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CHEMICALS AND PLASTICS

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KING CITY, CA.

P. O. BOX 579, NIAGARA FALLS, NEW YORK 14302

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Date December 3, 1969

Originating Dept. Research and Development Department

Answering letter date

Subject

PLAINTIFF'S EXHIBIT
UC-161

Attached is your copy of a Technical Service Report prepared for Nalco Chemical Company on repulping systems for asbestos pellets. It may be useful for other customers and applications areas. Additional copies are available from Niagara Falls.

J. E. Skvarla

JES/bsn
Attach.

A17165

THE DISCOVERY COMPANY

Calidria ASBESTOS

AQUEOUS REPULPING TECHNIQUES FOR CALIDRIA PELLETIZED ASBESTOS

for

Nalco Chemical Company
Chicago, Illinois

by

J. E. Skvarla

Group Manager - W. L. Carrick

Project No. 897-M41

November 21, 1969

A17166

Research and Development Department
Niagara Falls, New York 14302

UNION CARBIDE CORPORATION • CHEMICALS AND PLASTICS • 270 PARK AVENUE, N.Y., N.Y. 10017

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AQUEOUS REPULPING TECHNIQUES FOR CALIDRIA PELLETIZED ASBESTOS

Calidria Asbestos pellets are sufficiently coherent to require that a moderate amount of energy be used to repulp them in water to the fully liberate fiber condition. The pellets are bound by physical (Van Der Wahl) forces only, but the high surface area of the asbestos (60 square meters per gram) and the small fiber diameter (.0250 micron) require a net repulping energy of 10-15 horsepower hours per ton for fiber liberation. The gross (installed) power requirement is 30 H.P. hours per ton of pellets repulped.

Two basic procedures have been developed for repulping asbestos pellets; the continuous system utilizing high level cavitation energy and the batch recirculation system based on lower energy levels over a period of time. The system selection is based primarily on capacity requirements. Table I lists pound-volume relationships and appropriate repulping systems.

The repulping systems, typical equipment and cost areas, are described in the following sections.

I. System for Continuous Repulping of Asbestos Pellets - High Use Rates

A. Procedure

The continuous system for repulping asbestos pellets is based on cavitation energy produced by an impact mill (disintegrator). Water and pellets are metered to the mill to provide a slurry consistency of 4 weight per cent. The repulped slurry is then delivered to the process. Appendix 1 is a description and schematic layout of a continuous system for repulping up to 900 lb. per hr. asbestos pellets.

A17167

TABLE I

ASBESTOS AND ASBESTOS SLURRY FEED RATES

(Pounds Asbestos and Gallons of 3% Asbestos Slurry)

	Asbestos Demand(1)	Pounds Asbestos per Day	Shift	Hour	Minute	Gallons 3% Slurry per Day	Shift	Hour	Minute
	10	83	28	3.5	.06	332	112	14	.24
	15	124	42	5.2	.09	498	162	21	.36
(2)	20	166	56	7.0	.12	664	224	28	.48
	30	249	84	10.5	.18	996	336	42	.72
	40	332	112	14	.24	1328	448	56	.96
	50	415	138	17	.29	1660	553	68	1.2
	100	830	277	35	.58	3320	1110	138	2.3
(3)	150	1250	417	52	.87	4990	1660	208	3.5
	200	1670	557	70	1.16	6670	2220	278	4.6
	300	2050	832	104	1.74	9990	3320	415	6.9

(1) Asbestos demand column indicates the product of the PPM asbestos required and the gallons/day x 10^{-6}.

(2) Single Batch System indicated for use at these rates

(3) Dual Batch or Continuous System indicated

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B. Equipment

1. Pellet Hopper

The hopper is sized for a pellet bulk density of 45 pounds per cubic foot, or approximately 1 cubic foot of volume for each 50-pound bag of asbestos pellets. The pellets are free flowing; a 45° hopper bottom is adequate.

2. Pellet Feeder and Metering

The asbestos pellet bulk density is sufficiently constant to permit the use of volumetric feeders. A weight control of better than ± 5 per cent is obtained with vibratory and screw feeders.

Screw feeders are sized for 45 pound per cubic foot material.

3. Water Metering

A slurry consistency of 4% is optimum for repulping and distribution. The consistency should be maintained to ± 1%. Too low a consistency results in poor repulping and if too high, the slurry becomes too viscous for pumping to the process. A rotameter is generally used for regulating the water to the impact mill.

4. Impact Mill

The pellet repulping is done by the impact mill. These mills are characterized by high hammer tip speed, ranging at 10,000 ft. per minute. The optimum mill configuration includes the following items:

a. Stainless steel construction

b. Blunt, hard-faced hammers

c. Conidur-type screen, 0.006 in. openings

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d. Mill power requirement of 30 HP-hours per ton asbestos pellets repulped. Power ranges presently available are from 1 to 75 HP.

5. Slurry Sump

The mill should discharge to a sump fitted with a pump recirculation pipe and float valve to maintain a constant pump feed.

6. Slurry Distribution

Although fully repulped asbestos slurries of 4% consistency are very viscous, the fluid character is pseudoplastic, allowing pumping with moderate line pressure loss. Positive displacement pumps are not susceptible to air binding and offer good reliability.

Centrifugal pumps are also satisfactory; the open impeller type being preferred. The centrifugal pump should be equipped with an air bled valve on the casing. The pressure-flow relationships are for asbestos slurries at 2% and 4% solids and are shown in Figures 1 and 2.

C. Typical Manufacturers' Equipment

Cost Range of $3000-$4000

1. Pellet Hopper

A pellet hopper can be purchased with the pellet feeder or shop fabricated.

2. Pellet Feeder - Eriez Mfg. Co., Erie, Pa.

Vibratory feeder Model 20A		$125.00
Vibratory feeder & 1.2 ft^3 hopper	FBV-212	$335.00
Vibratory feeder & 3 ft^3 hopper	FBV-413	$536.00

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Variable speed screw feeders can be purchased with the impact mills.

3. Impact Mills

Fitzpatrick Co., Chicago

Communitors

Model D6 10 HP	$3750
Model M5 5 HP	$3100

Homoloid Mill

Model JT 3 HP	$2500

Rietz Manufacturing Co., Chicago

Disintegrator

Model RP-12 10 HP (Smaller units also available)	$2500

4. Rotameter

A rotameter calibrated for water is adequate.

Brooks, Schutte & Koerting	$50-75

5. Slurry Pump

a. Positive displacement type

Robbins & Myers - Moyno pump - Model 1L4, 3/4 HP	$450.00

Jabsco Co.

Neoprene impeller 1" 3/4 HP	$150.00

b. Centrifugal Pump - various manufacturers

90 ft. head, 10 gpm , 1 HP	$175.00

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II. Batch System for Asbestos Pellet Repulping - Low Use Rates

A. Procedure

Low asbestos use rates permit the preparation of stock batches of asbestos slurry in moderate sized tanks and it also permits interrupting asbestos slurry feed to the process for the short time required for slurry preparation.

The batch system consists of a supply tank and a pump to recirculate an asbestos-water mixture through a throttling valve, maintaining a pressure differential in the range of 40 psi. Multiple passes at moderate shear conditions will effectively repulp the asbestos pellets. After initial batch preparation, the slurry is left on recirculation while a side stream of the pump output is metered to the process. Continuing recirculation allows a much higher average power input to the slurry batch. A typical batch system is shown in Figure 3.

The initial repulping power input for batch preparation should be calculated for 30 HP-hours per ton asbestos pellets.

Asbestos slurry consistency should be maintained at 3%. This is a pumpable viscosity slurry and it is made up conveniently by adding a 50-pound bag of asbestos pellets to 200 gallons of water.

The asbestos pellets have a high settling rate and should be added gradually to the recirculating water in order to prevent plugging the system.

The following operating procedure can be used to prepare a 200-gallon batch of 3% slurry using a 3 HP pump (60 gpm at 40 psi).

1. Close process feed line valve.
2. Load one bag (50#) of pellets into feeder hopper.

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3. Adjust recycle valve for maximum flow at 40 psi pump pressure.

4. Open water fill valve and start pellet feeder. Adjust pellet feed time to match water fill time.

5. Recirculate the slurry for a total elapsed time of 15 minutes. (The actual recirculation time will vary for particular systems.)

6. Start slurry feed to process at required rate as indicated by rotameter. Allow recirculation flow to continue during slurry feed.

B. Equipment

1. Pellet Feed Hopper

The pellet feed hopper should be sized for 50-pound batches of asbestos pellets weighing 45 pounds per cubic foot, to permit loading the pre-weighed 50-pound bags of asbestos pellets.

2. Feeder

A mechanical feeder is recommended for an even addition of the pellets. The vibrating feeder is adequate.

An adjustable slide gate on the hopper can be substituted for the feeder.

3. Slurry Tank

The tank is generally sized for 50-pound batches of asbestos pellets, 200 gallons of 3% slurry. A practical volume limit for a single tank is 400 gallons. For larger systems, dual tanks for alternate feed and slurry make-up should be considered.

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The tank should have a dished or conical bottom to ensure pellet feed to the pump suction. The tank is fitted with either a recirculation pipe fitting or a pipe located at the fluid level midpoint and arranged to direct the flow across the tank to effect slurry mixing. Water resistant materials of construction are adequate.

4. Pump

A slurry-type (open impeller), abrasion-resistant centrifugal pump is recommended. It should be located as low as possible to obtain the maximum suction feed pressure. An air bleed vent valve should be installed at the top of the casing to remove slugs of air that may enter the pump.

The pump should be sized in proportion to a basic capacity of 60 gpm at 40 psi for a 200-gallon batch tank (3 HP).

5. Auxillary Equipment

a. Piping - sized for pump capacity; 1 inch minimum

b. Valves - gate, globe or ball type acceptable.

c. Slurry feed line - sized for distance and volume; 3/4 inch minimum

d. Rotameter - sized for required flow-water calibration adequate.

C. Typical Manufacturers' Equipment

Cost Range of $1500-$2500

1. Hopper Feeder

Eriez Mfg. Co., Erie, Pa.

Vibratory feeder Model 20A	$125
Model FBV-212, 1.2 ft^3 hopper	$335
Model FBV-413 3 ft^3 hopper	$536

