 ,,	7	51/-	4 ,,	1¼	1/4	46 ,,	7	90/-
6 ,,	1½	1/4	46 ,,	8	53/-	6 ,,	1½	1/4	46 ,,	8	96/-
7 ,,	1½	1/8	48 ,,	6	52/-	7 ,,	1½	1/10	48 ,,	6	96/-
8 ,,	1½	1/10	48 ,,	7	54/-	8 ,,	1½	2/2	48 ,,	7	102/-
9 ,,	1½	2/-	48 ,,	8	56/-	9 ,,	1½	2/4	48 ,,	8	108/-
10 ,,	1½	2/2	48 ,,	9	58/-	10 ,,	1½	2/8	48 ,,	9	114/-
10 ,,	2	2/2	48 ,,	10	60/-	10 ,,	2	3/-	48 ,,	10	120/-
12 ,,	2	2/6	50 ,,	6	60/-	12 ,,	2	3/2	50 ,,	6	108/-
12 ,,	3	2/8	50 ,,	8	64/-	12 ,,	3	3/8	50 ,,	8	120/-
14 ,,	3	3/2	50 ,,	10	68/-	14 ,,	3	4/10	50 ,,	10	132/-
15 ,,	3	3/6	52 ,,	8	70/-	15 ,,	3	5/4	52 ,,	8	132/-
16 ,,	3	3/10	52 ,,	9	72/-	16 ,,	3	5/8	52 ,,	10	104/-
16 ,,	4	4/2	52 ,,	10	74/-	16 ,,	4	5/8	54 ,,	6	132/-
18 ,,	3	4/8	54 ,,	7	76/-	18 ,,	3	6/6	54 ,,	7	138/-
18 ,,	5	5/6	54 ,,	9	80/-	18 ,,	6	8/2	54 ,,	9	150/-
18 ,,	6	6/2	54 ,,	10	82/-	20 ,,	4	8/6	54 ,,	10	156/-
20 ,,	3	5/4	56 ,,	8	92/-	20 ,,	5	9/2	56 ,,	8	156/-
20 ,,	4	5/8	56 ,,	10	102/-	22 ,,	4	10/-	56 ,,	10	168/-
22 ,,	3	5/10	60 ,,	7	110/-	22 ,,	5	9/6	60 ,,	7	174/-
22 ,,	4	6/2	60 ,,	8	114/-	24 ,,	3	10/4	60 ,,	8	180/-
24 ,,	3	6/8	60 ,,	9	118/-	24 ,,	4	11/2	60 ,,	9	186/-
24 ,,	4	7/2	60 ,,	10	122/-	24 ,,	6	11/2	60 ,,	10	192/-
24 ,,	6	8/-	62 ,,	8	128/-	26 ,,	4	12/6	62 ,,	8	186/-
26 ,,	4	8/8	62 ,,	10	140/-	26 ,,	5	13/-	62 ,,	10	204/-
26 ,,	5	6/2	62 ,,	12	150/-	30 ,,	4	18/-	62 ,,	12	216/-
30 ,,	4	13/-	64 ,,	7	132/-	30 ,,	5	20/-	64 ,,	7	198/-
30 ,,	5	14 6	64 ,,	9	144/-	30 ,,	6	22/-	64 ,,	9	210/-
30 ,,	6	16/-	64 ,,	10	150/-	32 ,,	4	24/-	64 ,,	10	216/-
32 ,,	4	17/-	66 ,,	8	150/-	32 ,,	5	27/-	66 ,,	8	216/-
32 ,,	6	21/-	66 ,,	10	162/-	32 ,,	6	30/-	66 ,,	10	228/-
36 ,,	4	24/-	66 ,,	12	176/-	36 ,,	4	36/-	66 ,,	12	240/-
36 ,,	5	26/-	68 ,,	8	168/-	36 ,,	5	39/-	68 ,,	8	228/-
36 ,,	6	28/-	68 ,,	9	176/-	36 ,,	6	42/-	68 ,,	9	234/-
40 ,,	4	32/-	68 ,,	12	198/-	40 ,,	4	50/-	68 ,,	12	252/-
40 ,,	5	34/-	70 ,,	7	172/-	40 ,,	5	54/-	70 ,,	7	234/-
40 ,,	6	36/-	70 ,,	9	188/-	40 ,,	6	58/-	70 ,,	9	246/-
42 ,,	5	36/-	70 ,,	12	218/-	42 ,,	5	58/-	70 ,,	12	264/-
42 ,,	6	38/-	72 ,,	8	200/-	42 ,,	6	62/-	72 ,,	8	234/-
42 ,,	7	40/-	72 ,,	9	210/-	42 ,,	7	66/-	72 ,,	9	242/-
42 ,,	8	42/-	72 ,,	10	220/-	42 ,,	8	70/-	72 ,,	10	250/-
46 ,,	5	47/-	72 ,,	12	240/-	46 ,,	5	78/-	72 ,,	12	266/-

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ILLUSTRATIONS OF WROUGHT-IRON TUBES AND FITTINGS.



BOILER TUBE FERRULES.

Outside diam. at large end	1½	1⅝	1¾	1⅞	2	2⅛	2¼	2⅜	2½	2⅝	2¾	2⅞	3	3⅛	3¼	3⅜	3½	3⅝	3¾	3⅞	4
Thickness, I.W.G. ...	14	13	12	12	12	11	11	11	11	11	11	10	10	10	10	9	9	9	8	8	8
Length in Inches ...	1	1⅛	1 3/16	1 3/16	1 3/16	1 3/16	1 3/16	1 3/16	1¼	1¼	1¼	1¼	1¼	1 5/16	1 5/16	1 5/16	1 5/16	1⅜	1⅜	1⅜	1⅜
Iron, price per 100 ...	10/-	10/-	10 6	11/-	12/-	13/-	14/-	15/-	16/-	17/-	18/-	19/-	20/6	22/-	23/6	25/-	26/6	28/-	29/6	33/-	34 6
Steel, price per 100 ... One Gauge thinner than Iron	13/6	15/-	16/6	18/6	20/-	22/-	24/6	26/6	30/-	33/-	36/6	40/-	43/-	46/-	50/-	53/-	56/-	60/-	64/-	66/-	69/-

WROUGHT IRON TUBE AND FITTING LIST.

	Inside Diameter in inches ...	⅜	½	⅝	¾	⅞	1	1¼	1½	1¾	2	2½	2½	2¾	3	3½	4
1	Tubes, from 2 to 14 ft. per ft.	-/2	-/2½	-/3	-/4½	-/6	-/8½	1/-	1/3	1/6	1/9	2/7	3/3	4/-	4/6	5/6	7/-
2	Do. 12 to 23½ in. each	-/4	-/5	-/7	-/9	1/-	1/4	1/8	2/-	2/6	3/-	4/6	6/3	7/6	9/-	11/6	14/6
3	Do. 3 to 11½ in. ... ,,	-/2	-/3	-/4	-/6	-/8	-/11	1/1	1/4	2/-	2/3	4/-	4/9	6/-	7/-	8/-	9/-
4	Connecting Tube, 12 to 23½ in. ,,	-/5	-/7	-/9	-/11	1/2	1/6	2/-	2/6	3/3	4/-	5/6	7/-	8/6	10/-	12/6	15/6
5	Do., 3 to 11½ in. ,,	-/4	-/5	-/6	-/8	-/10	1/-	1/3	2/-	2/6	3/-	4/6	5/6	6/6	7/6	8/6	10/-
6	Bends and Lamp Bends ... ,,	-/5½	-/6½	-/7	-/8	-/11	1/3	1/9	2/3	3/3	4/3	6/6	10/-	12/-	16/-	25/-	32/6
7, 8, 9	Springs, various elevations... ,,	-/4	-/5	-/6	-/7	-/9	-/11	1/4	1/8	2/6	3/3	5/6	7/6	10/-	12/-	19/-	26/-
10, 11	Socket or Pipe Unions, Wt. Iron ,,	...	2/-	2/6	3/-	4/-	5/6	6/9	8/-	9/-	10/-	12/-	14/-	16/-	18/-	22/-	28/-
12	Elbows, Equal or Diminished ,,	-/6	-/6½	-/7	-/8	-/10	1/2	1/9	2/3	3/-	3/6	5/6	8/6	11/-	14/-	22/-	28/-
13	Tees do. ... ,,	-/6	-/6½	-/7	-/9	1/-	1/3	1/9	2/6	3/-	3/9	6/-	9/6	12/6	16/6	24/-	30/-
14	Crosses do. ... ,,	1/2	1/4	1/4	1/11	2/4	3/-	4/-	4/8	6/-	7/-	14/-	21/4	28/-	40/-	56/-	66/8
15	Sockets, Plain ... ... ,,	-/1½	-/1½	-/2	-/3	-/3½	-/4	-/6	-/7	-/9	1/-	1/6	2/6	3/-	3/6	5/-	6/-
16	Do., Diminished ... ,,	...	-/3	-/4	-/5	-/6	-/7	-/9	-/11	1/1	1/3	2/-	3/-	4/-	5/-	7/-	9/-
17	Flanges ... ... ,,	-/8	-/9	-/10	1/-	1/2	1/4	1/6	1/9	2/-	2/6	3/9	5/-	6/9	8/6	10/-	11/6
18, 19	Caps and Plugs ... ... ,,	-/2	-/3	-/3	-/4	-/5	-/6	-/8	-/10	1/-	1/3	2/-	2/6	3/6	4/9	7/-	10/-
20, 21	Backnuts and Nipples ... ,,	-/1	-/2	-/2	-/3	-/3½	-/4	-/6	-/8	-/10	1/-	1/9	2/3	3/-	3/6	4/6	5/6
22	Union Bends or Elbows ... ,,	...	2/6	3/-	3/9	5/-	6/3	8/6	10/-	11/6	13/6	16/-	19/-	22/-	25/-	30/-	36/-
23	Elbows, round backed, Wt. Iron. ,,	-/7	-/7	-/8	-/9	1/-	1/4	1/11	2/6	3/4	3/10	6/6	10/-	13/-	16/-	25/-	32/-
24	Iron Main Cocks ... ... ,,	2/3	2/3	2/9	3/6	4/6	6/6	8/6	11/-	14/-	18/-	27/-	36/-	44/-	50/-	75/-	90/-
25	Do. do., Brass Plugs ,,	...	...	4/6	5/6	7/6	10/6	15/-	19/6	25/-	32/-	47/-	60/-	90/-	110/-	140/-	190/-
26	Do. do., Roundway ,,	...	...	3/6	4/-	5/6	7/6	10/-	13/-	17/6	22/-	38/-	54/-	62/-	70/-	100/-	160/-
27	Do. do., do., Brass Plugs ,,	...	...	5/-	6/6	9/-	13/-	19/-	28/-	36/-	42/-	60/	85/-	105/-	120/-	180/-	280/-
28	Spanners for Cocks, Wt. Iron ,,	...	...	1/-	1/4	1/8	2/-	2/4	3/-	3/6	4/-	4/9	6/-	7/6	9/-	12/-	14/-
29	Do. do., Mble. Cast ,,	...	...	-/7	-/8	-/10	1/2	1/8	2/2	2/9	3/3	4/9	6/-	7/6	9/-	12/-	14/-
30	Syphon Boxes, 1 quart ... ,,	...	...	...	11/-	12/-	13/-	14/-	15/-	15/6	16/-	18/-	...	...	...	...	...
31	Do. do., 2 do. ,,	...	...	...	...	16/-	17/-	18/-	19/-	21/-	23/-	25/-	30/-	35/-	40/-	...	...
32	Do. do., 3 do. ... ,,	...	...	...	...	20/-	22/-	24/-	25/-	26/6	28/-	32/-	35/-	40/-	45/-	50/-	56/-
33	Do. do., 4 do. ... ,,	...	...	...	...	21/-	23/-	25/-	27/-	29/-	31/-	34/-	38/-	42/-	47/-	54/-	60/-
34	Malleable Cast Round Elbows	-/6	-/6½	-/7	-/8	-/10	1/2	1/9	2/3	3/-	3/6	5/6	9/-	12/-	15/-	30/-	40/-

N.B.—Tubes of intermediate diameters will be charged at same price as next larger size.

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LAP-WELDED BOILER TUBES.

PRICE PER FOOT.

Ext. Dia. in inches	1¾	1⅞	1⅝	1¾	1¾	1⅞	2	2⅛	2¼	2⅜	2½	2⅝
Imp. Wire Gauge ..	13	13	13	13	13	13	12	12	12	11	11	11
Dec. in inches ..	·092	·092	·092	·092	·092	·092	·104	·104	·104	·116	·116	·116
Usual Wire Gauge ..	-/9½	-/9½	-/9½	-/9½	-/10	-/10½	-/11½	1/0½	1/0½	1/2	1/-½	1/3½
1 extra Gauge ..	-/10½	-/10½	-/10½	-/10½	-/11	-/11½	1/1	1/1½	1/1½	1/3½	1/4	1/5½
2 extra Gauges ..	-/11½	-/11½	-/12½	1/-	1/0½	1/0½	1/2½	1/3	1/3½	1/5½	1/5½	1/8½
3 extra Gauges ..	1/0½	1/0½	1/0½	1/1½	1/2	1/2	1/4	1/4½	1/5	1/7	1/7½	1/10½
4 extra Gauges ..	1/2½	1/2½	1/2½	1/2½	1/3	1/3½	1/5½	1/6½	1/7	1/9	1/9½	2/1½
3/16 in. thick	1/6	1/6	1/6	1/6½	1/7	1/7½	1/8	1/9	1/9½	1/10	1/10½	2/-
¼ in. thick	1/11	1/11	1/11	2/-	2/1	2/2	2/3	2/4	2/4½	2/5	2/6	2/8
5/16 in. thick	..	..	..	..	..	..	2/10	2/11½	3/1	3/2	3/3	3/5
⅜ in. thick	..	..	..	..	..	..	3/7	3/10	4/-	4/1	4/3	4/6
7/16 in. thick	..	..	..	..	..	..	4/5	4/8	4/11	5/1	5/4	5/8
½ in. thick	..	..	..	..	..	..	5/3	5/8	6/-	6/2	6/6	6/10

Ext. Dia. in inches	2¾	2⅞	3	3¼	3⅜	3½	4	4¼	4½	4¾	5	5¼
Imp. Wire Gauge ..	11	11	11	10	10	10	9	9	9	8	8	8
Dec. in inches ..	·116	·116	·116	·128	·128	·128	·144	·144	·144	·160	·160	·160
Usual Wire Gauge ..	1/1½	1/4½	1/5	1/8	1/10	1/11½	2/4½	2/7½	2/9½	3/4	3/7	3/11
1 extra Gauge ..	1/3½	1/6	1/7	1/10½	2/0½	2/2	2/7½	2/10½	3/1	3/3	3/11	4/3
2 extra Gauges ..	1/7½	1/8½	1/9	2/1	2/3	2/5	2/10½	3/2	3/4	4/-	4/3	4/8
3 extra Gauges ..	1/9	1/10½	1/11	2/3½	2/5½	2/7½	3/1	3/5	3/8	4/5	4/8	5/2
4 extra Gauges ..	1/11½	2/0½	2/1½	2/5½	2/8	2/10½	3/5	3/9	4/-	4/10	5/1	5/7
3/16 in. thick	2/1	2/3	2/3	2/5	2/7½	2/9½	3/-	3/4	3/7	3/11	4/2	4/7
¼ in. thick	2/9	2/11	3/-	3/3	3/6	3/9	4/1	4/6	4/10	5/6	5/9	6/3
5/16 in. thick	3/7	3/9	3/11	4/2	4/7	4/11	5/4	5/11	6/3	7/1	7/6	8/1
⅜ in. thick	4/8	5/-	5/2	5/7	6/1	6/7	7/2	7/10	8/4	9/6	10/-	10/6
7/16 in. thick	5/11	6/3	6/6	7/1	7/8	8/4	9/-	10/-	10/6	11/10	12/6	13/3
½ in. thick	7/2	7/6	8/-	8/9	9/6	10/3	11/3	12/2	13/-	14/6	15/6	16/6

Ext. Dia. in inches	5½	5¾	6	6¼	6½	6¾	7	7¼	7½	7¾	8	8¼
Imp. Wire Gauge ..	7	7	7	7	7	7	7	5	5	5	5	3
Dec. in inches ..	·176	·176	·176	·176	·176	·176	·176	·212	·212	·232	·212	252
Usual Wire Gauge ..	4/6	4/11	5/3	5/10	6/1	6/7	6/10	8/9	9/1	9/5	9/9	12/3
1 extra Gauge ..	4/11	5/4	5/7	6/4	6/7	7/2	7/5	9/7	9/11	10/3	10/7	13/3
2 extra Gauges ..	5/5	5/11	6/2	7/-	7/3	7/10	8/2	10/4	10/8	11/-	11/5	14/6
3 extra Gauges ..	5/10	6/5	6/9	7/7	7/11	8/7	8/11	11/4	11/9	12/2	12/7	..
4 extra Gauges ..	6/7	7/1	7/5	8/4	8/8	9/4	9/8	12/3	12/9	13/2	13/7	..
3/16 in. thick	4/10	5/3	5/6	6/2	6/6	7/-	7/3	..	..	..	..	..
¼ in. thick	6/7	7/1	7/5	8/-	8/8	9/4	9/8	10/4	10/8	11/-	11/5	12/3
5/16 in. thick	8/6	9/2	9/6	10/0	11/-	11/8	12/1	12/10	13/3	13/8	14/2	15/3
⅜ in. thick	11/-	11/8	12/3	13/3	13/9	14/4	15/-	15/6	16/-	16/6	17/3	18/-
7/16 in. thick	14/-	14/9	15/6	16/9	17/4	18/-	18/9	19/6	20/3	21/-	21/9	22/3
½ in. thick	17/3	18/-	19/-	20/6	21/3	22/3	23/-	24/-	24/9	25/9	26/6	27/6

Ext. Dia. in inches	8½	8¾	9	9¼	9½	9¾	10	10¼	10½	10¾	11	11¼	12
Imp. Wire Gauge ..	3	3	3	3	3	3	3	2	2	1	1	1	1
Dec. in inches ..	·252	·252	·252	·252	·252	·252	·252	·276	·276	·300	·300	·300	·300
Usual Wire Gauge ..	12/7	13/-	13/4	14/9	15/2	15/6	16/-	18/-	18/6	20/6	21/-	22/-	23/-
1 extra Gauge ..	13/10	14/4	14/9	16/3	16/8	17/2	17/6	19/6	20/-	..	..	..	..
2 extra Gauges ..	15/-	15/6	16/-	17/6	18/-	18/6	19/-	..	..	..	..	..	..
3 extra Gauges ..	..	..	..	..	..	..	..	..	..	..	..	..	..
4 extra Gauges ..	..	..	..	..	..	..	..	..	..	..	..	..	..
3/16 in. thick	..	..	..	..	..	..	..	..	..	..	..	..	..
¼ in. thick	12/3	13/-	13/4	14/9	15/2	15/6	16/-	..	..	..	..	..	..
5/16 in. thick	15/9	16/2	16/7	18/3	18/9	19/4	15/10	20/6	21/-	21/6	22/-	23/-	24/-
⅜ in. thick	18/6	19/3	19/9	21/9	22/6	23/-	21/6	24/6	25/-	25/6	26/-	27/3	28/6
7/16 in. thick	21/-	21/9	22/6	24/6	25/3	26/-	28/3	29/-	29/9	30/6	31/3	32/9	34/-
½ in. thick	28/3	29/3	30/3	31/-	32/-	33/-	33/9	34/6	35/6	35/6	37/6	39/-	41/6

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TUBULAR SCREWED STAYS, INCLUSIVE OF 11 INCHES OF SCREWING.

Ext. Dia. in inches..		1½	1⅝	1¾	1⅞	2	2⅛	2¼	2⅜	2½	2⅝	2¾
Three-sixteenths in. thick	per ft.	1/8	1/8½	1/9	1/9½	1/10	1/11	1/11½	2/-	2/0½	2/2	2/3
Quarter in. thick	,,	2/1	2/2	2/3	2/4	2/5	2/6	2/6½	2/7	2/8	2/10	2/11
Five-sixteenths in. thick	,,	..	..	..	..	3/-	3/1½	3/3	3/4	3/5	3/7	3/9
Three-eighths in. thick	,,	..	..	..	..	3/9	4/-	4/2	4/3	4/5	4/8	4/10
Seven-sixteenths in. thick	,,	..	..	..	..	4/7	4/10	5/1	5/3	5/6	5/10	6/1
Half in. thick	,,	..	..	..	..	5/5	5/10	6/2	6/4	6/8	7/-	7/4

Ext. Dia. in inches..		2⅞	3	3¼	3½	3¾	4	4¼	4½	4¾	5	
Three-sixteenths in. thick	per ft.	2/5	2/6	2/8	2/10½	3/0½	3/4	3/8	3/11	4/3	4/6	
Quarter in. thick	,,	3/2	3/3	3/6	3/9	4/-	4/5	4/10	5/2	5/10	6/1	
Five-sixteenths in. thick	,,	4/-	4/2	4/5	4/10	5/2	5/8	6/3	6/7	7/5	7/10	
Three-eighths in. thick	,,	5/3	5/5	5/10	6/4	6/10	7/5	8/2	8/3	9/10	10/4	
Seven-sixteenths in. thick	,,	6/6	6/9	7/4	7/11	8/7	9/4	10/4	10/10	12/2	12/10	
Half in. thick	,,	7/9	8/3	9/-	9/9	10/6	11/6	12/6	13/4	14/10	15/10	

SCREWED NUTS, SWELLING STAYS, & SCREWING STAYS BEYOND 11 IN.

Ext. Dia. of Stays in inches ..		1½	1⅝	1¾	1⅞	2	2⅛	2¼	2⅜	2½	2⅝	2¾
Screwed Nuts, each		-/8	-/9	-/10	-/11	1/-	1/1	1/2	1/3	1/5	1/6	1/7
Swelling Stays, ½ in. per End ..		-/6	-/6	-/7	-/7	-/8	-/8	-/10	-/10	-/10	-/10	1/-
Screwing Stays, per Lin. inch ..		-/1	-/1	-/1½	-/1½	-/1½	-/1½	-/2	-/2	-/2½	-/3	-/3½

Ext. Dia. of Stays in inches ..		2⅞	3	3¼	3½	3¾	4	4¼	4½	4¾	5	
Screwed Nuts, each		1/9	1/10	2/3	2/8	3/-	3/5	3/9	4/2	4/8	5/3	
Swelling Stays, ½ in. per End ..		1/-	1/-	1/2	1/2	1/4	1/4	1/6	1/8	1/10	2/-	
Screwing Stays, per Lin. inch ..		-/3	-/3	-/3	-/3½	-/3½	-/4	-/4	-/5	-/5	-/5	

PRICES FOR THICKENING UP ENDS OF TUBES TO ⅜ IN. FOR 2½ IN. UP.

Ext. Dia. of Tube		1½	1⅝	1¾	1⅞	2	2⅛	2¼	2⅜	2½	2⅝	2¾
Price per End, Tubes ⅜ in. thick		4/-	4/4	4/8	5/-	5/4	5/8	6/-	6/4	6/8	7/-	7/3
,, ,, ,, ½ in. thick		3/-	3/2	3/4	3/6	3/8	3/10	4/-	4/3	4/6	4/9	5/-
,, ,, ,, ⅝ in. thick		2/9	2/11	3/1	3/3	3/5	3/7	3/9	4/-	4/3	4/6	4/9

Ext. Dia. of Tube		2⅞	3	3⅛	3¼	3⅜	4	4⅛	4¼	4⅜	5	
Price per End, Tubes ⅜ in. thick		7/8	8/4	..	..	..	..	..	..	..	..	
,, ,, ,, ½ in. thick		5/3	5/6	6/2	6/9	7/4	7/10	8/6	9/6	10/6	11/6	
,, ,, ,, ⅝ in. thick		5/-	5/3	5/8	6/3	6/8	7/-	7/6	8/6	9/6	10/6	

NOTE.—Any tubes over ⅝ in. thick to be charged at same price as that given for ⅝ in. thick.
When the length of the thickened end exceeds 2½ inches, 1/8 shall be added to above prices for every half-inch of extra length.

PRICES OF IRON COLLARS WELDED ON TUBES, AND TURNING AND FACING COLLARS AND WELDING IN ENDS OF TUBES.

Diameter of Tube in inches		2	2⅛	2⅛	2¼	3	3⅛	3⅛	3⅜	4	4⅛	4⅛	4¼	5
Length of Collar in inches ..		2	2	2	2	2½	2½	2½	2½	2½	2½	2½	2½	2½
Price each, for ⅜ in. thick ..		1/4	1/6	1/8	1/10	2/1	2/4	2/7	2/10	3/1	3/4	3/8	4/-	4/4
,, for ½ in. thick ..		1/7	1/9	1/11	2/1	2/4	2/7	2/10	3/1	3/4	3/7	4/-	4/4	4/8
Turning and Facing Collars ..		1/2	1/4	1/6	1/8	1/11	2/2	2/5	2/8	3/1	3/6	3/10	4/2	4/8
Welding in Ends		1/4	1/6	1/8	1/10	2/1	2/4	2/7	2/10	3/1	3/4	3/8	4/-	4/4

NOTE.—Every half-inch increased length of Collar up to 3 inches diameter, 7d. per half-inch; and larger diameters, 10d. per half-inch extra.

NOTES.

Tubes of intermediate diameters will be charged at the same price as the next larger size.
Tubes of an intermediate thickness will be charged at the next higher price.
Tubes thinner than the list gauge will be charged at the price of the usual list gauge.
Maximum length 18 feet, or 5½ metres.
Lengths in excess of maximum length to be charged at 2½ less gross discount for every foot or part of a foot, or every 300 m/m or part of 300 m/m.
No extra charge for tubes swelled or reduced ⅛ at one end and 3 inches up.
Extra swelling or reducing, 12s. per 100 ends per ⅛ inch for tubes up to 4 inches diameter for 3 inches long.
Swelling tubes of larger diameter charged extra.
When no thickness is specified, orders will be supplied the wire gauge named on first line.

MALLEABLE UNIONS.


Fig. 1.

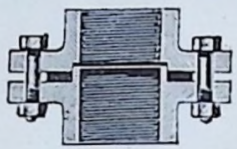

Section.


Fig. 2.

PRICE PER PAIR.

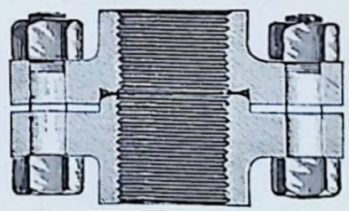
Screwed to Standard W.I. Pipe Sizes, and fitted with Bolts and Asbestos Jointing.

Size of Pipe ...	¼	⅜	½	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4 in.
Fig. 1	1/2	1/4	1/6	1/7	2/2	2/7	2/11	3/1	3/2						
Fig. 2			1/8	1/9	2/4	2/9	3/3	3/5	3/6	6/-	6/6	8/-	9/6	12/6	14/6

REDUCING UNIONS.

These Unions are exceedingly useful, serving the purpose of a Union and Reducing Socket in one fitting. Prices of large end same as above.

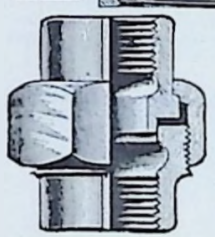
Fig. 1	⅜ × ¼	½ × ¼	½ × ⅜	¾ × ⅜	¾ × ½	1 × ½	1 × ¾	1¼ × ¾	1¼ × 1	1¼ × 1¼	1½ × 1	1½ × 1¼	1½ × 1 in.
	1½ × 1¼	2 × 1	2 × 1¼	2 × 1½									
Fig. 2	⅜ × ¼	½ × ¼	½ × ⅜	¾ × ⅜	¾ × ½	1 × ½	1 × ¾	1¼ × ¾	1¼ × 1	1¼ × 1¼	1½ × 1	1½ × 1¼	1½ × 1 in.
	1½ × 1¼	2 × 1	2 × 1¼	2 × 1½	2½ × 1½	2½ × 2	3 × 2	3 × 2½	4 × 2½	4 × 3			



MALLEABLE HYDRAULIC UNIONS.

PRICE.

Sizes ...	½	¾	1	1¼	1½	2 in.
Fig. 1 ...	2/-	2/6	3/-	3/6		
Fig. 2 ...	...	...	...	...	6/-	8/-



"CAP PATTERN" MALLEABLE UNIONS.

PRICE.

Sizes	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4 in.
Each	-/8	-/10	-/11	1/2	1/6	2/-	2/6	3/9	6/-	8/-	12/6	16/6



MALLEABLE HEXAGON TAPER NIPPLES.

PRICE PER DOZEN.

¼	⅜	½	¾	1	1¼	1½	2	2½	3	4 in
3/-	3/	3/-	3/9	4/6	6/-	9/-	12/-	33/-	39/-	66/-



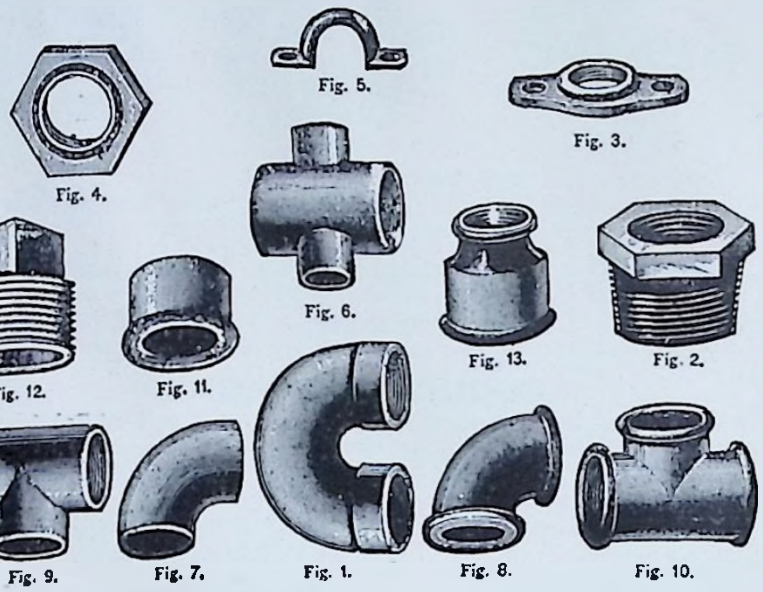
REDUCING NIPPLES.

Prices, taken at largest end, same as above.

⅜ × ¼	½ × ¼	½ × ⅜	¾ × ⅜	¾ × ½	1 × ½	1 × ¾	1¼ × ¾	1¼ × 1	1¼ × 1¼	1½ × 1	1½ × 1¼ in
1½ × 1	1½ × 1¼	1½ × 1½	2 × 1	2 × 1¼	2 × 1½	2					

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MALLEABLE GAS AND STEAM FITTINGS.

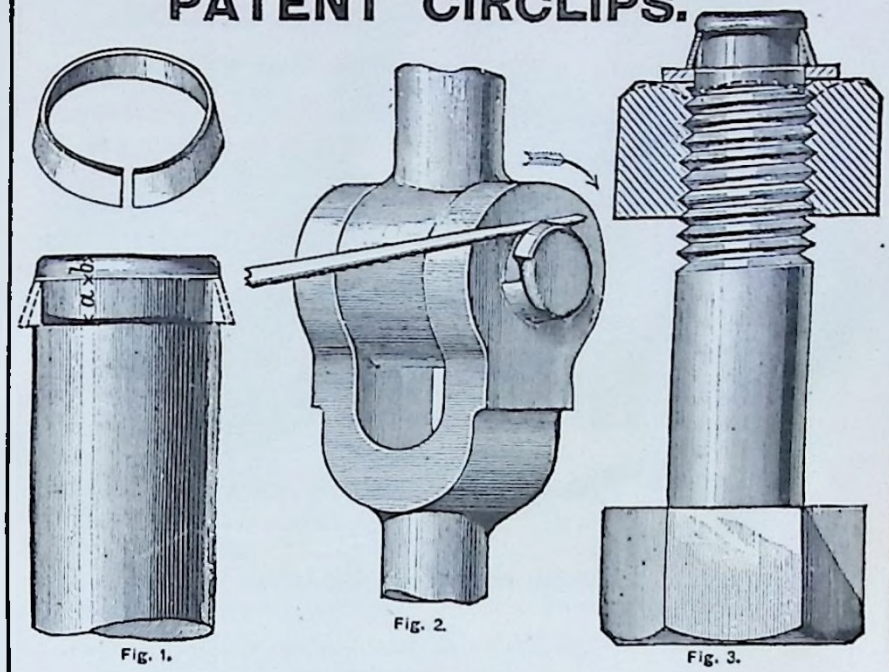


PRICES.

Fig.	Size	¼	⅜	½	¾	1	1¼	1½	2	2½	3 in.
1	Return Bends			-/6	1/3	1/9	2/8	3/-	5/6	8/-	11/-
2	Reducing Bushings ...		-/2	-/2½	-/3	-/4	-/5	-/7	-/10	1/3	2/-
3	Flanges	-/4	-/5	-/6	-/8	-/11	1/-	1/4	1/9	3/-	4/-
4	Backnuts	-/0¾	-/1	-/1½	-/2	-/2	-/3	-/4	-/6		
5	Straps	-/0¾	-/1	-/1	-/1½	-/1½	-/2*	-/2½	-/3½		
6	Crosses	-/2½	-/3½	-/4½	-/6	-/8	1/2	1/5	2/1		
7	Elbows	-/2	-/2½	-/3	-/4½	-/6	-/9	1/-	1/8		
8	Elbows, strong beaded			-/5½	-/7½	-/11	1/4	1/10	2/11	6/4	8/6
9	Tees	/2	-/2¾	-/4	-/5	-/6	-/9	1/1½	1/8		
10	Tees, strong beaded ...			-/7	-/9	-/11	1/4	2/-	3/-	8/-	10/10
11	Caps	-/1	-/1½	-/2	-/2½	-/3					
12	Plugs		-/1½	-/2	-/2	-/2½	-/3½	-/4	-/6	-/10½	
13	Reducing Sockets ...		-/2	-/2½	-/3	-/3½					

The Bushings, Elbows, Tees, Crosses, and Sockets may be had "reducing" to smaller sizes.

PATENT CIRCLIPS.



These Circlips are elastic split hoops, conical in form They are intended as a substitute for loose collars, set-screws, and washers, taper and split pins, &c., and have greater holding power, and will not run back like nuts They are fixed in shallow grooves and no holes are required. They are not injured by being repeatedly removed and will outlast dozens of split pins. They are neat in appearance, can be easily replaced, and have no projections.

Fig. 1 gives perspective view of Circlip. Fig. 2 gives perspective view of joint pin held in position, and shows how Circlip can be removed by a pointed instrument such as a mechanic's scriber, which, after having been forced into the position shown, is to be pushed round in direction indicated by arrow. The scriber must not be kept under the Circlip. Fig. 3 shows application of Circlip, in combination with ordinary washer, for retaining a bolt-nut in position.

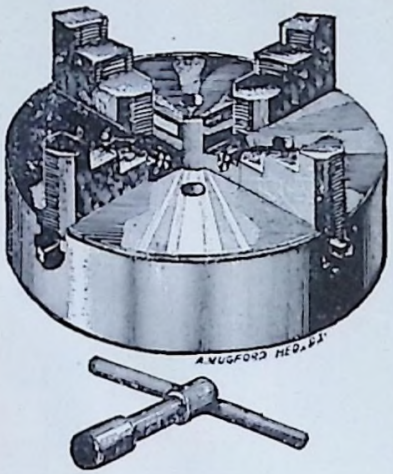
PRICES PER GROSS.

Diameter of Shaft, Spindle, or Stud.	Circlips.		Diameter of Shaft, Spindle, or Stud.	Circlips.		Diameter of Shaft, Spindle, or Stud.	Circlips.	
	Steel.	Phosphor Bronze.		Steel.	Phosphor Bronze.		Steel.	Phosphor Bronze.
in.			in.			in.		
3/16	3/9	4/1	9/16	4/8	5/10	1 1/8	7/4	11/6
¼	3/9	4/1	⅝	4/8	5/10	1¼	8/-	13/2
5/16	3/9	4/4	11/16	5/-	6/11	1 3/8	8/8	17/4
⅜	4/-	4/6	¾	5/4	7/5	1½	9/4	20/4
7/16	4/4	4/8	13/16	6/-	8/8	1 5/8	11/3	—
½	4/4	5/3	1	6/8	10/4	1¾	13/6	—

Directions for forming grooves for the Circlips :—
Width of groove (*a*) = width of Circlip.
Do. collar (*b*) = half-width do.
Depth of groove = thickness do.

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NEW INDEPENDENT JAW CHUCK.



With Reversible Jaws.

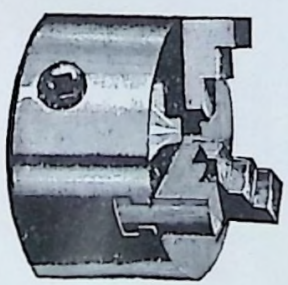
This is the best Independent Chuck now made. It is well proportioned in all its parts, and very strong. The screws are of steel, with long bearings at each end, the out end being thoroughly hardened after being fitted for the wrench. The jaws are also of steel, well hardened, and in all sizes can be run out and reversed. The body is of the finest quality cast iron, and all sizes over 16 in. have slots through the face, so that they can be used as face-plates if required.

Wrench and Bolts are provided with each Chuck.

PRICES AND PARTICULARS.

Size.	Weight.	Diam. of Hole.	Price.	Size.	Weight.	Diam. of Hole.	Price.
			£ s. d.				£ s. d.
4 inch.	5 lb.	1 in.	2 18 6	18 in.	143 lb.	4 in.	9 4 0
6 ,,	12 ,,	1¼ ,,	3 15 0	20 ,,	190 ,,	4 ,,	10 10 0
8 ,,	25 ,,	1⅞ ,,	4 12 0	22 ,,	216 ,,	4¾ ,,	11 18 0
10 ,,	35 ,,	2 ,,	5 10 0	24 ,,	254 ,,	4¾ ,,	13 11 0
12 ,,	61 ,,	3 ,,	6 5 0	26 ,,	340 ,,	5½ ,,	17 4 0
14 ,,	84 ,,	3 ,,	7 2 0	28 ,,	373 ,,	5½ ,,	20 16 0
16 ,,	114 ,,	3 ,,	8 0 0	30 ,,	454 ,,	6 ,,	25 0 0

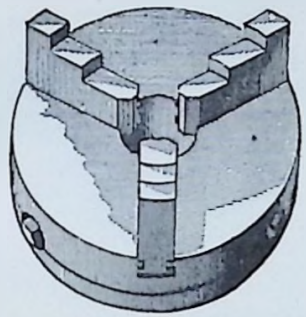
AMATEUR'S GEARED SCROLL CHUCK.



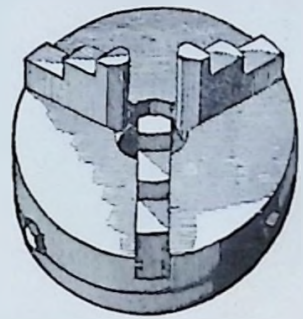
This is a new design of Chuck for Foot Lathes and light work. Each Chuck has one socket pinion which projects only slightly beyond the outside. The 2 in. size is made either for fitting a taper plug or face-plate. The 2½ in. is for face-plate only.

Diam.	Weight.	Price with one Set of Jaws.	Price with two Sets of Jaws.
2 inch.	1½ lb.	25/- each.	32/-
2½ ,,	2 ,,	30/- ,,	35/6

CUSHMAN'S AMERICAN
GEARED SCROLL CHUCKS.



With No. 1 Jaws.



With No. 2 Jaws.

These Chucks have been constantly improved, and owing to their accuracy, construction, and durability, are now one of the best universal Chucks for general use.

The working parts are made of forged steel, and every attention is paid to the mechanical construction.

All are now made with three pinions, an advantage over the old style, as a Chuck so made will outwear any other. It not only makes a handier Chuck to use by having a pinion always within reach, but the Chuck is more perfectly balanced, an advantage when required for high-speed Machines.

A Steel Key is supplied with each Chuck, also Screws for attaching to Face Plate.

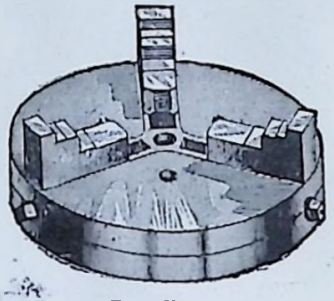
Chucks with No. 1 Jaws, No. 2 Jaws, and with two sets of Jaws (Nos. 1 and 2) are kept in stock. Unless otherwise ordered, Chucks with No. 1 Jaws are sent.

DIMENSIONS AND PRICES.

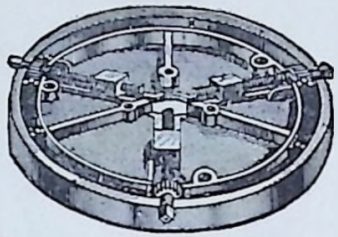
Diameter.	Diameter of Hole.	Weight.	Price, One Set Jaws.	Price, Two Sets Jaws.	Extra Sets of Jaws ordered without Chuck.
In.	In.				
2½	⅜	2 lbs.	£1 11 0	£1 17 6	10/-
3	⅝	3 ,,	2 2 0	2 10 0	12/6
4	⅝	6 ,,	2 10 0	3 0 0	15/6
5	¾	10 ,,	3 3 0	3 15 0	20/-
6	1 1/16	14 ,,	3 15 0	4 10 0	23/-
7½	2	22 ,,	4 3 0	5 0 0	28/-
9	2½	36 ,,	5 0 0	6 0 0	37/6
10½	3	51 ,,	5 12 6	6 15 0	45/-
12	3	62 ,,	6 5 0	7 10 0	50/-
15	3½	78 ,,	8 10 0	10 0 0	65/-

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HORTON'S PATENT CHUCKS.



FRONT VIEW.



BACK VIEW (OPEN).

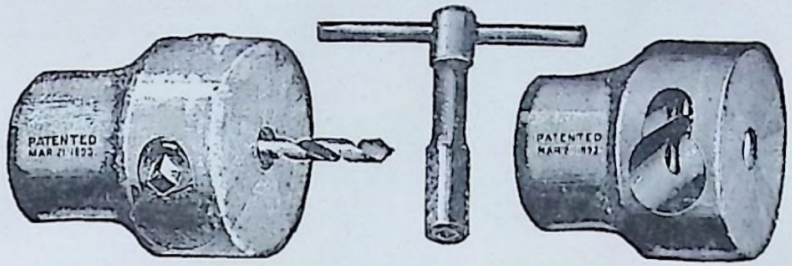
The jaws of this Patent Universal Chuck are moved simultaneously by means of geared screws and a circular rack, which is enclosed in a deep groove or recess in back plate, the centre faces of both front and back plates making a perfectly tight casing for the gearing, so that no dirt, &c., can get to them to cause injury. When rack is taken out it makes a superior *Independent Jaw Chuck*. The jaws are made solid, of the very best wrought iron, and thoroughly case-hardened. The geared screws and circular rack are of a special steel.

All Horton's Chucks are made on these lines, but vary in form and detail to suit different requirements.

PARTICULARS AND PRICES.

With 3 Jaws.			With 4 Jaws.		
Diameter.	Weight.	PRICE.	Diameter.	Weight.	PRICE.
inches.	lbs.	£ s. d.	inches.	lbs.	£ s. d.
6	12	5 5 0	6	14	6 10 0
9	22	7 0 0	9	24	8 10 0
12	40	9 0 0	12	43	11 10 0
15	56	10 10 0	15	60	13 0 0
18	68	12 10 0	18	75	15 0 0
21	88	16 0 0	21	105	19 0 0
24	101	20 0 0	24	115	24 0 0
30	197	34 0 0	30	230	40 0 0
36	330	46 0 0	36	345	57 0 0
42	487	54 0 0	42	515	65 0 0

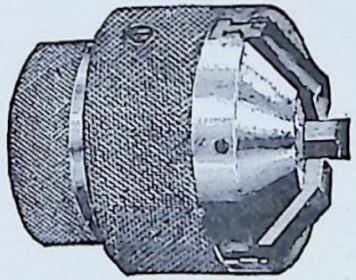
HORTON'S IMPROVED DRILL CHUCKS.



This Chuck can be recommended for its simplicity and strength. The body is composed of one piece, and there are but few parts to get out of order. Jaws and screws are thoroughly hardened; and the former are so constructed that teeth on bite come opposite each other, thus avoiding the danger of injuring the Drill. Nos. 5 and 6 are fitted for face-plates.

PARTICULARS AND PRICES.

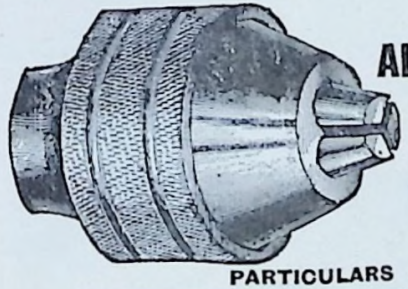
Size.	Holds Drills	Diam. of Body.	PRICE.	Size.	Holds Drills	Diam. of Body.	PRICE.
No.	in.	in.		No.	in.	in.	
1	0 to ¼	1⅜	29/6	4	0 to 1	3½	42/-
2	0 ,, ½	2⅜	33/6	5	0 ,, 1½	5¼	75/-
3	0 ,, ¾	2 15/16	37/6	6	0 ,, 2	6½	84/-



IMPROVED ACME DRILL CHUCK.

This Chuck, which is made of steel, is self-tightening, and is true and firm. It holds Drills from 0 to ½ inch.

PRICE 17/6



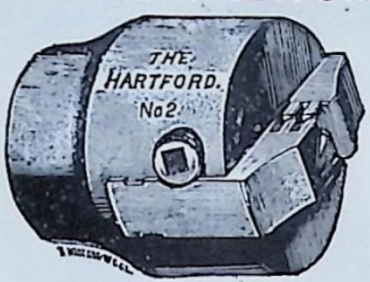
THE ALMOND DRILL CHUCK.

This Chuck is thoroughly and accurately made, and possesses all the features of a high-class tool.

PARTICULARS AND PRICES.

No.	Holding Drills	PRICE.
1	0 to 3/16 in.	22/-
2	0 ,, 5/16 ,,	22/-
3	0 ,, ½ ,,	36/-

THE HARTFORD DRILL CHUCK.



This is a most useful Chuck, as, in addition to drills, it holds reamers, taps, &c., by the round or square part, and does not injure the tools in any way.

PARTICULARS AND PRICES.

No.	Diam.	Length.	Capacity.	Price.
0	1¼ in.	2½ in.	0 to ⅜ in.	£1 4 0
1	2⅜ ,,	2¾ ,,	0 ,, ½ ,,	1 8 0
2	2⅞ ,,	3¼ ,,	0 ,, ¾ ,,	1 12 0

STEEL LATHE DOGS.

Heavy Pattern.



PARTICULARS AND PRICES.

No. 1	..	⅜ inch	Bore	..	1/8 each	No. 12	.. 2 inch	Bore .. 5/- each
,, 2	..	½ ,,	,,	..	2/1 ,,	,, 14	.. 2½ ,,	,, .. 6/1 ,,
,, 4	..	¾ ,,	,,	..	2/6 ,,	,, 15	.. 3 ,,	,, .. 6/8 ,,
,, 6	..	1 ,,	,,	..	2/11 ,,	,, 16	.. 3½ ,,	,, .. 7/6 ,,
,, 8	..	1¼ ,,	,,	..	3/4 ,,	,, 17	.. 4 ,,	,, .. 8/9 ,,
,, 10	..	1½ ,,	,,	..	3/11 ,,	,, 18	.. 4½ ,,	,, .. 11/6 ,,
,, 11	..	1¾ ,,	,,	..	4/7 ,,	,, 19	.. 5 ,,	,, .. 13/9 ,,

STEEL LATHE DOGS.

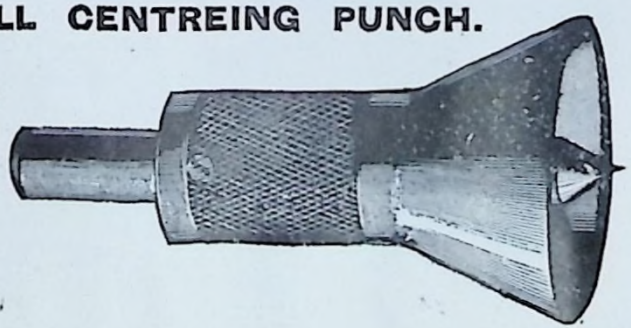
Light Pattern for Amateurs, &c.

No. 1	..	⅜ inch	Bore	..	1/6 each	No. 3	.. ¾ inch	Bore .. 2/- each
,, 2	..	½ ,,	,,	..	1/9 ,,	,, 4	.. 1 ,,	,, .. 2/6 ,,

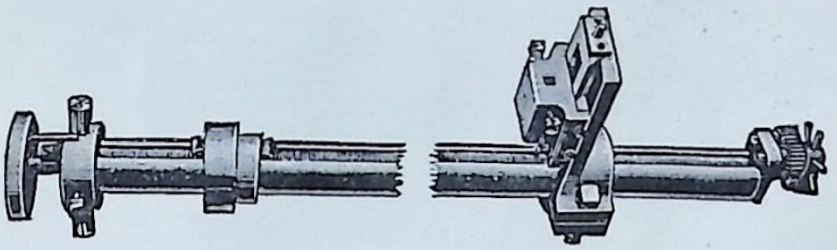
BELL CENTREING PUNCH.

This is a full-size illustration of a handy and useful tool, having a capacity up to 1½ inch.

Price 5/- each.



BORING BARS.



These Boring Bars are provided with **self-acting feed** motion by means of a star wheel. It is suitable either for working in a lathe or a horizontal machine It is made **in steel from 3 in. to 8 in.** diameter, and in cast iron above 8 in.

The price of each Bar includes the nut on the feed screw. To this all sizes of Boring Heads can be fixed.

Boring Heads of all sizes and Facing Arms are supplied with the Bars if required, at extra prices.

DIMENSIONS.

Bar.		Diameter of Boring Head.	Facing Arm to face in diameter.	Price.		
Diameter.	Length.			Bar.	Boring Head including Cutters	Facing Arm.
In.	Ft.	In.	In.	£ s. d.	£ s. d.	£ s. d.
3	6	6	12	6 5 0	2 16 0	2 16 0
4	8	8	12	8 5 0	3 15 0	3 15 0
5	10	12	20	12 10 0	4 14 0	4 14 0
6	10	14	20	13 15 0	5 15 0	5 15 0
7	12	16	20	15 0 0	6 12 0	6 12 0
8	12	20	30	17 10 0	7 10 0	7 10 0
10	12	24	30	20 0 0	9 2 0	9 2 0
12	14	28	60			
16	16	32	60			

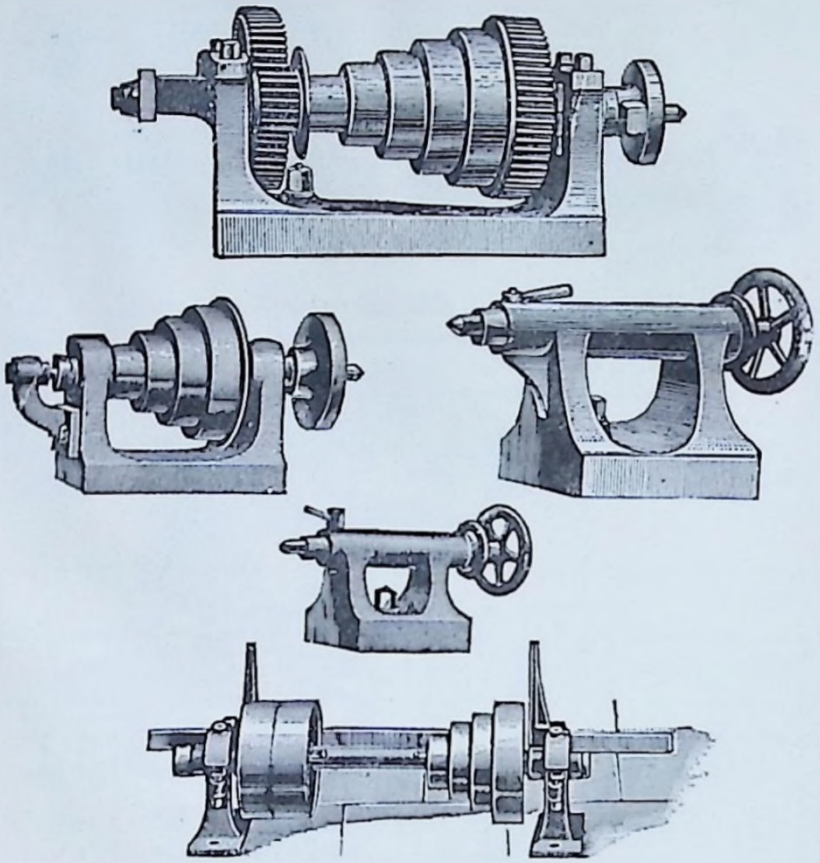
BORING MACHINES.

Boring Machines differ so much, owing to the work for which they are required, that we do not illustrate any, but on receipt of particulars shall be pleased to send full details.

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PARTS OF LATHES.

FAST AND LOOSE HEAD STOCKS.



The Double-geared fast Head Stocks are fitted with **steel spindles, gun-metal** bearings and **parallel** or **conical** adjustable bushes.

PRICES, INCLUDING OVERHEAD MOTION.

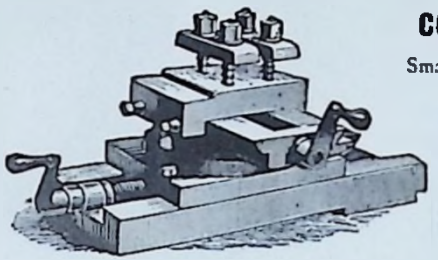
Size of Lathe	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.	14 in.
	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Double-geared Fast and Loose Head Stocks, per pair	8 2	9 15	13 0	17 2				
Single-speed ditto, ditto	6 10	8 2	9 15	12 5	14 13	16 5		

PARTS OF LATHES.



ECCENTRIC HAND RESTS.

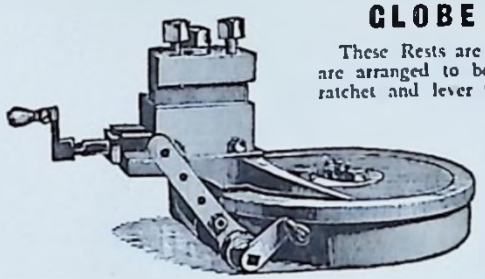
Sizes of Lathes, and Prices.						
5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
32/- each.	39/6 each.	39/6 each.	47/6 each.	47/6 each.	56/- each.	63/6 each.



COMPOUND SLIDE RESTS.

Small sizes are fitted with cast-iron swivel tool-holders.

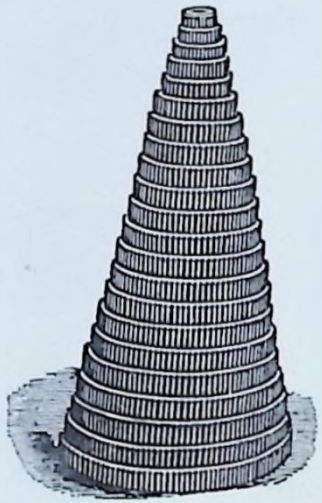
Sizes of Lathes, and Prices.						
5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
95/- each.	126/6 each.	142/6 each.	158/- each.	206/- each.	253/- each.	348/- each.



GLOBE TURNING REST.

These Rests are for turning Governor Balls, &c., and are arranged to be worked by hand, or self-acting by ratchet and lever from overhead motion; they can be adapted to fit any Lathe bed, or carriage of a self-acting Lathe.

Sizes of Lathes, and Prices.			
6 in.	8 in.	10 in.	12 in.
6 13 6 each.	9 6 8 each.	12 13 6 each.	16 0 0 each.

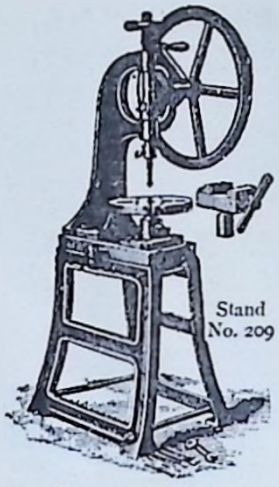


LATHE CHANGE WHEELS.

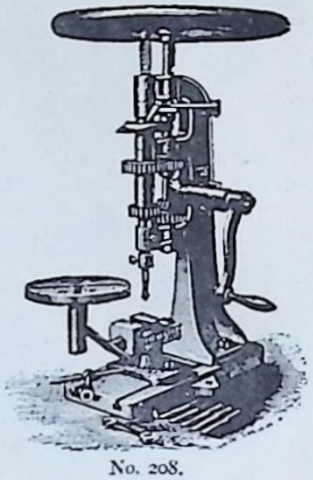
These are supplied in sets of 22 Wheels. They are bored, turned on bosses and rims, keyways cut, and teeth cleaned by machine.

Pitch of Teeth.	Price.	
	As above.	With Teeth cut from Solid Metal.
	£ s. d.	£ s. d.
¼ in.	2 2 6	5 0 0
5/16 "	2 6 8	6 10 6
⅜ "	3 0 0	8 13 4
7/16 "	4 13 4	9 13 4
½ "	6 2 6	14 13 4
⅝ "	10 0 0	

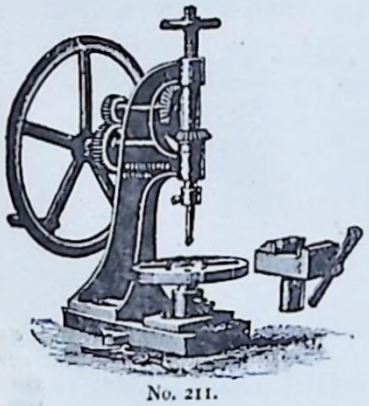
HAND AND POWER DRILLS.



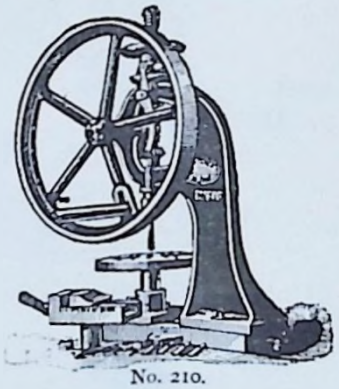
Nos. 200, 201, 202.



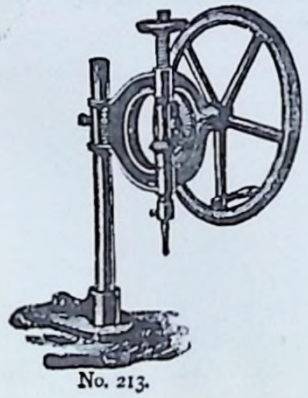
No. 208.



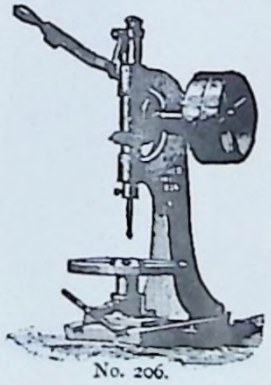
No. 211.



No. 210.



No. 213.



No. 206.

BENCH DRILLING MACHINES.

No.	Capacity. Hole drilled.	Centre to frame.	Feed.	Diam. of Table.	Height	Weight	Prices. With Table and Vice	With Table	Cast Iron Stands.	Fast and Loose Pulleys.
	In.	In.	In.	In.	In.	Lb.	£ s. d.	£ s. d.	£ s. d.	s. d.
200	¾	5	2½	9½	27	100	3 16 6	3 7 6	1 2 6	10 9
201	1	6	3½	11½	31	150	5 8 0	4 14 6	1 7 0	14 6
202	1¼	7	4½	13½	37	250	8 2 0	7 4 0	1 11 6	18 0
206	1¼	7	3	13½	36	252	8 2 0	7 4 0	1 11 6	Included
207	¾	5	2½	9½	27	100	4 5 6	3 17 6	1 2 6	do.
208	1¼	6½	4	11½	42	258	10 16 0	9 18 0	1 11 6	18 0
210	¾	5	2½	9½	27	100	4 5 6	3 16 6	1 2 6	10 9
211	⅝	5	2½	9½	27	110	4 10 6	4 7 6	1 2 6	10 9
212	¾	5	2½	No Table	27	90	£2 17 6		—	10 9
213	½	4½	2		18	28	£1 17 9		—	—
213A	¾	7½	2½	,,	24	70	£3 3 0		—	—
213B	1	8½	3	,,	30	116	£4 3 0		—	—
214	¾	7½	2½	,,	27	80	£3 15 6		—	—

Six Drills and a set of Spanners sent with each Machine (with No. 213, four Drills).

Machines can be supplied **without** Table, Pedestal, and Foot Plate, at the following reduction in prices.

For Machine to drill .. .. up to	¾ inch.	1 inch.	1¼ inch.
Table	5/9	8/-	11/6
Pedestal	2/9	3/6	5/-
Foot Plate	5/3	6/6	8/3

All connecting parts of Machines are planed true, ensuring accuracy in drilling.

The Pedestal and Table can be removed to admit larger work, and when placed in the slots of the Plate is again central with the Drill. The Table can be taken out of the Pedestal and the Vice put in and secured in any position by one steel set screw; the leg of this Vice is turned, and is free to revolve in the Pedestal; by this means holes may be drilled round a circle or curve, or in a line, as desired.

Nos. 200 and 201 are Quick Speed Drilling Machines. The Pinion Wheels are with a distance Bush, which prevents the teeth of the wheels from being broken, and work more smoothly. **No. 201** is similar to **No. 200**, but stronger.

No. 202 is an Extra Strong Drilling Machine, designed for heavy work. The Machine is similar in design to **No. 200.**

Nos. 206 and 207 are Lever Feed Machines designed for drilling or Countersinking.

No. 208 is a **Self-Feed Machine.** It is fitted with **Double Gear Wheels,** by which means either a quick or slow speed can be obtained, or the power multiplied for large holes by simply sliding the Spindle Tooth Wheel in or out of gear with the other wheels.

No. 210 is a **Self-Feeding Machine** with Fly Wheel suitable for hand or power.

No. 211 is a very **Quick Speed Machine** fitted with extra wheels, giving a speed of 4 to 1.

No. 212 is **No. 200** fixed to a wall by an angle plate, changeable to a stand or bench.

No. 213 is a small **Radial Pillar Drilling Machine;** it is very light, strong, and portable. By means of the set pin it can be raised or lowered on the pillar to suit any kind of work.

No. 213a is stronger. No. 213b is very strong.

No. 214 is similar **to No. 213,** but **specially designed for Drilling Pipes** up to 6 in. diameter.

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 178 of 298
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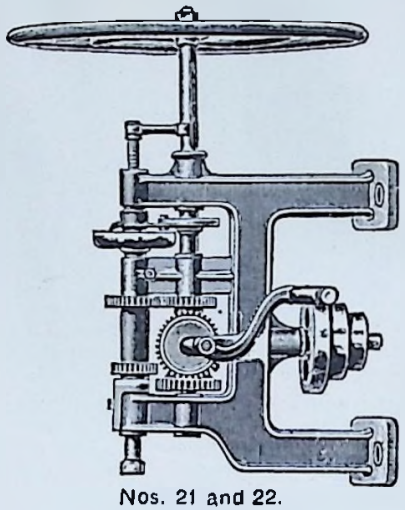
WALL DRILLING MACHINES.



No. 9.



No. 20.



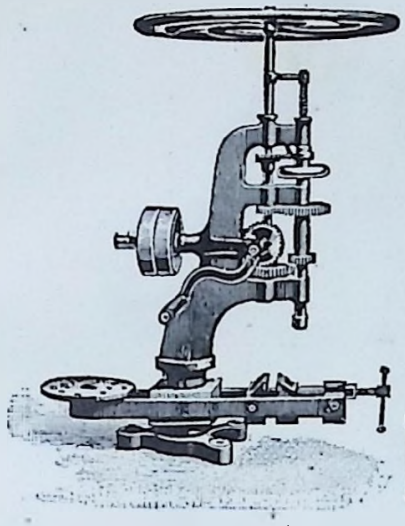
Nos. 21 and 22.

Nos. 9 and 20 are Single Speed Machines for hand power. Nos. 21 and 22 are Double Geared, with self-acting Feed motion, adapted for hand or power.

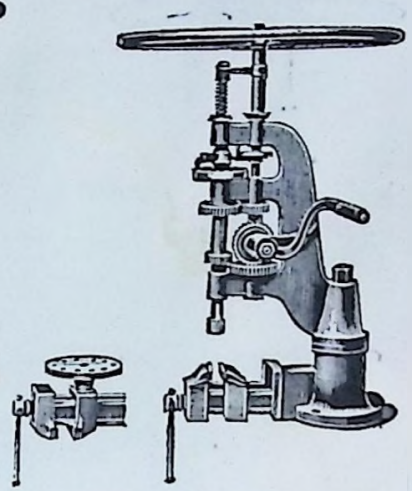
PRICES.

No.	Will drill up to	Diameter of Wheel.	Approximate Weight.	Price.	With Fast and Loose Pulleys or Cone.	With Cone for Steam Power (without fly wheel); also Transmission Cone.
	In.	In.	lb	£ s. d.	£ s. d.	£ s. d.
9	⅝	20	75	1 9 0		
20	⅝	20	81	1 7 0		
20	⅝	23½	95	1 8 0		
21	1 3/16	33½	265	5 3 0	5 13 0	
22	1 9/16	39½	375	5 17 0	6 16 0	6 12 0

BENCH DRILLING MACHINES.



Nos. 30, 31, and 32.



Nos. 27, 28, 29, 46, and 48.

Machines Nos. 27, 28, 29, 46, and 48 are double geared, with self-acting feed-motion, and adjustable vice made to fit up in four different positions. These machines are made to swing round on base; and fast and loose pulleys can be fitted to handle shaft if required for power.

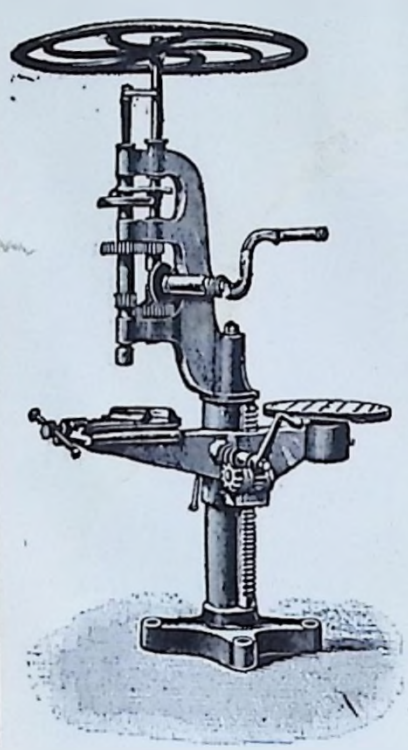
Nos. 30, 31, and 32 are double geared, with self-acting feed-motion, revolving parallel vice and drawer, and can be made with table to revolve in all directions.

When desired for power, fast and loose pulleys are fitted at back of arm as shown in Illustration.

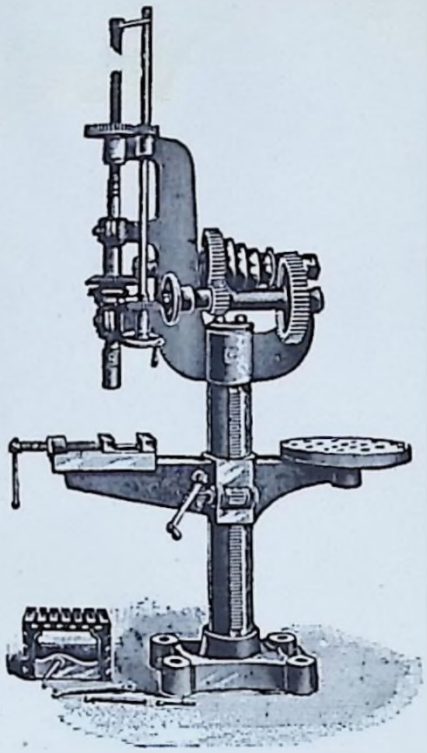
No.	Drill up to	Diameter of Wheel.	Approximate Weight.	Price. As above.	Price. With Fast and Loose Pulleys.	No.	Drill up to	Diameter of Wheel.	Approximate Weight.	Price. As above.	Price. With Fast and Loose Pulleys.	Price. Extra Table to revolve in any direction.
	In.	In.	Lbs.	£ s. d.	£ s. d.		In.	In.	Lbs.	£ s. d.	£ s. d.	£ s. d.
48	1	31½	242	5 3 0	5 12 0	29	2	43½	540	8 9 0	9 8 0	
46	1 3/16	33½	309	5 17 0	6 9 0	30	1	31½	322	6 16 0		0 19 0
27	1⅜	37½	353	6 12 0	7 4 0	31	1 3/16	33½	441	7 [illegible] 0	8 7 0	1 3 0
28	1 9/16	39½	441	7 10 0	8 5 0	32	1 9/16	39½	664	11 [illegible] 0	12 9 0	1 8 0

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PILLAR DRILLING MACHINES.



Nos. 42, 43, and 44.



Nos. 61, 62, and 63.

These very useful and cheap Drilling Machines are fitted with revolving parallel vice and table, rising and falling on pillar by rack and pinion, and automatic feed motion.

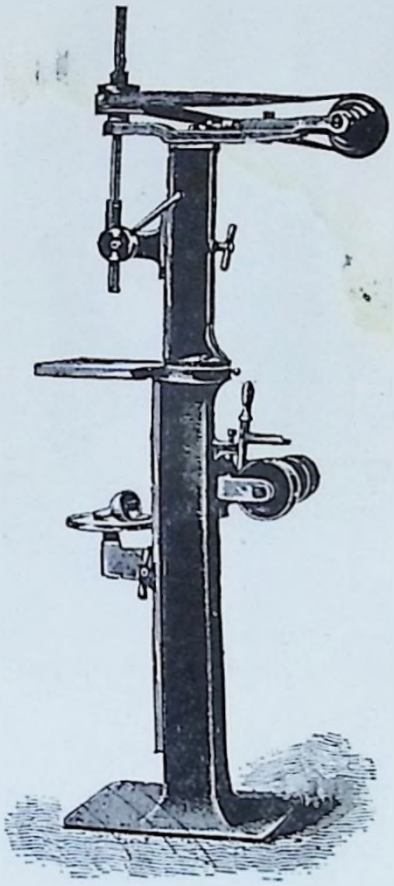
Nos. 42, 43, and 44 can be fitted with fast and loose pulleys to handle if required for power.

Nos. 61, 62, and 63, for power only, are provided with back-gear and cone, with best gun-metal bushed bearings.

No	Drill up to	Approximate Weight.	Price. As above.	Price. With Cone or Pulleys.	Price. Transmission Cone.	No	Drill up to	Approximate Weight.	Price. As above.	Price. With square box table instead of vice.	Price. With square box table and vice.	Price. Transmission Cone.
	In.	Cwts.	£ s.	£ s.	Extra.		In.	Cwts.	£ s.	£ s.	£ s.	Extra.
42	1⅜	5¼	11 10	12 5	15/-	61	2⅜	10½				25/-
43	1⅝ / 2⅜*	7	12 18	13 18	20/-	62	2 9/16	12				25/-
44	2 / 2 9/16*	9	15 10	16 10	20/-	63	3⅛	22½				25/-

* Will drill up to these sizes if pulleys or cones are used.

HIGH SPEED SENSITIVE DRILLING MACHINE



This Machine has, among others, the following advantages: it is specially adapted for drilling holes up to ½ in.; the spindle nose is bored to No. 1 Morse Twist Drill Taper; the spindle can be raised or lowered at will 12 in.; a depth stop is provided.

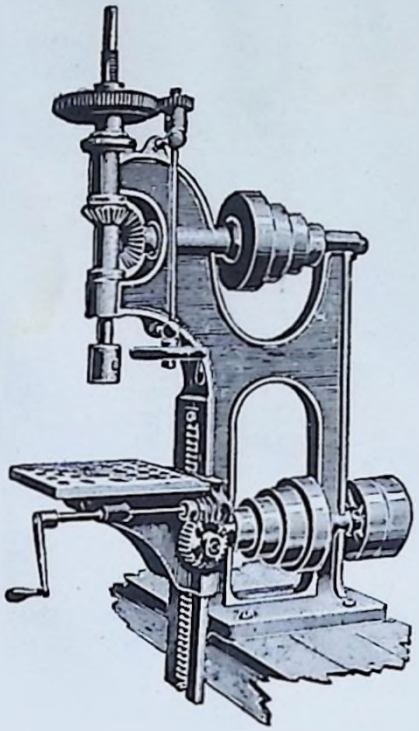
All pulleys are turned inside and out, **to ensure steadiness in running.** It is fitted with fast and loose pulleys and strap fork.

DIMENSIONS.

Will drill extreme length.	Centre of Spindle to face of column.	Fast and loose Pulleys	Approximate Weight.	Price.
3 ft. 6 in.	5 in.	4¼ in. × 1⅜ in.	240 lbs.	£15

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SINGLE SPEED DRILLING MACHINE.



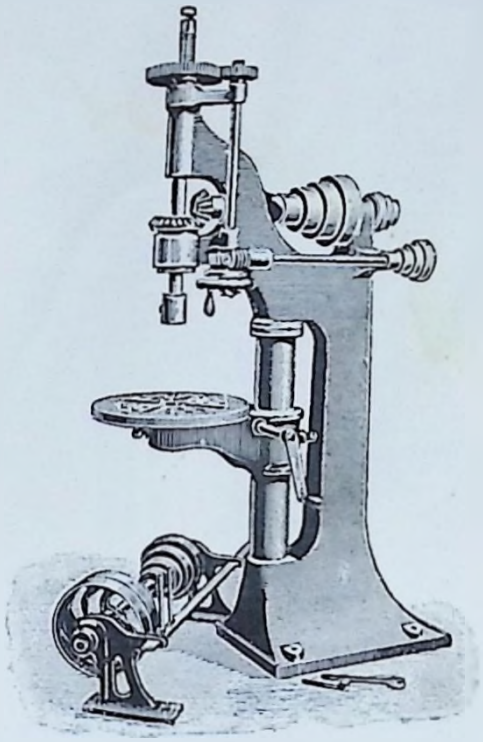
This Machine is designed to fix on a bench, or, if preferred, on a cast-iron stand. It is fitted with a **steel spindle** having hand feed by screw, and steel-wearing faces adjustable by lock nuts. The table is square and is made to rise and fall on a planed face by rack and pinion. The **machine is very rigid** and self-contained, and is complete with fast and loose pulleys, strap fork and shifter, screw-keys, &c

DIMENSIONS.

Will admit in diam.	Diam. of Spindle.	Will Drill		Size of Table.	Speed Cone.	Approximate weight, no Stand.	Price.			
		Diam.	Deep.				As above.	With Stand.	With self-acting Feed Motion.	With Wheel and Handle.
in.	in.	in.	in.	in.	4 speed ×	cwt.		extra	extra	extra
18	1¼	1	6	13½ square.	1½ wide	5	£14	£1 18 0	£1 7 6	£0 18 0

For list of Twist Drills and Sockets, see Index.

DRILLING MACHINE.



Above is made with **Single and Double Gear.** The frame is of box pattern and **very rigid**; and the table is circular moving on a turned pillar. The Machine is fitted with a steel spindle having conical gun-metal bearings with **adjustment for taking up the wear.** Variable self-acting feed-motion with improved **instantaneous disengaging motion.**

Each Machine is complete with overhead motion, strap-bar and fork, screw-keys, &c.

Note.—When Machine is double-geared frame is slightly altered.

Will admit in Diameter.	Diameter of Spindle.	Will Drill		Diameter of Table.	Speed Cone.	Weight.	Price.	
		Diameter.	Deep.				Single-geared.	Double-geared.
In.	In.	In.	In.	In.	4-speed ×	Cwts.	£	£
24	1¼	1½	8	20	2½ in. belt.	11½		

For list of Twist Drills and Sockets, see Index.

PILLAR DRILLING MACHINES.

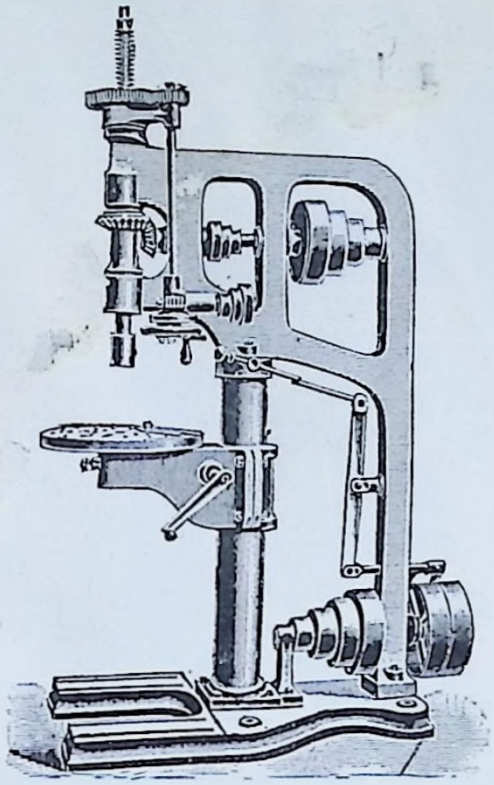


Illustration represents a strong and durable Machine, having circular **table** which can be **raised or lowered** on turned pillar, and swing to sides **clear of base**; self-acting **variable feed-motion** with improved disengaging motion. Spindles are of steel, having hardened steel end thrust and adjusting nuts for taking up wear. Base-plate has **T** slots, and a pit can be made between for receiving long articles. Machine being self-contained requires **no countershaft.** Wrought-iron case-hardened screw-keys are provided with each machine.

DIMENSIONS.

Admits in Diam.	Admits in Height.		Fall of Spindle.	Diameters of			
	On Table.	On Base-plate.		Steel Spindle.	Table.	Pillar.	Driving Pulleys.
In.	Ft. in.	Ft. in.	In.	In.	In.	In.	In.
30	2 8	3 6	10	2	20	6	12

Approx. Weight.	4-speed Cone.		Gear.	Price.	
	Width.	Diam. of largest.		As specified.	With Plain Bearings.
Cwt.	In.	In.		£	£
15	2½	11	Single		
20	2½	11	Double		

PILLAR DRILLING MACHINES.

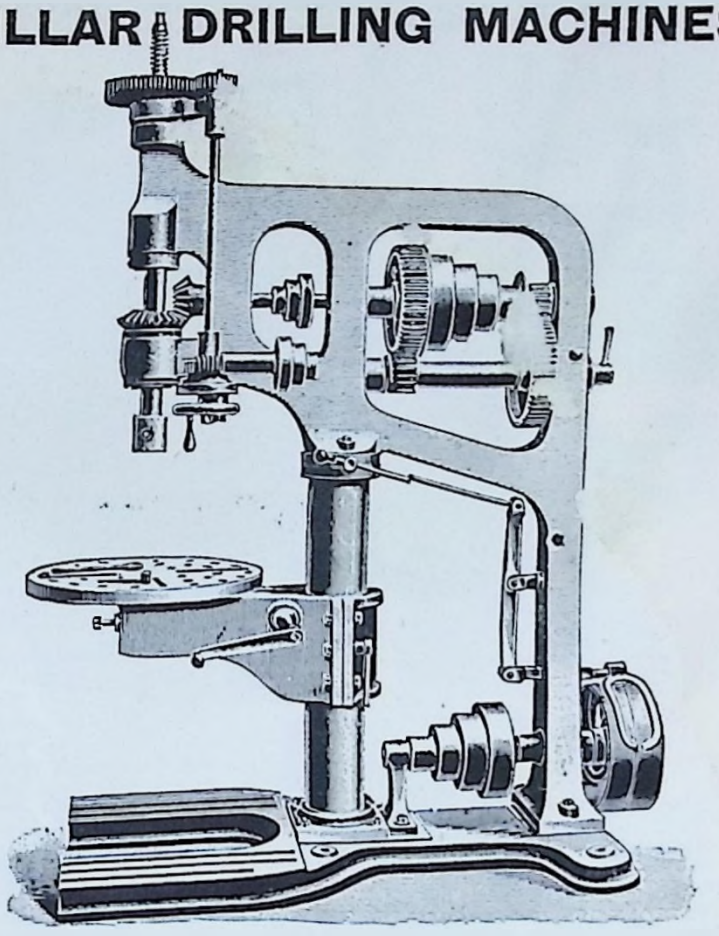


Illustration represents 36 in. and 42 in. Machines, which have **powerful frames**, and are strong and durable; are provided with circular tables which can be raised or lowered on turned pillar, and swing to sides **clear of base**; **self-acting variable feed disengaging motions.** Spindles are of steel, having **hardened steel end thrust** and adjusting nuts for taking up wear. Bearing for spindle has a large gun-metal bush bored out to receive coned sleeve of driving-wheel, and bush is fitted with adjusting nuts. Machines being **self-contained** require **no countershaft.** Wrought-iron case-hardened screw-keys are provided with each machine.

Admits in Diameter.	Admits in Height.				Fall of Spindle.	Diameters of			Approximate Weight.
	On Table.		On Base plate.			Steel Spindle.	Table.	Driving Pulleys.	
In.	Ft.	In.	Ft.	In.	In.	In.	In.	In.	Cwt.
36	2	4	3	10	12	2⅛	32	15	28
42	2	4	3	10	12	2¼	38	15	32

36-in. Machine, as specified .. .. £ : : If plain bearings .. .. £ : :
42-in. .. .. £ : : .. .. £ : :

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PILLAR DRILLING MACHINES.

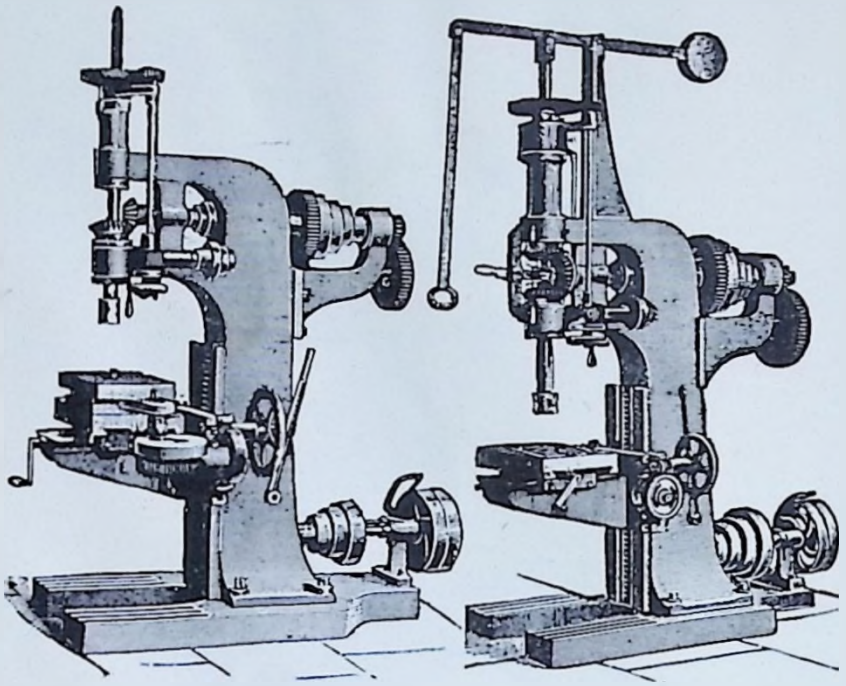


Fig. 1 Fig. 2.