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2. Tank - Stainless steel

250 gallon	$450
500 gallon	$600

3. Pump

Robbins and Myers

Moyno Model 1L8, 5 HP	$1159
Centrifugal 40 psi, 60 gpm 3 HP	$300-400

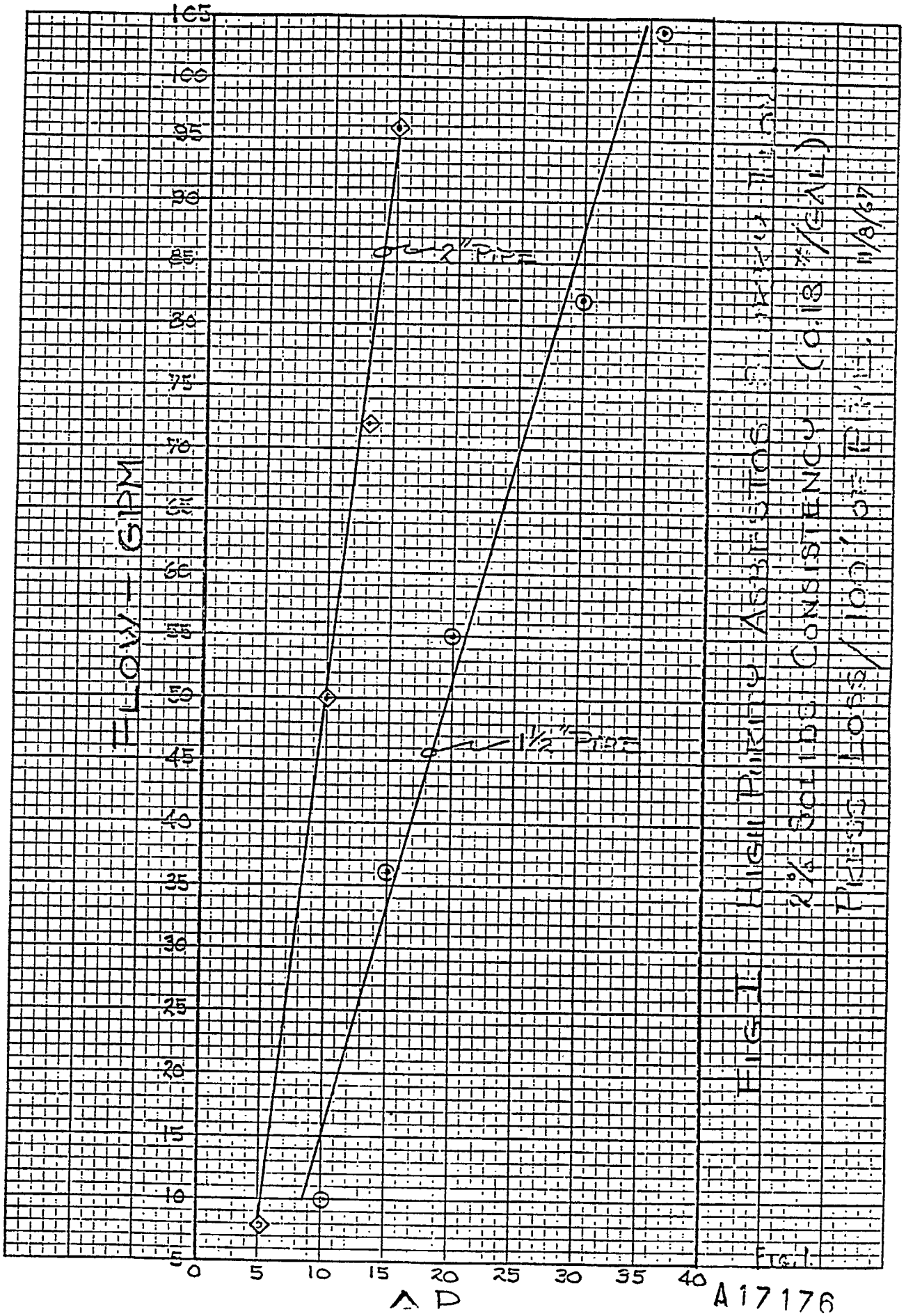
4. Rotameter

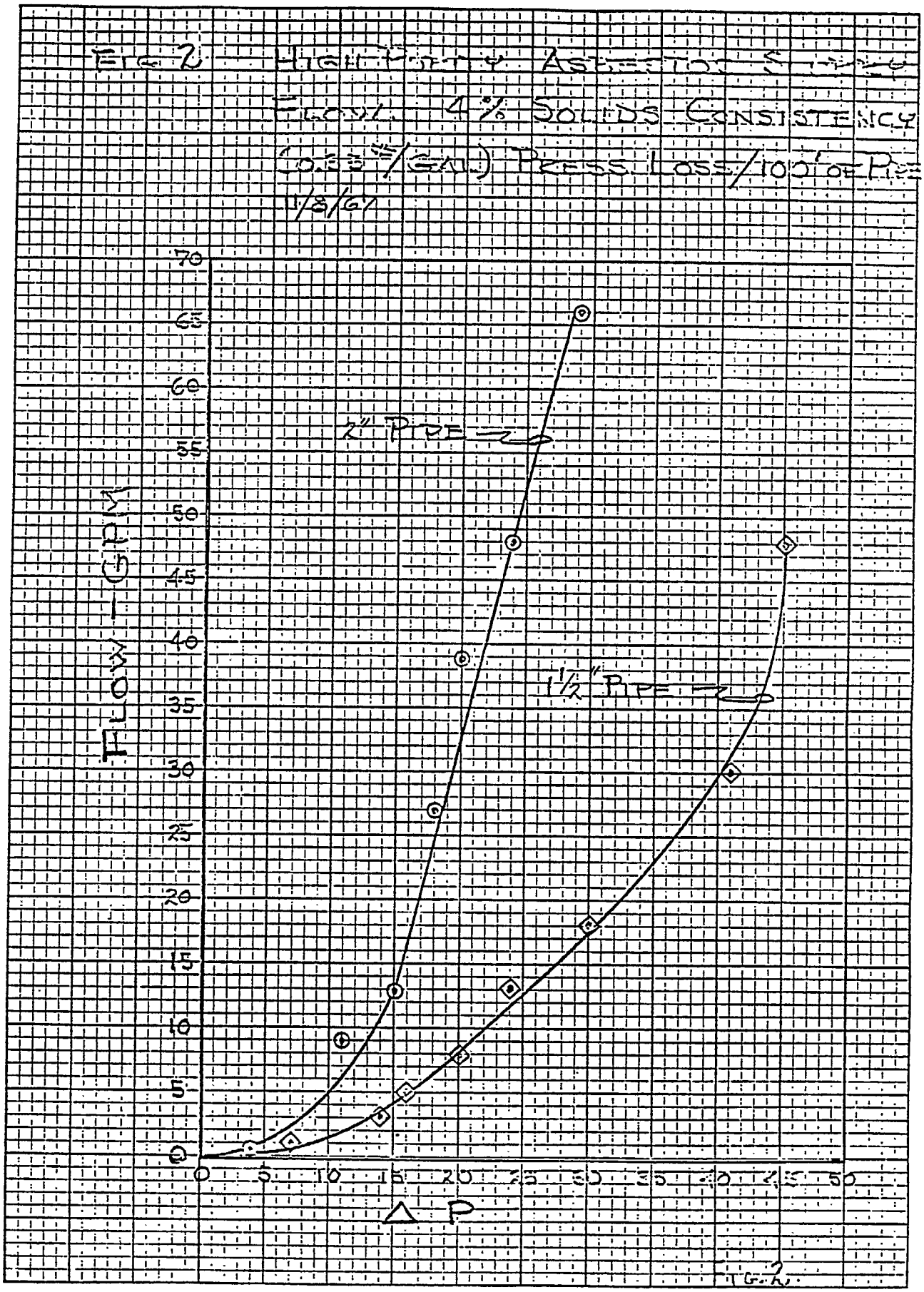
Brooks, Schutte & Koerting	$ 50-75

5. Auxillary Equipment $200

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105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
5
10
15
20
25
30
35
40
ΔP
1-1-0-W-1 — GPM
2" Pipe
1½" Pipe
FIG. 1
A17176
11/8/67
K&E 5 X 5 TO ½ INCH 7 X 10 INCHES MADE IN U.S.A. KEUFFEL & ESSER CO. 46 0860



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K&E 5 X 5 TO ½ INCH 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A. 46 0860

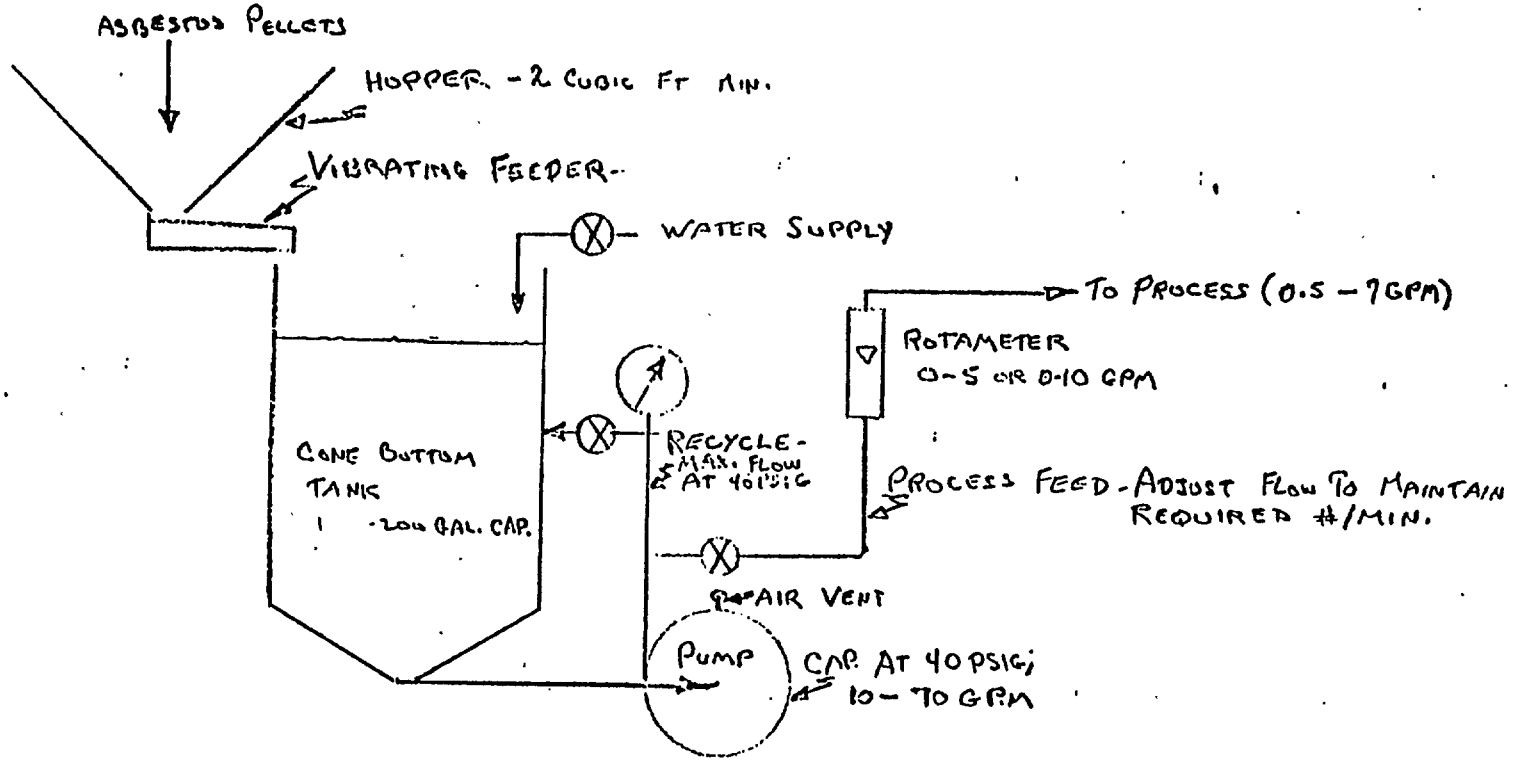


FIG. 3. BATCH SYSTEM FOR ASBESTOS PELLET REPULPING

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OPERATING INSTRUCTIONS

for the

FITZMILL ASBESTOS PELLET REPULPER

F-1

138.5 to 900 lb./hr. Capacity

December, 1964

Revised August 10, 1967

by

W. H. Blackwell

A17179

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3.	Water Flow Rate vs. Asbestos Flow Rate	7
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REPULPER

The repulper unit provides a means of converting asbestos pellets into a slurry under controlled conditions. The unit consits of a hopper for the pellets, a feeder, a mill for fiberizing the pellets, water controls, sump, and pump for transferring slurry to the use point. A schematic flowsheet for the repulper is presented in Figure 1. Photographs are found on Page 4.

A. DESCRIPTION OF EQUIPMENT

1. Pellet Hopper

The pellet hopper is sized to hold 200 pounds of High Purity Asbestos pellets. A bag opener is provided near the top of the hopper. Below the bag opener is a screen with one inch openings to prevent paper from entering the screw feeder.

2. Screw Feeder

A 3-1/2" diameter feed screw augers pellets from the hopper into the Fitzmill. The screw is sprocket driven through a jackshaft by a 1/4 HP type VA-JV-GS U.S. Electric Motors Varidrive. Feed rate settings may vary from 0 to 10 on the relative scale - approximate calibration is presented in Figure 2.

3. Fitzmill

A Model D Fitzpatrick Comminution Mill fiberizes the asbestos pellets. The machine is essentially a horizontal wet hammermill having fixed hammers set in a special configuration with water introduced through the top cover. A wide variety of screens may be used on the bottom half of the hammer circle to properly size the grind. The mill is V belt driven by a 15 HP 3600 RPM motor mounted under the screw feeder. See Figure 3 for rates to produce 2, 3 and 4 per cent solids. Bearing cooling water is discharged into the sump.

4. Water Control

One Schutte-Koerting Rotameter 0-30 GPM is provided to indicate and control the flow of water into the Fitzmill. Another 0-30 GPM Rotameter is provided for adding dilution water into the slurry sump.

5. Dilution Sump

The dilution sump simply serves as a reservoir from which the Moyno Pump is fed. Level control in the sump is maintained through two float valves on the pump discharge bypass line.

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6. Pump

One 2L6 Moyno Pump transfers slurry from the dilution sump to the point of use.

7. Electrical

Electrical supply required is 440 V, 3 phase, 60 cycle at the main disconnect switch box. Note: When repairs or adjustments are required, please pull the main disconnect lever to the off position and lock it there. All controls are 110 volts supplied by an intergal control transformer.

After connecting the power supply, check the rotation ON THE PUMP. DO NOT check the rotation on the screw feeder.

8. Miscellaneous

(a) The equipment on the repulper should not be greased. A weekly check of the oil level in the Vari-Drive is sufficient.

(b) A drain plug is provided in the bottom of the dilution sump for cleanout.

(c) A scale is included.

B. PREPARATORY PROCEDURES

1. The mill electrician will connect 440 volt, 3 phase, 60 cycle power to the main disconnect. Check rotation on the pump, if rotation is incorrect, change the leads at the disconnect switch.

2. Connect the water supply to the 1-1/2" manifold on the Rotameters. It is desirable to have a cut-off valve near the repulper for shutting off the water supply.

3. Connect 1-1/2" slurry discharge line.

4. Inspect hammers and Fitzmill screen. Spare screens will accompany the mill.

(a) Any inspections of the equipment, when guards are removed, should be done with the main disconnect locked out.

C. START UP PROCEDURES

1. Turn on water supply. This automatically starts the mill bearing cooling water.

2. Turn on water through the No. 2 Rotameter into the mill discharge chute.

3. Turn on Fitzmill.

4. Start water through No. 1 Rotameter - no more than 20-25 GPM - This water enters the Fitzmill cover.

5. Turn on the Screw Feeder (change feed setting only when feeder is in operation)

(a) Observe the load reading on the Fitzmill Ammeter. Don't operate above the red line.

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START UP PROCEDURES (Continued)

5. Start the pump

6. Begin recording performance data.

D. SHUTDOWN PROCEDURE

1. Empty Feed Hopper and turn off Screw Feeder.

2. After a five minute flush-out, shut off the water.

3. Turn off Fitzmill.

4. Empty the sump and turn off pump.

5. Remove drain plug and flush out sump (optional, depending on length of shutdown).

Note: Asbestos is very easy to wash off the equipment while wet -- when it dries, the task is difficult.

E. EMERGENCY SHUTDOWN PROCEDURE

1. Turn off Screw Feeder

2. Turn off water

3. Turn off Fitzmill

4. Turn off pump.

F. CHECKING FEED RATE

1. Shut off water supply and lock switch "OFF".

2. Try start buttons to double-check that power is off.

3. Remove mill cover and take out screen.

4. Remove rectangular plate from mill discharge chute and insert tapered chute.

5. Replace mill cover, without screen, turn power back on.

6. Run screw feeder for a few seconds until flow is steady. Set speed dial to approximate setting desired WHILE SCREW IS RUNNING.

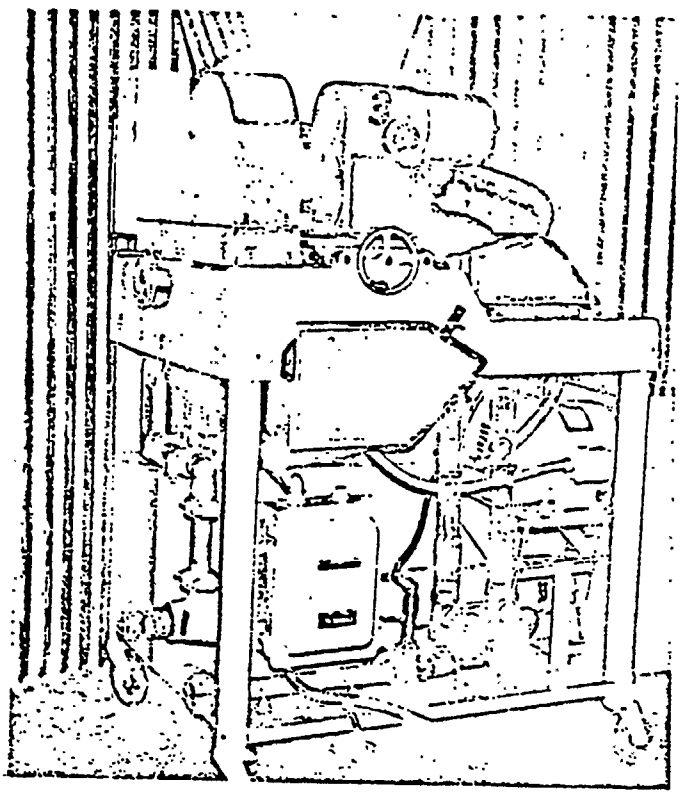
7. Catch and weigh timed sample. Repeat Steps 6 and 7 as necessary until desired feed rate is obtained.