These Special Drilling Machines are Double Geared and have **Compound Tables**; the frame is box pattern, with planed V slides in front. Table rises and falls by worm gear and handle, and has carefully-fitted Slides, planed T slots on top, and large hinged joint at side so that it can be swung clear of any large work; when in use table is bolted to saddle, which slides in front of standard. Spindle is of steel, working in conical gun-metal bearings, with adjustable wearing nuts. The variable self-acting feed motion can be instantaneously engaged or disengaged while cut is on and will not stick. Driving motion is double geared and self contained, with speed cone, fast and loose pulleys, strap fork and shifter, screw keys, &c., complete.

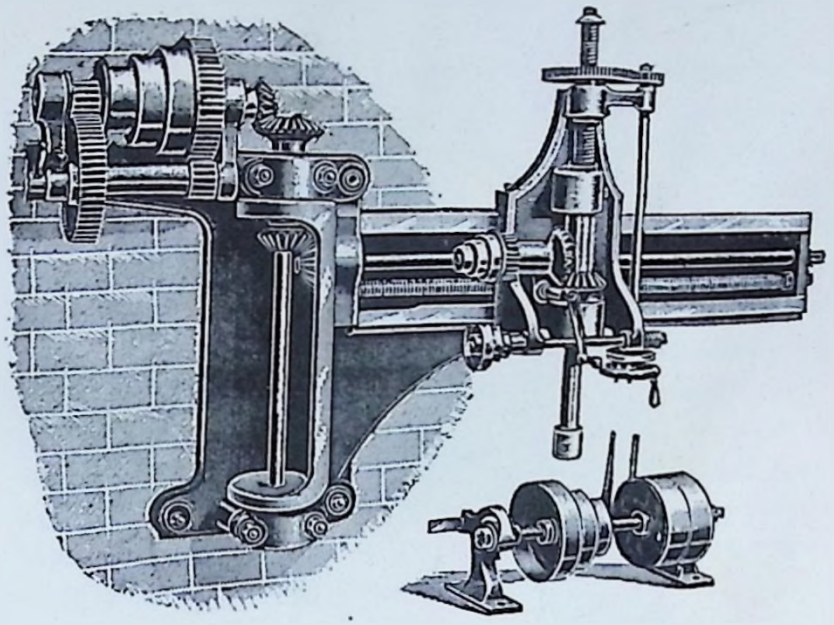
Fig. 1 shows **Machine provided with Self-acting Slot Drilling Attachment**, and will cut keyways up to 12 in. long × 1½ in. wide

Fig. 2 shows **Machine provided with Tapping Arrangement**. Spindle is balanced and motion is reversible. Screw used for self-acting feed motion can be instantly detached from nut, leaving spindle free to follow tap which is secured into it; when tap is through hole, spindle is reversed by lever in front; this withdraws tap from hole.

Admits			Diam. Steel Spindle	Size of Table.	4-Speed Cone.		Pulley.		Approx. Weight	Price.
In Diam.	On Table.	On Base.			Largest Diam.	Width.	Diam.	Width.		
In.	In.	In.	In.	In. In.	In.	In.	In.	In.	Cwts.	
30	24	36	2	20 × 14	10½	2¼	12	3	28	£
36	28	40	2½	24 × 16	11	2¾	15	3¼	34	£
42	28	40	2½	24 × 16	11	2¾	15	3¼	37	£

If as Fig. 1, with Slot-drilling Attachment, Price extra to either size, £
,, Fig. 2, with Tapping Arrangement ,, ,, ,, £

WALL RADIAL DRILLING MACHINES.



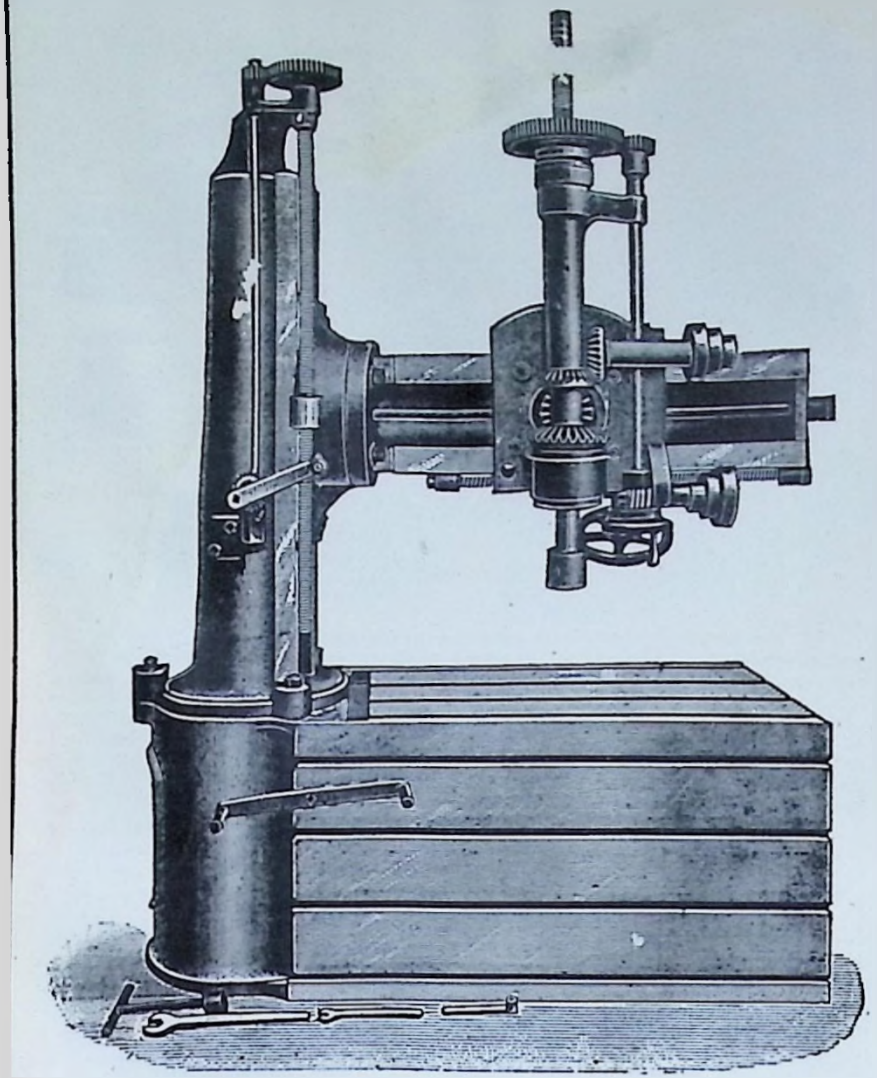
The above machine is suitable for fixing to an ordinary wall, as shown, or to a pillar. The wall plate carries the driving cone and wheels, which can be arranged either at top or bottom, also two large bearings. Radial arm has two trunnions cast upon it, turned to fit bearings, firmly secured by caps and bolts. Drill head on arm is adjusted by handle, which is placed close to spindle. Handle revolves a nut wheel on fixed screw; this gives quick hand traverse, and secures drill in position. Spindle is of steel, with self-acting variable feed, hardened steel end thrust bearings, and slides through driving-wheel, which has long-coned sleeve revolving in gun-metal bearing, with adjustable nuts. Feed screw has adjustable nuts for taking up wear. Each machine is complete with overhead motion and screw-keys.

No.	Radius will bore.	Spindle.		Arm.			Cone.		
		Diam.	Vertical Feed.	Length from centre of Trunnion.	Width on Face.	Travel of Saddle.	No. of Speeds.	Largest Diam.	Width.
	Ft. In.	In.	In.	Ft. In.	In.	Ft. In.		In.	In.
1	4 5	2¼	12	5 0	14	2 8	3	10¾	2⅜
2	6 0	2½	16	6 7	15¼	4 0	3	12½	3⅛
3	6 3	2¾	16	7 0	17	4 0	4	12	3⅛
4	7 3	3½	18	8 0	20	4 10	5	14	3⅛

No.	Approx. weight.		PRICE.	
	Double Geared.	Single Geared.	Double Geared.	Single Speed.
	Cwts.	Cwts.	£	£
1	20	18½		
2	26	24		
3	36	—		Not made.
4	60	—		

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RADIAL DRILLING MACHINE.



For Dimensions and Particulars, see opposite page.

RADIAL DRILLING MACHINE.

This Machine [illegible] **ive box bed,** with T slots planed out of the solid metal, on top and one side. A [illegible] **pillar** with trunnion of large diameter is fitted into the box bed, and secured by t[illegible]n any position; the **pillar may be revolved** through a complete circle by a handle placed in the front of the bed. The **arm is rigidly fitted** to the pillar by a flat slide with adjustment for taking up the wear, and has hand motion for raising or lowering. It is also made universal as shown in illustration. The **drill carriage is adjustable** on the arm by a revolving nut on a fixed screw worked by a handle near the spindle. The **spindle is steel** and is driven by a wheel which has a long coned sleeve revolving in adjustable gun-metal bearings, which with the hardened steel end thrust bearings of the spindle and feed screw have **adjustable nuts** for taking up the wear. Drill carriage can also be made **universal to revolve** on a planed face so as to drill at any angle. **Spindle has a variable self-acting feed** motion, with improved arrangement for engaging and disengaging while machine is working. The driving motion is **double geared,** with four-speed cone, and can be fixed at end or back of bed as ordered. Complete overhead motion and screw-keys are supplied with machines.

DIMENSIONS.

Length of Arm.	Arm will raise and lower.	Traverse of Head on Arm.	From top of table to Spindle Nose.	Dimensions of Bed.			Diam. of Spindle.	Fall of Spindle.
				Length.	Width.	Depth.		
Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	In.	In.
4 6	2 7	2 2	2 8	5 11	2 4	2 4	2½	14

Will Bore		4-Speed Cone.		Appx. Weight.	Price.		
At a radius of	Diam. holes up to.	Width.	Diam. of largest.		As above.	If fitted with Universal Arm.	If fitted with universal Head and Arm.
Ft.	In.	In.	In.	Cwts.	£	£	£
4	10	2½	10½	42			

For list of Twist Drills and Sockets, see Index.

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RADIAL DRILLING MACHINE.

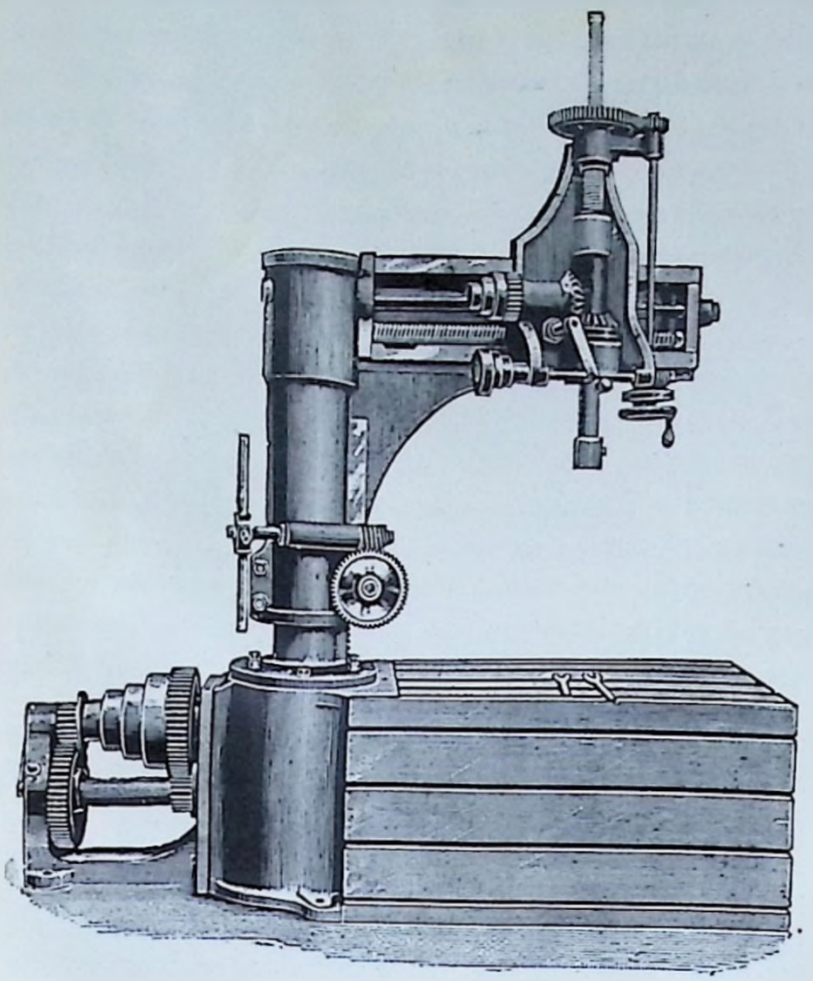


Illustration of Machines Nos. 1 and 2.

For Dimensions and Particulars, see opposite page.

RADIAL DRILLING MACHINES.

These Machines consist of a **strong box base** with T slots planed out of the solid metal in the top and one side. The **arm revolves** on a turned pillar firmly fixed into the base; it has a hand motion for raising and lowering, and will revolve through the entire circle. The drill carriage is moved along the arm by a revolving nut on a fixed screw, and is worked by a handle near the spindle. This motion gives a **quick travel** of the head, and also fixes it in position for work.

The **steel spindle** is driven by a wheel which has a long coned sleeve revolving in a gun-metal **adjustable bearing.** This and the **hardened steel end thrust** bearings of the spindle have adjusting nuts for taking up the wear.

The driving motion is **double geared** with four-speed cone, and is provided with complete overhead motion and belt shifter.

DIMENSIONS.

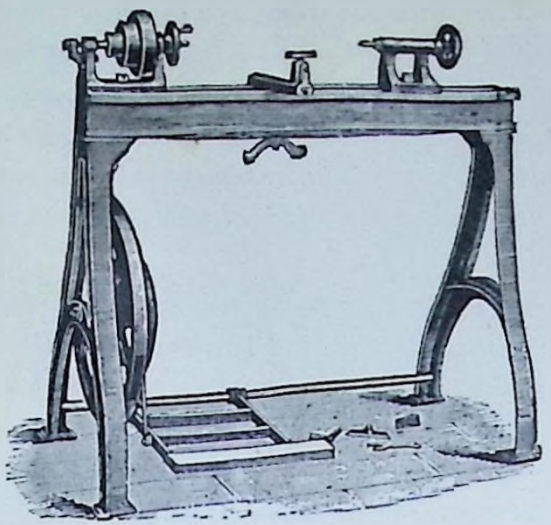
No.	Length of Arm.	To bore at a Radius of	Arm will raise and lower	Traverse of Head on Arm	Dimensions of Bed.		
					Length.	Width.	Depth.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
1	3 7	3 1	1 3	1 6	4 9	2 4	2 4
2	4 8	4 1	1 6	2 2	6 5	2 9	2 2

No.	From top of Table to Spindle Nose.	Fall of Spindle.	Diameter of Spindle.	Diameter of Pillar.	Approximate Weight.	Price.
	Ft. In.	Ft. In.	Ft. In.	In.	Cwts.	
1	3 6	1 0	0 2	7	36	£
2	4 0.	1 6	0 2½	9	50	£

For List of Twist Drills and Sockets, see Index.

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HAND-TURNING LATHE.



This Lathe is designed to sell at a low price, and to meet the requirements of light turning and drilling where a more expensive tool is not necessary

It is well made; 4 inch centres; 3 feet girder; ribbed bed on iron standards; and can be supplied for foot or machine, or both.

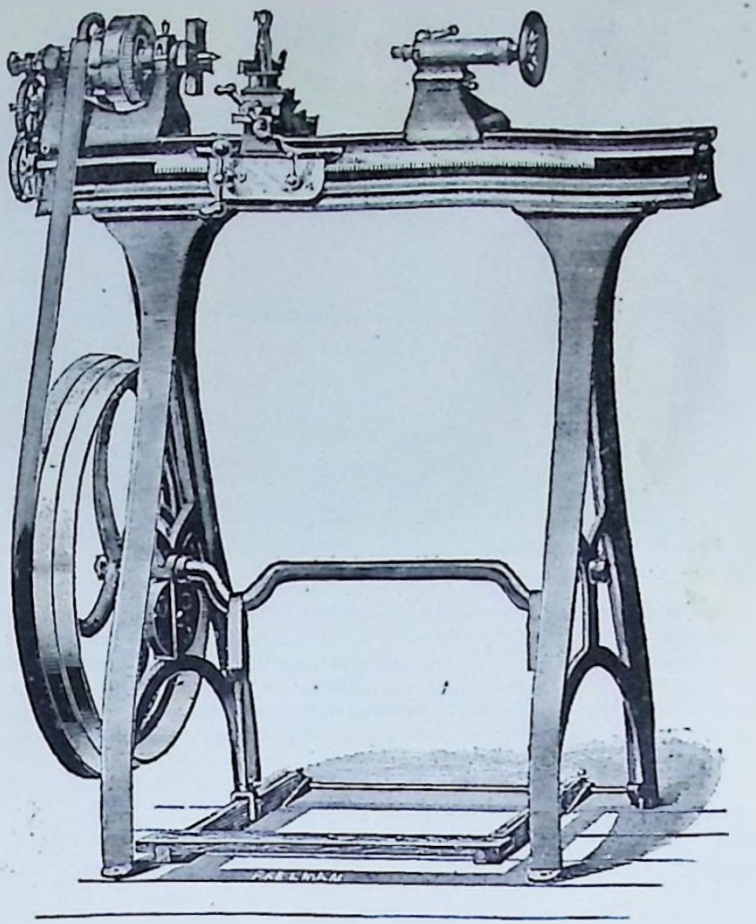
The driving wheel of the foot mechanism is arranged to give a great range of speed without much variation in the action of the foot in treading.

A hand-rest for wood and metal turning; centres for wood and metal; carrying plate and wrench are provided.

Price for foot power	£8 10 0
„ „ steam power	8 10 0
„ „ Counter Shaft .. .. .. extra	1 15 0

SCREW-CUTTING FOOT LATHE.

LIGHT PATTERN.

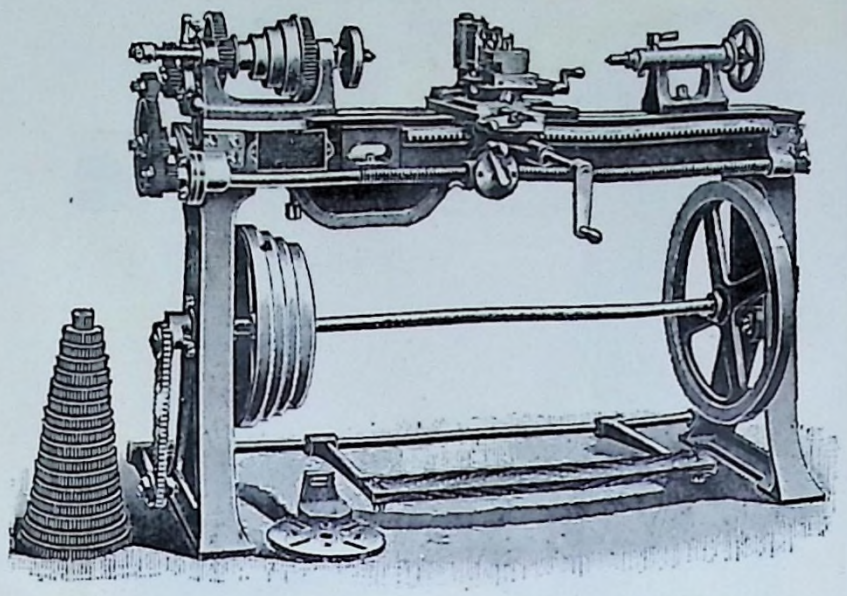


The above represents a Light Pattern Foot-Power Lathe, suitable for amateurs, &c. It has 4½ inch centres, and will turn work 25 inches long. The Headstock has a hollow spindle, allowing rods ⅜ inch to pass through the head and be held in a chuck. The Cone Pulleys are 2½, 3½, and 4 inches diameter, giving a good variety of speed. It is back-geared, feeds either to right or left, and cuts screws right or left without change of gear.

	With Plain Rest	With Compound Rest.
Price of Lathe ...	£	£

The Lathe can be supplied with a Large Face Plate and Centre Rest at a small extra cost.

SCREW-CUTTING FOOT LATHES.



The above represents a very strong and accurate class of Foot-power Lathes, provided with back following stay, tool board, face-plate, driver-plate, treadle with **anti-friction bearings** and heavy **balanced fly-wheel** and cone. Foot motion may be fitted with wrought iron, double throw crank, if so ordered. Double geared head-stocks with machine-cut wheels, conical or parallel bearings as required, and steel spindle. Carriage has quick hand traverse by rack and pinion, slide rest arranged to surface or turn conical and indexed to set at any angle. Guide screw is fitted with double clam nuts of gun metal.

DIMENSIONS.

Height of Centres.	Bed			Admit between Centres.	Gap.		Cone for Foot Motion.			Guide Screw ¼ in. Pitch.
	Length.	Width.	Depth.		Width.	Depth.	No. of Speeds.	Largest Diameter.	Width.	
In.	Ft.	In.	In.	Ft. In.	In.	In.	—	In.	In.	In.
3½	3½	5¼	4	1 9	4¼	4	3	18	1⅛	1
4½	4½	6	4⅜	2 5	5	4¼	3	18¼	1 3/16	1⅛
5	5	6½	5½	2 7	5¼	4¾	4	18¼	1 3/16	1¼
6	6	8	5½	3 3	7½	6¾	4	25	1 9/16	1⅜

Height of Centres.	Approximate Weight.	Sliding, Surfacing and Screw-cutting.	Sliding and Screw-cutting.	Sliding and Surfacing.	Extra for Overhead Motion.	Extra per Foot of Bed.
In.	Cwts.	£	£	£	£	£
3½	5	Not made with Back-shaft.				
4½	7½					
5	11					
6	14					

TREBLE-GEARED FOOT LATHES.

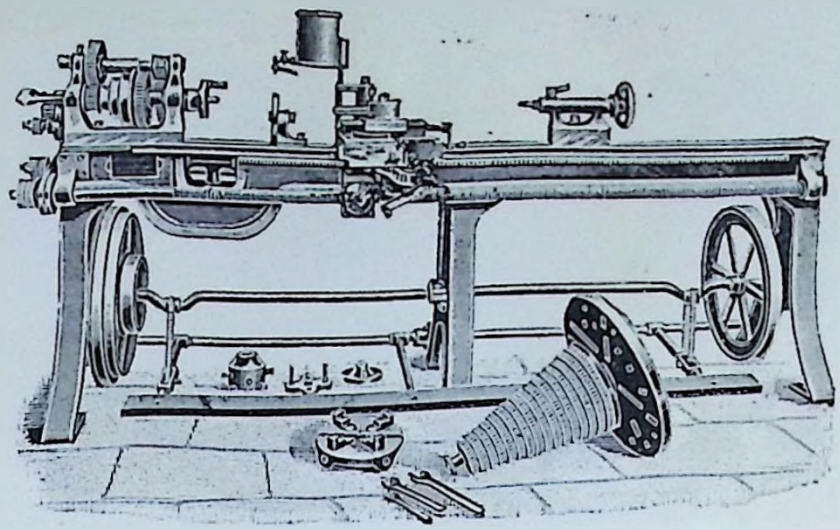


Illustration represents a class of Lathes suitable for turning either **iron, wood, or brass,** and have self-acting motions throughout. The beds are fitted with gap plates and bolted to two standards, having roller bearings for crank shaft and parallel capped bearings for treadle shaft. **Treble-geared head-stocks,** fitted with steel spindles, parallel or conical gun-metal bearings, as desired, or if ordered, with hardened steel spindles and bearings. Carriages have quick hand traverse by rack and pinion, and receives self-acting sliding and surfacing motions by back shaft. Compound slide rests indexed at base for conical turning. Guide screws have double clam nuts of gun-metal. Each lathe complete with overhead motion, 22 change wheels, tool board, face-plate, driver-plate, screw-keys, &c.

DIMENSIONS.

Height of Centres.	Bed.			Admit between Centres.	Gap.		3 Speed Cone for Foot Motion.		Guide Screw × ¼ in. Pitch.
	Length.	Width.	Depth.		Width.	Depth.	Largest Diam.	Width.	
In.	Ft.	In.	In.	In.	In.	In.	In.	In.	In.
6	5	6¼	5½	30	5¼	4¾	18	1½	1¼
	6	8½	6	36	7½	6	25½	1½	1½

Height of Centres.	App. Weight.	Complete as above.	Extra with hardened steel spindle and bearings.	Extra with Boring Collar.	Extra with Clement's Driver.	Extra with large Face-plate.	Extra per foot of Bed.
In.	Cwts.	£	£	£	£	£	£
5	11½						
6	15½						

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SCREW CUTTING LATHES.

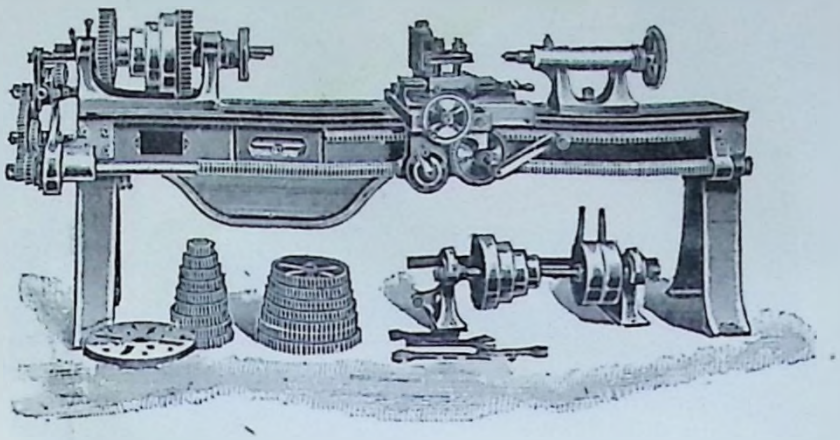


Illustration of 8 in. size.

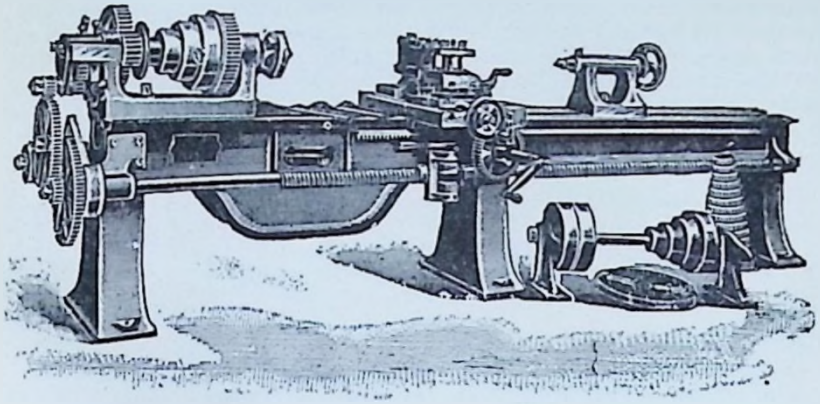
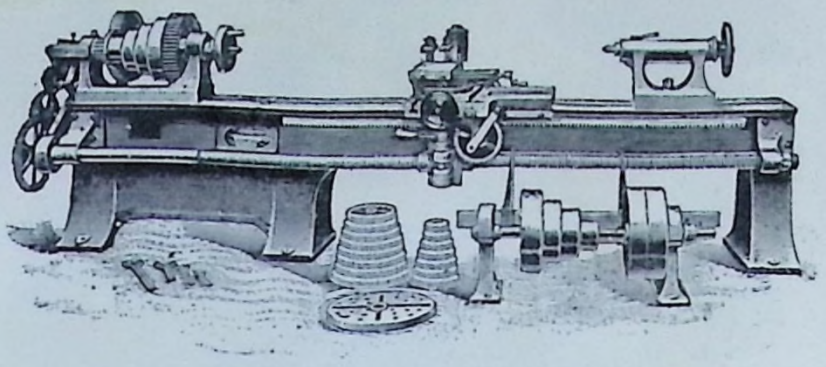


Illustration of 9 in. size.

For full specification and particulars see opposite page.

SCREW-CUTTING LATHES.



Above have strong gap-beds, and may be made with a **Box Gap-bed**, as shown in illustration. Fast head-stocks are double geared, with **machine-cut gear wheels.** Steel spindle runs in gun-metal bearings, either parallel or conical as desired. Carriage has self-acting sliding and surfacing motions by back-shaft, quick hand traverse by rack and pinion, **compound slide rest, arranged to turn conical,** and **indexed at base,** to set to any angle and back following stays. Leading screw is accurately cut and fitted with **double clam nuts** of gun-metal, and reversing motion for turning right and left hand screws. Guide screw and back-shaft will **clear largest diameter** gap will take in. Each lathe is complete with face-plate, driving-plate, overhead motion, screw-keys, and full set twenty-two change wheels, &c.

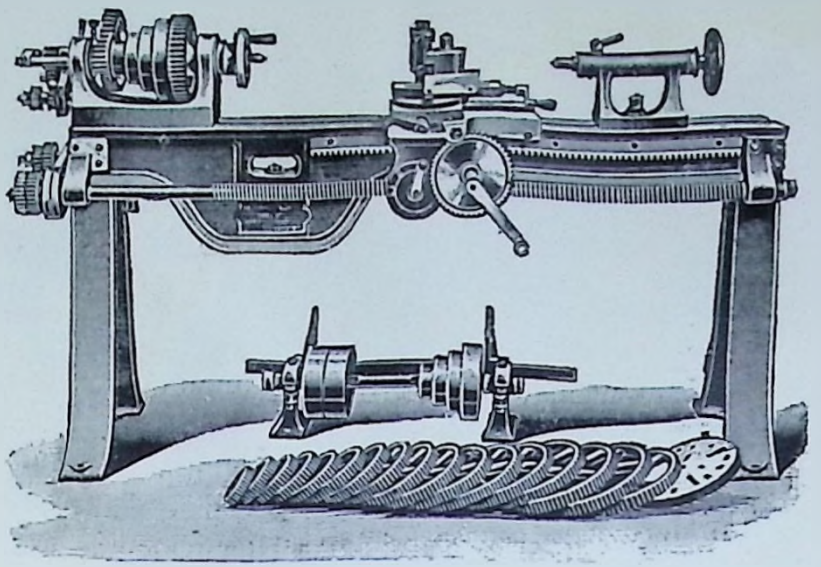
DIMENSIONS.

Height of entres.	Bed.			Admit between Centres.	Gap.		4-speed Cone.		Diam. Leading Screw, half-inch pitch.	Approx. weight.
	Length.	Width.	Depth.		Width.	Depth.	Width.	Diam. largest speed.		
In.	Ft.	In.	In.	In.	In.	In.	In.	In.	In.	Cwt.
8	8	12	8¼	52	13	8	2⅛	10½	1¾	21
9	12	13½	9	96	13	10	2⅜	11½	2	30
10	12	15	10½	90	15	10½	3⅛	12½	2⅛	35

Height of Centres.	Complete as above.	Screw cutting only.	Sliding and Surfacing only.	Loose Head to Slide Taper.	Large Face-plate for Gap.	Extra per foot of Bed.	Extra if with Box Gap-bed.
In.	£	£	£	£	£	£	£
8							
9							
10							

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SCREW-CUTTING LATHES.



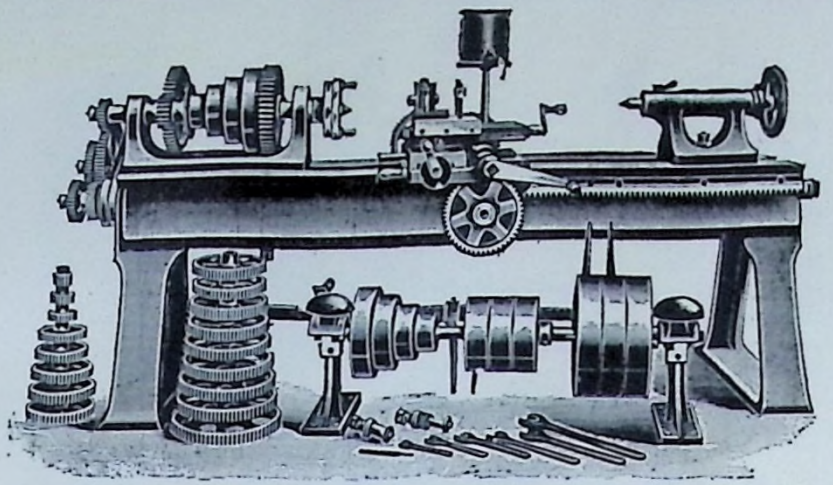
The above are of most **improved design** and **best construction.** The wheels of headstock are **machine cut**, and spindle runs in either parallel or conical gun-metal bearings as desired. If not specified conical bearings are fitted. Carriage has quick hand traverse by rack and pinion, and carries compound slide rest arranged for **turning conical** and **indexed at the base.** Rest can be easily removed and T or hand-rest substituted. Leading screw is accurately cut and fitted with double clam nuts of gun-metal, and reversing motion for cutting right and left-hand screws. Each Lathe is **complete** with overhead motion, face-plate, driving-plate, screw-keys, full set 22 change wheels, teeth of which are cleaned by machine, &c.

DIMENSIONS.

Height of Centres.	Bed. Length.	Bed. Width.	Bed. Depth.	Admit between Centres.	Gap. Width.	Gap. Depth.	Leading Screw ½ in Pitch.	Cone. No. of Speeds.	Cone. Width.	Cone. Dia. largest Speed.	Appr. Weight.
In.	Ft. in.	In.	In.	In.	In.	In.	In.		In.	In.	Cwts.
3½	3 6	5¼	4	21	4¼	4	1	3	1⅝	4¾	4
4½	4 6	6	4⅞	29	5	4¼	1⅛	3	1 5/16	5¾	7
5	5 0	6½	5⅛	31	5¼	4¾	1¼	4	1 5/16	6½	8
6	6 0	8	5½	39	7½	6¼	1⅜	4	1 9/16	8	11
7	6 0	10½	7½	33	9	7	1⅜	4	1¾	9¼	15

Height of Centres.	Complete as above.	Sliding and Screw-cutting only.	Sliding and Surfacing only.	Extra per foot of Bed.
In.	£	£	£	£
3½	Not made with Back-shaft.			
4½				
5				
6				
7				

SPECIAL HIGH CLASS LATHES.



These Machines are of the **highest class workmanship**, and of best material. **All** sliding parts are **accurately surfaced.** Fast head-stocks are double-geared with **machine cut wheels**, and fitted with steel spindles with **hardened necks** running in **hardened steel bearings.** Leading screws are of steel, accurately cut, fixed inside bed, and covered with top of bed, and fitted with double-clam nuts of gun-metal; handles for working them are conveniently fixed in front of carriage. Carriages have **quick hand traverse** by rack and pinion, and receive self-acting, sliding, and surfacing motions from strong back shaft. **Speed of surfacing screws can be altered** for scroll-cutting. All parts are **specially strong** and arranged so as to adapt lathes for use on **most accurate** kind of work, and to produce the largest quantity possible. Complete with overhead motion, Clement's driver, face-plate, full set change wheels, back following stays, water can, stand, screw-keys, &c.

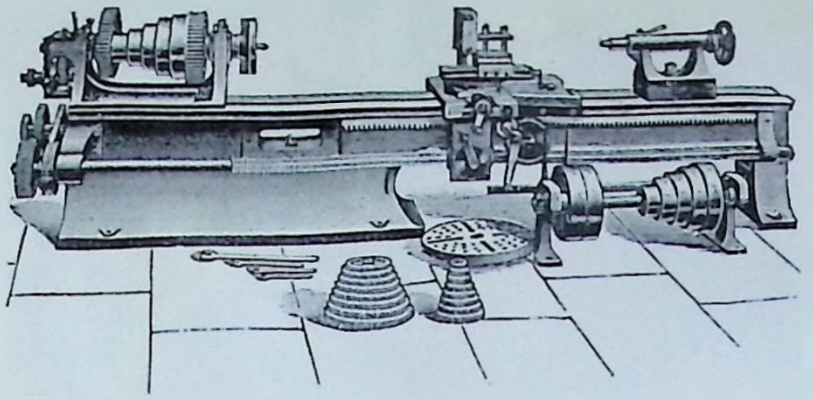
DIMENSIONS.

Height of Centres	Bed. Length.	Bed. Width.	Bed. Depth.	Admits between Centres.	4-speed Cone. Width.	4-speed Cone. Diam. of largest.	Leading Screw. Diam.	Leading Screw. Pitch.	Approx. Weight.
In.	Ft.	In.	In.	In.	In.	In.	In.	In.	Cwts.
5	5	10	7	26	1⅜	7	1⅜	¼	11
6	6	12	8	32	1⅜	8⅜	1⅜	¼	16
7	7	13¼	9	39	2⅛	10	2	¼	24
8	8	14½	10	46	2⅜	11½	2⅛	¼	32
9	9	16	11	51	2⅜	13¼	2¼	¼	40
10	10	18	13	56	3⅛	15	2½	½	52

Centres.	As above.	Screw Cutting only.	Extra per foot of Bed.	Extra with Gap Bed.	Extra Machine cut Change Wheels.
In.	£	£	£	£	£
5					
6					
7					
8					
9					
10					

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POWERFUL SCREW-CUTTING LATHES.



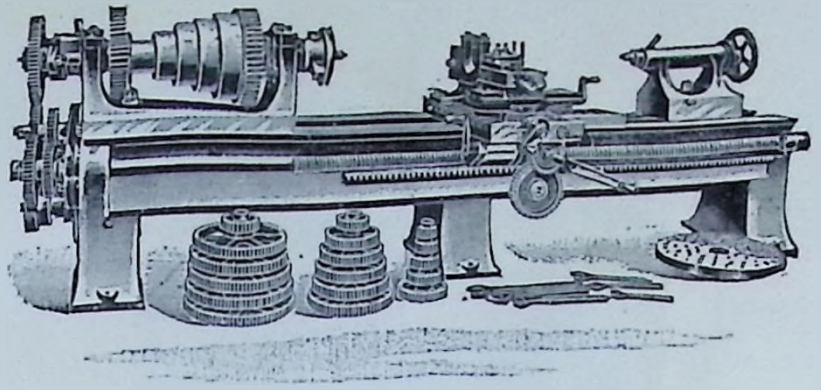
Above are of **very strong construction**, having **Box Gap-beds**. Head-stocks are double-geared with carefully fitted wheels (No. 1 size are machine cut) Spindle runs in parallel gun-metal or phosphor-bronze bearings. The self-acting, sliding and surfacing motions are obtained by a back shaft driven by change wheels from headstock. Leading screw is accurately cut and fitted with double-clam nuts of gun-metal. Carriage has a **quick hand traverse** by rack and pinion, and carries **compound slide-rest indexed at base**, and arranged to turn conical Each Lathe is complete with overhead motion, face-plate, driving-plate, back following stay, screw-keys, and change wheels. The illustration shows bed supported by one standard; longer beds are supported by two or three, according to length

DIMENSIONS.

Height of Centres.	Bed. Length.	Bed. Width.	Bed. Depth.	Admit between Centres.	Gap admits. In Diam.	Gap admits. In Width.	5-speed Cone. Width.	5-speed Cone. Dia largest Speed.	Approximate Weight.
In.	Ft.	In.	In.	Ft.	In.	In.	In.	In	Cwt.
12	20	18	12	14½	48	20	3⅛	14	70
14	20	22	13	13¼	54	20	3⅛	16½	105
16	20	22	13	13	58	20	3⅛	21	114
18	20	24	16	12¼	64	24	4	22¼	140
24	20	30	18	11	72	24	5	26	240

Height of Centres.	Complete as above.	Screw-cutting and Hand-Surfacing only.	Self-acting, Sliding and Surfacing only.	Back-shaft driven by Cone and Belt.	Extra per foot of Bed.
In.	£	£	£	Extra, £	£
12					
14					
16					
18					
24					

POWERFUL SCREW-CUTTING LATHES.



The above represents a pattern of very substantial and accurate Lathes. Beds are of Box form. Fast head-stocks are fitted with steel spindles running in large size bearings of phosphor bronze; can be made either parallel or conical with adjusting nuts. Teeth of head-stock wheels **are cut from the solid.** Sliding and surfacing motions are obtained by means of a grooved back-shaft, which can be driven by change wheels or belt, as shown in illustration. Screw-cutting motion is obtained by change wheels from headstock; screw is fitted with double-clam nuts of phosphor bronze. Carriages have quick hand travel by rack and pinion, fitted with compound slide-rest, with circular base for conical turning; and back following stay. Each Lathe is provided with complete overhead motion, 22 change-wheels, face-plate, driver-plate, and screw-keys.

DIMENSIONS.

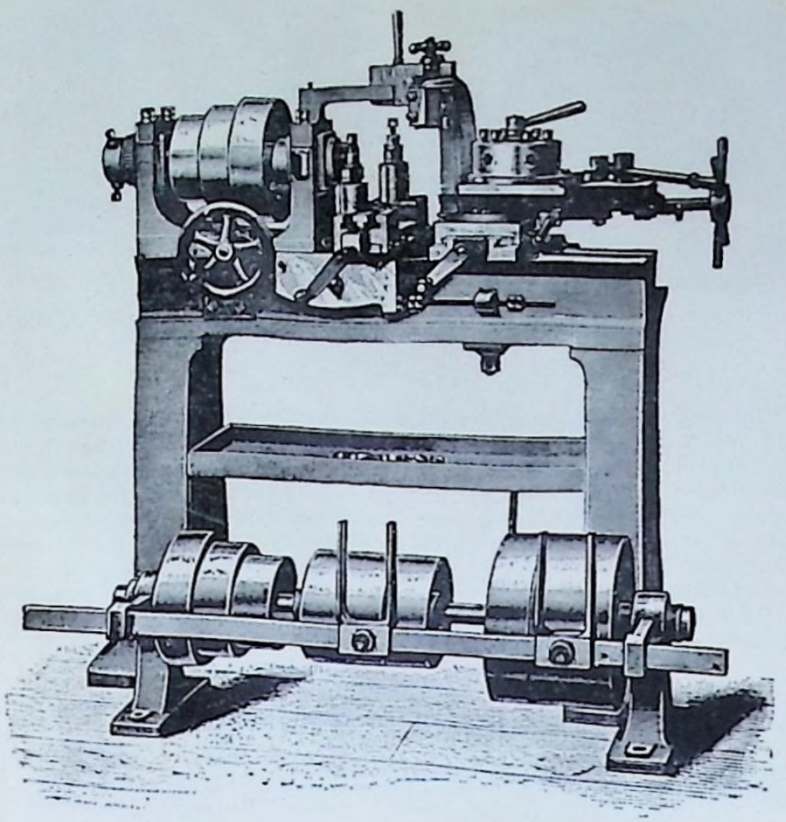
Height of Centres.	Bed. Length.	Bed. Width.	Bed. Depth.	Admit between Centres.	Cone. No. of Speeds.	Cone. Largest Diam.	Cone. Width.	Appr. Weight.
In.	Ft.	In.	In.	Ft. In.		In.	In.	Cwts.
10	12	15	10½	7 6	4	12½	3⅛	33
10½	12	16	10½	7 4	4	13⅛	3⅛	40
12	15	18	12	9 6	5	14	3⅛	60
12½	15	20	14	9 0	5	16	3⅜	75
14	18	22	15	10 6	5	18½	4⅛	100
16	20	24	16	12 4	5	22½	4⅛	120

Height of Centres.	Complete as above.	Sliding and Surfacing only.	Sliding and Screw-Cutting only.	Extra per foot of Bed.
In.	£	£	£	£
10				
10½				
12				
12½				
14				
16				

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HOLLOW SPINDLE LATHE.

With Chasing attachment and Traversing Cut-off Slide.



This illustrates No. 1 Machine.

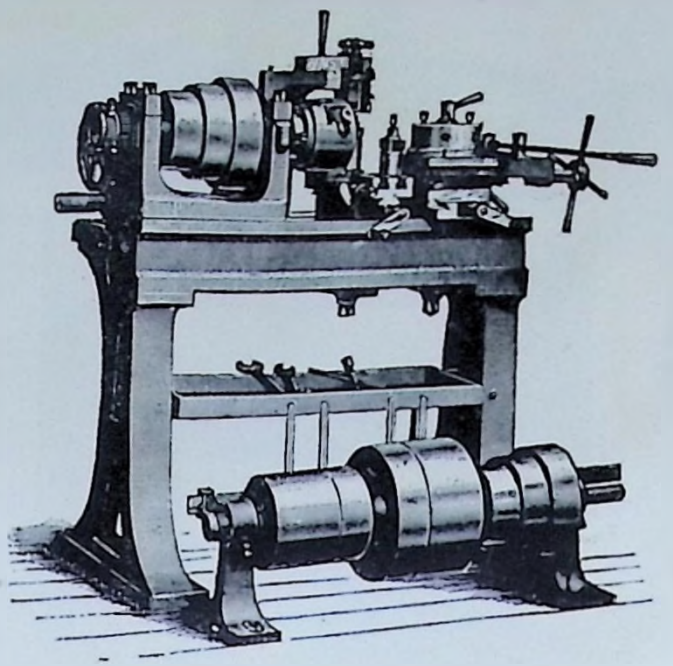
DIMENSIONS.

No.	Height of Centre.	Length of Bed.	Hole through Spindle.	Chuck to take	Speed Cones.	Approx. Weight.	PRICE.
	In.	Ft In.	In.	In.		Cwt.	£
1	7	3 6	2 1/16	1/4 to 2	3-speed × 2 1/4 in. belt.	10 1/2	
2	7	3 6	2 1/16	1/4 to 2	3-speed × 2 1/4 in. belt.	10 1/2	

For description of above see next page.

HOLLOW SPINDLE LATHE

WITH CHASING ATTACHMENT.



This illustrates No 2 Machine.

Specification of Hollow Spindle Lathes.

These Lathes have **hollow steel spindle** running in best gun-metal parallel bearings, and are fitted with self-centreing chuck, and also have a steady chuck at tail end of spindle, to support the bar.

Compound slide rests, with capstan for six tools, can be set to any angle for taper work; and has a **stop** in bottom slide to ensure holes in turret being exactly **concentric** with spindle of headstock.

The longitudinal slides are operated by both **lever** and **screw**, the latter being provided with a pilot wheel for heavy cutting. Either of these can be used **independently** of each other by engaging or disengaging the nut. The screw can be used for heavy cuts, and the lever for **quickly withdrawing** the tool, thus saving time winding back the screw. Where power is not so requisite the screw can be disengaged and the lever used as required.

Chasing or screwing arms are provided to these Lathes, a master thread of any required pitch being attached to a stud connected with the back shaft.

Sliding tool-holders are also provided with an adjustable stop, attached to regulate depth of cut.

Countershafts have **two sets** of pulleys for reversing, or to give six changes of speed.

The above are mounted on a massive planed bed, with two standards, and tray, backboard, and screw keys.

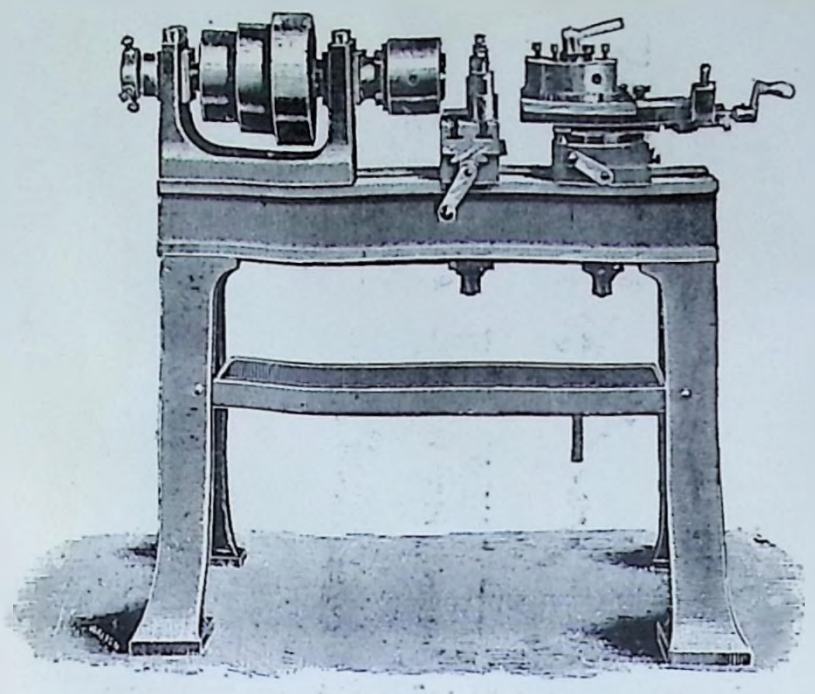
The No. 1 and No. 2 Lathes differ as under:—

No. 1 has a **traversing cutting-off slide** fitted to this Lathe, actuated by hand wheel, screw gearing and screw, having a movement of 11 in. which can be regulated by a stop as shown. It has also a **duplex slide**, with adjustable front and back, tool holders and stop.

No. 2 has no traversing slide, but is fitted with **duplex cutting-off slide**, which has adjustable front and back, tool holders and stop.

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HOLLOW SPINDLE LATHE.



No. 3.

The specification of Lathe illustrated above is the same as for Nos. 1 and 2 Lathes described, of same class; but no chasing or screwing arm is provided.

No.	Height of Centre.	Length of Bed.	Hole through Spindle.	Chuck to take	Speed Cones.	Approximate Weight.	PRICE complete.
	In.	Ft. in.	In.	In.		Cwt.	£
3	7	3 6	2 1/16	1/4 to 2	3-speed × 2 1/4 in. belt.	10 1/2	
3	7	3 6	1 9/16	1/4 to 2	3-speed × 2 1/4 in. belt.	10 1/2	

HOLLOW SPINDLE LATHE.

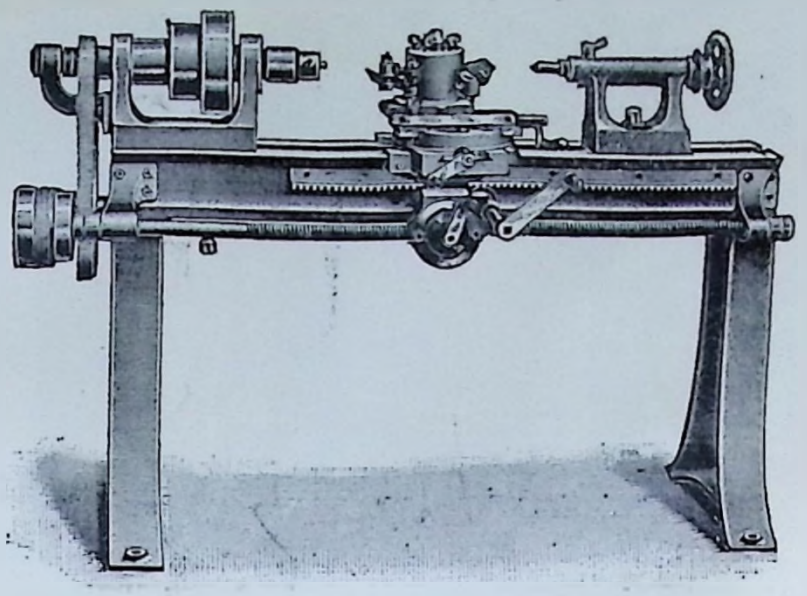


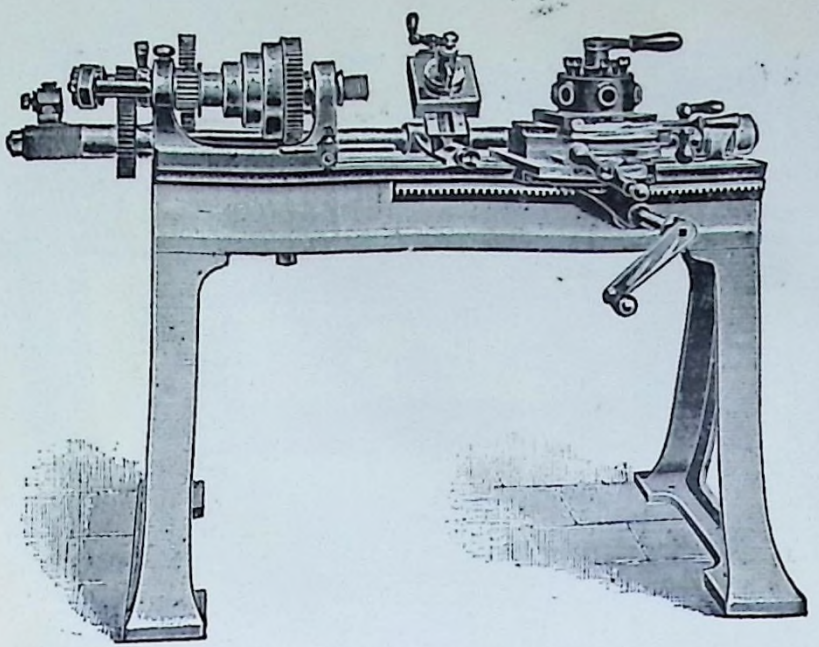
Illustration shows a **Hollow Spindle Capstan** Lathe, suitable for various kinds of work. This tool is accurately and substantially made. The carriage has a self-acting motion by a screw driven by cones and belt, and a quick hand traverse by rack and pinion. The single speed fast head-stock has a steel spindle running in conical gun-metal bearings. The **Capstan Rest carries five tools**; each can be fixed in working position by revolving the rest, when a **spring lever** engages in a notch and so fixes the tool. It is complete with overhead motion, water-can, screw-keys, &c.

DIMENSIONS.

Height of Centres.	Diam. Hole through Spindle.	Bed.			Admit between Centres.	3-speed Cone.		Appr. Weight.	Price.
		Length.	Width.	Depth.		Largest Diam.	Width.		
In.	In.	Ft.	In.	In.	In.	In.	In.	Cwts.	£
7	1 1/16	5	8	5 1/2	23	8 1/2	2 1/4	9	

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BRASS FINISHERS' LATHES.



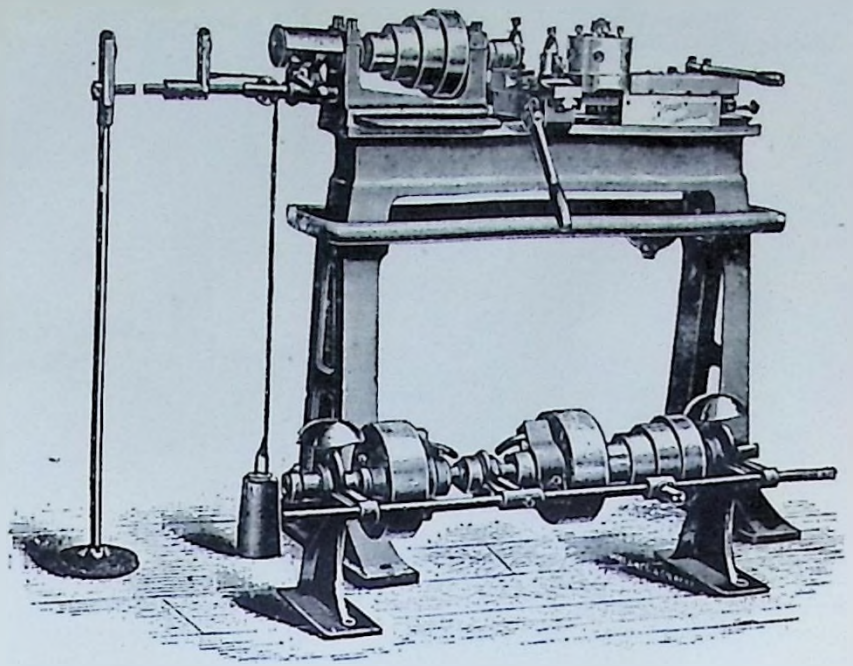
The above represents a tool suitable for **turning, boring, and chasing** all kinds of brass finishers' work. It is accurately and strongly made; and complete with overhead motion. one sample screw and die, screw-keys, &c. Bed carries a double-geared head-stock with **machine-cut wheels** and has a **hollow spindle** running in gun-metal bearings. Carriage moves on bed by rack and pinion, with compound slide rest indexed and arranged to set at any angle for taper turning, and has a **revolving capstan** for five tools. Chasing apparatus consists of a strong shaft at back of lathe, to which is fitted a lever carrying nut or die working into a guide screw driven from spindle. A slide rest carrying chasing tool, is fitted to shaft, and arranged to turn over to back of lathe and at same time to throw die out of guide screw This enables the saddle and capstan rest to be brought up to work for turning, boring or chasing straight or taper work.

DIMENSIONS.

Height of Centres.	Bed.			Dia. Hole through Spindle.	Dia. Hole in Capstan Head.	Appr. Weight.	Price.		
	Length.	Width	Depth.				Complete as above	Extra with Loose Head	Extra per foot of Bed.
In.	Ft.	In.	In.	In.	In.	Cwts.			
5½	5	6¾	5½	1 1/16	⅞	8½	£	£	£
6½	6	8	5½	1 3/16	1⅛	10½	£	£	£
7½	6	10½	7½	1 5/16	1⅛	14	£	£	£

WIRE FEED CAPSTAN LATHE

(AUTOMATIC).



This Lathe is adapted for making Screws, Studs, Nuts, Fittings, and a great variety of light repetition work from the bar. The steel spindle is driven by 4-speed cone to take 2 in. belt, the end thrust being taken by a **ball-thrust collar.** An **Automatic self-feeding** arrangement is provided, by means of which the bar is fed through the spindle and chuck without stopping lathe. One **outward** stroke of lever releases chuck from bar, which feels forward; the **return** stroke tightens grip, the bar being centrally held by a spring collet, which does not mark bar. **The turret** is bored to receive six tools, and **revolves automatically** with backward stroke of lever; the forward stroke brings next tool into operation. The slide is fitted with adjustable stop to regulate traverse. The duplex cutting-off slide is operated by a lever and rack and pinion; has front and back tool posts with **improved** wedge tool adjustment, also adjustable stops.

Height of Centre.	Length of Bed.	Diameter of Turret.	Diameter of holes in Turret.	Largest stock admitted through Wire Feed.	Size of Pulleys on Countershaft.	Speed of Counter shaft.	Approximate Weight.
In.	Ft. In.	In.	In.	In.	In.		Cwt.
5	3 6	6	⅞	¼ diameter	9 × 3	200	7

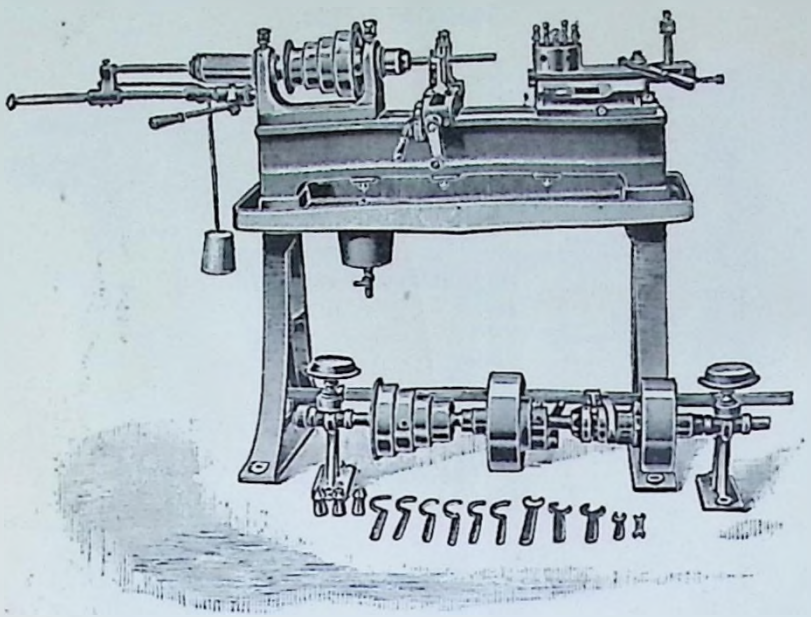
Price, as illustrated, with one spring collet, countershaft and screws, £

" if without Automatic Turret, £

" " " " and Wire Feed, £

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STUD AND SCREW LATHE.



This is a special tool for turning studs and screws to the greatest advantage. The head-stock has a steel spindle running in conical bearings. The **spindle is hollow** and fitted with an **improved cone chuck**, and has also an **automatic motion** for pushing rods forward. The **turret** rest has six holes for tools and **revolves automatically** with back motion of the lever. A transverse slide carrying **two tools for cutting off** the studs is worked by a lever or a screw, and has **wedge adjustments** for raising each tool, and this, and also turret rests, are provided with **adjustable stops**. Overhead motion included has friction cones for **starting or stopping instantaneously.** Lathe is also fitted with **water trough** under the bed.

DIMENSIONS.

Height of Centres.	Bed.			Speed Cone.	Chuck to take	Approx. Weight.	Price.
	Length.	Depth.	Width.				
5½ in.	3 ft. 6 in.	6 in.	6½ in.	4 speeds 1¼ in.	⅜ to ¼ in. diameter.	9 cwt.	£

STUD-SCREWING LATHES.

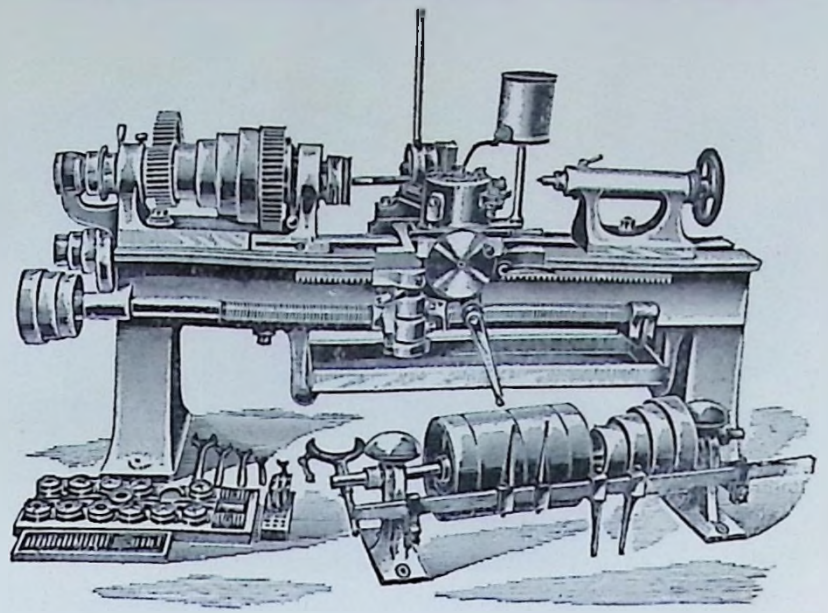


Illustration represents Nos. 1 and 2, special Capstan Rest Screwing Lathes. The head-stocks are single or double geared, with **machine-cut** wheels, hollow spindles and **extra large necks.** Spindle nose is fitted with **powerful gripping chuck conical holders**, and stop to hold spindle fast, self-acting and hand-feed motions, and **capstan rest for five tool-holders.** By revolving rest any tool is brought quickly to work, and fastened by spring catch. **Die-box for screwing** is at back of carriage, and arranged to be immediately fixed in position for screwing, and turned back out of the way when not used. **Sliding motion** by belt-driven screw. Lathes have five tool-holders and ten sample tools, tool-board, cast-iron trough, with draw-off tap, water can and stand, overhead motion, screw keys, &c.

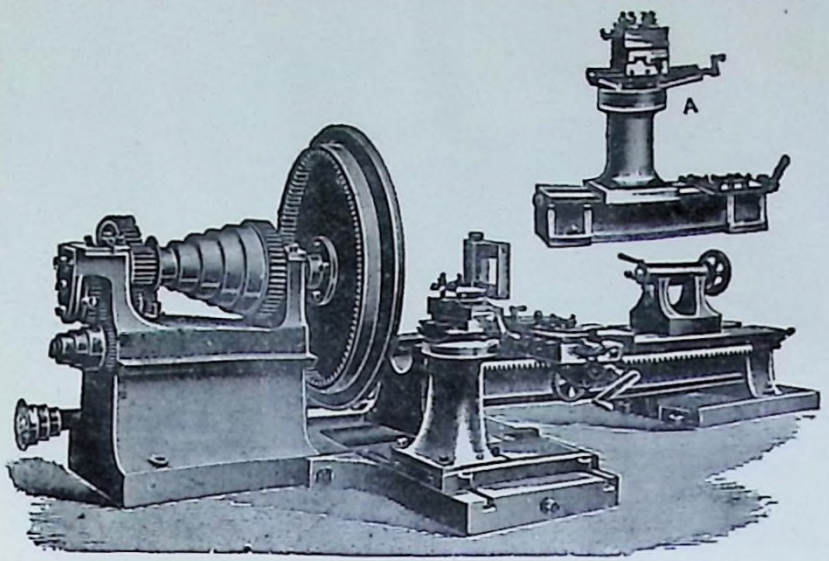
DIMENSIONS.

Gear.	Heights of Centres.	Bed.			Admit between Centres.	Dia. Spindle Hole.	Cones.			Approximate Weight.
		Length.	Width.	Depth.			Speeds.	Dia. of largest	Width.	
	In.	Ft. In.	In.	In.	In.	In.		In.	In.	Cwt.
Single	6	5 0	10½	7	24	1¼	3	9½	3½	14
Double	6	5 0	10½	7	21	1¼	4	9½	2¾	15
Single	7½	6 0	12	9	30	1⅜	4	13½	2¾	18
Double	7½	6 8	12	9	30	1⅜	4	13½	2¾	20

Gear.	Height of Centres.	With 4 sets screw tools ⅛ to ¼ in., and 7 sets conical holders for black iron, 7/16 to 1 3/16 in.	With 6 sets conical holders for bright iron, ⅛ to 1 in.	With 5 sets screw tools ⅛ to 1 in., and 9 sets conical for black iron, 7/16 to 1 5/16 in.	With 9 sets conical holders for bright iron, ⅛ to 1¼ in.	Screw Tools, per set.
	In.	£	Extra, £	£	Extra, £	Extra, £
Single	6					
Double	6					
Single	7½					
Double	7½					

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 194 of 298
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DOUBLE AND TREBLE GEARED LATHES.



The Machines illustrated above are arranged to turn large diameters without **having a pit** below base-plate. The fast head-stock has steel spindle, phosphor-bronze parallel bearings, loose head-stock arranged for taper turning Self-acting, sliding and surfacing motions by back-shaft. Carriage has quick hand traverse by rack and pinion; compound slide-rest, and back following stay. **Bed moves** on planed base-plates by screw and ratchet. For **turning large diameters** it can be adjusted on plate as shown, or on loose cross-bed as illustration marked A. Self-acting motion to slide by lever and ratchet. Screw-cutting arrangement also provided, if desired. Each lathe is supplied with complete overhead motion, strap guide, shifting lever, two face-plates, one driver plate, rocking shaft for self-acting motion to pillar rest, and wrought-iron case-hardened screw keys.

DIMENSIONS.

Centres.		Sliding Bed.			Diameter.		Width Gap from front Face-plate.	4-speed Cone.		Appr. Weight.
Height.	Admit Gap closed.	Length.	Width.	Depth.	Face-plate.	Can be turned.		Width.	Diam. of largest.	
In.	Ft.	Ft.	In.	In.	Ft.	Ft.	Ft.	In.	In.	Cwts.
12	7¼	10	18	12	4	5½	3½	4	14	95
14	7½	10	22	13	5	6	3½	4¼	16½	140
16	7½	10	22	13	5	6½	3½	4⅜	21	150

Height of Centres.	Sliding and Surfacing.		Extra if Screw-cutting with full set Change Wheels.	Extra per foot of Bed.	Extra for Loose Cross-bed.
	Treble Geared.	Double Geared.			
In.	£	£	£	£	£
12					
14					
16					

HEAVY SHAFT TURNING LATHE.

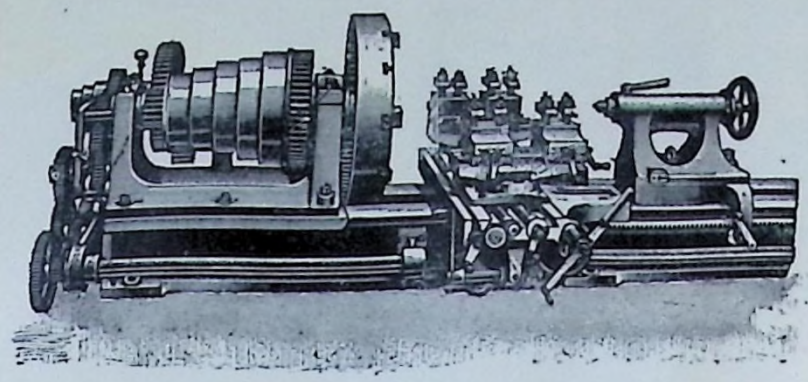


Illustration represents a powerful **Treble-geared, Self-acting, Sliding, Surfacing and Screw-cutting Lathe,** suitable for the heaviest kind of engineering work, such as heavy shafts, mill rolls, hydraulic rams, propeller shafts, &c. Bed is of **massive construction.** Head-stock is **treble geared** and has a speed cone for broad belt. May be used either **treble, double,** or **single geared.** Spindle is steel. Carriage has **self-acting,** sliding and surfacing motions from back-shaft driven by change wheels from head-stock. **Leading screw** is of **steel.** Quick hand traverse is obtained by rack and pinion. **Two compound slide rests,** each carrying two tools, adjusted from front. Loose head-stock arranged for **taper turning.** All sliding parts are **accurately surfaced.** Long Lathes can be fitted with **two carriages** carrying **four tools** each. Each Lathe is provided with complete overhead motion, screw-keys, and other requisites.

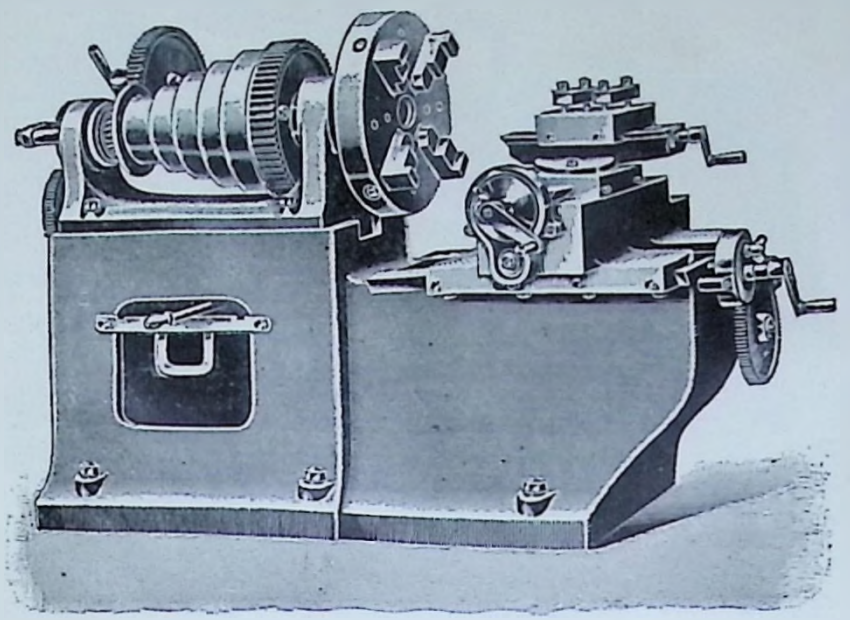
DIMENSIONS.

Height of Centres.	Bed.			Admit between Centres.	5-speed Cone.			Dia. Leading Screw ⅛in. Pitch.	Dia. Spindle Neck.	Dia. Face-plate.	App. Weight.
	Length.	Width.	Depth.		Largest.	Smallest	Width.				
In.	Ft.	In.	In.	Ft.	In.	In.	In.	In.	In.	Ft. In.	Tons.
24	25	30	18	16	26	16	5½	3½	7	3 8	16
30	30	36	22	18½	36	24	6¾	4	12	5 0	27

Height of Centres.	Sliding and Surfacing only.	Extra for Screw-Cutting.	Extra additional Carriage with 4 Tool Rests.	Extra Face-plate, fitted with 4 Gripping Jaws.	Extra per foot of Bed.
In.	£	£	£	£	£
24					
30					

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SURFACING AND BORING LATHE.

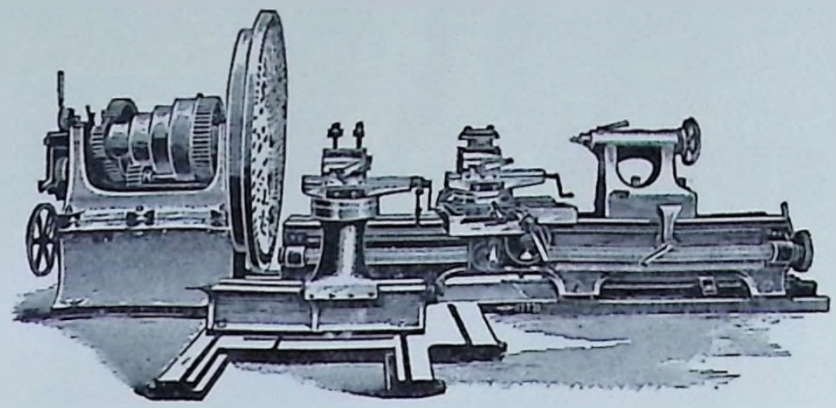


Above are fitted with **machine-cut wheels,** independent four-jawed chucks and link motion for **self-acting feed** of slide rests. Double-geared. Head-stocks have steel spindles running in conical phosphor-bronze bearings. Beds are of box form, with accurately planed and surfaced slides, fitted with strong **compound slide rests, indexed at base,** and arranged for turning conical. Carriages receive **self-acting motion** from screw inside bed by lever and ratchet from rocking shaft overhead; this can also be applied to slide rests. If so ordered, carriages are made with continuous feed motion from change wheels driven from head-stocks, then having three different speeds of feed, each of which can be **instantaneously engaged or disengaged** by hand lever in front without stopping machine. Complete overhead motion, screw-keys &c., are supplied.

DIMENSIONS.

Height of Centres.	Will swing clear of bed and saddle	Bed.		Cone.	Chuck.	Approx. Weight.	Price	
		Width.	Admits between chuck and rest.				As above.	With continuous Feed Motion
In.	In.	In.	In.		In.	Cwt.	£	£
12½	30	15	18	4-speed × 3½ in.	20 dia.	32	£	£
15	36	18	24	5 ,, × 3½ in.	30 ,,	40	£	£

TREBLE GEARED BREAK LATHES.



The above represents a powerfully constructed Lathe, adapted for **very heavy work** and turning large diameters; designed to work **single, double, or treble geared.** Face-plates are driven by internal wheel and pinion when treble gear is used. Head-stock has steel spindle, phosphor bronze bearings, front bearing is of large diameter to prevent vibrations of face plate. Loose head-stock arranged for taper turning, adjusted by handle and pinion working in rack. Self-acting, sliding, and surfacing motions by back shaft. Carriage fitted with compound slide-rest, indexed at base for conical turning, back following stay, and has quick hand traverse by rack and pinion. Bed moves on planed base-plates by screw and ratchet. Base-plate nearest face-plate arranged to slide out, uncovering pit to admit large diameters; this carries cross-bed fitted with compound slide rest. Self-acting motions obtained by lever and ratchet driven overhead. Loose cross-bed allows full width gap will take in to be turned, and can be placed parallel with face-plate for surfacing any diameter running over base-plate. Leading screw is driven by back shaft, and carried by loose bed. Each Lathe is complete with overhead motion, strap guide and fork, rocking shaft for feed of slide-rest on pillar, wrought iron case-hardened screw-keys, &c.

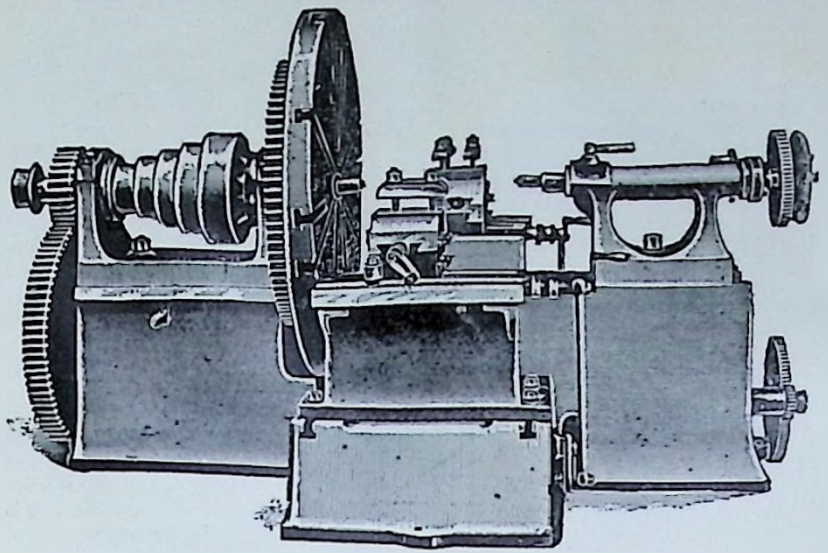
DIMENSIONS.

Centres.		Sliding Bed.			Diameter.			Gap opens from Face Plate.	Cone.		
Height.	Admit Gap Closed.	Length.	Width.	Depth.	Face Plate.	Can be turned over Base Plate.	Can be turned in pit.		No. of Speeds.	Width.	Dia. of Largest.
In.	Ft. In.	Ft.	In.	In.	Ft.	Ft. In.	Ft.	Ft.		In.	In.
18	6 9	10	24	16	6	7 0	10	6	4	5	22
24	8 6	12	30	18	7	8 3	12	6	4	6½	26
30	10 6	15	36	22	9	9 8	14	6	5	6½	36
36	10 6	15	36	22	10	10 8	15	6	5	6½	36
40	10 6	15	48	22	10½	11 4	15½	6	5	6½	36

Height of Centres.	Approx. Weight.	Sliding, Surfacing, and Screw-Cutting.	Sliding and Surfacing.	Extra per Foot of Bed.
In.	Tons.	£	£	£
18	10			
24	17			
30	36			
36	39			
40	46			

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PULLEY TURNING LATHES.



ABOVE REPRESENTS LATHE NO. 2.

These Machines **will bore, boss, turn, and face Pulleys or Wheels at one setting.** Either one or two rests may be fitted to Lathes as required, each rest being provided with motion for rounding face of Pulley, self-acting sliding motion; these are adjustable to size of work, and adjustable swivel motion set to any angle for turning Rope Pulleys or Car Wheels. **Hollow Spindles** are of cast iron, running in very large gun-metal bearings Cones give quick speed for boring and turning bosses; wheels working into face-plate give suitable speeds for largest diameters turned. Loose Headstock is adjustable on bed.

No. 1 Machine is very powerful and **Treble-geared**, and has internal gear at back of face-plate on front side of Headstock, so as to apply power as near the cutting tool as possible, and to adapt it to turn large diameters. The loose Headstock has a transverse motion, and carries tool holder for turning bosses. It has also self-feeding motion for boring.

Nos. 2 and 3 Machines are Double-geared as shown in illustration.

No.	Will turn Pulleys.		Spindles.				Transverse travel of Rests.	Dia. of Face Plate
	Diam.	Width.	Front Bearing. Diam.	Front Bearing. Length.	Diam. in Loose Headstock.	Dia. admits in Hollow Spindle.		
	In.	In.	In.	In.	In.	In.	In.	In.
1	84	30	12	10	4	3	30	72
2	60	30	8½	7	4	3	30	60
3	42	15	7	6	2½	2	16	45

No.	5-Speed Cone.		Approx. Weight.	Price.	
	Largest Diam.	Width.		With one Slide Rest.	With two Slide Rests.
	In.	In.	Tons.	£	£
1	22	4½	7½		
2	22	4	5		
3	14½	3	2½		

WHEEL CUTTING MACHINE.

For Fixing on Stand or to Bench.

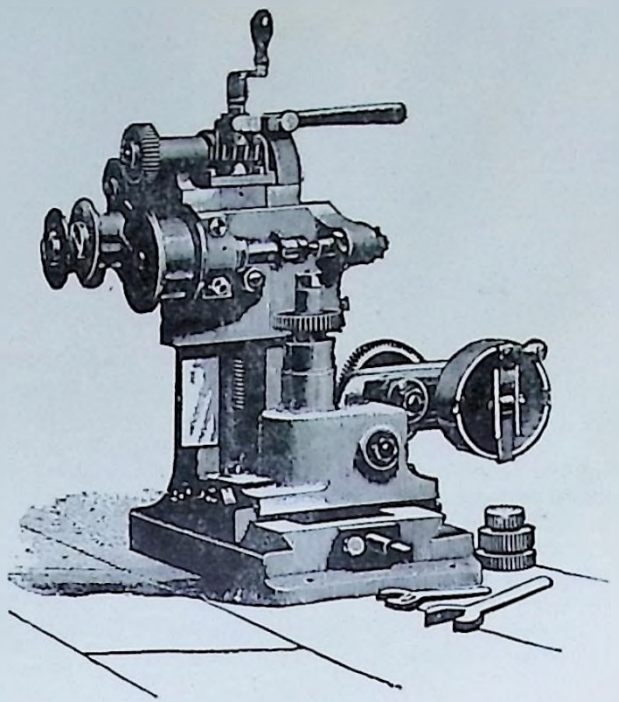


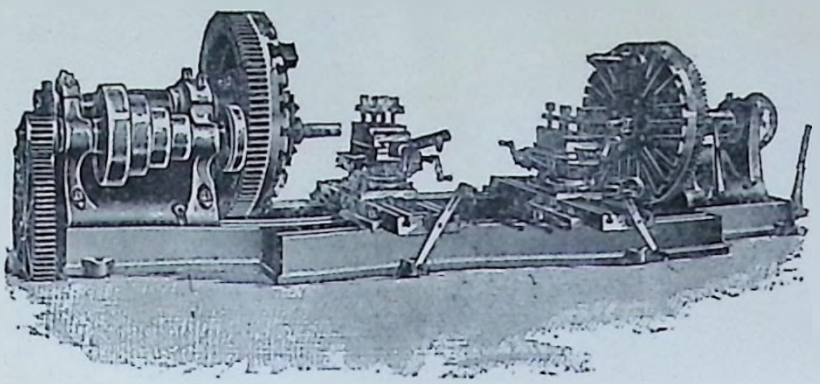
Illustration represents a small, self-contained Wheel Cutting Machine, which is provided with self-acting vertical feed motion, dividing box, and change wheels, and will cut the following numbers of teeth:—15, 20, 25, 27, 30, 33, 35, 40, 45, 50, 54, 60, 63, 66, 70, 80, 90, 108, 110, 112, and 126.

DIMENSIONS.

Will cut Wheels up to		Width of Driving Belt.	Approximate weight.	Price, Complete.
Diameter.	Pitch.			
In.	In.	In.	Cwts.	£
10	⅜	1¾	2	

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DOUBLE-WHEEL LATHES.



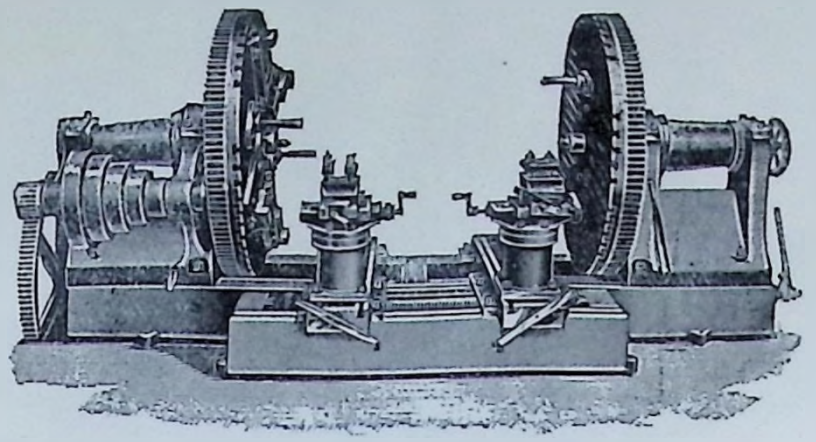
These Lathes are adapted for turning a pair of **tramcar or railway wheels** at the same time, on their own axles, each wheel being driven by the gearing of the Lathe; they will turn **two tyres at the same time**, or turn a wheel or bore a tyre upon one face-plate while boring or bossing a wheel upon the other. Fitted with two headstocks, spindles revolve in cast-iron parallel bearings, face-plates **geared externally** on the back, and driven by pinions which can be disengaged separately. Fast headstock has additional **quick-speed internal gear**, allowing face-plates to run at different speeds. Loose headstock is moved on bed by screw and ratchet lever, fitted with **steel spindle** for carrying centre. Compound slide rests are self-acting both ways by ratchet motion from overhead, fitted with extra adjustable swivel motion to set to tyre. Each rest is adjustable on bed by rack and pinion. Face-plate on fast headstock is fitted with four jaws and two drivers. The two centres are arranged for outside crank pins. Each Lathe is complete with overhead driving and feed motions, screw-keys, &c.

DIMENSIONS.

Centres.		Largest Diam. Wheel can be turned.	Diam. of Face-plate.	Bed.				4-speed Cone.	
Height.	Length between.			Length.	Depth.	Width where Saddles fit.	Width where Heads fit.	Largest Diam.	Width.
Ft. In.	Ft.	Ft. In.	Ft. In.	Ft.	In.	Ft. In.	Ft. In.	Ft. In.	In.
1 5	7	2 10	2 10	13½	9	2 11	2 0	1 1½	4
1 9⅛	9	3 6	3 7½	16½	10	3 5	2 4	1 6½	4½
2 2	9	4 2	4 3½	16½	12	3 5	2 4	1 6½	4½
2 3½	9	4 6	4 6	17½	14	3 10	2 7	1 10	4½
2 6½	9	5 0	5 0	17½	14	4 4	2 7	1 10	4½

Height of Centres.	Approximate Weight.	Prices.		
		With Two Compound Slide Rests.	With Four Compound Slide Rests.	Four extra Jaws to bolt on Face-plate.
Ft. In.	Cwt.	£	£	£
1 5	105			
1 9⅛	140			
2 2	180			
2 3½	210			
2 6½	225			

DOUBLE WHEEL LATHES.



These Lathes are adapted for turning and boring large size **Railway wheels**; to turn a pair of wheels on their own axles, each wheel being driven by the gearing of the lathe; will turn **two tyres at the same time**, or turn a wheel or bore a tyre upon one face-plate, while boring or bossing a wheel upon the other. Fitted with two head-stocks, spindles revolve in cast-iron parallel bearings, face-plates **geared externally** on the back and driven by pinions which can be disengaged separately. Fast headstock has additional **quick speed internal gear**, allowing face-plates to run at different speeds. Loose headstock is moved on bed by screw and rachet lever; and fitted with **steel spindle** for carrying centre. Compound slide rests are self-acting both ways by rachet motion from overhead, fitted with extra adjustable swivel motion to set to tyre. Each rest is adjustable on bed by rack and pinion; face-plate on fast headstock is fitted with four jaws and two drivers. The two centres are arranged for outside crank pins. Each Lathe is complete with overhead driving and feed motions, screw-keys, &c.

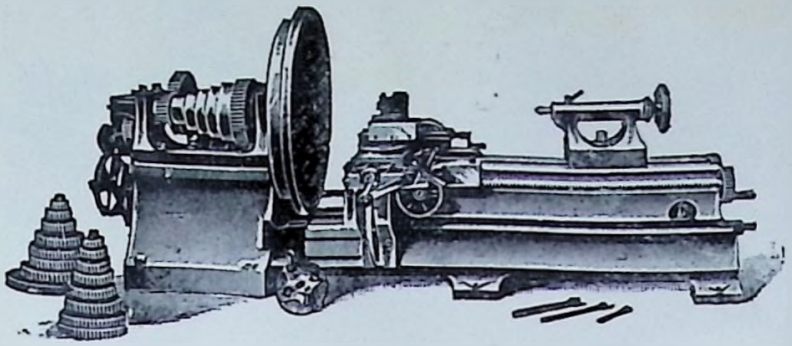
DIMENSIONS.

Centres.		Largest diam. wheel can be turned.	Diam. of Face-plate.	Bed.				5-speed Cone.	
Height.	Length between.			Length.	Depth.	Width where Saddles fit.	Width where Heads fit.	Largest diam.	Width.
Ft. in.	Ft.	Ft.	Ft.	Ft. in.	In.	Ft. in.	Ft. in.	In.	In.
2 9¼	9	5½	5½	19 7	18½	4 6	2 11	26	5
3 0½	9	6	6	19 7	18½	4 11	2 11	26	5
3 3½	9	6½	6½	19 7	18½	5 2	2 11	26	5
3 6½	9	7	7	19 7	18½	5 5	2 11	26	5
4 1	9	8	8	21 3	20½	6 9	4 0	42	6¼

Height of Centres.	Appr. Weight.	With Two Compound Slide Rests.	With Four Compound Slide Rests.	Four Extra Jaws to bolt on Face-plate.
Ft. in.	Cwts.	£	£	£
2 9¼	312			
3 0½	322			
3 3½	376			
3 6½	430			
4 1	730			

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TREBLE-GEARED BREAK LATHE.



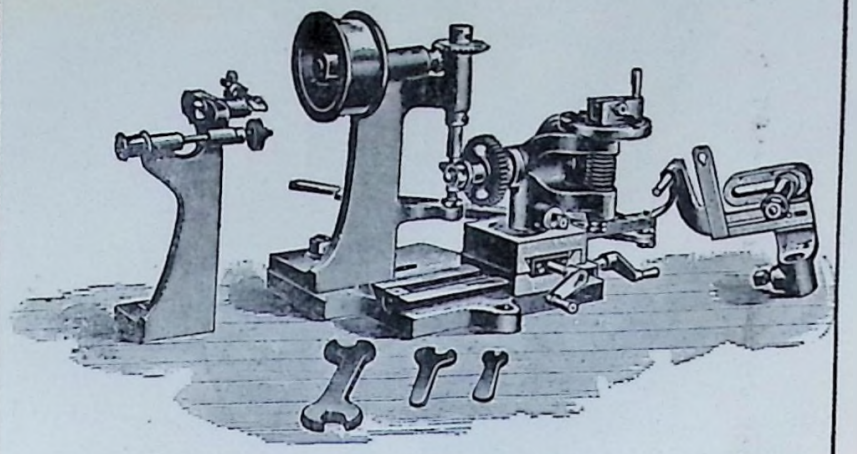
The above shows an extra strong and powerful Lathe. The upper bed slides on foundation bed. Back shaft gives motion for **sliding and surfacing**, and also for screw cutting at end of sliding bed. Screw is placed inside bed Nut box has double clam nuts of phosphor bronze, handle is placed in a convenient position in front of carriage, which is fitted with compound slide rest **indexed at base** for taper turning, also back following stay. Fast head stock is fitted with steel spindle, running in phosphor bronze **bearings of large diameter** to prevent vibrations of face-plates, which is provided with internal wheel at back. The strong bracket fixed in T slots in front of bed below gap, supports carriage when in use for turning large diameters; can be easily detached when turning lighter work. **Treble-geared** face-plate can be easily removed and ordinary face-plate or Clement's driver substituted. Complete overhead motion, 22 change wheels, Clement's driver, and screw-keys are provided with each lathe.

DIMENSIONS.

Height of centres.	Dimensions of Beds.						Admit between centres.	Dia. of Face-plate.	Gap.	
	Foundation.			Sliding.					Opens out from Face-plate.	Admits in diameter.
	Length.	Width.	Depth.	Length.	Width.	Depth.				
In.	Ft.	In.	In.	Ft.	In.	In.	Ft. in.	Ft.	In.	Ft.
12	12	18½	10½	7	18	13¼	6 2	4	12	4

Leading Screw. ¼ in. pitch.	5-speed cone.		Appr. Weight.	PRICE.		
	Largest diam.	Width.		Complete as above.	Sliding and Surfacing only.	Extra per foot of Bed.
In.	In.	In.	Tons.	£	£	£
2½	14	3⅛	5			

CUTTER MAKING & SHARPENING MACHINE.



This Machine will make almost any kind of **straight toothed cutter**, such as **surface** cutters, **grooving** and **side cutters**, also all sorts of **angle and bevel** cutters; with it any number of divisions can be cut that will divide 240. The dividing head is mounted on **compound slides**, and can be swivelled round on top slide; this enables it to be put into almost any desired position. The head carrying spindle and having small cutter for cutting out teeth in the blanks is driven by bevel wheels from pulley, and can be **adjusted** slightly in **horizontal** and **transverse** directions; for sharpening up cutters, this head can be taken off, and one carrying small emery wheel fixed in its place. Dividing head can also be replaced for one carrying cutter to be sharpened, and has a catch to drop into teeth of cutter for holding and dividing it; this can be regulated for different sizes. Compound slides can be quickly moved by hand lever, thus drawing cutter across emery wheel and renewing cutting edge without the expense of annealing, re-cutting, and hardening. The Machine is complete with screw keys, one sample cutting tool, and emery wheel.

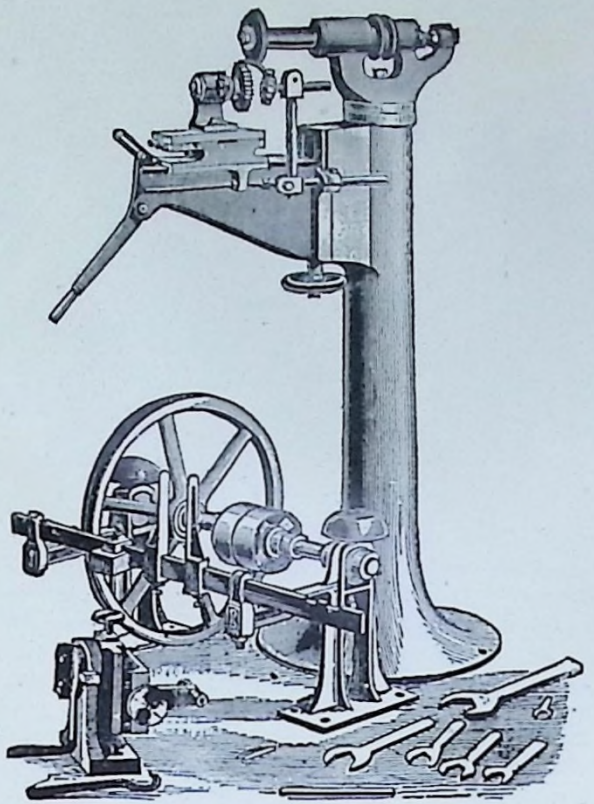
Above is a most useful and handy addition to the Milling Machines now used by almost all classes of Engineers.

DIMENSIONS.

Will make cutters up to:		PULLEY.		Approximate Weight.	PRICE.
Diameter.	Width.	Diameter.	Belt.		
In.	In.	In.	In.	Cwts.	
8	3	5	1¼	1½	

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CUTTER GRINDING MACHINE.

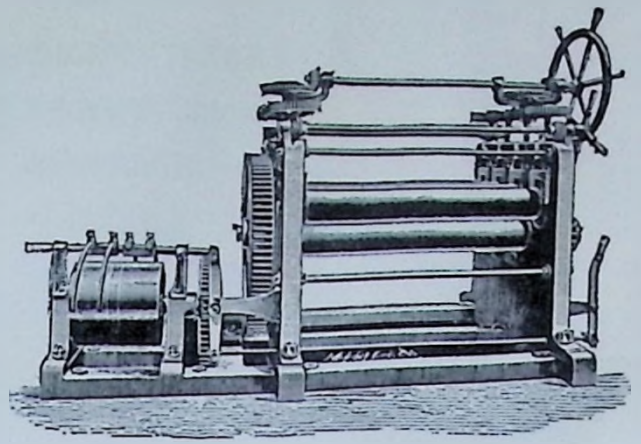


This Machine consists of standard carrying swivel headstock, fixed in centre by bolt. Steel Spindle runs in hardened bearings. Table has longitudinal and transverse slides; first is worked by lever, the latter by screw and handle. On both sides of pillar are supports for side rods, carrying fingers, which are nipped by thumb-screws in any position. Machine will grind all special cutters required for milling, and has attachment for grinding cutters with semi-circular circumferences. Cutters with teeth in straight or curved lines may be sharpened to keen edge, perfectly true. Overhead motion and screw-keys included.

DIMENSIONS.

Will grind Cutters up to			Approximate weight.	Price, Complete.
Diameter.	Width.	Diameter Semi-circular Cutters.		
In.	In.	In.	Cwts.	£
8½	6	9	4½	

PLATE-ROLLING MACHINES.

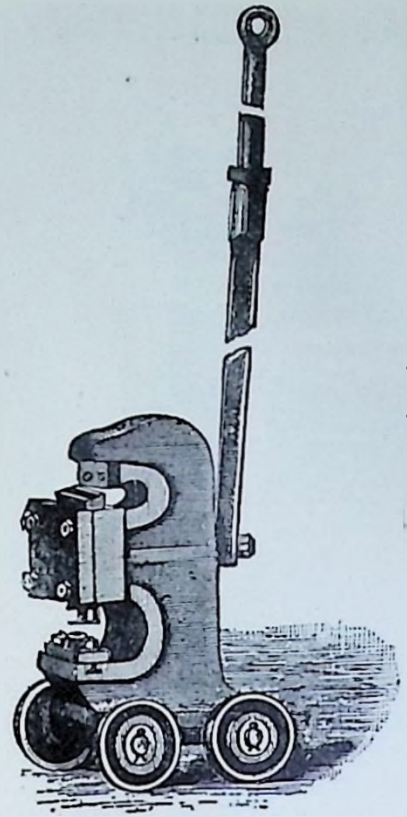


This Plate Straightening and Flattening Machine produces a **perfectly flat surface,** and is specially useful in cases where plates require to be painted, such as in Gas Holders, Deck Houses, Locomotive Tenders, &c. It consists of six cast iron and one steel roller, the former being made with a wrought-iron shaft, which forms the bearings at each end. They are driven by **steel pinions,** and the four top rollers have **vertical adjustment,** the two end rollers having also **independent** vertical adjustment. Machine has **reversing motion,** and is fitted with fast and loose pulleys, strap fork and shifter; or with Steam Engine with reversing motion. Illustration represents small-size machine; the large sizes differ slightly in construction. All the rollers can be made of steel if desired.

DIMENSIONS.

No.	For Plates up to		Appr. Weight without Steam Engine.	Price.	
	Width.	Thickness.		Without Steam Engine.	Extra for Steam Engine.
	Ft.	In. In.	Tons.	£ s. d	£ s. d.
1	4½	13 W.G. to ¼	4		
2	4¾	⅛ ,, ⅜	6		
3	5	⅛ ,, ½	8½		
4	6	¼ ,, ¾	12		
5	6	⅜ ,, 1	15		
6	8	½ ,, 1⅛	28		

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LEVER PUNCHING AND SHEARING MACHINE.

Strong Cast-iron Body, mounted on four wheels, and fitted with Wrought-iron Lever complete.

To punch ½ inch diameter hole through ½ inch plate, and shear ½ inch iron plate.

Price, £11 0 0



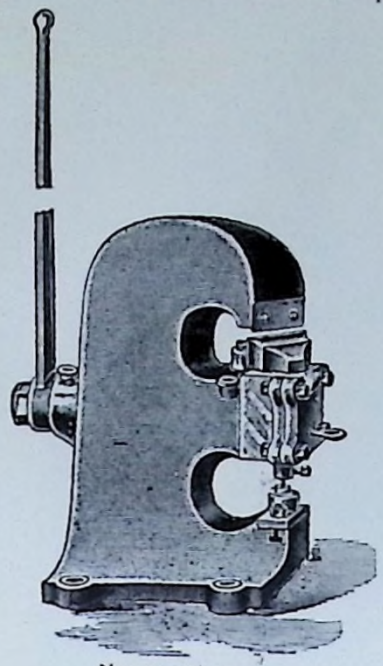
LEVER PUNCHING MACHINE.

This convenient tool will be found useful in any workshop. It is fitted with Shear and Guide

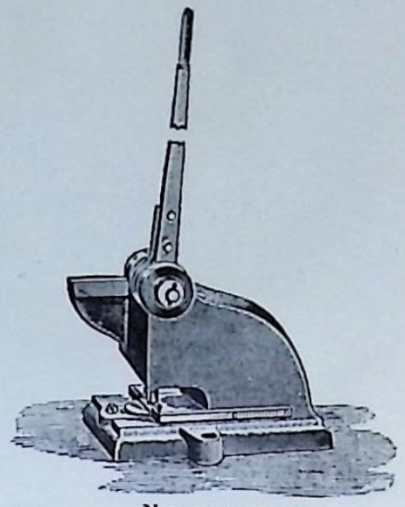
DIMENSIONS AND PRICES.

No.	To Punch.	Distance from Frame	Weight.	PRICE £ s. d.
21	⅛ in. diam., ⅛ in deep	2 in.	35 lbs.	1 10 0
22	¼ ,, ¼ ,,	2⅛ ,,	60 ,,	1 18 0
23	5/16 ,, 5/16 ,,	3 ,,	90 ,,	2 14 0
24	⅜ ,, ⅜ ,,	3½ ,,	147 ,,	3 10 0
25	7/16 ,, ⅜ ,,	3⅞ ,,	225 ,,	5 0 0

LEVER PUNCHING & SHEARING MACHINES.



Nos. 31 and 32.



Nos. 21 to 29a.

Machines Nos. 21 to 30 are fitted with shear and guide, and moveable die-bearer. Lever of Nos. 21 to 25 falls and shears at back, and in Nos. 26 to 29A falls and shears in front. Nos. 31 and 32 are fitted with shear at an angle to frame, which enables bars to be cut on square or plates cornered.

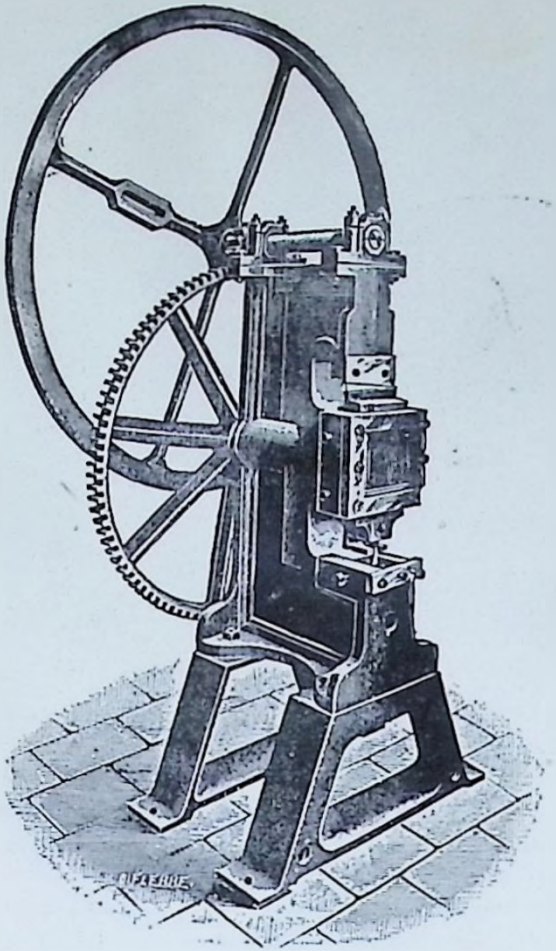
These machines are very powerful and strongly made, and they will be found most useful in any workshop.

No.	To Punch Diam.	To Punch Deep.	Approx. Weight.	Price. Without Shear.	Price. With Shear.	No.	To Punch Diam.	To Punch Deep.	Approx. Weight.	Price. Without Shear.	Price. With Shear.	Price. With Shear and Guide
	In.	In.	lb.	£ s. d.	£ s. d.		In.	In.	lb.	£ s. d.	£ s. d.	£ s. d.
21	⅛	⅛	35	..	1 7 0	26	¼	¼	60	2 2 0	2 10 0	2 13 0
22	¼	¼	60	..	1 14 0	27	5/16	5/16	95	2 14 0	3 3 0	3 6 0
23	5/16	5/16	99	..	2 8 0	28	⅜	⅜	137	3 7 0	3 17 0	4 3 0
24	⅜	⅜	147	2 17 9	3 1 0	29	7/16	⅜	225	4 7 0	4 17 0	5 3 0
25	7/16	⅜	225	4 0 0	4 4 0	29A	9/16	7/16	337	5 10 0	6 11 0	6 16 0
31	7/16	5/16	142	£8 9 0		32	9/16	⅜	609	£11 15 0		

These machines are very powerful and strongly made, and they will be found most useful in any workshop.

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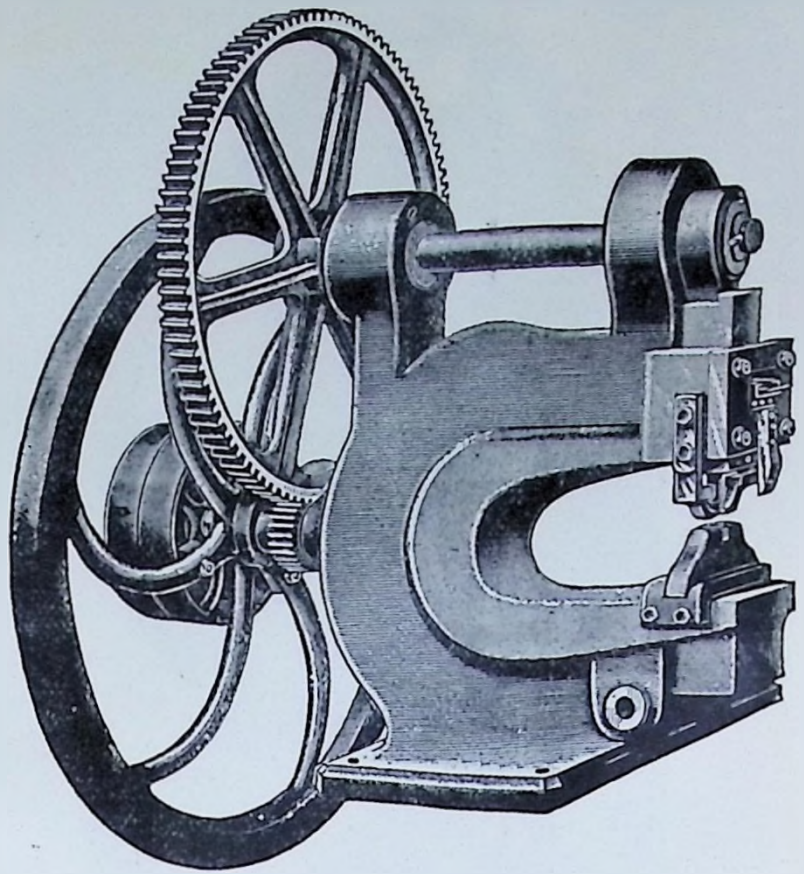
PUNCHING AND SHEARING MACHINE.



This Machine is suitable for Boiler and General Smiths' Shops, and is well adapted for Gate, Fencing, and all kinds of Sheet Iron Work. It is carefully designed and strongly constructed, and will punch and shear with the greatest ease. Each Machine is provided with one punch and die, pair of shear blades, and hand handle for fly-wheel.

Will Punch		Will Shear	Depth of Gap.		Approximate Weight.	Price.
Hole.	Plate.		Punch.	Shear.		
½ in.	½ in.	½ in.	6½ in.	6 in.	15 cwt.	£

PUNCHING AND SHEARING MACHINES.



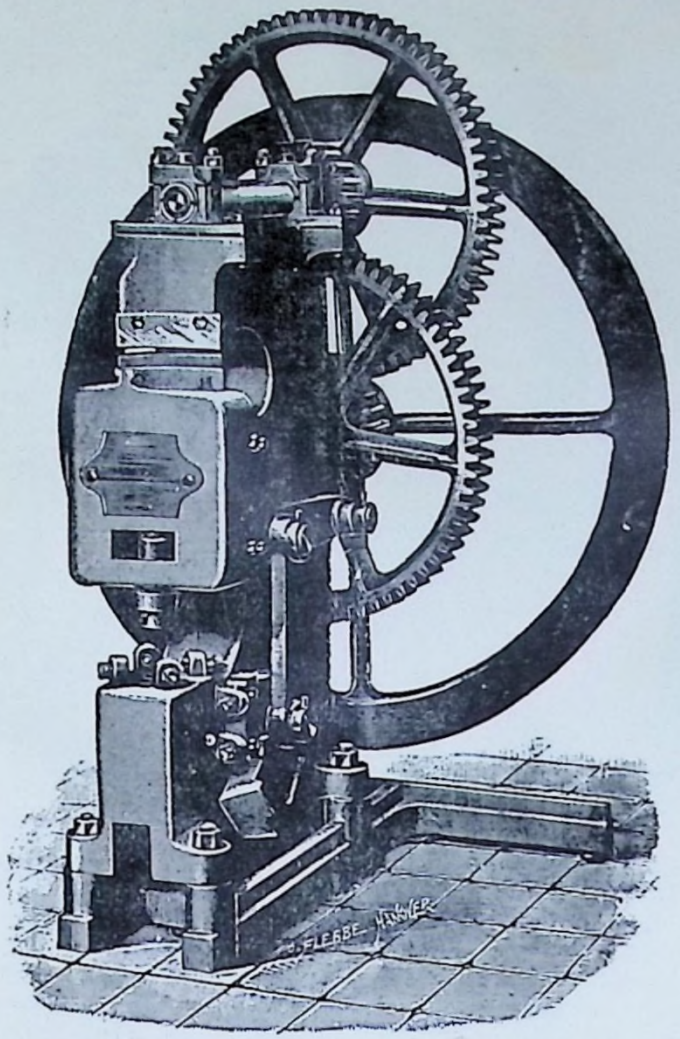
DIMENSIONS.

No.	Will Punch		Will Shear			Approximate Weight.	Price			
	Diameter Hole Through	In Centre of	Square Iron.	Flat Iron.	Angle Iron.		To Punch only.	To Shear only.	To Punch and Shear Square and Flat Iron.	To Punch and Shear Square, Flat and Angle Iron
	In.	In.	In.	In.	In.	Cwts.	£	£	£	£
40	7/16 × 3/8	13	1 3/16	2 3/8 × 7/16	1 1/8	8				
41	9/16 × 9/16	17 1/4	1	2 1/4 × 9/16	1 1/4	12				
42	9/16 × 9/16	33 1/2	1	2 1/4 × 9/16	1 9/16	16				
43	11/16 × 11/16	31 1/2	1 3/16	2 1/4 × 11/16	2 3/16	24				
44	1/2 × 1/2	39 1/4	1 1/4	3 1/2 × 1/2	2 9/16	37				
45	1 1/16 × 1 1/16	40 1/4	1 9/16	3 1/2 × 11/16	3 1/4	55				

R

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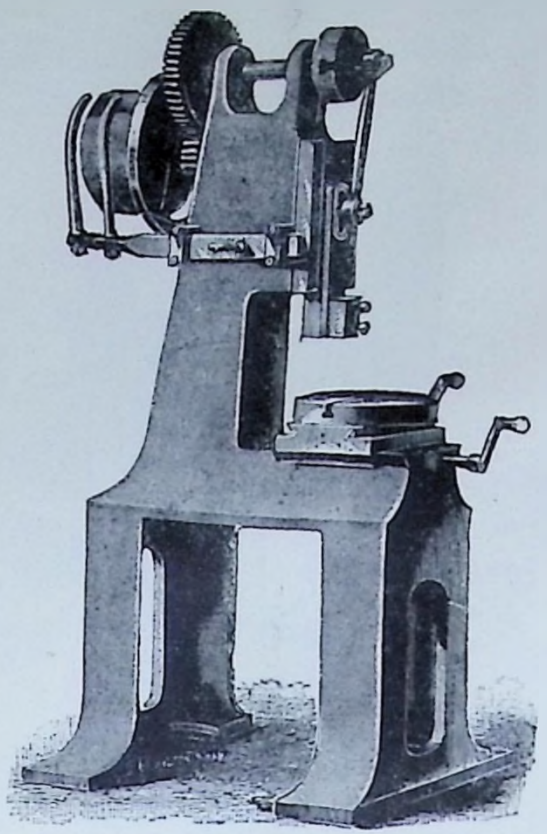
PUNCHING AND SHEARING MACHINE.



This powerfully-geared hand-power Punching and Shearing Machine is suitable for Engineers, Iron Stores, and Shipyards. Specially arranged for cutting Angle, Bar, and Sheet Iron with great ease. Shears are set at angle for cutting long lengths. Complete with one Punch and Die, pair of Shear Blades, and handle for fly-wheel.

Will Punch		Will Shear		Depth of Gap		Approximate Weight.	Price.	Extra with Angle Iron Cutter.
Hole.	Plate.	Plate.	Angle Iron	Punch.	Shear.			
¾ in.	¾ in.	¾ in.	¼ in.	8 in.	9 in.	36 cwt.	£	£

5-in. STROKE SLOTTING MACHINE.



The above illustration represents a useful **Geared** Slotting Machine, for light work. It is fitted with **compound slides**, fast and loose pulleys, flywheel, and strap fork complete. All screws are of **steel**, and of large diameter

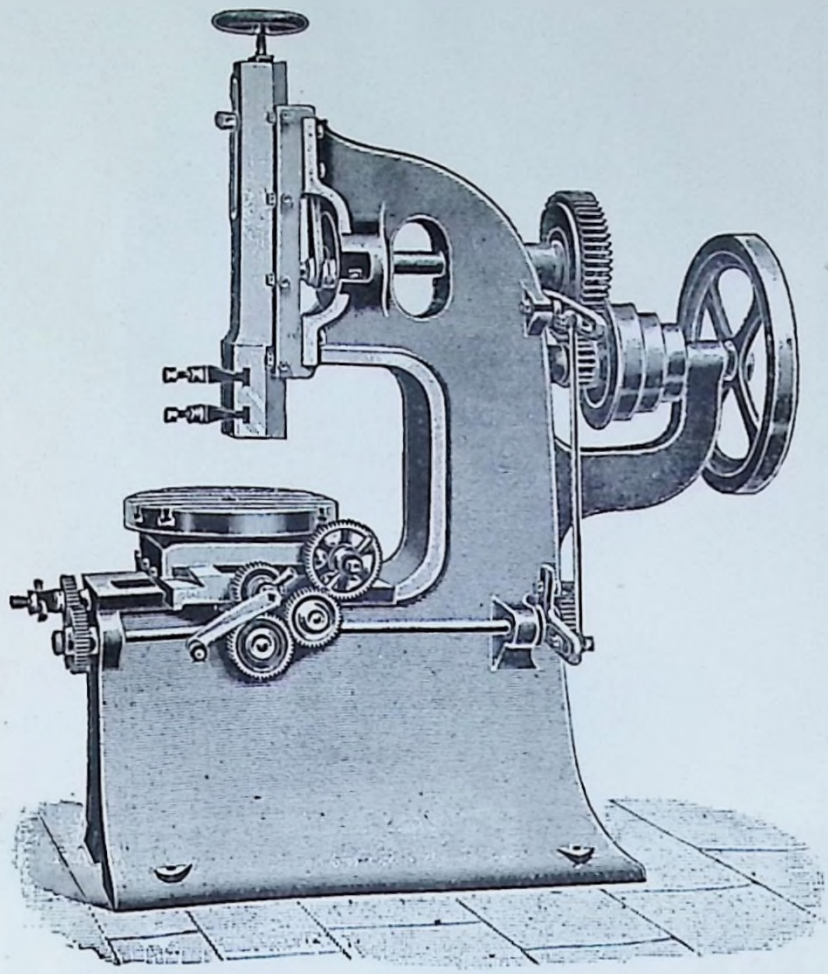
DIMENSIONS.

Diameter of Table.	Will take in.		Traverse.		Approximate Weight.	Price.	
	Diameter.	Depth.	Longitudinal.	Transverse.		Complete.	Extra for Circular Motion.
12 in	13 in.	8 in.	6 in.	8½ in.	8½ cwt.	£	£

If with cone pulley and overhead motion, instead of fast and loose pulleys and strap fork, £1 12s. 6d. extra.

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SLOTTING MACHINES.



Above illustration represents all three sizes shown.

For Prices and Particulars, see opposite page.

SLOTTING MACHINES.

These are strongly geared, and have adjustable rams working in long continuous bearings. They are **self-acting** in the **longitudinal, transverse,** and **circular cuts,** and are fitted with compound table and variable stroke. The feeds are **adjustable independently** of each other. The throw disc is recessed into the body of the machine, and is graduated to facilitate setting to the length of the stroke. The worm wheel for machine table is **machine-cut,** and each machine is provided with complete overhead motion, belt-shifter, and screw-keys

If required, the table can be fitted with an improved **canting motion.** The upper part of the table is then secured by two bolts, and when these are loose, it may be turned half-way round, and secured in that position; and it will be found that a **cant of ⅛ of an inch** is given to the table, and when it is again turned back it is level. At each position it is **quite solid on the bed,** requiring no wedges or screws to set up with.

If required, a quick return motion may be fitted to ram.

DIMENSIONS.

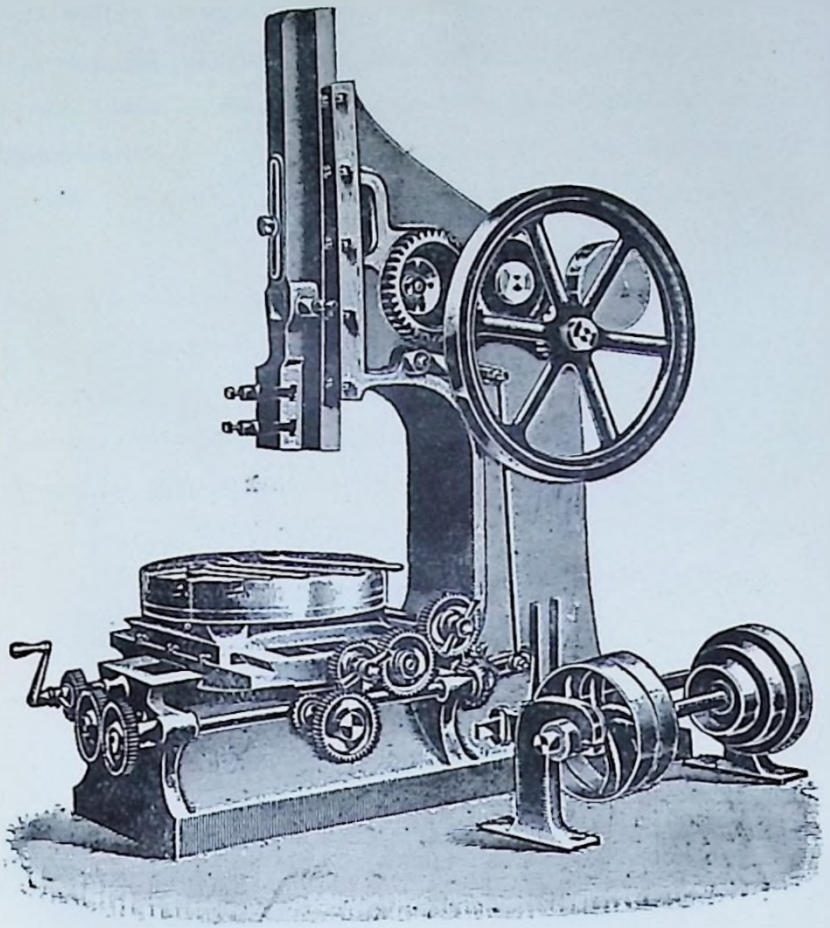
Length of Stroke.	Will admit on top of Table.		Traverse Table Slides.		Diam. of Round Table.	3-speed Cone.		Ram.	
	Diam.	Depth.	Longitudinal.	Transverse.		Diam. of largest Speed.	Width.	Length.	Vertical Adjustment.
In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	In.	In.	Ft. In.	Ft. In.
6	2 0	0 7	1 2	0 8½	1 3½	9½	2⅛	2 3½	0 6½
8	3 0	1 0	1 2	0 10	1 8	11½	2¾	2 11	0 11
10	3 6	1 4	1 5	1 2	2 0	14	3¼	3 6	1 0

Length of Stroke.	Driving Pulleys		Approximate Weight.	Price.		
	Diam.	Width.		As above.	Extra with Canting Table.	Extra with Quick Return Motion to Ram.
In.	In.	In.	Cwts.	£	£	£
6	12	2½	19			
8	12	3	28			
10	15	3	38			

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SLOTTING MACHINES.

(PATENT.)



Above illustration stands for all four sizes.

For Prices and Particulars see opposite page

SLOTTING MACHINES.

(PATENT.)

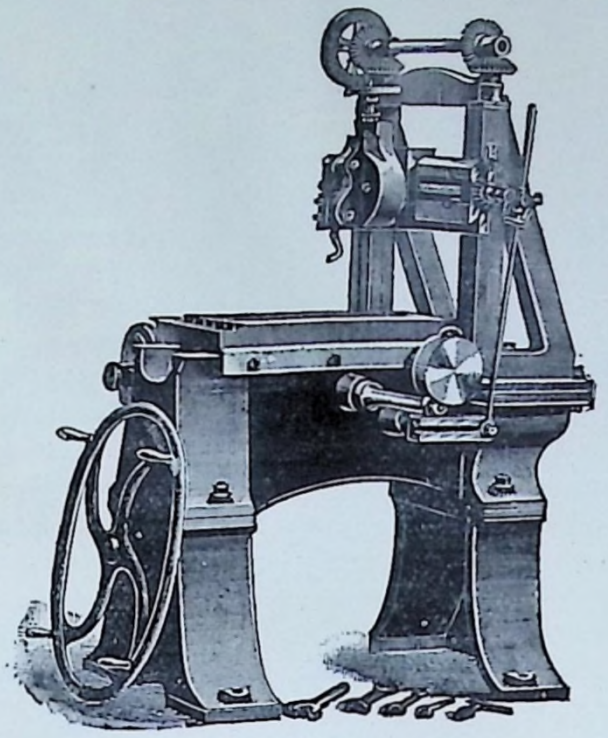
In this improved Machine, overhanging studs in connecting rod are done away with, and all adjustable parts are brought within **easy reach** of workmen. The balanced lever is placed inside frame, and working in **bearings on both sides** of it are two driving-wheels with large bosses, in which are fitted two eccentrics, made fast and loose with the wheels by a strong bolt passing through them and through slot in balanced lever. On bolt is placed block that slides in slot of lever, so when wheels revolve in bearings the eccentrics and bolt are carried with them, giving motion to lever in accordance with position of eccentrics and bolt. **Stroke is adjusted** by loosening bolt and turning fly-wheel round until a point on eccentric cones is opposite required stroke on wheel, which is **indexed.** Improved **canting motion** for table is provided; the upper part of table is secured by two strong bolts, when loosened this part is turned half-way round, secured in that position, a **cant of one-eighth of an inch** is given to table for **tapering key-ways**; when table is turned back it is then level, being at each position quite solid on bed; there are **no screws or wedges** to secure it; tables have **self-acting feed motions** both ways, also **self-acting circular** motion. Ram is adjusted in height by screw and handle on side, and tool has **quick return stroke** balanced by lever. All dangerously large driving-wheels are done away with, **power** of machine being **fully maintained** by double train of wheels; all bearings for shafts are inside frame. Complete overhead motion and screw-keys are provided with each machine.

DIMENSIONS.

No.	Length of Stroke.	Admits in		Traverse of Slides.		Approximate Weight.	Price.
		Diameter.	Depth.	Longitudinal.	Transverse.		
	In.	In.	In.	In.	In.	Cwt.	
1	12	48	21	19	16	65	£
2	14	54	21	19	16	75	£
3	15	60	24	30	24	97	£
4	20	72	32	36	30	150	£

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SMALL PLANING MACHINES.



No. 0 Machine.

The above class of Planing Machines are suitable for Hand or Steam Power, and they are especially adapted to be easily worked by hand for planing small articles in an expeditious manner. The power machines are worked by bevel gearing, with quick return motion to table. The cross slide is provided with one tool box, and is adjustable to any height, and has self-acting horizontal cut.

Machines are complete with fast and loose pulleys and hand-working flywheel.

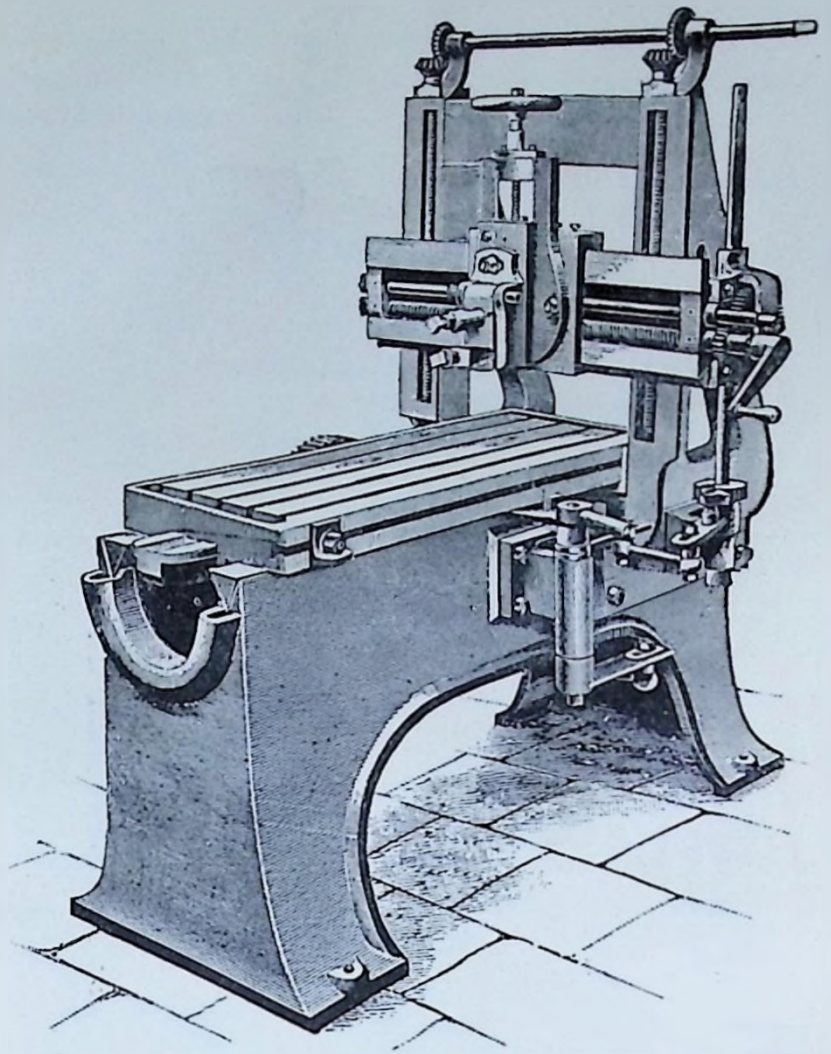
Machines Nos. 00 and 0 can be supplied with or without Stand.

Machine No. 1 has Frame and Stand cast in one.

DIMENSIONS.

No.	Will Plane.			Approximate Weight.		Price.	
	Length.	Width.	Height.	With Stand.	Without Stand.	With Stand.	Without Stand.
	In.	In.	In.	Cwts.	Cwts.	£	£
00	16	12	8	6¾	6	19	17
0	23¾	16	12	10½	11½		
1	31¾	20	16	17¾			

PLANING MACHINE.



The bed of this Machine has flat top, and is angled inside, to which table is fitted, with adjustable strip to take up wear. It is self-acting in horizontal, angular, and vertical cuts, and quick return motion.

DIMENSIONS.

Will plane			Length of Bed.	Table.		Diam. of Pulleys.	Approx. Weight.	Price.
Length.	Width.	Depth.		Length.	Width.			
In. 36	In. 20	In. 18	In. 54	In. 41	In. 17½	In. 15	Cwts. 23½	£

PLANING MACHINE.

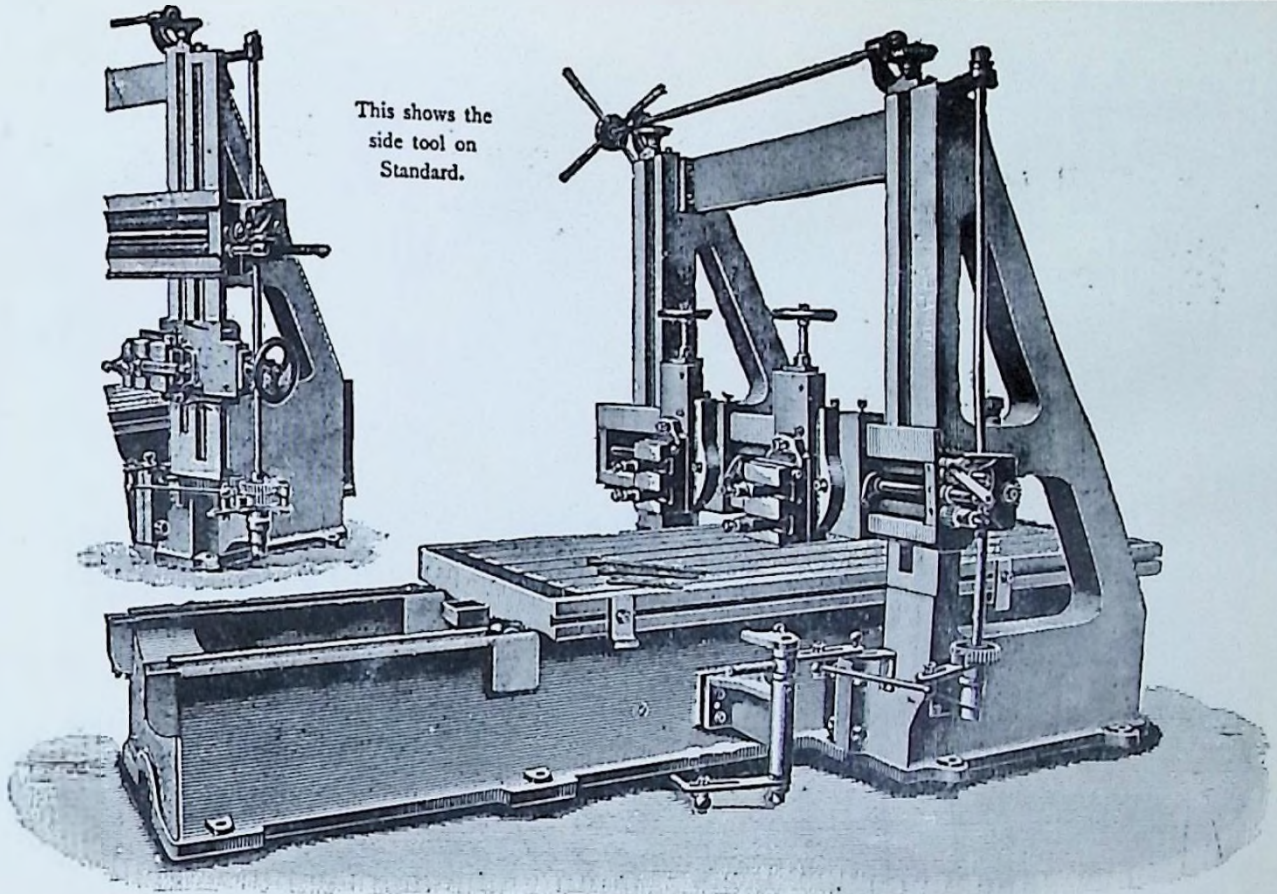


Illustration of Machines Nos. 1, 2, and 3.

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POWERFUL PLANING MACHINES.

These Machines have **massive beds** and standards carrying cross slides arranged to carry one or two tool boxes, and having **self-acting horizontal, vertical, and angular cuts.**

They may also be fitted with a separate side standard and tool box with **self-acting vertical feed.**

This addition is very useful for planing the ends of articles which are too long to go between the standards, and also for **plate edge planing**; or the machine can be fitted with an extra tool box with self-acting down feed to one or both standards of the machine.

The table is driven by a rack which receives its motion from a large intermediate wheel driven by a pinion, an arrangement which **reduces the wear** and makes much **smoother work.**

It has **slow cutting** and **quick return** motions and is provided with self-acting oilers, screw keys, &c.

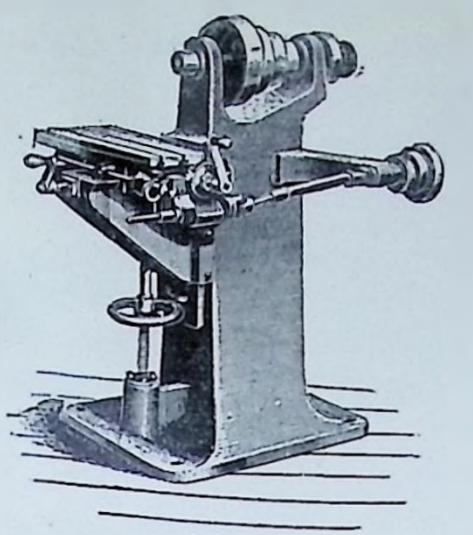
Will Plane	Bed		Width of Table.	Approximate Weight.	Price.				
	Length.	Between Centres of V's.			With One Tool Box.	With Two Tool Boxes.	Per Foot longer to be Planed.	For separate Standard and Tool Box with S.A. Down Feed.	For Tool Box on Standard of Machine.
Ft. Ft. Ft.	Ft.	Ft. In.	Ft. In.	Tons.	£	£	Extra £	£	Extra £
12 × 4 × 4	18	2 9	3 9	8½					
12 × 4½ × 4½	18	2 9	3 9	9					
12 × 5 × 5	18	2 9	4 3	9¾					

These machines may have **flat sides** for the table at the same prices.

They can also have tables **driven by powerful screw** with adjustable nuts to take up the wear. Price extra for each size, £

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SINGLE-GEARED MILLING MACHINE.

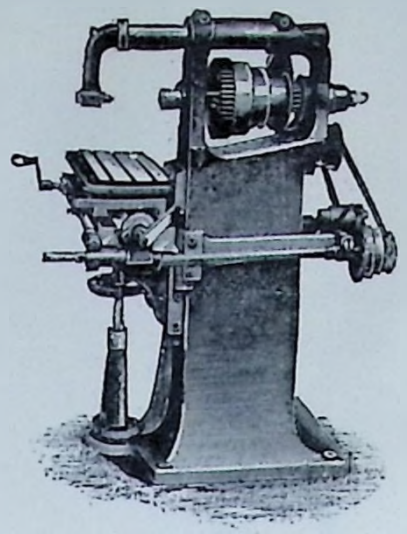


This Machine has conical steel spindle, with reverse cones for adjustment, the nose of spindle being bored taper and slot cut through to cover up mandrils, thus enabling the Machine to **run in either direction.** The slides and table are **heavy** and have **large** wearing surfaces; the latter has a sud channel all round, with drawing-off pipe. The **automatic feed** is strong and simple, with worm and wheel, **machine cut** from the solid, the worm running in oil. All screws of **steel**, and of large diameters, the screw for transverse-slide having two starts to allow the table to be run back quickly by hand. This slide is self-acting and self-stopping, at any part of its traverse, by means of an adjustable stop.

Size of Table.	Traverse.			Approximate Weight.	Prices, with Overhead Motion.		
	Transverse.	Longitudinal.	Vertical.		Complete as shown.	With Overhung Arm.	If without Automatic Feed.
					£	£	Less £
21in. × 8in.	13 in.	6½ in.	14 in.	9½ Cwt.			

Cone pulley has four speeds for 2½ in. belt; largest diameter is 10 in.

DOUBLE-GEARED MILLING MACHINE.



This Machine has conical steel spindle, with reverse cones for adjustment, the nose of spindle being bored taper and slot cut through to cotter up mandrils, thus enabling the machine to **run in either direction.** The tail pin runs in oil.

The overhanging arm is secured at back and front, and can be instantaneously withdrawn.

The slides and table are **heavy** and have **large** wearing surfaces, the latter has a sud channel all round, with pipe for drawing off the suds.

The **automatic feed** is strong and simple, with worm and wheel, **machine cut** from the solid. The worm running in oil.

All screws are **Steel** and of large diameters, the screw for transverse slide having two starts to allow the table to be run back quickly by hand. This slide is self acting and self-stopping at any part in its traverse, by means of an adjustable stop.

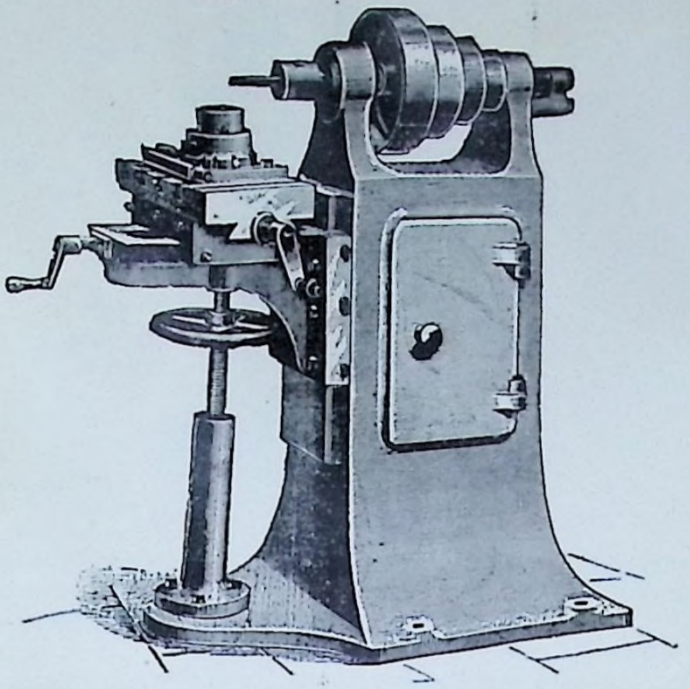
Size of Table.	Traverse.			Approx. Weight.	Prices with overhead Motion.			
	Transverse.	Longitudinal.	Vertical.		Complete with back gear.	Without arm.	Single geared for 3 in. belt.	If without Automatic Feed.
					£	£	£	Less £
20 × 8½ in.	13 in.	6 in	12 in.	14 cwt.				

Cone pulley has 3 speeds for 2½ in. belt.

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MILLING MACHINES.

SINGLE AND DOUBLE.



These Machines will be found specially valuable for quickly shaping all kinds of Brass Work, and where a number of small surfaces have to be shaped. Tables have planed T slots, with Adjustable Horizontal and Vertical Slides, and Dividing Attachment for four, six, and eight side articles.

Double Machine will shape two sides of work at once, having two independent heads, with V slides adjustable by screw.

Machines are complete with Overhead Motion, Screw Keys, and Cutter to each head.

DIMENSIONS—SINGLE MACHINE.

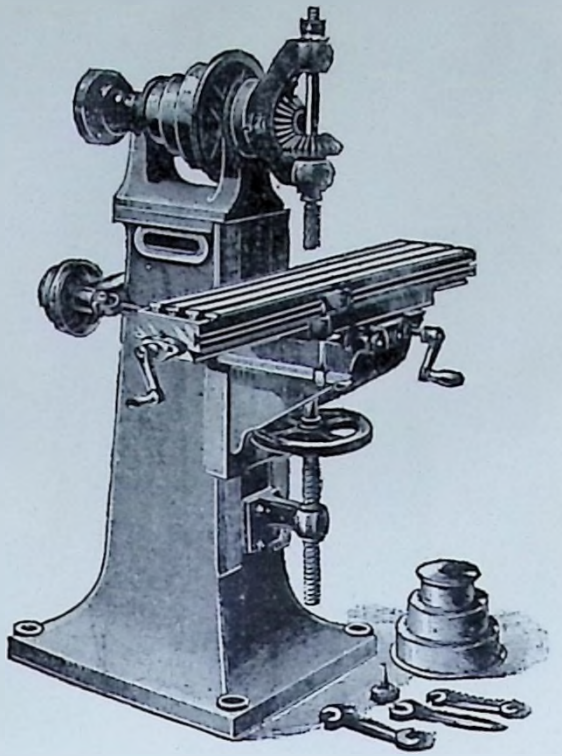
Table		Turret.		4-Speed Cone.		Appr. Weight.	Price.	
Horizontal Traverse each way.	Rise and Fall.	Diam. of Hole.	Diam. Hole in Bush.	Largest Diam.	Width.		As above.	Without Dividing Attachment.
In.	In.	In.	In.	In.	In.	Cwts.	£	£
7	9	2¼	1	11½	2⅜	11½		

DIMENSIONS—DOUBLE MACHINE.

Table.		Turret.		Heads open between Spindles	Pulleys.		Appr. Weight.	Price.	
Horizontal Traverse.	Rise and Fall.	Diam. of Hole.	Diam. Hole in Bush.		Diam.	Width.		As above.	Without Dividing Attachment.
In.	In.	In.	In.	In.	In.	In.	Cwts.	£	£
6	8	2¼	1	8	6	3	14		

MILLING MACHINE.

HORIZONTAL AND VERTICAL.



No. 1 Machine.

The above Machine is specially designed for **Horizontal and Vertical Milling** and Boring, which changes can be effected simply by removing the Vertical bracket, shown in illustration, and attaching cutter in usual way for horizontal milling.

The table is regulated in height by hand wheel and screw from underneath.

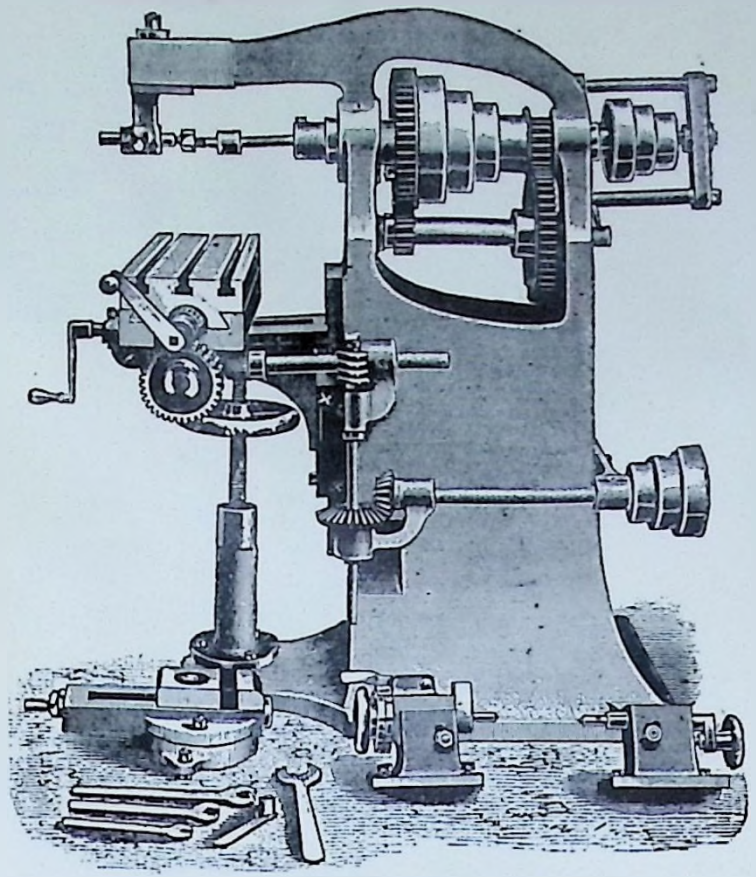
Machine has self-acting traverse motion with three different speeds, and strike out lever to disengage same at any point.

DIMENSIONS.

No.	Traverse.			Approximate Weight.	Price.	
	Longitudinal.	Transverse.	Vertical.		As above.	If without self-acting motion.
	In.	In.	In.	Cwts.	£	£
1	23⅛	6	10	7		
1A	29⅜6	7	10	6¼		

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MILLING MACHINES.



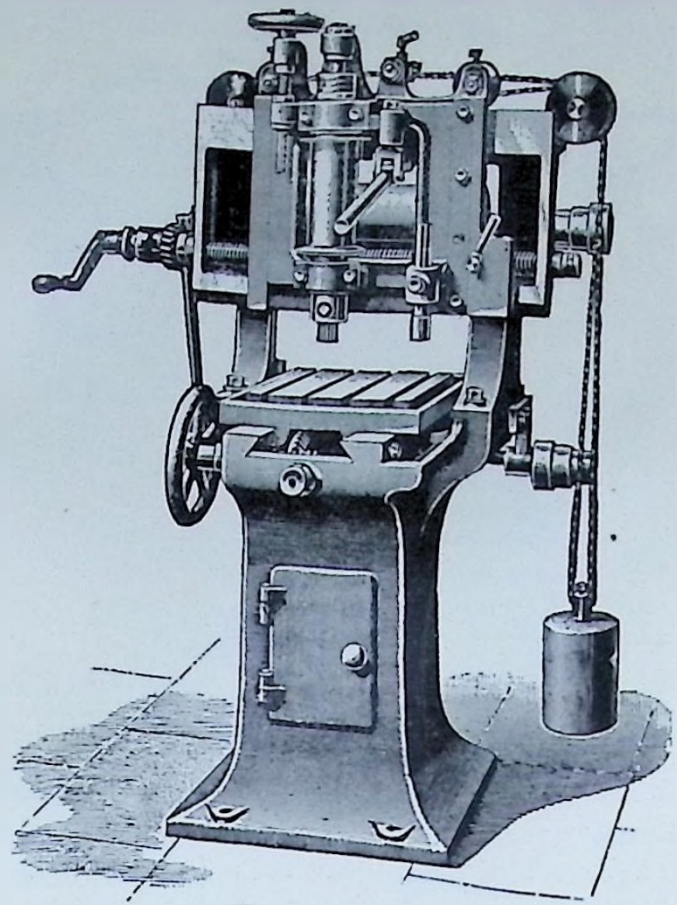
The above is a valuable Machine for milling all kinds of small work, adapted for Cycle Manufacturers, Gunsmiths, Locksmiths, Electrical Engineers, &c. It is made with **machine-cut double gear**, as shown, or **single gear**. If fitted with dividing head and back centre will divide wheels or milling cutters, and is useful for milling nuts, &c. Table is provided with **self-acting** longitudinal travel with three speeds of feed motion to each speed of cutter. Machine has **steel** spindle running in **adjustable** conical gun-metal bearings, and is complete with overhead motion and screw-keys.

DIMENSIONS.

Particulars of Table.						4-Speed Cone.			Appx. Weight.	
Length.	Width.	Self-Acting Travel.	Transverse Travel.	Greatest Depth from Top to Spindle.	Will Rise and Fall	Width of Belt. Double Gear.	Width of Belt. Single Gear.	Largest Diam.	Double Gear.	Single Gear.
In.	In.	In.	In.	In.	In.	In.	In.	In.	Cwt.	Cwt
24	9½	18	7	12	9	2	2½	11½	17	15

Double-Geared Machine.	Single-Speed Machine.	Extra for Dividing Heads up to 30, or more, as ordered.	Extra for Vice to admit 6 in. with 4½ Jaws, and Swivel Base.
£	£	£	£

MILLING AND PROFILING MACHINE.



These Machines are of the best workmanship and materials of the highest class, they are specially designed for milling or shaping to a pattern all kinds of engineers' and brass finishers' work, such as links, cams, flanges, &c., &c. The Table and Cutter are provided with **self-acting feed motions**, and also hand-feed motions for irregular-shaped work. The self-acting motion to table is by **machine-cut rack and pinion**. Cutter spindle revolves in adjustable phosphor-bronze bearings, with adjustable hardened steel end thrust bearings, and is **adjustable vertically** by screw and hand-wheel. The profiling motions of cutter-head and table can be worked in either direction by hand lever. Near cutter spindle is an adjustable feeler, which is held against the copy by means of weights. Machines are complete with overhead motion, screw-keys, and one sample cutter.

DIMENSIONS.

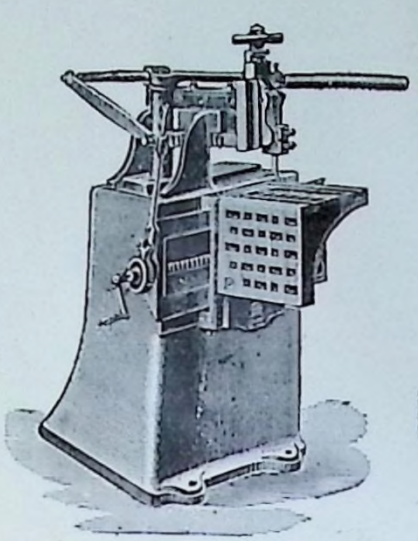
Table.			Cutter.		Will Admit		Approx. Weight.	Price.
Self-acting Traverse.	Length.	Width.	Traverse on Slide.	Vertical Adjustment.	Between Standards.	Under Spindle Nose.		
In.	In.	In.	In.	In.	In.	In.	Cwts.	£
15	17	14	9	6	18	6	18	

Particulars of larger size Machines will be sent on application.

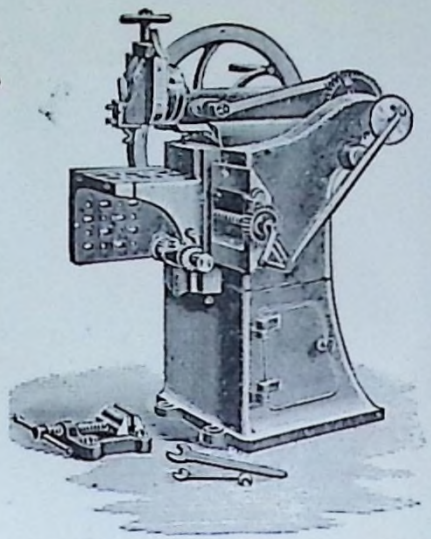
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SHAPING MACHINES.



No. 44.



No. 44A.

No. 44 Machine is fitted with lever and self-acting motion for hand power, rising and falling table, or vice, as desired.

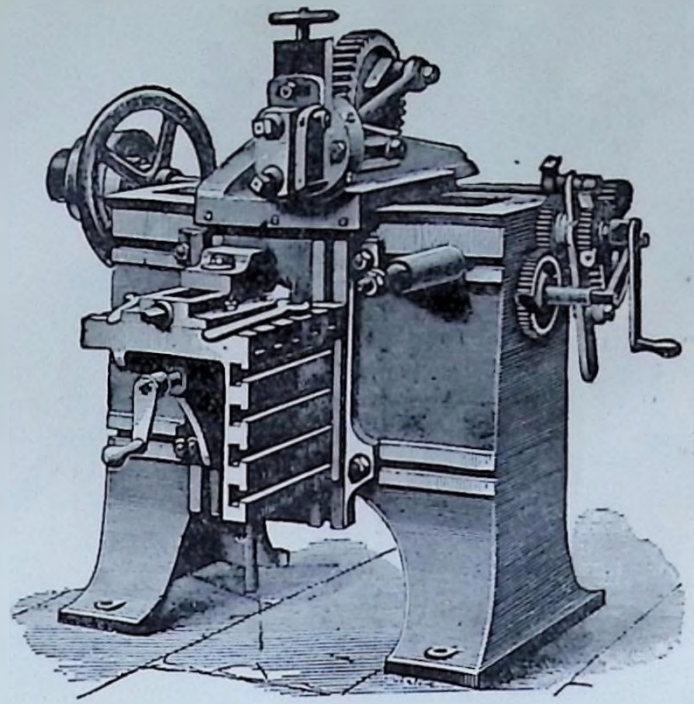
No. 44A Machine is fitted with variable stroke, for hand and steam power, self-acting and quick return motion, adjustable tool carriage for planing angles and down cutting, and rising and falling table, or vice, as desired. This Machine can also be fitted with automatic circular motion for external curves. Although these Machines are very low in price, the quality and material is of the best, they are well-finished, strongly and accurately made.

DIMENSIONS.

No.	Stroke.	Traverse.	Approximate Weight.	Price. With rising and falling vice.	With Socket-stand.	With small vice over table.	With automatic circular motion.	As above.
	In.	In.	Cwts.	£	£	£	£	£
44	6	14	8½					
44A	6 11/16	16	10½					

SHAPING MACHINE.

6-INCH STROKE.



The above is a very handy Machine, with a **variable stroke**, driven by cone wheel and pinion. The head traverses along bed by a screw, and has **variable self-acting surfacing cut**. The ram is indexed and fitted with slides for down and angle cutting. The table has planed T slots on top and side, and is adjustable horizontally on bed by bolts sliding in T slots, and vertically by screw and bevel wheels, with handle for working them in front. A **self-acting circular motion** is provided for external curves. Machine is complete with overhead motion, parallel vice, and screw keys.

DIMENSIONS.

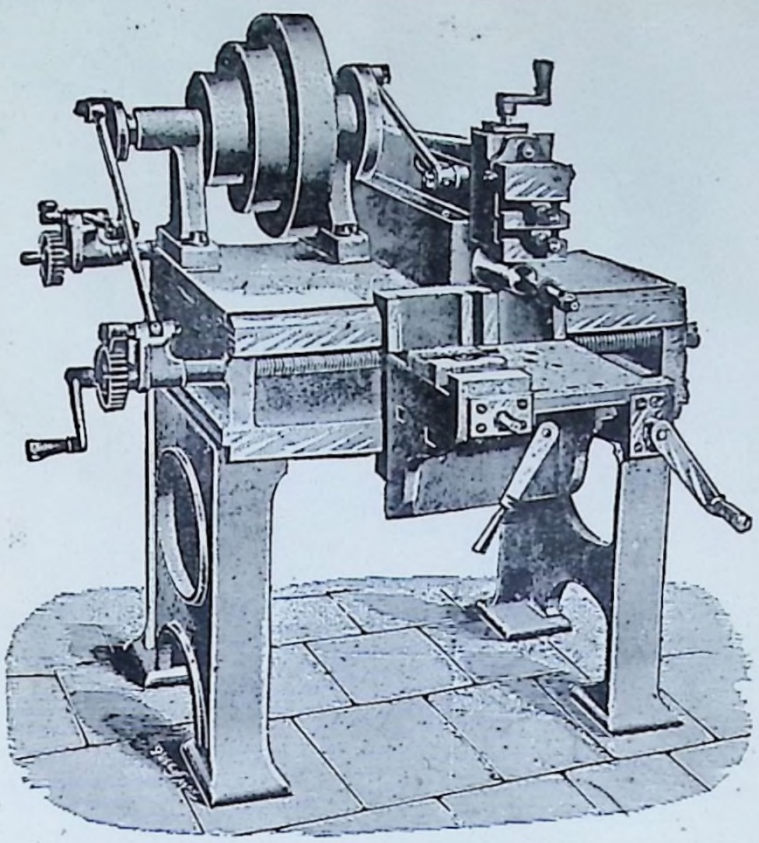
Maximum Length of Stroke.	Traverse of Head.	Length of Bed.	Admits on Top of Table.	Size of Table.	Approximate Weight.	Price. As above.	Nut-Shaping Attachment.	to Special Nut Shaping Mandrils with Collars.
In.	In.	In.	In.	In.	Cwts.		Extra.	Extra.
7	22	33	12	14 × 13 × 12	13	£	£7	£6 5

Larger Machines quoted for on application.

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SHAPING MACHINE.

WITH FIXED HEAD.

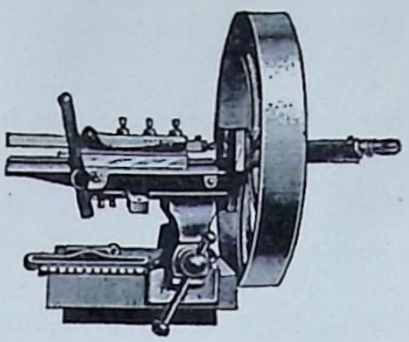


The above is of simple construction and, working at **quick speed,** is adapted for shaping quantities of small articles of same size and shape, and is a most useful adjunct to an engineering fitting shop. It has **fixed head** and **traversing table** on strong bed, with **adjustable stroke,** provided with long ram and adjustable slot. Table with planed and perforated top with fixed vice, also side plate with vice as shown; table is adjustable vertically, and has variable **self-acting traverse.** Tool-box, swivels for angular work, and self-acting motion for circular work; is fitted with mandrel and pair of cones. Machine is complete with overhead motion, handles, screw-keys, &c.

Stroke.	Traverse.	Length of Bed.	Table admits under Tool.	Will shape distance from Frame.	3-Speed Cone.		Approx. Weight.	Price.
					Diameters.	Belt.		
In.	Ft. In.	Ft. In.	In.	In.	In. In. In.	In.	Cwts.	£
6	2 10	3 6	12.	12	16×12×8	2½	14	

PATENT SLOTTING AND KEYWAY-CUTTING MACHINES.

For Steam or Hand Power.



Can be worked by man or boy.

Will produce excellent work with expedition.

Will do better work in one-tenth the time than skilled mechanic with hammer, chisel, and file.

Equal to Shaping or Slotting Machine for ordinary purposes.

Will cut keyways parallel or taper as desired.

Can be fixed to Bench or Standard, and for large Pulleys or Fly-wheels can be fixed to work itself.

Description.	A	B	C	D
Length of Stroke in inches ...	8	12	16	24
Will Cut Keyway	1 in. wide	1½ in. wide	2½ in. wide	3 in. wide
Approximate Weight for Hand .	1 cwt.	1½ cwt.	3 cwt. 1 qr.	—
,, ,, for Steam .	—	7¼ cwt.	10 cwt.	25 cwt.
Price for Hand	£11 10s.	£17	£25	—
,, Steam	—	£29	£39	£60

This Machine differs from the ordinary Slotting Machine, inasmuch as it will cut keyways in articles of any diameter; and along with this, its lightness, portability, and easy working, which are great and important advantages, make it a desirable acquisition in large and small workshops. Its cheapness brings it within the reach of all users.

An important feature in this Machine is the arrangement by which the tool clears itself in the return stroke, and immediately resumes its firm and rigid position on returning towards the article to be cut; by this arrangement the wear on the tool is reduced, and the cutting edge preserved, which is favourable to the performing of good work, and with a minimum power.

In slotting articles with a small hole, our special **Patented Split Mandril,** which is supplied as an extra, is very desirable when large quantities are to be cut with holes of the same diameters. By the use of this Mandril several articles can be fixed and cut together, and no setting is required; this is a great saving in such work as slotting change-wheels.

The first cost is less than a quarter of any other Machine, and owing to few working parts cost of maintenance will be next to nothing.

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EMERY WHEELS.

In these Emery Wheels the grains of emery are consolidated by a special process, which developes the cutting properties in the best possible manner; they are especially recommended for freedom from glazing, durability, and rapidity of cutting.

Flanges for mounting Emery Wheels should not be less than half the diameter of the Wheels, and Insertion Rubber Washers should be used between wheels and flanges.

Emery Wheels should be frequently and carefully examined.

SPEEDS FOR EMERY WHEELS.

The following have been found to be the best and most effective speeds at which Emery Wheels should be run.

Diameter and Revolutions per Minute.

Up to 6 in.	7 to 9 in.	10 to 12 in.	14 in	16 in.	18 in.	20 in.	22 in.	24 in.	28 in.	30 in	32 in.	36 in.
2,500	2,000	1,600	1,300	1,200	1,000	900	800	750	650	600	580	550

EMERY WHEEL MACHINES.

These Machines have been designed and constructed, complete with Emery Wheels, in a variety of patterns suitable for various trades. All shafts are of steel, running in long bearings of improved form, which only require oiling about once every three months. A countershaft is recommended for driving these Machines, but to suit various requirements and convenience, they are fitted up in two ways, one with fast and loose pulleys on wheel shaft, and the other with fast pulley only on wheel shaft and countershaft at back of Machine.

Full particulars respecting improved self-oiling bearings are sent with each Machine.

In ordering Emery Wheels, please state **purpose for which they are to be used**; whether **coarse, medium, or fine**; and if to be used **wet or dry.**

PRICES OF EMERY WHEELS.

From 10 in. to 36 in. diameter.

Price **ONE SHILLING** per lb.

Approximate Weight of Wheels, one inch thick:—

10 in.	11 in.	12 in.	14 in.	15 in.	16 in.	18 in.	20 in.	22 in.	24 in.	28 in.	30 in.	32 in.	36 in.	Diam.
8¼	10	12	16¼	19	21	28	33	40	48	66	75	86	108	lbs.

From 2 in. × ¼ in. to 9 in. × 3 in.

Diameter in Inches.	Thickness in Inches.														Over 3 in. thick per lb.
	¼	⅜	½	⅝	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
2	0 4	0 4	0 5	0 5	0 6	0 8	0 10	1 0	1 0	1 0	1 3	1 3	1 6	1 6	2 0
2¼	0 5	0 5	0 6	0 8	0 10	1 0	1 0	1 0	1 0	1 0	1 3	1 3	1 6	1 6	2 0
2½	0 6	0 6	0 8	0 8	0 10	1 0	1 0	1 0	1 0	1 0	1 3	1 6	1 6	1 6	2 0
3	0 6	0 6	0 8	0 8	0 10	1 0	1 3	1 6	1 9	2 0	2 0	2 0	2 0	2 3	1 6
3¼	0 8	0 8	0 9	0 9	1 0	1 4	1 6	1 6	1 9	2 0	2 0	2 3	2 3	2 6	1 6
3½	0 8	0 8	0 10	0 10	1 0	1 4	1 6	1 6	2 0	2 0	2 3	2 6	2 9	3 0	1 6
3¾	0 10	0 10	1 0	1 0	1 3	1 6	1 9	1 9	2 0	2 0	2 6	2 6	3 0	3 0	1 6
4	0 10	0 10	1 0	1 3	1 6	1 9	2 0	2 0	2 6	2 9	3 3	3 9	4 0	4 3	1 3
4½	0 10	1 0	1 3	1 6	1 9	2 0	2 3	2 6	2 9	3 0	3 3	3 9	4 0	4 3	1 3
5	1 0	1 3	1 6	1 9	2 0	2 6	3 0	3 6	4 0	4 6	5 0	5 6	6 0	6 6	1 0
6	1 3	1 9	2 3	2 6	3 0	3 6	4 0	4 6	5 3	6 0	6 9	7 6	8 3	9 0	1 0
7	1 6	1 9	2 6	3 0	3 9	4 6	5 6	6 6	7 3	8 0	9 0	10 0	11 0	12 0	1 0
8	2 0	2 8	3 2	3 10	4 6	5 6	6 9	8 0	9 3	10 6	11 9	13 0	14 3	15 6	1 0
9	2 9	3 3	4 0	5 0	6 0	7 0	8 9	10 6	12 3	14 0	15 9	17 6	19 3	21 0	1 0

Any sizes between the above will be charged at the same rate as the next size larger or thicker. All wheels are made with square edges; but if required round, bevel, or other shaped edges, a slight extra charge is made for turning.

CUP OR DISH WHEELS.

6 in., 8 in., and 10 in. diam. ... ... 1/6 per lb.
12 in. and 14 in. ... ... 1/3 ,,
16 in. and above ... ... 1/- ,,

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SPECIAL SAFETY EMERY WHEELS.



This special shape Safety Emery Wheel is securely fastened to iron plate by an improved method. It is made round on the side, that is, half-an-inch fuller in the centre than at the edge, as shown above. This plan has had a long and successful trial, and will be found to render great safety for running at high speeds.

The above shape of wheel is made only in 24 inch and 28 inch diameters, and can be fitted if desired on the B, BB, C and CC machines at slight extra cost.

Full particulars will be sent on application.

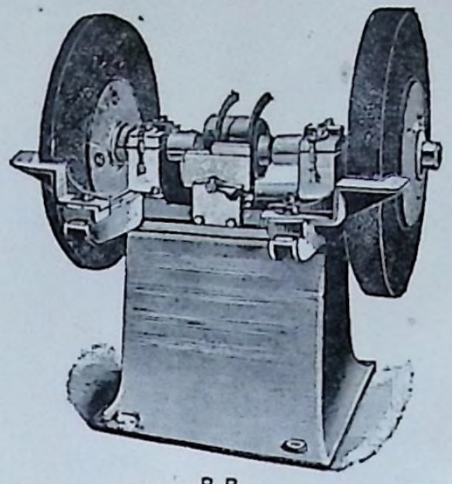
FLANGES, OR WASHER PLATES.

These are made of cast-iron, turned all over and balanced, bored to fit any size of shaft, and drilled for bolts or set screws.

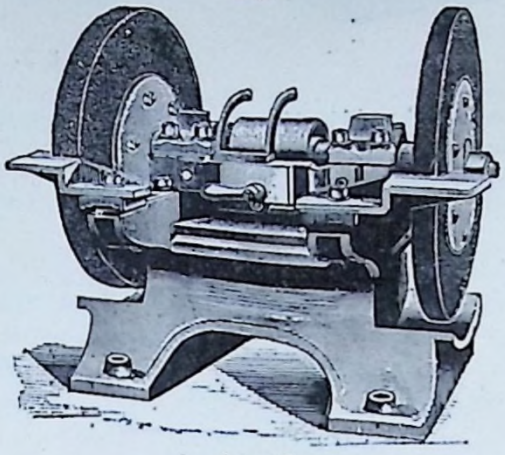
Suitable for Emery Wheels.		Diameter of Flanges.	Price, Per Pair.	Suitable for Emery Wheels.		Diameter of Flanges.	Price, Per Pair.
Diameter.	Hole.			Diameter.	Hole.		
8 in.	2 in.	4 in.	£0 4 6	18 in.	6 in.	9 in.	£0 18 0
8 ,,	3 ,,	5 ,,	0 6 0	20 ,,	8 ,,	11 ,,	1 5 0
10 ,,	3 ,,	5 ,,	0 6 0	22 ,,	8 ,,	11 ,,	1 5 0
10 ,,	4 ,,	6 ,,	0 7 6	24 ,,	10 ,,	13 ,,	1 15 0
12 ,,	4 ,,	6 ,,	0 7 6	28 ,,	12 ,,	15 ,,	2 10 0
12 ,,	5 ,,	7 ,,	0 9 0	30 ,,	12 ,,	15 ,,	2 10 0
14 ,,	6 ,,	8 ,,	0 12 0	32 ,,	16 ,,	20 ,,	4 0 0
16 ,,	6 ,,	8 ,,	0 12 0	36 ,,	16 ,,	20 ,,	4 0 0

Prices include Bolts and Rubber Insertion Washers.

EMERY WHEEL MACHINES.



B B



A and B

The above are strong and powerful Machines, specially designed for large Works, and suited for fettling and dressing castings, grinding wrought-iron and steel work, and for general purposes. The spindles are of steel, running in specially long self-oiling bearings Machines are complete with fast and loose pulleys, strap guide, and adjustable rests.

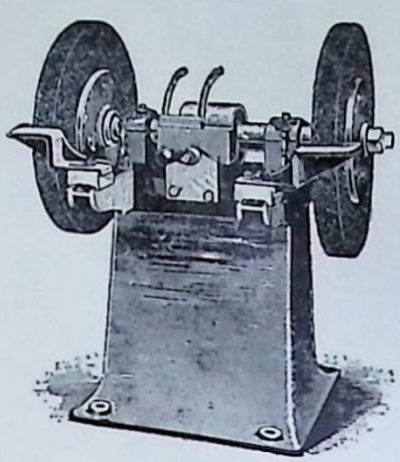
DIMENSIONS.