8. Lock power off, repeat Step 2, replace screen in mill, replace mill cover and rectangular plate in discharge chute.

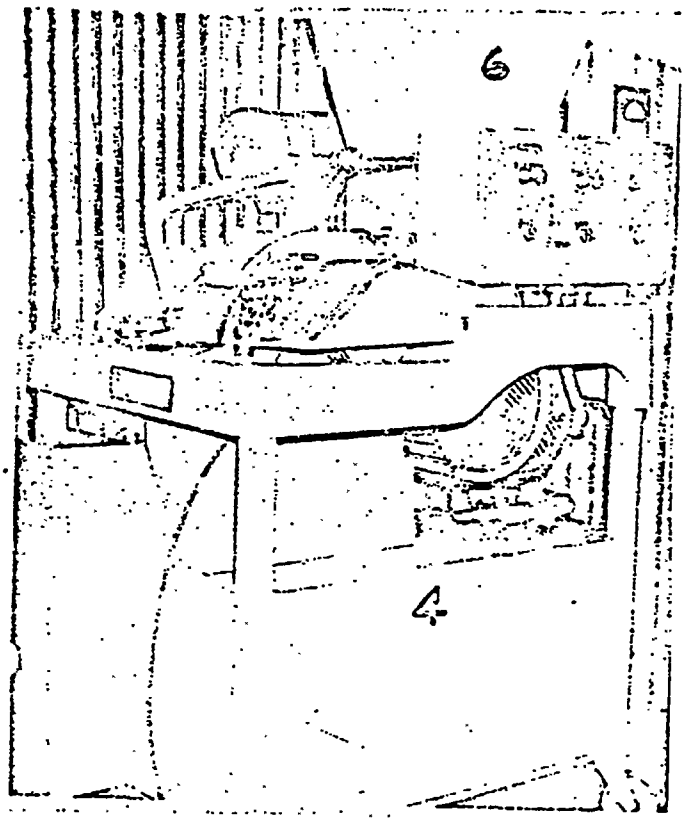
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G. PHOTOGRAPHS



View showing Slurry Discharge (1)
Rotameters (2) and
Screw Feed Speed Adjustments (3)



View showing Sump (4)
Control Panel (5) and
Feed Hopper (6)

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HT-1699

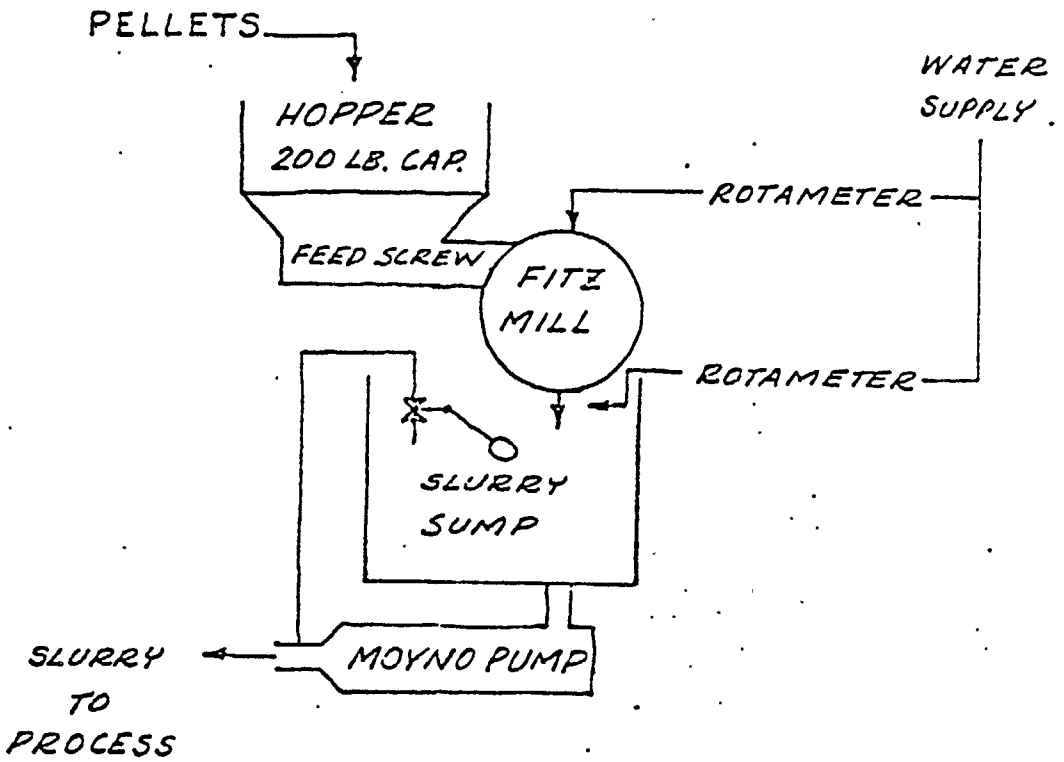


FIG. 1
SCHEMATIC
FLOWSHEET
FITZMILL REPULPER

JAR 12·8·64

A17185

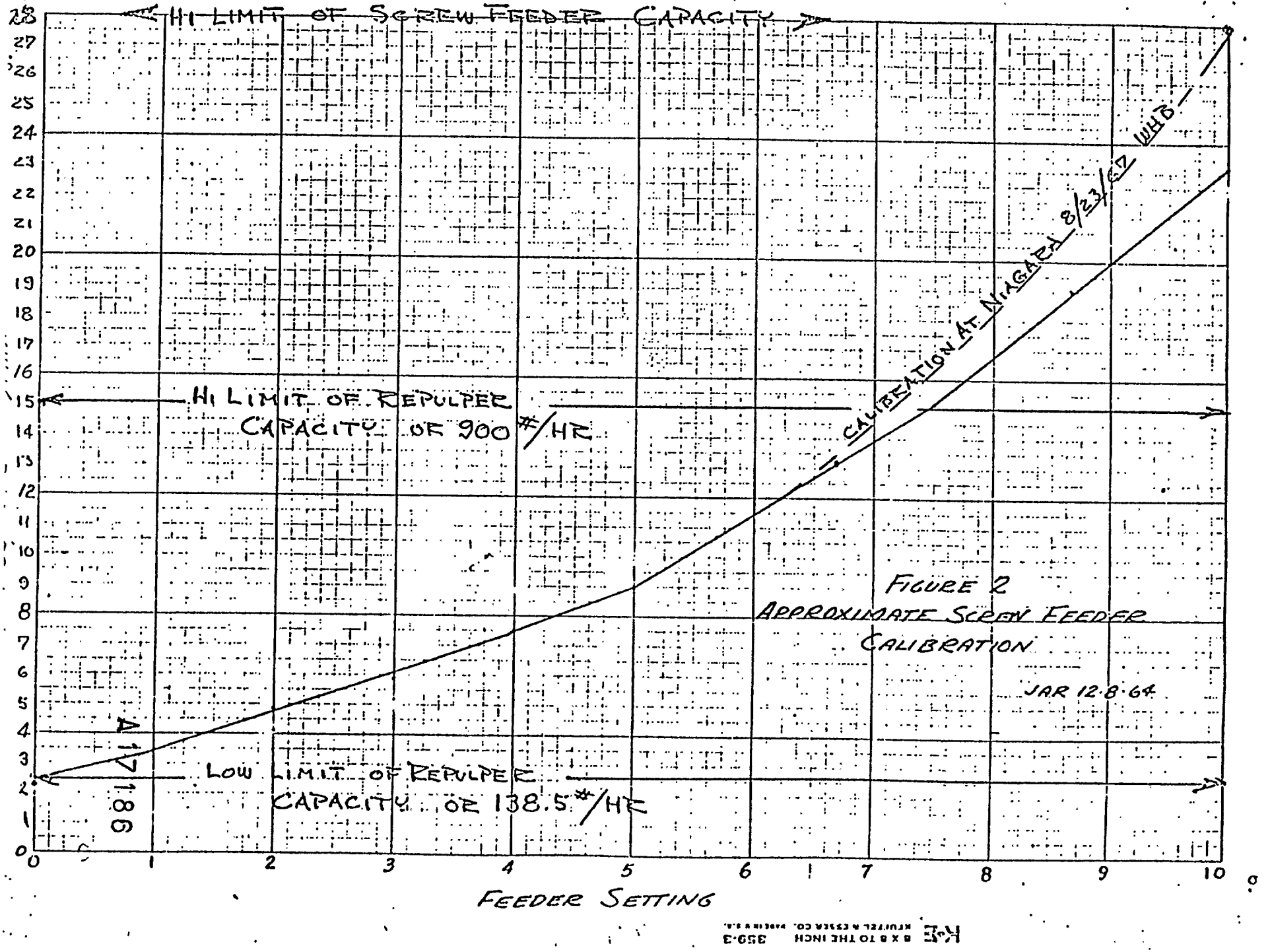


FIGURE 2
APPROXIMATE SCREW FEEDER CALIBRATION
JAR 12-8-64

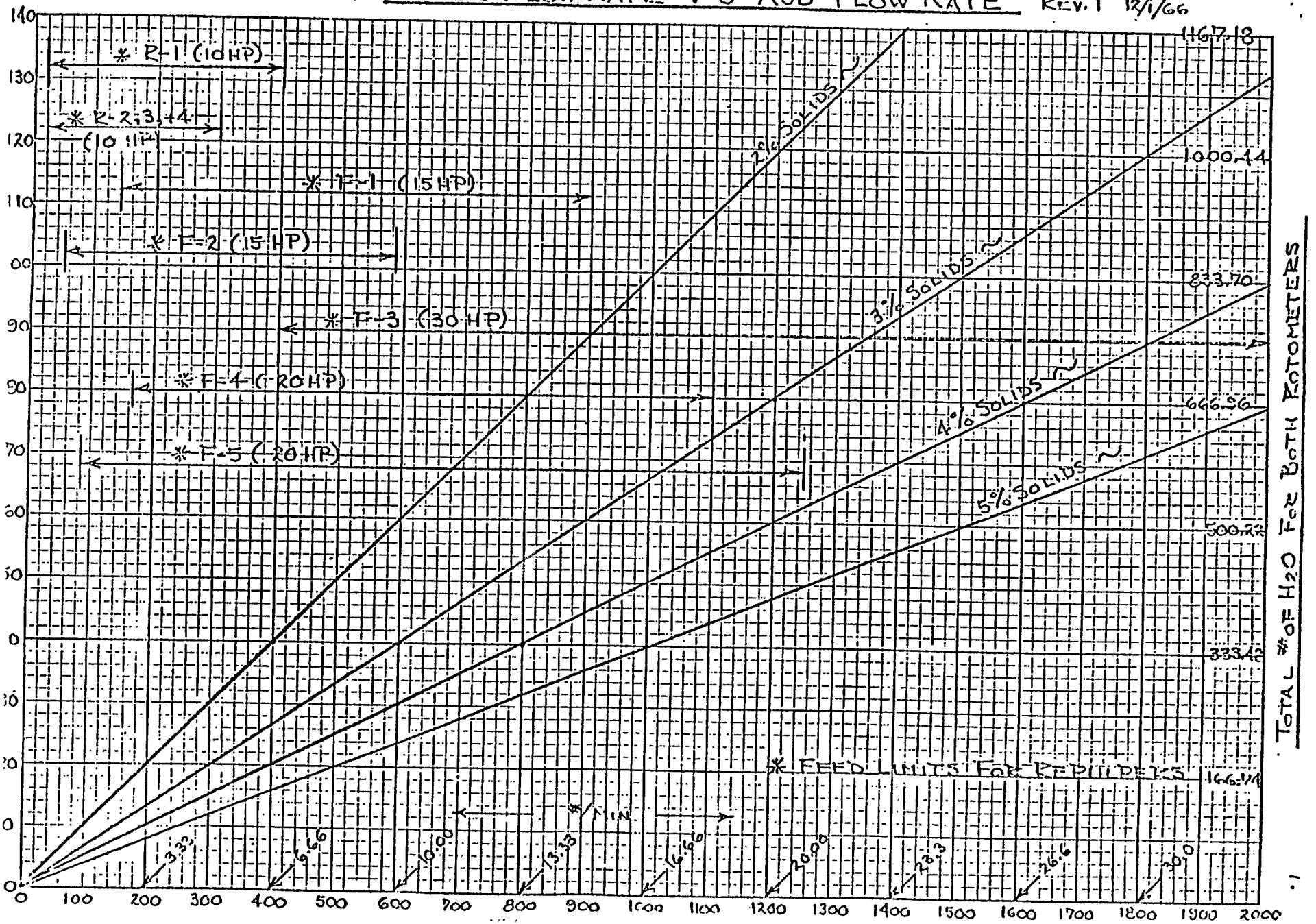
KEUFFEL & ESSER CO. MADE IN U.S.A. 359-3 8 X 8 TO THE INCH

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K·E 10 X 10 TO THE INCH 46 0780
7 X 10 INCHES MADE IN U.S.A.
KEUFFEL & ESSER CO.

FIG III — WATER FLOW RATE V-S ASB FLOW RATE

REV. 2 8/24/67
REV. 1 12/1/66



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FIGURE 4

ROTAMETER SETTINGS FOR DIFFERENT SOLIDS CONCENTRATIONS

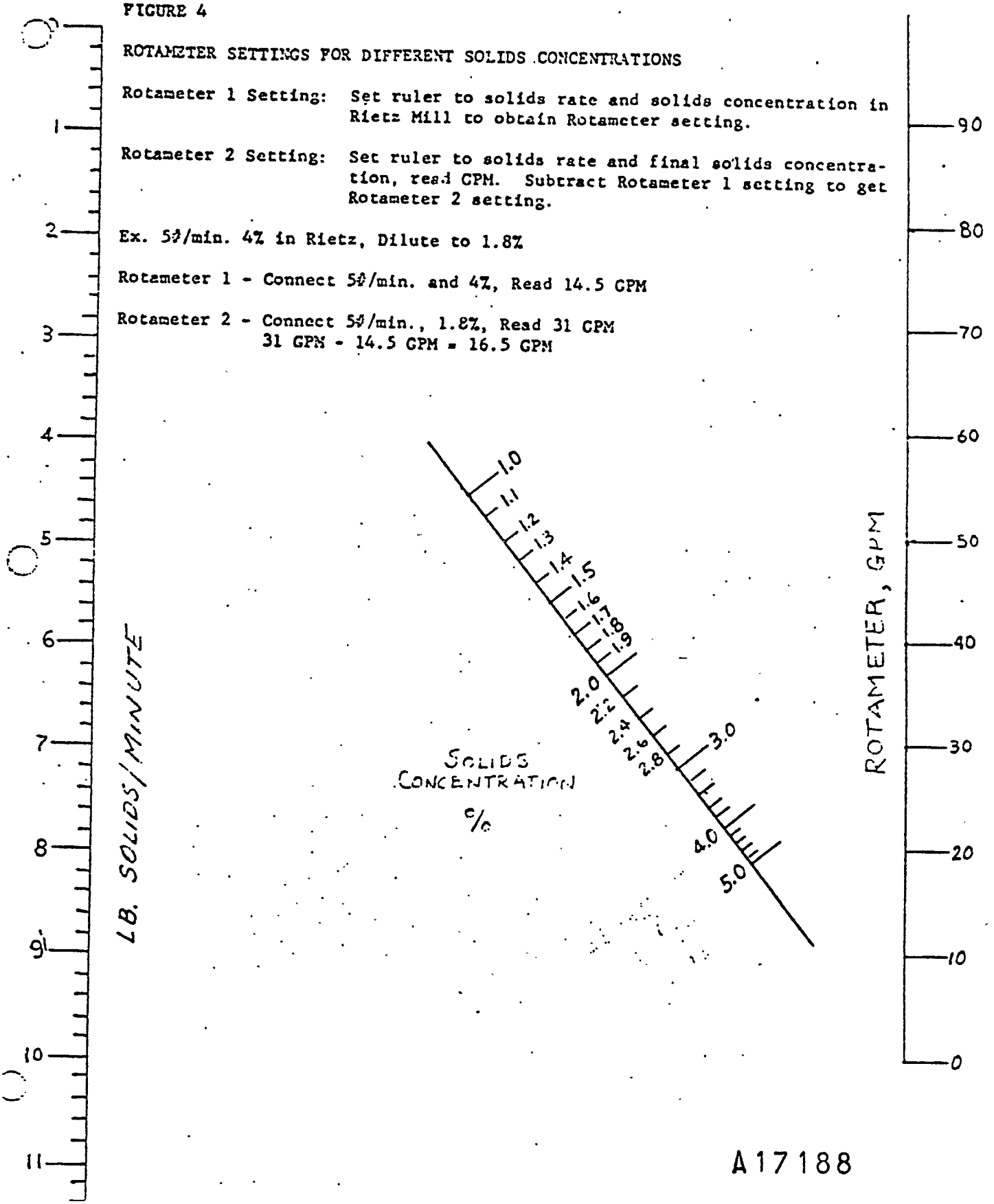
Rotameter 1 Setting: Set ruler to solids rate and solids concentration in Rietz Mill to obtain Rotameter setting.

Rotameter 2 Setting: Set ruler to solids rate and final solids concentration, read GPM. Subtract Rotameter 1 setting to get Rotameter 2 setting.

Ex. 5#/min. 4% in Rietz, Dilute to 1.8%

Rotameter 1 - Connect 5#/min. and 4%, Read 14.5 GPM

Rotameter 2 - Connect 5#/min., 1.8%, Read 31 GPM
31 GPM - 14.5 GPM = 16.5 GPM



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FITZMILL ASBESTOS REPULPER

Quantity	Item
(1)	MILL DRIVE (For Model D 6 Fitzmill SN DA-SO-6-5964)
	U.S. Motor 15 HP 3 phase 60 cycles frame 256U Type J Design B Code F 208-220/440 volts 3600 RPM 42-40/20 Amp. 55°C Serial No. 331611
(1)	FEED SCREW DRIVE (For 3-1/2" Screw Intergal with Mill)
	U.S. Varidrive Frame 5-56-10 60 cycles Type VA-JV-Gs Motor RPM 1200 Ratio 10-42, 55°C Rise, 220/440 volts, 3 phase, 1/4 HP, RPM Min. 28.2, 1.8/9.0 Amp. Max. RPM 282, Code L, Serial No. 3357649, U.S. Varibelt No. 4522
(1)	MOYNO PUMP
	Type SSQ Frame 2L6 Form KW. Rated 43 GPM at 900 RPM & 80 PSIG.
	PUMP DRIVE (for Moyno Pump above)
(1)	3 HP G.E. Motor, 208, 220, 440 volts 9.0/4.5 amp., 60 cycle, 3 ø, Model K, Frame 213, 1745 RPM. Note: This drive is connected to the pump above via a V Belt Drive.
(1)	DISCONNECT SWITCH
	Trumbull Electric Type RBA Cat. No. 34362C 60 Amp. 3 pole 600 volt AC Enclosed Safety Switch
(1)	AMP METER
	Westinghouse AC Amp. Type A-351 3-1/2" Round Face
	STOP START SWITCHES
	Contact Blocks 10250T3 Two N.C. Cuttler Hammer 10250T1 NO-NC Black Button Start 102505101 Red Button Stop 102505102

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Quantity	Item
	STARTERS
(2)	Size 1 G.E. CR106C0, 110 volt Coil No. 15D21G2 Overload Relays No. CR124 C028 Heaters C 1.18A 81D549
(1)	Size 2 G.E. CR106D0, 110 volt Coil No. Overload Relays CR124 C028 Heaters C21.4B Aux. Cont. Sw. (No. 600 Volt ZV) (CR105-V200P)
	WIRE
	Control #14 THW Feed Screw #14 THW Pump #12 THW Mill # 8 THW Disconnect to Control #8 THW Lead in # 8 Type S
(1)	Elapsed Time Hr. Meter Hobbs Cat. No. 1932
(2)	Rotameters
	S & K Co. #8 HCF 1827 Rotameters 0 to 30 GPM equipped with 83-J float
(2)	Float Valves 1" Robert Mfg. Co. 90° Male each end

MISCELLANEOUS EQUIPMENT ITEMS

1. 1-1/2" fire hose, 2 lgths. 50' long
2. Scale, Hanson 0-60#
3. 1-1/2" Victaulic to pipe nipple
4. 1-1/2" Victaulic coupling
5. Screens - 1 .006 Conidur screen in mill. 6" wide
6. Bassick #561 Swivel Casters

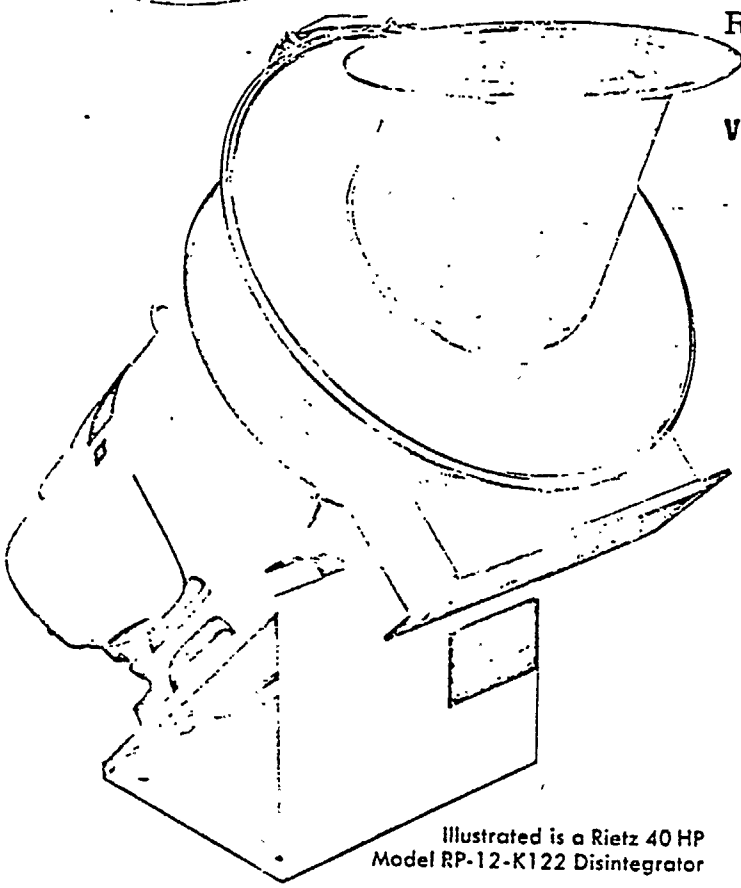
A1719C

RP Model Disintegrators

are designed for specific adaptation to size reduction requirements in the Food Process Industries.

Rietz RP Distintegrators offer

VERY LOW INITIAL COST
VERY LOW OPERATING COST
VERY HIGH EFFICIENCY



Illustrated is a Rietz 40 HP Model RP-12-K122 Disintegrator

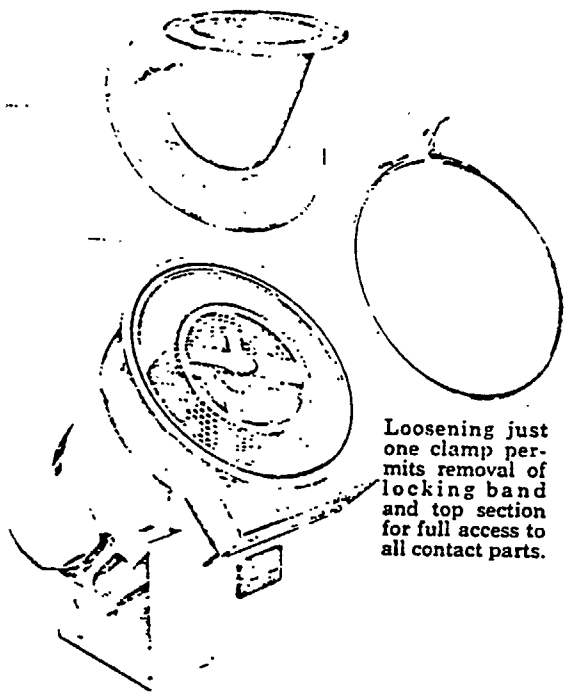
RUGGED SIMPLE DESIGN / Rietz RP design has reduced the complex operations of feeding, grinding and discharging to the ultimate in efficient simplicity. Fixed speed* direct-connected drive eliminates belts, gears and accompanying maintenance problems. 45° feed and discharge chutes speed product handling and shorten distance between inlet and outlet to reduce over-all vertical space requirements. Complete self-contained unit reduces weight and requires less floor space.

All of these features combine to make Rietz RP Disintegrators uniquely efficient machines measured either by

capacity per dollar of cost
or by
operating cost per output unit.

***All models of RP's are also available with direct-connected variable speed motors.*

see other side for information on
PRODUCT APPLICATION SIZE AND MODEL SPECIFICATIONS
VARIOUS STANDARD FEED AND DISCHARGE DESIGNS



Loosening just one clamp permits removal of locking band and top section for full access to all contact parts.

FAST EASY CLEANING / Rietz RP Dislintegrators are unmatched in ease and speed of cleaning. As illustrated, releasing one clamp exposes all contact parts* for quick, thorough cleaning. Stainless bowl and top are free of joints, cracks and crevices.

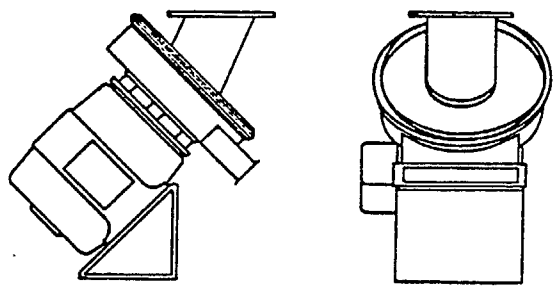
Illustration also shows RP operating principle. Rigid hammers disintegrate product on high speed impact. Combined centrifugal force and positive hammer action force product through 360° stainless steel screen. Screens are available in many mesh sizes, are quickly removable and replaceable for cleaning or interchange.

***All contact parts are of stainless steel for complete sanitation.*

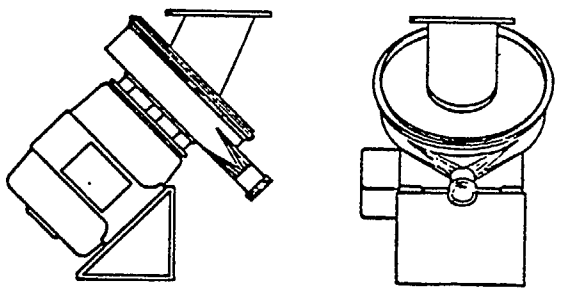
A 17191

Rietz RP's offer built-in adaptability

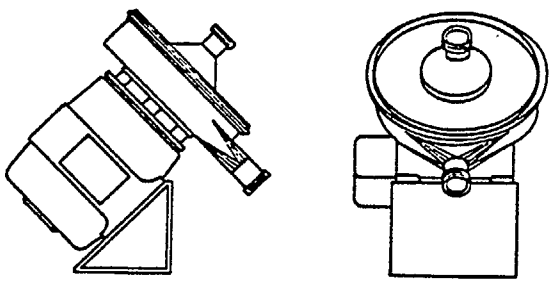
Three standard feed and discharge combinations are available to meet the process requirements of your particular products. The top and bowl sections illustrated below may also be ordered in any set of combinations for special situations.