Machine	Diameter of Spindle.	Length of Bearings.	Size of Pulleys.	No. 1. Size of Emery Wheels.		Prices.	No. 2. Size of Emery Wheels.		Prices.
	In.	In.	In.	In.	In.	£	In.	In.	£
A	3	14	10 × 5½	36 × 4	36 × 2½		32 × 4	32 × 2½	
B	2½	12	9 × 4¼	30 × 4	30 × 2½		28 × 4	28 × 2½	
BB	2½	12	9 × 4¼	30 × 4	30 × 2½		28 × 4	28 × 2½	

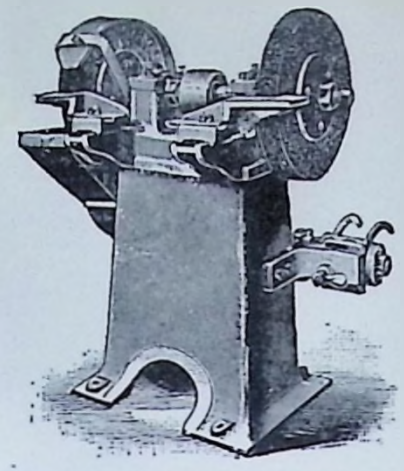
Prices of Machines with other thicknesses of wheels sent on application.

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EMERY WHEEL MACHINES.



C



D D.

These are strong and substantial Machines, suitable for all kinds of general work in Machine Shops, Shipbuilding Yards, and will be found invaluable to Coach and Wagon Builders for grinding up wrought-iron work, steel, &c., such as scrolls, stays, rods, and other parts. They are fitted with steel spindles which run in specially long self-oiling bearings, and with adjustable rests.

Machine C is very similar in design to the C C Machine, and is of rather heavier construction. Both patterns are provided with fast and loose pulleys and strap guide.

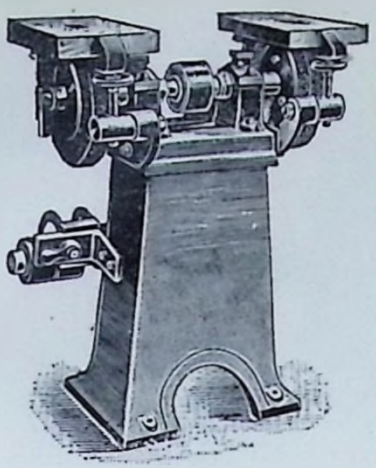
Machine D D is very useful, having an Emery Wheel for ordinary grinding at one end, and a Special Wheel for tool grinding, with Water Trough and Guard, at the other end. It has fast pulley only on wheel shaft, with countershaft at back of Machine.

DIMENSIONS.

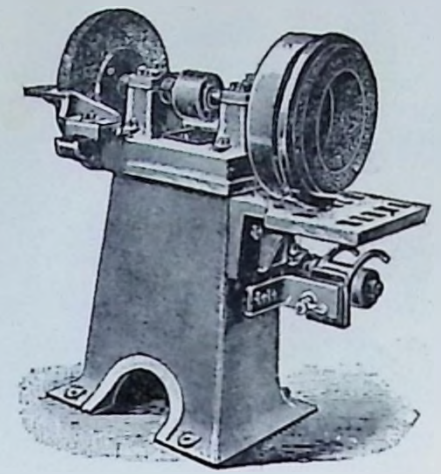
Machine.	Diameter of Spindle.	Length of Bearings.	No. 1. Size of Emery Wheels.		Price.	No. 2. Size of Emery Wheels.		Price.
	In.	In.	In.	In.	£ s. d.	In.	In.	£ s. d.
C	2	10	24 × 2½	24 × 1½		20 × 2½	20 × 1½	
C C	2	10	24 × 2½ Ordinary.	24 × 1½ Grinding.		20 × 2½	20 × 1½	
D D	1½	6	18 × 2	16 × 2	17 10 0			

Prices of Machines with other thicknesses of wheels sent on application.

EMERY WHEEL MACHINES.



E E



D

Both of the above are very handy and useful machines, specially designed for the Fitting Shop, for dressing and grinding fancy, light and heavy castings, and articles such as bolt-heads, nuts, keys, &c., which can be faced up very quickly, and perfectly true. They have fast pulleys only on wheel shaft, with countershaft at back of machine. They are fitted with steel spindles, which run in specially long self-oiling bearings.

Machine E E has planed tables over wheels, on which work can be rested while dressing or grinding small beading, &c. The Emery Wheels project through the tables, which, when not required, can be turned back, and the wheels used for ordinary grinding purposes. Tables are adjustable, and as the wheels wear down they can be lowered by the hand-wheel screw in front and the pillar and screw at back.

Machine D has planed and slotted bracket at side under the Face Wheel, on which a slide-rest can be fixed for holding articles. This Face Wheel is secured firmly between flanges, and with a wrought iron shield round in addition. At the other end of shaft is a suitable wheel for grinding on the edge, and is provided with adjustable rest.

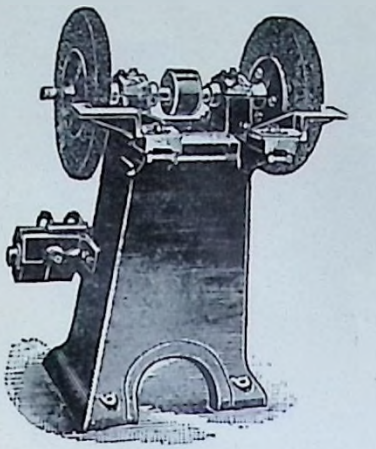
DIMENSIONS.

Machine.	Diameter of Spindle.	Length of Bearings.	Size of Pulleys.	Size of Emery Wheels.		Price.
	In.	In.	In.	In.	In.	£ s. d.
D	1½	6	5	16 × 2	14 × 4 × 2 face	18 10 0
E E	1½	7	5	14 × 2	14 × 2	19 10 0

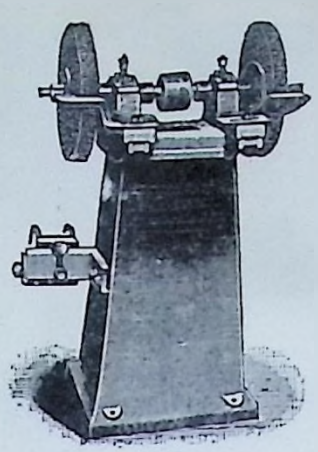
Prices of Machines with other thicknesses of Wheels sent on application.

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EMERY WHEEL MACHINES.



E



E F

These Machines are specially designed for Engineers, Iron and Brass Founders, &c., for fettling and dressing small castings, grinding up steel and wrought iron work, &c., and will be found invaluable in fitting and repairing shops. They are fitted with steel spindles, which run in specially long self-oiling bearings, adjustable hand rests, and strap guides.

Machines E and EF, as illustrated above, can be supplied without the counter-shaft at back, but with fast and loose pulleys on Wheel shaft.

Machine EF is similar in design to the E Machine, but is of lighter construction, and takes smaller size Emery Wheels.

Machine FF is a very useful tool in a Foundry or Engineer's shop, as two workmen can use it at the same time, on account of the extra width between the Wheels. It is constructed on the same lines as the E Machine, and has one fast pulley only on Wheel shaft, but if desired, can be fitted with countershaft as above; or it can be supplied without stand.

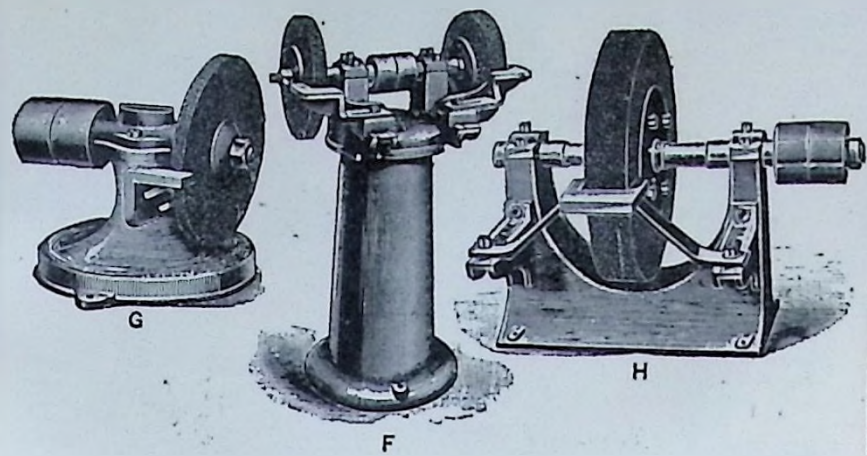
DIMENSIONS.

Machine	Diam. of Spindle.	Length of Bearing.	Size of Pulleys.	No. 1 Size of Emery Wheels.		Price.			No. 2 Size of Emery Wheels.		Price.			Counter-shaft extra.		
	In.	In.	In.	In.	In.	£	s.	d.	In.	In.	£	s.	d.	£	s.	d.
E	1½	6	5 × 3¼	18 × 2½	18 × 1½	15	0	0	16 × 2½	16 × 1½	14	0	0	2	0	0
EF	1 5/16	6	4 × 2¼	14 × 2	14 × 1¼	9	10	0	12 × 2	12 × 1¼	9	0	0	2	0	0
FF	1½	6	4 × 2¼	14 × 1½	14 × 1½	10	10	0	12 × 1½	12 × 1½	10	0	0	2	0	0

Machine FF, without stand, deduct £2.

Prices of Machines with other thicknesses of Wheels sent on application

EMERY WHEEL MACHINES.



G F H

The above Machines are adapted for fettling, dressing, and grinding small and light articles. They are suitable for Cycle Manufacturers, Brass Founders, Sewing Machine Makers, &c. All are provided with steel spindles, which run in specially long self-oiling bearings and adjustable rests.

Machine G is small, light, and cheap; it has a circular base, and can be bolted down on a bench with two ¼-in or ⅜-in. screws.

Machine F can be supplied without stand, and can then be fixed on any convenient place, such as the vice-bench, where it will be found a very useful tool

Machine H is recommended for fixing on a stone, and will be found exceedingly useful where the workman has to put a lot of pressure on the articles he is grinding.

DIMENSIONS.

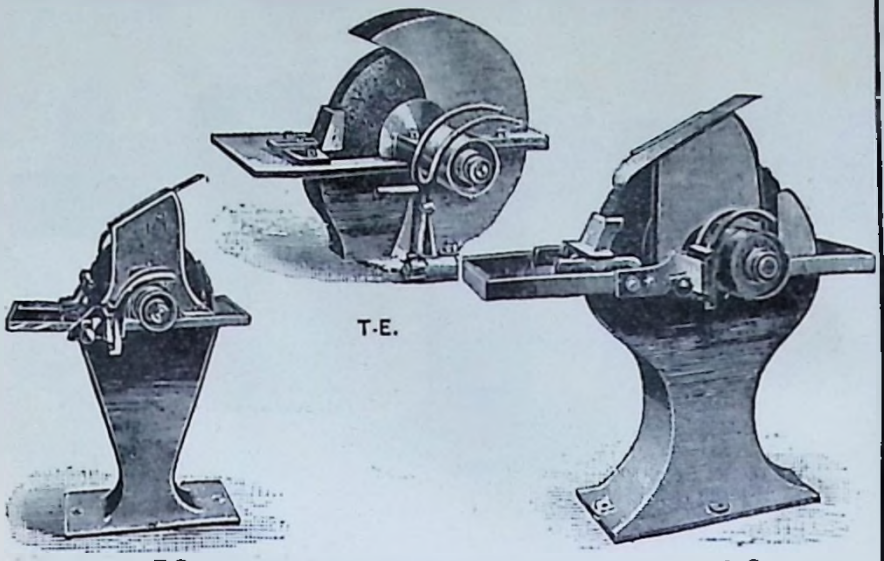
Machines.	Diameter of Spindle.	Length of Bearings.	Size of Pulleys.	No. 1. Size of Emery Wheels.		Price.			No. 2. Size of Emery Wheels.		Price.		
	In.	In	In	In.	In.	£	s	d.	In.	In	£	s.	d.
G	¾	7	3 × 2	9 × 1		2	0	0					
F	1 5/16	6	4 × 2¼	14 × 1½	14 × 1½	9	0	0	10 × 1½	10 × 1½	8	0	0
H	1¾	7	6 × 3¼	22 × 3		12	10	0	20 × 2½		10	10	0

Machine F without stand, No 1 size wheels, £8; No. 2 size wheels, £7. This Machine can also be supplied with two 12-in. × 1½-in. wheels, with stand, £8 10s.; without stand, £7 10s.

Prices of Machines with other thicknesses of wheels sent on application.

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EMERY TOOL-GRINDING MACHINES.



These Machines are specially designed for use in works, where they will be found invaluable. The wheels are of special manufacture, and adapted for grinding all kinds of light and heavy tools. They are provided with covers, as shewn above, to prevent the water flying about. The spindles are of steel and run in specially long self-oiling bearings. Machines are complete with adjustable rests, which are fixed so that tools can be ground at either side of wheel, also fast and loose pulleys and strap guide.

Machine T-E. will be found a very handy and useful tool for Brass Finishers, Cycle Manufacturers, &c. It can easily be bolted on the end of a Lathe bed, to bench, or other convenient place.

Machine T-C. is illustrated above. T-B. is slightly heavier, and will take larger Emery Wheels.

Machine T-A. is a specially strong Machine adapted for grinding the largest and heaviest tools; suitable for large Engineering Works, Iron and Brass Foundries, Shipbuilding yards, &c.

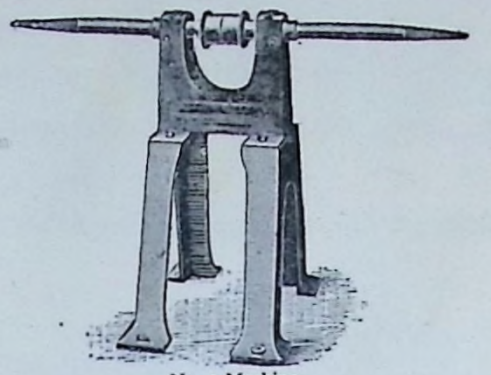
Machines can be fitted with a centrifugal Pump if desired, at small extra cost.

DIMENSIONS.

Machine.	Diameter of Spindle.	Size of Pulleys.	Size of Emery Wheels.	Price. As above.	Price. With Centrifugal Pump.
	In.	In.	In.	£ s. d.	£ s. d.
T-E.	⅝	4 × 2¼	12 × 1½	5 5 0	6 15 0
T-D.	1½	5 × 2½	14 × 2 15 × 2	12 0 0 12 10 0	13 10 0 14 0 0
T-C.	1¼	6 × 3¼	18 × 2½ 20 × 2½	17 0 0 18 0 0	18 10 0 19 10 0
T-B.	2	7 × 3¼	24 × 3		
T-A.	3	9 × 4¼	36 × 4		

Prices of Machines with other thicknesses of wheels sent on application.

POLISHING MACHINES.

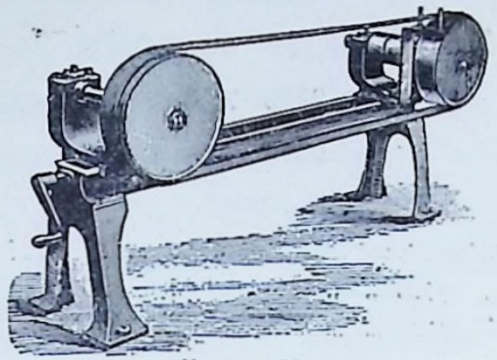


No. 1 Machine.

Above is adapted for any kind of Buffing wheels. The shaft is of steel, running in specially long self-oiling bearings, and is made extra long so that articles can be kept clear of machine. Each end is screwed with taper screw. If desired, one or two pairs of fast and loose washers can be fitted at small extra cost.

DIMENSIONS.

Diameter of Spindle.	Length of Bearings.	Size of Pulleys.	Price. On Stand.	Price. Without Stand.
1½ in.	6 in.	4 × 2¼ in.	£5 0 0	£4 10 0



No. 2. Machine.

This will be found invaluable to Brass Finishers, Cycle Manufacturers, &c., for polishing irregular surfaces of metal by means of endless belt covered with emery. Machine consists of planed bed with fast headstock at one end and loose headstock at other end, adjustable by handle and screw to regulate strap to required tension. If desired, a flanged pulley can be fitted instead of plain strap pulley and guide.

DIMENSIONS.

Length of Bed.	Size of Strap Drums.	Fast and Loose Pulleys.	Price Complete. Without Straps.	Price Complete. If with Flanged Pulley.
5 ft. 4 in.	14 × 4 in.	5 × 3¼ in.	£16 0 0	£16 10 0

Straps are extra, charged according to width.

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DIAMOND TOOLS.

For turning Emery Wheels. This is the only quick and practical way, as solid wheels can be turned to any desired shape in a very short time.

When turning with a diamond, the Emery wheel should run about 80 feet per minute.

Price from 60/- each, according to size of Diamond.



EMERY WHEEL DRESSER

For trueing, shaping, or hacking Emery Wheels, while running at full speed.

Price, including one extra set of Cutters, 13/6

EMERY BLOCKS

FOR GRANITE AND MARBLE POLISHERS

These Blocks are made round or square, and any size.

PRICES.

Blocks weighing 1 lb. each and heavier .. .. -/10 per lb.
" " ½ lb. " " under 1 lb. .. .. 1/- "
" under ½ lb. ... ... Special Prices.

SELF-OILING BEARINGS.

Supplied with all our Emery Wheel Machines.

Special attention is called to these Bearings. Machines fitted with them only require oiling about once every three months.

Full particulars are sent with each Machine

WESTON'S DIFFERENTIAL PULLEY BLOCKS.

These Blocks are the simplest and cheapest in the market, and possess the invaluable quality of not "running down" under any circumstances whilst the load is suspended.

Note.—For actual work we always recommend one size larger than the maximum loads to be lifted.

WESTON'S BLOCKS WITH AND WITHOUT GUIDES.

Tested to	¼	½	¾	1	1½	2	3	4	Tons.
Blocks...	6/-	8/6	11/6	13/6	20/-	27/6	36/-	52/-	per set.
With Guides	8/-	12/6	14/6	17/6	25/-	32/-	45/-	65/-	"
Bright Chain	-/5	-/5	-/6	-/7	-/8	-/9	-/10	-/11	per ft.



WESTON'S BLOCK WITH SPOCKET WHEEL.

Tested to Tons.	Blocks, per set. £ s. d.	Bright Chain, per foot.	Hand Chain, per foot.
1½	1 15 0	-/8	-/6
2	2 5 0	-/9	-/7
3	3 0 0	-/10	-/8
4	3 15 0	-/11	-/8

WESTON'S BLOCK WITH GEAR.

Tested to Tons.	Blocks, per set. £ s. d.	Bright Chain, per foot.	Hand Chain, per foot.
2	2 15 0	-/9	-/6
3	3 5 0	-/10	-/6
4	4 0 0	-/11	-/6
5	5 10 0	1/-	-/7
6	7 0 0	1/3	-/7
8	9 0 0	1/6	-/7
10	12 0 0	1/9	-/8
12	18 0 0	3/-	-/8

In ordering, state whether Blocks are required with or without Chain Guides. Blocks with Guides are sent, unless otherwise ordered.

The length of Chain required is about four times the height of lift.

The lengths of Chains required for Spocket or Gear Blocks are twice the height of lift, plus six feet for the Lift Chain, and twice the height of lift only for the Hand Chain.

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 219 of 298
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PICKERING'S
PATENT QUICK HOIST.



Specially adapted for Grocers, Bakers, Millers, Corn and Flour Stores, Dairies, Granaries, &c., &c.

This is an extremely useful and simply-constructed Hoist. Since their introduction many thousands have been sold, and have given great satisfaction.

It will be seen that **the Hoists are of the simplest construction**, having two wheels of different diameters connected together, the smaller one carrying the lift-chain, and the larger one the endless hand-chain; by this arrangement **great power is obtained.**

The difference in size of the wheels is in all cases as great as can be had, compatible with **quick working.**

The quantity of work done in a given time by these Hoists, as compared with the old method, is nearly doubled, because **the empty chain descends simultaneously with the raising of the load.**

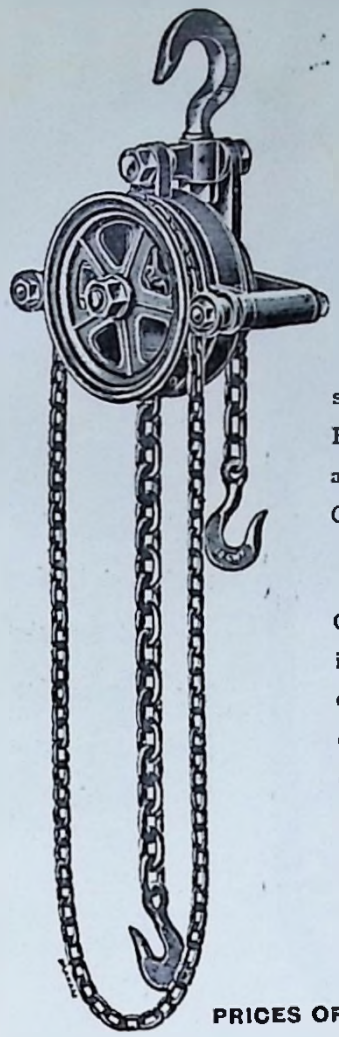
The 15 cwt. Hoist is similar to the 10 cwt., but is provided with a bottom block.

No.	Tested to cwts.	PRICE, with Ordinary Brake. £ s. d.	Lift or Hand Chain, per foot.
A	2½	1 5 0	-/7
B	5	1 10 0	-/7
C	7½	1 15 0	-/8
D	10	2 0 0	-/8
E	15	2 7 6	-/8

If without Brake, 10/- less.

The Chain required is three times the height of Lift, with the exception of the 15 cwt. size, which is four times.

DIFFERENTIAL PULLEY BLOCKS.



ADVANTAGES.

SELF-SUSTAINING. RIGID FRAMING.
NO OVERHAULING FOR FRESH LOAD
CONTINUOUS HAND CHAIN.
WORKS AT ANY ANGLE.

These Pulley Blocks are of new design and specially suitable for Engineers, Millwrights, Builders, Contractors, Railway, Gas, Water, and Mining Companies, Home and Foreign Governments.

They work quicker and easier than Endless Chain Blocks. The power, being obtained through internal gearing, enables the load and hauling chain to be independent, and therefore they cannot lock. A hook is provided at each end of the lift chain, which is used alternately, thus distributing the wear on working parts, and doubling their durability. The hooks are marked to indicate the load they are intended to carry.

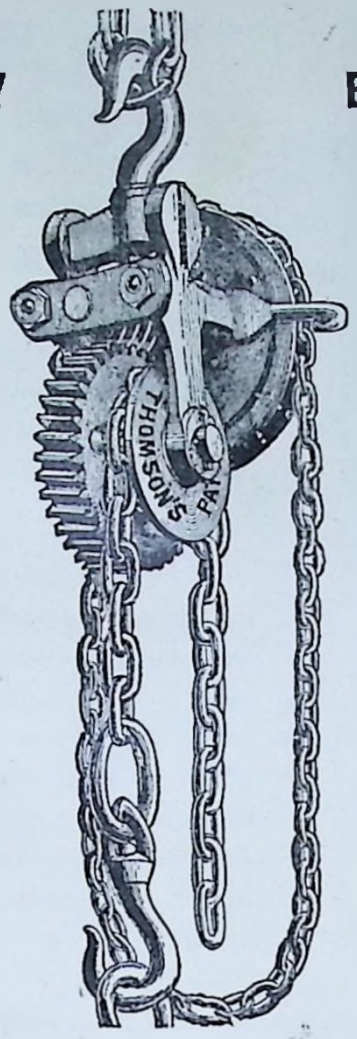
PRICES OF BLOCKS, INCLUDING CHAINS.

Tested to Cwts.	10	20	30	40	60	80
Complete with Chains, for 8 ft. Lift ...	45/-	65/-	75/-	85/-	125/-	185/-
,, ,, 10 ft. ,, ...	48/6	70/-	81/-	91/6	133/-	194/-
,, ,, 12 ft. ,, ...	52/-	75/-	87/-	98/-	141/-	203/-
,, ,, 15 ft. ,, ...	57/3	82/-	96/-	107/9	157/-	212/-
,, ,, 20 ft. ,, ...	66/-	95/-	111/-	124/-	173/-	239/-
Extra Chain per foot of Lift (Equal 3 ft. Chain)	1/9	2/6	3/-	3/3	4/-	4/6

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PATENT SELF-SUSTAINING SCREW

PULLEY BLOCK.



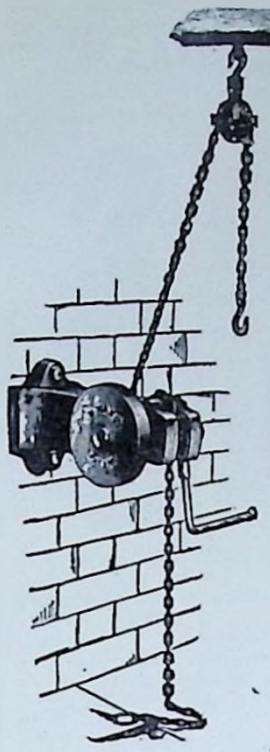
The adoption of the Screw principle renders this Pulley Block well worthy of the attention of Engineers, Contractors, Shippers and Warehousemen, &c., who wish to combine great lifting power with but small expenditure of labour, and absolute safety. The Screw Pulley Block stands unrivalled for both **Lifting** and **Self-Sustaining Power, Simplicity, Lightness** and Durability.

PRICES.

Block to carry	Cwt.			Tons.										
	5	10	15	1	1½	2	3	4	5	6	7	8	10	
Price	31/6	42/-	47/6	52/6	£8/6	84/-	105/-	126/-	157.6	220/-	242/-	284/-	364/-	each set
Hand chain	7½d	7½d	7½d	7½d	8½d	8½d	9½d	10½d	1/1	1/1	1/1	1/1	1/1	per foot
Lift chain	7½d	9½d	9½d	10½d	11½d	1/1	1/3	1/7	1/11	2.6	3/2	3 8	4/9	" "

WALL AND PILLAR CRAB HOISTS.

(WARD'S PATENT.)



Wall Crab Hoists.

These Hoists are suitable for

WAREHOUSES,
GOODS SHEDS,
CELLARS,
COACH HOUSES,
FACTORIES,
DOCKYARDS,
HOTELS,
BUTCHERS,
CORN MILLS,
BUILDERS,
BREWERIES,
GROCERS.

In ordering, state Height of Lift required. If not stated, all Hoists are sent with Chain suitable for 10-feet Lift.

The Length of Chain required is twice the height of Lift.



Pillar Crab Hoist.

SIZES AND PRICES.

Tested to	Wall Crab.	Pillar Crab.	Bright Chain, per Foot.	Top Pulley.
	£ s. d.	£ s. d.		
2½ Cwt.	2 0 0	2 5 0	5d.	3/6
5 "	3 0 0	3 7 6	7d.	5/-
10 "	4 10 0	5 0 0	9d.	9/-
20 "	6 10 0	7 0 0	11d	11/-

These Hoists are extremely simple, compact and handy, and are suitable for any height of Lift, as the Chain merely passes through them instead of accumulating on a barrel.

They have a **Self-Acting Brake** which releases as the load is being raised, sustains it afterwards, and only permits of lowering by winding backwards.

When desired the empty chain may be lowered quickly by disengaging the pawl.

A very slight effort is required in lowering, accelerated speed is impossible, **the load is under perfect control, and the handle can never "fly round,"** though suddenly loosened when the load is in suspension.

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LONDON PATTERN PULLEY BLOCKS.

Each plate of the Blocks forms a support for the centre shaft, besides protecting the Pulley from damage. The actual width of the groove is from one-sixteenth of an inch to one-eighth of an inch more than list, so that 16 in. × 3¼ in. is really 16 in. × 3⅜ in., and so on, to allow for new rope being larger. The 10 in. × 2 in. and larger sizes are made with rings and shackle, instead of hooks. These Blocks have turned shafts, bright pulleys, and are bored.

Snatch Block No. 1 is made as shown, with open side.

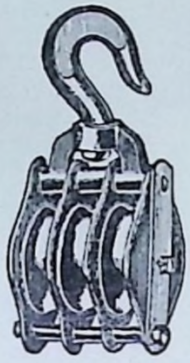
Snatch Block No. 1A is made with fixed sides.



No. 1.—Snatch Block.



Two-Sheave.



Three-Sheave.



Gin-Block.

Diameter of Sheave ... in. / Width of Groove ... ,,	2½ / ⅜	3½ / ½	4 / ⅝	4¾ / ¾	5 / ⅞	6 / 1	7 / 1¼	8 / 1½
Price, Snatch No. 1	3/6	5/-	5/6	6/6	8/6	10/-	12/6	16/-
Do. Snatch No 1A	4/6	7/-	8/-	9/6	11/6	13/6	16/-	21/-
Do. 1 Sheave	3/-	3/6	3/9	5/3	6/3	7/6	9/6	12/6
Do. 2 Sheaves	4/-	5/-	5/9	7/3	9/6	11/6	16/-	22/6
Do. 3 Sheaves	5/-	6/-	7/6	9/6	13/-	16/-	22/-	32/-
Do. 4 Sheaves	6/6	7/6	9/-	13/-	16/6	21/-	31/-	45/-
Spare Iron Sheaves ... each	-/3	-/4	-/6	-/10	1/3	1/6	2/6	3/3
Brass Sheaves ... per Sheave	1/-	1/6	2/3	3/9	5/-	6/3	8/6	12/6
Block will take Chain Diameter ...	...	...	...	3/16	¼	5/16	⅜	7/16

Diameter of Sheave ... ... in. / Width of Groove ... ... ,,	9 / 1¼	10 / 2	11 / 2¼	12 / 2½	14 / 2¾	15 / 3	16 / 3¼
Price, Snatch No. 1	24/-	42/-	50/-	75/-	95/-	115/-	145/-
Do. Snatch No. 1A	30/-	45/-	60/-	84/-	105/-	130/-	160/-
Do. 1 Sheave	20/-	30/-	45/-	60/-	80/-	100/-	115/-
Do. 2 Sheaves	32/-	50/-	90/-	105/-	126/-	150/-	175/-
Do. 3 Sheaves	42/6	70/-	115/-	140/-	170/	200/-	240/-
Do. 4 Sheaves	65/-	95/-	140/-	165/-	200/-	260/-	300/-
Spare Iron Sheaves ... ... each	4/3	6/-	8/-	10/-	14/-	17/-	20/-
Brass Sheaves ... ... per Sheave	18/9	32/-					
Block will take Chain Diameter... ...	½	9/16	⅝	11/16	¾	13/16	⅞

For Brass Sheave Blocks, add to price of Blocks price of Brass Sheaves less that of Iron Sheaves.

For Galvanized Blocks, add 20 per cent. to above list prices.

GIN BLOCKS OR RUBBISH PULLEYS.

The actual width of groove is from 1/16th of an inch to ⅛th of an inch more than list, to allow for new ropes being larger

Diameter of Pulley .. ins.	2½	3½	4	4¾	6	7	8	9
Width of Groove ... ins.	⅜	½	⅝	¾	1	1¼	1⅜	1⅝
Weight... ... ... lb.	1¼	1¾	2½	4	8	13	10	12
Price ... . each	2/3	2/6	2/9	3/-	4/6	5/6	6/9	7/-
Diameter of Pulley ... ins.	10	11	12	14	16	18	20	22
Width of Groove ... ins.	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝	1⅝
Weight... .. ... lb.	14	17	20	31	38	44	58	64
Price ... . each	7/6	8/-	10/-	10/6	13/6	15/6	18/6	21/-

TABLE SHOWING RELATIVE POWERS OF WROUGHT-IRON PULLEY BLOCKS.

Diameter of Sheave .. ins. / Width of Groove ... ins.	2½ × ⅜	3½ × ½	4 × ⅝	4¾ × ¾	5 × ⅞	6 × 1	7 × 1¼	8 × 1½
Each Sheave will lift cwts.	1	3	5	7	10	12	18	27

Diameter of Sheave ... ... ins. / Width of Groove ... ... ins.	9 × 1¼	10 × 2	11 × 2¼	12 × 2½	14 × 2¾	15 × 3	16 × 3¼
Each Sheave will lift ... ... cwts.	35	48	60	75	90	105	120

To ascertain the size and number of Sheaves required to lift a given weight, divide the weight to be lifted by any weight in the above table; the result will give the number of Sheaves and sizes of blocks required.

EXAMPLE.—If 60 cwt. is to be lifted, either of the following combinations will be suitable:—

A pair of 3 and 3 Sheaves, ⅞ in. at 10 cwts. per Sheave } equals 60 cwts.
Or a pair of 2 and 3 Sheaves, 1 in., at 12 ,, ,, ,, }

NOTE.—We do not bind ourselves to the exact powers given above, but they are approximately correct.

In ordering, it is always advisable to leave a sufficient margin.

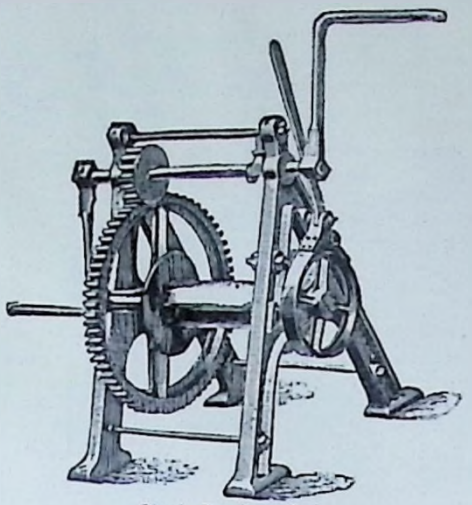
Contractors' Heavy Pattern Pulley Blocks quoted for on application.

See also Weston and Pickering Pulley Blocks (for pages, see index.)

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IMPROVED HOISTING CRABS.

Single and Double Purchase.



With Cast-Iron Sides.

Single Purchase Crab.

These Crabs are strongly made, of best materials and workmanship, and can be confidently recommended. The Barrel and Gearing are of cast iron; all Shafts and Handles are of wrought iron.

DIMENSIONS—SINGLE PURCHASE.

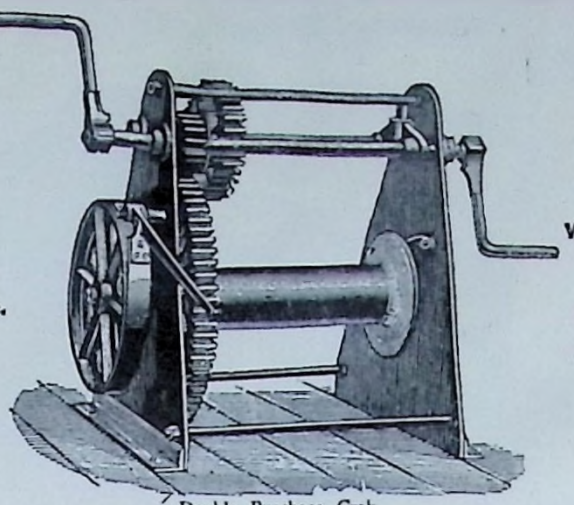
No.	Lifting Power.		Chain.	Price.			Extras.	
	With 2 and 3 Sheave Blocks.	Direct from Barrel.	"B.B." Tested. Diam.	Without Brake.	With Lever Brake.	With Screw Brake.	Brass Bushing.	Chain, per Foot.
	Tons.	Cwts.	In.	£ s. d.	£ s. d.	£ s. d.		
1001	2	8	¼	2 12 0	3 0 0	3 7 0	13/-	-/5
1002	3	12	5/16	2 16 0	3 4 0	3 11 0	13/-	-/5½
1003	4	16	⅜	3 5 0	3 14 0	4 1 0	14/-	-/6
1004	5	20	7/16	3 15 0	4 4 0	4 11 0	15/-	-/7½
1005	6	25	7/16	5 0 0	5 10 0	6 0 0	16/-	-/7½

DIMENSIONS—DOUBLE PURCHASE.

No.	Lifting Power.		Chain.	Price.			Extras	
	With 2 and 3 Sheave Blocks.	Direct from Barrel.	"B.B." Tested. Diam.	Without Brake.	With Lever Brake.	With Screw Brake.	Brass Bushing.	Chain, per Foot.
	Tons.	Cwts.	In.	£ s. d.	£ s. d.	£ s. d.		
1010	4	16	⅜	3 10 0	4 0 0	4 10 0	17/-	-/6
1011	5	20	7/16	4 0 0	4 12 0	5 2 0	18/-	-/7½
1012	6	25	7/16	5 4 0	5 17 0	6 7 0	19/-	-/7½
1013	8	32	½	5 12 0	6 7 0	6 17 0	20/-	-/9
1014	9	36	9/16	6 0 0	6 17 0	7 7 0	21/-	-/10
1015	10	40	9/16	6 13 0	7 10 0	8 10 0	22/-	-/10
1017	12	50	⅝	7 5 0	8 3 0	9 3 0	24/-	1/-
1018	14	55	11/16	8 12 0	9 10 0	10 10 0	28/-	1/2
1019	15	60	¾	9 8 0	10 8 0	11 8 0	30/-	1/3
1020	18	70	¾	14 15 0	16 0 0	17 0 0	36/-	1/3
1021	20	80	13/16	16 15 0	18 0 0	19 0 0	38/-	1/5

IMPROVED HOISTING CRABS.

Single and Double Purchase.



With Wrought-Iron Sides.

Double Purchase Crab.

These Crabs are strongly made, of best materials and workmanship, and can be confidently recommended, especially for Export orders, as there is no risk of breakage. All Shafts and Handles are of wrought iron, and the Bearings for Shafts are carefully fitted into the plates.

DIMENSIONS—SINGLE PURCHASE.

No.	Lifting Power.		Chain.	Price.			Extras.	
	With 2 and 3 Sheave Blocks.	Direct from Barrel.	"B.B." Tested Diam.	Without Brake.	With Lever Brake.	With Screw Brake.	Brass Bushing.	Chain, per foot.
	Tons.	Cwts.	In.	£ s. d.	£ s. d.	£ s. d.		
1001A	2	8	¼	3 17 0	4 5 0	4 12 0	13/-	-/5
1002A	3	12	5/16	4 1 0	4 9 0	4 16 0	13/-	-/5½
1003A	4	16	⅜	4 14 0	5 3 0	5 10 0	14/-	-/6
1004A	5	20	7/16	5 5 0	5 14 0	6 1 0	15/-	-/7½
1005A	6	25	7/16	6 10 0	7 0 0	7 10 0	16/-	-/7½

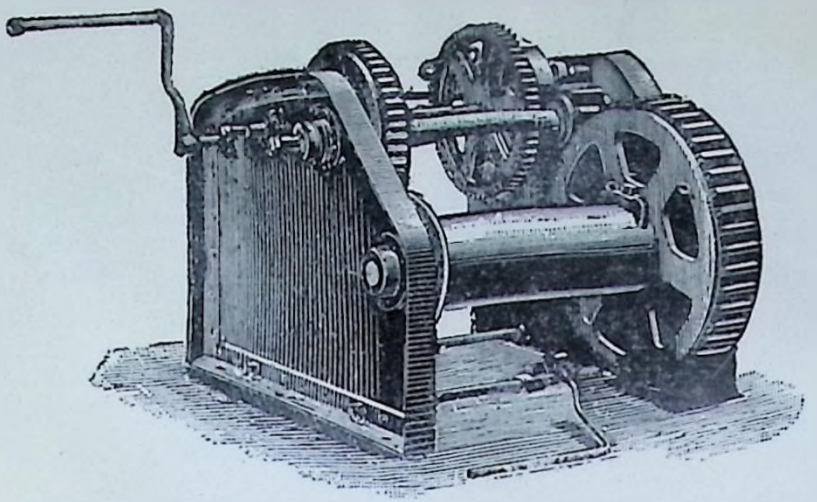
DIMENSIONS—DOUBLE PURCHASE.

No.	Lifting Power.		Chain.	Price.			Extras.	
	With 2 and 3 Sheave Blocks.	Direct from Barrel.	"B.B." Tested Diam.	Without Brake.	With Lever Brake.	With Screw Brake.	Brass Bushing.	Chain, per foot.
	Tons.	Cwts.	In.	£ s. d.	£ s. d.	£ s. d.		
1010A	4	16	⅜	5 5 0	5 15 0	6 5 0	17/-	-/6
1011A	5	20	7/16	5 16 0	6 8 0	6 18 0	18/-	-/7½
1012A	6	25	7/16	7 2 0	7 15 0	8 5 0	19/-	-/7½
1013A	8	32	½	7 11 0	8 6 0	8 10 0	20/-	-/9
1014A	9	36	9/16	8 0 0	8 17 0	9 7 0	21/-	-/10
1015A	10	40	9/16	8 13 0	9 10 0	10 10 0	22/-	-/10
1017A	12	50	⅝	9 7 0	10 5 0	11 5 0	24/-	1/-
1018A	14	55	11/16	10 14 0	11 12 0	12 12 0	28/-	1/2
1019A	15	60	¾	11 10 0	12 10 0	13 10 0	30/-	1/3
1020A	18	70	¾	16 17 0	18 2 0	19 2 0	36/-	1/3
1021A	20	80	13/16	18 15 0	20 0 0	21 0 0	38/-	1/5

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WROUGHT-IRON CRABS.

Double and Treble Purchase.



From photograph of Treble Purchase, 15 Tons Size.

The above are constructed to meet a demand for a strong and reliable Crab Winch for Contractors' use.

Barrels of large diameter, and in cast iron, turned for spur wheel, and bored for wrought-iron shaft.

Gearing well proportioned, in cast iron, bored and keyed in position.

Shafts are in wrought iron, accurately turned to fit bearings.

Bearings are all machined and brass bushed.

Side Frames are wrought iron, framed and stiffened with angle iron.

Tie Rods are wrought iron, with solid collars and screwed ends.

Brake. Powerful Band-Screw Brake to second motion shaft.

Handles in wrought iron, fitting either of the motion shafts, according to weight to be lifted.

DIMENSIONS.

	Will lift direct, Tons.	Barrel: Diam., in inches.	Barrel: Length between, in inches.	Approximate Weight, Cwts.	Price. £
Treble Purchase.	6	9	30	18	
	8	10	33	23	
	10	11	33	29	
	12	11	33	33	
	15	12	36	37	
	20	15	42	68	
Double Purchase.	3	7½	30	11	
	4	8	30	14	
	5	9	30	17	
	6	9	30	20	

FRICTION CRAB.

Brass Bushed Bearings.

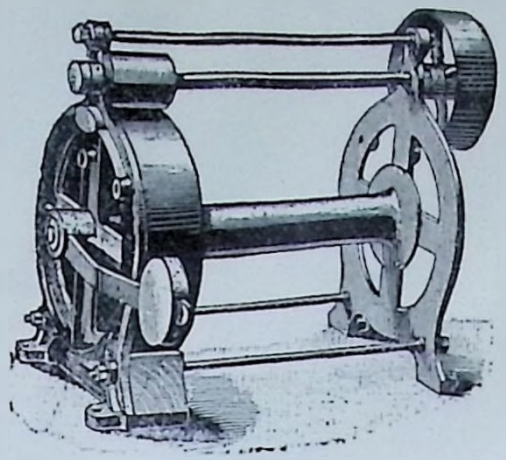


Illustration of 5-cwt. size.

The above will be found invaluable, where a small amount of power is available, for raising light loads at a quick speed in Mills, Warehouses, Breweries, &c., and is especially suitable for Builders and Contractors.

The arrangement is so simple that a single lever controls all motions.

To raise the load, the weighted lever is lifted until the driving wheel comes in contact with the friction pinion, when the load immediately ascends. As soon as the lever is released the driving wheel seats itself in the friction block, and the load remains stationary.

The lowering is effected by slightly lifting the driving wheel of the face of the brake block, and the load descends quickly or slowly as desired by the operator.

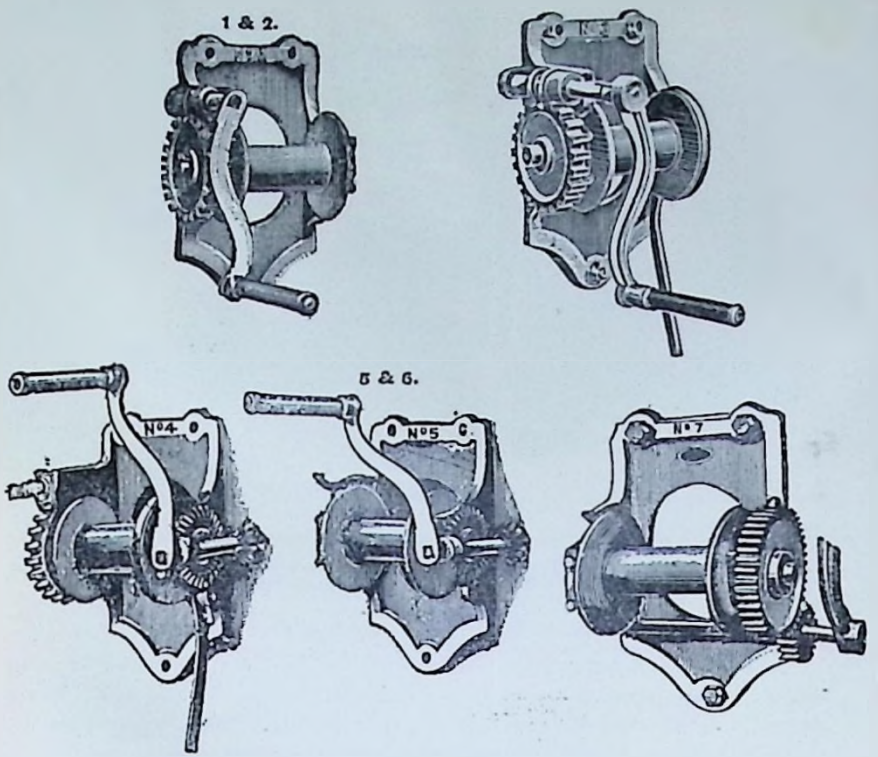
DIMENSIONS.

Will lift direct Cwts.	Barrel: Diam. in inches.	Barrel: Length in inches.	"B.B." Tested Chain. Diam. in inches.	Best Hemp Rope. Circum. in inches.	Price. Crab. £	"B.B." Tested Chain per foot.	Best Hemp Rope per foot.
3	5¼	20	¼	2¼	8	-/6	-/4
5	6	22	¼	3¼	10	-/6	-/5
10	6½	24	5/16	4¼	17	-/6½	-/11
20	7¾	27	5/16	6½		-/8	1/8

The above can be made with Barrels of large diameter for use with Wire Rope at an extra cost.

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WORM AND GEARED HOISTS.



The demand for a cheap and strong Hoist has suggested the introduction of the above class. All gearing is as cast, and bearings are in frames. All patterns are self-sustaining or fitted with brake.

PRICES, MEASUREMENTS, AND LIFTS.

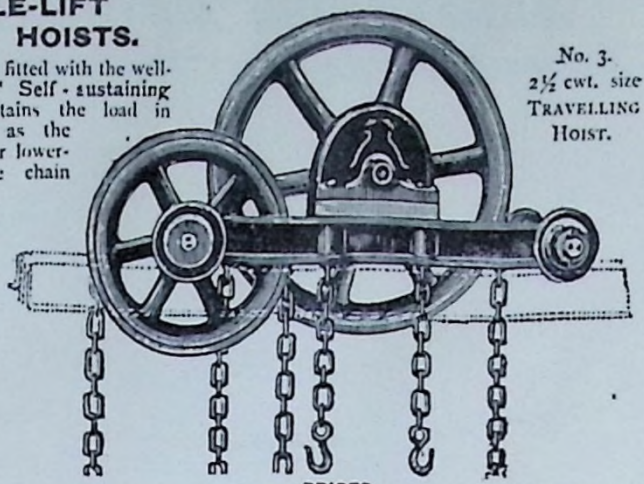
No.	To Lift.		Size.			Price.
	Weight.	Feet per Minute.	Frame.	From Wall	Barrel.	
	Cwt.		Ins.	Ins.	Ins.	£ s. d.
1	5	3	16 × 12	10	2½ × 6	1 14 0
2	10	2	24 × 18	16	4 × 10	2 13 0
3	10	2	24 × 18	16	4 × 9	3 7 0
4	10 & 3	3 & 13	24 × 22	16	3 × 9	4 6 0
5	3	13	24 × 18	16	4 × 10	3 0 0
6	3	7	16 × 12	10	2½ × 6	1 14 0
7	3	15	24 × 22	10	3 × 9	3 7 0

Steel wire rope or chain for above 8d. per foot. Bolts for 9-inch wall, 5s. Suitable jib crane to work with above quoted on application.

DOUBLE-LIFT SAFETY HOISTS.

These Hoists are fitted with the well-known "Weston" **Self-sustaining Brake,** which retains the load in position as soon as the action of raising or lowering ceases. The chain has a hook at each end, so that there is a **hook always ready** for a fresh load. A great saving of time is thereby effected.

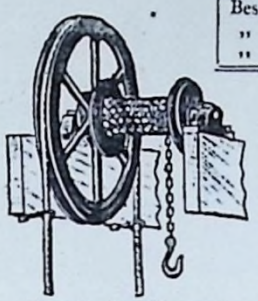
This Hoist is also used as a Cage Lift, for either one or two Cages. In the latter instance the two ends of chain must be separated by means of guide pulleys.



No. 3. 2½ cwt. size Travelling Hoist.

PRICES.

No.	Tested to Cwts.	2½	5	10	15	20
1	Cage Lift	47/-	80/-	170/-	300/-	
2	,, with Spur Gearing ...	...	120/-	230/-	300/-	
3	Travellers	95/-	140/-	260/-		
	Best Load Chain, per ft.	-/5	-/7	-/9	1/1	1/3
	,, Hand Rope ,, ...	-/3	-/3	-/5	-/5	-/6
	,, ,, Traversing Chain, per ft. .	...	...	-/6	-/7	-/7



If required to lift 5 cwt., a Single-sheave Pulley Block can be added, and double quantity of chain is necessary.

SAFETY HOISTS.

This Hoist is perfectly self-sustaining, and should the hand-rope be "let go," the load would remain in position. Lowering is effected by reversing motion of hand-rope. A similar pattern is also made for rapid lowering, the load being released by reversing the action of the main wheel. The descent can be regulated by wheel as the rope remains stationary.

PRICE.

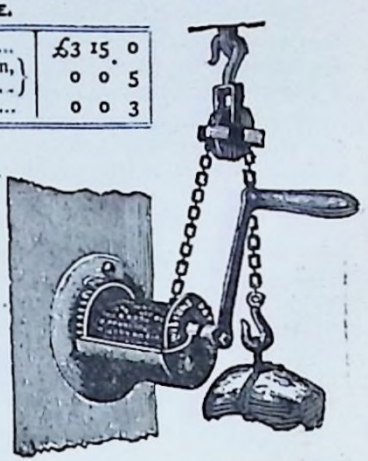
To lift 2½ cwts. ...	£3 15 0
"BB" Tested Chain, With Hook, per ft. .	0 0 5
Hand Rope, per ft. ...	0 0 3

SAFETY BRACKET HOISTS.

These are very useful little Hoists for Barns, Stables, &c., and can be readily fixed to walls or woodwork. The load remains stationary when handle is stopped; it is impossible for load to run back of its own accord. A rapid lowering pattern is also made, and works in a similar manner to that described above.

PRICE.

To lift 2½ cwts....	£1 15 0
Single-sheave Block to lead to load	0 3 9
"BB" Tested Chain, with Hook, per ft.	0 0 5

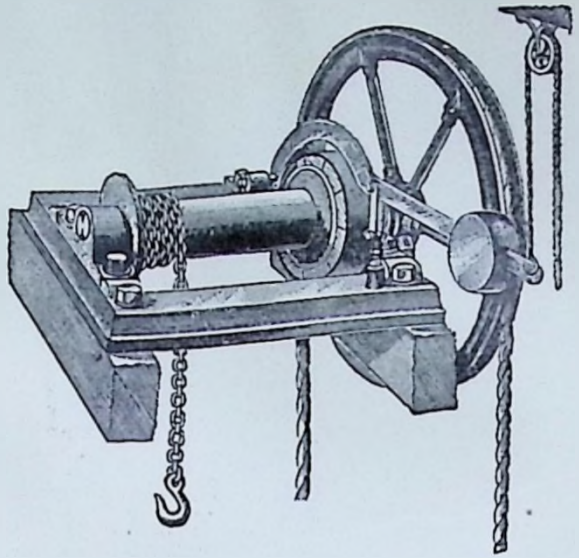


If required to lift 5 cwts., a second Single-sheave Block can be added.

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WAREHOUSE HAND HOIST.

Self-sustaining, Safe, Silent, and operated from any position.



This Hoist is arranged to be worked by any one, and its construction is such that it **cannot fail.** The endless hauling rope, working in a V groove, is for lifting loads only. The brake is released by an **automatic motion** while lifting, but is always on pulley when stationary

For lowering, the brake lever cord only is used, and **will regulate** the speed as may be required.

This type of Hoist is highly recommended for general warehouse work; it can be fixed on roof beams, or bolted to the ceiling; the machine is **self-contained on frame;** any ordinary joiner can fix it. It is equally suitable for raising loads through hatchways, as illustrated, or for use over a cathead pulley projecting beyond the building

The load being self-sustained during hoisting, the man can raise it with greater ease than with the common Hoist of this class; the brake rope being led to where goods are landed, the operator has full **control in handling and lowering** the load.

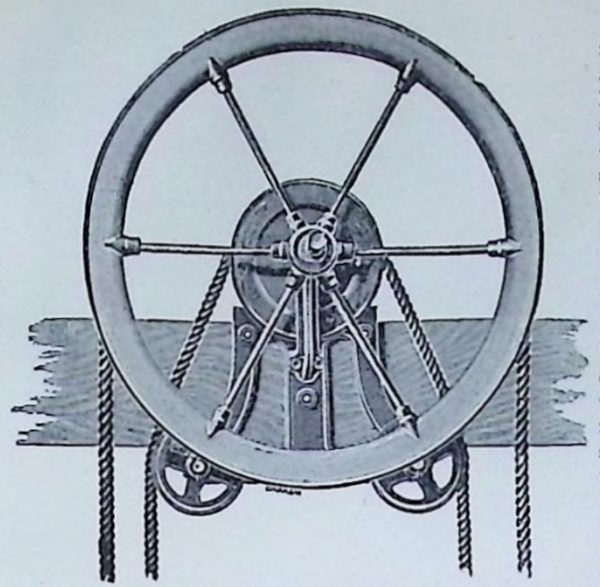
DIMENSIONS.

To lift.	Power and Speed.	Hoist only.	Chain or Steel Rope.	Hemp Rope.
		£ s. d.		
3 cwt.	7 to 1	7 0 0	7d. per foot.	4d. per foot.
5 ,,	10 ,, 1	9 0 0	7d. ,, ,,	4d. ,, ,,

For silent and smooth working we recommend steel wire rope in place of chain, as shown above. If lengths are given we send all ropes spliced and fixed ready for working.

SINGLE AND DOUBLE

SELF-SUSTAINING SERVICE LIFT.



This is one of the most **compact, efficient, and reliable service lifts.** It is an invaluable acquisition in any public or private building where a speedy conveyance of household commodities is a necessity. The machine being **self-sustaining,** fragile ware can be carried free from any risk of damage. There being **no brake-rope,** or other contrivance besides the usual endless hand-rope for lifting, lowering, and sustaining the load, any inexperienced person can work these lifts safely. The gearing is complete on one plate, and has no detached parts; the whole is fixed on one carrying timber. Every machine is in tested working order when leaving works.

The cages are of special construction, and neat artistic design; each being fitted with phosphor-bronze slip guides. The upright guides are of best seasoned pine, grooved, rebated, and braced together ready for erection. Ropes supplied are of the highest quality; finest white flax or cotton at a small extra cost.

PRICES.

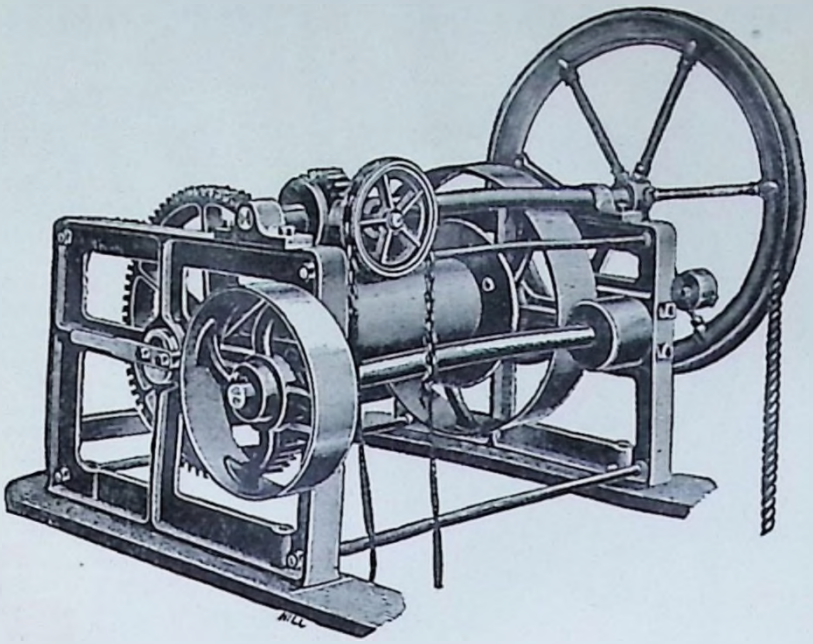
Maximum Weight Lifted.	Length of Guides.	Ordinary Sizes of Cages which may be varied.						Price of Single Lift Complete.	Price of Double Lift Complete.	Extra for Additional Height per foot.	Price for Machine only.
		Single Cages.			Double Cages						
		Width.	Depth.	Height.	Width.	Depth.	Height.				
lbs.	Ft.	In.	In.	In.	In.	In.	In.	£ s.	£ s.	s. d.	£ s.
28	18	15	15	24	12	15	24	10 0	13 0	3 0	5 0
56	18	18	18	27	15	18	27	12 10	15 0	3 0	6 0
80	18	24	24	30	18	24	30	15 0	18 0	3 3	7 10
112	18	27	27	36	24	27	36	18 0	..	3 6	9 0

Any other size or special arrangement will be quoted for.

Special Quotations for improved Hydraulic and Electric Power Service Lifts.

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HAND AND POWER FRICTION HOIST.



This type of Hoist is similar in construction to others shown, as far as working parts are concerned, and is fitted with hand-power gearing.

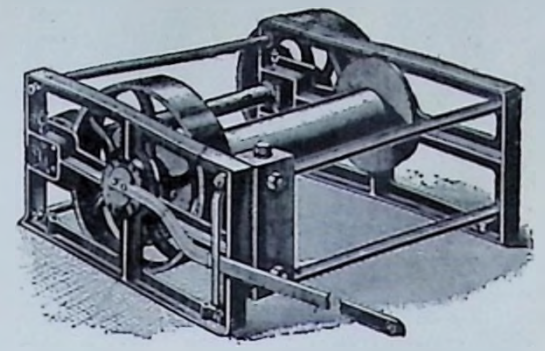
There are occasions in many warehouses where breakdowns in the motive power are of frequent occurrence. To meet such difficulties we have arranged the above combination to raise loads by hand. Gearing is introduced, and a V hand rope-wheel. These parts are quite independent of Hoist when working by belt power. All that is necessary for bringing the hand-power into action is effected by the moving of a sliding clutch by a lever, this can be done in a moment. Warehouse owners will appreciate the value of having a hoist so readily convertible, and we strongly recommend one at least being included in a group of Friction Hoists, and thereby preventing loss or inconvenience should a sudden breakdown occur.

PRICES.

To Lift.	2 cwt.	3 cwt.	4 cwt.	6 cwt.	8 cwt.	10 cwt
Price Complete.	£ s. d. 12 0 0	£ s. d. 13 10 0	£ s. d. 15 0 0	£ s. d. 17 10 0	£ s. d. 20 0 0	£ s. d.

FRICTION POWER HOIST.

Simple in construction, safe and positive in action, self-contained; applies its own brake and sustaining power.



From Photo of 6 cwt. size.

This Hoist is suitable for all kinds of Factories, Mills, Stores, Warehouses, Wharves, Breweries, &c., &c., and especially for buildings of several floors, as it is actuated entirely by a single rope, which can be passed through different floors, and both loading and unloading carried out on any level by one attendant.

The Hoist may be placed in any position, and where power can only be obtained in basement, it can be fixed and worked there as easily as elsewhere, and loads lifted to top of building.

The driving pulley or pinion is of fibre, giving best possible grip, making wear much more even, durable, and silent in use; the brake is of hard wood, and easily adjusted for wear.

The driving shaft is always running, and has broad bearings on each side of main frame, and may be driven from shafting, gas, steam, or air engine, electric or water motor.

The speed of lifting can be varied from 80 to 200 feet per minute.

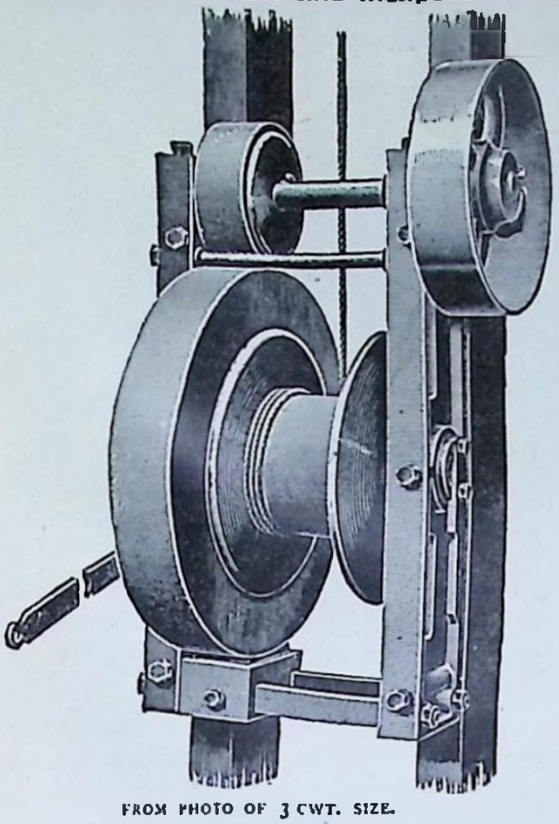
To Lift.	Sizes		Driving Pulleys			Approximate Weight.	Price			
	Frame.	Barrel.	Diameter	Width.	Speed to lift 100 ft. per minute		Hoist Only.	Chain or Steel Rope	Hook and Ball.	Cathead, Pulley, Rope, &c.
Cwts.	In. In.	In. In.	In.	In.	Revs.	Cwts.	£	Per ft.		
4	31 × 36	24 × 8	18	3½	150	5	10	7d.	7/6	15/-
6	33 × 35	24 × 8	18	3¼	160	7	12	7d.	7/6	20/-
8	38 × 38	24 × 8	18	4¼	178	8	13	8d.	10/-	20/-
10	40 × 39	24 × 8	21	4½	187	12	15	8d.	10/-	20/-

Barrel can be made 6 inches shorter, if desired, in all Hoists.

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THE "UNIVERSAL" FRICTION HOIST.

Suitable for all Classes where a reliable and inexpensive Hoist is required.



FROM PHOTO OF 3 CWT. SIZE.

ADVANTAGES.

EASY TO FIX in any POSITION, VERTICALLY or HORIZONTALLY, on or under FLOOR OR BEAMS.

EASY TO WORK.

ONE LEVER controls the LIFTING, LOWERING OR SUSTAINING.

WORKS SILENTLY.

This Hoist has been devised as suitable for special positions, and by reason of its being light and compact it is easily fixed, without the expense of extra timbers, by placing it on the ordinary roof timbers, or to joists against a wall.

The position of Hoist in relation to its work is not of much concern, as the hauling rope can be led over pulley in any direction or angle, and with equal facility the driving of Hoist can be effected by belt off main shaft, or with a rope drive, as may be found most convenient.

The friction pinion is made from specially prepared fibre, thus ensuring improved grip, freedom from heating, silent working, whilst for wear we have proved it to be superior to any other material.

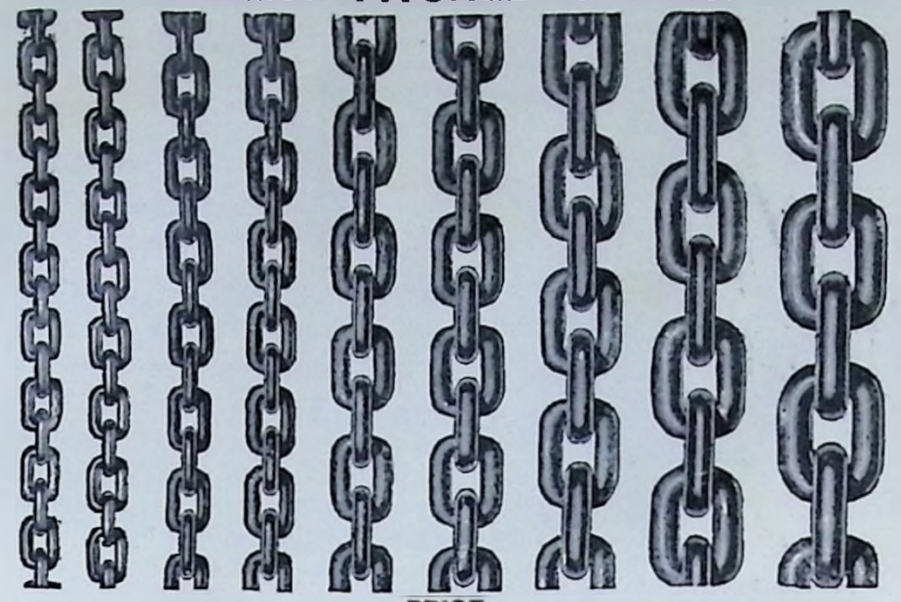
The shafts are strong and run in gun-metal bearings; the barrel is made of a suitable length for the height of lift.

The controlling lever is of extra length, to ensure easy and not too sudden control, and is heavy enough to sustain the load on the brake.

To lift	Sizes.		Driving Pulleys.			PRICE.			
	Frame.	Barrel.	Diam.	Width.	Speed to lift 100 ft per min.	Hoist only.	Chain or Steel Rope.	Hook and Ball.	Cathead Pulley on frame and Bolts.
Cwts.	In.	In.	In.	In.	Rev.	£	Per ft.		
2	32 × 23	12 × 8	14	3½	125	8 0 0	6d.	5/-	12/6
3	32 × 23	12 × 8	16	3½	137	9 0 0	6d.	5/-	12/6
4	34 × 24	12 × 8	18	3½	150	10 0 0	7d.	7/6	15/-

Barrel can be made 6 ins. longer or shorter if desired, in all Hoists.

BRIGHT PITCHED CHAINS.



PRICE.

Per Font.	No. 4 6 m/m	6½ m/m	7 m/m	8 m/m	10 m/m	11 m/m	12½ m/m	14 m/m	16 m/m	17½ m/m	¾-inch. 19 m/m
	-/5	-/6	-/7	-/8	-/9	-/10	-/11	1/-	1/3	1/6	1/9

TINNING EXTRA.

Pitched Chains can be supplied to suit any kind of Pulley Blocks or Pitched Chain Wheels; and prices quoted on receipt of drawing or sample Chain or Gear Wheel. Pulleys for Pitched Chains can also be supplied.

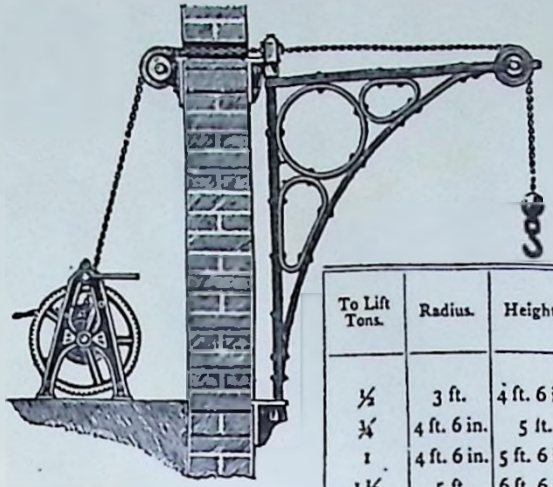
SHORT LINK CHAINS.

Diameter Iron	Inches	3/16	¼	5/16	⅜	7/16	½	9/16	⅝	11/16	¾	13/16	⅞	15/16	1
Average Weight	Per Yard ..lbs.	1½	2½	3½	4½	6½	8½	10½	12½	15	18	19½	21	26½	30½
RIGGING	Dollied Welds	59/6	43/-	29/9	24/6	20/9	20/3	19/3	18/9	18/3	17/9	17/6	17/3	17/-	16/9
	Hammer'd Welds	29/9	25/6	23/9	22/9										
BEST CRANE	Dollied Welds	64/-	46/6	31/-	27/-	24/-	22/6	21/9	21/3	20/6	20/-	19/9	19/6	19/-	18/9
	Hammer'd Welds	35/-	29/-	27/-											
BEST BEST CRANE	Dollied Welds	76/3	53/6	38/-	31/6	28/-	26/3	25/-	24/	23/3	22/6	22/3	22/-	21/6	21/3
	Hammer'd Welds	49/-	38/6	31/-											
TREBLE BEST CRANE	Dollied Welds	81/6	59/6	40/3	34/-	30/9	29/-	27/9	26/9	25/9	25/-	24/9	24/6	24/-	23/9
	Hammer'd Welds	55/-	42/-	33/9											
Galvanising, extra ...		11/-	11/-	9/-	7/-	6/6	6/6	6/6	6/3	6/3	6/3	6/3	6/3	6/3	6/-
NAVY TEST B B B	Tons ...	¼	¼	½	¾	1¼	1½	2¼	3	3¼	4¼	5⅜	6¼	7⅝	9⅜	10½	12

NOTE.—In actual work the load should not exceed half the proof. All Chains above ⅜-in. have Dollied Welds. Chains tested on private machine 0d. per cwt. extra. Chains tested at Lloyds' Public Machine extra according to size. Chain Cables, Plain or Twisted Coil Chains, Rigging Chains, &c., quoted on application.

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WROUGHT-IRON WAREHOUSE CRANES.



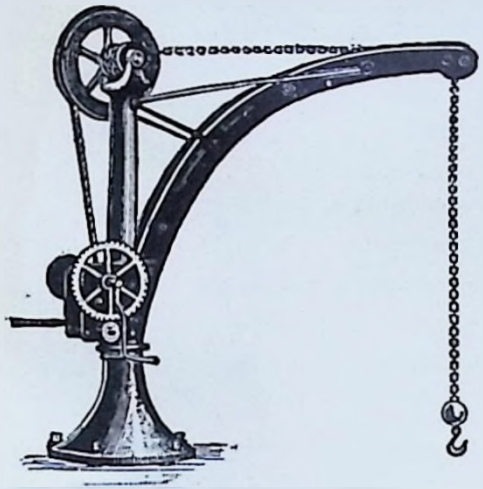
These Cranes consist of strong wrought-iron jib, cast-iron wall brackets, with bolts, nuts, and washers; also, chain pulleys, and rollers.

State thickness of walls when ordering.

To Lift Tons.	Radius.	Height.	Price.	Suitable Hoisting Crab, with Brake.	Chain, including Hook and Ball, per foot.
			£ s. d.	£ s. d.	£ s. d.
½	3 ft.	4 ft. 6 in.	5 5 0	3 4 0	0 0 7
¾	4 ft. 6 in.	5 ft.	6 15 0	3 14 0	0 0 7
1	4 ft. 6 in.	5 ft. 6 in.	7 15 0	4 12 0	0 0 8
1½	5 ft.	6 ft. 6 in.	10 10 0	6 7 0	0 0 10
2	5 ft. 6 in.	6 ft. 6 in.	12 0 0	7 10 0	0 1 0

Height and radius can be varied as necessary. Prices of other sizes quoted on application.

IMPROVED INDEPENDENT WHIP CRANE.



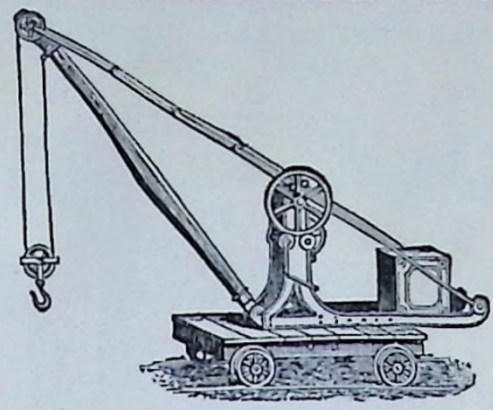
Specially adapted for all positions where support cannot be had from roof. This Crane has three speeds, and swings completely round. Light weights can be lifted quickly by pulling directly at the rope; for medium weights the handle can be fitted to the rope-barrel shaft; whilst for heavy loads the handle should be fitted to pinion shaft.

Complete, with single-purchase gear, lever brake, whip wheel, rope, sufficient tested chain to reach ground level, foundation bolts, nuts, and washers.

Power of Crane ... ... Tons	½	1	1½	2	3
Radius ... ... Feet	10	13	14	14	14
Price					

The above dimensions can be varied to suit special requirements.

HAND TRAVELLING CRANES.

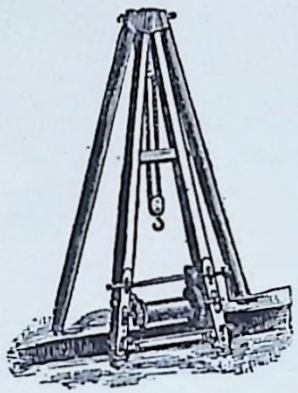


These Cranes are designed as a cheap yet substantial machine for lifting light weights. They are mounted on strong wood-framed carriage, and are provided with powerful lever brake, balance weight box, wrought-iron axles, cast-iron wheels for road or rail as required, chain, &c., all complete and ready for work. The one-ton size has single-purchase motion; the two and three-ton sizes have both single and double purchase. If desired, the front wheels can be fitted on a swivelling bogie for turning corners, and also fitted with horse shafts.

To lift	Radius.	Price.	Adjustable Balance Box.	Holding-down Clips.	Approx. Weight.
Tons.	Feet.	£ s. d.	£ s. d.	£ s. d.	cwt.
1	9		1 15 0	1 15 0	30
2	9		1 15 0	2 5 0	43
3	10		Included	Included	52

HAND WHARF CRANES quoted for on application.

IMPROVED SHEER LEGS.



Will lift	Price.	"B.B." Tested Chain.	
		Size.	Price per foot.
Tons.	£ s. d.	In.	
1	10 0 0	¼	-/6
2	12 0 0	¼	-/6
3	15 0 0	5/16	-/6½
4	20 0 0	3/8	-/7
5		7/16	-/8
7		½	-/10

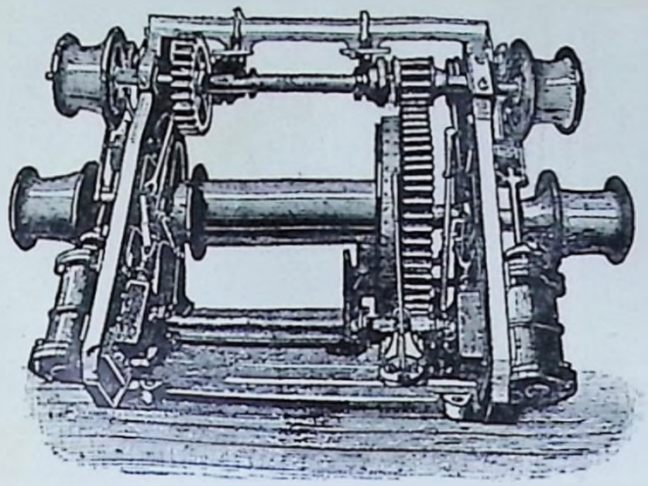
Price includes the Ironwork, with Barrel and Gearing, also one pair of two and three-sheave Pulley Blocks.

When ordering, state maximum load to be lifted, and depth below ground level for which chain is required.

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STEAM WINCHES.

DIAGONAL OR HORIZONTAL. DOUBLE CYLINDER. SINGLE BARREL.



Fitted with link-reversing motion, warping barrels, grain drums for quick whipping, single and double purchase gear, and handle shaft. Wheels are protected with iron covering.

DIMENSIONS.

Will lift direct, Tons.	Cylinders.		Approximate Weight.		Price.
	Diameter in Inches.	Stroke in Inches.	Horizontal.	Diagonal.	
			Cwts.	Cwts.	£
1	4	8	19¾	18½	
1½	4½	8	22	20	
2	5	10	26	23	
3	6	10	37½	34	
4	7	10	43	40	
5	7	12	55	48	
6	8	12	60	52	

Horizontal and Diagonal Types are same prices.

DOUBLE-BARRELLED STEAM WINCH.

This pattern is very convenient for working two hatches on board ship. The barrels are on separate shafts, and can be worked singly or together. Complete with link motion, brake on each barrel, warping ends and drums.

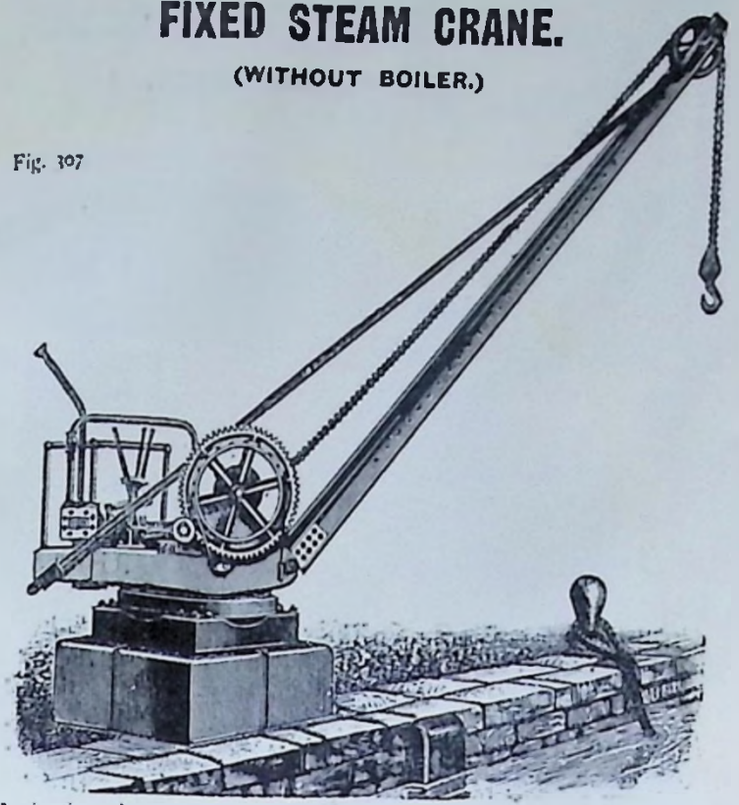
Will lift direct, Tons.	Cylinders.		Price.
	Diameter in Inches.	Stroke in Inches.	
			£
1	4	8	
2	5	9	
3	6	10	
3½	7	10	
4	7	12	
5	8	12	

Horizontal and Diagonal Types are same prices.

FIXED STEAM CRANE.

(WITHOUT BOILER.)

Fig. 307



In situations where steam power already exists, or where there are other reasons such as the risk of fire, &c., for not having a steam boiler at work upon a wharf or quay, these Cranes can be built as shown in the woodcut, **Fig. 307**, so that they take the steam through the centre bolt, a special connection being made to an underground steam-pipe.

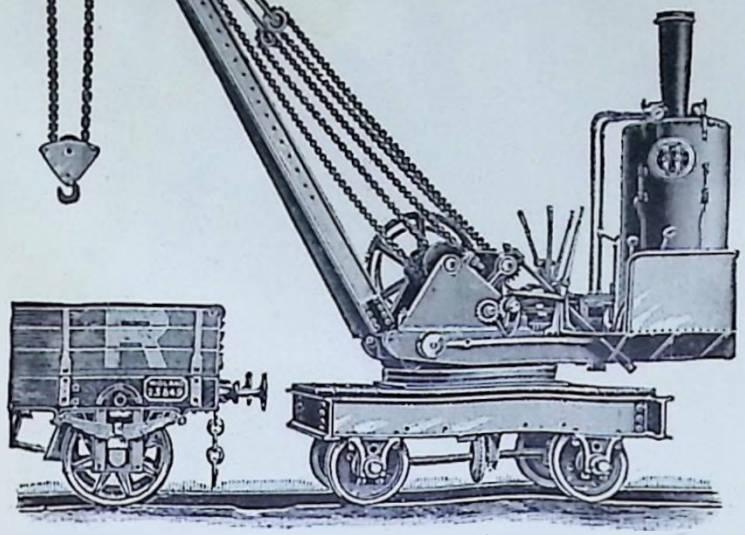
Power of Crane ... ... Tons	2	3	5	7	10
Radius... ... ... Feet	15	16	16	16	16
Cylinders, Diameter and Stroke .. Inches	5½ × 9	6½ × 10	7 × 10	8 × 10	9 × 12
Fixed Crane, Fig. 306, including Steam Boiler ... ... £					
Steam Derrick Motion ... extra ,,					
Approximate Net Weight ... ... Tons	7	9	10	15	20
,, Gross Shipping Weight and Measurement ,,	9	11	12	17	23
,, Weight of heaviest piece ... ... ,,	1¾	2¼	2½	3¼	3¼
Fixed Crane, Fig. 307, without Boiler £					
Steam Derrick Motion ... extra ,,					
Approximate Net Weight ... ... Tons	6	7½	9	14	18
,, Gross Shipping Weight and Measurement ... ,,	7	9	10	16	19
,, Weight of heaviest piece ... ... ,,	1¾	2¼	2½	3¼	3¼

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LOCOMOTIVE STEAM CRANE.

(WROUGHT-IRON CARRIAGE.)

Fig. 303 (5-ton size).

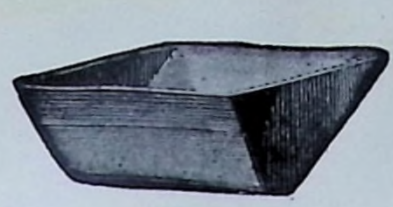


The driver's position on the Crane is such that he has a clear view of the work, the engines and the gearing of the Crane; the levers by which the various motions are thrown in and out of gear are all brought together. This is a special feature with this type of Crane; and everything requiring driver's attention is quite close at hand.

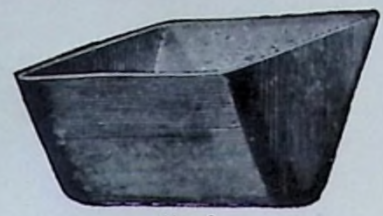
Power of Crane ... ... Tons	2	3	5	7	10
Radius ... ... Feet	16	16	16	16	16
Cylinders, Diameter and Stroke ... Inches	5½ × 9	6½ × 10	7 × 10	8 × 10	9 × 12
Portable Crane, with iron jib, to lift and turn by steam ... ... £					
Steam Travelling Motion ... extra ,,					
Steam Derrick Motion ... ,, ,,					
Felting, Lagging and Casing Boiler ,, ,,					
Galvanised Iron House or Canopy ,, ,,					
Steel Tyred Wheels ... ... ,, ,,					
Special Shunting Carriage, with Spring Buffers and Draw Hooks (including enlarged Boiler) ... ... extra ,,					
Rail Clips ... ... ,, ,,					
Injector and Fittings (if second feed required) ... ... extra ,,					
Approximate Net Weight ... ... Tons	9	12	18	23	30
,, Gross Shipping Weight and Measurement ... ,,	12	14	20	24	32
,, Weight of heaviest piece ,,	2¼	2¾	3½	4	4¼

PATENT STAMPED STEEL

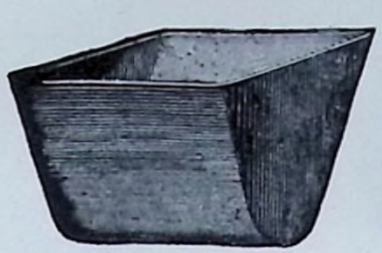
ELEVATOR BUCKETS.