Round Chute Inlet and Rectangular Outlet for Solids



Round Chute Inlet and Sanitary Thread Outlet for Purees



Sanitary Thread Inlet and Outlet for Liquids

SOME PROVEN APPLICATIONS FOR

RP DISINTEGRATORS

GRINDING — PULPING — CRUSHING
Fruits / Fats / Food Wastes / Horse-radish / Cheese

PUREEING
Vegetables / Fruits / Cooked Meats

SIFTING — CRUMBLING
Breads and Crackers / Flour

BLENDING — MIXING
Pastes / Cake and Pie Mix

SPECIFICATIONS
RIETZ RP SERIES DISINTEGRATORS

MODEL NO.	HP RANGE	RPM RANGE	ROTOR DIA.	SCREEN HEIGHT	CAPACITY EXAMPLES T/HR. THRU 3/16" SCREEN	
					TOMATOES	APPLES
RP-8-K115	5 to 10	1800 3600	8"	2⅜"	7.5	5
RP-8-K126	10 to 20	1800 3600	8"	6¼"	15	10
RP-12-K122	20 to 40	1800 3600	12"	6¼"	30	20
RP-18-K133	40 to 75	1800 3600	18"	9⅞"	60	40

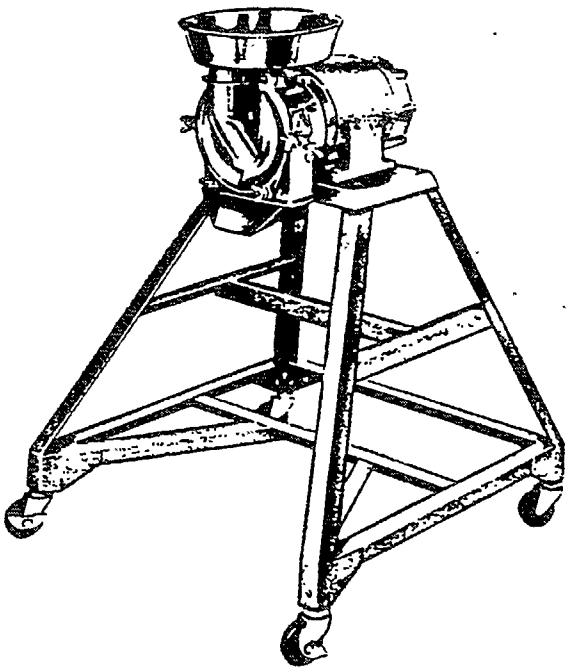
MANUFACTURING COMPANY

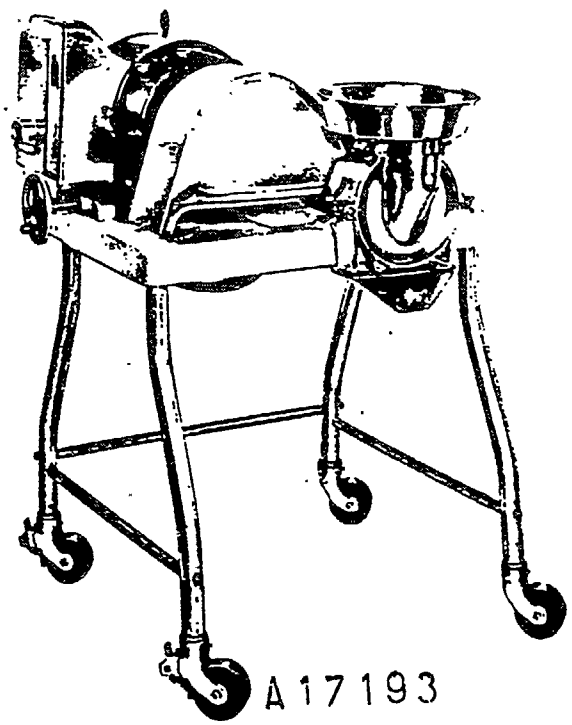
A 17 192

FITZ-MILL

Bulletin
No. 552

MODELS J AND JT
homoloid® machines





A17193

832 INDUSTRIAL DRIVE, ELMHURST, ILLINOIS 60126

FITZ-MILL

homoloid® machines IN STAINLESS STEEL FOR PRODUCTION, PILOT PLANTS, AND LABORATORIES

The HOMOLOID® embodies a unique design using the basic impact-in-air principle of the Comminutor. The unit is fed axially so that the product path into the rotor blades is similar to an interrupted-face colloid mill. The shear forces and labyrinth path through the rotor provide complete homogenization, with the degree of comminution governed by the selection of blade shape, rotor speed, and screen opening.

Broad processing needs are met in both dry and liquid products through the use of basic features in many combinations.

STABLE EMULSIONS, including the difficult citrus oil bases, are obtained with great efficiency at high speed.

COLLOIDAL SUSPENSIONS with practically unlimited shelf-life are produced with small power needs through the use of the exclusive "porcupine" rotor.

OINTMENTS are thoroughly milled and dispersed with liquid inlets and outlets permitting "closed-line" operation.

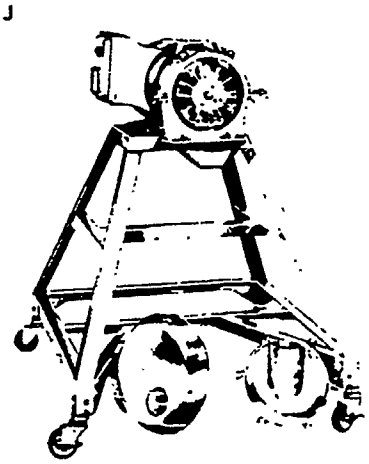
WET GRANULATIONS are achieved efficiently and economically through the use of integral, force-fed hoppers.

DRY AND SLUG GRANULATING is obtained with minimum fines through wide combinations of speeds, blade shapes, and screens.

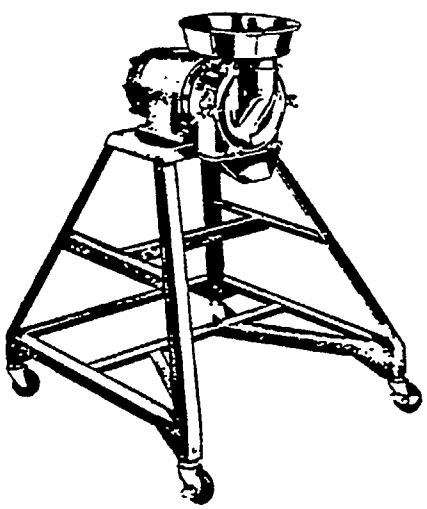
PULVERIZING is accomplished under dustless conditions on products ranging from extreme frangibility to elastic characteristics.

Standard features available in both the MODEL J (motor mounted) and MODEL JT (belt driven) include Stainless Steel construction, reversible rotors with dual purpose blades in many styles, sanitary and sterile designs, a wide range of screen openings, and chamber cover inlets for gravity, pump, or screw feed. Sizes range from 3HP to 15HP.

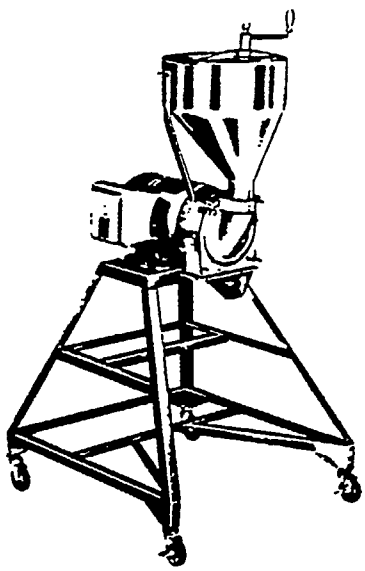
Units illustrating some of the possible combinations are shown in this bulletin.



For normal cleaning, simple changing of screens, or reversing the rotor this view of the Model J illustrates how only the chamber feed cover has to be removed. This may be accomplished in seconds by loosening finger-operated wing nuts on swing-bolts.



The basic Model J showing motor-mounted chamber is suitable for liquid and dry products. It is equipped with 12½ diameter Stainless Steel feed pan, 3" opening feed throat with flow control disc. A full selection of all blade designs and screen openings is available. The Stainless Steel platform is mounted on a mobile stand and is available with 3HP motor, 3600 (standard) or 1800 RPM.

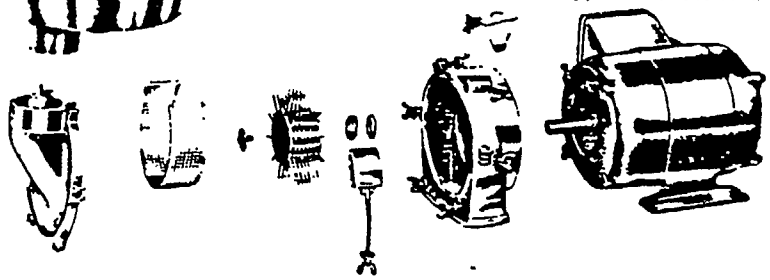


The basic Model J Homoloid® is equipped with a 20 quart Stainless Steel holding hopper and has a manually or motor operated feed screw. This permits the processing of high viscosity liquids, semi-plastic materials, or chunky solids which cannot be fed by gravity-drop alone.

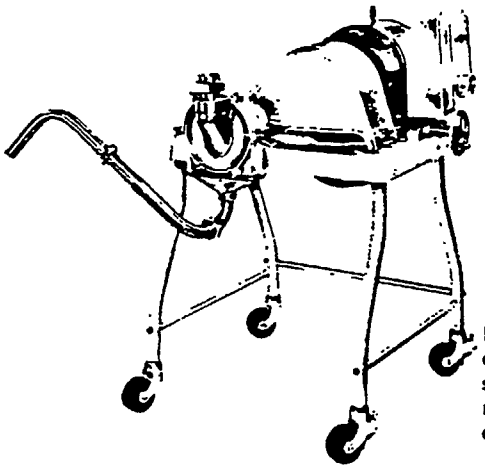
A 17194

® © The Fitzpatrick Company, Elmhurst, Illinois 1969

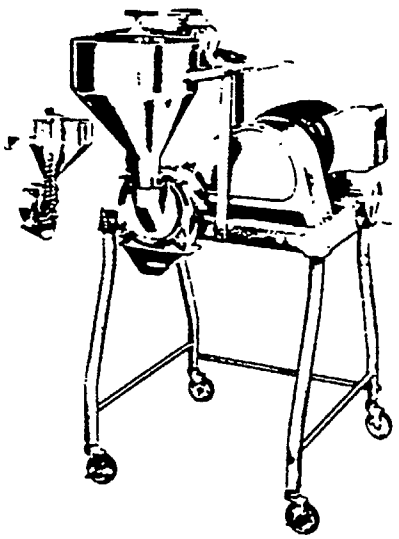
All HOMOLOID® Machines retain the fundamental simplicity of complete and rapid disassembly, regardless of the final combination of features supplied with the unit.



The exploded view illustrates how all operating parts can be disassembled in less than one minute for complete immersion in water or for cleaning with steam, detergents or other chemicals. A further variation illustrated at the lower right provides a sterile design in which the operating parts can be autoclaved as an assembly.

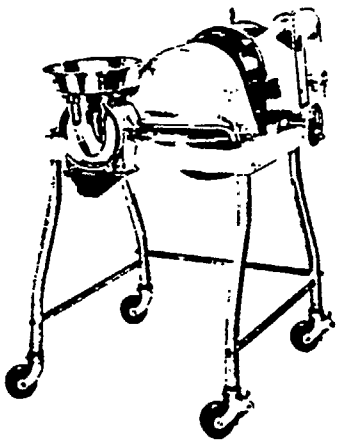


This variation of the basic Model JT is similar to the manual screw-fed Model J except with a 20 quart hopper feed screw driven by ⅛HP gear motor. Both models may also be equipped with variable speed drives.

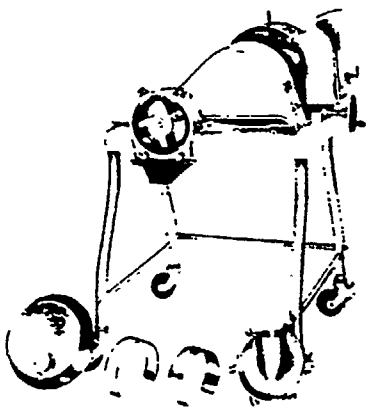


A variation of the basic Model JT shows the chamber cover with a liquid fitting inlet. The special goose-neck discharge always retains full level in chamber for high efficiency processing.

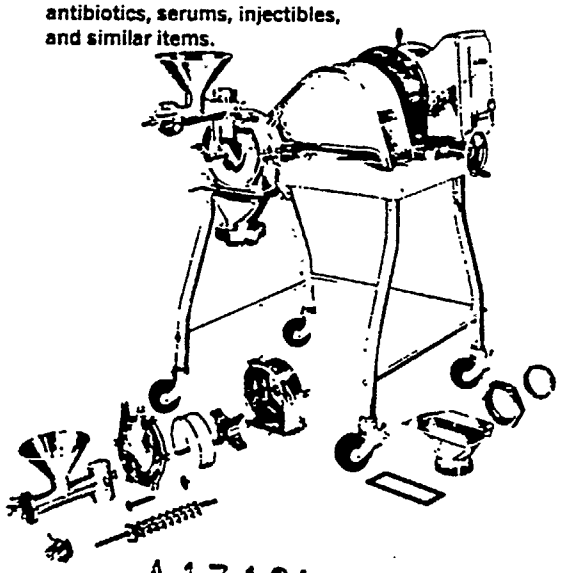
This basic design of the Model JT illustrates a belt-driven chamber, speeds of 3600, 5400, and 7200RPM. Motors from 5HP to 15HP are available. High speeds are ideal for maximum blending, dispersing, or pulverizing. The straddle legs permit mobility while providing the necessary stability without the need of securing to the floor.



The sterile design variation of the basic JT provides for autoclaving of pre-assembled operating parts as a unit. The entire sterile assembly may then be coupled to the rotor shaft by locking it on the spider cage support without destroying the rigid sterile conditions. This unique rotor construction affords the complete absence of joints, seams, and crevices. The screw feed permits the precise control of pulverizing, dispersing, and emulsifying. The Stainless Steel construction with surfaces finished to super gloss makes this unit ideal for antibiotics, serums, injectibles, and similar items.



The disassembled view of this machine shows the fixed impact-blade rotor recommended for pulverizing.



A17195

FITZ·MILL

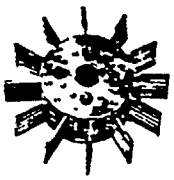
homoloid®

GENERAL: All product contact parts of this equipment are available in Stainless Steel. Mobility is provided by mounting on rugged bases equipped with straddle legs and casters.

MODEL J: Chambers are motor-mounted with single speeds of 1800 RPM and 3600 RPM. Motors are 3HP.

MODEL JT: Chamber Base-mounted for operating speeds of 3600, 5400, and 7200 RPM. Motors of 3HP to 15HP are available. All units are equipped with thermally protected starters.

ROTORS AND BLADES
The wide variety of rotor and blade combinations illustrated can be used on any model HOMOLOID® to provide a style most efficient for each specific liquid and dry operation. Wear-resisting Fitz Metal facings and inserts are available when required.



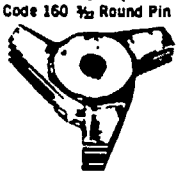
FIXED PIN
Code 80 ⅛" Square Pin
Code 160 ⅛ Round Pin



Code 1125 Impact
Code 1225-FM Knife-Impact
Code 1425 Knife



FIXED
Code 2100



FIXED
Code 2150
Code 2250

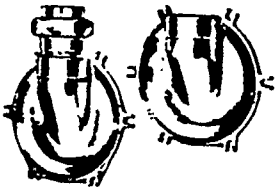


STERILE, SOLID, FIXED
Code 4125 Impact
Code 4225 Knife-Impact



SPLINED FIXED
Code 3575

CHAMBER COVERS
The chamber covers illustrated are used for pan, liquid, and screw feeds. Other designs are available.



DISCHARGES
Many discharge designs are available for specific needs.



SCREENS
Stainless Steel screens, both perforated and mesh, in more than 100 selections are carried in stock for immediate delivery. Screen area of 2" x 16", 2" x 8", and 2" x 4" are standard, with special areas custom made.



Modern fully equipped laboratories are maintained for testing products. Laboratories in South Plainfield, New Jersey and Elmhurst, Illinois, are conveniently located for your evaluation of this equipment without obligation. Verification of recommendations on FitzMill ® equipment and systems permit accurate scaling for assured plant performance providing industry with the most advanced and highest efficiency equipment.

FITZ·MILL equipment is designed to meet many specific requirements. A few of these machines are described below. Individual bulletins are available upon request.



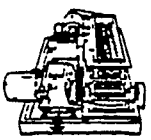
. . . for universal, all purpose size reduction and blending of dry materials, liquids or mixtures of these.



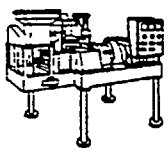
. . . varied design principles for initial pre-breaking of bulk, pressed, frozen, or baked products preceding further processing.



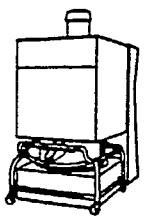
. . . primarily adapted to production of emulsions, colloidal suspensions, dispersions, and ointments, but also applicable to dry products.



. . . multi-function units provide continuous proportioning and intimate blending with granulation of fine grinding when desired.



. . . for instantaneous, continuous compacting of powder by pressure alone.



. . . fluidized bed drying for fast and efficient drying of granular materials.

A17196

FITZ·MILL

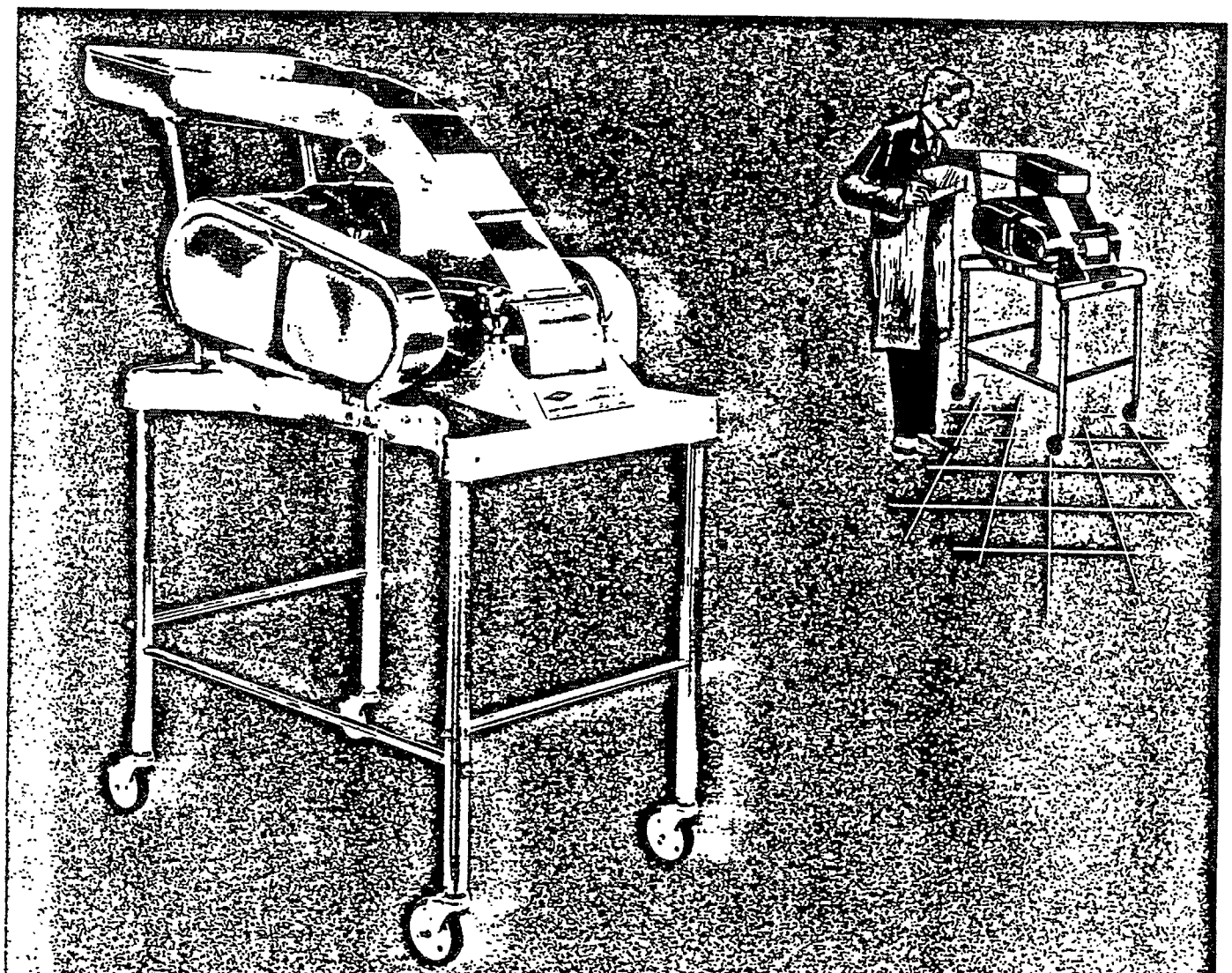
THE FITZPATRICK COMPANY

832 INDUSTRIAL DRIVE • ELMHURST, ILLINOIS 60126 Area Code: 312/832-1700
Eastern Division: 4219 South Clinton Avenue, South Plainfield, New Jersey 07080 Area Code: 201/561-1500

FITZ-MILL

Bulletin
No. 152

model D comminuting machine



THE FITZPATRICK COMPANY

832 INDUSTRIAL DRIVE, ELMHURST, ILLINOIS 60126

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FITZ·MILL

model D comminuting machines

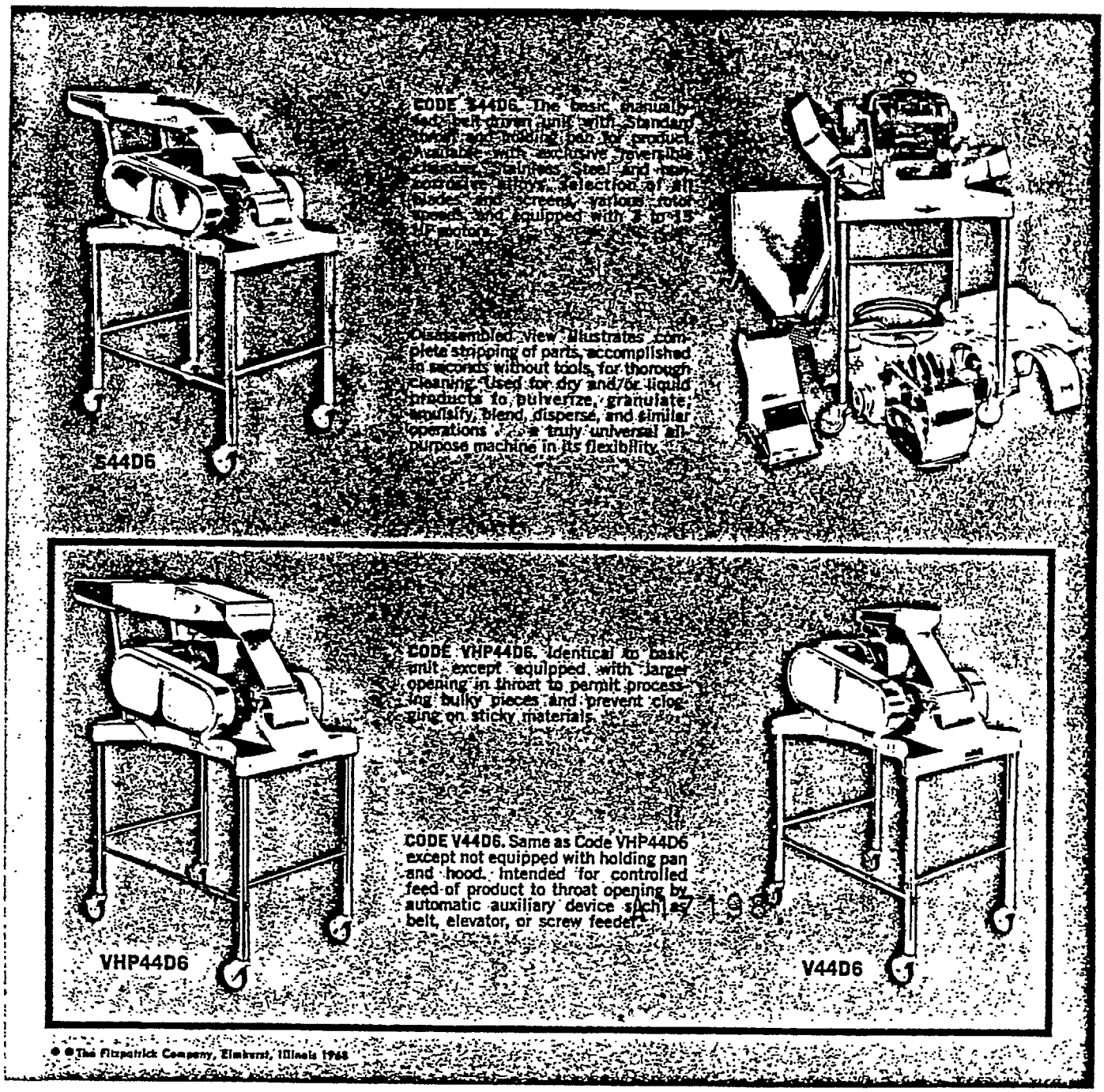
means . . . universal all-purpose

COMMINUTING EQUIPMENT for

pulverizing, granulating,
emulsifying, blending, dispersing
and similar operations

Adapted to broad processing requirements through flexibility of components which provide hundreds of combinations to process efficiently and economically a wide variety of products.

- Feed methods include manual, gravity, automatic, vibratory, star-pocket, pump, single and multiple screw.
- Blade selection from more than 200 blade styles.
- Over 200 screen sizes.

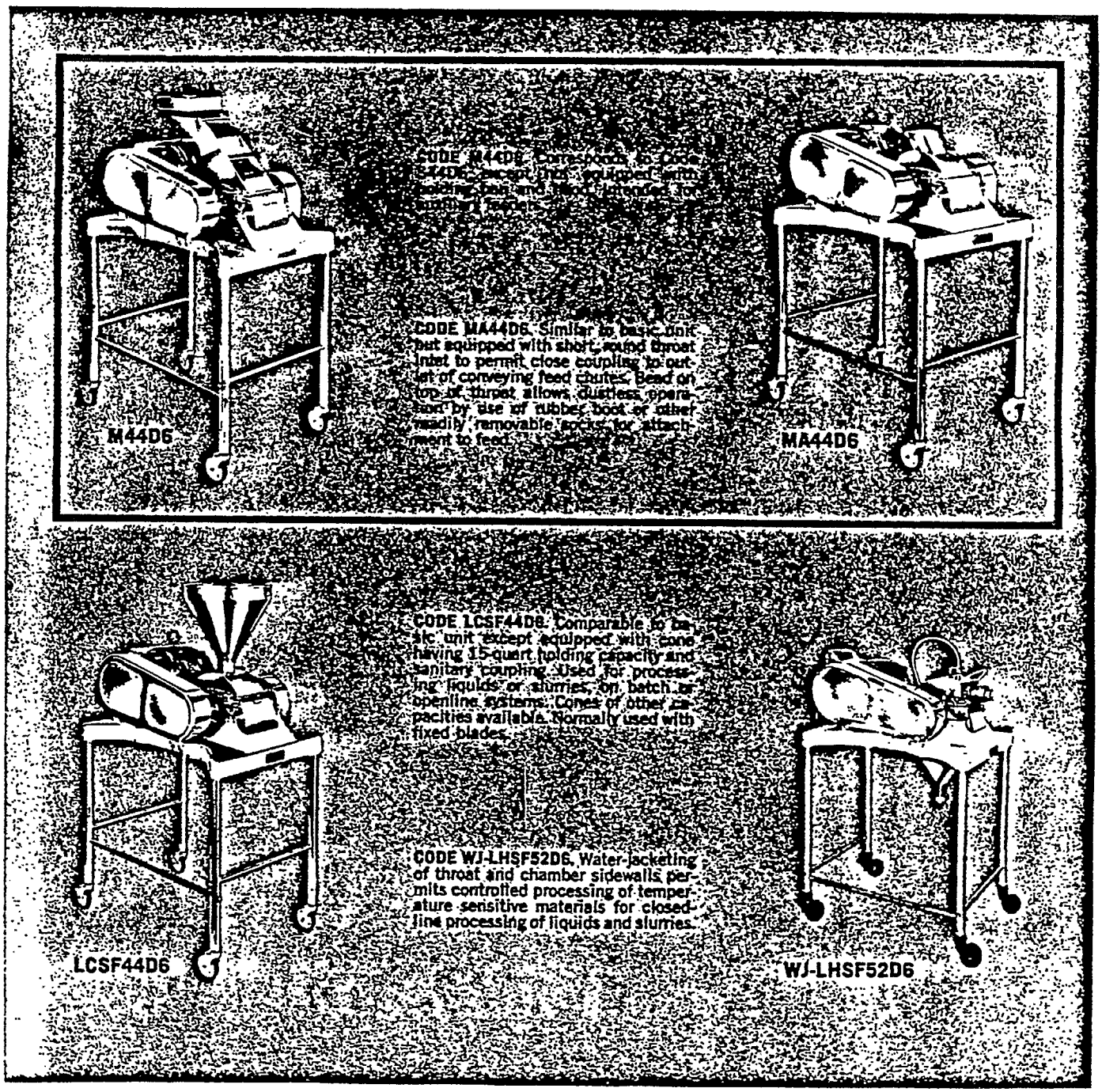


● ● The Fitzpatrick Company, Elmhurst, Illinois 1968

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asbestosclaims.law/library/15432/34

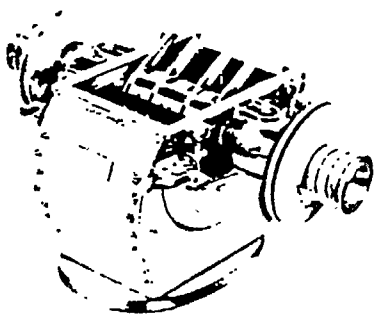
- Speeds up to 10,000 RPM.
- Water-jacketing for temperature controlled processing.
- Available in Stainless Steel and non-corrosive alloys.
- Sizes to fit production needs. Pilot Plant and Laboratory units available. Model D units up to 40 HP.
- Belt, gear, chain, direct and variable speed drives.