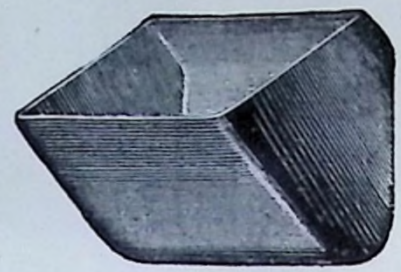
No. 1.



No. 2.



No. 3.



No. 4.

These Buckets are in steel, blocked in one piece, and without rivets or overlapping edges.

All the angles are rounded, and the inside tapers slightly from the mouth.

May be galvanized, tinned, or japanned, when so ordered.

Can be fixed to belting or elevator chain.

No. 1 pattern is suitable for flour, grain, clay, phosphates, &c.

No 2 pattern is suitable for grain, rice, malt, and general light substances.

Nos. 3 and 4 patterns are suitable for coal, slag, grain, water, and general materials.

These Buckets are made in lengths varying from 3 in. to 24 in., and in breadths varying from 3½ in. to 9 in.

Prices quoted specially on application.

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EXCAVATORS AND BUCKETS.



Fig. 4.



Fig. 1.

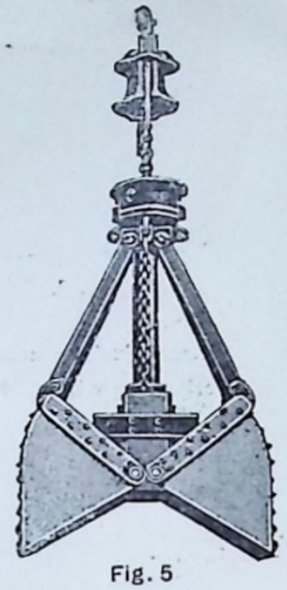


Fig. 5

A sketch of the Jib Head of the Crane with which the Digger is to be used should be sent with order.

EXCAVATORS AND BUCKET.

The speciality of goods shown on opposite page is that:—**They are worked with a single chain.** Can be used with an ordinary Jib Crane. They are complete with automatic gear for opening and closing.

The following is a brief description of each pattern.

CIRCULAR DIGGER, Fig. 1.

These Diggers are mostly used for cylinder and well sinking, having been originally designed for use in the caissons of the Benares Bridge in India; they have since been sold in large numbers in India, Spain, America, and elsewhere, and having been altered and simplified from time to time as experience suggested, are now manufactured as illustrated. They can be used for dredging purposes in sand or gravel, but are not recommended for very soft mud.

Diameter	Ft. in. 3 0	Ft. In. 3 6	Ft. In. 4 0	Ft. In. 4 6	Ft. In. 5 0
Capacity ... ... cubic feet	6	9½	14	20	27
Approximate Weight ... cwts.	10	12	17	19	22
PRICE	£	£	£	£	£

GRAB BUCKETS, Fig. 4.

This Grab is suitable for all classes of dredging and excavating in sand, gravel, or ordinary soil, as also for dredging canals, for which purpose it has recently been supplied to the Madras Government. A novel arrangement has been added to the design of grab by means of which, when dealing with soft material, the multiple purchase closing barrel may be disconnected and the closing chains reeved with a simple return purchase. When excessively hard stuff has to be excavated the dead weight of the machine may be increased by bolting cast-iron weights inside framing.

Size ... ... cubic yard	½	½	¾	1	1½
Approximate Weight .. cwts.	16	22	29	34	42
PRICE	£	£	£	£	£

MUD OR GRAIN BUCKET, Fig. 5.

This is a light Grab Bucket specially designed for dredging in mud or silt, and has been found to work most satisfactorily in the alluvial deposits found in the canals and rivers in India and elsewhere; it is also suitable for raising grain, ashes, and other light material. A ½ yard Bucket lately supplied is raising 350 tons of silt in 9 hours.

Size ... ... cubic yard	½	½	¾	1	1½
Approximate Weight ... cwts.	10	12	16	20	30
PRICE	£	£	£	£	£

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SCREW LIFTING JACKS.

BOTTLE JACK.—I.

Wrought Iron Screw. Malleable Cast Iron or Wrought Iron Bottles.



I.

No.	Tested to Tons.	Diam. Screw, Ins.	Height when down Ins.	Price, with M.C.I. Bottle. £ s. d.	Price, with W.I. Bottle and Brass Nut. £ s. d.
135	2	1½	10	0 8 0	0 12 0
136	3	1⅝	12	0 9 6	0 14 0
137	4	1¾	15	0 13 0	0 19 0
138	5	2	18	0 15 0	1 3 0
139	6	2⅛	20	0 19 0	1 7 0
140	8	2¼	22	1 2 0	1 12 0
141	10	2⅜	27	1 17 0	2 7 0
142	12	2½	30	3 0 0	3 10 0
143	14	2⅝	33	4 0 0	4 10 0
144	16	2¾	36	5 0 0	5 15 0
145	18	3	42		6 15 0
146	20	3	28		5 0 0
147	20	3¼	48		8 0 0
148	30	3⅜	26		7 0 0

TRIPOD JACK (Cotton Screws).—H.

Wrought Iron Lifting Screw and Legs. Brass Nut.

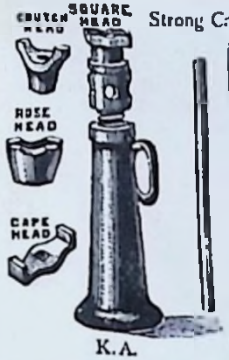
No.	Tested to Tons.	Diam. Screw. Ins.	Height when down. Ins.	Price. £ s. d.	Price, with Ratchet. £ s. d.
121	2	1½	10	0 12 0	0 16 0
122	3	1⅝	12	0 14 6	0 18 6
123	4	1¾	15	0 19 0	1 3 0
124	5	2	18	1 4 0	1 8 6
125	6	2⅛	20	1 8 0	1 13 0
126	8	2¼	22	1 12 0	1 18 0
127	10	2⅜	27	2 4 0	2 10 0
128	12	2½	30	3 10 0	3 18 0
129	14	2⅝	33	4 10 0	4 18 0
130	16	2¾	36	5 0 0	5 10 0
131	18	3	42	5 15 0	6 5 0
132	20	3¼	48	7 0 0	7 15 0



H.

CAPE WAGGON JACKS.—K.A.

Strong Cast Iron Body, with Wrought Iron Screw and C.I. Square Head.



K.A.

No.	Tested to Tons.	Diam. Screw. Ins.	Height when down. Ins.	Run out. Ins.	Price, with Square Head.	Crutch, Rose, or Cape Head Extra.	Plain Lever Extra.
180	1	1 3/16	10	3	5/6	-/9	-/9
181	1½	1½	12	4	6/-	-/9	-/9
182	2	1⅝	15	7	7/-	1/-	-/9
183	3	1⅞	16	7¼	8/3	1/-	-/9
184	4	1⅞	18	9½	9/3	1/3	1/-
185	5	1¾	21	11¾	10/6	1/3	1/-
186	6	1⅞	24	14½	13/9	1/6	1/-
187	8	2⅛	24	14	16/3	1/6	1/3
188	10	2⅜	24	13½	19/3	1/9	1/6

SPECIAL "SHORT LIFT" SCREW JACKS.



Fig. A. Nos. 160-164.



Fig. E. With Ratchet. Nos. 400-428.



Fig. B. Nos. 165-166.

No.	Size. Tons.	Diameter Screw. In.	Height when down. In.	Run Out. In.	Price.	Extra for Brass Nut.	Extra for Ratchet.
160	3	1½	7	2¼	15/-		4/-
161	8	2	9	3½	35/-		4/6
162	15	2⅜	12	5	60/-		6/-
163	20	2¾	15	7	90/-		10/-
164	24	3	18	9	120/-		10/-
165	1½	1¼	6	2	11/-		
166	3	1½	7	2½	13/-		4/-
400	5	1¾	7	2¼	20/-	1/9	
401	8	2	9	3	25/-		
402	8	2	12	4	28/-		
403	6	2	15	7	31/-	2/-	4/6
404	6	2	18	9½	35/-		
405	11	2⅛	9	2½	27/-		
406	11	2⅛	12	4	31/-		
407	9	2⅛	15	7	35/-	2/6	5/-
408	9	2⅛	18	9½	39/-		
409	12	2¼	9	2½	31/-		
410	12	2¼	12	3½	35/-		
411	10	2¼	15	6	39/-	3/-	6/-
412	10	2¼	18	9	43/-		
413	15	2⅜	9	2	36/-		
414	15	2⅜	12	3½	40/-		
415	13	2⅜	15	6	44/-	3/9	6/-
416	13	2⅜	18	9	48/-		
417	16	2½	9	2	40/-		
418	16	2½	12	3	44/-		
419	14	2½	15	5½	49/-	4/6	8/-
420	14	2½	18	8½	53/-		
421	20	2⅜	9	2	45/-		
422	20	2⅜	12	2½	49/-		
423	18	2⅜	15	5	54/-	5/6	8/-
424	18	2⅜	18	8	59/-		
425	22	2¾	9	2	51/-		
426	22	2¾	12	2½	55/-		
427	20	2¾	15	5	60/-	7/-	10/-
428	20	2¾	18	7½	65/-		

DESCRIPTION OF JACKS ILLUSTRATED ABOVE.

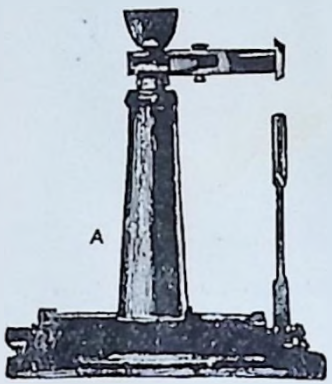
Fig. A.—This Jack has a solid brass body, with wrought-iron screw and head.
Fig. B.—Has brass body, flat at bottom, with wrought iron screw and head.
Fig. E.—Has strong wrought or malleable cast-iron body, with wrought-iron screw and head. Is supplied with or without ratchet, as required.

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SCREW LIFTING JACKS.

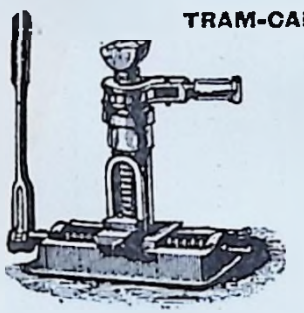
RATCHET-HEAD BOTTLE TRAVERSING JACK—A.

Brass Traverse Nut.



No.	Tested to Tons	Diam. Lifting Screw. Ins.	Height when down. Ins.	Will Traverse. Ins.	Price. £ s. d.	Plain Wrought-Iron Lever extra.
11	2	1½	15	6	2 7 0	1/-
12	3	1¾	16	6	2 10 0	1/-
13	4	1⅞	18	6	2 13 0	1/-
14	5	2	20	7	2 17 0	1/3
15	6	2⅛	20	7	2 19 0	1/3
16	8	2¼	20	7	3 2 0	1/6
17	10	2⅜	21	10	3 12 0	1/9
18	12	2 7/16	21	12	3 18 0	1/9
19	15	2½	22	12	4 8 0	2/-
20	16	2⅝	22	12	5 0 0	2/-
21	18	2¾	22	12	6 0 0	2/6
22	20	3	27	18	6 19 0	2/6

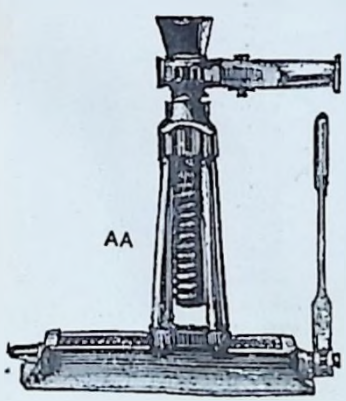
TRAM-CAR TRAVERSING JACK.



No	Tested to Tons.	Diam. Lifting Screw. Ins.	Height when down. Ins.	Will Traverse. Ins.	Price. £ s. d.
345	6	2	15½	7	3 12 0
346	12	2¼	18	12	4 10 0
347	15	2½	22	12	5 8 0

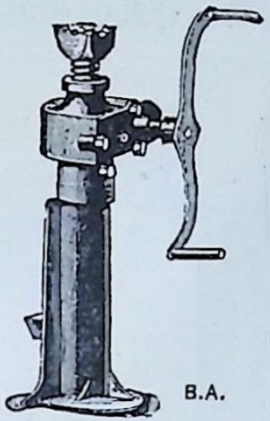
LEG TRAVERSING JAOK—AA.

Brass Top and Bottom Nuts.



No.	Tested to Tons	Diam. Lifting Screw. Ins.	Height when down. Ins.	Will Traverse. Ins.	Price. £ s. d.	Plain Wrought-Iron Lever extra.
26	2	1½	15	6	2 11 0	1/-
27	3	1¾	16	6	2 14 0	1/-
28	4	1⅞	18	6	2 18 0	1/-
29	5	2	20	7	3 1 0	1/3
30	6	2⅛	20	7	3 3 0	1/3
31	8	2¼	20	7	3 5 0	1/6
32	10	2⅜	21	10	4 0 0	1/9
33	12	2 7/16	21	12	4 5 0	1/9
34	15	2½	22	12	4 15 0	2/-
35	16	2⅝	22	12	5 15 0	2/-
36	18	2¾	22	12	6 5 0	2/6
37	20	3	27	18	8 4 0	2/6

SCREW LIFTING JACKS.



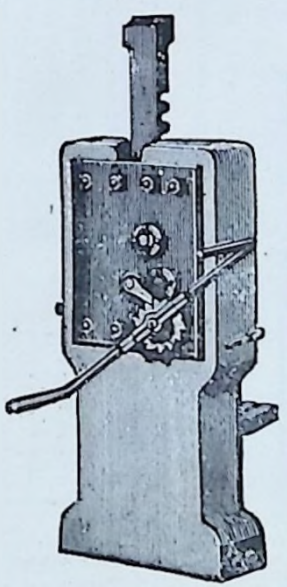
IRON HALEY JACK—B.A

No.	Tested to Tons.	Diam. Screw.	Height when down	Price. £ s. d.
		In.	In.	
65	2	1¼	25	2 15 0
66	4	2	26	3 6 0
67	6	2¼	28	3 17 0
68	8	2½	30	4 13 0
69	10	2⅝	31	5 5 0
70	12	3	33	6 15 0
71	16	3½	35	9 15 0
72	20	3⅝	38	12 5 0



WOOD HALEY JACK—B.

No.	Tested to Tons.	Diam. Screw.	Height when down	Price. £ s. d.
		In.	In.	
55	2	1¼	28	2 6 0
56	4	2	30	2 17 0
57	6	2¼	31	3 5 0
58	8	2½	33	4 0 0
59	10	2⅝	33	4 8 0
60	12	3	35	5 12 0
61	16	3½	38	8 12 0
62	20	3⅝	41	11 0 0



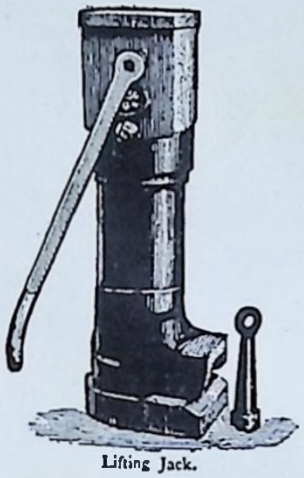
D and E—WOOD BODY RACK AND PINION JACKS.

D.—SINGLE PURCHASE.			
No.	Tested to Tons.	Height when down.	Price. £ s. d.
		In.	
86	2	27	3 0 0
87	3	30	3 10 0
88	4	30	4 5 0
89	5	32	5 0 0
E.—DOUBLE PURCHASE.			
92	4	30	6 0 0
93	6	30	7 5 0
94	8	32	8 5 0
95	10	34	9 10 0
96	15	36	14 0 0
TREBLE PURCHASE.			
97	20	38	20 0 0
98	25	40	25 0 0

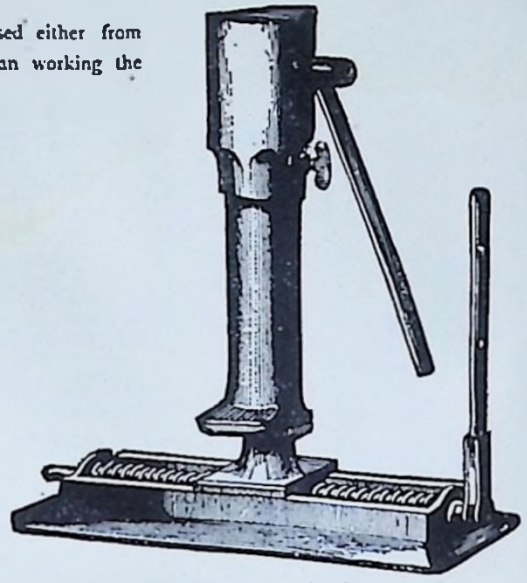
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HYDRAULIC LIFTING JACKS.

The weight given can be raised either from the head or foot, with one man working the lever.



Lifting Jack.

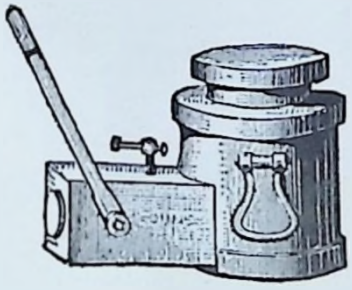


Lifting and Traversing Jack.

No.	Tested to Tons.	Height when down.	Run out.	Weight.	Price. Lifting. £ s. d.	Price. Lifting and Traversing. £ s. d.
		In.	In.	lbs.		
2000	3	19	6	34	3 0 0	5 5 0
2001	4	23	10	51	3 15 0	5 15 0
2002	6	24	10	63	4 0 0	6 5 0
2003	8	26	11	72	4 10 0	7 0 0
2004	10	27	12	88	5 0 0	7 10 0
2005	12	27	12	96	5 10 0	8 0 0
2006	15	28	12	103	6 0 0	9 0 0
2007	20	28	12	129	6 10 0	10 0 0
2008	30	29	12	163	7 10 0	13 10 0
2009	40	29	12	224	9 0 0	15 10 0
2010	50	29	12	262	10 10 0	20 0 0
2011	60	29	12	335	12 10 0	22 10 0

HYDRAULIC SHIP JACKS.

CAST-STEEL CYLINDERS.

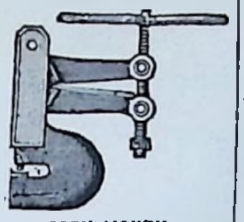


Hydraulic Ship Jack.

No.	Tested to Tons.	Height when down.	Run out.	Price. £ s. d.
		In.	In.	
2013	7	11	6	5 0 0
2014	12	11	6	6 0 0
2015	20	11	6	6 10 0
2016	35	11	6	8 10 0
2017	50	12	6	11 0 0
2018	70	12	6	15 0 0
2019	100	13	6	18 10 0
2020	150	13	6	21 10 0
2021	200	13	6	25 0 0

Safety Valve attached, 35/- each extra.
Hydraulic Gauge attached, 84/- each extra.
The Ship Jack can be supplied detached from cistern with hydraulic connections, at an extra cost.

"DUPLEX" LEVER PUNCHING BEAR.



OPEN MOUTH, WITHOUT SHOE.

No.	To punch Hole. (Inches.)	Through Iron Plate. (Inches.)	Depth Gap from Centre of Punch. (Inches.)	Approx. Weight lbs.	Price, including one Round Punch and Die.	Cast-iron Shoes extra.
451	½	¼	1⅛	22	£3 0 0	6/-
452	¾	⅜	1⅜	45	4 0 0	8/-
453	13/16	⅜	2	94	6 0 0	10/-
454	⅞	⅜	2⅛	137	9 0 0	12/-
455	1	⅜	2½	200	16 0 0	18/-
456	1¼	⅜	2¾	300	18 0 0	21/-
460*	1¼ through ¾ Iron Rail			380	18 10 0	—
461*	1¼ „ ½ Steel „			380	18 10 0	—

* Nos. 460 and 461 are Close-mouth Bears.

BOILER SCREW PUNCHING BEAR.



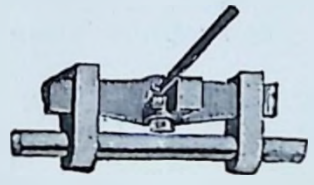
No.	To punch Hole. (Inches.)	Through Iron Plate. (Inches.)	Depth Gap from Centre of Punch. (Inches.)	Approx. Weight. lbs.	Price, including one Round Punch and Die.	Plain Wrought-iron Lever. (Extras.)	Ratchet Lever. (Extras.)
471	½	¼	1⅛	21	£2 0 0	2/-	12/-
472	¾	⅜	2	45	2 10 0	3/-	12/-
473	13/16	⅜	2⅛	59	3 15 0	5/-	12/-
474	⅞	⅜	2½	81	4 10 0	8/-	12/-
475	1	⅜	2¾	88	5 0 0	10/-	16/-
476	1	⅜	3	150	7 10 0	12/-	25/-

BOILER CRAMP, WITH STEEL SCREW.



To take	2	3	4	5	6	Inches.
PRICE...	7/-	8/-	9/6	11/-	12/-	Each.

HYDRAULIC SHAFT STRAIGHTENER.



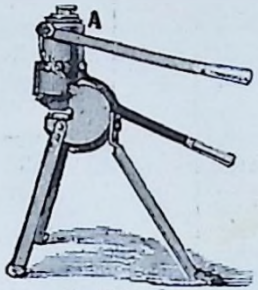
No.	Size of Ram. (Inches diameter.)	Will take Shafts up to (Inches diameter.)	Approx. Weight. cwts.	Price, including Straps.
2125	2½	3	2	£13 0 0
2126	5	4	3½	20 0 0
2127	6½	6	5¼	

This Machine is usually placed on the saddle of lathe, and the shafts pass through the straps in the manner illustrated. The shaft is then centred, and the ram brought to bear on any part requiring straightening.

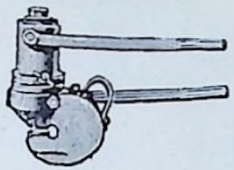
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PORTABLE HYDRAULIC PUNCHING BEAR.



No. 2101/6.



No. 2102.

No. 2102 supplied either mounted on legs or fitted with handle at back, as shown, according to requirements.

ORDINARY OPEN-MOUTH BEAR.

No.	To punch hole	Through Iron Plate	Depth of Gap from centre of Punch.	Approx. Weight.	Price.	Spare Punch and Die, per pair. Round.	Spare Punch and Die, per pair. Oval or Square.
	In.	In.	In.	lbs.	£ s. d.	£ s. d.	£ s. d.
2101	¾	½	1¾	80	7 10 0	0 5 6	0 11 0
2102	13/16	⅝	1¾	108	9 0 0	0 6 0	0 12 0
2103	1	¾	2	125	10 10 0	0 7 0	0 14 0
2104	1⅛	⅞	2	180	17 10 0	0 7 6	0 15 0
2105	1¼	1	2¼	200	21 0 0	0 7 6	0 15 0
2106	1½	1⅛	2¼	410			

RAILWAY CLOSE-MOUTH BEAR.

2110	¾	½		95	12 0 0	0 5 6	0 11 0
2111	1	¾		175	17 0 0	0 7 0	0 14 0
2112	1¼	1		285			0 15 0
2113	1½	1		455			

Prices include one round Punch and Die.

Nos. 2105/6 Bears require Punch and Die Holders when used for holes under ¾ in. diam. Prices, 4/- and 5/- per pair respectively.

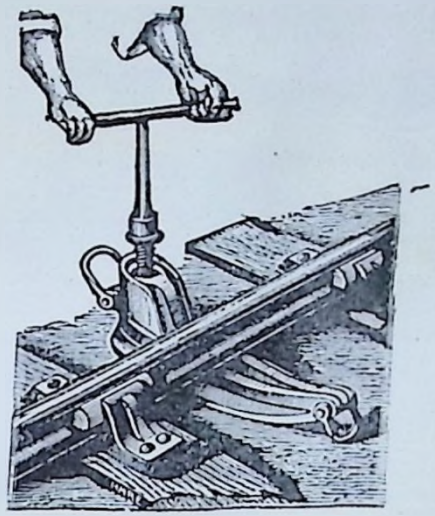
Depth of gap can be increased at a proportionate price.

When angle iron is required to be punched, a sample or section should be sent.

The Railway Close-mouth Bear is suitable for iron or steel rails, girders, &c., and a sample or section should accompany order.

PRICES OF PUNCHES AND DIES FOR HYDRAULIC AND SCREW BEARS.

To punch hole ...	½	¾	13/16	⅞	1	1¼	1½ in.
Through Iron Plate	¼	½	⅝	⅝	¾	1	1⅛ ,,
Round	4/-	5/6	6/-	6/6	7/-	8/-	10/- per pair of one Punch
Oval or square ...	8/-	11/-	12/-	13/-	14/-	16/-	20/- and one Die.

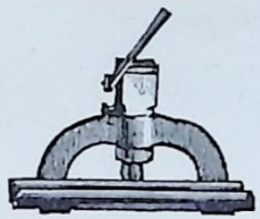


IMPROVED RAIL LIFTER.

No. 1, for Heavy Rails.

Price £3 0 0

HYDRAULIC RAIL BENDER, OR "JIM CROW."



No.	To Bend. Iron Rails. lbs. per yd.	To Bend. Steel Rails. lbs. per yd.	Span between Claws. Ins.	Approx. Weight. lbs.	Price. £ s. d.
516	50	45	20	105	6 0 0
517	90	65	24	160	8 10 0
518	—	90	24	215	10 0 0

Can be worked in any position.

SCREW RAIL BENDER, OR "JIM CROW."

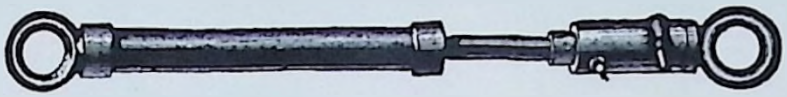


No	To Bend. Iron Rails. lbs. per yd.	To Bend. Steel Rails. lbs. per yd.	Diam. of Screw. Inches.	Span between Claws. Inches.	Approx. Weight. lbs.	Price. £ s. d.	Lever extra.
501	14	10	1½	12	24	1 7 0	1/-
502	24	16	1¾	14	38	1 10 0	1/9
503	30	20	2	16	52	1 13 0	2/6
504	50	45	2¼	20	80	2 6 0	3/6
505	90	65	2½	24	120	3 5 0	4/6
506	—	75	2⅝	24	136	4 8 0	5/-
507	—	90	2¾	24	152	4 15 0	6/-

CROW BARS. 5 ft. long, 5/3; 5 ft. 6 in. long, 6/-; 6 ft. long, 7/6.

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HYDRAULIC PULLING JACK.



This Jack will pull vertically or horizontally, and the weight specified can be moved by the power of one man.

Instructions for Use.—After filling with water (which can be poured in through the air screw) suspend it with the cistern end downwards, screw up the stop valve, and work the hand lever; the water will then be pumped from the cistern through the inner tube to the underside of the piston, thus impelling it forward, and, at the same time the water from the back of the piston is constantly flowing through the passage to supply the cistern. **To lower**, open the stop valve, when the water will return to the cistern.

PRICES.

Tons.	Run out.	Appro Weight.	Price.	Price per extra foot, run out.
2	24 in	60 lbs	£ 9 0 0	£3 0 0
4	24 ,,	70 ,,	11 10 0	3 0 0
6	24 ,,	90 ,,	14 0 0	3 10 0
8	24 ,,	120 ,,	16 0 0	4 0 0
10	24 ,,	180 ,,	18 0 0	4 0 0
20	39 ,,	370 ,,		

SCREW PULLING JACK.



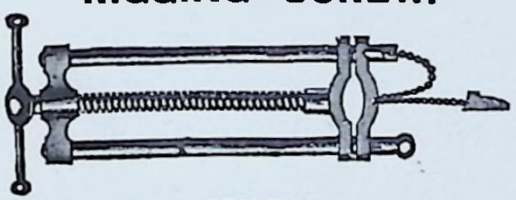
This is a very useful Pulling Jack with right and left hand square thread for rough work, and where unskilled labour is employed. It runs out 24 inches.

PRICES.

Tons ...	2	4	6	8	10
Each £	5 0 0	6 10 0	8 0 0	10 0 0	12 0 0

Other sizes quoted to specification.

RIGGING SCREW.

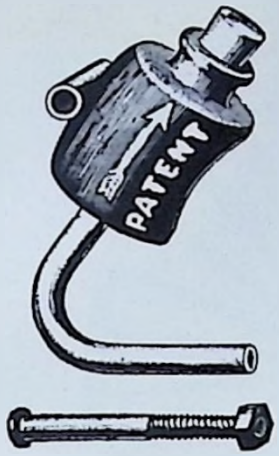


PRICES.

Diameter of Screw ... In. / Length ... ... ,,	⅜ 10	⅜ 12	⅞ 14	1 16	1⅛ 18	1¼ 20	1⅜ 22	1½ 24
Each	10/-	10/6	12/6	14/-	15/6	17/-	20/-	24/

When ordering, please state if required for Wire or Hemp Rope.

LOOSE PULLEY LUBRICATORS.





This Lubricator is specially designed for Loose Pulleys, but is also suitable for any parts revolving on a shaft or axle, wheels, or any other machine. They have been in use for some time past on large circular-saw benches, planing, and other wood-working machinery, printing, and many other machines, running at speeds varying from 40 to 4,000 revolutions per minute, and have in every case given entire satisfaction.

This Lubricator is perfect in its action, and can be relied upon to lubricate a loose pulley most effectively and economically, and all undue wear and tear of bushes and spindles is avoided; the cost of renewals is consequently diminished, and less driving power required.

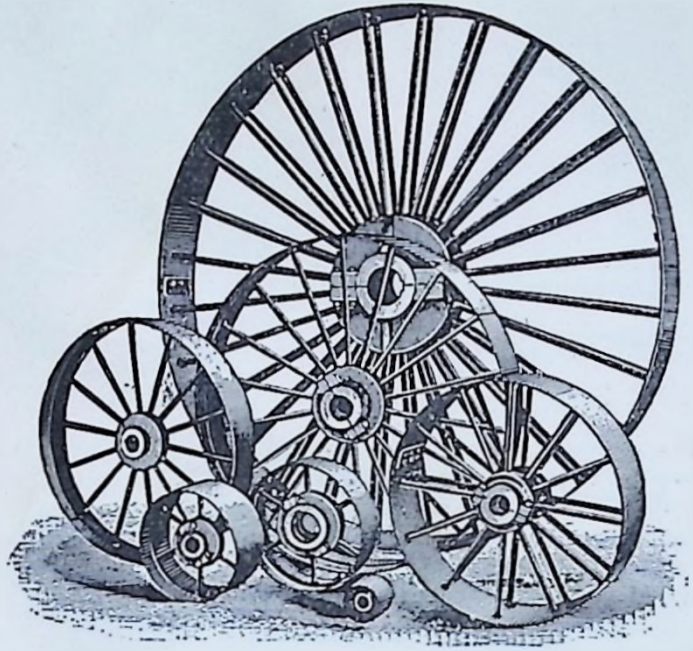
By its novel construction, the centrifugal action, which greatly affects the ordinary syphon lubricator, is entirely overcome; it will therefore lubricate a loose pulley as efficiently as an ordinary lubricator feeds a fixed bearing.

PRICES.

Number	1	2	3	4
Approximate Diameter ... ... inches	1	1¼	1½	1¾
Price ... ... each	2/6	3/-	3/6	4/6

STRONG WROUGHT IRON PULLEYS

(SOLID OR SPLIT).



In ordering these pulleys, please state if Flat or Rounded on face.

Unless otherwise ordered, the pulleys are bored to standard gauge. A small wire gauge, giving the diameter of the shaft, will ensure accuracy.

Double-Armed Pulleys, which are recommended where the breadth of Rim is 12 ins. or over, are charged at same price as two Single-Armed Pulleys of half the width. For example: a 12 in. Double-Armed Pulley is charged at same price as two Single-Armed Pulleys 6 ins. wide.

Special quotations given for sizes not on list, or for large quantities.

PRICES OF

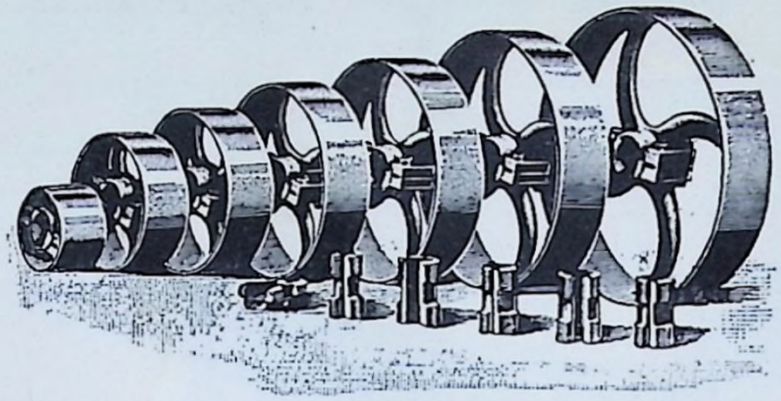
STRONG WROUGHT IRON PULLEYS.

Single Arms.

Diam. in Inches.	BREADTH ON FACE, IN INCHES.									
	3	4	5	6	7	8	9	10	11	12
10	13/-	14/6	15/6	17/-	19/-	20/6	23/-	25/6	29/-	32/-
12	14/-	15/6	16/6	18/	20/-	22/-	24/-	26/6	30/-	33/-
14	15/-	16/6	17/6	19/-	21/-	22/6	25/-	27/6	31/	34/-
16	17/-	18/-	19/-	20/6	22/6	24/-	26/6	29/-	32/6	35/6
18	18/-	20/-	22/-	24/-	25/6	27/6	29/6	30/6	34/-	36/6
20	19/6	22/	24/6	26/6	28/6	30/-	31/6	33/-	35/-	38/-
22	22/6	24/-	27/	29/6	31/6	33/-	35/-	37/-	39/-	41/-
24	25/-	27/6	29/6	32/-	34/-	36/-	38/-	40/-	42/-	44/-
26	28/-	30/-	32/6	35/-	37/-	39/-	41/6	43/6	45/6	48/-
28	31/6	34/-	35/6	37/6	40/-	42/6	44/6	47/6	49/6	51/6
30	33/-	35/6	38/-	40/-	42/6	44/6	46/6	49/-	51/6	55/-
32	35/6	37/6	40/-	42/6	45/-	47/6	50/-	52/6	55/-	57/6
34	37/6	40/-	42/6	45/-	47/6	50/-	52/6	55/	57/6	60/-
36	40/-	42/6	45/	47/6	50/-	52/6	55/-	57/6	60/-	63/-
38	45/-	48/-	51/-	52/6	55/-	57/6	60/	63/-	67/-	70/-
40	47/-	50/-	53/-	56/-	59/-	62/-	65/-	69/-	72/-	75/-
42	49/-	52/6	56/-	59/6	62/6	65/6	68/6	72/6	75/6	80/-
44	55/6	59/-	63/	66/-	69/-	72/-	75/	79/-	83/-	86/-
46	60/-	63/-	66/-	69/-	72/-	75/-	78/-	82/-	86/-	90/-
48	62/6	65/6	68/6	71/-	74/	77/-	80/-	84/-	88/-	92/-
50	67/6	70/6	73/6	76/-	79/-	82/-	85/-	89/-	93/-	97/-
52	72/6	75/6	78/6	81/-	84/-	87/-	90/-	94/-	98/-	102/-
54	77/6	80/6	83/6	86/-	89/-	92/-	95/-	99/-	103/-	107/-
56	82/6	85/6	88/6	91/-	94/-	97/-	100/-	104/-	108/-	112/-
58	87/6	90/6	93/6	96/-	99/-	102/-	105/-	109/-	113/-	117/-
60	92/6	95/6	98/6	101/-	104/-	107/-	110/-	114/-	118/-	122/-

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PATENT "CONVERTIBLE" FINISHED
CAST-IRON PULLEYS.



The object of this invention is to provide simple means for mechanically fixing Pulleys securely to shafting and spindles, without keyways, keys or set screws.

To secure a Pulley to shaft by this improved method, it is simply necessary, after placing Pulley on shaft, to open the divided and screw-threaded bush and place same in position on shaft; after the Pulley has been rotated so as to screw its conical centre hole over the conical bush, the latter will be caused to firmly grip the shaft. The Pulley is then securely fixed ready for work, and the greater the power transmitted the tighter the bush will grip the shaft.

In ordering, state if required solid or split, flat or rounded. Split Pulleys recommended. No extra charge for rounding.

NOTE.—Split Pulleys with flat face always sent unless otherwise ordered.

No. 0 SERIES.—This series cannot be supplied over 24 in. diameter, 6 in. wide on face, or 2 in. bore.

PRICES OF SPLIT PULLEYS.

Diameter in inches.	Breadth on Face, in inches.				Diameter in inches.	Breadth on Face, in inches.			
	3	4	5	6		3	4	5	6
6	9/-	9/6	10/-	10/6	16	14/-	14/6	15/6	16/6
7	9/6	10/-	10/6	11/-	17	14/6	15/6	16/6	17/6
8	10/-	10/6	11/-	12/-	18	15/6	16/6	17/6	18/6
9	10/6	11/-	11/6	12/6	19	16/6	17/6	18/6	19/6
10	11/-	11/6	12/6	13/6	20	17/6	19/-	20/-	21/-
11	11/6	12/-	13/-	14/-	21	18/6	20/-	21/-	22/-
12	12/-	12/6	13/6	14/6	22	19/6	21/-	22/	23/-
13	12/6	13/-	14/-	15/-	23	20/6	22/-	23/-	24/-
14	13/-	13/6	14/6	15/6	24	21/6	23/-	24/	25/-
15	13/6	14/-	15/-	16/-					

Whole Pulleys supplied at a deduction of 3/6 each from above list.

For prices of larger sizes see next page.

PRICES OF EXTRA BUSHES.

Series.	Suitable for Shafts.	PRICE each.
No. 0	From 1⅛ inch to 2 inches diameter	2/-
,, 1	,, 1½ ,, ,, 3 ,, ,,	3/6
,, 2	,, 2½ ,, ,, 4½ ,, ,,	5/6
,, 3	,, 4½ ,, ,, 6 ,, ,,	7/6

In ordering an extra Bush, give diameter and length of screwed hole in Pulley, so that the correct series may be supplied.

PATENT "CONVERTIBLE"
FINISHED CAST-IRON PULLEYS.

Nos. 1, 2, and 3 Series.

PRICES OF SPLIT PULLEYS.

Diam. in Inches.	Breadth on Face in Inches.														
	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24
7	12/6	13/6	14/6	15/6											
8	12/6	13/6	14/6	15/6	16/6										
9	13/6	14/6	15/6	16/6	17/6	18/6									
10	14/6	15/6	16/6	17/6	18/6	19/6	21/6								
11	14/6	15/6	16/6	17/6	18/6	19/6	21/6	23/6							
12	15/6	16/6	17/6	18/6	19/6	20/6	22/6	24/6	26/6						
13	16/6	17/6	18/6	18/6	19/6	20/6	22/6	23/6	25/6						
14	17/6	18/6	19/6	20/6	22/6	22/6	23/6	24/6	26/6	28/6					
15	18/6	19/6	20/6	22/6	23/6	24/6	24/6	26/6	28/6	30/6	33/6				
16	19/6	20/6	22/6	23/6	24/6	26/6	26/6	28/6	30/6	32/6	35/6				
17	20/6	21/6	23/6	24/6	26/6	28/6	28/6	30/6	32/6	34/6	37/6	43/6			
18	20/6	21/6	24/6	25/6	27/6	29/6	31/6	32/6	33/6	36/6	39/6	45/6			
19	21/6	22/6	24/6	26/6	28/6	30/6	32/6	33/6	35/6	38/6	40/6	46/6	53/6		
20	22/6	23/6	25/6	27/6	29/6	31/6	33/6	35/6	37/6	40/6	41/6	47/6	55/6		
21	23/6	25/6	27/6	29/6	31/6	33/6	35/6	36/6	38/6	41/6	43/6	50/6	58/6	65/6	
22	23/6	25/6	28/6	30/6	32/6	34/6	36/6	38/6	39/6	42/6	44/6	52/6	60/6	68/6	
23	25/6	27/6	29/6	31/6	33/6	35/6	37/6	39/6	41/6	44/6	46/6	54/6	62/6	70/6	79/6
24	25/6	28/6	30/6	32/6	34/6	36/6	38/6	40/6	43/6	46/6	49/6	57/6	65/6	73/6	83/6
25	26/6	29/6	31/6	33/6	35/6	37/6	39/6	41/6	43/6	48/6	51/6	59/6	67/6	77/6	87/6
26	27/6	30/6	32/6	34/6	36/6	38/6	40/6	43/6	45/6	50/6	52/6	60/6	70/6	80/6	90/6
27	28/6	31/6	33/6	35/6	37/6	39/6	41/6	44/6	47/6	52/6	54/6	62/6	73/6	83/6	93/6
28	29/6	32/6	34/6	36/6	38/6	40/6	43/6	46/6	49/6	54/6	57/6	65/6	76/6	86/6	96/6
29	30/6	32/6	35/6	38/6	40/6	42/6	45/6	48/6	51/6	57/6	59/6	67/6	78/6	88/6	98/6
30	32/6	33/6	36/6	39/6	41/6	43/6	46/6	49/6	52/6	59/6	62/6	70/6	79/6	91/6	103/6
31	33/6	35/6	38/6	41/6	43/6	45/6	48/6	51/6	54/6	62/6	64/6	74/6	84/6	96/6	106/6
32	34/6	36/6	39/6	43/6	45/6	47/6	50/6	53/6	56/6	64/6	67/6	77/6	88/6	100/6	112/6
33	35/6	37/6	40/6	44/6	46/6	48/6	51/6	54/6	57/6	67/6	68/6	78/6	91/6	101/6	115/6
34	36/6	38/6	41/6	45/6	47/6	50/6	53/6	56/6	59/6	68/6	70/6	80/6	94/6	105/6	119/6
35	37/6	39/6	42/6	46/6	48/6	52/6	55/6	58/6	61/6	70/6	71/6	82/6	97/6	110/6	123/6
36	38/6	40/6	43/6	47/6	50/6	53/6	56/6	59/6	62/6	73/6	73/6	84/6	100/6	112/6	125/6
38	41/6	44/6	47/6	48/6	51/6	54/6	57/6	60/6	63/6	78/6	76/6	88/6	103/6	115/6	129/6
39	43/6	46/6	50/6	51/6	55/6	58/6	61/6	65/6	68/6	85/6	79/6	91/6	106/6	120/6	134/6
40	45/6	48/6	52/6	54/6	58/6	62/6	66/6	71/6	76/6	89/6	85/6	96/6	109/	123/6	139/6
42	48/6	52/6	56/6	56/6	60/6	64/6	69/6	74/6	79/6	94/6	91/6	104/6	117/6	126/6	142/6
45	52/6	56/6	60/6	64/6	68/6	68/6	73/6	79/6	84/6	98/6	98/6	110/6	124/6	131/6	147/6
48	57/6	61/6	65/6	69/6	73/6	72/6	78/6	84/6	91/6	103/6	103/6	118/6	134/6	139/6	155/6
50			70/6	74/6	79/6	75/6	84/6	90/6	97/6	113/6	113/6	128/6	144/6	150/6	167/6
54			77/6	82/6	87/6	84/6	90/6	96/6	102/6	120/6	120/6	136/6	153/6	160/6	180/6
57			83/6	88/6	93/6	91/6	99/6	106/6	113/6	131/6	129/6	145/6	170/6	171/6	191/6
60			89/6	94/6	99/6	99/6	105/6	113/6	121/6	140/6	139/6	159/6	184/6	192/6	212/6
66			116/6	119/6	121/6	120/6	132/6	142/6	152/6	176/6	174/6	199/6	226/6	244/6	262/6
72			132/6	135/6	137/6	142/6	152/6	162/6	172/6	201/6	202/6	232/6	265/6	290/6	312/6

Price of Pulleys up to 36 in. diameter include one bush for bores from 1⅛ to 3 in. diameter (No. 1 Series).
,, ,, from 38 to 72 in. diam. ,, ,, ,, ,, 1⅛ to 4½ in. ,, (Nos. 1 and 2 Series).

For Bores from 3 to 4½ in diameter (No. 2 Series), add 2/- each Pulley to 36 in. diameter
,, ,, 4½ to 6 in ,, (No. 3 Series), ,, 3/6 ,, ,, 36 in. ,,
,, ,, 4½ to 6 in ,, (No. 3 Series), ,, 3/6 ,, 39 to 72 in. ,,

WHOLE PULLEYS

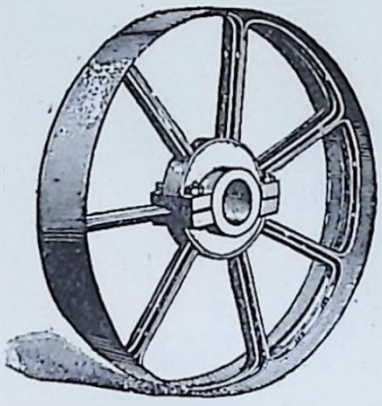
Supplied at the following deductions from above list.

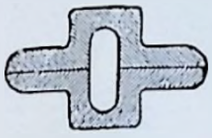
4 to 12 in. wide.				13 to 24 in. wide.			
7 to 11 in. diam.	3/6	39 to 48 in. diam.	7/6	13 to 19 in. diam.	5/6	33 to 48 in. diam.	10/6
12 ,, 19 ,, ,,	4/6	5 ,, 60 ,, ,,	9/6	20 ,, 72 ,, ,,	6/6	51 ,, 60 ,, ,,	12/6
20 ,, 29 ,, ,,	5/6	63 ,, 72 ,, ,,	12/6	23 ,, 29 ,, ,,	7/6	63 ,, 72 ,, ,,	15/6
30 ,, 36 ,, ,,	6/6			30 ,, 36 ,, ,,	8/6		

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WROUGHT IRON SPRING PULLEY.

IMPROVED PATENT.





SECTION OF ARMS.

As will be seen by the engraving and section, the Pulley is made of Rail Section Iron, which gives to the spoke the appearance of a Gear Wheel Spoke, and in reality makes it stronger than any other driving Pulley Arm on the market. It will also be seen that the spoke is carried around the periphery, giving to it a large amount of support. Another advantage is that it is not necessary to drill through the centre of the iron, which has always been a source of weakness in other Pulleys, but in place of this the rivet holes are put through the web, which allows the use of much smaller rivets without reducing the strength of the material.

This New Pulley is an improvement on the old for Heavy Driving, and it will take the place of Heavy Cast-Iron Pulleys in Mills and Factories where rigidity is of the utmost importance, and where hitherto objections have been made to using Wrought Iron Pulleys.

The claim to have invented a Hollow-Ribbed Spoke Pulley is novel, and as it is a well-known fact that a hollow pipe is more rigid than a solid bar, the immense advantage derived by its adaptation to Pulleys or Wheels of any description will be apparent to all.

Pulleys with Wide Bands.—Pulleys more than 12 inches on the face are not recommended with Single Arms, except for light machines, or where two or more belts are to be used for reversing. **Fast and Loose Pulleys,** in Pairs.—When ordering these state the length of the bosses. **Pulleys with Two or more Sets of Arms** (of not less than 12 inches diameter by 36 inches wide, or more than 60 inches diameter by 36 inches wide). Prices are calculated as follows:—If order is for a 12-in. by 24-in. (double arms), price is 66/-, same as for two 12-in. by 12-in. (single arms); or a 60-in. by 36-in. (double arms), 360/-, same as two 60-in. by 18-in. (single arms). **Special Quotations** for Heavy Pattern Pulleys, or when the bore exceeds 5 inches. **For Boring,** send small Wire Gauge of the diameter of the Shaft the Pulley is required to fit; if not sent the Pulleys are bored to Whitworth's Standard Gauges. When made a shade smaller, the Pulley will nip the Shaft sufficiently tight so that no key is necessary under ordinary circumstances.

Double Crowned Pulleys and Solid Boss Pulleys.—Prices on application.

No extra charge for rounding on face.

WROUGHT IRON SPRING PULLEY.

IMPROVED PATENT.

PRICES.

Dia.	BREADTH ON THE FACE.									
In.	3	4	5	6	7	8	9	10	11	12
8	11/-	12/-	13/-	14/-	15/-					
9	12/-	13/-	14/-	15/-	16/-	17/-				
10	13/-	14/4	15/-	17/-	19/-	20/-	23/-			
12	14/-	15/-	16/-	17/6	19/6	21/6	23/6	26/6	29/0	33/-
14	15/-	10/-	17/-	19/-	20 6	22/-	24/6	27/-	30/6	34/-
16	17/-	18/-	19/-	20/-	22/-	24/-	26/-	29/-	32/-	35/6
18	18/-	20/-	22/-	24/-	25/-	27/-	29/-	30/-	34/-	36/-
20	19/-	22/-	24/-	26/-	28/-	30/-	31/-	33/-	35/-	38/-
22	22/-	24/-	27/-	29/-	31/-	33/-	35/-	37/-	39/-	41/-
24	25/-	27/-	29/-	32/-	34/-	36/-	38/-	40/-	42/-	44/-
26	28/-	30/-	32/-	35/-	37/-	39/-	41/-	43/-	45/-	48/-
28	31/-	34/-	35/-	37/-	40/-	42/-	44/-	47/-	49/-	51/-
30	33/-	35/-	38/-	40/-	42/-	44/-	46/-	49/-	51/-	55/-
32	35/-	37/-	40/-	42/-	45/-	47/-	50/-	52/-	55/-	57/-
34	37/-	40/-	42/-	45/-	47,6	50/-	52/-	55/-	57/-	60/-
36	40/-	42/-	45/-	47/-	50/-	52/-	55/-	57/-	60/-	63/-
38	45/-	48/-	51/-	52/-	55/-	57/6	60/-	63/-	67/-	70/-
40	47/-	50/-	53/-	56/-	59/-	62/-	65/-	69/-	72/-	75/-
42	49/-	52/-	56/-	59/6	62/-	65/-	68/-	72/-	75/-	80/-
44	55/-	59/-	63/-	66/-	69/-	72/-	75/-	79/-	83/-	86/-
46	60/-	63/-	66/-	69/-	72/-	75/-	78/-	82/-	86/-	90/-
48	62/-	65/-	68/-	71/-	74/-	77/-	80/-	84/-	88/-	92/-
50	67/-	70/-	73/-	76/-	79/-	82/-	85/-	89/-	93/-	97/-
52	72/-	75/-	78/-	81/-	84/-	87/-	90/-	94/-	98/-	102/-
54	77/-	80/-	83/-	86/-	89/-	92/-	95/-	99/-	103/-	107/-
56	82/-	85/-	88/-	90/6	94/-	97/-	100/-	104/-	108/-	112/-
58	87/-	90/-	93/-	96/-	99/-	102/-	105/-	109/-	113/-	117/-
60	92/-	95/-	98/-	101/-	104/-	107/-	110/-	114/-	118/-	122/-
62	98/-	101/-	104/-	107/-	110/-	113/-	116/-	120/-	124/-	128/-
64	104/-	107/-	110/-	113/-	116/-	119/-	122/-	126/-	130/-	134/-
66	110/-	113/-	116/-	119/-	122/-	125/-	128/-	132/-	136/-	140/-
68	116/-	119/-	122/-	125/-	128/-	131/-	134/-	138/-	142/-	146/-
70	122/-	125/-	128/-	131/-	134/-	137/-	140/-	144/-	148/-	152/-
72	128/-	131/-	134/-	137/-	140/-	143/-	146/-	150/-	154/-	158/-
74	134/-	137/-	140/-	143/-	146/-	149/-	152/-	156/-	160/-	164/-
76	140/-	143/-	146/-	149/-	152/-	155/-	158/-	162/-	166/-	170/-
78	148/-	151/-	154/-	156/-	159/-	162/-	105/-	169/-	173/-	177/-
80	158/-	161/-	164/-	167/-	169/-	172/-	175/-	179/-	183/-	187/-
82	168/-	171/-	174/-	177/-	179/-	182/-	185/-	189/-	193/-	197/-
84	178/-	181/-	184/-	187/-	189/-	192/-	195/-	199/-	203/-	207/-
86	188/-	191/-	194/-	197/-	199/-	202/-	205/-	209/-	213/-	217/-
88	198/-	201/-	204/-	207/-	209/-	212/-	215/-	219/-	223/-	227/-
90	210/-	213/-	216/-	219/-	221/-	224/-	227/-	231/-	235/-	239/-
92	222/-	225/-	228/-	231/-	233/-	236/-	239/-	243/-	247/-	251/-
94	234/-	237/-	240/-	243/-	245/-	248/-	251/-	255/-	259/-	263/-
96	246/-	249/-	252/-	255/-	257/-	260/-	263/-	267/-	271/-	275/-
98	260/-	263/-	266/-	269/-	271/-	274/-	277/-	281/-	285/-	289/-
100	274/-	277/-	280/-	283/-	285/-	288/-	291/-	295/-	299/-	305/-

Pulleys are also made wider on flange than listed; and for particulars and prices of these, and of pulleys with double arms and fast and loose pulleys, see opposite page.

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THE "BOSSLESS" SPRING PULLEY.

PATENT.



This pulley is made of Wrought Iron, and, as shown by figure on left of above illustration, will spring over shaft for fixing.

The manufacture of small Split Pulleys has been attended with so many difficulties, that Engineers have almost universally declined to supply them under eight inches in diameter.

The improvements will be readily understood by a casual examination of the accompanying engravings.

The principle adopted in the new design is doing away with the boss on both sides of the centre web, thus giving all the space between the shaft and the band for placing the fixing bolts and nuts, which can now be easily and quickly accomplished.

By these improvements *small* Spring or Split Pulleys have been brought to a practical success, and we can with confidence recommend our friends to give the Patent "Bossless" Pulleys a trial, as we are certain they will give every satisfaction.

PRICE LIST.

Diameter.	Width on the Face.	Standard List Bores.	PRICE.
4 inch	3 inch to 4 inch	1 inch to 2 inch	6/6
4½ inch	3 inch to 4½ inch	1 inch to 2 inch	7/-
5 inch	3 inch to 5 inch	1 inch to 2½ inch	8/-
5½ inch	3 inch to 5½ inch	1 inch to 2½ inch	9/-
6 inch	3 inch to 6 inch	1 inch to 2½ inch	10/-
6½ inch	3 inch to 6½ inch	1 inch to 2½ inch	11/-
7 inch	3 inch to 7 inch	1 inch to 2½ inch	12/-

EXTRAS.

The following extras if required are charged net.

If a given size of puiley is required bored above size specified 2/- each.
If required round on face .. .. 2/- ,,
If required greater width than specified .. per inch or part 1/- ,,

STRONG CAST IRON PULLEYS.

Ordinary Bore, Keywayed or fitted with Set Screw.

PRICES OF SOLID PULLEYS.

Diam. in Inches.	WIDTH ON FACE, IN INCHES.										
	2	3	4	5	6	7	8	9	10	11	12
4	4/-	4/6	5/-								
5	4/6	5/-	6/-	6/6							
6	4/6	5/6	6/-	6/6	7/-						
7	5/6	6/-	6/6	7/-	7/6	12/-					
8	6/-	6/6	7/-	7/6	8/6	12/-	13/-				
9	6/6	7/-	7/6	8/-	9/-	13/-	14/-	15/-			
10	7/-	7/6	8/-	9/-	10/-	14/-	15/-	16/-	18/-		
12	7/6	8/6	9/-	10/-	11/-	14/-	15/-	16/-	18/-	20/-	22/-
14		9/6	10/-	11/-	12/-	16/-	18/-	19/-	20/-	22/-	24/-
16		10/6	11/-	12/-	13/-	19/-	20/-	22/-	24/-	26/-	28/-
18		12/-	13/-	14/-	15/-	20/-	22/-	24/-	26/-	28/-	30/-
20		14/-	15/-	16/-	17/-	22/-	24/-	26/-	28/-	30/-	32/-
22		16/-	17/-	18/-	19/-	24/	26/-	28/-	30/-	32/-	34/-
24		18/-	19/-	20/-	21/-	27/-	29/-	31/-	33/-	35/-	38/-
26			22/-	25/-	28/-	30/-	32/-	34/-	36/-	39/-	42/-
28			24/-	27/-	30/-	33/-	35/-	37/-	40/-	43/-	46/-
30			26/-	29/-	32/-	35/-	37/-	39/-	42/-	45/-	48/-
32			28/-	31/-	34/-	38/-	40/-	42/-	45/-	48/-	51/-
34			30/-	33/-	36/-	40/-	42/-	46/-	49/-	52/-	55/-
36			32/-	35/-	38/-	42/-	45/-	48/-	51/-	54/-	57/-
38			35/-	38/-	41/-	45/-	49/-	52/-	55/-	59/-	62/-
40			38/-	41/-	45/-	49/-	53/-	57/-	62/-	67/-	72/-
42			41/-	45/-	49/-	53/-	57/-	61/-	66/-	72/-	78/-
44			43/-	47/-	51/-	55/-	59/-	63/-	69/-	75/-	81/-
46			48/-	52/-	56/-	60/-	64/-	68/-	74/-	80/-	87/-
48			50/-	54/-	58/-	62/-	66/-	71/-	77/-	83/-	90/-
50					61/-	65/-	70/-	75/-	81/-	87/-	93/-
52					65/-	70/-	75/-	81/-	87/-	93/-	100/-
54					68/-	73/-	78/-	84/-	90/	97/-	104/-
60					80/-	85/-	90/-	96/-	102/	110/-	120/-

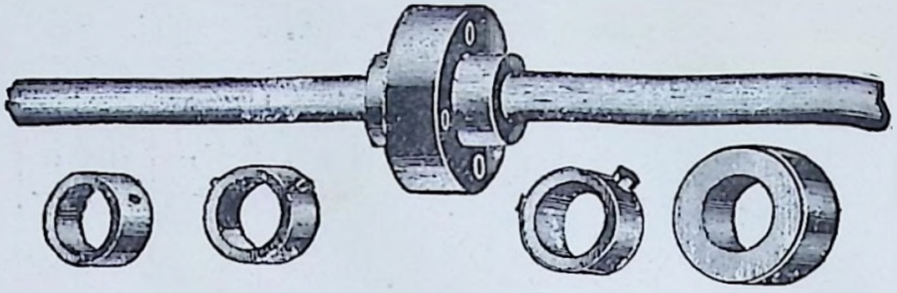
For Split Pulleys, from 4 in. to 11 in. diam., add 3/6 per Pulley.
,, ,, ,, 12 in. to 19 in. ,, ,, 4/6 ,,
,, ,, ,, 20 in. to 29 in. ,, ,, 5/6 ,,
,, ,, ,, 30 in. to 60 in. ,, ,, 6/6 ,,

Turned flat or rounded on face. Flat faces always sent unless otherwise ordered.

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SHAFTING AND COLLARS.

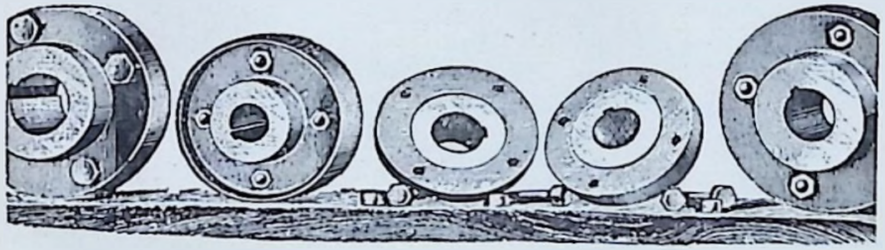
Turned true to Whitworth Standards, and Polished Bright.



Diameter in Inches.	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4
Iron Shafting, best Scrap Iron ... per ft.	1/-	1/2	1/4	1/6	1/9	2/3	2/9	3/4	3/10	5/3	7/-
Best Mild Steel Shafting ... ... per ft.	1/2	1/4	1/6	1/10	2/3	2/9	3/2	3/8	4/6	6/-	7/6
W.I. Loose Collars, with Patent Set Screws... .. each	1/9	2/-	2/3	2/6	3/-	3/6	4/-	4/6	5/-	5/6	6/-

COUPLINGS.

Turned Bright all over, and fitted with Turned Bolts and Bright Nuts.

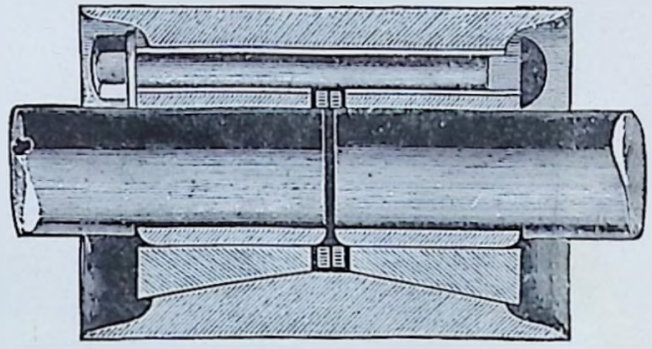


Diameter in Inches.	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4
Flanged ... per pair	6/-	7/-	8/-	10/-	12/-	15/-	18/	21/-	25/-	35/-	47/6
Recessed ... ,,	8/-	9/-	10/6	13/-	16/-	20/-	24/-	28/-	33/-	47/-	63/-
Pulley ... ,,	9/-	10/-	11/6	14/6	18/-	22/-	26/-	30/-	37/6	52/6	70/-
Keying up :—Keybeds cut in Shaft and Steel Keys fitted	4/-	5/-	6/-	7/-	8/-	9/-	10/-	11/-	12/-	14/-	16/-

COMPRESSION COUPLINGS.

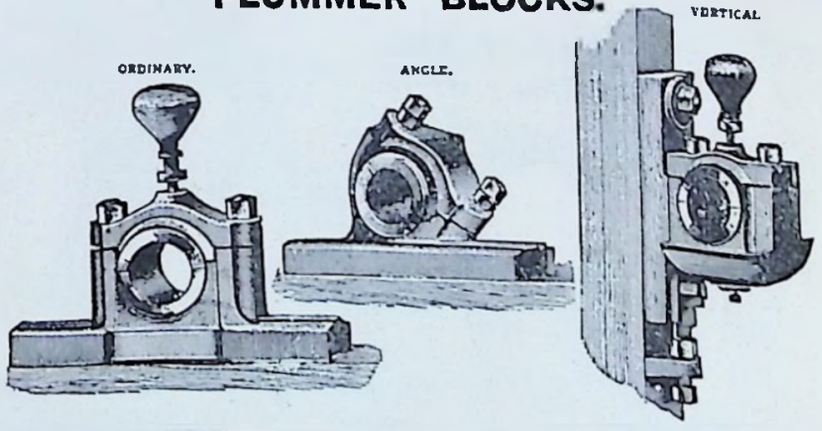
This Coupling consists of two cones turned outside to a standard taper, and bored to a standard size, which slip on to the ends of the shafts and are drawn together by three bolts within a coned outer sleeve.

The inner cones are split to enable both to accommodate themselves to slightly varying sizes of shafting, and to allow them to grip the shafting tightly when compressed.



Diam. of Shaft	1½	1¾	2	2¼	2½	2¾	3	3½	4	inches.
PRICE	14/6	17/6	20/6	25/6	30/-	34/6	41/-	65/-	98/-	each.

PLUMMER BLOCKS.

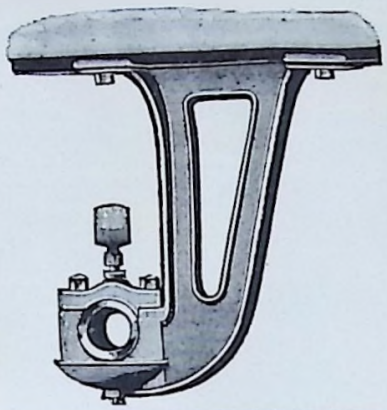


Diam. of Shaft in inches.	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4
Ordinary	3/6	4/6	5/6	7/-	9/-	11/6	14/6	17/6	22/6	37/-	48/-
Ditto, ex. heavy ...	5/-	6/3	7/-	10/-	12/6	16/-	19/-	22/6	27/6	42/-	57/-
Angular	6/-	6/-	7/-	9/-	11/6	14/6	18/6	22/-	27/6	46/-	60/-
Ditto, ex. heavy ...	7/3	7/3	8/6	11/-	13/6	16/-	20/-	25/-	32/-	52/6	67/6
Vertical			10/6	12/6	15/6	17/6	21/6	25/6	32/-	48/-	60/-
Ditto, ex. heavy ..			12/-	14/6	18/-	20/-	25/-	30/-	38/-	60/-	72/-

These prices include Gun Metal Bearings top and bottom, bored and turned.

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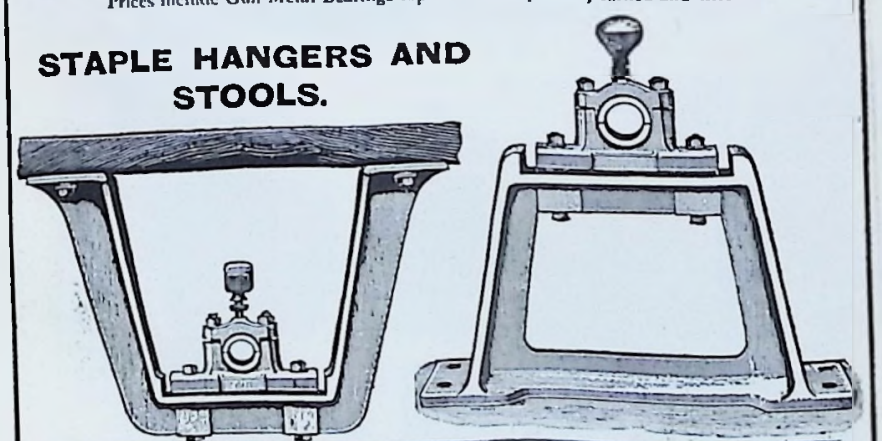
COUNTER SHAFT, OR "J" HANGERS.



Diam. of Bore, in inches	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4
Ordinary Hangers ...	6/6	8/6	10/6	12/6	15/6	17/6	21/6				
Ditto Extra Heavy ...	7/6	10/-	12/6	15/6	17/6	21/-	26/-				
Adjustable Hangers ...				15/-	20/-	25/-	32/6	37/6	45/-		
Ditto Extra Heavy ...				18/-	25/-	30/-	37/6	45/-	55/-	85/-	105/-
Pillar Hangers ...			13/-	16/-	20/-	25/-	30/-	37/6	45/-	72/6	90/-
Ditto Extra Heavy ...			15/-	18/-	25/-	30/-	37/6	45/-	55/-	85/-	105/-

Prices include Gun Metal Bearings top and bottom, bored, turned and fitted.

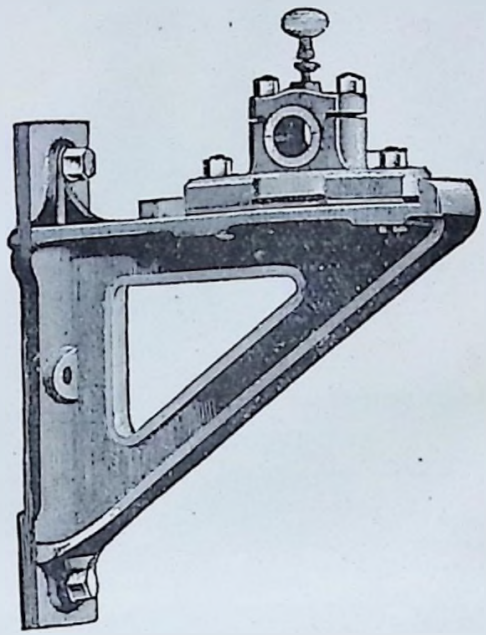
STAPLE HANGERS AND STOOLS.



Diam. of Bore, in inches	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4
Staple Hangers	7/6	9/6	11/6	15/-	19/-	24/6	31/6	36/6	45/-	77/-	100/6
Ditto Extra Heavy ...			15/-	20/-	25/6	33/-	41/-	47/6	57/6	94/6	127/-
Stools	7/6	9/6	11/6	15/-	19/-	24/6	31/6	36/6	45/-	77/-	100/6
Ditto Extra Heavy ...			15/-	20/-	25/6	33/-	41/-	47/6	57/6	94/6	127/-

These Prices include Plummer Blocks.

WALL BRACKETS.



Diam. of Bore, in inches	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4
Ordinary	7/6	9/6	11/6	15/-	19/-	24/6	31/6	36/6	45/-	77/-	100/6
Extra heavy			15/-	20/-	25/6	33/-	41/-	47/6	57/6	94/6	127/-

These prices include Plummer Blocks.

WALL BOXES.

Diam. of Bore, in inches	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4
Ordinary	7/6	9/6	11/6	14/-	18/-	22/-	29/-	35/-	43/-		
Extra heavy				19/-	23/6	30/-	38/-	43/	52/-	85/-	105/-

These prices include Plummer Blocks

SILL PLATES AND ANGLE BRACKETS.

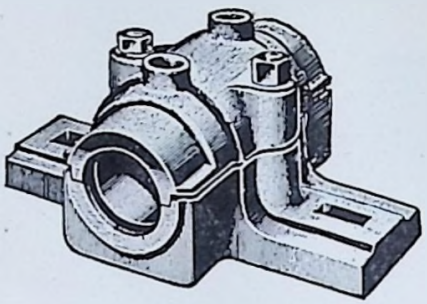
Suitable for Plummer Blocks... ..	1½	1¾	2	2¼	2½	2¾	3	3½	4
Sill Plates or Angle Brackets ...	6/-	7/-	8/-	9/-	11/-	12/6	16/6	27/6	33/-

These prices do not include Plummer Blocks.

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PLUMMER BLOCKS,

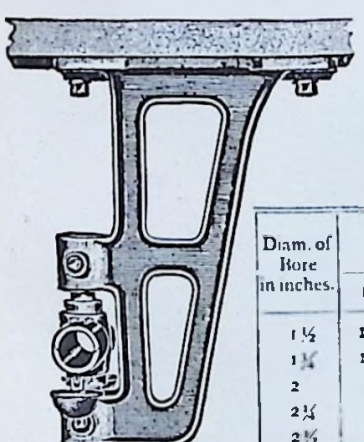
With Rigid Cast-iron Bearings.



The Bearings are 3½ diameters long, bored, turned, and channel-cut for lubricant.

Diam. of Bore in inches	1½	1¾	2	2¼	2½	2¾	3	3½	4
PRICE	6/-	7/-	8/6	10/6	13/-	16/-	20/-	30/-	40/-
Extra for Self-oiling ...	2/-	2/3	2/6	2/9	3/-	3/6	4/-	4/6	5/-

OPEN SIDE HANGERS,



With Cast-iron Swivelling Bearings and Vertical Adjustment; also Detachable Oil Dishes.

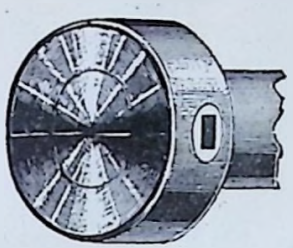
Bearings are 4 diameters long, bored, turned, and channel-cut for lubricant.

Diam. of Bore in inches.	Drop in inches from Base to Centre of Shaft.						Extra for Self-oiling Bearings.
	12	15	18	21	24	30	
1½	13/-	16/-	...	...	...	...	2/-
1¾	16/-	19/-	...	...	...	...	2/3
2	...	21/-	23/-	25/-	...	...	2/6
2¼	...	24/6	26/-	28/-	31/-	...	2/9
2½	...	27/6	30/-	32/6	35/-	...	3/-
2¾	...	32/6	35/-	37/6	40/-	...	3/6
3	...	37/6	40/-	42/6	45/-	50/-	4/-
3½	...	55/-	58/-	62/-	65/-	70/-	4/6
4	...	75/-	80/-	85/-	90/-	95/-	5/-

Prices of other Fittings with Cast-iron Bearings quoted on application

BELL'S HOLLOW SAFETY SET SCREWS.

(PATENT.)





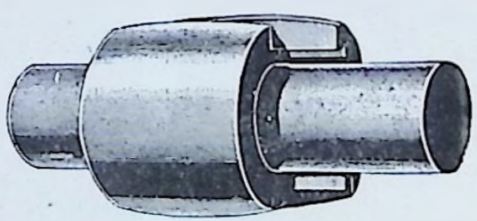


The above has been designed **to remedy the danger arising from projecting set screws**. A want long felt generally by the Engineering Trade, Mill Owners, &c. This Set Screw will be found **thoroughly efficient, most effective** and **perfectly safe.**

PRICES.

Whitworth Thread... ... ... inches	¼	⅜	½	⅝	1
Gas Thread ... ... inches	¼	⅜	½	—	—
PRICE ... ... per doz.	3/-	4/-	4/9	5/9	7/6

BELL'S DOVETAIL SPLIT PULLEY & COLLAR.



No Lugs, Bolts, Dowel Pins, Cotters, Plates, Screws, or Projections of any kind.

By a very **Simple** and **Effective** construction the above disadvantages are abolished, and the difficulty in obtaining Small Split Pulleys, especially for shafts of large diameter, is overcome. All Pulleys are planed, bored, turned, and keyway cut, and it is impossible for them to come apart of their own accord. Each half dovetails into the other, and by holding both pieces either side of the shaft and end to end, then sliding them together, they lock and so grip the shaft, forming a complete pulley or collar.

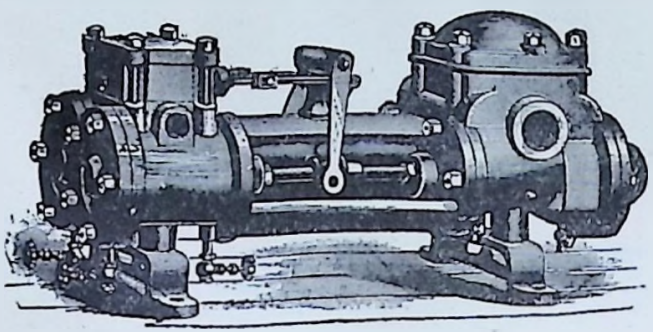
Prices quoted on application.

Large Pulleys may also be fitted with this Boss, and Prices will be quoted to specification.

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DUPLEX STEAM PUMPS

FOR GENERAL PURPOSES.



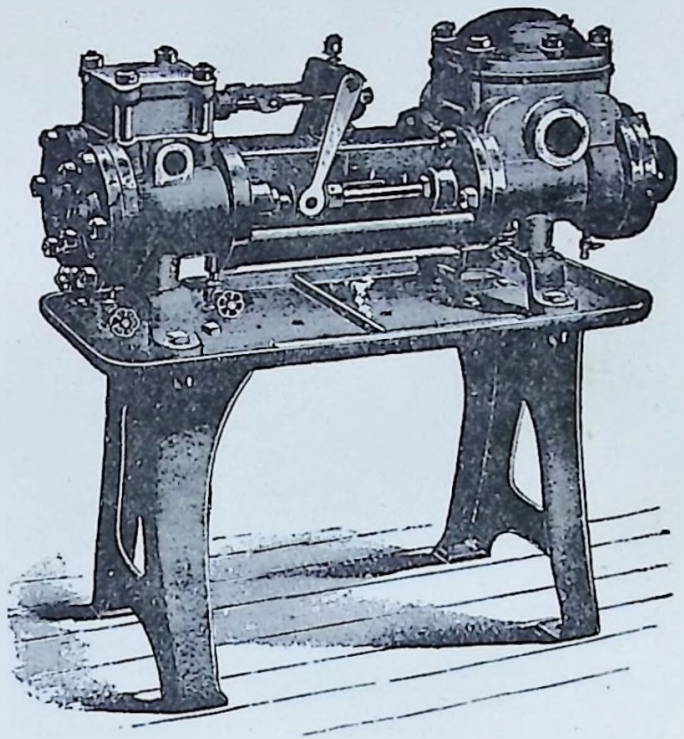
Sizes, 4½", 5¼" and 6"

These Pumps are constructed for all purposes when pressure does not exceed 150 lb. per square inch. They are fitted with two double-acting Plungers, and are suitable for pumping hot or cold water.

The duties and speeds given below are their maximum for efficient working.

Diameter of Cylinders.			Maximum Speed of each Plunger per minute.	Delivery both Plungers per minute.	Diameter of Pipes in Inches.				Prices.	
Steam.	Water.	Stroke			Steam	Exhaust.	Suction.	Discharge.	General Patterns.	Brass Plungers and Rods. Extra per Pump.
									£ s. d.	£ s. d.
2½	1½	2	300	9	¼	½	1	¾	8 10 0	1 5 6
3	2	3	250	20	⅜	½	1¼	1	12 10 0	1 17 6
4½	2¾	4	200	40	½	1	2	1½	19 16 0	3 0 0
5¼	3½	5	200	80	¾	1¼	2½	2		
6	4	6	150	100	1	1½	3	2		
7	4½	8	150	165	1¼	2	4	3		
8	6	10	125	305	1½	2	5	4		
10	7	10	125	415	2	2½	6	5		
12	7	12	125	500	2½	3	6	5		
12	10	12	125	1,020	2½	3	8	7		
14	12	12	125	1,480	2½	3	10	8		
18	14	12	125	2,000	3	4	12	10		

DUPLEX BOILER FEED PUMP.



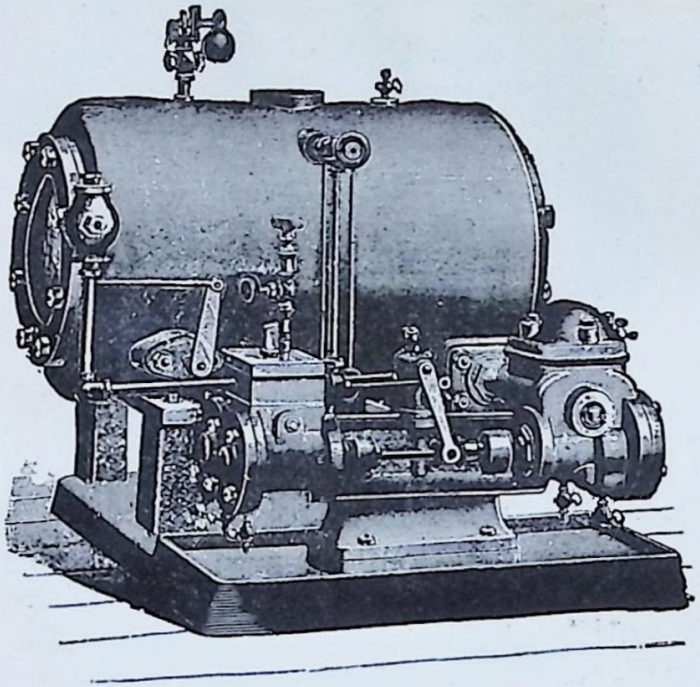
The above illustration represents a reliable Pump, mounted on Drip Pan and Stand. This Pump is suitable for all Boiler pressures, and works well with hot feed water. All parts are made to template, and spare parts can be supplied

Diameter of Cylinders.			Maximum Speed of each Plunger per minute.	Delivery from Pump per minute.	Diameter of Pipes in Inches.				Prices	
Steam.	Water.	Stroke.			Steam.	Exhaust.	Suction.	Discharge	General Pattern With Drip Pan. No Stand.	Brass Plungers and Rods. Extra each.
									£ s. d.	£ s. d.
3	2	3	250	20 gall.	⅜	½	1¼	1	14 0 0	2 2 0
4½	2¾	4	200	40 ,,	½	1	2	1½		
5¼	3½	5	200	80 ,,	¾	1¼	2½	2		
6	4	6	150	100 ,,	1	1½	3	2		

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AUTOMATIC RECEIVER AND FEED PUMP

FOR HEATING PLANTS.



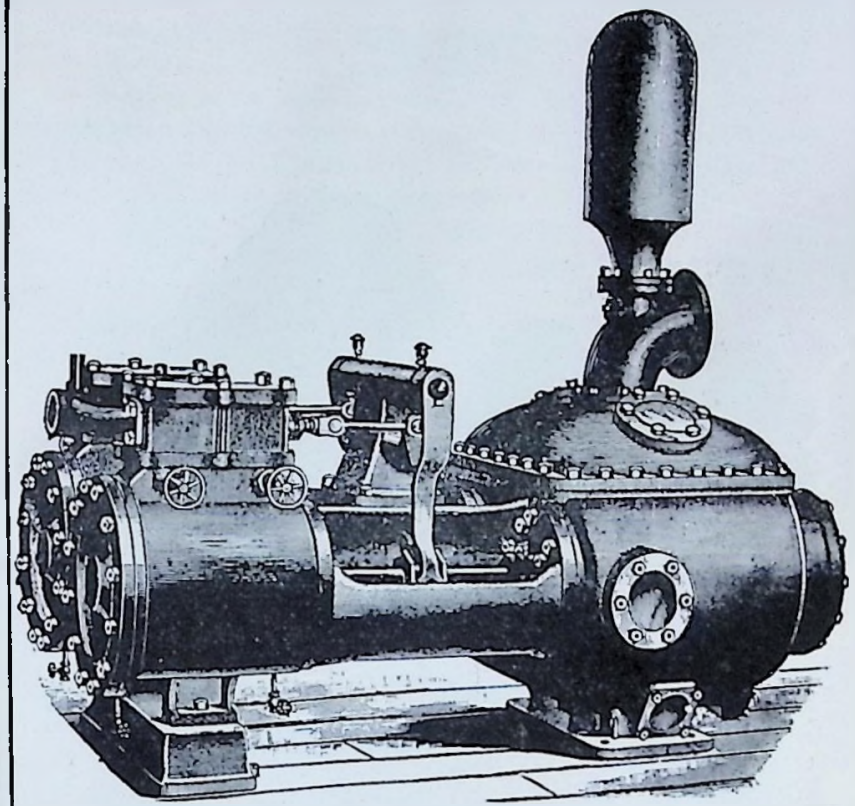
In the draining of Steam Coil Radiators, &c., it is important to have an automatic arrangement as a source of economy. The delivering of the water of condensation to the boiler, when in its hottest condition, considerably increases the efficiency of the heating plant

In brief, this apparatus consists of a tank into which the water from the coils, &c., drains. Inside the tank is a ball or float connected with a regulating apparatus placed on the steam end of the pump. This float so regulates the speed of the pump, by its rising and falling, that the water is kept at about a constant level in the tank.

Size.	Pump	Gallons delivered per minute.	Sq. feet of Radiating Surface it will drain.	Price.
A	With 3 × 2 × 3	12	5,000	
B	,, 4½ × 2¼ × 4	20	10,000	
C	,, 5¼ × 3½ × 5	35	20,000	
D	,, 6 × 4 × 6	60	40,000	

The above Illustration represents D size.

DUPLEX STEAM FIRE PUMP.