A 17199



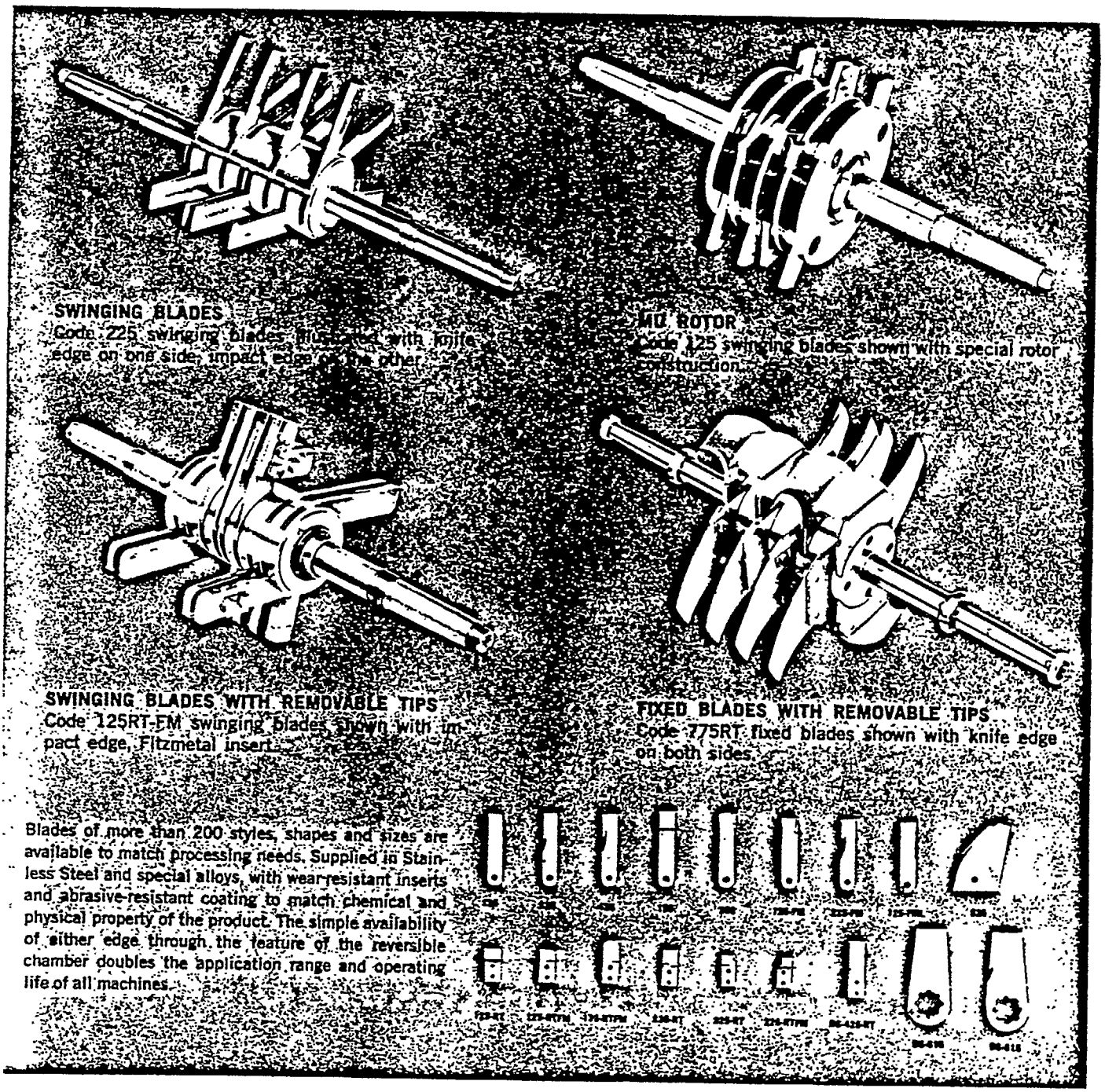
FITZ·MILL

The reversible comminuting chamber is an exclusive FitzMill® feature. This permits using dual-purpose blades having knife or impact edge available for comminuting action by simply reversing the chamber in its mount. Knife edge is normally used for granulating or chopping . . . flat impact edge for pulverizing or pureeing and emulsifying.



A17200

MODEL D6 COMMINUTING CHAMBER
Standard reversible chamber shown with Code 225 swinging blades; knife edge one side, impact edge on the other.



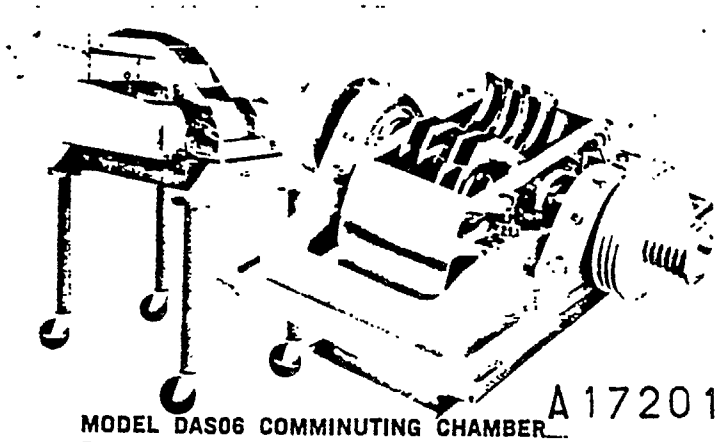
SWINGING BLADES
Code 225 swinging blades illustrated with knife edge on one side, impact edge on the other.

HD ROTOR
Code 125 swinging blades shown with special rotor construction.

SWINGING BLADES WITH REMOVABLE TIPS
Code 125RT-FM swinging blades shown with impact edge, Fitzmetal insert.

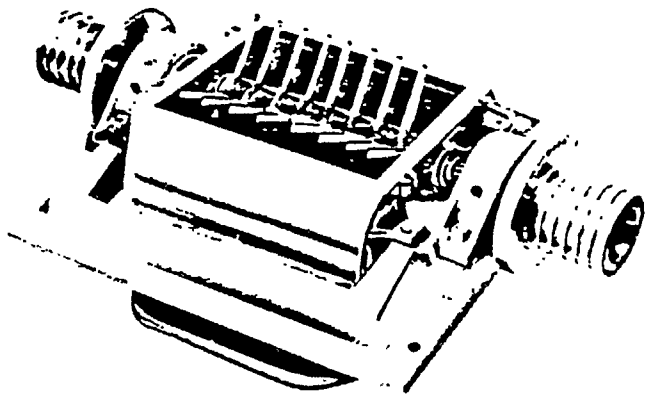
FIXED BLADES WITH REMOVABLE TIPS
Code 775RT fixed blades shown with knife edge on both sides.

Blades of more than 200 styles, shapes and sizes are available to match processing needs. Supplied in Stainless Steel and special alloys, with wear-resistant inserts and abrasive-resistant coating to match chemical and physical property of the product. The simple availability of either edge through the feature of the reversible chamber doubles the application range and operating life of all machines.

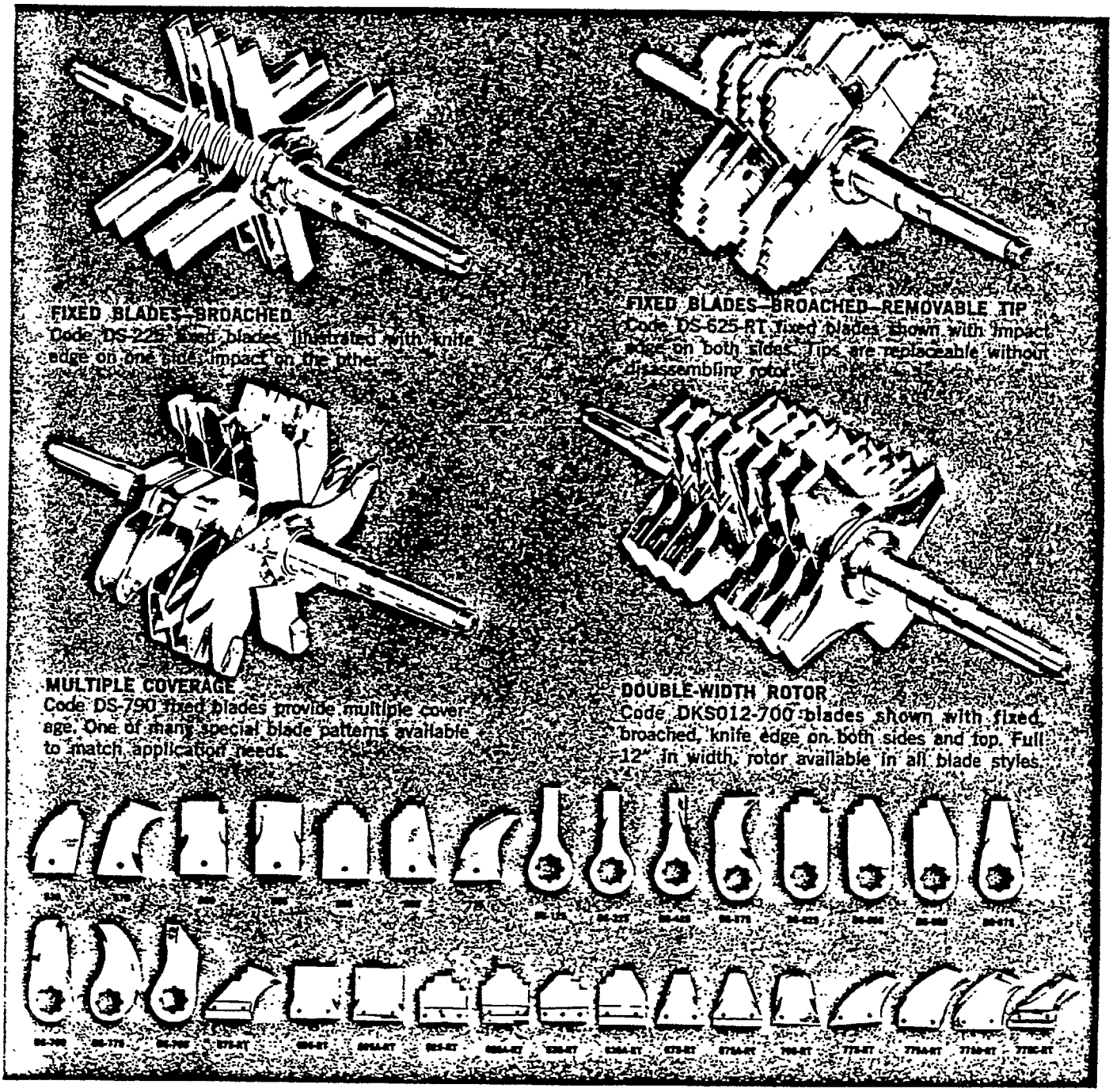


A17201

MODEL DAS06 COMMINUTING CHAMBER
Remote outboard pillow-block bearing supports for rotor shaft, reversible assembly with Code 575 fixed blades, knife-impact edges.



MODEL DKAS012 COMMINUTING CHAMBER
Similar to DAS06 except double-width chamber of heavier construction.



FIXED BLADES—BROACHED
Code DS-225 fixed blades illustrated with knife edge on one side, impact on the other.

FIXED BLADES—BROACHED—REMOVABLE TIP
Code DS-625-RT fixed blades shown with impact edge on both sides. Tips are replaceable without disassembling rotor.

MULTIPLE COVERAGE
Code DS-790 fixed blades provide multiple coverage. One of many special blade patterns available to match application needs.

DOUBLE-WIDTH ROTOR
Code DKS012-700 blades shown with fixed, broached, knife edge on both sides and top. Full 12" in width, rotor available in all blade styles.