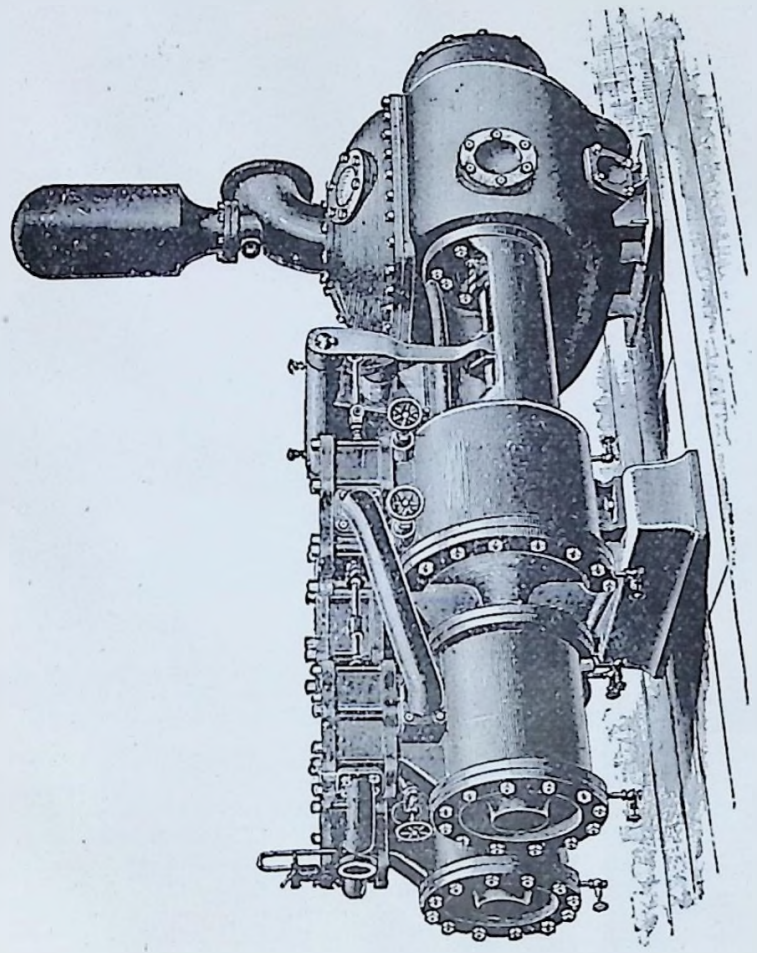
In this Pump, each valve being controlled by its opposite steam piston, "dead centres" are impossible, and this is most valuable for a **Fire Pump**. This Pump will throw a continuous and steady stream of water, varying in height with the steam pressure available.

Diam. of Steam Cylinder.	Diam. of Water Plungers.	Length of Stroke.	Max. Strokes per minute of one Plunger.	Galls. delivered per minute by both Plungers.	Diameter of Pipes in Inches.				Prices.
					Steam.	Exh'st.	Suction.	Discharge.	£ s. d.
7	3½	8	150	99	1¼	2	4	3	
8	4	10	150	165	1½	2	5	4	
10	5	10	150	250	2	2½	5	4	
12	5	12	150	306	2½	3	6	5	
12	6	12	150	420	2½	3	6	5	
14	7	12	150	600	2½	3	6	6	
16	8	12	150	783	3	3½	8	6	
18	9	12	150	990	3	4	8	7	
18	10	12	150	1224	3	4	8	7	
20	12	12	150	1750	4	5	10	8	

If fitted with Brass Plungers and Piston Rods, add 15 % extra.

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DUPLEX COMPOUND STEAM PUMP.



For Particulars, see opposite page

DUPLEX COMPOUND STEAM PUMPS.

Where work is regular and a saving in fuel desired, this combination of high and low pressure cylinders is recommended. The steam acting through the entire stroke upon the smaller piston expands upon the larger during the return stroke. This is in effect the same as using a cut-off device and results in a saving of from 20 to 30 per cent. As compound cylinders require less steam, the size and cost of boilers may be materially lessened.

Compound cylinders are used extensively on hydraulic Elevator Pumps, Pressure and Mine Pumps; also on pumps designed for the water supply of smaller cities and towns.

If desired, by means of a special pipe attachment, steam may be led directly to the low pressure cylinder.

Diameter of Steam Cylinders.	Dia. of Water Plungers.	Length of Stroke.	Maximum Strokes per minute of ONE Plunger.	Gallons delivered per minute by BOTH Plungers.	Diameter of Pipes in Inches.				Prices.
					Steam.	Exhaust.	Suction.	Discharge	£ s. d.
8 and 12	7	12	125	492	1½	3	6	5	
8 „ 12	8½	12	125	740	1½	3	8	5	
10 „ 16	8½	12	125	740	2	3½	8	5	
12 „ 18	8½	12	125	740	2½	4	8	5	
14 „ 20	8½	12	125	740	2½	5	8	5	
8 „ 12	10	12	125	1020	1½	3	8	7	
10 „ 16	10	12	125	1020	2	3½	8	7	
12 „ 18	10	12	125	1020	2½	4	8	7	
14 „ 20	10	12	125	1020	2½	5	8	7	
8 „ 12	12	12	125	1480	1½	3	10	8	
10 „ 16	12	12	125	1480	2	3½	10	8	
12 „ 18	12	12	125	1480	2½	4	10	8	
14 „ 20	12	12	125	1480	2½	5	10	8	
10 „ 16	14	12	125	2000	2	3½	12	10	
12 „ 18	14	12	125	2000	2½	4	12	10	
14 „ 20	14	12	125	2000	2½	5	12	10	

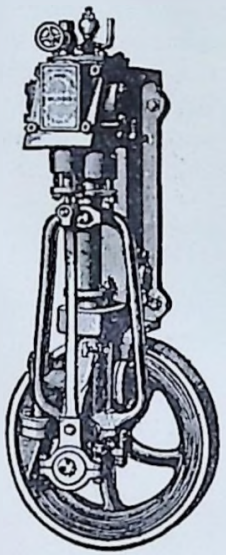
If fitted with brass Plungers and piston rods 15 per cent. extra.

Trays can be supplied if ordered with Pump.

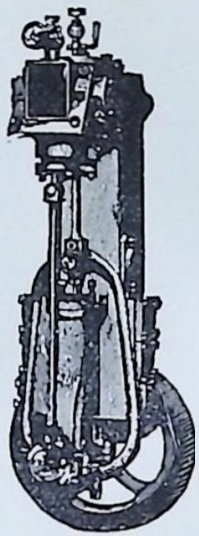
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THE "FAVOURITE" DONKEY PUMP.

SPECIALLY DESIGNED FOR STEAM VESSELS AND USERS OF STEAM POWER GENERALLY.



SINGLE ACTION.



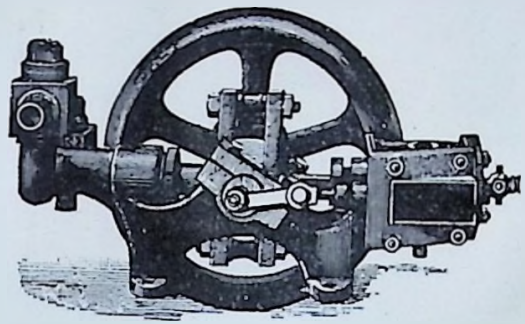
DOUBLE ACTION.

Careful attention has been given in designing these Pumps to render them adaptable to any position in which they may be required to be fixed; and also of immediate and easy access to all working parts. Steam is taken in the centre of the valve chest, and exhaust arranged for connection to be made on either side of the cylinder, as most convenient. Suction and delivery valves are interchangeable, to admit of their being fixed whichever side of the Pump may be considered advantageous. Rams, glands, and bearings are of gunmetal; bearings are adjustable. Piston rod is same diameter as ram, in order to diminish the velocity of up-stroke whilst pumping against a high pressure in the boiler, thus insuring the least possible amount of wear and tear, and a great reduction in the use of steam. The material and workmanship throughout are of the very best. Pumps are sent out complete with fittings.

	SINGLE-ACTION PUMPS.						DOUBLE-ACTION PUMPS.				
Sizes.	No. 0	No. 1	No. 2	No. 3	No. 4	No. 5	No. 3	No. 4	No. 5	No. 6	No. 7
Diameter of Ram ins.	1	1 5/16	1 9/16	2 1/8	2 5/8	3 1/16	1 1/2	2	2 1/2	3	3 1/2
Diameter of Cylinder ,,	2	2 1/2	3	3 3/4	4 1/2	5 1/4	3	3 3/4	4 1/2	5 1/2	6
Length of Stroke ,,	2	2 1/2	3	4	5	6	3	4	5	6	6
No. of Revolutions..	200	190	170	150	120	110	160	140	110	100	95
Gallons per hour ...	60	125	210	440	660	1,000	480	980	1,260	1,832	2,300
N.H.P. of Boiler ...	4	8	16	30	45	70	32	70	90	120	150
Diameter of Steam Pipe ins.	1/4	3/8	3/8	1/2	3/4	3/4	3/4	1/2	3/4	3/4	1
Diameter Exhaust Pipe ,,	3/8	1/2	1/2	3/4	1	1	1/2	3/4	1	1	1 1/4
Diameter of Water Pipe ,,	1/2	3/4	1	1 1/4	1 1/2	2	1	1 1/4	1 1/2	2	2 1/2
PRICE	£7	£9	£13	£16	£20	£	£16	£	£	£	£

IMPROVED DONKEY PUMP.

Can be worked Vertically or Horizontally.



This Pump has been carefully designed to meet the requirements of small steam vessels and engine rooms of limited space, and where Pump must be placed in cramped position.

The arrangement of the Pump is such that by giving the suction and delivery valves half-a-turn in their sockets, it can be worked either vertically or horizontally

All wearing parts are adjustable. Plungers, Valves, Seatings, and Glands are of gun-metal.

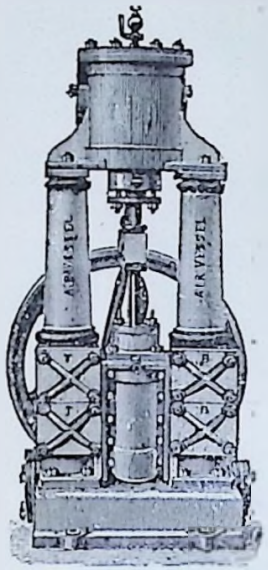
A large number of these Pumps have been supplied for Admiralty steam cutters.

Sizes	No. 1	No. 2	No. 3.
Diameter of Ram	1	1 1/4	2 1/8
Diameter of Cylinder	2	3	4 1/2
Length of Stroke	2	3	5
Number of Revolutions	200	170	120
Gallons per Hour	50	250	660
N.H.P. of Boiler	4	20	40
Diameter of Steam Pipe	1/4	3/8	1/4
Diameter of Exhaust Pipe	3/8	1/2	1
Diameter of Water Pipe	1/2	1	1 1/2
PRICE	£7	£13	£18

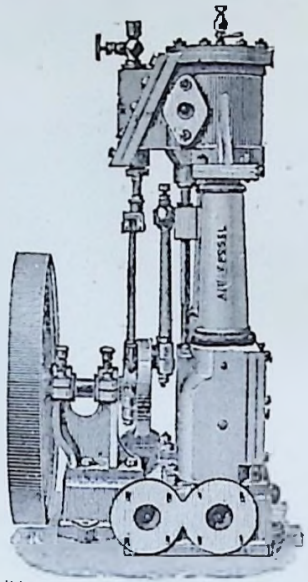
Size No. 1 is specially suited for small Steam Launches, and can be had with steam cylinder and pump body made entirely of gun metal. Price, £8.

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IMPROVED PUMPING ENGINE.



Can be used as Engine for driving Mechanical Stoker, Lathes, &c., &c., in Engine Room.



Specially designed to get largest capacity into smallest possible space, and possesses advantages over other Pumps of this class. All valves and working parts are arranged easily accessible. Suction and delivery may both be fixed on either side of pump, or opposite to each other. They are highly finished, and fitted with gun-metal seatings, glands, pump-rods, and adjustable bearings, india-rubber or leather valves. Prices include gun-metal wheel valve, snift valves, grease cup, and screwed flanges for connections.

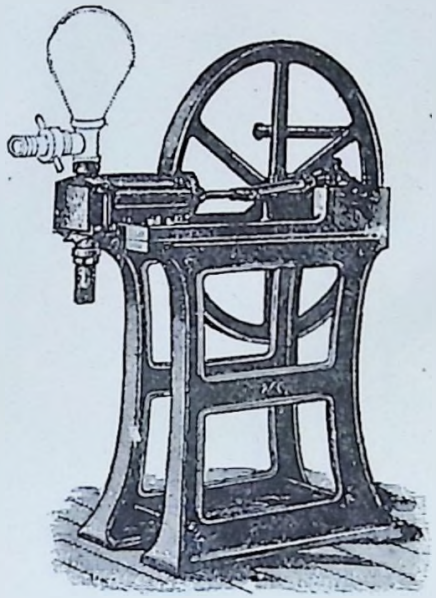
Single Ram Pump.							Double Acting Pump.				
Diameter of Ram ...	ins.	3½	4	4½	5	6	3½	4	4½	5	6
Dia. of Steam Cylinder	,,	6	7	7½	8	10	6	7	7½	8	10
Length of Stroke ...	,,	6	7	7	8	9	6	7	7	8	9
Revolutions per Minute ...		90	80	80	80	75	100	85	85	80	80
Gallons per Hour ...		940	1320	1700	2150	3300	2300	2520	3080	4200	6020
Horse Power Boiler Fed ...		75	95	120	150	230	150	180	220	300	430
Price	£										
G. M. lined	£										
Dia. Suction & Delivery	ins.	2½	3	3	4	4	2½	3	3	4	4
Dia. Steam Pipes ...	,,	1	1	1	1½	1½	1	1	1	1½	1½
Dia. Exhaust Pipes ...	,,	1¼	1½	1½	2	2	1¼	1½	1½	2	2

Double Acting Pumps for Low Service, Ballast Pumps, &c.						
Diameter Pump ...	ins.	5	6	7	8	9
Diameter Steam Cylinder	,,	6	7	8	9	10
Length of Stroke ...	,,	6	7	8	9	9
Water, in Tons per Hour ...		60	75	90	120	150
Price	£					
G. M. lined	£					
Dia. Suction & Delivery	ins.	4	4	5	6	7
Dia. Steam Pipes ...	,,	1	1	1½	1½	1½
Dia. Exhaust Pipes ...	,,	1¼	1½	2	2	2

HORIZONTAL

DOUBLE-ACTING ALL BRASS PUMP,

On Cast Iron Frame.



No. 246

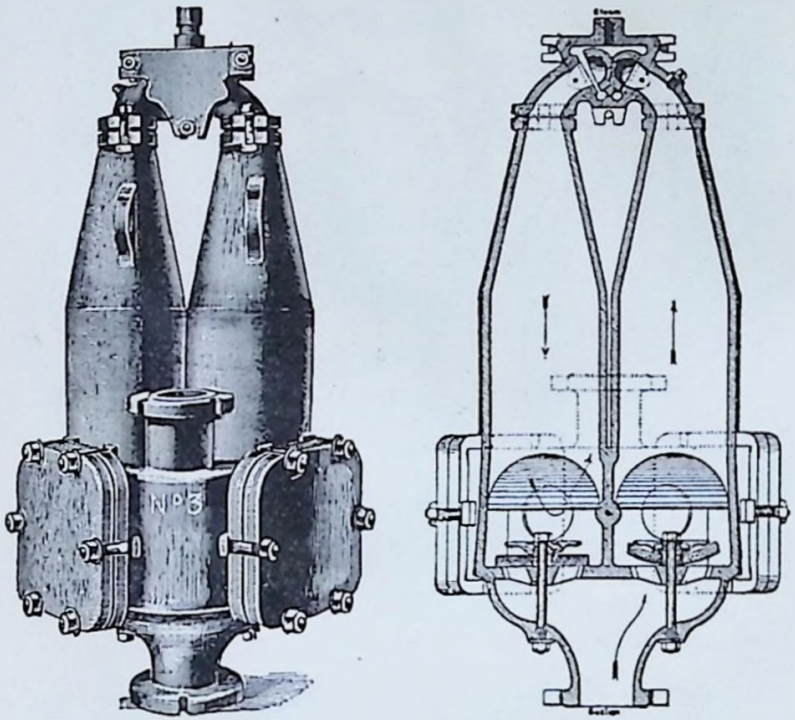
This Pump has met with much favour since its introduction. The Pump and Working Parts are entirely of Brass. The Valves are of the simplest construction and are easily accessible. The Crank is of strong Wrought Iron, with Connecting Rod having Gun Metal Marine Head, and all Bearings are Gun Metal bushed

A heavy Fly Wheel is supplied with the 2½ in. and 3 in. sizes, and two Fly Wheels with the 4 in.

Diam. of Bore of Working Barrel ...	2½	3	4 ins.
Diam. of Bore of Suction and Delivery Pipes	1¼	1½	2 ins.
Price	£7 0 0	£8 10 0	£10 5 0
Additional Handle ... ... Extra	12 6	12 6	12 6
Improved Copper Air Vessel with Brass T Pipe .... Extra			

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PULSATING STEAM PUMPS.



The above represents front elevation and section of a most reliable Pumping Engine, which has **patented valuable** and **decided improvements.** It is guaranteed to show **equal economy** for same duty with any other Pump of its class.

A FEW OF ITS ADVANTAGES ARE:—

Requires no skilled labour, oil, tallow, packing, or leather.

Will pump almost anything, work suspended on a chain, start at once after lying idle for months.

Has no rods, glands, pistons, or exhaust steam to cause overheating.

Is very compact, light, most reliable, and almost noiseless.

PULSATING STEAM PUMP.

The construction of this Pump is of the most simple form. On each side of the body casting are openings, with covers properly fitted and secured by bolts, giving free and easy access for examination or renewal of the Suction and Delivery Valves.

The Steam Valve is formed of two hollow semispheres joined together, and with a bearing or rocking bar, forming a much more durable Valve than the usual "Flap," "Disc," "Piston," "Ball," or other types.

VALVES are usually sent of our Compound Rubber, with protecting grids; but Metal Valves are used where it is considered advisable.

Steam pressure varies with circumstances; but, assuming a 40-ft. lift, it should not be less than 30 lb. at Pump, and 80-ft. lift requires 50 lb. Suction should not exceed 15 ft. to obtain best results.

PRICES AND DUTIES.

Size No.	Gallons per hour.	Size of Steam Pipe.	Size of Suction Pipe.	Size of Delivery Pipe.	Space occupied.	Price.		
						Pump.	Foot Valve.*	Back Pressure Valve.†
		Inches.	Inches.	Inches.	Inches.	£		
1	1,200	¼	1½	1¼	12 × 9	8	18/-	16/-
2	2,000	⅜	2	1½	14 × 10	11	20/-	18/-
3	3,500	½	2½	2	16 × 12	15	30/-	25/-
4	6,000	½	3	2½	19 × 13	20	32/-	28/-
5	8,000	¾	3½	3	22 × 15			
6	10,000	¾	4	3	24 × 16			
7	14,000	1	4½	3½	27 × 19			
8	20,000	1¼	5	4	32 × 22			
9	26,000	1¼	6	5	36 × 25			
10	35,000	1½	7	6	44 × 30			
11	50,000	2	8	7	52 × 36			
12	65,000	2	9	8	59 × 39			
13	85,000	2½	10	9	62 × 42			

* This is advisable in most cases.

† This should be used in long or high lifts.

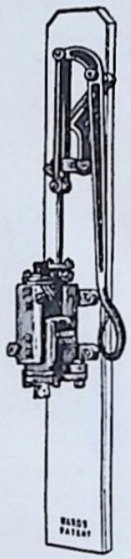
The above measurements and capacities are approximate and calculated on a total lift of 20 ft. For higher lifts the quantity delivered will vary and be dependent upon the length of piping, density of liquid, and conditions of each case. We shall be glad to advise on receipt of full particulars.

In ordering please state—Quantity per hour; Steam pressure at Pump; Nature and consistency of liquid.

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SINGLE AND DOUBLE-ACTING FORCE PUMPS.

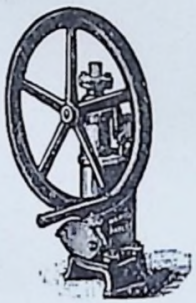
(PATENT.)



No. 71.



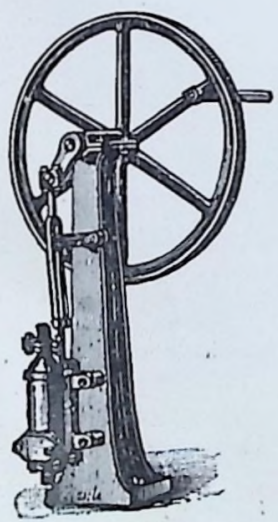
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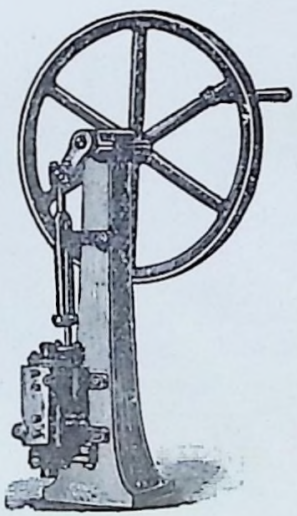
No. 67.



No. 66.



No. 74.



No. 75.

SINGLE AND DOUBLE ACTING FORCE PUMPS.

AND COMBINED AIR VESSEL.

(WARD'S PATENT.)

DISTINCT ADVANTAGES.—These Single Acting Force Pumps and Combined Air Vessel dispense with the usual Bucket Rod Stuffing Box, thus reducing friction. Each Pump has an Air Vessel in the body casting. The handle is a lever of the second order. The suction takes place in the up stroke and the delivery in the down stroke, thus dividing the power required and greatly reducing the labour in working the pump.

Water does not pass through the Bucket. Waterway is not restricted. Only Two Valves in each Pump. Easily accessible. No pipe joints have to be broken to reach them.

The **Double Acting Force Pumps** have specially large waterways. Effect great economy in bulk, weight, and space occupied.

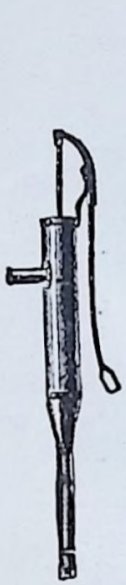
PRICES.

	Diameter of Bore of Working Barrel ... Inches	2½	3	3½	4
	Diameter of Bore of Suction and Delivery Pipes ... ,,	1¼	1½	2	2
	Combined Single Acting Force Pump and Air Vessel				
No. 64	on Base	27/-	31/6	40/-	
,, 65	on Plank	30/-	35/-	44 6	
,, 66	with Guide on Plank	42 9	47/-	62 9	
,, 67	With Rotary Motion on Base	60/-	75/-		108 9
,, 68	with Rotary Motion on Plank	64 6	79 6		116/3
,, 69	with Front Rotary Motion, with Guide on Plank ...	71/3	86 3	105/-	
,, 70	with Side Rotary Motion, with Guide on Plank ...	86 3	101/3	120/-	
,, 74	on Registered Frame	157/6	165/-	172 6	
	If fitted with "Draw-off Cock" ... ... extra	6/9	7/6	9/-	
	Double Acting Force Pump.				
No. 71	with Combined Fulcrum and Guide Bracket on Plank	46/-	57/-	67 6	
,, 72	with Front Rotary Motion on Plank	67/6	87/-	112 6	
,, 73	with Side Rotary Motion on Plank	75/-	94 6	120/-	
71 72 73	if fitted with "Brass Working Barrels" ... extra	18/9	26 3	33 9	
71 72 73	if "All Brass Pump" ... ... extra	30/-	60/-	90/-	
71 72 73	if fitted with "Cast Iron Air Vessel" ... extra	6/-	7/6	9/-	
71 72 73	if fitted with "Draw-off Cock" ... ... extra	6/9	7/6	9/-	
75	on Registered Frame	165/-	176/3	187 6	

NOTE.—The "**Brass Working Barrels**" in the **Patent Double Acting Pumps** are **not** Brass Liners, 1/16 in. thick, but **bored Barrels**, ¼ in. thick, which **can be withdrawn when desired** from the Pump Body.

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 251 of 298
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HAND LIFT PUMPS.



No. 25.



No. 1.



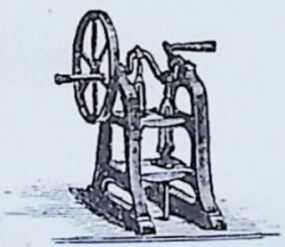
No. 300.

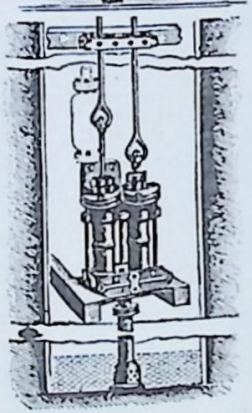


No. 6.



No. 28.

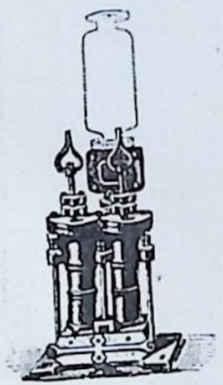




Nos. 88 and 89.



No. 30.



No. 317.

HAND LIFT PUMPS.

PRICES.

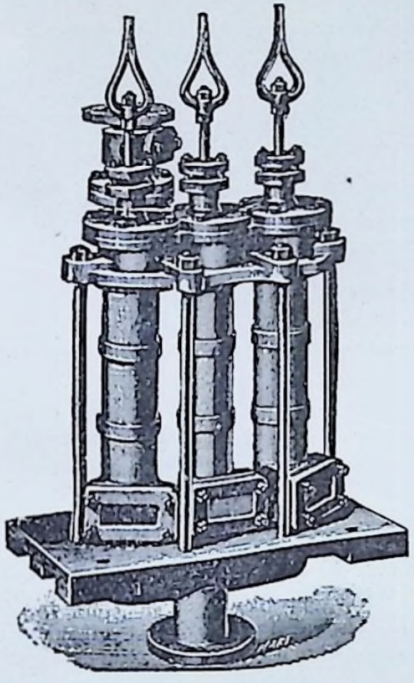
Diam. of Bore of Working Barrel	2	2¼	2½	2¾	3	3¼	3½	4 ins.
Diam. of Bore of Suction Pipe ...	1	1	1¼	1¼	1½	1½	1½	2 ins.
No. 1 "Paragon" Pump, with Brass Union	10/-	11/-	12/6	14/-	15/6	20/-	23/-	27/6
No. 2, ditto, with Lugs and Brass Union	10/-	11/-	12/6	14/-	15/6	20/-	23/-	27/6
No. 3, ditto, with Bracketed Base and Brass Union	10/-	11/-	12/6	14/-	15/6	20/-	23/-	27/6
No. 6, ditto, with Brass Union...	10/9		13/6		17/-		24/6	
No. 8, ditto, with Long Tail and Brass Union	12/-		14/9		18/3		26/3	
If with Copper Cylinder ... extra	3/-	3/6	4/-	4/6	5/6	6/-	6/6	8/6
If with Brass Bucket and Valve ,,	3/6	4/-	4/6	5/-	6/-	6/9	7/6	8/6
Galvanised Strainer ... ... ,,			2/6		2/6			
Diam. of Bore of Working Barrel	3	4	4½	5	6	7	8	9 ins.
Diam. of Bore of Suction Pipe ...	1½	2	2	2½	3	3½	4	5 ins.
No. 25, Galvanised Sheet-iron Contractor's Pump, 7 ft. 6 in. under spout	44/-	47/-		51/-	59/-	87/6	106/6	123/6
No. 28, Galvanised Sheet-iron Contractor' Pump, 7 ft. 6 in. under head, on Tripod, with Brass Union and Galvanised Strainer			45/-					
No. 30, Double Barrel Contractor's Pump, 28 ft. under spout		300/-			530/-			
Diam. of Bore of Working Barrel				2	2½	3	3½	4 ins.
Diam. of Bore of Suction and Delivery Pipes				1	1¼	1½	2	2 ins.
No. 300, Strong Brass Force Pump, on Oak Plank ...				55/	67/-	77/6	91/6	106/-
No. 311B, ditto, ditto, with Rotary Motion				63/-	77/-	89/6	105/6	121/6
No. 310, Strong Iron Force Pump on Oak Plank, Copper Lined, and with Brass Union				40/-	47/	52/6	64/-	70/-
No. 88, Double Barrel Iron Force Pump and "A" Frame, complete for well 30 ft. to surface				£				
No. 89, Double Barrel Brass Force Pump and "A" Frame, complete for well 30 ft. to surface				£				
No. 317, Double Barrel Iron Deep Well Force Pump with Doors					144/-	164/-	199/-	224/-
No. 317B, Double Barrel Brass ditto					174/-	199/-	244/-	279/-
Cast-iron Air Vessels for Nos. 88, 89, 317, and 317B Pumps ... ... extra					18/-	18/-	22/6	22/6

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DEEP WELL PUMPS.

EXTRA STRONG.

Gun-Metal Barrels, with Doors for access to Valves.



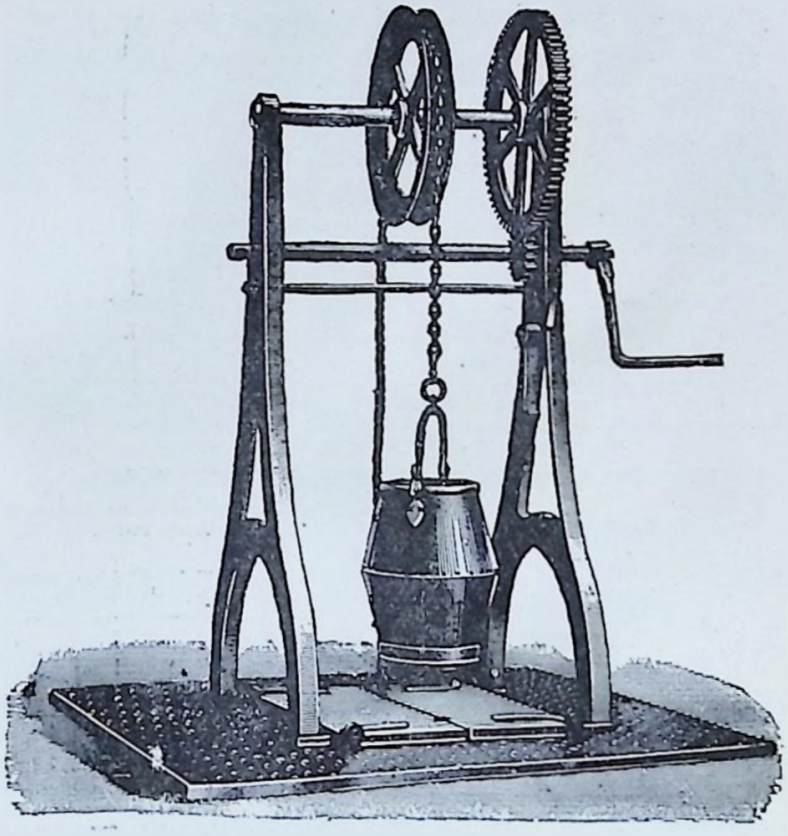
Extra strong Gun-metal Treble Barrel Pumps, for deep wells, fitted with valve doors, retaining valve, &c., cast-iron top and bottom chambers, and strong brass buckets, with hard drawn copper rods, fitted with bows or socket keys to order.

PRICES.

Dia. of Barrels.	2	3	3½	4	4½	5	6	Inches.
10-in. Stroke...	£19	£	£	£	£	£	£	Each.

If with Suction and Delivery screwed for iron, 2 in., 2½ in., and 3 in. ... ... 3/9 each extra.
Do. do. do. 3½ in. and 4 in. ... ... 6/6 do.

DOUBLE-ACTION WELL GEAR.



This **Well Gear** is strongly made and of improved construction, and is suitable for wells of any depth. The frame is bolted to a heavy cast-iron kerb, of a sufficient size to cover any ordinary well, saving the expense of any wood-work, which soon decays and becomes unsafe and, falling into the well, renders the water unfit for use.

The handle shaft is fitted with a fly-wheel, which is not shown in illustration. By the use of the double buckets a considerable saving of time is effected, and the weight of the chain and empty bucket helps to balance the full one.

Price, including two 6-gallon galvanised buckets, £11 11s.; chain, extra.

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HYDRAULIC PROVING PUMPS.

For Testing Boilers, Pipes, Tanks, &c.



TRIPOD BOILER PROVER.

With Gun-metal Pump, Gauge, Flexible Suction and Delivery Pipes, and Brass Connections, without Pail.

No.	To Test.	Price.
2130	200 lbs. per square inch.	£8 0 0

If to test to 300 or 500 lbs. per square inch, extra.

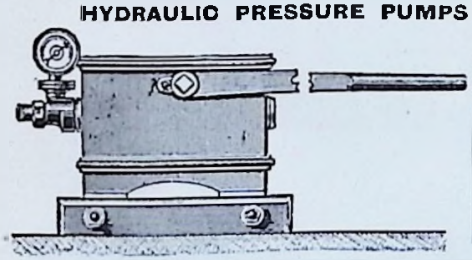
BARROW BOILER PROVER.

With Gun-metal Pump in Cast-iron Cistern, Gauge, Flexible Delivery Pipes and Brass Connections, Mounted on Strong Barrow.

No.	To Test.	Price.	Without Barrow.
2135	200 lbs. per square inch.	£12 0 0	£11 0 0

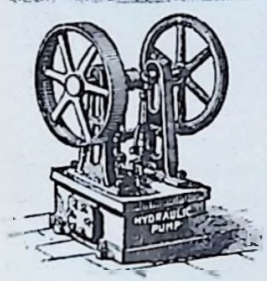
If to test to 400 or 500 lbs. per square inch, extra.

HYDRAULIC PRESSURE PUMPS FOR HAND POWER.



Fitted with one or two Gun-metal Pumps and Valves enclosed in Cast-iron Cistern.

No.	Pumps.	Pressure.	Price.
2137	One 1 in. dia.	2 Tons per sq. in.	£10
2138	One each 1 in & 2 in. dia.		£11



With Hydraulic Gauge extra, or with Safety Valve extra. Pumps can be had of any other sizes below the above for greater pressures at same prices.

FOR HAND OR STEAM POWER.

The Pump, Body, and Plunger are of Gun-metal, and the Cistern of Cast-iron; fitted with Safety and Relief Valves, Fitted with One, Two or Three Pumps.

The Hand-power Pumps No. 2140 and 2141 have Wrought-iron Handles with counter balanced Levers. The Steam-power Pumps Nos. 2142 and 2143 have Fast and Loose Pulleys, also Fly-wheel, Wrought-iron Crank Shafts and Connecting Rods.

No.	Pumps.	Pressure.	£
2140	One 1 in. diameter.	2 Tons per square inch.	
2141	Two 1 in. & 2 in. diameter.		
2142	Two ,, ,, ,,		
2143	Three 1 in., 1½ in. & 2 in. do.		

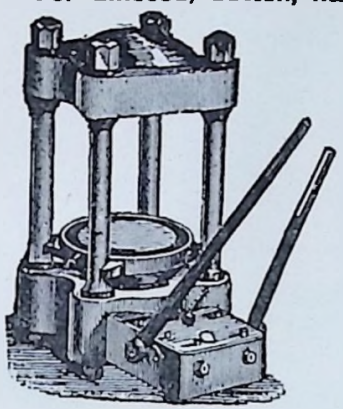
Pumps can be had of any other size below the above for greater pressures.

HYDRAULIC GIRDER TESTERS.—Prices and particulars on application.

HYDRAULIC PRESSES.

HYDRAULIC "OIL" PRESS,

For Linseed, Cotton, Rape, Olive, Castor, and other Oils.



This Press consists of powerful cylinder and ram, with strong head attached to four wrought-iron columns.

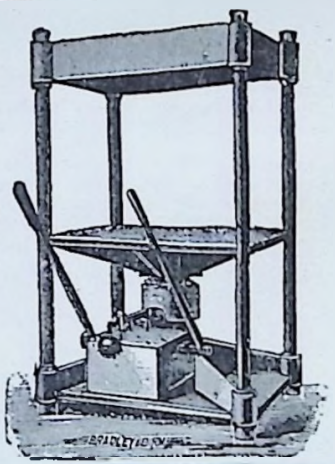
The table is circular, and has a groove around it with outlet pipe.

It has also an attached cistern with high- and low-pressure pumps of best gun-metal, stop valve, and two pump levers, which can easily be worked by one man.

No.	Diam. of Ram.	Tons Pressure.	Price, complete.
	In.		£ s. d.
3	10	150	
4	12	200	

Extra for Roller Mills, £ Seed Heaters, £

HYDRAULIC "PRINTER'S" PRESS.



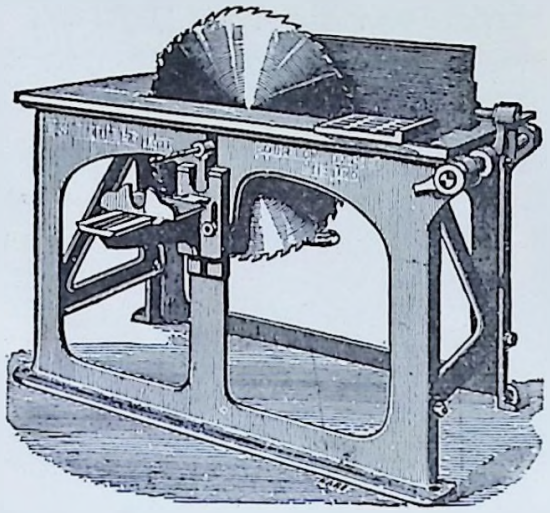
For Bookbinders, Printers, Stationers, and others.

No.	Diam. Ram.	Rise Ram.	Power. Tons.	Distance between Table & Top when down.	Distance between Pillars.	Size of Table.	Price, with Cistern and one Pump on base.
	In.	In.		In.	In.	In.	£
1	3	10	30	15	15½ × 10⅜	17½ × 13	13
2	3	10	10	30	15½ × 10⅜	17½ × 13	15
3	3½	10	15	26	23⅜ × 20⅜	27½ × 23½	19
4	3½	10	15	49	23⅜ × 20⅜	27½ × 23½	20
5	3½	10	20	26	32½ × 22	35¾ × 25½	
6	3½	10	20	40	32½ × 22	35¾ × 25½	
7	3½	10	20	46	32½ × 22	35¾ × 25½	
8	4	10	30	26	32½ × 22	35¾ × 25½	
9	4	10	30	36	32½ × 22	35¾ × 25½	
10	4	10	30	26	36½ × 22	36 × 24½	
11	4	10	30	33	36½ × 22	36 × 24½	
12	4	10	30	40	36½ × 22	36 × 24½	
13	6	12	50	42	24 × 18	24 × 18	

With two Pumps, £5 extra.

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CIRCULAR SAW BENCH.



This Saw Bench has a well-planed top, and the frame is of an improved design, rendering it exceedingly strong, rigid, and steady in work.

The Spindle, which runs in very long gun-metal adjustable bearings, and is raised or lowered by a screw and hand-wheel, can carry two saws if required, for Tenoning, Rebating, Grooving, &c.

Fast and loose pulleys are provided of dimensions given below.

The Fence has a fine screw adjustment, can be inclined at any angle for bevel cutting, or can be instantly thrown over, leaving the table clear for cross cutting. The Carrier Plate runs in a groove on the table, and is most useful in cross cutting, mitreing, &c. The Boring Table has a vertical adjustment, and holes can be bored at any angle.

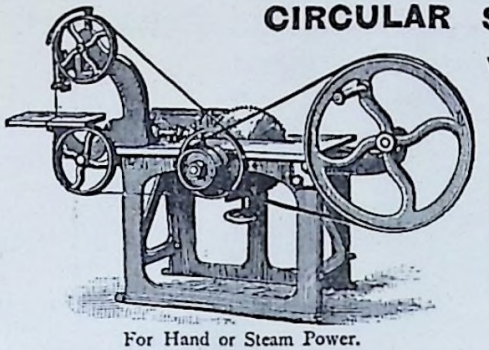
No	1	2	3	4
Price £	12 10 0	15 10 0	21 0 0	
Size of Table ins.	42 × 21	48 × 24	60 × 30	72 × 36
Saw included ins.	18	24	30	36
Will take Saws up to ins.	24	30	36	48
Depth of Timber cut with largest Saw ins.	8	11	14	20
Width of Planing and Moulding Cutters ins.	2½	2½	3	3
Diameter of Pulleys ins.	7	8	10	12
Width of Pulleys ins.	3	4	4½	5
Rising Spindle £	3 0 0	3 10 0	4 10 0	6 0 0
Boring Table and one Auger £	2 5 0	2 10 0	3 10 0	5 0 0
Planing and Moulding Apparatus £	3 10 0	3 10 0	3 10 0	4 0 0
Tenoning Apparatus £	8 10 0	8 10 0	8 10 0	9 0 0
Spoke Ending Apparatus £	4 0 0	4 0 0	4 0 0	4 0 0
Belt Striking Gear	10/-	12/-	15/-	20/-
Packing for Shipment	12/-	15/-	18/-	27/-
Weight for Shipment cwt.	7	8	12	20
Measure for Shipment cubic feet	18	22	32	58

This Bench can also be fitted with Band Saw Apparatus. Prices on application.

For Prices of Circular Saws, see Index.

CIRCULAR SAW BENCH,

With Boring Table and Band Saw Apparatus.

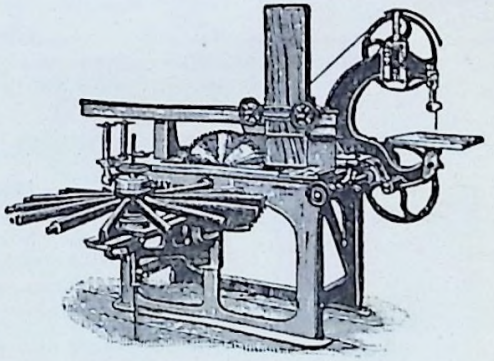


For Hand or Steam Power.

These Benches are similar to the preceding, and are specially designed for Hand Power, having a heavy fly-wheel and handle carrying a leather belt, which runs on the pulley usually provided for steam power. They are, therefore, equally adapted for hand and for steam power. The driving arrangement is simple and effective.

No.	60	70
Price £	15 0 0	17 0 0
Size of Table in.	42×21	48×24
Saw included in.	18	24
Will take Saw up to in.	24	30
Depth Cut by Band Saw in.	6	7
Rising Spindle £	3 0 0	3 10 0
Boring Table and one Auger	2 5 0	2 10 0
Band Saw Apparatus	6 0 0	7 10 0
Spoke Ending Apparatus	4 0 0	4 0 0
Packing for Shipment	1 1 0	1 6 0
Weight for Shipment cwt.	10	12
Measure for Shipment cubic ft.	28	40

JOINER AND WHEELWRIGHT.



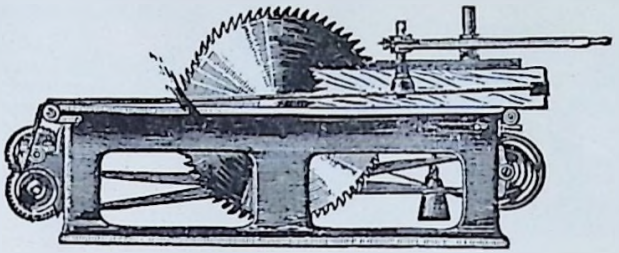
This Machine will do a great variety of work quickly and well. In addition to the ordinary work of a Circular Saw Bench, it has a fence that can be inclined at any angle for cutting bevel work, and a carrier plate for mitreing. The tenoning apparatus will make all the four cuts at one operation, and so accurately as to require no hand labour to fit it into the mortice. The Planing and Moulding Apparatus is simple and effective, working to the widths named in the schedule of dimensions above. The spoke-ending apparatus will end the spokes very quickly and quite accurately. By the use of this Machine a vast amount of labour is saved and better work done than is possible by hand labour.

No.	80	90
Price, with Rising Spindle, Tenoning Apparatus, and Boring Apparatus, four Saws included £	6 0 0	7 10 0
Band Saw Apparatus	4 0 0	4 0 0
Slot Mortising Apparatus	2 0 0	2 0 0
Spoke Ending Apparatus instead of ordinary Boring Apparatus	3 10 0	3 10 0
Planing and Moulding Apparatus	6	7
Depth Cut by Band Saw in.	2½	2½
Width of Planing and Moulding Cutters in.	£1 3 0	£1 1 0
Packing for Shipment	12	15
Weight for Shipment cwt.	34	48
Measure for Shipment cubic ft.		

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IMPROVED SELF-ACTING SAW BENCH.

With Variable Feed Motion.

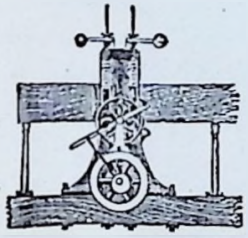


This Bench is of strong construction, and well designed for the heaviest class of work. It is fitted with the simplest arrangements to insure ease in working, and to prevent the possibility of getting out of order. The Saw Spindle, which is made of steel, is fitted with adjustable Lock-nuts to take up the wear, and revolves in three long gun metal bearings. Each Bench is complete with Fine Adjustment Screw, Strong Parallel Rack Fence, Lever Pressure Roller and Weight, Drag Rope, Hook, Strap Fork, and Spanner.

PARTICULARS AND PRICES.

No.	Size of Bench.	Maximum Size of Saw.	Depth of Cut.	Size of Driving Pulleys.	Revs. per min. of Saw.	Approx. Weight.	Average Power Required.	Price.
	ft. in. ft. in.							£ s. d.
1	5 6×2 9	36 in.	15 in.	12×4½	1,000	21 cwt.	6 H.P.	
2	6 0×3 0	42 ,,	18 ,,	14×4½	900	26 ,,	7 ,,	
3	8 0×3 0	48 ,,	21 ,,	16×4½	800	35 ,,	8 ,,	

Two Timber Carriages and 36 ft. of Rails, or 18 ft. of Tram, extending 9 ft. at each end of the Bench. Price £10 10/- extra.



IMPROVED SINGLE DEAL FRAME.

This Machine occupies small space, requires little foundation, and can easily be fastened to floor. It will be found most suitable for Builders, Contractors, &c., who have not sufficient sawing to employ a Double Deal Frame.

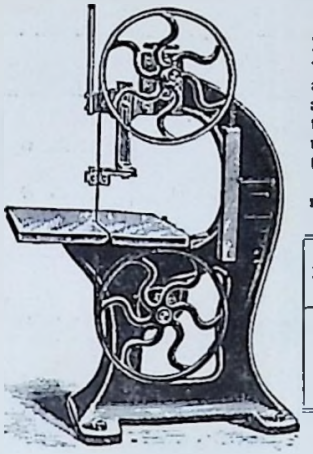
To Saw Deals.	No of Saws will take.	Power Required.	Dia. Fast and Loose Pulleys.	Speed.	Approx. Weight.	Price, complete with Roller Stands.
In.		H.P.	In.	Revs.	Cwts.	
14×4	7	1½	18	250	30	
18×6	11	2	20	200	40	
20×6	11	3	20	190	45	
24×6	11	3½	20	180	50	

At small extra cost Nos. 2, 3, and 4 Machines can be fitted with extra feed Rollers, and made to take in 12 in. wide.

Prices of Log Frames on application.

BAND SAW MACHINE.

A PATTERN.



This machine occupies very little space, and requires less power than any other kind of saw doing the same work. The Saw Pulleys are turned, accurately balanced, and covered with rubber tyres. The Top Pulley is adjustable by screw and spring, and can also be canted to ensure the saw running true. A Guide is provided under the Table; also another adjustable one over the work.

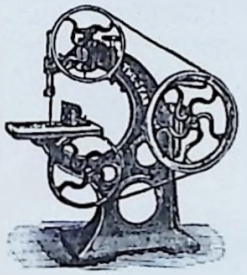
The entire frame is in one casting, thus making the machine very strong, substantial, and steady in work.

No.	Diam. of Saw Pulley.	Size of Table.	Diam. of Fast and Loose Pulleys.	Depth of Timber cut.	Price.
4A	24 in.	27×27 in.	10×3 in.	12 in.	£18
5A	30 ,,	27×30 ,,	12×3½ ,,	14 in.	
6A	36 ,,	33×36 ,,	14×3½ ,,	16 in.	

Larger sizes quoted for on application.

BAND SAW MACHINE.

B PATTERN.



This machine is specially adapted for the use of all, where steam power is not available, though it can be fitted for power-driving if desired. It is all in one casting, is self-contained, and has the advantage of having a long saw, viz., 13 ft. 9 in.

The Table is arranged so that it will cant or swivel to any angle for the purpose of bevel or straight cutting of timber. It is also fitted with angular fence; while the machine is further provided with Patent Tension arrangement, and a neat brass Saw Guide, which is adjustable for thick or thin saws.

If required to cut hard wood by hand power, it is advisable to have the extra heavy Fly Wheel in addition, which is fitted on opposite side to the ordinary one shown in illustration. By this means one man can saw timber 6 in. thick, either straight, circular, or bevel.

Height.	Length of Saw	Depth of Cut.	Distance from Saw to Frame.	Size of Table.	Diam. of Band Saw Pulleys.	Diam. of Fly Wheel.	Revolutions of Driving Pulleys.	Approx. Weight.
5 ft. 2 in.	13ft. 9m.	11 in.	22 in.	20in. square	18 in.	2 ft. 4 in.	300 per min.	5 cwt.

PRICE

With angle Bracket for tenoning, and ½ in. best Band Saw ...	£11 0 0
If fitted to work by Steam Power, with two 9 in. Pulleys, extra ...	0 12 6
Hand Power Machine, fitted with large heavy Fly Wheel, in addition to the usual Fly Wheel, to give increased momentum, diameter 3 ft. 9 in., weight 2¼ cwt., extra...	2 10 0

In ordering, state distinctly whether for Hand or Steam Power, or for both.

For prices of Band Saws see Index.

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HAND MORTISING MACHINE.



No. 2.

This is a well-designed machine. The vertical frame and base are cast in one piece, thereby securing the necessary strength and solidity for first-class work. It will mortise 6 in. deep, and the table will take timber 16 in. by 8 in. wide.

No. 1	PRICE including 8 Chisels, Core Driver, Spanners, &c.	£11 10 0
No. 2	Fitted with Boring Apparatus, 3 Bits for iron and 3 for wood	12 10 0
	If with Improved Tenoning Tools ... extra	2 0 0

IMPROVED SAW SHARPENING MACHINE.



This illustration represents a cheap and efficient arrangement for sharpening Circular and Frame Saws. The sharpening is effected by an emery wheel which is fixed on a revolving spindle carried on a counter-balanced arm. The Vice can easily be set to any angle to suit form of tooth required, and for gulleting, topping, and bevelling. When Circular Saws have to be sharpened, the Frame Saw Vice is removed and replaced by Stud and Vice, as shown. The depth of cut is regulated by an adjustable gauge.

Complete with fast and loose pulleys, one emery wheel 12 in. diameter, and spanner.

PRICE, fitted for either Circular or Frame Saws	£12 0 0
,, ,, both Circular and Frame Saws	14 10 0

PATENT

AUTOMATIC KNIFE GRINDING MACHINE.



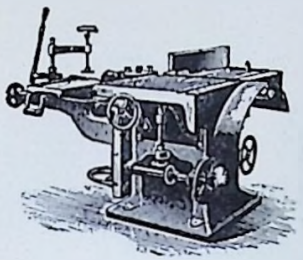
This tool is very compact, and has been specially designed to grind Planes, Knives, &c., in a first-class manner. The emery wheel can be set to grind any depth of cut required. The Knives are ground hollow or concave, and to any desired angle.

PRICE OF MACHINE.

To grind Plane Irons up to			
15	18	24	30 inches long.
£14 0 0	£15 10 0	£17 10 0	£21 0 0

Complete with Fast and Loose Pulleys, Emery Wheel and Spanner.

UNIVERSAL WOOD WORKER.



This is an improved Machine for preparing woodwork of various kinds. It will plane perfectly true and take out all twist in the work, bevel, chamfer, stop chamfer, stick beads, strike moulds either straight or irregular, work sash bars, window bars, tongue, groove, &c., &c. Spindle and Table are prepared for 12-in. Circular Saw for ripping, cross-cutting, and tenoning. The Fence will bevel to any angle. Two side-pressure springs are supplied to keep the timber up to the fence, and top-pressure Roller Spring and Bracket hold it to Cutter. A safety Guard is fixed over the various Cutters.

Power required, ½ H.P. Size of Driving Pulleys on Countershaft, 10 in. × 4½.

Speed of Countershaft, 500 revolutions per minute. Approximate Weight, 20 cwt.

	£	s.	d.
PRICE, complete with Countershaft and one Set of Plane Irons, to plane 12 inches wide			
If made to plane 15 inches wide ... ... Extra	4	10	0
If with Boring and Slot Mortising Apparatus, including one 1-in. Auger, and one ½-in. Slot Mortise Bit .. .. Extra	13	0	0
If with outside Adze Block, and arranged for planing and shaping felloes, and complete with three pairs of Convex Guide Plates 3 ft. 5 in., 3 ft. 11 in., and 4 ft. 6 in. radius, and one pair of 6 in. Irons ... ... Extra	8	10	0

HAND-FEED PLANING AND JOINTING MACHINE.

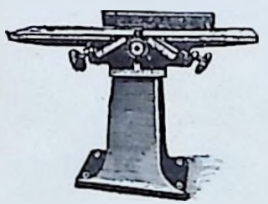
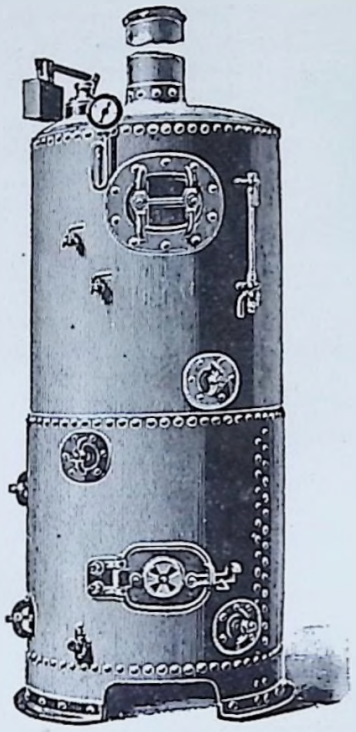


Table is in two parts, both are adjustable, cannot be lowered on the knives, planed true and fitted with safety Guard and adjustable Bevel Fence. A special form of Cutter Block is supplied carrying straight knives so arranged as to work spirally and give a shear cut. Size of Pulleys on Countershaft, 7 in. × 3 in. Speed of ditto, 800 revolutions per minute.

No.	Will Plane.	Approx. Weight	Power required.	PRICE.	Countershaft Extra.	If with Special Cutter block having 3 Knives.
				£ s. d.	£ s. d.	£ s. d.
1	8 in. wide.	7 cwt.	1 H.P.	15 0 0	3 5 0	1 0 0
2	9 ,,	8 ,,	1 ,,	16 0 0	3 5 0	1 0 0
3	12 ,,	9 ,,	1 ,,	19 0 0	3 15 0	1 10 0
4	15 ,,	10 ,,	1½ ,,		3 15 0	2 0 0
5	18 ,,	12 ,,	2 ,,		3 15 0	2 10 0

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VERTICAL CROSS TUBE BOILER.



Above illustration represents a 10-H.P. nominal size. The vertical seam of bottom plate is shown in this position for illustration only, its real position being at back of Boiler.

CONSTRUCTION.

All plates are Siemens' Steel, "Boiler" quality. Manhole and Mudholes, with their respective covers, are fixed in approved positions. All sizes above 9 N.H.P. have faced seatings riveted to crowns for fixing safety and stop valves upon. Ashpits are arranged for unless otherwise ordered. All Vertical Seams of Shells are double riveted, and all Mudholes have Compensation Rings riveted on.

For Prices and Specifications, see opposite page.

Bell's Asbestos-Packed Fittings, see Index.

VERTICAL CROSS TUBE BOILERS.

Nominal Horse-power ...	1	1½	2	2½	3	4	5	6	7	8
Height of Boiler, ft. ins. (Ashpit included)	4 0	4 6	5 0	5 6	6 0	6 6	7 0	7 0	8 0	8 6
Diameter of Boiler, ft. in.	2 0	2 0	2 6	2 6	2 6	2 9	3 0	3 3	3 3	3 6
Height of Firebox ,,	2 1	2 3	2 6	2 9	3 3	3 6	4 0	4 6	4 9	5 0
Diameter of Firebox ,,	1 8	1 8	2 2	2 2	2 2	2 4	2 7	2 10	2 10	3 1
Number of Crosstubes ...	1	1	1	1	2	2	2	3	3	3
Diam. of Crosstubes, ins.	5	5	5	6	6	7	8	8	8	8
Diameter of Uptake ,,	5	5	6	6	7	8	8	9	9	9
Thickness of Shell ...	¼	¼	5/16	5/16	5/16	5/16	5/16	3/8	3/8	3/8
,, Firebox ...	5/16	5/16	5/16	5/16	3/8	3/8	3/8	3/8	3/8	3/8
,, Tubes & Uptake	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
,, Crowns ...	5/16	5/16	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Heating Surface (approximate)	15	16	24	27	32	40	50	62	66	75
Approx. Weight in cwts.	7	8½	11	12	13	19	23	29	32	35
Price ... ... £										
Extras										
Mountings Ordinary £										
,, Asbestos Packed £										

Nominal Horse-power ...	9	10	12	14	15	16	18	20	25	30
Height of Boiler, ft. ins. (Ashpit included)	9 0	10 0	11 0	12 0	12 3	12 6	13 0	14 0	15 0	15 0
Diameter of Boiler, ft. in.	3 6	3 9	4 0	4 3	4 6	4 9	5 0	5 0	5 6	6 0
Height of Firebox ,,	5 3	6 0	6 6	7 0	7 3	7 6	7 9	8 6	9 0	9 0
Diameter of Firebox ,,	3 1	3 3	3 6	3 9	4 0	4 3	4 6	4 6	5 0	5 6
Number of Crosstubes ...	3	3	4	4	4	4	5	6	6	6
Diam. of Crosstubes, ins.	9	9	9	10	10	11	11	11	11	11
Diameter of Uptake ,,	9	10	11	12	13	14	15	16	18	20
Thickness of Shell ...	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
,, Firebox ...	3/8	3/8	3/8	3/8	3/8	3/8	7/16	7/16	7/16	½
,, Tubes & Uptake	3/8	3/8	3/8	⅜ & 5/16	⅜ & 5/16	⅜ & 5/16	⅜ & 5/16	⅜ & 5/16	⅜ & 5/16	⅜ & 5/16
,, Crowns ...	3/8	7/16	7/16	7/16	7/16	7/16	½	½	½	7/16
Heating Surface (approximate)	83	104	118	140	150	167	184	214	267	290
Approx. Weight in cwts.	38	43	52	60	60	74	88	100	115	130
Price ... ... £										
Extras										
Mountings; Ordinary £										
,, Asbestos Packed £										

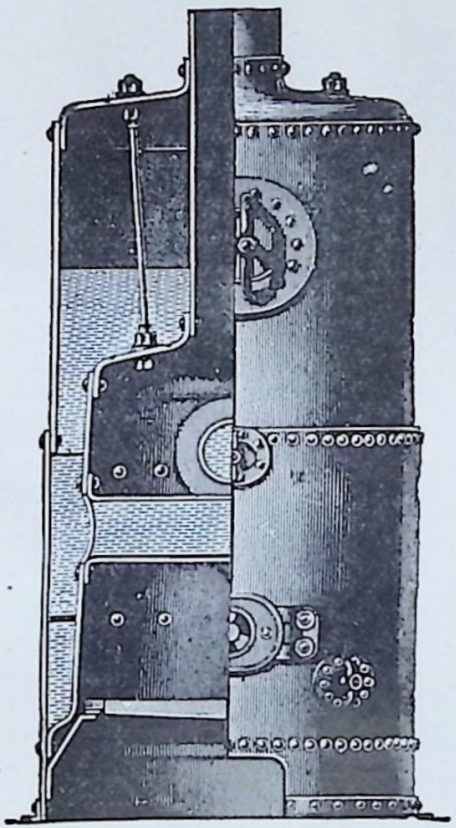
Prices include Firedoor with Air Regulator, Firebars, Firebar-ring, Bearers, Chimney in one straight length. If elbow or cast iron bend, extra price is made. **Mountings** consist of Safety Valve with lever and weight, Steam Gauge, Syphon, Stop Valve, Feed Valve, Water Gauge, Glass and Rings, Test Taps, Blow-off Cock. Stop Valve and Feed Valve are not affixed unless their exact positions are given. Fusible plugs are not supplied unless specially ordered.

If desired, cast iron "Liners" (as recommended by Boiler Insurance Companies) are supplied and fitted in uptake (these being enlarged to admit them) at an extra charge of Five Shillings per N.H.P., minimum charge Twenty Shillings. These "liners" prevent to a large extent the burning away of uptake.

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VERTICAL DONKEY BOILER.

FOR WINCHES, CRANES, &c.



CONSTRUCTION.

All plates are Siemens' Steel, "Boiler" quality. Vertical seams of shells are double riveted. All Mudholes are strengthened by means of straps being riveted round openings. All sizes have faced seatings riveted on crowns for fixing Safety Valve on. Side stays as shown commence with No. 7 Boiler; crown stays with No. 5 Boiler. Ashpits are formed and are included in the height.

For Prices and Specifications, see opposite page.

Bell's Asbestos Packed Fittings, see Index

VERTICAL DONKEY BOILERS.

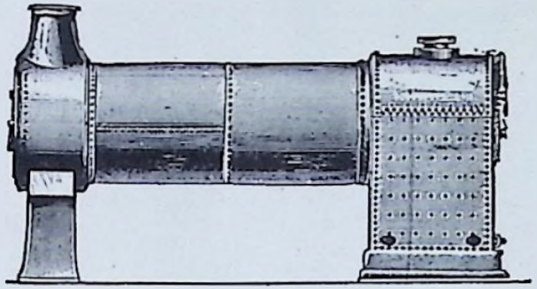
Size or Number	1	2	3	4	5	6	7	8
Height of Boiler ... ft. ins.	5 0	5 6	6 0	6 6	6 6	7 0	7 0	7 6
Diameter of Boiler ... ,,	2 6	2 9	3 0	3 3	3 6	3 6	3 9	3 9
Height of Firebox ... ,,	2 9	3 0	3 0	3 3	3 9	4 0	4 0	4 6
Diameter ,, ... ,,	2 1	2 4	2 7	2 10	3 1	3 1	3 5	3 5
Number and size of Tubes. ins.	1×6	1×8	1×9	2×7	2×7	2×8	2×8	2×9
Thickness of Shell	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16
,, Firebox	5/16	5/16	5/16	5/16	5/16	7/16	7/16	7/16
,, Crowns	5/16	5/16	5/16	7/16	7/16	7/16	7/16	7/16
Approximate Heating Surface ...	24	30	41	47	56	60	67	74
,, Weight in Cwts. ...	15	18	22	26	30	32	34	37
PRICE ... . £								
Extras								
Mountings, Ordinary .. £								
,, Asbestos Packed £								

Size or Number	9	10	11	12	13	14	15	16	17
Height of Boiler ... ft. ins.	7 6	8 0	8 6	9 0	9 6	10 0	10 6	11 0	12 0
Diameter of Boiler ,,	4 0	4 0	4 6	4 6	5 0	5 0	5 6	5 6	6 0
Height of Firebox ,,	4 6	4 9	5 0	5 3	5 6	6 0	6 3	6 6	7 0
Diameter ,, .. ,,	3 7	3 7	4 1	4 1	4 7	4 7	5 1	5 1	5 7
Number and Size of Tubes .. ... ins.	2×9	2×9	3×8	3×8	3×9	3×9	3×10	3×10	3×10
Thickness of Shell ..	5/16	5/16	7/16	7/16	7/16	7/16	7/16	7/16	1/2
,, Firebox ..	7/16	7/16	7/16	7/16	1/2	1/2	1/2	1/2	1/2
,, Crowns ...	1/2	1/2	1/2	1/2	9/16	9/16	9/16	9/16	5/8
Approx. Heating Surface...	78	81	103	106	130	138	160	166	194
,, Weight in Cwts....	42	48	56	64	72	78	86	98	114
PRICE ... ... £									
Extras :									
Mountings, Ordinary £									
,, Asbestos Packed £									

Prices include Firedoor, with Airslide, Firebars, Ring, Chimney 6 feet high, Manhole and Mudholes, with their covers complete. **Mountings** consist of Safety Valve with spring balance, Stop Valve, Feed Valve, Water Gauge with glass and rings, Steam Gauge, Syphon, Test Taps, and Blow-off Cock.

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 259 of 298
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SEMI-PORTABLE BOILER.



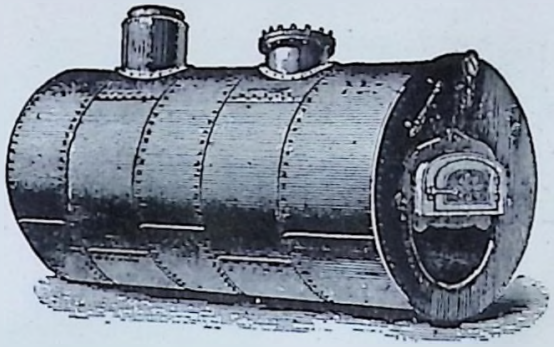
Nominal Horse-power ...	4	6	8	10	12	15	20	25	30
Size across Front ft. ins	2 6	3 0	3 0	3 3	3 6	3 9	4 0	4 3	4 6
Width of Casing ... ,,	2 0	2 0	2 3	2 6	3 0	3 0	3 6	4 0	4 3
Height ,, ,,	3 6	4 0	4 3	4 6	4 9	5 0	5 6	6 0	6 6
Length of Barrel ,, (Excl. of Smoke Box)	4 6	5 9	6 0	6 6	6 9	7 0	7 6	8 0	8 6
Diameter of Barrel ,,	2 2	2 6	2 6	2 9	3 0	3 3	3 6	3 9	4 0
Number of Tubes ..	18	24	28	32	36	40	46	52	60
Thickness of Barrel Plates	5/16	5/16	5/16	3/8	3/8	3/8	3/8	3/8	3/8
,, ,, Shaped ,,	3/8	3/8	3/8	3/8	3/8	3/8	7/16	7/16	7/16
Approx. Heating Surface	71	114	139	169	200	230	280	370	450
,, Weight in Cwts.	28	36	42	48	57	65	79	96	115
PRICE £									
EXTRAS.									
Mountings, Ordinary £									
,, Asbestos Packed £									
Lowmoor Firebox £	10	12	14	16	19				
Colonial ,, £	4	6	8	10	12	15	20		
Travelling Wheels £	16	16	18	18					

Construction.—All Plates are Siemens Steel, "Boiler" quality. Longitudinal seams of Barrel are double riveted. A Manhole and Mudholes with their covers are placed in approved positions. A faced Seating is riveted on for fixing the Safety and Stop Valve upon.

Prices include Chimney, Smokebox, Ashpan, Firedoor, Firebars, Bearers, Standard, Tube Brush. **Mountings** consist of Safety Valve with lever and weight, Stop Valve, Feed Valve, Water Gauge with glass and rings, Steam Gauge, Syphon, Test Taps, Blow-off Cock. Fusible plugs are charged extra, and not supplied unless ordered specially.

4 to 20 H.P. Boilers have Tubes 2¼ in. diameter; 25 to 30 H.P. have Tubes 2¾ in. diameter.

CORNISH BOILER.



CONSTRUCTION.

All plates are Siemens' Steel, "Boiler" quality. The longitudinal seams of the Shell are double riveted in all sizes. The end plates are flanged to fit into the shell as a rule, but we reserve the right to use angle bar connections. A manhole and cover, with compensation ring riveted around opening, is placed on top of Boiler. Faced seatings are attached in approved positions.

Nominal Horse-power	6	8	10	12	14	16	20*	25*
Length of Boiler ... ... ft. ins.	10 0	12 0	13 0	15 0	16 0	18 0	20 0	20 0
Diameter ,, ... ,,	4 0	4 3	4 6	4 9	5 0	5 0	5 6	6 0
,, Flue ... ... ,,	2 0	2 3	2 3	2 6	2 6	2 6	2 9	3 0
Thickness of Shell...	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
,, Flue	3/8	3/8	3/8	3/8	3/8	3/8	7/16	7/16
,, Ends	7/16	7/16	1/2	1/2	1/2	1/2	1/2	1/2
Heating Surface ... ... sq. ft.	125	156	182	234	256	288	350	390
Approximate Weight in cwts.	48	56	66	77	88	100	120	130
PRICE .. .. £								
Extras:								
Mountings, Ordinary ... £								
,, Asbestos Packed £								
Galloway Tubes ... each	55/-	55/-	55/-	60/-	60/-	60/-	60/-	65/-
Dome† ... ... extra, £	7	7	7½	7½	8	8	9	10
Size of Dome in inches	H. D. 21 x 18	21 x 18	21 x 21	21 x 21	24 x 24	24 x 24	27 x 27	30 x 30

Prices include Furnace Front and Door, Dead Plates, Firebars, Bearers, two Soot Doors, Floor Plate and Frame, Damper Frame, Chain, Weight, Pulley.

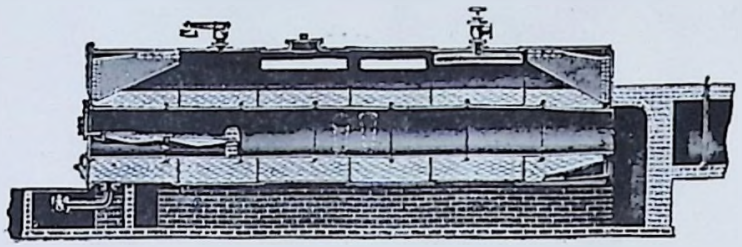
Mountings consist of Safety Valve (single or double according to size of Boiler), Stop Valve, Feed Valve, Water Gauge with glass and rings, Test Taps, Steam Gauge, Syphon, Blow-off Cock. Fusible plugs are not supplied except when specially arranged for.

* Expansion Hoops are adopted in the flues of the Boilers thus marked, enabling them to be worked at 80 lbs. "working pressure."

† Anti-priming pipes are adopted instead of domes; if the latter are required it must be specially mentioned.

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LANCASHIRE BOILER.



CONSTRUCTION.

All Plates are Siemens Steel, "Boiler" quality. Longitudinal seams are double riveted. The Flues have their long seams solid welded, and their circular seams are flanged out, thus making the well-known "Adamson Joint."

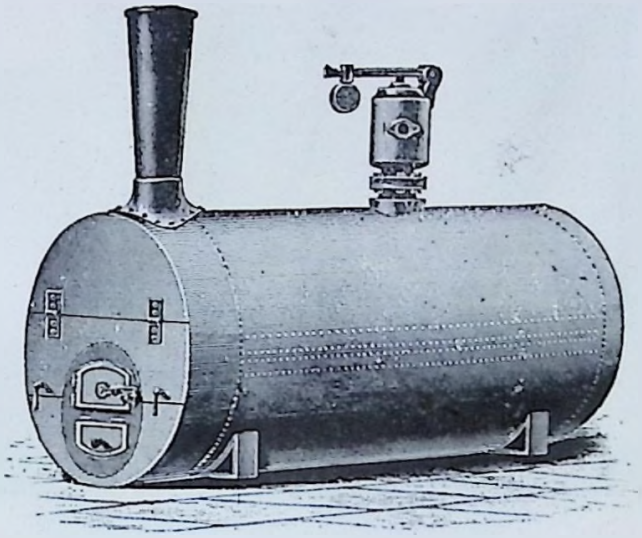
Nominal Horse-power	25	30	35	40	45	50	60
Length of Boiler... ... ft. in.	18 0	22 0	24 0	26 0	28 0	30 0	30 0
Diameter of Boiler ... ,,	6 0	6 0	6 6	6 6	7 0	7 0	7 6
,, Flues ... ,,	2 3	2 3	2 6	2 6	2 9	2 9	2 10½
Thickness of Shell	7/16	7/16	7/16	7/16	½	½	½
,, Flues	⅜	⅜	⅜	⅜	⅜	⅜	⅜
,, Ends	½	½	½	½	9/16	9/16	⅝
Approximate Heating Surface ...	423	517	587	653	780	850	892
,, Weight in Tons ...	7½	9	11½	12½	14	15½	17½
PRICE ... ... £							
Extra:							
Mountings, Ordinary ... £							
,, Asbestos Packed £							
Galloway Tubes ... ... each	55/-	55/-	60/-	60/-	60/-	60/-	65/-

Prices include Furnace Fronts and Doors with Baffle Plates and Air Slides, Firebars, Bearers, Dead Plates, Damper and Frame, Chain, Weight, Pulley, 2 Soot Doors, Floor Plate and Frame, raised Manhole and Cover, Faced Seatings for fixing Safety Valve, Stop Valve, Feed Valve, and Blow-off Cock upon.

Mountings are of extra quality, and consist of double Safety Valves with levers and weights, Stop Valve, Feed Valve with internal pipe, two sets of Water Gauges, Blow-off Cock, Steam Gauge, Syphon and Cock. Fusible Plugs are extra.

HOME AND COLONIAL BOILER.

SELF-CONTAINED.



Above illustration represents a cheaply-constructed and economical type of Boiler. All the heat evolving from the fuel is, practically speaking, "in touch" of effective heating surface.

CONSTRUCTION.

All Plates are Siemens' Steel, "Boiler" quality; longitudinal seams of Shells are double riveted. Manhole and Mudholes with their covers are placed in approved positions.

Nominal Horse-power ...	3	4	5	6	8	10	12	14
Length of Boiler (over all) ft. in.	4 9	5 9	7 3	8 0	8 6	9 6	10 3	11 3
Diameter of Boiler .. ... ,,	2 0	2 6	2 9	3 0	3 3	3 6	4 0	4 3
,, Flue .. ... ,,	1 2	1 6	1 7	1 8	1 10	2 0	2 2	2 4
Number of Tubes	13	20	23	25	28	32	41	45
Heating Surface... ... sq. ft.	41	70	102	126	152	176	270	330
Grate Area* .. .. ,,	3·2	4·7	6·0	7·0	9·0	11·0	13·5	15·5
Approximate Weight in Cwts. ...	14	18	23	30	38	47	58	70
PRICE .. .. £								
EXTRAS:								
Mountings, Ordinary... .. £								
,, Asbestos Packed £								
Travelling Wheels ... .. £	10	11	12	13	14	15	16	17

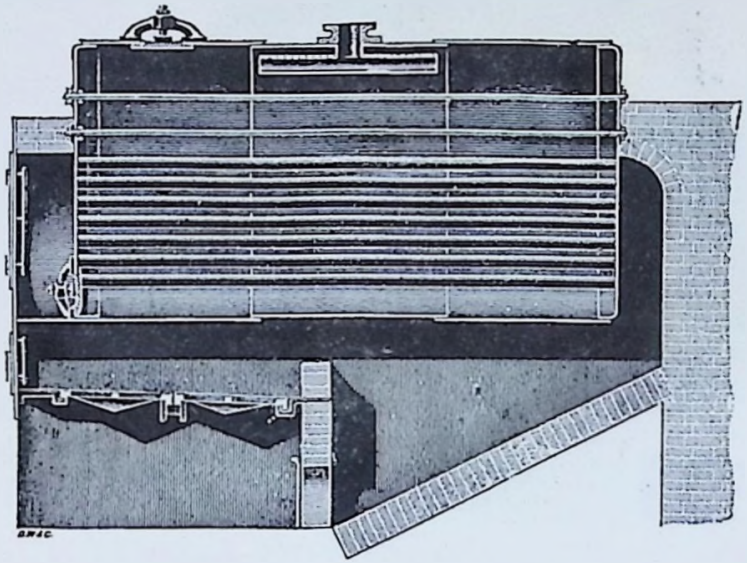
Prices include Furnace Front with Firedoor, Ashpit Door, Airslide, Firebars, Bearers, Dead plates, Smokebox, Chimney, Tube Brush.

Mountings consist of Safety Valve, Stop Valve, Feed Valve, Water Gauge with glass and rings, Test Taps, Steam Gauge, Syphon, Blow-off Cock.

* This may be increased a little if desired.

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HORIZONTAL MULTITUBULAR BOILER.



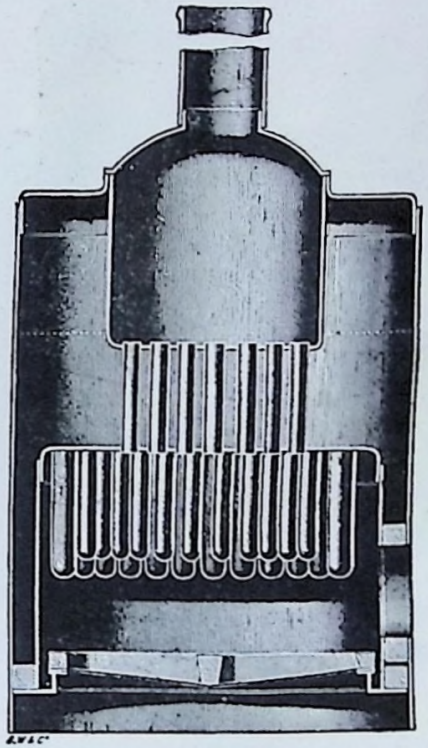
Construction.—All plates are Siemens' Steel, "Boiler" quality, the tubes being of iron and lap-welded. Longitudinal seams are double riveted. Manholes and Mudholes, with their respective covers, are placed in approved positions.

Nominal Horse-power	8	10	12	16	18	20	25	30
Length of Boiler .....ft. ins.	8 0	9 0	9 9	10 0	10 6	11 0	11 0	12 0
Diameter of Boiler ..... ,,	3 9	3 9	4 0	4 6	4 9	5 0	5 6	6 0
Number of Tubes	22	24	26	34	38	40	44	44
Diameter	3	3	3	3	3	3	3¼	3½
Thickness of Shell	⅛	⅛	⅛	⅛	⅛	⅛	⅛	⅛
Thickness of Ends	¼	¼	9/16	9/16	9/16	⅜	⅜	11/16
Appr. Heating Surface ..... sq. feet	160	200	240	320	360	400	500	600
Appr. Weight in cwts.	38	43	50	68	80	94	100	113
PRICE .....£								
Extra:								
Mountings, ordinary .. ..£								
,, Asbestos packed ..... £								
Dome,* extra .....£	6 10	6 10	7 10	7 10	7 10	8 0	8 10	10 0
Dia. and H of Dome ... ins.	18	18	21	21	21	24	27	30

Prices include Furnace Front, Doors, Airslide, Firebars, Deadplates, Damper and Frame, Chain, Weight, Pulley, Two Soot Doors, Smokebox with Doors, Tube Brush, Bars and Bolts for brickwork. **Mountings** consist of Safety Valve with lever and weight, Stop Valve, Feed Valve, Water Gauge with glass and rings, Test Taps, Blow-off Cock, Steam Gauge and Syphon, with their seating and "distance" pipes.

*An anti-priming pipe is adopted instead of dome; if the latter is required it must be specially mentioned.

VERTICAL LAUNCH BOILER.



The illustration represents a new type of Vertical Boiler, specially designed for small steamboats. There is very large heating surface in comparison with its bulk, the vertical tubes (which in many Launch Boilers give so much trouble) are in this case below the "level" of water, shown by dotted line; and the "centre of gravity" is low, because of the little height of Boiler.

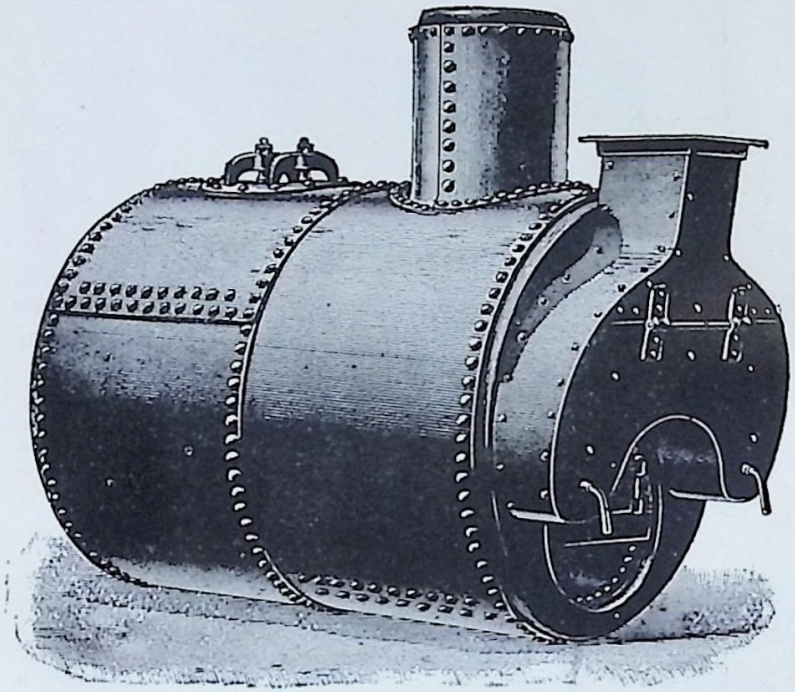
Construction.—Plates are of Siemens' Steel, "Boiler" quality. Vertical seams of Shell are double riveted. Ashpit is formed in base, and is included in height given.

Sizes	1	2	3	4	5	6	7	8	9	10	11
Height of Boiler, ft. ins.	2 6	2 9	3 0	3 6	4 0	4 3	4 9	5 3	5 9	6 3	6 9
Diameter ,, ,,	1 6	1 9	2 0	2 3	2 6	2 9	3 0	3 3	3 6	4 0	4 6
Number of Tubes.....	20	26	34	40	60	69	79	83	93	93	103
App Heating Surface ...	9	12	16	21	37	50	65	80	100	130	160
Grate Area in sq. ft.....	1·0	1·4	2·0	2·8	3·4	4·2	5·1	6·1	··3	10·0	13·0
App. Weight in Cwts....	5	7	9	12	14	16	19	23		37	46
PRICE .....£											
Extras:											
Mountings, Ordinary ...											
,, Asbestos packed											

Prices include Firebars, Firedoor, Bearers and Ring, Smokebox, Chimney, Tube Brush, Manhole and Mudholes, and covers. **Mountings** consist of Safety Valve with spring balance, Steam Valve, Feed Valve, Water Gauge, Steam Gauge, Test Taps, Blow-off Cock.

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MARINE RETURN TUBE BOILER.



Construction.—All plates are Siemens', Steel, "Boiler" quality; the tubes are Iron, lap-welded; faced seatings are attached for fixing the larger mountings upon. All longitudinal seams of Shells are double riveted. Manholes and Mudholes are placed in approved positions

Nominal Horse-power ...	4	6	8	10	12	16	20	25	30
Length of Boiler ft. in.	4 6	5 0	5 6	6 0	6 6	7 0	7 6	8 0	8 6*
Diameter of Boiler ... ,,	4 0	4 0	4 6	5 0	5 6	6 0	6 6	7 0	7 6
Diameter of Flue ... ,,	2 0	2 0	2 3	2 6	2 9	3 0	3 3	3 6	2 3
Number of Tubes	30	34	40	48	54	60	70	80	90
Diameter of Tubes ... in.	2¼	2½	2½	2½	2½	2¾	2¾	2¾	3
Height of Dome ft. in.	1 9	1 9	2 0	2 0	2 3	2 6	2 6	3 0	4 0
Diameter of Dome ,,	1 6	1 6	1 9	2 0	2 0	2 3	2 3	2 6	2 0
App. Heating Surface ...	90	128	166	220	269	320	410	500	600
App. Weight in Cwts. ..	40	48	60	74	87	104	125	150	186
PRICE ... . £									
Mountings, ordinary £									
,, Asbestos packed £									

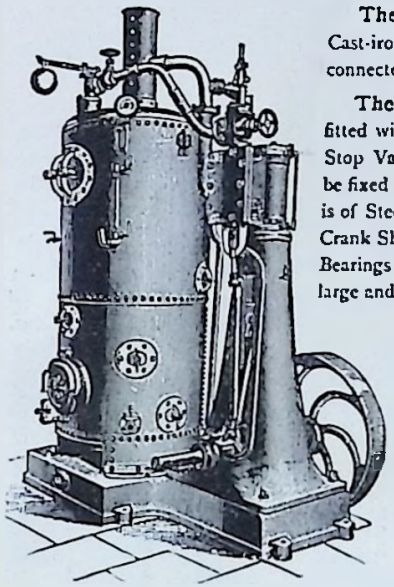
Prices include Smokebox and Doors, Chimney one and a half times length of Boiler, Furnace Front and Door, Firebars, Bearers, Dead Plates, Tube Brush.

Mountings consist of Safety Valve, single or double (as passed by Lloyd's), Stop Valve, Feed Valve, Water Gauge, Test Taps, Blow-off Cock, Steam Gauge, Syphon, and Cock, all of extra quality

Boiler marked * has two Flues and Horizontal Dome.

We do not guarantee the above "to pass" Lloyd's or the Board of Trade, but they may be made to do so at a little extra cost.

VERTICAL ENGINES AND BOILERS.



The Engine and Boiler are both fixed on a Strong Cast-iron Base, which forms a water tank, and are connected by steam and water pipes.

The Engines are strong and well finished, and are fitted with High Speed Governors, Equilibrium Valve and Stop Valve combined, and turned Fly Wheel, which can be fixed at either end of Crank Shaft. The Crank Shaft is of Steel, and of large diameter. The Bearings carrying Crank Shaft and Frame Work are all in one casting, and Bearings are of best Gun Metal. All wearing surfaces are large and well arranged.

The Boilers are of the Cross Tube Type, made of Mild Steel Plates, and tested to 140 lbs. per square inch Hydraulic Pressure. The Vertical Seams of Shell are Double Riveted, and Ashpits are formed in the base of the Boilers, and included in height given below.

The following Fittings and Mountings are included:—

Fire-door with Air Regulator, Fire-bars, Bearers, Fire-bar Ring, Chimney, Manhole with Cover and Bridges, Manholes around bottom of Boiler and are opposite each Tube, Safety Valve with Lever and Weight, Steam Gauge, Stop Valve, Feed Valve, Water Gauge, Test Cocks and Blow-off Cock.

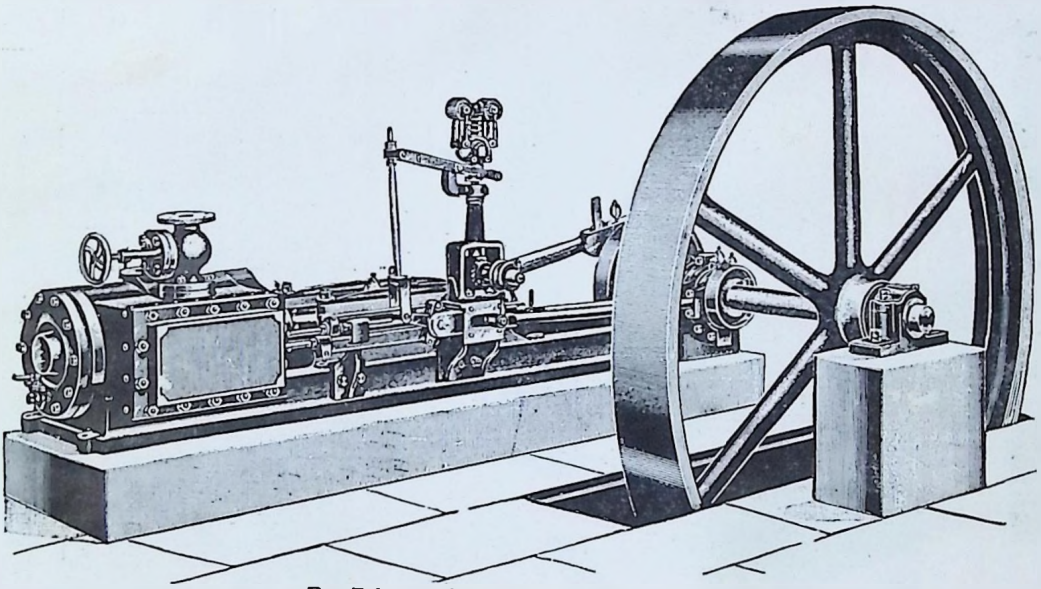
DIMENSIONS.

Vertical Engine.							Boilers.			Price.		
Nom. H.P.	Diam. of Cylinder.	Length of Stroke.	Diam Crank Shaft.	Fly Wheel. Diam.	Fly Wheel. Width	Speed per Minute.	Diam	Height.	No. of Tubes	Engine and Boiler Complete.	Engine only.	Cylinder covered Sheet Steel, Brass Bands
	In.	In.	In.	In.	In.	Revs.	Ft.	Ft.		£	£	£
4	6½	9	2⅜	30	6	200	2¼	6½	2			
5	7¼	10	2⅜	33	6	180	3	7	2			
6	8	12	2¾	39	6	160	3¼	7½	3			
8	9½	14	3	45	6	150	3½	8½	3			
10	10	15	3½	54	6½	130	4	9	4			
12	12	16	3¾	60	6½	120	4	11	4			

For other Patterns of Governors, see Index.

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HORIZONTAL HIGH-PRESSURE STEAM ENGINE.



For Prices and Particulars see opposite page.

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HIGH PRESSURE STEAM ENGINES.

The Engine illustrated on preceding page is worked on the Double Slide principle, and has full-sized Cylinder, with long stroke. It is finished in first-class style, strongly and accurately made, and is modern in construction; and is fitted with High Speed Governor, Equilibrium Valve and Stop Valve combined. The Piston Rod, Cross-head, and Crank Pin are made of Steel, and Connecting Rod of best hammered wrought iron, turned and polished. The Valves are well and carefully arranged, and work with economy and durability. The working parts, which are few in number, are strong and accurately fitted on massive box-pattern bed, and all are easy of access. The Slides are recessed at the bottom for holding oil, and have grit cavities at each end; they are neatly designed and bright.

The Engine is complete with Pump, Turned Fly-wheel, End Pedestal, and all necessary Lubricators and Grease Cups. This Engine can be easily fixed, little foundation being required.

A Condenser can be added to Engines, when ordered, with 12-inch Cylinder and upwards, and, where sufficient water is available, ensure the greatest economy in fuel and steam, besides considerably increasing the power of the Engine.

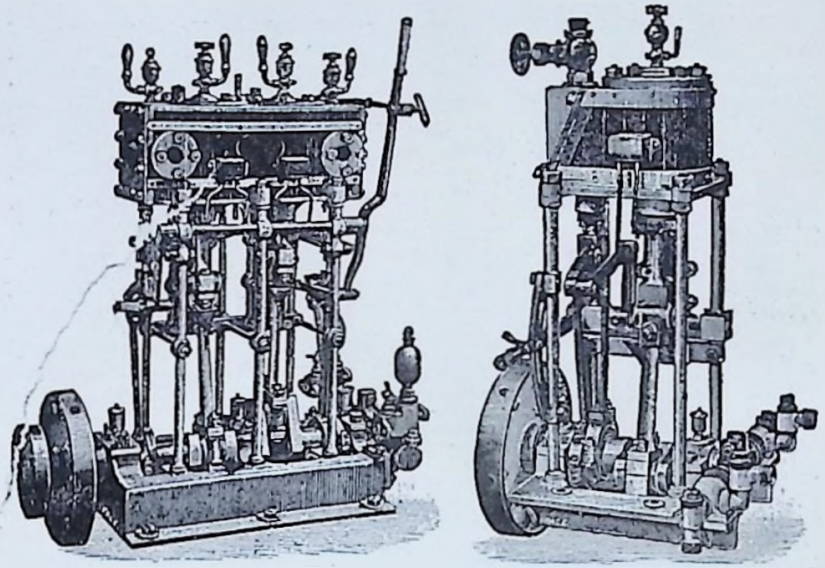
DIMENSIONS.

N.H.P.	Diameter of Cylinder.	Length of Stroke.	Speed per Minute.	Fly-wheel.				Price.			
				Diameter.	Width.	Diameter of Shaft.	Length of Shaft.	Complete with Pump.	Cylinder covered, Sheet Steel, Brass Bands.	Meyer's Variable Hand Expansion.	Horizontal Condenser.
	In.	In.	Revs.	Ft.	In.	In.	Ft.	£	£ Ext.	£ Ext.	£ Ext.
4	6	12	150	3½	5	2½	3½				
5	7	14	140	4½	5½	2¼	4				
7	8	16	120	5	6	3¼	4½				
9	9	16	110	5	6½	3½	5				
12	10	20	100	6	7	4	5½				
13	11	20	100	6	8	4¼	5½				
14	12	24	80	7	8¼	4½	5½				
16	13	24	80	8	8½	4¾	5½				
16	13	26	80	8	9	5	5½				
20	14	28	80	8½	9	5½	5½				
25	15	30	75	9	10	6	5½				
27	16	30	70	9	11	6½	5½				
27	16	36	70	9	12	7	6				
30	17	30	70	9	12	7	6				
35	18	30	70	9¼	12	7¼	6				
35	18	36	65	10	12	7½	6				
40	20	36	65	10	14	7¾	6				
40	20	40	60	12	12	8	6¼				
50	22	42	60	12	14	9	6¼				

For Feed Water Heaters and other patterns of Governors, see Index.

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LAUNCH ENGINES.



The above Illustration shows Double and Single Cylinder Launch Engines. They are designed with a view to the greatest amount of strength, durability, and lightness. The crank shafts, as also piston rods, crossheads, connecting-rods and columns, are made of best steel. The cylinders and bases are cast from a special mixture of very tough and strong iron. The whole is highly finished and of very best materials and workmanship.

ENGINE.—Inverted cylinders mounted on turned and polished steel columns or cast-iron frame, as desired. Strong cast-iron bed-plate, with blocks cast solid for carrying crank-shaft brasses, which are adjustable. Best forged iron or steel crank-shaft, machined and polished all over. Steel link-motion reversing gear, with extra broad wearing surfaces. Gun-metal stop valve, grease cups, lubricators, and pet-cocks. Two pumps (feed and bilge) fixed to end of bed-plate and worked direct from engine crank-shaft. The cylinders, lagged with mahogany or teak, and brass bands.

SHAFTING, &c.—Propeller shaft of steel, with solid forged coupling and intermediate shaft when necessary; thrust block, fitted with brasses; suitable stern tube, fitted with gun-metal gland, bushes, and lignum-vitæ packing. Propeller of best cast-iron (or gun-metal at extra cost).

BOILER.—Horizontal type, with large steam dome, of ample size for free steaming. Wrought-iron furnace bars, pressure gauge, safety valve, two water gauges, blow-off and scum cocks, steam valve, whistle, brass filling plug on dome, blast cock and pipe. The boiler is made of the best quality iron or steel, with brass tubes, and tested by hydraulic pressure to 200 lbs. per square inch. With the Boiler are included firing tools, and set of spanners; also requisite lengths of copper pipes, flanges, &c., for fixing the machinery in the boats.

DIMENSIONS.

Dia. of Cylinders. Ins.	4	5	6	7	8	9	10
	£	£	£	£	£	£	£
Engine (Single) only ...							
,, ,, with Shafting							
,, ,, ,, Boiler & Shafting ..							
Engine (Double) only ..							
,, ,, with Shafting							
,, ,, ,, Boiler & Shafting							

CIRCULAR FIRE-BARS.

For Vertical Boilers.



View showing Underside of Bars.

These Bars are cast off well-designed and accurate patterns, each segment being formed of two bars, so that they can easily be got into position through a small fire-door, and the risk of unequal contraction is reduced to a minimum.

A recess is cast on two sides of the circle to allow for the seams of rivetted fire-boxes.

The sizes given below are the approximate diameters of the Fire-Bars, which should be from ½ in. to 1 in. less than fire-box:—

PRICES.

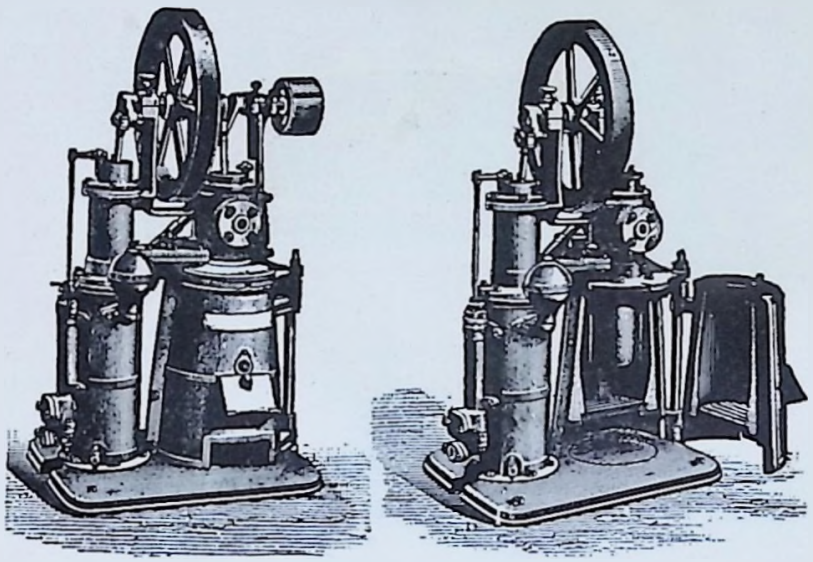
Diam.	Per set.	Diam.	Per set.
22 inches	£0 17 3	33 inches	£1 15 9
23 ,, ...	0 18 3	34 ,, ...	1 17 9
24 ,, ...	0 19 6	35 ,, ...	1 19 6
25 ,, ...	1 1 3	36 ,, ...	2 1 6
26 ,, ...	1 3 0	37 ,, ...	2 3 0
27 ,, ...	1 4 9	38 ,, ...	2 5 0
28 ,, ...	1 6 9	39 ,, ...	2 6 9
29 ,, ...	1 8 6	40 ,, ...	2 8 6
30 ,, ...	1 10 0	41 ,, ...	2 10 6
31 ,, ...	1 12 0	42 ,, ...	2 12 3
32 ,, ...	1 14 0		

Prices of Straight Bars for Portable and Stationary Boilers quoted on application.

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IMPROVED HOT-AIR ENGINE.

(PATENT.)



Illustrations show Engine fitted with pump suitable for **shallow wells not exceeding 28 feet** in depth.

This Hot-air Engine has attained a high position for itself, and is undoubtedly the best engine for domestic use and water supply; and, coupled with the late patented improvements, is suitable for all practical work.

The fire-box is made removable, the engine on that side being supported by a column. The form and proportions make it almost impossible to damage the heater excepting by gross carelessness; and if necessary to renew the heater, it can be done by simply unbolting the fire-box and replacing it when the new heater is attached. In the No. 1 and No. 2 sizes, the two halves of fire-box swing open on hinges, as shown in illustration.

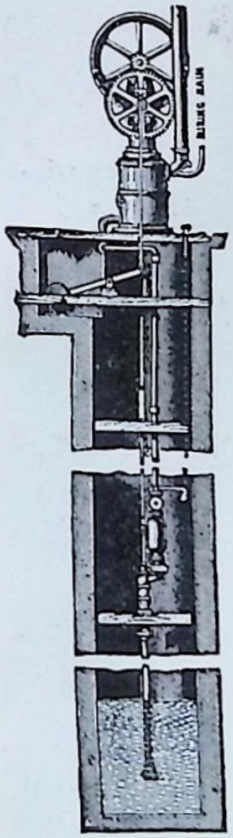
Suction pipe should have a retaining valve at bottom.

DIMENSIONS.

Diameter of Pump.	Plungers.		Diameter of Pipes.		Delivery.		Speed.	Price.	
	Diameter.	Stroke.	Suction.	Delivery.	Per Hour.	Height of.		½-H.P. No. 2.	1-H.P. No. 3.
	In.	In.	In.	In.	Galls.	Ft.	Rev.	£	£
1	6¼	9	1	1	220	180	120		
½	6¼	9	1¼	1¼	320	125	20		
2	6¼	9	1½	1½	600	70	120		
2¼	6¼	9	2	1½	720	58	120		
2½	10	13	2	1½	1,100	80	100		
2¾	10	13	2½	2	1,320	65	100		
3	10	13	2½	2	1,540	55	100		
3½	10	13	2½	2	1,900	40	90		
If fitted with Driving and extra Standard									
If arranged to be used for either Power or Pumping									

IMPROVED HOT AIR ENGINES.

(PATENT.)



A

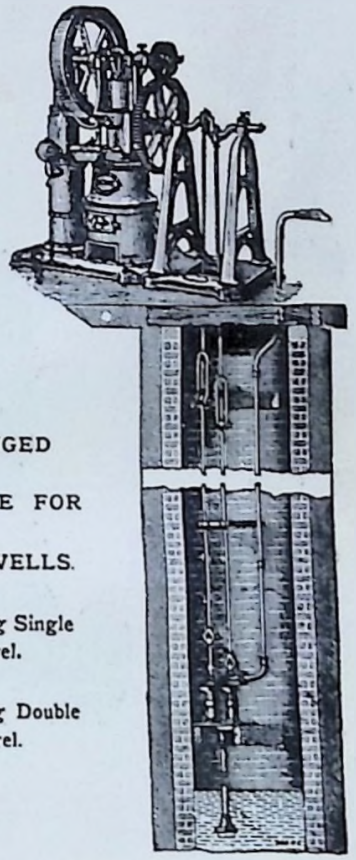
ARRANGED

SUITABLE FOR

DEEP WELLS.

A showing Single Barrel.

C showing Double Barrel.



C

Engines, Pumps, Pipes, &c., are quoted for without stages, unless specified.

Illustration.	Size of Engine.	Pumps.	Depth of Wells.			
			60 ft.	80 ft.	100 ft.	200 ft.
			£	£	£	£
A.	½ HP.	Single Barrel				
A.	1 ,,	,, ,,				
C.	½ ,,	Double ,,				
C.	1 ,,	,, ,,				

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THE "PICKERING" PATENT

STEAM ENGINE GOVERNOR.

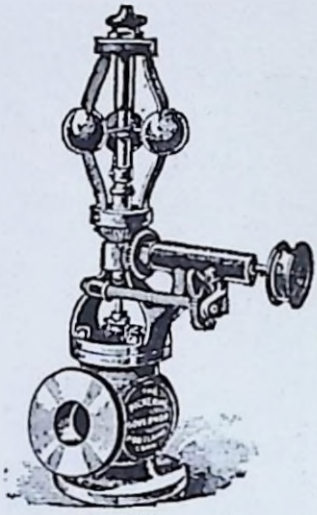


Fig. 1500

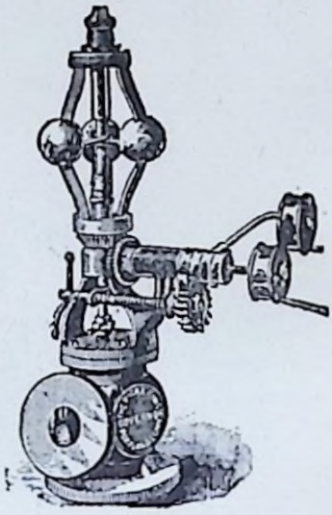


Fig. 1504.

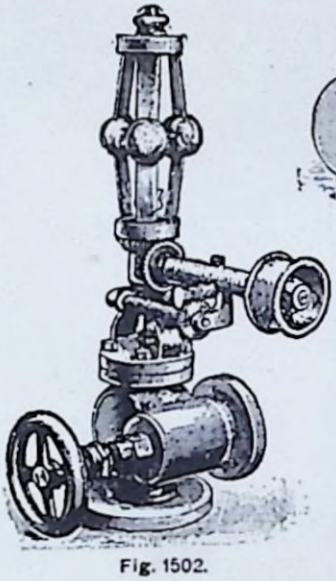


Fig. 1502.

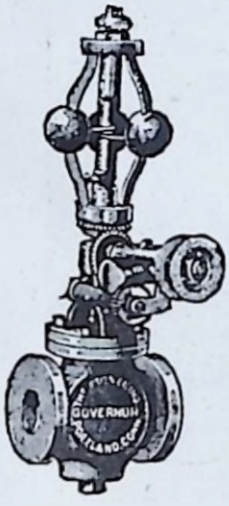


Fig. 1508.



Fig. 1506.

DESCRIPTION.

Fig. 1500 represents the ordinary Governor with Spiral Speed Adjuster. The tension is adjustable by means of a worm and worm wheel, which may be manipulated while engine is in motion, thus adjusting the speed according to requirements.

Fig. 1502 is provided with combined Stop Valve arrangements.

Fig. 1504 is the ordinary Governor provided with Automatic Stop Motion. Should the belt break or slip off either pulley, the connection between the Governor and Valve is severed, steam is instantly shut off, the valve being closed and locked in that position until the belt is properly adjusted.

Fig. 1506 is a special horizontal arrangement, suitable for cases in which there is not sufficient room for the vertical type.

Fig. 1508 has a straight through valve chamber.

For Prices see next page.

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THE "PICKERING" PATENT STEAM ENGINE GOVERNOR.

PARTICULARS AND PRICES.

Diameter of Steam Pipe	¾	1	1¼	1½	1¾	2	2½	3	3½	4	5	6	Inches.
Diameter of Steam Cylinders suitable for	2½ to 3½	4 to 5	5 to 6	6 to 8	7 to 9	8 to 10	10 to 12	12 to 15	14 to 17	16 to 20	20 to 25	24 to 34	Inches.
Size of Pulley attached to each Governor	1½ × ¾	2 × 1½	2 × 1½	3 × 1½	3 × 1½	3 × 1½	4 × 2	5 × 2½	5 × 2½	5 × 2½	5 × 2½	6 × 2½	,,
Average speed per minute	500	300	300	420	420	420	380	320	320	320	275	275	Revolutions.
Extreme height	15	19	20½	25	26	26	31½	36	37½	44	48	52	Inches.
Distance from centre of Governor to centre of Pulley (this may be varied)	4¼	7	9	9	9	9	10½	12	12	13½	14¼	14¼	,,
Distance from base of Governor to centre of Steam Pipe	2	2½	3¼	3½	4¼	4¼	5⅛	5½	6¼	7½	8	8½	,,
Diam. of Bottom Flange	3½	4½	5	6	7	7	7½	9	10	11	12	13	,,
Diam. of Side Flange	Screwed.		5	5½	6	6½	7	7½	8½	9	10½	12	,,
Fig. 1,500 Price	65/-	70/-	75/-	85/-	95/-	105/-	150/-	190/-	230/-	280/-	360/-	460/-	Each
,, 1,502 ,,				98/-	110/-	120/-	175/-	220/-	275/-	335/-	430/-		,,
,, 1,504 ,,	72/-	78/-	85/-	95/-	106/-	117/-	168/-	210/-	255/-	310/-	400/-		,,
Speed of Horizontal Governor (Fig. 1,506)	500	400	400	380	380	380	—	—	—	—	—	—	Revolutions.
Diam. of Pulley ditto ditto	1½ × ¾	2½ × 1⅜	2½ × 1⅜	3 × 1½	3 × 1½	3 × 1½	—	—	—	—	—	—	Inches.
Extreme length of Governor	15	19	20	24	25½	25½	—	—	—	—	—	—	,,
Fig. 1,506 Price	65/-	70/-	75/-	85/-	95/-	105/-							Each.
Fig. 1,508 ,,	65/-	70/-	75/-	85/-	95/-	105/-	150/-	190/-	230/-	280/-	360/-	460/-	,,

These Governors are constructed to stand a working steam pressure of 160 lb. per square inch.

Prices of larger sizes quoted on application.

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 269 of 298
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PROELL'S PATENT SPRING GOVERNOR

Combined with Throttle Valve, for Strap Driving.

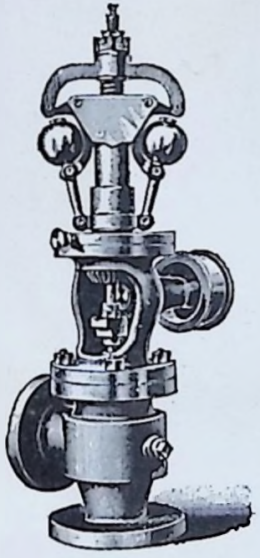


FIG. 3.

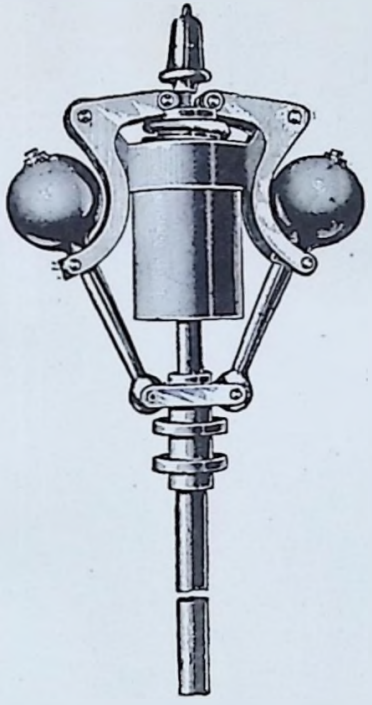


FIG. 4.

FIGS. 3 and 4 represent Proell's Patent Spring Governor. FIG. 3, combined with a throttle valve. For this purpose an extremely simple and neat Governor has been designed, which differs from the original form mainly in the fact that the spring is in tension instead of compression.

Proell's Patent Spring Governor is strongly recommended for any kind of medium speed throttling engines, stationary, electric light, portable, and particularly **marine engines.** This Governor, owing to its sensibility and power, will effectively and absolutely prevent racing of the propeller in a heavy sea; its action is almost instantaneous, and its power more than sufficient to actuate the throttle valve.

It has not been considered desirable to combine a stop valve with the governor throttle valve, as it is preferable from every point of view that the governing apparatus should be as free as possible from complication.

PROELL'S PATENT SPRING GOVERNOR.

Is the **most powerful** engine regulator ever constructed.

Combines the **greatest sensibility** with the **most perfect steadiness of running.**

Is of the **simplest construction,** can never get out of order, and is subject to the least possible wear.

Is **cheaper** than any other Governor **which gives out the same energy** with the same variation of speed.

Is **perfectly balanced:** it is the only Governor which is not subject to the influence of gravitation, and **works, therefore, equally well in any position**—vertical, horizontal, or inverted.

Is therefore the only reliable Governor on board ship for marine as well as electric light engines.

Is the only Governor that admits of the application of an auxiliary spring to vary the speed of the engine while running, retaining at the same time the correct relation between centrifugal force and spring power.

Proell's Patent Spring Throttling Governors are made in accordance with the following list:—

STANDARD SIZES OF THROTTLE VALVES AND GOVERNORS.

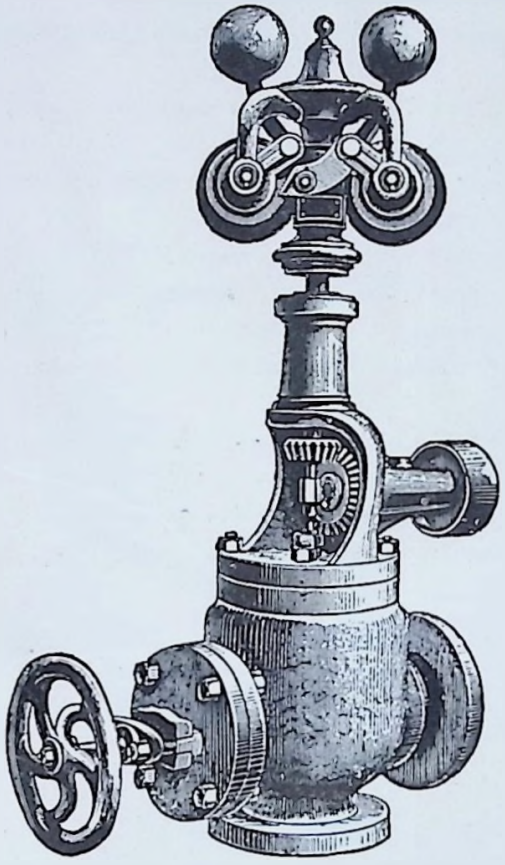
No. of Governor	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XIII.
	In.	In.	In.	In.	In.	In.	In.	In.	In.
Diameter of Steam Inlet...	1½	2	2½	3	3½	4	4½	5	6
Centre of Body to Face of Side Flange	5⅛	5⅛	5¼	5¼	7	7	7½	7½	9
Centre of Side Branch to Face of Bottom Flange	4	4⅛	4½	5	6	7	7½	8	9
From centre of Stand to centre of Pulley	7½	7½	7½	10	10	10	10	10	10
From centre of Side Branch to centre of Shaft	7 7/16	8 1/16	7 13/16	8 7/16	8⅝	9½	10	10⅛	11⅛
From Bottom Flange to top of Governor, approximately	28	28½	28½	29½	31	33	33½	35	37
Diameter of Pulley	4⅛	4⅛	4⅛	4⅛	4⅛	4⅛	4⅛	4⅛	4⅛
Width of Pulley	2	2	2	2	2	2	2	2	2
Revolutions of Governor per minute	250	250	250	250	250	250	250	250	250
PRICES	290/-	310/-	370/-						

Prices and Particulars of Stop Valves, see Index.

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STEAM ENGINE GOVERNOR.

WITH EQUILIBRIUM AND STOP VALVES.



No. 25.

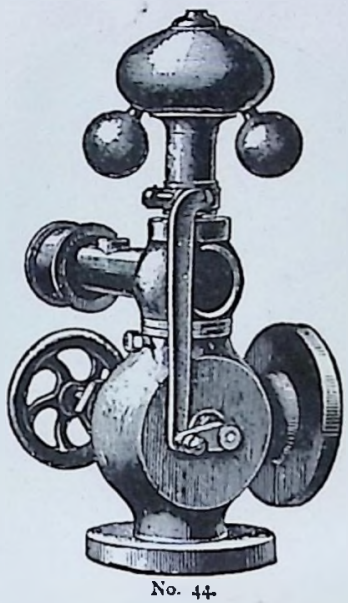
This Governor maintains its position as a most perfect Steam Engine Governor, and is specially recommended wherever the greatest possible **regularity of speed** is required. Although only revolving at a moderate speed, it is much more sensitive and powerful than other Governors of similar dimensions, and its **energy is constant** in all positions of the muff. Having no springs or parts subject to wear, it is most durable and reliable.

DIMENSIONS.

Size of Steam Pipe	¾	1¼	1½	2	2½	3	3½	Inch
Extreme Height	21	23	26¼	27¾	32½	37¼	39½	Each
Driving Pulley { Revolutions	145	145	135	135	124	117	117	Per min
Driving Pulley { Diameter ...	3⅛	3⅛	3⅛	3⅛	4⅛	4¼	4¾	Inch
PRICE .. .. £	7 15	8 10	9 10	10 15	12 0	15 10	17 15	Each

STEAM ENGINE GOVERNOR

WITH EQUILIBRIUM AND STOP VALVES.



No. 44.

This Governor is **specially adapted for Small Engines** working under varying loads; it possesses the advantages of an easy motion with sufficient stability, rendering it particularly applicable for small high-speed engines of all classes.

The throttle valve, being of the rotary type, is completely equilibrated, and therefore only offers **a very small resistance** to motion of Governor. Stuffing-box on throttle valve spindle is replaced by a conical valve seating, which is kept tight by pressure of steam in valve. Governor proper is supported near top upon a fixed steel spindle, thus reducing friction to a minimum, and wear in toothed wheels is almost obviated.

The lateral arm supporting driving pulley may be turned round to suit conditions of driving the Governor.

DIMENSIONS.

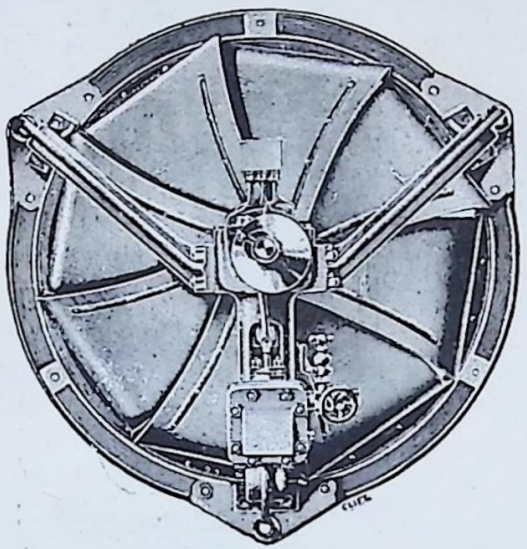
Size of the Steam Pipe ...	¾	1	1¼	1½	2	... Inch.
Extreme Height	12	12	13½	14½	15¼	... Inch.
Driving Pulley { Revolutions	300	300	300	300	300	Per Minute.
Driving Pulley { Diameter...	2⅛	2⅛	2⅛	2⅛	2⅛	... Inch.
PRICE	£ s. 5 0	£ s. 5 10	£ s. 6 0	£ s. 6 15	£ s. 8 0	...Each.

Stock sizes have steam inlet on the right, and driving arm to the left, as seen from hand-wheel.

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VENTILATING FANS.

With Direct-Coupled Driving Engines.



These Fans are largely used for the ventilation of Ships' Holds, Factories, and other buildings, and also for forced draught. In many cases it is much more convenient and less expensive to drive by means of a direct-coupled engine, involving only the coupling of steam and exhaust pipes, than by means of shafting.

The illustration shows a Fan with Engine arranged vertically, but, where needed, they are also fitted to work horizontally, and with the Engine on either the suction or delivery side of the Fan as required

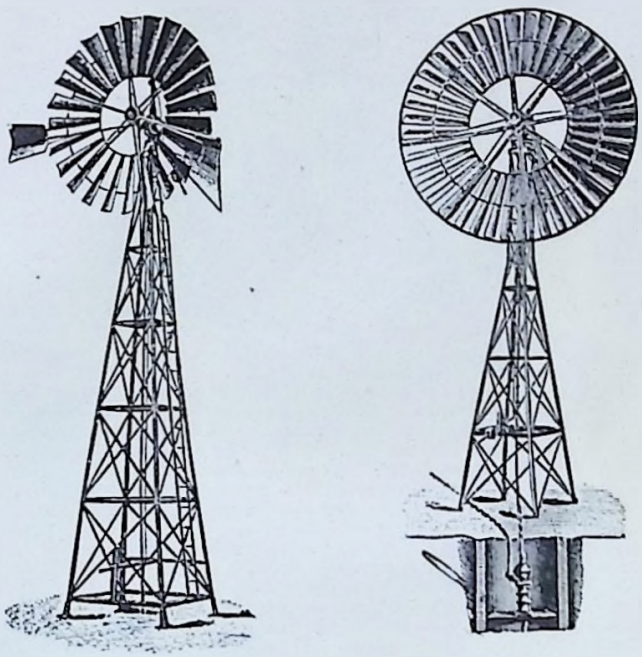
The Engines are complete with steam valve and lubricating arrangement for every working part, and are thoroughly well made in every detail. Each Fan and Engine is tested under steam when complete; as fitted together, Fan, Ring Frame, and Arms form the neatest and most compact combined ventilating plant made

We list three sizes of Fans only, 30-in., 36-in., and 42-in. diameter, but shall be glad to quote for Fans of larger diameter and different types on receipt of specification

Sizes	30-inch.	36-inch.	42-inch dia.
Revolutions of Fan per minute ...	450—750	400—650	350—600
Cubic Feet of Air moved per minute	5,000—9,000	7,700—14,000	11,500—20,000
Price of Fan and Engine, complete as illustrated	£	£	£

Ventilating Fans also supplied driven by Belt or Electric Current.

PATENT WIND ENGINES.



For pumping water supplies to villages, mansions, farms, nurseries and public institutions.

Also, for irrigation, drainage, driving barn machinery, dynamos, and a variety of other work.

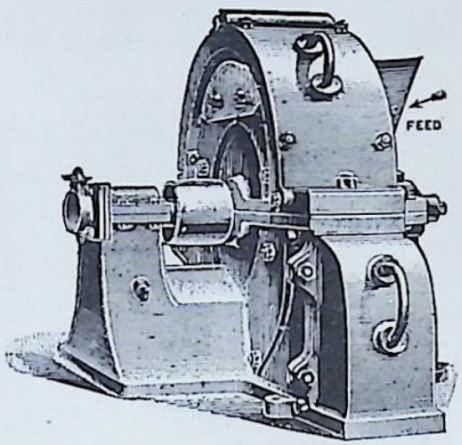
Supplied with or without pumps, or with gearing for driving purposes

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Special quotations given and plans furnished to suit requirements, on application.

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DISINTEGRATOR AND DRESSER.



No 3½

These Disintegrators are suitable for every kind of grinding and the fineness to which things are ground may be varied to suit the different requirements. The grinding is done by percussion. The material is fed in at the periphery of a grinding chamber, and falling on the extremity of the beaters, which travel at about three miles per minute, is pulverised by them, or by being beaten against the serrated chilled iron linings of the upper half of the chamber. The ordinary frictional grinding machines, operating with two corrugated iron surfaces require these surfaces to be set close together in order to produce a fine sample. The friction thus set up soon polishes the iron flutes or corrugations, and when this occurs, grinding can only be produced by extreme pressure, engendering considerable heat, and absorbing enormous power.

The main body of machine is of cast iron, the inner linings or renewable plates of the hardest chills, the spindles of steel, the bearings of phosphor bronze, beaters of Lowmoor iron, faced with steel, screens of wrought iron sides and steel bars or strong special perforated steel plates. All these materials are of the best description. The workmanship is of the best.

There are from four to six beaters to a set made of the best Lowmoor iron and faced with highly tempered steel, forged on. **The beaters are set so that in running they travel in three paths, thus covering the whole available space of the beater chamber.** When worn at ends they can be refaced with steel by any good blacksmith. They must then be put into the disc, and the **whole centre be most carefully balanced. This is absolutely necessary.** Two sets are included in the price of each machine.

The Screens are "made with the perforated or mortised spaces perfectly level on the inside face, and under the full rush of the beaten material, thus keeping them open."

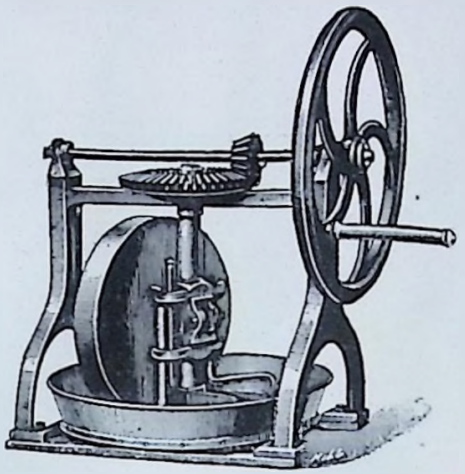
They can be quickly changed, and a finer or coarser mesh substituted as required Three pairs are included in the price of each machine.

The Spindles are made of steel with a self-oiling arrangement.

PRICES AND MEASUREMENTS AS UNDER:—

Size No.	Diameter of Beater Chamber.	Revolutions per Minute.	Approximate Nominal H.P.	Diameter of Pulley.	Width of Belt.	Size of Feed Inlet Hole in inches.	Shipping Measurements	Shipping Weight Packed.	Price.	Automatic Finger Feed.	Automatic Worm Feed Extra.
	In.			In	In.			Cwt.	£	£	£
0	12	5,000	1½ to 2½	3	2	3¼ × 2¼	28 × 28 × 21	4½	15		
00	17	4,000	3 to 4	4	3	6 × 5	34 × 24 × 22	7½	20	6	
1½	20	3,300	4 to 6	4 to 5	4	6 × 6	37 × 35 × 34	11½			
2½	30	2,500	6 to 8	6 to 8	5	8½ × 6½	44 × 43 × 41	19			
3½	39	1,700	10 to 12	9 to 11	6	9½ × 7½	104 × 56 × 48	40			
4½	54	1,300	15 to 20	12 to 15	8	12½ × 10½	81 × 71 × 69	90			

EDGE RUNNER ROLLER MILL.

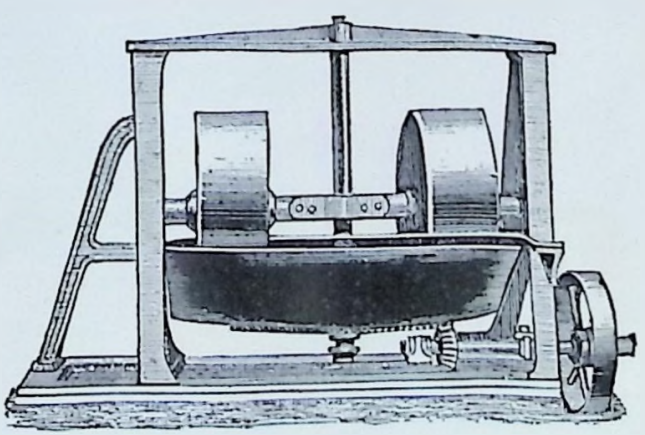


This Mill can be worked by either Hand or Steam Power, and can be made with single or double rollers. It has great crushing power, and will reduce the hardest substances to impalpable powder. It is fitted with automatic scrapers, discharge slide, &c., complete, and is suitable for dry and oil colours, foundry sand, alum, lime, &c., &c.

DIMENSIONS.

Diameter of Pan.	Height of Mill.	Approximate Weight.		Price		
		Single Roller.	Double Roller.	With Single Roller.	With Double Rollers.	With Fast and Loose Pulleys.
24 in.	36 in.	5 cwt	8 cwt.	£7	£8 10s.	£1 extra.

MORTAR MILLS.

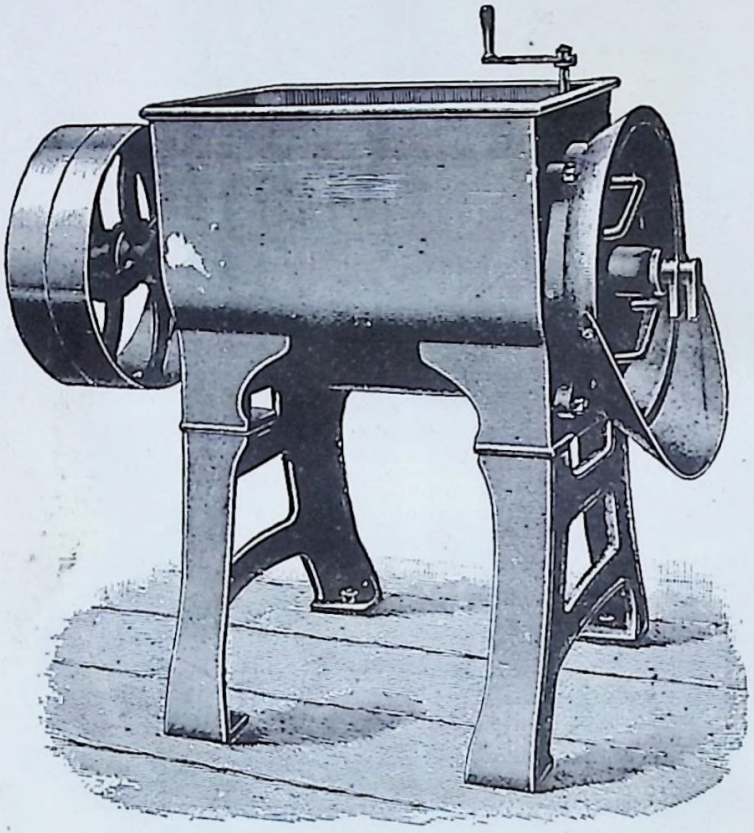


These Mills are constructed for Builders, Contractors, &c., and soon repay their original cost in the saving of time and materials. They are of the very best construction, with all the latest improvements.

Prices quoted to Specification. Heavy Mills suitable for Seed Crushing, Oil Mills, &c., also quoted to Specification.

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HEAVY POWER PAINT MILL.



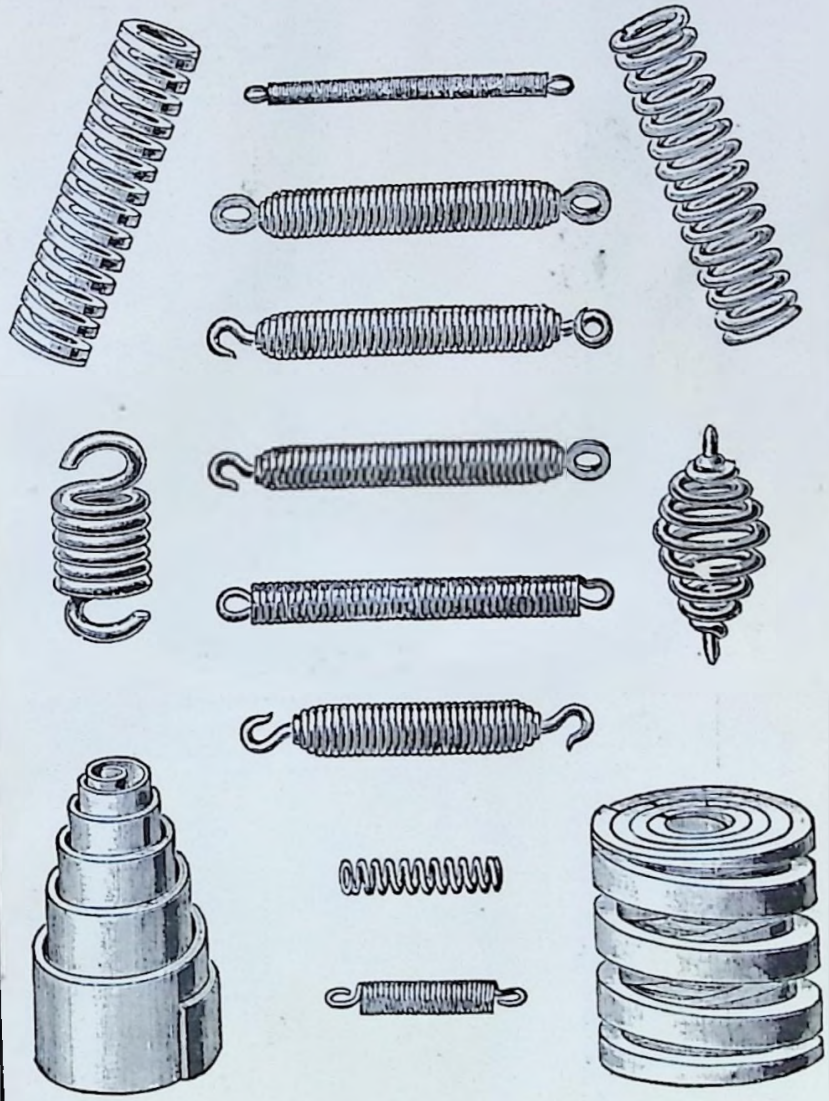
No. 6.

This Mill has been specially designed for manufacturers who require to turn out large quantities of paint. It has been thoroughly tested and found to give general satisfaction The machine is exceedingly simple, and all complications done away with; there are no spring scrapers or gearing to get out of order. It is mounted on strong cast-iron frame which renders it complete in itself.

PRICE.

Diameter of Grinding Disc.	Size of Hopper.	Total Height.	Complete with Fast and Loose Pulleys, Pugging and Mixing Knives.
In.	In.	In.	£ s. d
19	26 × 19	40	16 16 0

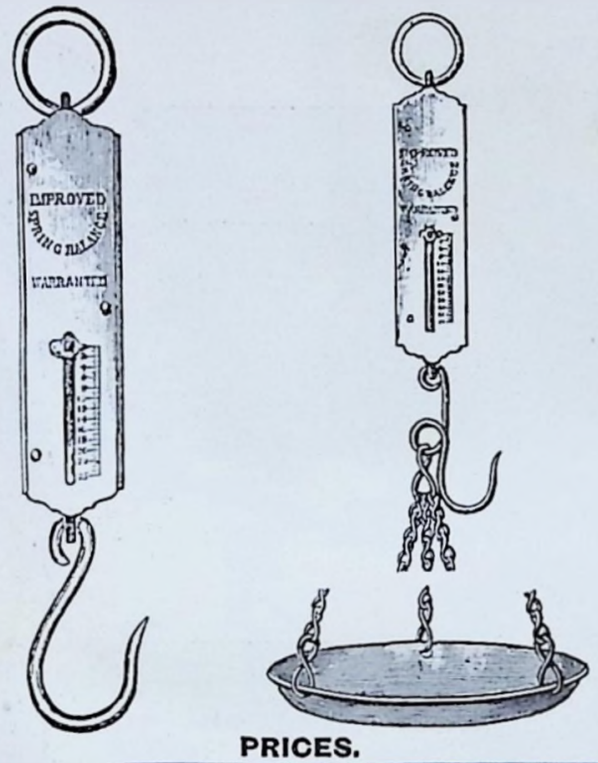
SPRINGS FOR COMPRESSION AND TENSION.



Quotations given for all kinds of open, close, flat, scroll, and all other varieties of springs. If necessary, the springs may be regulated to any pressure. Springs can be supplied at short notice to pattern, or specification giving material required, strain to be carried, diameter, length, and manner in which ends are to be finished.

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IMPROVED SPRING BALANCES.

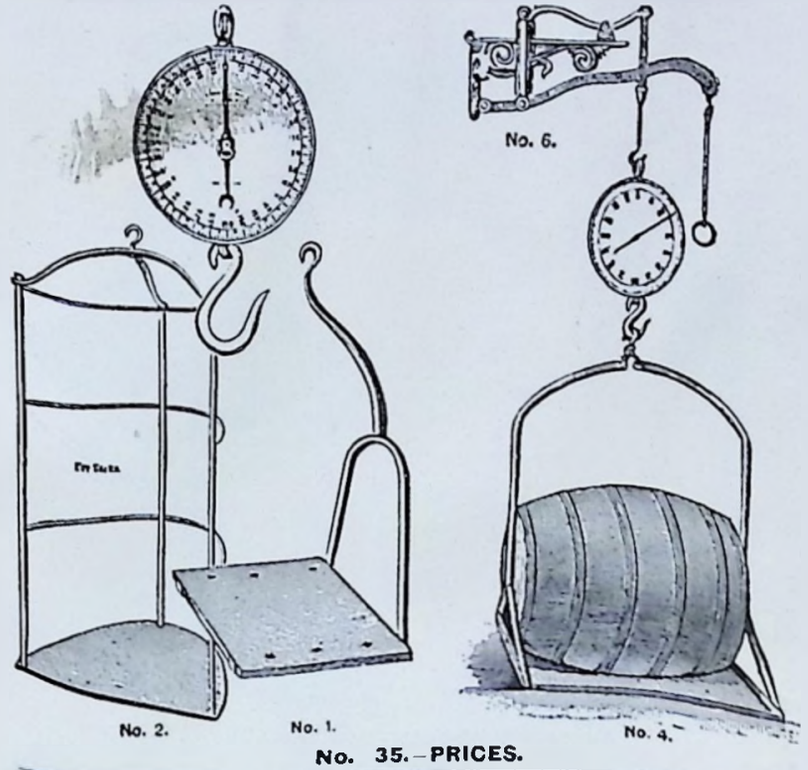


PRICES.

To Weigh.	Scale.	With Hook only.	With Hook and Tin Scale.
lb.	In.	Per doz.	Per doz.
30 × 1	8	22/-	36/-
40 × 1	10	30/-	51/-
50 × 1	11	40/-	61/-
60 × 1	11	50/-	74/-
80 × 1	11	72/-	96/-
90 × 1	12	90/-	120/-
100 × 1	12	108/-	138/-
		each.	each.
112 × 1	14	10/-	13/-
120 × 1	14	12/-	15/-
130 × 1	14	14/-	17/-
140 × 1	14	16/-	19/-
150 × 1	16	18/-	23/-
168 × 1	16	20/-	25/-
lb.	In.	Per doz.	Per doz.
25 × ½	8	22/-	36/-
30 × ½	9	30/-	48/-
40 × ½	10	51/-	72/-
50 × ½	11	72/-	96/-
60 × ½	11	102/-	126/-
		each.	
80 × ½	11	12/-	14/-
100 × ½	12	18/-	20/6
112 × ½	14	22/-	25/-

To Weigh.	Scale.	With Hook only.	With Hook and Tin Scale
lb.	In.	Per doz.	Per doz.
12 × ¼	8	22/-	36/-
15 × ¼	9	30/-	48/-
20 × ¼	9	42/-	60/-
25 × ¼	10	51/-	72/-
30 × ¼	10	72/-	93/-
40 × ¼	11	96/-	120/-
		each.	each.
50 × ¼	11	10/-	12/-
60 × ¼	11	12/6	14/6
lb. oz.	In.	Per doz.	Per doz.
8 × 2	8	30/-	45/-
10 × 2	8	36/-	51/-
14 × 2	9	48/-	66/-
20 × 2	10	60/-	81/-
24 × 2	10	84/-	105/-
6 × 1	8	48/-	63/-
8 × 1	8	54/-	69/-
10 × 1	9	00/-	78/-
12 × 1	10	84/-	105/-
4 × ½	8	54/-	69/-
2 × ¼	8	54/-	69/-

IMPROVED CIRCULAR BALANCE.

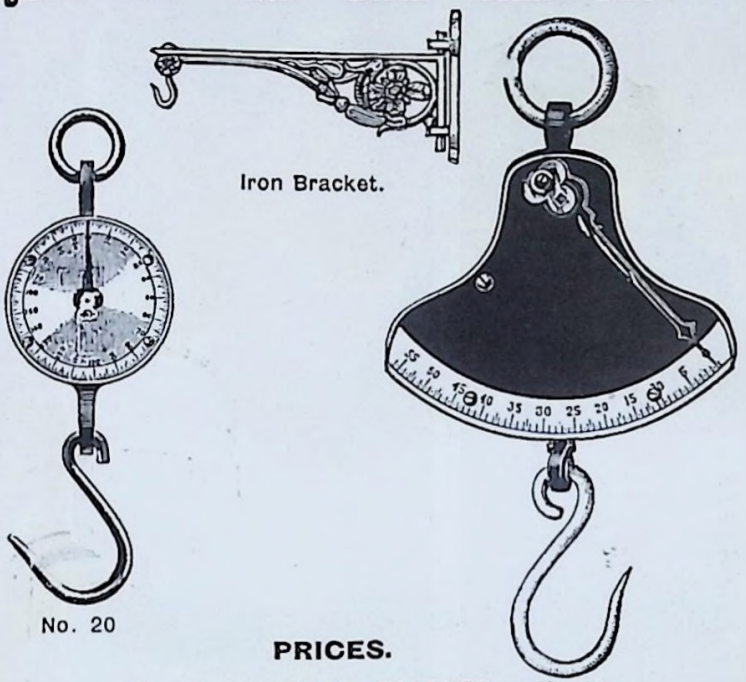


No. 35.—PRICES.

To Weigh.	Diameter of Brass Dial	With Hook only.	Scales. Iron Arm, Wood Bottom No. 1	Scales. Iron. No 2.	Scales. Iron Arm and Bottom. No. 4.	Iron Draw Levers. No. 6.	White Enamelled Dials. Extra.
	In.						
112 lb. × ½ lb.	11	30/-	17/6	25/-	27/-	36/-	
200 ,, × ,,	14	36/	17/6	25/-	27/-	36/-	3/6
224 ,, × ,,	14	42/	17/6	25/-	27/-	36/-	5/-
250 ,, × ,,	16	48/-	17/6	25/-	27/-	36/-	5/-
300 ,, × ,,	18	60/-	17/6	25/-	27/-	36/-	6/-
336 ,, × ,,	18	72/-	17/6	25/-	27/-	36/-	7/6
200 lb. × 1 lb.	8½	22/-	17/6	25/-	27/-	36/-	7/6
224 ,, × ,,	8½	24/-	17/6	25/-	27/-	36/-	2/6
250 ,, × ,,	10	28/-	17/6	25/-	27/-	36/-	2/6
300 ,, × ,,	12	32/-	17/6	25/-	27/-	36/-	3/6
336 ,, × ,,	12	36/-	17/6	25/-	27/-	36/-	3/6
350 ,, × ,,	12	40/-	21/-		38/-	44/-	3/6
400 ,, × ,,	14	44/-	21/-		38/-	44/-	3/6
450 ,, × ,,	14	50/-	21/-		38/-	44/-	5/-
500 ,, × ,,	16	56/-	21/-		38/-	44/-	5/-
560 ,, × ,,	16	62/-	21/-		38/-	44/-	6/-
600 ,, × ,,	18	68/-	21/-		38/-	44/-	6/-
800 lb. × 2 lb.	15	56/-					7/6
10 cwt. × 2 ,,	18	60/-					6/-
25 ,, × 7 ,,	20	96/-					7/6
60 ,, × 14 ,,	20	150/-					7/6
							7/6

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QUADRANT AND DIAL BALANCES.



PRICES.

No. 20. CIRCULAR BALANCE. No. 40.

To Weigh	Dia. of Dial.	With Hook only.	Extra: White Enamelled Dial.	To Weigh.	Dia. of Dial.	With Hook only.	Extra: White Enamelled Dial.
Lbs.	In.	Each.	Each.	Lbs.	In	Each.	Each
200 × 1	5	11/6	1/-	50 × ¼	5	11/6	1/-
224 × 1	6	13/6	1/-	56 × ¼	6	13/6	1/-
250 × 1	8	15/-	2/9	100 × ½	10	28/-	3/-
300 × 1	8	19/-	2/9	100 × ½	5	11/6	1/-
336 × 1	9	22/-	2/9	112 × ½	6	13/6	1/-
400 × 1	10	28/-	3/-	150 × ½	8	19/-	2/9
500 × 1	13	38/-	4/-	200 × ½	10	28/-	3/-
600 × 1	15	50/-	5/-	250 × ½	13	38/-	4/-
				300 × ½	15	50/-	5/-

Scales and Chains complete can be supplied for above.

No. 40. QUADRANT BALANCE.

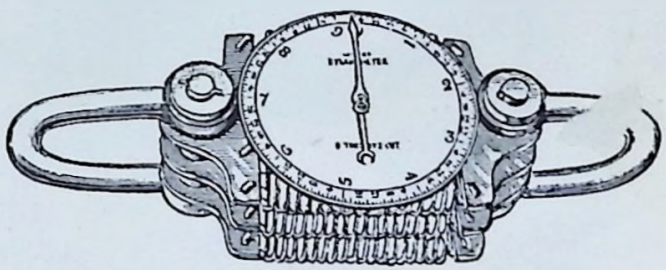
To Weigh.	Scales.	With Hook only.	With Scales & Chains.
	In.	Per Doz.	Per Doz.
7 lb. × 1 oz.	8	57/-	70/-
14 ,, × 2 ,,	9	57/-	72/-
28 ,, × ¼ lbs.	10	60/-	78/-
56 ,, × ½ ,,	12	60/-	90/-
112 ,, × 1 ,,	14	66/-	102/-
200 ,, × 2 ,,	16	78/-	138/-

Iron Brackets to carry Balances:—
8 in. 10d.; 10 in. 1/-; 12 in. 1/2 each. Extra Strong, 15 in. 5/- each.

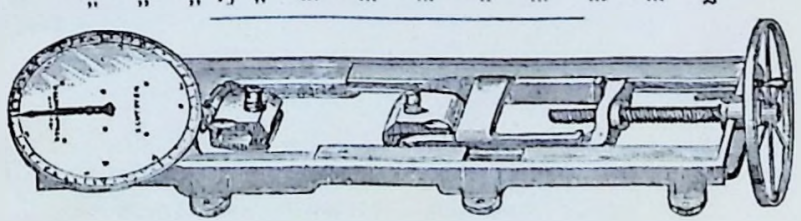
DYNAMOMETERS.



No. 125. For Testing the Draught of Ploughs, Carriages, &c.
To indicate up to 10 Cwt., with Box, complete ... ... £1 19 0 each.
,, ,, each Cwt. above 10 Cwt., extra ... ... 2 0 ,,



No. 128. For Testing the Draught of Barges, &c.
To indicate up to 6 Tons £16 0 0
,, ,, ,, 9 ,, ... £
,, ,, ,, 15 ,, ... £

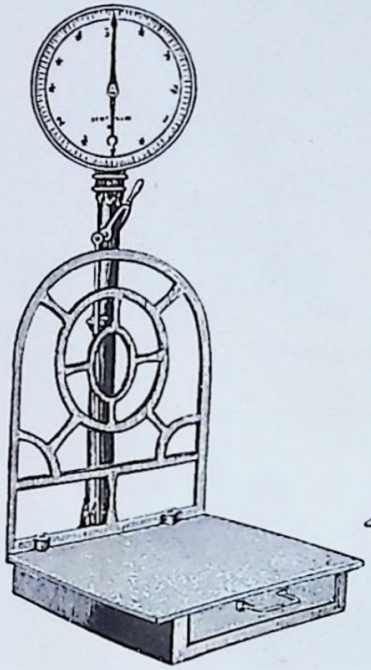


No. 135. For Testing the Strength of Wire Rope, Cloth, Hoop Iron, Cement, &c.
With suitable Jaws and Holders.

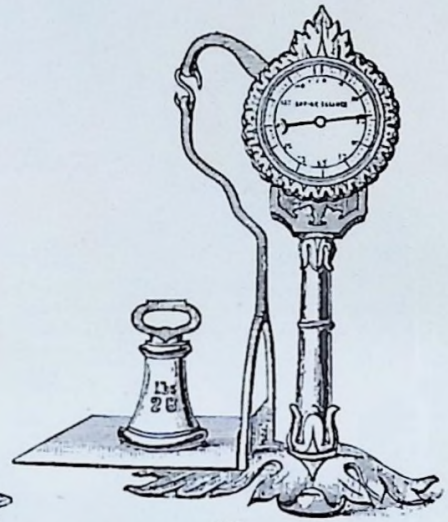
To indicate.	Dial.	Frame.		Between Jaws.	Price.
		Length.	Width.		
					£ s.
6 cwt. × 1 lb.	18 in.	4 ft. 6 in.	11½ in.	12 in.	10 5
10 ,, × 2 ,,	18 ,,	4 ft. 6 in.	11½ ,,	12 ,,	12 10
20 ,, × 7 ,,	24 ,,	6 ft. 3 in.	13½ ,,	20 ,,	15 10
40 ,, × 7 ,,	24 ,,	6 ft. 3 in.	13½ ,,	20 ,,	18 5
60 ,, × 14 ,,	24 ,,	6 ft. 3 in.	13½ ,,	20 ,,	

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SPRING WEIGHING MACHINES.



112a



105

PRICES.

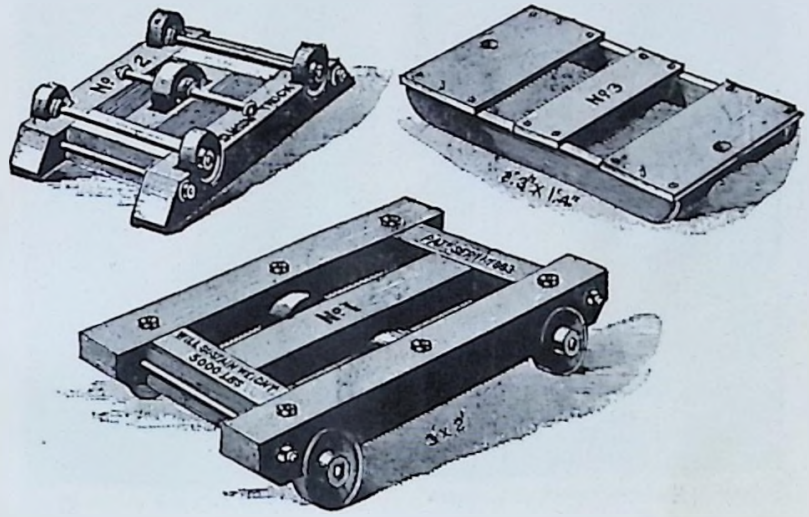
No. 105. SPRING COUNTER BALANCES.

No.	To Weigh.	Dial.	With Square Scale.	With Oblong Scale.
1	15lb. × 1 oz.	Brass.	£1 12 0	£1 12 0
2	30lb. × 2 oz.	,,	£1 15 0	£1 15 0
3	60lb. × ¼ lb.	,,	£1 19 0	£1 19 0
4	120lb. × ½ lb.	,,	£2 12 0	£2 12 0

No. 112a. PLATFORM WEIGHING MACHINES.

No.	To Weigh. Cwt.	lb.	Dial In.	Scale. In.	In.	With Back.	Without Back.	With Wheels	With Double Index figured × 10lb. and ¼ cwt.	With Brass Rim & Plate Glass Cover to Dials.
1	3	× 1	15	24 ×	20	£5 10	£5 0	Ext	Ext.	Ext. 20/-
2	3	× ½	18	24 ×	20	£6 5	£5 15	8/-	7/6	26/-
3	5	× 1	16	28 ×	24	£7 10	£7 0			23/-
4	10	× 2	18	30 ×	30	£10 10	£10 0			26/-
5	20	× 4	18	36 ×	30	£12 10	£12 0			26/-

WAREHOUSE TRUCK.



These trucks are made of **hard wood, well framed,** and **bolted together,** and are constructed for moving **heavy loads** on warehouse or factory floors. By the introduction of **central rotating wheels,** set slightly lower than outside ones, the heaviest load can be **steered into any direction.** No. 3 is of light and different construction.

Being kept so close to the ground they are particularly useful for moving machinery, &c.

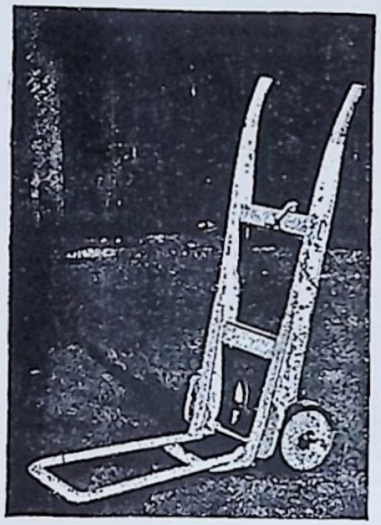
For bulky goods, boxes can be set on them considerably larger than the truck if desirable.

PRICES, MEASUREMENTS AND CAPACITIES.

No.	Size.	Weight.	Will carry.	Price.
1	36 in. × 24 in.	lb.	50 cwt.	£2 2 0
2	22 in. × 16 in.	,,	30 ,,	1 1 0
3	27 in. × 16 in.	,,	10 ,,	0 7 6

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 277 of 298
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PATENT SACK TRUCK.



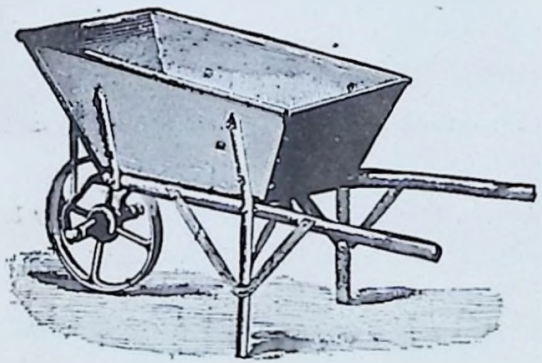
This shows the truck set for large packages.



This shows the extension iron closed

The above illustrations show a strongly and well-made truck which has a double purpose, combining the usual sack truck and railway pattern
Price, made in hard wood, well ironed, 17/6 each

WROUGHT-IRON WHEEL-BARROWS.



These Wheel-barrows are made entirely of wrought-iron, are very light and strong, and much superior to wooden barrows for all purposes. They are made for exportation, can be taken to pieces, and quickly put together again.

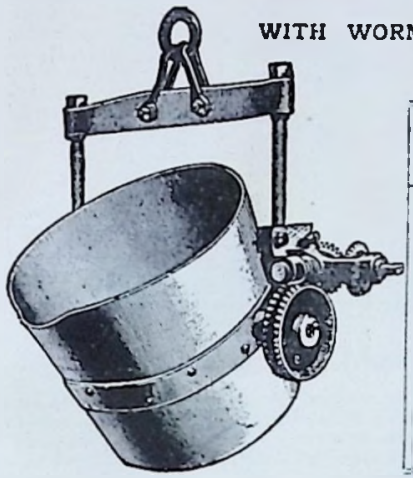
PRICES.

No. 1. Wheel-barrow for general purposes ... ... 20/- each.
„ 2 „ for Garden and Stable purposes .. 25/- „

IRON FOUNDERS' LADLES.

CRANE LADLES

WITH WORM GEARING.



PRICES.

Capacity.	Size of Ladle. Top.	Bottom.	Dpth	Plate.	Appr. Weight.	Price.
Tons.	In.	In.	In.	In.	Cwt.	£ s.
1	30	23½	24	⅜	6½	16 5
1½	32	26	25	⅜	6¾	17 10
2	36½	30½	29	⅜	8¼	
3	42	35	32	⅜	10	
5	48	42	35	½	14	
8	57	51	37	⅝	20	
10	62	56	39	⅝	27	
12	65	59	42	⅝	35	

WELDED CRANE LADLES.



No. 50a,
Made to any required size,
Price 8d. per lb.

WELDED SHANK LADLES.

No. 50,
With or without Handles,
Price 8d. per lb.



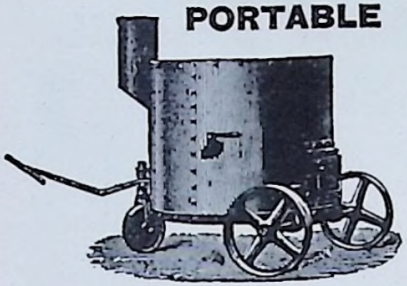
WELDED HAND LADLES.



No. 50 b,
Made to any required size,
Price 10d. per lb.

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PORTABLE TAR BOILERS.

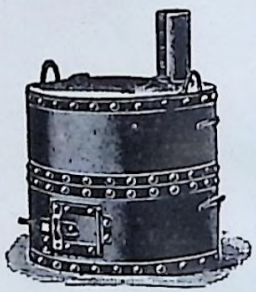


This Boiler is extremely portable, and **convenient for small contracts.** It is intended simply for Tar, and the stirring is done by hand. It is made of ordinary Boiler plates, which makes it very durable. Sizes from 25 to 60 gallons have a cast-iron internal pan; the larger sizes have a flanged bottom across the centre of the outside casing, which thus forms the pan. This Boiler is not suitable for Rock Asphalte.

PRICE COMPLETE.

Gallons ...	25	30	40	50	60	70	80	90	100	120	250
Each ... £	12 5	12 15	13 10	14 0	14 10	15 0	15 10	16 0	16 10	18 0	

IMPROVED ASPHALTE BOILER.

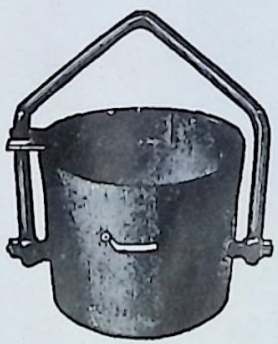


This Boiler is designed for conveniently carrying in contractor's cart, and, if desired, can be provided with wheels. The body is made in two parts, the top fitting into lower half The pan in which Asphalte is heated fits into top half, and has a loose plate forming bottom. This is made tight by means of clay lute, and can be easily replaced, at trifling cost, when burnt through. If desired, the Boiler can be made suitable for Tar and Asphalte by flangeing and rivetting the bottom of pan.

PRICES.

Diameter ..	36 in.	42 in.	46 in.	51 in.
Height ...	36 ,,	36 ,,	39 ,,	48 ,,
Cwts. ...	6	8½	11	15
Each... £	14 5	15 10	19 0	

WROUGHT-IRON TIPPING SKEPS.



These are suitable for Colliery Owners, Contractors, Excavators, Dock Companies, Harbour Commissioners, Engineers, Crane Makers, and sundry other purposes.

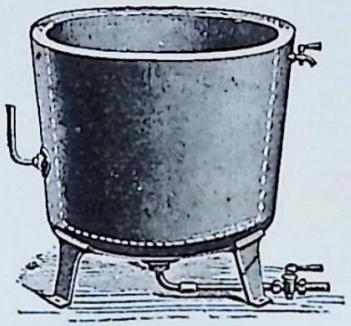
PRICES.

Capacity.	Depth.	Diam. at top.	Diam. at bottom.	With Plates ⅛in. thick.	With Plates 3/16in. thk.
	In.	In.	In.	£ s.	£ s.
¼ yd. or 5 cwt.	20	24	20	5 0	5 5
⅓ ,, ,, 6½ ,,	28	30	26	7 0	7 10
½ ,, ,, 10 ,,	30	34	30	10 0	10 15
⅔ ,, ,, 13 ,,	32	40	36	12 0	13 0
¾ ,, ,, 15 ,,	34	41	37	13 0	14 0
1 ,, ,, 20 ,,	36	44	40	14 0	15 10

Strengthening Plates riveted to sides, 30/- extra. Strengthening Bands round top, 25/- extra.
Other sizes and patterns made to order.

STEAM JACKETED PANS.

WELDED.



No. 27C.



No. 27B.

Welded Furnace Pan. No. 27.

PRICES.

No.	Capacity.	Inside Sizes. Diam.	Inside Sizes. Depth.	With ⅛th Plates. No. 27.	With ⅛th Plates. No. 27B.	With ¼th Plates. No. 27.	With ¼th Plates. No 27B.
	Galls.	In.	In.	£ s. d.	£ s. d	£ s. d.	£ s. d.
1	10	16	16	2 10 0	5 15 0	3 2 6	7 0 0
2	15	18	18	3 0 0	6 17 6	3 12 6	8 5 0
3	20	20	20	3 10 0	8 0 0	4 5 0	9 12 6
4	25	21	21	3 17 6	9 0 0	4 12 6	10 15 0
5	30	22	22	4 5 0	10 0 0	5 2 6	12 0 0
6	35	24	22	4 15 0	11 0 0	5 15 0	13 5 0
7	40	25	24	5 5 0	12 0 0	6 5 0	14 7 6
8	45	26	24	5 12 6	12 15 0	6 15 0	15 5 0
9	50	27	26	6 2 6	13 17 6	7 7 6	16 12 6
10	60	28	28	6 15 0	14 10 0	8 2 6	17 7 6
11	70	30	30	7 15 0	16 0 0	9 5 0	19 2 6
12	80	32	30	8 15 0	18 0 0	10 10 0	
13	90	32	32	9 5 0	...	11 2 6	
14	100	34	32	9 15 0	...	11 12 6	

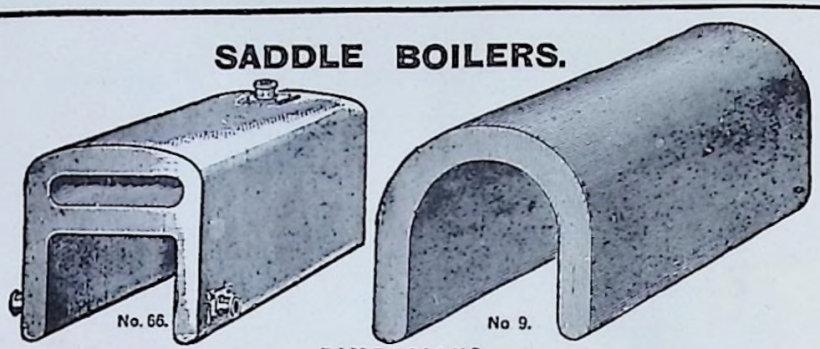
No. 27C is same price as No. 27B, with extra for 3 Cast Iron Legs and Flanges for connections, according to requirements.

If Pans are required to bear a regular pressure of over 25 lbs. per square inch, they should be stayed. Price for this will be extra.

In ordering please state Number, Size of Boiler, and Thickness of Plates.

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SADDLE BOILERS.



DIMENSIONS.

No. 9. Plain Saddle Boiler, exclusive of Sockets.

No.	Size of Boiler. Long. L. In.	Inside Arch. W. In.	Inside Arch. H. In.	Outside Size. W. In.	Outside Size. H. In.	Actual Heating Power, 4-in. Pipe. Ft.	Price. Boiler, 5/16-in. Plates. £ s. d.	Boiler, 3/8-in. Plates. £ s. d.	Furnace Fittings. £ s. d.
1	18	10	11	14	13	150	2 7 6	3 0 0	2 2 6
2	18	12	12	16	14	180	2 17 6	3 10 0	2 5 0
3	21	10	11	14	13	180	2 15 0	3 7 6	2 7 6
4	21	12	12	16	14	210	3 2 6	3 15 0	2 7 6
5	24	10	11	14	13	210	2 17 6	3 10 0	2 10 0
6	24	12	12	16	14	240	3 7 6	4 2 6	2 12 6
7	24	14	14	18	16	280	3 17 6	4 15 0	2 15 0
8	27	12	12	17	14½	270	3 15 0	4 12 6	2 12 6
9	27	14	14	19	16½	315	4 5 0	5 7 6	2 17 6
10	30	12	12	17	14½	300	4 0 0	5 0 0	2 17 6
11	30	14	14	19	16½	350	4 17 6	6 0 0	3 0 0
12	33	12	12	17	14½	330	4 10 0	5 10 0	3 2 6
13	33	14	14	19	16½	385	5 2 6	6 5 0	3 5 0
14	36	12	12	17	14½	360	4 17 6	6 0 0	3 5 0
15	36	14	14	19	16½	420	5 7 6	6 15 0	3 7 6
16	36	16	16	22	19	480	6 7 6	7 10 0	3 7 6
17	42	14	14	20	17	490	6 7 6	7 10 0	3 7 6
18	42	16	16	22	19	560	8 0 0	9 10 0	3 10 0

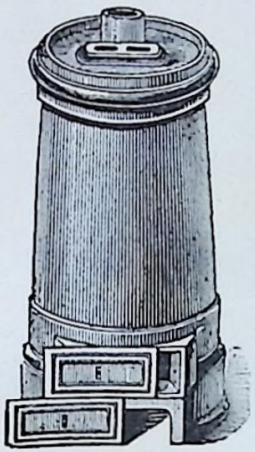
Furnace Fittings consist of Furnace Front, Fire Bars, Bearers, Deadplate, Damper, and three Soot Doors.

No. 66. Improved Saddle Boiler, with Terminal Waterway and Return Flue through Crown, exclusive of Sockets.

No.	Size of Boiler. Long. L. In.	Inside Arch. W. In.	Inside Arch. H. In.	Outside Sizes. W. In.	Outside Sizes. H. In.	Actual Heating Power, 4-in. Pipe. Ft.	Price. Boiler, 5/16-in Plates. £ s. d.	Boiler, 3/8-in. Plates. £ s. d.	Furnace Fittings. £ s. d.
6	36	14	14	20	25	575	14 15 0	17 10 0	3 5 0
7	36	16	16	22	27	650	16 10 0	19 10 0	3 10 0
8	42	14	14	20	25	675	17 0 0	20 0 0	3 10 0
9	42	16	16	22	27	750			
10	42	18	18	24	29	875			
11	48	16	16	22	27	850			
12	48	18	18	24	29	975			
13	48	21	21	27	32	1,150			
14	48	24	21	30	32	1,225			
15	54	21	18	27	29	1,175			
16	54	21	21	27	32	1,300			
17	54	24	21	30	32	1,375			
18	60	21	18	27	29	1,300			
20	60	24	21	30	32	1,525			
22	72	24	21	32	32	1,825			
24	72	30	21	38	32	2,025			
26	84	24	21	32	32	2,150			

Furnace Fittings consist of Furnace Front with sliding doors, Fire Bars, Bearer, Deadplate, Damper, three Soot Doors, and one large Soot Door for Flue. Prices of Plain and Elbow Sockets on application.

THE ECONOMIC BOILERS.

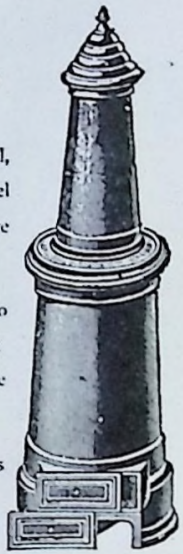


No. 3

Patterns Nos. 3 and 4 are made conical, so as to prevent the possibility of the fuel sticking fast in the Boiler. These are specially recommended.

Patterns No. 1 and 2 are similar to above in design, but are made straight Patterns No. 1 and 3 are fitted with Slide Damper

The Sockets are fitted at back unless specially ordered.



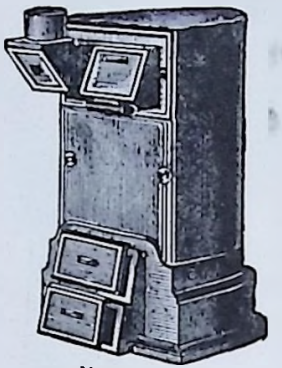
No. 4

DIMENSIONS.

No.		Outside Sizes of Boiler. Height. In.	Outside Sizes of Boiler. Diam. In.	Outside Diam. of Smoke Flue. In.	Size of Sockets. In.	Actual Heating Power, 4-in. Pipe. Ft.	Price of Boiler. With 5/16-in. Plates. £ s. d.	Price of Boiler. With 3/8-in. Plates. £ s. d.
Pattern No. 1	1	24	10	3	1	65	2 5 0	2 15 0
	2	26	12	4	1¼	80	2 12 6	3 2 6
	3	29	14	4	1½	110	3 0 0	3 10 0
	4	34	14	4	1½	140	3 15 0	4 7 6
	5	32	16	4½	2	170	4 10 0	5 5 0
	6	36	16	4½	2	200	5 5 0	6 2 6
	7	40	16	4½	2	220	6 0 0	7 0 0
Pattern No. 2	8	46	10	4	1	65	3 0 0	3 10 0
	9	46	12	4	1¼	80	3 10 0	4 0 0
	10	53	14	5	1½	110	4 0 0	4 10 0
	11	58	14	5	1½	140	4 15 0	5 7 6
	12	60	16	5	2	170	5 10 0	6 5 0
	13	64	16	5	2	200	6 5 0	7 2 6
	14	68	16	5	2	220	7 0 0	8 0 0
Pattern No. 3	1	26	12	3	1¼	80	2 15 0	3 5 0
	2	28	12	3	1¼	85	3 0 0	3 10 0
	3	29	14	4	1½	110	3 2 6	3 12 6
	4	32	14	4	1½	120	3 7 6	3 17 6
	5	36	14	4	1½	140	4 5 0	5 0 0
	6	34	16	4	2	170	5 0 0	5 17 6
	7	38	16	4	2	200	5 15 0	6 15 0
	8	42	16	4	2	220	6 10 0	7 12 6
Pattern No. 4	9	46	12	4	1¼	80	3 12 6	4 2 6
	10	48	12	4	1¼	85	3 17 6	4 7 6
	11	53	14	5	1½	110	4 2 6	4 12 6
	12	55	14	5	1½	120	4 7 6	4 17 6
	13	60	14	5	1½	140	5 5 0	6 0 0
	14	60	16	5	2	170	6 0 0	6 17 6
	15	64	16	5	2	200	6 15 0	7 15 0
	16	68	16	5	2	220	7 10 0	8 12 6

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GREENHOUSE HEATING BOILERS.



Nos. 1 to 7

The Gardenia Boilers Nos. 1 to 7 have waterway top, back and sides; this is carried to the level of the fire-bars, but not in front of Boilers.

The Finsbury Boilers are of improved construction, but similar in design to the above. They have waterway top, back, front and sides; this is also carried to the level of the fire-bars, so that the fire is entirely surrounded by a waterway.

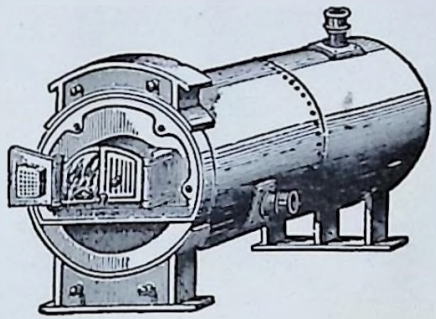
These boilers can be fixed either in a Brick or Wood Foundation of Greenhouse. The Smoke-flue can be fixed either at the right or left hand side as required. A Slide Damper is provided.

DIMENSIONS.

No.	Size of Boiler without Stand.			Height with Stand.	Outside Diam. Smoke Flue.	Size of Sockets.	Actual Heating Power 4 in. Pipe	Price of Boiler.	
	Height.	Width.	Diam.					With 3/16 in. Plates.	With 3/8 in. Plates.
	In.	In.	In.	In.	In.	In.	Feet.	£ s. d.	£ s. d.
1	18	12	12	21½	3½	1½	90	3 7 6	3 17 6
2	21	12	12	24½	3½	1½	105	3 15 0	4 7 6
3	24	12	12	27½	3½	1½	120	4 2 6	4 15 0
4	15	14	14	21	4	1½	90	3 7 6	3 17 6
5	18	14	14	24	4	1½	110	4 2 6	4 15 0
6	21	14	14	27	4	1½	130	4 12 6	5 5 0
7	24	14	14	30	4	1½	150	5 2 6	5 17 6
8	27	14	14	33	4	2	180	6 0 0	7 0 0
9	30	14	14	36	4	2	200	6 10 0	7 12 6
10	24	16	16	31	5	2	200	7 5 0	8 10 0
11	30	16	16	37	5	2	245	8 10 0	10 0 0
12	36	16	16	43	5	2	290	10 0 0	11 12 6
13	42	16	16	49	5	2	325	11 10 0	13 7 6
14	24	18	18	32	6	2	230	8 5 0	9 12 6
15	30	18	18	38	6	2	280	9 15 0	11 5 0
16	36	18	18	44	6	2	330	11 5 0	13 2 6
17	42	18	18	50	6	2	380	13 0 0	15 2 6
18	24	20	20	32	6	2	260	9 0 0	10 12 6
19	30	20	20	38	6	2	315	10 10 0	12 7 6
20	36	20	20	44	6	2	370	12 0 0	14 2 6
21	42	20	20	50	6	2	435	14 0 0	16 10 0
22	24	24	24	33	6	2	330	11 10 0	13 7 6
23	30	24	24	39	6	2	410	13 10 0	15 15 0
24	36	24	24	45	6	2	490	15 10 0	18 0 0

No. 1 to No. 7 Finsbury Boilers can also be supplied. Prices and Particulars on application.

"TRENTHAM" CORNISH BOILER.



This Boiler is made with or without Waterway Bridge End. It is suitable for large quantities of pipe, and for working under a heavy pressure. It is simple in construction and, from the amount of surface exposed to the action of the fire and the arrangements of the flues, it is rendered a very efficient boiler

DIMENSIONS.

No.	No. 1 Boiler with Open End.					No. 2 Boiler with Bridge End.	
	Outside Size of Boiler.			Actual Heating Power, 4 in. Pipe.	Price of Boiler complete, 3/8 in. Plates.	Actual Heating Power, 4 in. Pipes.	Price of Boiler Complete, 3/8 in. Plates.
	Length.		Diameter.				
	Ft.	In.	Ft. In.	Ft.	£	Ft.	£
1	4	6	2 8	1050		1150	
2	5	0	2 8	1200		1300	
3	5	0	3 0	1400		1575	
4	5	6	3 0	1575		1750	
5	6	0	3 0	1750		1925	
6	7	0	3 0	2100		2275	
7	8	0	3 0	2450		2625	
8	6	0	3 6	1950		2150	
9	7	0	3 6	2375		2575	
10	8	0	3 6	2800		3000	
11	9	0	3 6	3225		3425	
12	10	0	3 6	3650		3850	
13	11	0	3 6	4075		4275	
14	12	0	3 6	4500		4700	
15	10	0	4 0	4100		4375	
16	11	0	4 0	4600		4375	
17	12	0	4 0	5100		5375	

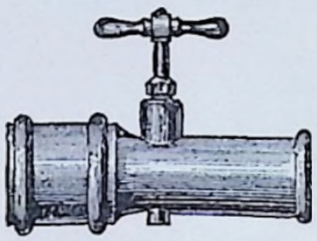
Cross Tubes can be welded in these boilers at extra prices. Waterway Bridges or Pockets in Boilers at extra prices.

Illustrations showing Brick Setting sent on application.

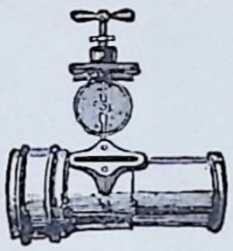
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CIRCULATION VALVES.

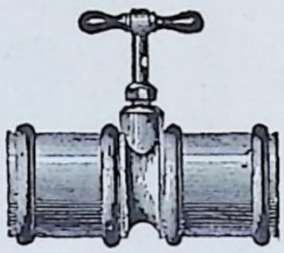
FOR HEATING APPARATUS.



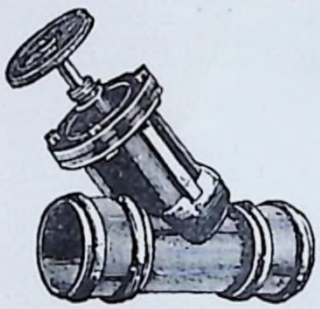
No. 19.



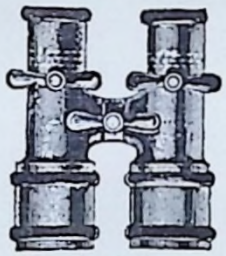
No. 19 S.T



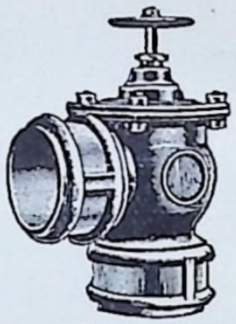
No. 19A.



No. 19D.



No. 19H.



No. 19E.

PRICES.

No.	Description.	2	3	4	5	6	Inch.
	THROTTLE VALVES.						
19	Socket and Spigot	8/6	10/6	12/6			Each.
19A	Double Sockets	8/6	10/6	12/6			,,
19S.T.	,, or Socket and Spigot ...	10/-	12/6	15/-			,,
19H	Socket and Spigot.						
	With One Valve	25/-	28/-	31/-			,,
	,, Two Valves	30/-	35/-	40/-			,,
	,, Three Valves	35/-	42/-	50/-			,,
	ANGLE SCREW VALVES, with Gun-metal Faces.						
19D	Double Socket	18/6	25/6	30/-	75/-	85/-	,,
19E	Double or Single Socket	16/-	21/6	26/-	65/-	80/-	,,

The above are the general patterns of valves we recommend for Greenhouse and Horticultural work, but we shall be pleased to quote other patterns when it is desired.

ELECTRIC WIRES.

Tinned Copper Conductors covered with **one coat cotton, paraffin wax** and finished **cotton tape, braided and compounded.**

Class.	S.W.G.	Weight.	Per Yard.	Per Mile.	Class.	S.W.G.	Weight.	Per Yard.	Per Mile.
		lb.	d.	£ s.			lb.	s. d.	£ s.
G	20	46	-¼		K	7/20	218	0 3	
1 lap pure I. R.	19	50	1		2 laps pure I. R.	7/19	257	0 3½	
	18	64	1			7/18	350	0 4¼	
	17	80	1¼			7/17	455	0 5¼	
	16	96	1¼			7/16	580	0 6½	
	15	110	1½			7/15	715	0 7¾	
	14	142	1¾			7/14	860	0 9	
	13	177	2			19/20	510	0 6	
	12	220	2½			19/19	620	0 7	
	11	265	2¾			19/18	850	0 9	
	10	318	3¼			19/17	1120	0 11½	
	9	395	4			19/16	1435	1 2¾	
	8	475	4¼			19/15	1800	1 5½	
	3/23	56	1			19/13	2855	2 3	
	3/20	100	1½			19/12	3610	2 10	
	7/25	77	1¼			37/16	2710	2 2	
	7/23	102	1½			37/14	4150	3 2	
	7/21½	144	2			37/12	6910	5 2	
				£ s.					£ s.
K	20	60	1¼		L	7/20	348	0 3¾	
2 laps pure I. R.	19	68	1¼		Un-vulca-nized I. R.	7/19	400	0 4¾	
	18	80	1½			7/18	500	0 5¼	
	17	97	1¾			7/17	610	0 6	
	16	114	1¾			7/16	750	0 7¼	
	15	134	2			7/15	895	0 8¼	
	14	156	2¼			7/14	1060	0 9¾	
	13	196	2¾			19/20	670	0 6¼	
	12	238	3			19/19	750	0 7½	
	11	285	3½			19/18	1050	0 9¼	
	10	336	4			19/17	1360	1 0¼	
	9	415	4¼			19/16	1730	1 3½	
	8	500	5½			19/15	2150	1 7¼	
	3/23	73	1½			19/13	3390	2 6	
	3/20	116	2			19/12	4270	3 2	
	7/25	93	1¼			37/16	3200	2 5	
	7/23	116	2			37/14	4900	3 8	
	7/21½	162	2½			37/12	8130	5 11	

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ELECTRIC WIRES.

Tinned Copper Conductors, covered with pure and vulcanised I.R.

Taped, braided flax and compounded. CLASS M.

Insulation in Megohms per Mile.	S.W.G.	Weight.	Per Yard.	Per Mile.
		lb.	s. d.	£ s.
600	7/20	335	0 4½	
,,	7/19	395	0 5¼	
,,	7/18	512	0 6½	
,,	7/17	650	0 8¼	
,,	7/16	802	0 9¾	
,,	7/15	956	0 11½	
450	7/14	1164	1 2	
,,	19/20	715	0 8¼	
,,	19/19	840	0 10¼	
,,	19/18	1120	1 1¼	
,,	19/17	1475	1 5	
,,	19/16	1850	1 9	
300	19/15	2270	2 1¼	
,,	19/13	3490	3 4	
,,	19/12	4380	4 1	
,,	37/16	3320	3 2	
,,	37/14	4960	4 6	
,,	37/12	8080	7 1	

CLASS N.

				£ s.
900	7/20	334	0 4¾	
,,	7/19	393	0 5½	
,,	7/18	510	0 7	
,,	7/17	647	0 8½	
,,	7/16	800	0 10¼	
,,	7/15	962	1 0¼	
750	7/14	1160	1 2½	
,,	19/20	713	0 9¼	
,,	19/19	830	0 10¾	
,,	19/18	1120	1 2	
,,	19/17	1470	1 5¼	
,,	19/16	1840	1 9¾	
600	19/15	2260	2 3	
,,	19/14	2715	2 9	
,,	19/12	4345	4 4	
,,	37/16	3290	3 4	
,,	37/14	4920	4 10	
,,	37/12	8030	7 8	

Taped, braided cotton and compounded. CLASS M.

Insulation in Megohms per Mile.	S.W.G.	Weight.	Per Yard.	Per Mile.
		lb.	s. d.	£ s.
1200	20	92	0 1¾	
,,	19	100	0 1¾	
,,	18	116	0 2	
,,	17	137	0 2¼	
,,	16	157	0 2½	
,,	15	180	0 2¾	
900	14	206	0 3	
,,	13	248	0 3½	
,,	12	300	0 4¼	
,,	11	358	0 4¾	
,,	10	420	0 5½	
,,	9	512	0 6½	
,,	8	612	0 7½	
1000	3/23	116	0 2¼	
,,	3/20	174	0 3	
,,	7/25	137	0 2½	
750	7/23	164	0 2¾	
,,	7/21½	220	0 3½	

CLASS N.

				£ s.
2000	20	88	0 1¾	
,,	19	95	0 2	
,,	18	110	0 2	
,,	17	132	0 2½	
,,	16	150	0 2½	
,,	15	180	0 2¾	
1500	14	206	0 3¼	
,,	13	250	0 3¾	
,,	12	300	0 4½	
,,	11	360	0 5¼	
,,	10	420	0 6	
,,	9	513	0 7	
,,	8	613	0 8¼	
1800	3/23	110	0 2¼	
,,	3/20	174	0 3	
,,	7/25	130	0 2¼	
1000	7/23	165	0 3	
,,	7/21½	220	0 3¼	

ELECTRIC WIRES.

Tinned Copper stranded Conductors, covered with pure and vulcanized rubber, taped, braided flax and compounded.

CLASS N.A.

Insulation in Megohms per mile.	S.W.G.	Weight.	Per Yard.	Per Mile.
		lb.	s. d.	£ s.
4000	7/20	320	0 5	
,,	7/19	380	0 5¾	
,,	7/18	490	0 7½	
,,	7/17	620	0 9¼	
3500	7/16	750	0 11	
,,	7/15	930	1 1	
,,	7/14	1100	1 8½	
,,	19/20	685	0 10	
,,	19/19	805	0 11½	
3000	19/18	1080	1 3	
,,	19/17	1410	1 7	
,,	19/16	1780	1 11¼	
,,	19/15	2190	2 4¼	
2500	19/14	2650	2 10	
,,	19/12	4050	4 10	
2000	37/16	3030	3 8	
,,	37/14	4600	5 3	
,,	37/12	7360	8 6	

CLASS O.

Insulation in Megohms per mile.	S.W.G.	Weight.	Per Yard.	Per Mile.
		lb.	s. d.	£ s.
5500	7/20	350	0 6¼	
,,	7/19	400	0 7¼	
,,	7/18	535	0 9½	
,,	7/17	690	0 11¾	
,,	7/16	849	1 2½	
,,	7/15	1030	1 5¼	
,,	7/14	1250	1 9	
,,	19/20	750	1 0¾	
,,	19/19	900	1 3¼	
,,	19/18	1240	1 8¾	
,,	19/17	1625	2 3	
5000	19/16	2050	2 10	
,,	19/15	2510	3 5	
,,	19/13	3785	4 11	
,,	19/12	4660	5 11	
,,	37/16	3585	4 8	
,,	37/14	5275	6 6	
,,	37/12	8680	10 7	

CONCENTRIC CABLES.

Tinned, Copper stranded Conductors, covered with pure and vulcanized I.R.

CLASS P. (outer Conductor covered with cotton tape, braided and compounded).

Inner Conductor S.W.G.	Ins. in Megohms per Mile between Conductors.	Ap. Weight per Mile. cwt.	PRICE per Statute Mile.
			£ s.
7/16	4000	12·1	
7/14	,,	17·5	
19/20	,,	10·7	
19/18	3000	17·3	
19/17	,,	22·6	
19/15	,,	35·6	
19/14	,,	43·4	
19/12	,,	71·3	
37/16	,,	53·3	
37/15	,,	66.6	

CLASS R. (outer Conductor covered with pure & vulcanized I.R. tape, braided & compounded.)

Ins. in Megohms per Mile of Outer Conductors.	Ap. Weight per Mile. cwt.	Outer Conductor equal in area to Inner Conductor.	PRICE per Statute Mile.
			£ s.
2000	16·1	7/16	
,,	22·4	7/14	
,,	14·4	19/20	
1500	22·1	19/18	
,,	28·2	19/17	
,,	43·2	19/15	
,,	52·4	19/14	
,,	84·2	19/12	
,,	63·7	37/16	
,,	78·8	37/15	

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COPPER CONDUCTORS.

In order of carrying capacity.

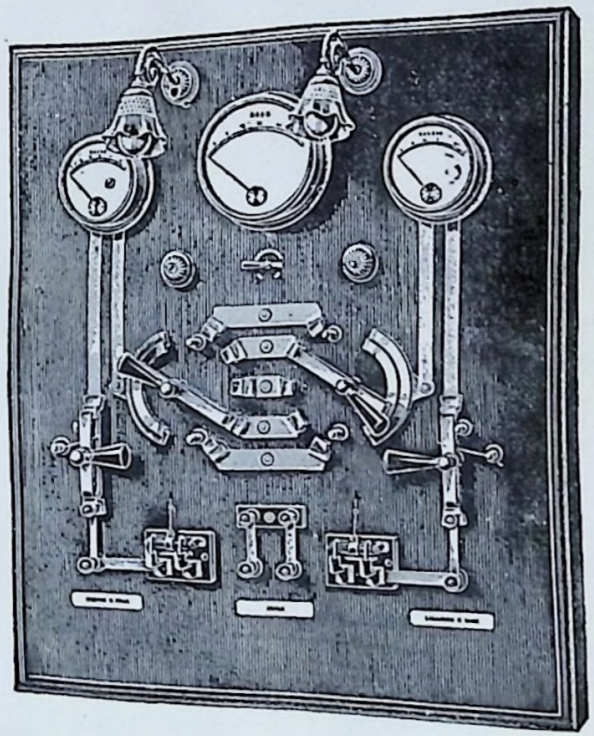
Gauge, S.W.G.	Sectional Area.		Current at 1000 Amperes per sq. in.	Resistance in Ohms per 1,000 ft. 60° F. 98 %.	Weight lb. per mile.	Diameter.	
	Sq. in.	Sq. m/m.				m/m.	Inches.
61/12	·5319	343·2	531·9	·0151	10816·6	23·7	·936
61/13	·4162	268·5	416·2	·0193	8463·8	21·0	·828
37/12	·3217	207·7	321·7	·0250	6541·9	18·4	·728
37/13	·2516	162·6	251·6	·0320	5116·3	16·3	·644
37/14	·1909	122·9	190·9	·0422	3881·8	14·2	·560
19/12	·1647	106·3	164·7	·0489	3349·1	13·2	·520
37/15	·1541	99·58	154·1	·0522	3133·7	12·8	·504
19/13	·1282	83·20	128·2	·0628	2606·7	11·6	·460
37/16	·1219	78·6	121·9	·0661	2479·0	11·3	·448
19/14	·0973	62·77	97·3	·0828	1978·5	10·1	·400
19/15	·0789	50·96	78·9	·1021	1604·0	9·14	·360
19/16	·0624	40·25	62·4	·1291	1268·8	8·12	·320
19/17	·0479	30·91	47·9	·1682	973·6	7·10	·283
7/13	·0469	30·0	46·9	·1714	955·7	7·01	·276
7/14	·0356	22·98	35·6	·2263	723·9	6·10	·240
19/18	·0349	22·66	34·9	·2308	709·6	6·10	·240
7/15	·0289	18·66	28·9	·2788	587·6	5·49	·216
19/19	·0243	15·72	24·3	·3315	492·1	5·08	·200
7/16	·0229	14·73	22·9	3518	465·7	4·88	·192
8	·0201	12·97	20·1	·4007	408·7	4·06	·160
19/20	·0198	12·74	19·8	·4069	402·3	4·57	·180
7/17	·0174	11·28	17·4	·4630	353·8	4·27	·168
9	·0162	10·50	16·2	·4947	331·1	3·65	·144
10	·0128	8·30	12·8	·6261	261·4	3·25	·128
7/18	·0128	8·30	12·8	·6295	259·8	3·66	·144
11	·0105	6·77	10·5	·7624	214·9	2·94	·116
7/19	·0089	5·77	8·9	·9053	180·6	3·04	·120
12	·0084	5·48	8·4	·9485	172·7	2·64	·104
7/20	·0072	4·65	7·2	1·1191	146·3	2·74	·108
13	·0066	4·29	6·6	1·2121	135·2	2·34	·092
7/21	·0056	3·6	5·6	1·4170	115·6	2·44	·096
7/21½	·0050	3·242	5·0	1·6340	102·0	2·28	·090
14	·0050	3·24	5·0	1·6030	101·9	2·03	·080
7/22	·0044	2·85	4·4	1·8313	89·2	2·13	·084
15	·0040	2·63	4·0	1·9790	82·4	1·83	·072
7/23	·0032	2·075	3·2	2·5180	65·0	1·83	·072
16	·0032	2·08	3·2	2·5047	64·9	1·62	·064
3/20	·0031	2·000	3·06	2·6386	63·0	1·95	·077
17	·0024	1·59	2·4	3·2715	49·6	1·42	·056
7/25	·0022	1·423	2·2	3·6621	45·0	1·54	·060
3/22	·0019	1·22	1·9	4·2409	38·5	1·50	·059
18	·0018	1·19	1·8	4·4528	36·4	1·22	·048
3/23	·0014	·893	1·4	5·5485	28·0	1·29	·051
19	·0012	·81	1·25	6·4120	25·3	1·02	·040
20	·0010	·66	1·01	7·9160	20·6	·914	·036
3/25	·0009	·585	·9	8·9530	19·0	1·07	·042
21	·0008	·52	·80	10·01	15·8	·813	·032
22	·0006	·39	·61	13·08	12·1	·711	·028

The resistance of pure copper varies :—·215 % per degree Fahr.
or ·387 % „ „ Cent.

MAIN SWITCH-BOARD

AND

FUSE-BOARD.



The above illustration is intended for accumulator circuit.

	£	s.	d.
50 Ampère Boards			
100 „ „			
200 „ „			

Switchboards can be designed to suit any requirements for central stations or private installations.

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ARC LAMP CARBONS.

The Carbons quoted below are of the very best quality, and are supplied in 12 inch lengths, pointed at one end.

Cored Carbons are not stocked, but can be supplied at short notice.

PRICES.

Diameter.		Catalogue No.	Solid per 100 feet.	Catalogue No.	Cored per 100 feet.
In Millimètres	In Inches.				
9	0·35	144	12/6	152	12/6
10	0·39	145	14/6	153	14/6
11	0·43	145	16/8	154	16/8
12	0·47	147	18/9	155	18/9
13	0·51	148	21/	156	21/
15	0·59	149	25/-	157	25/-
18	0·71	150	29/-	158	29/-
20	0·79	151	33/6	159	33/6

FLEXIBLE CORDS FOR INCANDESCENT LIGHTING.

A.—1 Lap of Rubber. B.—2 Laps of Rubber.

Two Conductors, each covered with Cotton, one or two laps of pure India-rubber, another coat of Cotton, and then braided outside with either glazed Cotton or Silk, of any colour or colours, before being stranded together.

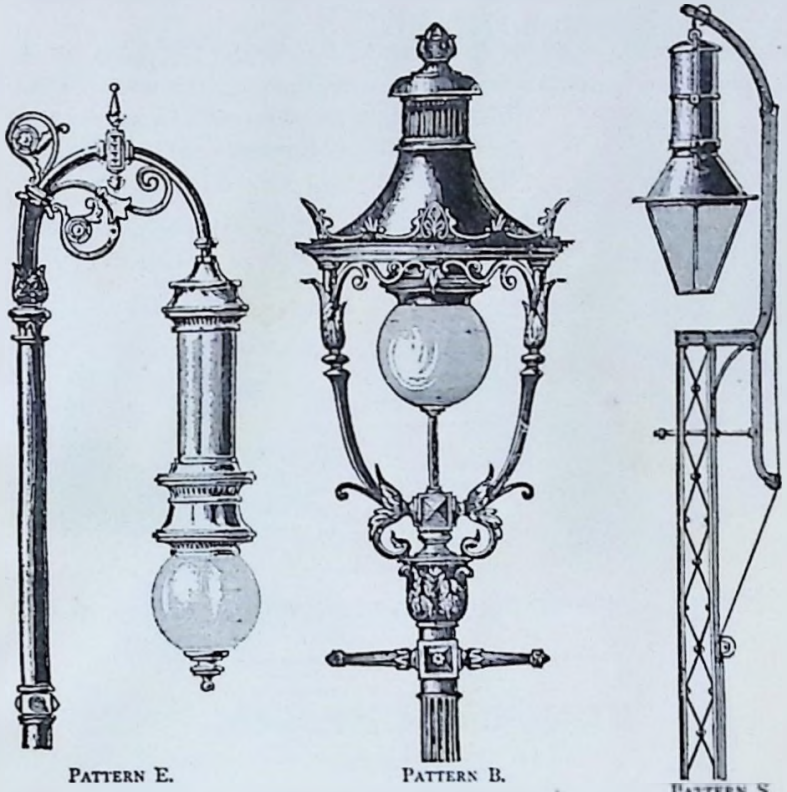
C.—Two Conductors, each covered with Cotton, Vulcanized India-rubber, and then braided outside with either glazed Cotton or Silk, of any colour or colours, before being stranded together.

Conductors.			Prices per Gross Yards.					
	Each.	Equal to S.W.G. No.	Workshop.			Glazed Cotton.		
			£	s.	d.	£	s.	d.
A	23/40	22	1	8	0	1	8	0
A	35/40	20	1	17	0	1	17	0
A	70/40	18	2	15	0	1	15	0
A	130/40	16	3	10	0	3	10	0
B	23/40	22	1	17	6	1	17	9
B	35/40	20	2	8	6	2	8	6
B	70/40	18	3	14	0	3	14	0
B	130/40	16	4	14	0	4	14	0
C	12/·008	22	2	12	0	2	17	6
C	19/·008	20	3	2	0	3	8	0
C	36/·008	18	3	16	0	4	6	0
C	61/·008	16	4	19	0	5	17	6

Silk.		
£	s.	d.
1	16	6
2	7	6
3	13	6
4	15	0
2	6	0
2	19	0
4	12	6
5	19	0
3	18	0
4	14	0
5	18	0
7	12	0

Any of above Flexible Cords can be supplied in single conductors at half respective rates.

ARC LAMP ACCESSORIES.



Pattern E. Pattern B. Pattern S

Prices of the above quoted to inquiry for quantities

PRICE LIST OF ROUND AND OVAL ARC LAMP GLOBES.

Diameter.	Clear Glass.		Opalescent		Wire Nets for Globes.
	Round.	Oval.	Round.	Oval.	
In.	s. d.	s. d.	s. d.	s. d.	s. d.
10	4 0		5 0		1 0
14	7 0	7 0	8 0	8 0	1 0
16	10 0	10 0	11 0	11 0	1 0
18	14 0	14 0	16 0	16 0	1 6
20	18 0	18 0	20 0	20 0	1 6

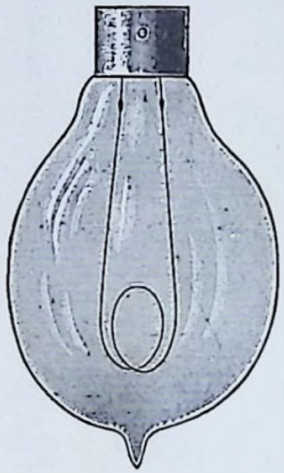
SOLID OR CORED CARBONS AT FOLLOWING PRICES.

Diameter ...	9	10	11	12	13	15	18	20	Millimetres
Price ...	d. 1½	d. 1¾	d. 2	d. 2¼	d. 2½	d. 3	d. 3½	d. 4	Per foot.

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 285 of 298
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INCANDESCENT ELECTRIC LAMPS.

The expiration of some of the patents of Incandescent Lamps has put on the market many worthless imitations, and while their first cost is lower, their life is so short and uncertain that we strongly advise the **best English make**, which we supply unless others are ordered.



The 16 c.p. lamps require only 56 Watts, and have an average life of 1,200 hours.

PRICES.

Maximum Candle Power.	Voltages.	PRICE EACH.
8	100, 105, 110.	1/6
16	45 to 65 & 100 to 110 x 5 Volts.	1/6
25	100, 105, 110.	1/6
32	100, 105, 110.	2/3
50	100, 110.	3/6
2½	100, 105, 110.	3/-

Lamps with Bayonet joints, as shown, are sent unless specified otherwise.

BEAD RAY DIFFUSER.

(PATENT.)

FOR INCANDESCENT ELECTRIC LAMPS.

The diffuser can be attached to existing lamps by anyone, and is easily removed for dusting and washing when required. It has distinct advantages over ground glass and increases the illumination. Being constructed of glass beads it is practically indestructible. These are usually supplied made of white beads, but can also be supplied in amber, blue, rose, and three shades of green, and variegated, to order.

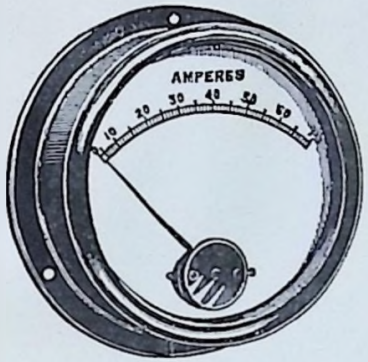


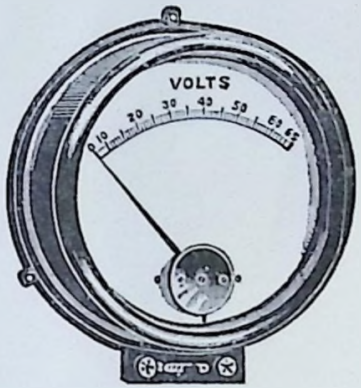
PRICES.

To suited 16 c. p. 5/- each; Tinted, 8/- each.
„ „ 32 c. p. 7/- „ „ „ 10/6 „

AMMETERS AND VOLTMETERS.

PATENT.





FOR ALTERNATING AND DIRECT CURRENTS.

The connections can be arranged with terminals behind or in front.

The prices are for gravity or Marine Type.

All Instruments are manufactured under Patents.

When ordering Alternating Current Instruments, please state periodicity.

PRICES.

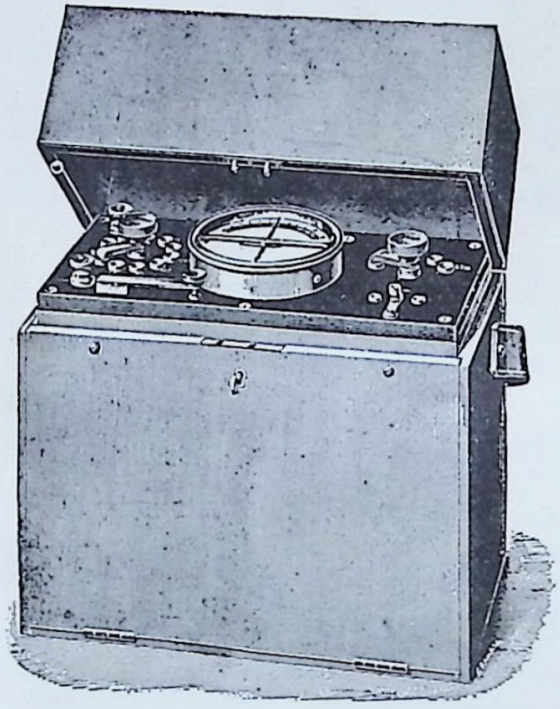
AMMETERS. Range.	£ s. d.	VOLTMETERS. Range.	£ s. d.
Up to 20 Amperes	3 10 0	Up to 60 Volts	4 4 0
„ 40 „	3 10 0	„ 80 „	4 4 0
„ 70 „	3 10 0	„ 120 „	4 15 0
„ 100 „	4 0 0	„ 160 „	4 17 0
„ 200 „	4 15 0	„ 200 „	5 5 0
„ 300 „	5 5 0	„ 240 „	5 10 0

OTHER SIZES MADE TO ORDER.

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PORTABLE TESTING SETS.

ELECTRIC.



These are constructed on the bridge principle without the use of plugs, there being two radial switches, one of which changes the resistance in one arm of the bridge, while the other changes the ratio of the known to the unknown resistance; thus when the arms of the rheostat are in such a position as to obtain no deflection of the galvanometer, then the required resistance is equal to the figure on right-hand rheostat multiplied by the number of tens marked on the other arm.

These are designed to be as portable and simple to use as possible.

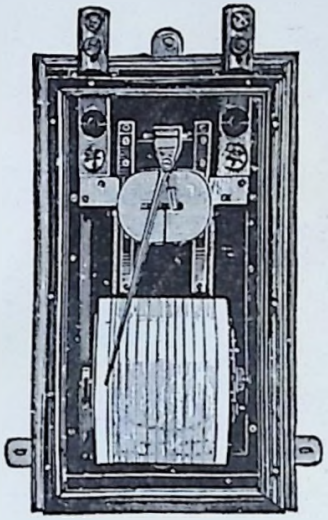
The whole Instrument weighs less than 20 lbs., including battery; and its dimensions are 12 inches long by 6 inches wide, and 11 inches high.

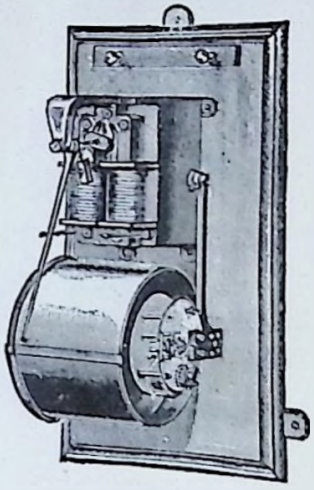
Price, containing a battery of 50 dry cells	£12 12 0
„ without battery...	6 0 0

RECORDING AMMETERS.

FOR ALTERNATING OR DIRECT CURRENT.

(PATENT.)





These Instruments have been designed upon the same principle as the Direct Current Recording Voltmeter, namely, to obtain the maximum amount of force moving the registering pen with the minimum consumption of electrical energy This object has been obtained by means of a special arrangement of the magnetic field which concentrates the force on the movement actuating the recording pen

The amount of iron used in these instruments is very small, and the errors due to hysteresis in the direct current instrument are negligable. The divisions of the scale are practically equal.

PRICES.

	£	s.	d.		£	s.	d.
Up to 20 Ampères	13	10	0	Up to 200 Ampères... ..	15	0	0
„ 50 „	13	15	0	„ 300 „	15	15	0
„ 100 „	14	0	0	„ 500 „	16	16	0

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SINGLE, DOUBLE, AND TRIPLE POLE SWITCHES.

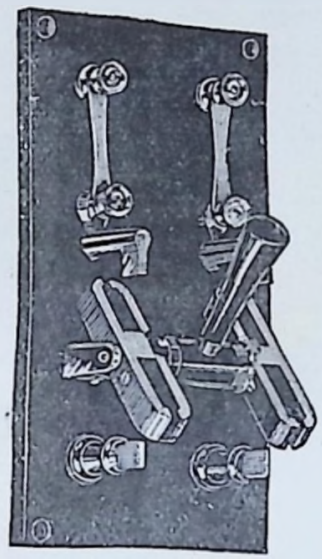


Fig. 1.



Fig. 2.

These Switch Boards are of the quick double-break type, having laminated brushes; and the best class of work only being supplied. The Single Pole Switches can be made less than 3 inches wide, thus being very slightly wider than the casing in which the cables are enclosed.

PRICES.

Carrying capacity.	Single Pole.				Double Pole.				Triple Pole.			
	On Plain Slate.	On Enamelled Slate.	With Fuse.	In Teak Case, Glass door, Lock and Key.	On Plain Slate.	On Enamelled Slate.	With Fuse.	In Teak Case, Glass door, Lock and Key.	On Plain Slate.	On Enamelled Slate.	With Fuse.	In Teak Case, Glass door, Lock and Key.
Amperes.												
20	12/-	14/-	16/-	21/-	30/-	32/-	42/-	50/-	—	—	—	—
50	15/-	16/-	17/6	25/-	35/-	37/-	44/-	52/-	45/-	48/-	55/-	65/-
75	18/-	19/-	21/-	28/-	45/-	47/-	57/-	65/-	60/-	63/-	70/-	80/-
100	25/-	26/-	32/-	35/-	55/-	57/-	67/-	75/-	75/-	78/-	88/-	100/-
200	30/-	32/-	38/-	45/-	70/-	72/-	82/-	90/-	90/-	93/-	100/-	115/-

DISTRIBUTING SWITCH AND FUSE BOARDS.





Double Pole distributing Fuse Board, each Pole on separate slates if desired.

PRICE PER WAY.

Ways.	5 Amperes.			10 Amperes.			20 Amperes.		
	Pole.		With Switch	Pole		With Switch	Pole.		With Switch
	Single	Double		Single	Double		Single	Double	
Up to 6	2/6	4/6	8/-	3/6	6/-	14/-	4/-	7/-	15/-
,, 10	2/3	4/-	7/-	3/-	5/-	13/-	3/6	6/-	14/-
,, 20	2/-	3/6	6/-	2/6	4/-	12/-	3/-	5/-	13/-

Prices include Polished Teak Case with glass door

Above 5 Amperes special type single pole switches (see Fig. 2, previous page) are used.

For 5 Amperes and under, tumbler switches are supplied.

Patent Automatic Magnetic Cut Out, or Cut In, for Accumulators, or to replace Fuses. Is absolutely reliable.

PRICES.

For use on	10	25	50	100	200 Ampère Circuit.
Price ...	35/-	40/-	45/-	55/-	65/-

Metal Cases with Glass Fronts, 5/- extra.

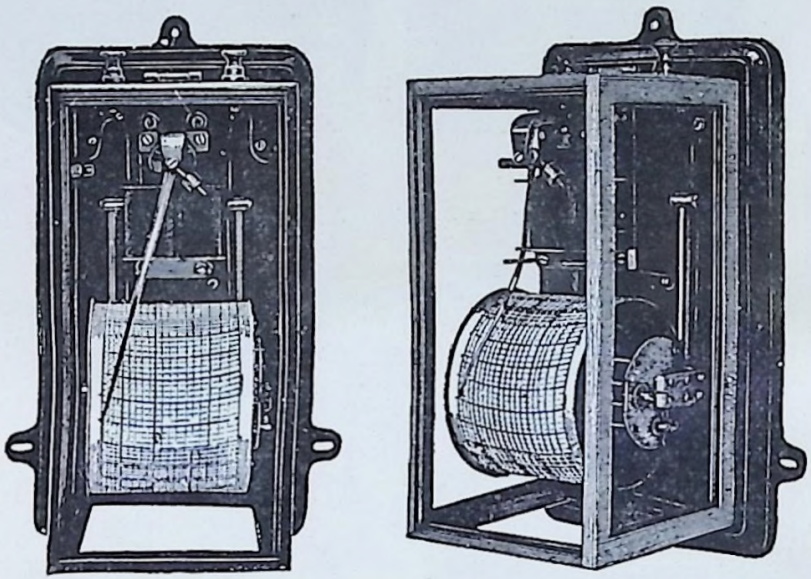
Special Quotations given for Radical Switches, Resistance Switches and Frames, High Tension Switches, Fuses, and Automatic Cut-outs, Choking Coils, Special Transformers, Condensers, &c., &c.

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RECORDING VOLTMETERS.

FOR DIRECT CURRENT.

(PATENT.)



These Instruments have been designed to obtain a large amount of force actuating the pen, without absorbing much electrical energy, thus eliminating the fault in most recording instruments of a tendency to stick, on account of the friction of the pen on the paper These instruments have been brought to such perfection in sensitiveness that they will record a variation of less than 0·3 per cent. They are adapted for fixing on switch boards, where indication can be read at a glance, in the same way as any ordinary direct reading voltmeter

The controlling force is gravity, so they are never liable to alter.

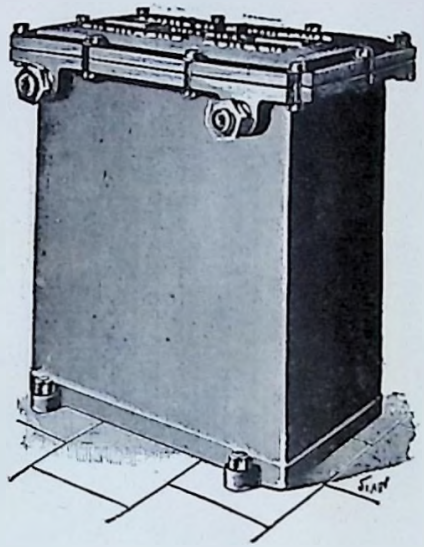
PRICE.

Up to 120 volts. £13 10 0

Up to 240 volts. £15 15 0

For higher voltages a transformer is supplied

ELECTRIC TRANSFORMERS.



DIMENSIONS.

K.W.	No. of 30 Watt Lamps.	Price £ s.	K.W.	No. of 30 Watt Lamps.	Price £ s.	K.W.	No. of 30 Watt Lamps.	Price £ s.
½	25	11 5	4½	150		15	500	
1	33	12 0	5	166		18	600	
1½	50	13 10	6	200		20	666	
2	66	15 0	7	232		25	833	
2½	83	16 10	8	266		30	1000	
3	100	18 0	9	300		35	1166	
3½	116	19 5	10	333		40	1333	
4	133		12	400		50	1666	

The illustration above shows general appearance of Transformer.

These Transformers are made in all sizes. They are carefully designed to suit the requirements of purchasers, as it is impossible for one design to suit all frequencies

The greatest care is taken with the insulation throughout. The primary and secondary coils are wound on separate cylinders of hard and indestructible material, and have, when afterwards placed concentrically on the cores, sheet ebonite interposed between them. This method of insulating is so perfect that a breakdown between primary and secondary, or between either coil and core, is unknown

The whole is enclosed in a cast-iron water-tight case provided with gun-metal ebonite bushed glands for both primary and secondary conductors. There is no fixing whatever to this case, so the Transformer, when the cover is removed, can be lifted out bodily if desired.

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ELECTRICITY SUPPLY METERS.

(PATENT.)

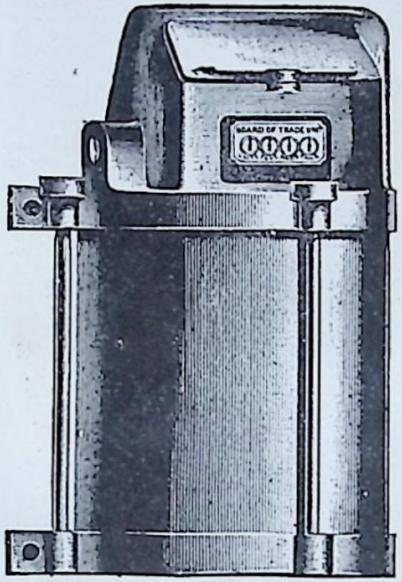
FOR CONTINUOUS CURRENTS.

GREAT SIMPLICITY.

ACCURACY GUARANTEED.

NO CLOCKWORK.

VERY COMPACT.



WASTES NO POWER.

DIRECT READING in b.o.t units.

SLOW SPEED.

HIGH INSULATION.

IMPROVED DESIGN. WITH PERMANENT MAGNETS.

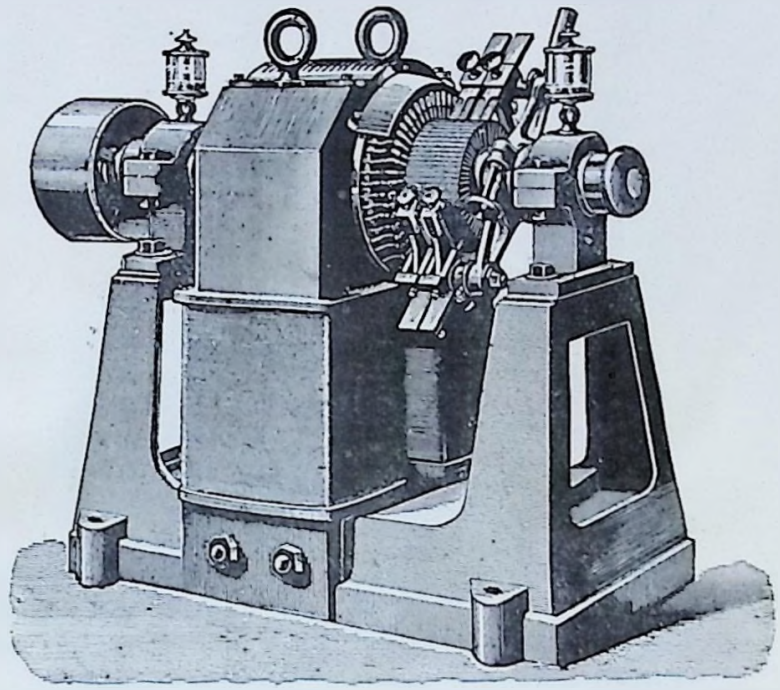
The Meter illustrated above possesses the following important points:—

Few and simple working parts.
Nothing to get out of order.
No brushes rubbing on commutators.
Fluid friction negligible.
Accurate over wide range.
Consumes no current.
Very small starting current.
Inappreciable fall of potential.
Forces acting very great, and yet balanced.
Same constant for all temperatures.
May be left unused for long periods without affecting its accuracy.

PRICE LIST.

Current in Ampères.	Price.	Current in Ampères.	Price.
	£ s. d.		£ s. d.
5	6 10 0	50	7 0 0
10	6 10 0	75	7 10 0
25	6 10 0	100	8 0 0

CONTINUOUS CURRENT DYNAMO.

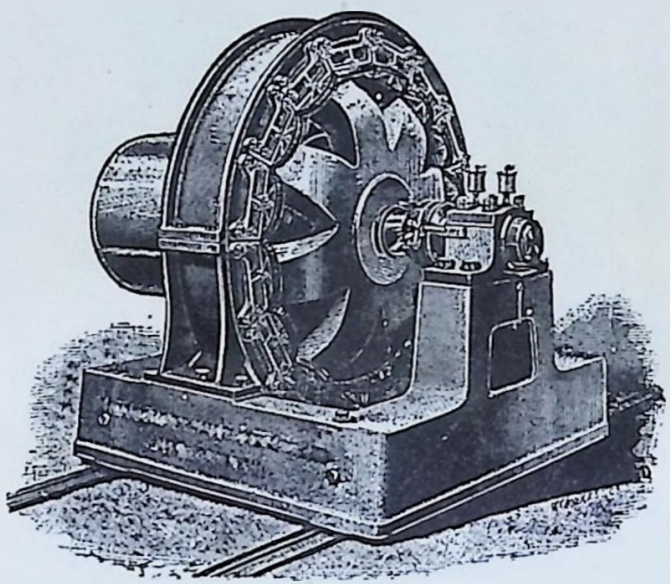


These machines are constructed on the latest lines, and the greatest attention has been given to mechanical details, such as **careful balancing** of armature, great **length of journals, automatic oiling**; the materials are most carefully selected of the best respective kinds. The machines work **at full load without overheating,** and **without sparking** at the brushes.

Size.	Output in Watts.	No. of 30-Watt Lamps.	Voltage Limit	Revolutions per minute (approx.)	Horse Power required.	Size of Pulley in inches.	Price.	Bedding Rails and Tightening Screws.
No.			As required from :—			Dia. Face.	£	£ s.
1D	600	20	50 to 65 Volts	1,500	1	4 × 3		1 10
2D	900	30		1,750	1½	5 × 4		1 10
3D	1,200	40		1,700	2	5 × 4		2 0
4D	1,800	60	65 to 100 Volts	1,600	3	6 × 5		2 0
5D	3,000	100		1,500	5	7 × 5		2 10
6D	4,500	150		1,420	7¼	8 × 6		3 0
7D	6,000	200		1,340	9½	9 × 6		3 0
8D	9,000	300	65 to 130 Volts	1,220	14½	11 × 7		3 10
9D	12,000	400		1,140	19	12 × 7		4 0
10D	15,000	500		1,060	23½	13 × 8		4 0
11D	18,000	600		990	28	14 × 10		4 10

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ALTERNATING CURRENT DYNAMOS.



PRICE LIST OF 2,000-VOLT MACHINES.

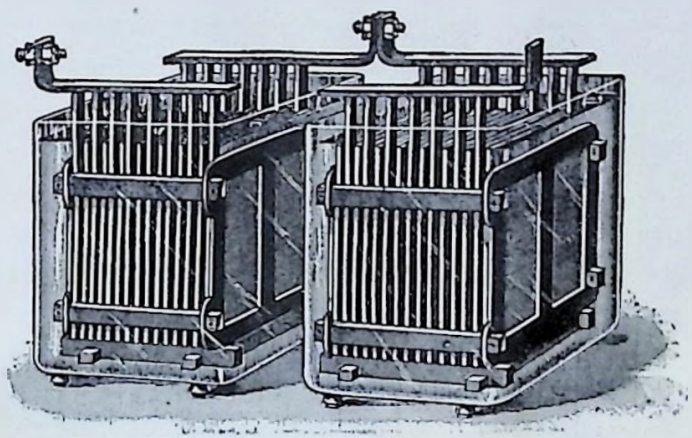
Frequency 75 complete cycles per second.

Kilowatts.	Speed. Revolutions per minute.	Price. Alternator only.	Price. Alternator and Exciter combined on same Spindle.	Extra for Racking Gear for Field Magnets
		£	£	£
30	750			
45	650			
60	560			
90	500			
120	450			

Sliding rails for belt adjustment charged extra.

ELECTRIC STORAGE BATTERY.

(PATENT.)



These Batteries combine the **durability** and large surface of the **Planké Cell** with the capacity of the pasted forms. And it has been shown that their **capacity increases** with use, whereas in the other types it diminishes.

The plates are produced by a special electrolytic process, which causes the active material to be formed out of the plate itself. The "protecting coat" is thus extremely dense, and the oxides in the best possible condition for electrolytic action.

The special construction affords an enormous working area, enabling the cells to be charged or discharged at very high rates without producing disintegration or buckling.

The rates of discharge given in the lists can be exceeded in cases of emergency, but it should be noted that where discharged very rapidly, a slight increase in the number of cells is necessary, to maintain the voltage.

The batteries are extensively used for Central Stations and Ship Lighting, for which special quotations are given.

Prices on other side include bottom blocks, connectors and supply of acid. Glass, fluid, insulators, oil, and wood strips are extra at 1/4 per cell complete. Stands for accumulators quoted on application.

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PRICES OF

SEPARATE ACCUMULATORS.

Distinguishing Letter.	Capacity Amp. hrs.	Normal rates in Amperes. Charge.	Normal rates in Amperes. Discharge.	Discharge rate for hours. Discharge.	Outside Dimensions. Height.	Length.	Width.	Quantity of Acid required in gallons. *	Weight of complete Cell, including Acid.	Prices, including Acid. In Glass Boxes.	Prices, including Acid. In Lead-lined Teak Boxes.
					Inches.	Inches.	Inches.		lb.	£ s. d.	£ s. d.
A	140	12	14	22	13½	6	12½	2·8	65	1 11 0	1 14 3
B	220	18	21	33	13½	8	12½	3·75	90	2 4 0	2 8 6
C	325	30	35	55	13½	11	12½	5·12	120	3 0 0	3 6 0
D	430	42	49	77	13½	14½	12½	6·25	156	3 15 0	4 2 6
E	500	48	56	88	13½	16½	12½	7·0	170	4 10 0	4 19 0
F	580	54	63	99	13½	18	12½	7·75	190	5 5 0	5 15 6
G	660	66	77	121	13½	21½	12½	9·25	220	6 0 0	6 12 0
H	725	72	84	144	13½	23½	12½	10·25	240	6 15 0	7 8 6

* A carboy of Acid contains from 8 to 10 gallons.

COMPLETE BATTERIES.

100-Volt Circuit. (*This is the voltage generally in use*).	No. and Type of Cells.	No. of 8-c.p. Lamps, at 32 watts.* For 9 hours.	No. of 8-c.p. Lamps, at 32 watts.* For 4 hours.	No. of 16-c.p. Lamps, at 60 watts.* For 9 hours.	No. of 16-c.p. Lamps, at 60 watts.* For 4 hours.	Price. £ s. d.
Suitable for Running Arc* and Incandescent Lamps in parallel.	53 A	44	69	24	37	
	53 B	65	103	35	55	
	53 C	110	172	58	91	
	53 D	153	240	82	128	
	53 E	175	275	93	147	
	53 F	197	306	105	165	
	53 G	240	378	128	200	
	53 H	262	450	140	240	

* Arc Lamps take about ⅓ of current to equivalent light in Incandescent Lamps.

Special quotations given for larger or intermediate size Batteries, or for different voltage.

APPENDIX.

TABLES OF

WEIGHTS, MEASUREMENTS, &c.

USEFUL TO

ENGINEERS AND OTHERS.

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COMPARATIVE TABLE OF

WIRES BY DIFFERENT GAUGES.

Standard Wire Gauge of English Board of Trade now in general use.

No.	English Standard Wire Gauge.			Birmingham, or B.W.G.		American, or B.S.G.		
	Diam.		Area.	Diam. Ins.	Area.	Diam.		Area.
	Inches.	m/m.				Inches.	m/m.	
0000	·400	10·16	·12566	·454	·16180	·460	11·68	·166190
000	·372	9·44	·108685	·425	·14190	·40964	10·38	·131790
00	·348	8·83	·095115	·380	·11340	·36480	9·36	·104520
0	·324	8·22	·082448	·340	·09079	·32495	8·25	·082932
1	·300	7·62	·070686	·300	·07076	·28930	7·34	·065733
2	·276	7·01	·059828	·284	·063340	·25763	6·54	·052130
3	·252	6·40	·049876	·259	·052680	·22942	5·82	·041339
4	·232	5·89	·042273	·238	·044480	·20931	5·18	·032784
5	·212	5·38	·035299	·220	·038010	·1[illegible]	4·61	·025998
6	·192	4·87	·028952	·203	·032360	·1[illegible]		·020617
7	·176	4·47	·024328	·180	·025440	·144		·016349
8	·160	4·06	·020106	·165	·021380	·1284	-	·012966
9	·144	3·65	·016286	·148	·017200	·11443	2·90	·010284
10	·128	3·25	·012867	·134	·014102	·10189	2·58	·008153
11	·116	2·94	·010568	·120	·011309	·09074	2·30	·006467
12	·104	2·64	·008494	·109	·009331	·08081	2·05	·005128
13	·092	2·33	·006647	·095	·007088	·07196	1·82	·004067
14	·080	2·03	·005026	·083	·005410	·06408	1·62	·003146
15	·072	1·82	·004071	·072	·004071	·05706	1·44	·002557
16	·064	1·62	·003217	·065	·003318	·05082	1·29	·002028
17	·056	1·42	·002463	·058	·002642	·04525	1·14	·001608
18	·048	1·21	·001809	·049	·001885	·04030	1·02	·001275
19	·040	1·01	·001256	·042	·001385	·03539	·898	·000983
20	·036	·941	·001017	·035	·000962	·03196	·811	·000802
21	·032	·813	·000894	·032	·0008012	·02846	·722	·000635
22	·028	·711	·000615	·028	·000615	·025347	·643	·000504
23	·024	·610	·000452	·025	·000490	·022571	·573	·000400
24	·022	·559	·000380	·022	·000380	·0201	·510	·000317
25	·020	·508	·000314	·020	·000314	·0179	·454	·000251
26	·018	457	·000254	·018	·000254	·01594	·404	·000199
27	·0164	416	·000211	·016	·000201	·014195	·360	·000158
28	·0148	376	·000172	·014	·000153	·012641	·321	·000125
29	·0136	345	·000145	·013	·000132	·011257	·285	·000099
30	·0124	315	·000120	·012	·000113	·010025	·254	·000079
31	·0116	294	·000105	·010	·000078	·008928	·226	·000062
32	·0108	274	·000090	·009	·000066	·00795	·201	·000049
33	·0100	254	·000078	·008	·000055	·00708	·179	·000039
34	·0092	233	·000066	·007	·000045	·0063	·160	·000031
35	·0084	213	·000055	·005	·000018	·00561	·142	·000024
36	·0076	193	·000045	·004	·000012	·005	·127	·000020
37	·0068	172	·000036	...	...	·00445	·113	·000015
38	·0060	152	·000028	...	...	·003965	·1007	·000012
39	·0052	132	·000021	...	...	·003531	·0896	·000009
40	·0048	122	·000018	...	...	·003144	·0798	·000007

Bell's Asbestos Company, Limited: Engineers' Stores Department (1898)
ACL Doc 21509 · Page 293 of 298
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TABLE OF AREAS OF CIRCLES.

Diam.	Area.	Diam.	Area.	Diam.	Area.	Diam.	Area.
⅛	·012	6 in.	28·274	23½ in.	433·73	47 in.	1734·94
¼	·049	¼	30·679	24 in.	452·39	½	1772·05
⅜	·110	½	33·183	½	471·43	48 in.	1808·56
½	·196	¾	35·784	25 in.	490·87	½	1847·45
⅝	·306	7 in.	38·484	½	510·70	49 in.	1885·74
¾	·441	¼	41·282	26 in.	530·93	½	1924·42
⅞	·601	½	44·178	½	551·54	50 in.	1963·49
1 in.	·785	¾	47·173	27 in.	572·55	½	2002·96
⅛	·994	8 in	50·265	½	593·95	51 in.	2042·82
¼	1·227	¼	53·456	28 in	615·75	½	2083·07
⅜	1·484	½	56·745	½	637·94	52 in.	2123·71
½	1·767	¾	60·132	29 in.	660·52	½	2164·75
⅝	2·073	9 in.	63·617	½	683·49	53 in.	2206·18
¾	2·405	¼	67·200	30 in.	706·86	½	2248·00
⅞	2·761	½	70·882	½	730·61	54 in.	2290·22
2 in.	3·141	¾	74·662	31 in.	754·76	½	2332·82
⅛	3·546	10 in	78·540	½	779·31	55 in.	2375·82
¼	3·976	¼	82·516	32 in	804·24	½	2419·22
⅜	4·430	½	86·590	½	829·57	56 in	2463·00
½	4·908	¾	90·762	33 in.	855·30	½	2507·18
⅝	5·411	11 in.	95·033	½	881·41	57 in.	2551·75
¾	5·939	¼	99·402	34 in	907·92	½	2596·72
⅞	6·491	½	103·869	½	934·82	58 in.	2642·07
3 in.	7·068	¾	108·434	35 in.	962·11	½	2687·82
⅛	7·669	12 in	113·097	½	989·80	59 in.	2733·97
¼	8·295	½	122·718	36 in.	1017·87	½	2780·50
⅜	8·946	13 in	132·732	½	1046·35	60 in.	2827·43
½	9·621	½	143·139	37 in.	1075·21	½	2874·75
⅝	10·320	14 in	153·938	½	1104·46	61 in.	2922·46
¾	11·044	½	165·130	38 in.	1134·11	½	2970·57
⅞	11·793	15 in.	176·715	½	1164·15	62 in.	3019·07
4 in.	12·566	½	188·692	39 in.	1194·59	½	3067·96
⅛	13·364	16 in.	201·062	½	1225·42	63 in.	3117·24
¼	14·186	½	213·825	40 in.	1256·64	½	3166·92
⅜	15·033	17 in.	226·980	½	1288·25	64 in.	3216·99
½	15·904	½	240·528	41 in.	1320·25	½	3267·45
⅝	16·800	18 in.	254·469	½	1352·65	65 in.	3318·30
¾	17·720	½	268·803	42 in	1385·44	½	3369·55
⅞	18·665	19 in	283·529	½	1418·62	66 in.	3421·19
5 in.	19·635	½	298·648	43 in.	1452·20	½	3473·22
⅛	20·629	20 in.	314·160	½	1486·17	67 in.	3525·65
¼	21·647	½	330·064	44 in.	1520·53	½	3578·47
⅜	22·690	21 in.	346·361	½	1555·28	68 in.	3631·68
½	23·758	½	363·051	45 in.	1590·43	½	3685·28
⅝	24·850	22 in.	380·133	½	1625·97	69 in.	3739·28
¾	25·967	½	397·608	46 in.	1661·90	½	3793·66
⅞	27·108	23 in.	415·476	½	1698·23	70 in.	3848·45

TABLE OF WHITWORTH'S
STANDARD SCREW THREADS,

For Gas, Water, Steam, and Hydraulic Tubes.

GAS, WATER, AND STEAM TUBES.			HYDRAULIC TUBES							
Internal Diam. of Tube.	External Diam. of Tubes.	No. of Threads per inch.	Internal Diam. of Tube.	External Diam. of Tube.	Pressure in lbs. per square inch.	No. of Threads per inch.	Internal Diam. of Tube.	External Diam. of Tube.	Pressure in lbs. per square inch.	No. of Threads per inch.
⅛	·385	28	¼	⅜	4000	14	1¼	1¾	4000	11
¼	·520	19		½	6000			1⅞	6000	
⅜	·665	19		⅝	8000			2	8000	
½	·822	14		¾	10000			2⅛	10000	
¾	1·034	14	⅜	½	4000	14	1⅜	1⅞	4000	·11
1	1·302			⅝	6000			2	6000	
1⅛	1·492			¾	8000			2⅛	8000	
1¼	1·650			1⅛	10000			2¼	10000	
1⅜	1·745		½	¾	4000	14	1½	2	4000	11
1½	1·882			⅞	6000			2⅛	6000	
1⅝	2·021			1	8000	11		2¼	8000	
1¾	2·047			1⅛	10000			2⅜	10000	
1⅞	2·245							2½	10000	
2	2·347		⅝	⅞	4000	14	1⅝	2⅛	4000	11
2⅛	2·467			1	6000	11		2¼	6000	
2¼	2·587	11		1⅛	8000			2⅜	8000	
2⅜	2·794			1¼	10000			2½	10000	
2½	3·001		¾	1	4000	11	1¾	2¼	3000	11
2⅝	3·124			1⅛	6000			2⅜	4000	
2¾	3·247			1¼	8000			2½	6000	
2⅞	3·367			1⅜	10000			2⅝	8000	
3	3·485							2¾	10000	
3¼	3·698		⅞	1⅛	4000	11	1⅞	2⅜	3000	11
3½	3·912			1¼	6000			2½	4000	
3¾	4·125			1⅜	8000			2⅝	6000	
4	4·339			1½	10000			2¾	8000	
			1	1¼	4000	11		2⅞	10000	
				1⅜	6000		2	2½	3000	11
				1½	8000			2⅝	4000	
				1⅝	10000			2¾	6000	
			1⅛	1½	4000	11		2⅞	8000	
				1¾	6000			3	10000	
				1⅞	8000					
				2	10000					

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TABLE OF WEIGHT OF CAST-IRON PIPES IN LBS. PER LINEAL FOOT.

Bore.	Thickness in Inches.								
Ins.	¼	⅜	½	⅝	¾	⅞	1	1¼	1½
1	3·06	5·06	7·36	9·97	—	—	—	—	—
1¼	3·69	5·98	8·59	11·51	14·73	—	—	—	—
1½	4·29	6·90	9·82	13·04	16·50	20·40	—	—	—
1¾	4·91	7·83	11·05	14·57	18·41	22·55	27	—	—
2	5·53	8·75	12·27	16·11	20·25	24·70	29·45	34·46	—
2½	6·74	10·58	14·72	19·17	23·92	28·93	34·36	40·03	46·02
3	7·98	12·43	17·18	22·19	27·62	33·29	39·28	45·56	52·16
3½	9·20	14·21	19·64	25·31	31·30	37·58	44·18	51·08	58·29
4	10·44	16·11	22·10	28·38	34·98	41·88	49·09	56·61	64·43
4½	11·66	17·94	24·54	31·44	38·65	46·17	53·99	62·12	70·56
5	12·88	19·78	26·99	34·51	42·33	50·46	58·90	67·64	76·69
5½	14·11	21·63	29·45	37·58	46·02	54·76	63·81	73·17	82·84
6	15·34	23·47	31·91	40·65	49·70	59·06	68·73	78·70	88·75
6½	16·57	25·31	34·36	43·72	53·39	63·36	73·41	84·22	95·10
7	17·79	27·15	36·82	46·79	56·84	67·65	78·53	89·74	101·20
7½	19·03	29·00	39·05	49·86	60·74	71·95	83·45	95·26	107·40
8	20·02	30·83	41·71	52·92	64·42	76·23	88·35	100·80	113·50
8½	21·69	32·90	44·40	56·21	68·33	80·76	93·49	106·50	119·90
9	22·71	34·52	46·64	59·07	71·80	84·84	98·18	111·80	125·80
9½	23·93	36·36	49·09	62·13	75·47	89·13	103·10	117·40	131·90
10	25·16	38·20	51·54	65·20	79·16	93·42	108·00	122·90	138·10
10½	26·38	40·04	54·00	68·26	82·84	97·71	112·90	128·40	144·20
11	27·62	41·88	56·46	71·33	86·52	102·00	117·80	133·90	150·30
11½	28·84	43·71	58·90	74·39	90·19	106·30	122·70	139·40	156·40
12	30·06	45·55	61·35	77·46	93·60	110·60	127·60	145·00	162·60

Note.—For each Joint add one foot in length of the Pipe.

WEIGHT OF CAST-IRON BALLS.

Size in Inches.	Weight in Pounds.	Size in Inches.	Weight in Pounds.	Size in Inches.	Weight in Pounds.	Size in Inches.	Weight in Pounds.
1	·14	4	8·81	7	47·23	10	137·70
1¼	·27	4¼	10·57	7¼	52·47	10¼	148·29
1½	·47	4½	12·55	7½	58·09	10½	159·40
1¾	·74	4¾	14·76	7¾	64·09	10¾	171·06
2	1·10	5	17·21	8	70·50	11	183·28
2¼	1·57	5¼	19·93	8¼	77·32	11¼	196·06
2½	2·15	5½	22·91	8½	84·57	11½	209·42
2¾	2·86	5¾	26·18	8¾	92·25	11¾	223·38
3	3·72	6	29·74	9	100·39	12	237·94
3¼	4·73	6¼	33·62	9¼	108·99		
3½	5·90	6½	37·81	9½	118·06		
3¾	7·26	6¾	42·35	9¾	127·63		

RELATIVE WEIGHT OF METALS PER SQUARE FOOT.

Thickness.	Wrought Iron.	Cast Iron.	Steel.	Copper.	Tin	Zinc.	Brass.	Gun Metal.	Lead
In.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1/16	2·50	2·34	2·55	2·89	2·41	2·28	2·63	2·73	3·71
⅛	5·00	4·69	5·10	5·79	4·81	4·55	5·26	5·46	7·41
3/16	7·50	7·03	7·65	8·68	7·22	6·83	7·89	8·19	11·1
¼	10·0	9·38	10·2	11·6	9·63	9·10	10·5	10·9	14·8
5/16	12·5	11·7	12·8	14·5	12·0	11·4	13·2	13·7	18·5
⅜	15·0	14·1	15·3	17·4	14·4	13·7	15·8	16·4	22·2
7/16	17·5	16·4	17·9	20·3	16·8	15·9	18·4	19·1	25·9
½	20·0	18·7	20·4	23·2	19·3	18·2	21·1	21·9	29·7

TABLE OF WEIGHT OF COPPER PIPES PER FOOT RUN.

Bore.	Thickness in Parts of an Inch.						
	1/16	⅛	3/16	¼	5/16	⅜	7/16
In.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
¼	·23	·56	·99	1·51	2·13	2·83	3·64
½	·42	·94	1·56	2·27	3·07	3·97	4·96
¾	·61	1·32	2·13	3·02	4·02	5·11	6·29
1	·80	1·70	2·69	3·78	4·96	6·24	7·61
1¼	·99	2·08	2·26	4·54	5·91	7·38	8·94
1½	1·18	2·46	3·83	5·29	6·85	8·51	10·26
1¾	1·37	2·84	4·40	6·05	7·80	9·64	11·58
2	1·56	3·22	4·96	6·81	8·75	10·78	12·91
2¼	1·75	3·59	5·53	7·56	9·69	11·92	14·23
2½	1·94	3·97	6·10	8·32	10·64	13·06	15·56
2¾	2·13	4·35	6·67	9·08	11·59	14·19	16·88
3	2·31	4·73	7·24	9·74	12·53	15·32	18·21

WEIGHT OF BRASS PIPES PER FOOT RUN.

Bore.	Thickness in Parts of an Inch.						
	1/16	⅛	3/16	¼	5/16	⅜	7/16
In.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
¼	·22	·53	·94	1·43	2·01	2·68	3·44
½	·40	·89	1·47	2·15	2·91	3·75	4·70
¾	·58	1·25	2·01	2·86	3·80	4·83	5·95
1	·76	1·61	2·55	3·58	4·70	5·92	7·25
1¼	·94	1·96	3·09	4·31	5·64	6·98	9·46
1½	1·12	2·34	3·67	5·01	6·49	8·05	9·71
1¾	1·33	2·66	4·14	5·70	7·36	9·11	10·94
2	1·48	3·04	4·69	6·44	8·27	10·20	12·21
2¼	1·65	3·40	5·23	7·16	9·17	11·27	13·46
2½	1·83	3·75	5·77	7·87	10·06	12·35	14·72
2¾	2·01	4·11	6·31	8·59	10·96	13·42	15·97
3	2·19	4·47	6·84	9·31	11·85	14·69	17·42

WEIGHT OF LAP-WELDED IRON BOILER TUBES PER FOOT RUN.

External Diameter.	Wire Gauge Thickness.	Average Weight per Foot.	External Diameter.	Wire Gauge Thickness.	Average Weight per Foot.
In.		lbs.	In.		lbs.
1¼	16	1	3½	11	4½
1½	14	1¼	3¾	11	4⅝
1¾	13	1⅜	4	10	5½
2	13	2	4½	10	6
2¼	13	2⅛	5	9	7¼
2½	12	2¼	6	8	9⅜
2¾	12	3	7	8	12½
3	12	3⅜	8	8	15
3¼	11	4			

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TABLE OF HORSE-POWER THAT DIFFERENT LEATHER BELTS WILL TRANSMIT PER INCH IN WIDTH AT VARIOUS SPEEDS.

Velocity of Belt per minute.	Kind of Belts.								
	Best Oak-tanned Belts.			Best Link or Chain Belts.					
	Single Belts.	Light double Belts.	Heavy double Belts.	¼	½	⅝	¾	⅞	1
Feet.	Horse-Power they will Transmit.								
100	·15	·21	·27	·13	·15	·17	·20	·24	·27
200	·30	·42	·55	·25	·29	·35	·40	·47	·55
300	·45	·64	·82	·38	·44	·52	·60	·71	·82
400	·61	·85	1·09	·51	·58	·69	·80	·95	1·09
500	·76	1·06	1·36	·64	·73	·86	1·00	1·18	1·36
600	·91	1·27	1·64	·76	·87	1·04	1·20	1·42	1·64
700	1·06	1·49	1·91	·89	1·02	1·21	1·40	1·65	1·91
800	1·21	1·70	2·18	·92	1·16	1·38	1·60	1·89	2·18
900	1·36	1·91	2·45	1·05	1·31	1·55	1·80	2·13	2·45
1000	1·51	2·12	2·73	1·27	1·45	1·73	2·00	2·36	2·73
1100	1·67	2·33	3·00	1·40	1·60	1·90	2·20	2·60	3·00
1200	1·82	2·55	3·27	1·53	1·75	2·07	2·40	2·84	3·27
1300	1·97	2·76	3·55	1·65	1·89	2·25	2·60	3·07	3·55
1400	2·12	2·97	3·82	1·78	2·04	2·42	2·80	3·31	3·82
1500	2·27	3·18	4·09	1·91	2·18	2·59	3·00	3·55	4·09
1600	2·42	3·39	4·36	2·04	2·33	2·76	3·20	3·78	4·36
1700	2·58	3·61	4·64	2·16	2·47	2·94	3·40	4·02	4·64
1800	2·73	3·82	4·91	2·29	2·62	3·11	3·60	4·25	4·91
1900	2·88	4·03	5·18	2·42	2·76	3·28	3·80	4·49	5·18
2000	3·03	4·24	5·45	2·55	2·91	3·45	4·00	4·73	5·45
2100	3·18	4·45	5·73	2·67	3·05	3·63	4·20	4·96	5·73
2200	3·33	4·67	6·00	2·80	3·20	3·80	4·40	5·20	6·00
2300	3·49	4·88	6·27	2·93	3·35	3·97	4·60	5·44	6·27
2400	3·64	5·09	6·55	3·05	3·49	4·15	4·80	5·67	6·55
2500	3·79	5·30	6·82	3·18	3·64	4·32	5·00	5·91	6·82
2600	3·94	5·52	7·09	3·24	3·78	4·49	5·20	6·15	7·09
2700	4·09	5·73	7·36	3·28	3·85	4·66	5·40	6·38	7·36
2800	4·24	5·94	7·64	3·31	3·86	4·73	5·60	6·62	7·64
2900	4·39	6·15	7·91	3·32	3·87	4·78	5·80	6·85	7·91
3000	4·50	6·36	8·18	3·31	3·86	4·75	5·97	7·09	8·18
3100	4·60	6·58	8·45	3·30	3·85	4·73	5·96	7·33	8·45
3200	4·69	6·79	8·70	3·28	3·82	4·71	5·94	7·37	8·73
3300	4·77	7·00	8·86	3·24	3·77	4·70	5·92	7·35	8·88
3400	4·84	7·21	8·96	3·19	3·71	4·64	5·87	7·32	8·86
3500	4·90	7·31	9·06	3·13	3·61	4·50	5·78	7·25	8·80
3600	4·95	7·40	9·16	3·05	3·50	4·37	5·67	7·16	8·73
3700	4·99	7·48	9·24	2·96	3·39	4·26	5·55	7·01	8·58
3800	5·03	7·54	9·29	2·84	3·28	4·15	5·41	6·87	8·41
3900	5·06	7·60	9·34	2·72	3·13	4·02	5·20	6·70	8·27
4000	5·08	7·64	9·37	2·58	2·95	3·84	5·01	6·48	8·04

TABLE OF POWER THAT STEEL SHAFTING WILL TRANSMIT AT VARIOUS SPEEDS.

Revolutions per minute.	Diameter of Shafts.												
	1½	1¾	2	2¼	2½	2¾	3	3½	4	4½	5	5½	6
	Horse Powers they will transmit.												
50	3·3	5·3	8·0	10·9	15·6	20·8	27	43	64	91	125	166	216
60	4·0	6·4	9·6	13·1	18·8	25·0	32	51	77	109	150	200	259
70	4·7	7·5	11·2	15·2	21·9	29·1	38	60	89	128	175	233	302
80	5·4	8·5	12·8	17·4	25·0	33·3	43	69	102	146	200	266	346
90	6·0	9·6	14·4	19·6	28·1	37·4	49	77	115	164	225	299	389
100	6·7	10·7	16·0	21·8	31·2	41·6	54	86	128	182	250	333	432
110	7·4	11·8	17·6	23·9	34·4	45·8	59	94	141	202	275	366	475
120	8·1	12·9	19·2	26·1	37·5	49·9	65	103	154	219	300	399	518
130	8·7	13·9	20·8	28·3	40·6	54·1	70	111	166	237	325	433	562
140	9·4	15·0	22·4	30·5	43·8	58·2	76	120	179	255	350	466	605
150	10·1	16·1	24·0	32·6	46·9	62·4	81	129	192	273	375	499	648
160	10·8	17·1	25·6	34·8	50·0	66·5	86	137	205	292	400	532	691
170	11·5	18·2	27·2	37·0	53·1	70·7	92	146	218	310	425	566	734
180	12·2	19·3	28·8	39·2	56·3	74·9	97	154	230	328	450	599	778
190	12·8	20·4	30·4	41·3	59·4	79·0	103	163	243	346	475	632	821
200	13·5	21·4	32·0	43·5	62·5	83·2	108	172	256	365	500	665	864
225	15·2	24·1	36·6	49·0	70·3	93·6	122	193	288	410	563	749	972
250	16·9	26·8	40·0	54·4	78·1	104·0	135	214	320	456	625	832	1080
275	18·6	29·5	44·0	59·8	85·9	114·4	149	236	352	501	688	915	1188
300	20·3	32·2	48·0	65·3	93·7	124·8	162	257	384	547	750	998	1296
325	21·9	34·8	52·0	70·7	101·6	135·2	176	279	416	592	813	1081	1404
350	23·6	37·5	56·0	76·2	109·4	145·6	189	300	448	638	875	1165	1512
375	25·3	40·2	60·0	81·6	117·2	156·0	203	322	480	683	938	1248	1620
400	27·0	42·9	64·0	87·0	125·0	166·4	216	343	512	729	1000	1331	1728
425	28·7	45·6	68·0	92·5	132·8	176·8	230	364	544	775	1063	1414	1836
450	30·4	48·2	72·0	97·9	140·6	187·2	243	386	576	820	1125	1497	1944
475	32·1	50·9	71·0	103·4	148·4	197·6	257	407	603	866	1188	1580	2052
500	33·7	53·6	80·0	108·8	156·2	208·0	270	429	640	911	1250	1664	2160

For power of Wrought-iron Shafts take 70 per cent. of Steel Shaft, same size.

TABLE GIVING CENTRES OF BEARINGS FOR LINE SHAFTS CARRYING A FAIR PROPORTION OF PULLEYS.

Diam. of Shaft in inches	1½	1¾	2	2¼	2½	2¾	3	3½	4	4½	5	5½	6
Centre of Bearings apart	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
	7 0	7 6	8 0	8 6	9 0	9 6	10 0	11 0	12 0	13 0	13 6	14 0	15 0

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	PAGE
Elevator Buckets	297
,, Webbings	2
Emery and Emery Cloth	20
,, Blocks	272
,, Machines	265 to 269
,, Tool-grinding Machines	270
,, Wheel Dresser	272
,, Wheels	262 to 264
Engine Governors	368 to 373
Engines and Boilers, Steam	361
,, Hot Air	366, 367
,, Launch	364
,, Steam	362, 363
,, Winch	375
Excavators and Buckets	298, 299
Expansion Joints	40, 97
Fans	172, 374
Ferrule Extractor	138
Fibre Sheets, Rods, and Tubes, Vulcanized	14
Files	156 to 159
Filters, Oil	30, 31
Fire-bars	365
Fire Hose Fittings	87
Foot Valves	39
Forges and Forge Fittings	167 to 171
Founders' Ladles	387
Fusible Plugs	89
Garden Pumps	19
,, Syringes	19
Gas Fitters' Tools	128, 148, 149
,, Tongs	134, 135
Gauges, Standard Cylindrical and Step	144, 145
Gauges and Fittings	72, 88, 89
Gauge Glass Protectors	85, 86
,, Glasses and Rings	20
Gauges, Wire	129
Glass Cloth and Paper	20
Glue	20
Governors, Engine	368 to 373
Grease Cups	56
Greases and Tallow	21
Grindstones	173 to 176
Hack Saws and Frames	146
,, ,, Machines	147
Hammers	141
Hangers and Stools	320, 322
Heaters, Feed Water	40, 41
,, Water	42
Hoisting Crabs	277, 280 to 285
Hoists, Wall and Pillar	277
,, Warehouse	286, 288 to 290
Hooks and Eyes	15
Hose Fasteners	17
,, Fittings	17 to 19, 87
,, Pliers	17
Hose, India Rubber	9 to 11
,, Leather Delivery	4
,, ,, Suction	4
,, Seamless Woven	4
,, ,, ,, Suction	4
,, Tanned Woven	10
Hydraulic Jacks	304
,, Presses	343
,, Pulling Jack	308
,, Pumps	342
,, Punching Bear	306
,, Rail-bender	307
,, Shaft-straightener	305
India Rubber Goods	6 to 8
Indicator Cocks	47
Indicators, Engine	46, 47
,, Speed	48, 146
Injectors	33 to 37
Injector Stop Cocks	40
Insertion Rubber	6
Jacks	300 to 304, 308
Jim Crows	307
Keyway Cutting Machines	261
Knife Grinding ,,	348
Laces, Helvetia	3
Ladles	387
Lamps	22, 23
Lathes	208 to 229, 232 to 234
,, parts of	190, 191
Lathe Carriers	139
,, Chucks	184 to 188
,, Dogs	188
Leathers	5
Lever Punching and Shearing Machines	238, 239
Lifts, Service	287
Locomotive Balances	107
Lubricators	50 to 56
,, Pulley	309
Machines, Band Saw	347
,, Cutter Grinding	236

	PAGE
Machines, Cutter Making and Sharpening	235
,, Drilling	192 to 207
,, Emery	265 to 270
,, Knife Grinding	348
,, Milling	252 to 257
,, Mortising	348
,, Planing	248 to 251
,, ,, and Jointing	349
,, Plate Rolling	237
,, Punching and Shearing	238 to 242
,, Saw Sharpening	348
,, Shaping	258 to 260
,, Slotting	243 to 247
,, ,, and Keyway Cutting	26
,, Wheel Cutting	231
Mats, Rubber	7
Mill Bills and Picks	141
Milling Machines	252 to 257
,, and Profiling Machines	257
Mortar Mills	377
Nail Pullers	146
Needle Lubricators	55
Oil Boxes	98
,, Cans	22, 23
,, Filters	30, 31
,, Syphons	56
Paints	21
Paint Mills	378
Pans, Steam Jacketed	389
Perreaux Pump Valves	12, 13
Pipe Cutters	133 to 135
Planing Machines	248 to 251
Plate Rolling Machines	237
Pliers	148, 149
Plumbago	20
Plummer Blocks	319, 322
Polishing Machines	271
Presses	343
Pressure Gauges and Fittings, Asbestos-packed	72
Pressure Gauges and Fittings, Ordinary	88, 89
Protectors, Water Gauge Glass	85, 86
Pulleys	310 to 317
Pulley Blocks	273 to 276, 278, 279
Pulley Calculators	29
Pulleys, Dovetail	323
Pulley Lubricators	309
Pump Leathers, Hydraulic	5
Pumps, Garden	19
Pumps, Hand	333, 336 to 339
,, Hydraulic	342
,, Pulsating	334, 335
,, Steam	324 to 332, 334, 335
,, Well	340, 341
Pumping Engine	332
Punches, Saddlers'	16
,, Wad	16
Punching Bears	305, 306
Punching and Shearing Machines	238 to 242
Rail Lifter	307
,, Bender	307
Ram Leathers, Hydraulic	5
,, Rings, Moulded	5
Ratchet Braces	139
,, Gas Tongs	139
,, Spanners	138
Red Lead	21
,, Rope Packing	21
Rigging Screw	308
Rimers	129, 132
Rivets and Burrs	16
Roller Mills	377
Roses	39
Rubber Goods	6 to 8
Sack Trucks	386
Saddle Boilers	390
Safety Set Screws	323
Saws	152, 153
Saw Benches	344 to 346
,, Sharpening Machines	348
Screwing Machines	116 to 118
Screw Plates	129
Shafting	318
Shaft Straightener	305
Shaping Machine	258 to 260
Sheer Legs	293
Sheeting, Rubber	6
Sight Feed Lubricators	50 to 54
Sill Plates	321
Skeps, Tipping	388
Slotting Machines	243 to 247
,, and Keyway-cutting Machines	261
Smiths' Tools	165
Soap Powder	21
Spanners	136, 138, 142, 143
Springs	379
Spring Balances	107
Sponge Cloths	20
Squeegees	8
Steam Cocks, see "Cocks."	

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	PAGE
Steam Traps	43 to 45
Steam Valves, see "Valves."	
Stools	320
Stocks and Dies	119 to 127, 130
Strainers	39
Swage Blocks	165
Tallow and Greases	21
Telegraph Tools...	150
Tipping Skeps	388
Tongs, Gas	134, 135
Trucks	385, 386
Tubes and Fittings	177 to 182
Tube Brushes	24, 25
,, Cutters	133 to 135
,, Expanders...	138
,, Scrapers	25
,, Vices	160
,, Wrenches	134, 135
Tyres, Rubber	7
Unions, Malleable	181
,, Steam	92
,, Swivel	115
Valves, Circulation	394
,, Perreaux Pump	... 12, 13
,, Rubber	6
,, Back-pressure and Boiler Feed, Asbestos Faced	79, 80
,, Back-pressure and Boiler Feed, Ordinary	96 to 98
,, Dennis	106, 107
,, Fire, Asbestos Faced ...	81 to 83
,, ,, Ordinary	87
Valves, Gas	110
,, Hydraulic, Asbestos Faced ...	84
,, Reducing	102
,, Self-closing	111
,, Safety and Relief ...	99 to 101
,, Sluice	108, 109
,, Steam, Asbestos Faced	73, 74, 76 to 84
,, ,, Ordinary ...	95, 104, 105
,, White Metal Acid ...	112, 113
Ventilating Fans...	374
Vices	160 to 165
Vice Clamps	161
Vulcanized Fibre Sheets, Rods, and Tubes	14
Wall Brackets and Boxes	321
Warehouse Trucks	385
Washers, Rubber	6
Waste, Cotton	20
Water Gauges, ordinary	90
,, ,, Patent Asbestos Faced	75
,, ,, ,, ,, Packed	59 to 61
Water Gauge Columns	... 60, 61
Waterproof Covers	7
Weighing Machines	384
Wheelbarrows	386
Wheel Cutting Machines	231
Whistles, Steam	94
White Lead	21
Winches, Steam	294
Wind Engines	375
Wire Gauges	129
Wrenches	134 to 137, 142
Wringing Machine Rollers	7
Wood Working Machinery .	344 to 349

APPENDIX: List of Tables of Weights, Measurements, &c., useful to Engineers and others ... ... 417 to 428

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ACL Doc 21509 · Page 298 of 298
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