FITZ-MILL

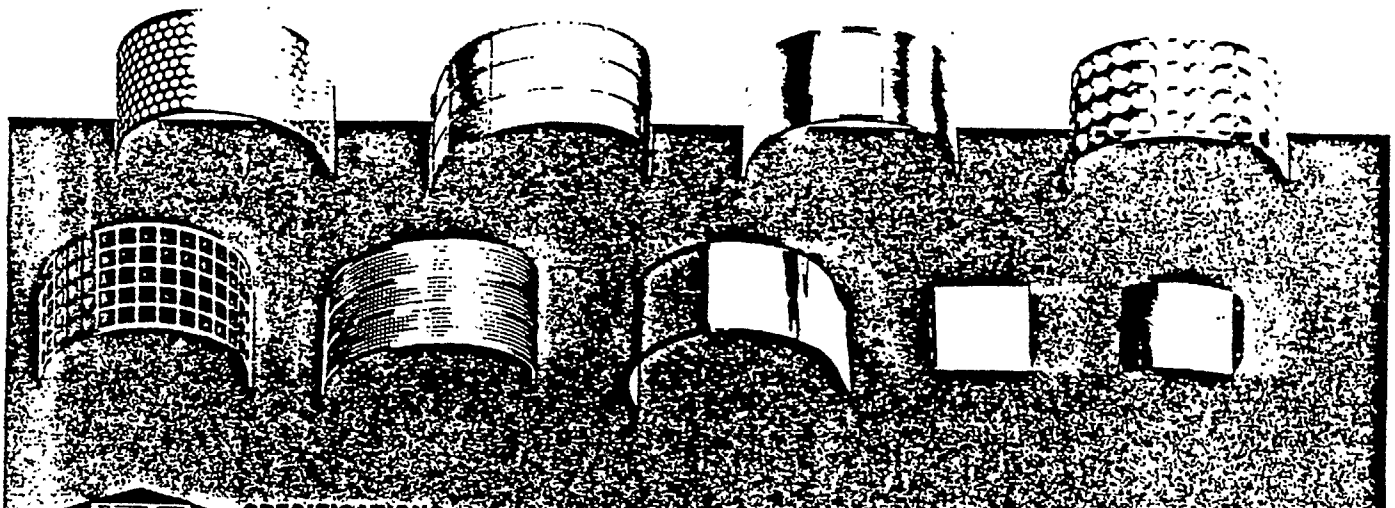
The selection of the correct feed throat is important for proper introduction of the product into the chamber. Over 50 standard designs are available and are interchangeable on all chambers. Special designs are custom built when needed. Normally supplied in 304 or 316 Stainless Steel, but also available in a full range of other corrosion resistant alloys.

A 17202



More than 200 different sizes of screens in various gauges and materials stocked for immediate shipment. Round, square, striated, woven wire mesh, diagonally and straight slotted, weir, electrolytic, bar, and drilled openings or other special designs made to order.

A17203



FITZ-MILL **SPECIFICATIONS**

The comminuting equipment identified by the trade mark, Fitz-Mill®, is manufactured in four general size ranges, Model M, Model D, Model F, and Model H. The machines in each size have the same rotor diameter (extended blade periphery) but are available in various rotor lengths. The specifications of the standard models available are:

Model Identification	Screen Area Sq. Ins.	Rotor Dimensions Inches Length	Diameter	Max. H.P. Applied	Usual Number of Blades
M5	83	4¾	8	25	16
D6	198	7¾	10¼	75	16 or 32
D12	357	12	10¼	150	32
F8	199	7¾	14¼	60	16 or 32
F12	309	11½	14¼	150	32
F20	529	19¼	14¼	275	32
H30	986	28¾	17	350	32

The construction of all types and sizes follows the same pattern of careful selection of the best materials available, precision workmanship, and rigid inspection including adequate "run in" time of each machine manufactured.

FEED THROATS AND HOPPERS
These parts and similar parts requiring fabrication are constructed from Type 304 Stainless Steel or Type 316 Stainless Steel when required. Other alloys are available if required.

SCREENS
Standard Stainless Steel screens, both perforated and mesh, in more than 200 selections are carried in stock for immediate shipment. Perforated types from .015" openings to 1.5" openings, mesh sizes from 325 to 2. Many types for special applications are also available.

SHAFTS AND ROTORS
All shafts are hardened and tempered Type 416 Stainless Steel stress relieved before machining. Rotors of solid Type 303 Stainless Steel machines with same precision as shafts. In addition to rotor and shaft combinations, splined shafts for mounting broached blades are available for all type machines.

BLADES
Over 200 types of blades are normally available from stock. Standard material is hardened and tempered Types 414 and 420 Stainless Steel. Hard surfacing or special inserts for abrasive products. Mounting pins for rotor mounted blades are Type 420 and 440 Stainless Steel. Other types of special steels or other metals are also available.

COMMINUTING CHAMBER
All castings required for comminuting chamber construction are normally Type 316 Stainless Steel polished before machining to prevent distortion. Other alloys can be provided for special applications.

BEARINGS
Dual row self-aligning ball bearings with precision-machine bronze or pressed steel cages with high overload factor. Bearings are manufactured to special dimensions to meet rigid specifications. Mounted in outboard type housing cast integral with comminuting chamber or remote outboard mounted in pillow block housings.

MOTORS AND STARTERS
All types and enclosures available.

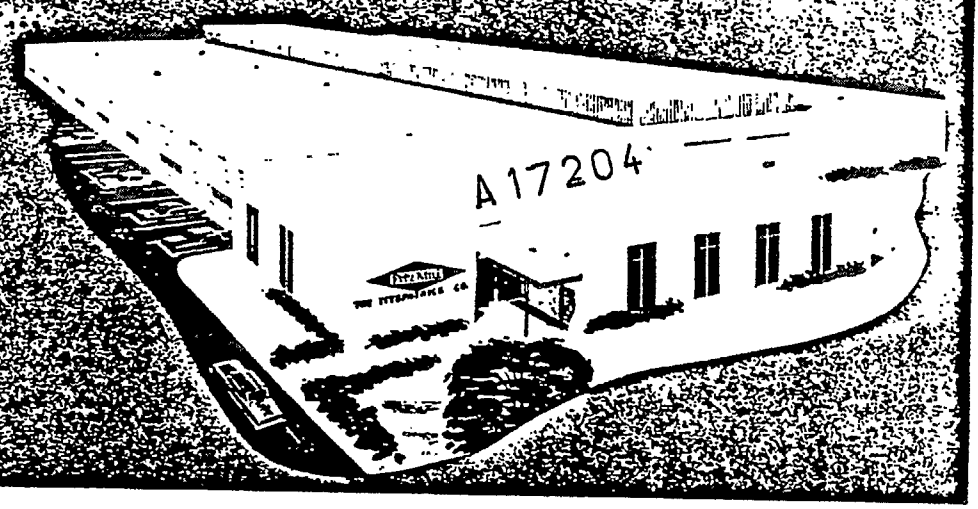
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FITZ·MILL

is the recognized Trademark of custom engineered Stainless Steel and non-corrosive processing equipment.

Serving over 90 Industries for...

Blending	Granulating
Chopping	Malaxating
Comminuting	Milling
Compacting	Mixing
Densifying	Pre-Breaking
Dispersing	Pulverizing
Divelling	Pureeing
Drying	Riying
Emulsifying	Sizing
Extruding	



Modern fully equipped laboratories are maintained for testing products. Laboratories in South Plainfield, New Jersey and Elmhurst, Illinois, are conveniently located for your evaluation of this equipment without obligation. Verification of recommendations on FitzMill® equipment and systems permit accurate scaling for assured plant performance providing industry with the most advanced and highest efficiency equipment.

FITZ·MILL equipment is designed to meet many specific requirements. Five of these machines are described below. Individual bulletins are available upon request.



COMMINUTOR ... for universal, all purpose size reduction and blending of dry materials, liquids, or mixtures of these.



HOMOLOID ... primarily adapted to production of emulsions, colloidal suspensions, dispersions, and ointments. Also applicable to dry products.



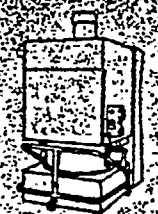
CHILSONATOR ... for instantaneous, continuous compacting of powder by pressure alone.



PRE-BREAKING ... varied design principles for initial pre-breaking of bulk, pressed, frozen, or baled products preceding further processing.



PROPORTIONING-BLENDING ... multi-function units provide continuous proportioning and intimate blending with granulation or fine grinding when desired.



DRYING EQUIPMENT ... fluidized bed drying for fast and efficient drying of granular materials.

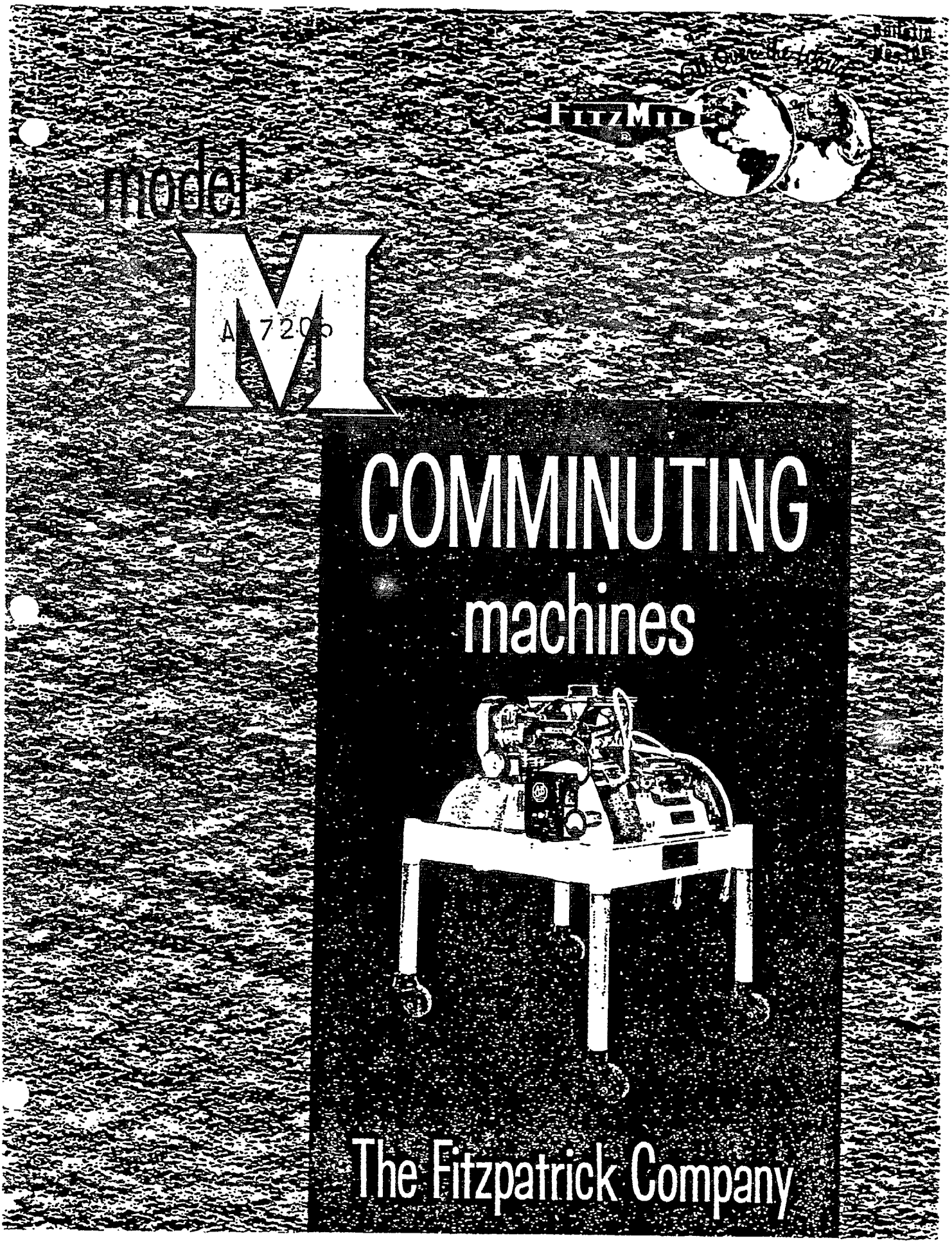
FITZ·MILL

THE FITZPATRICK COMPANY

832 INDUSTRIAL DRIVE • ELMHURST, ILLINOIS 60126 Area Code: 312/832-1700

Eastern Division: 4219 South Clinton Avenue, South Plainfield, New Jersey 07080 Area Code: 201/561-1500

Offices and sales engineers in principal cities throughout the United States. Representatives in Foreign Countries.



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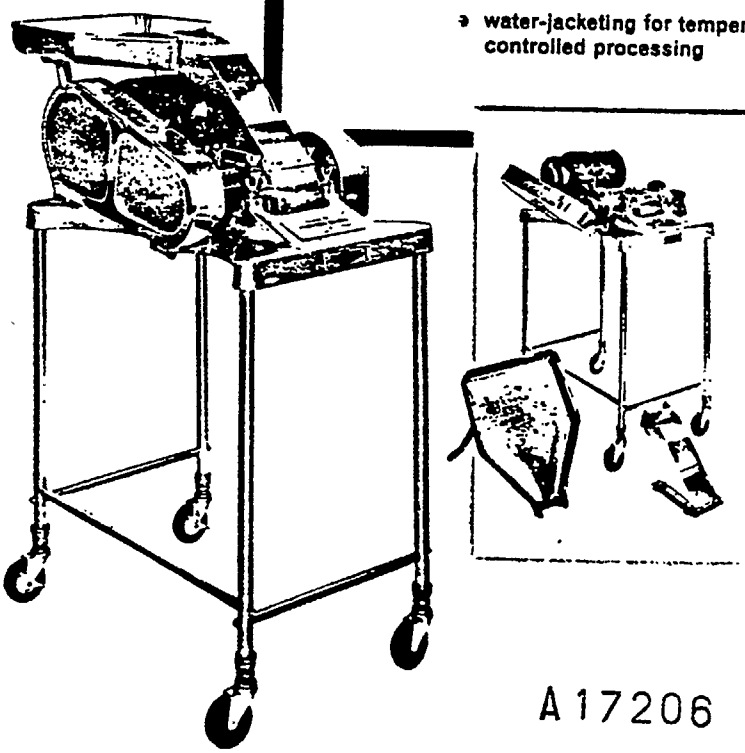
MODEL M COMMINUTING MACHINES

The many features and applications available with FitzMill All-Purpose Comminuting units originate in the *Model M* . . . the light-duty operational Comminutor in the wide range of sizes manufactured by the Company.

Unlimited comminuting processing needs are met by the design flexibility of basic components which can be incorporated in combinations to efficiently and economically process products ranging from dry solids to liquids, as well as mixtures of these, for light production requirements.

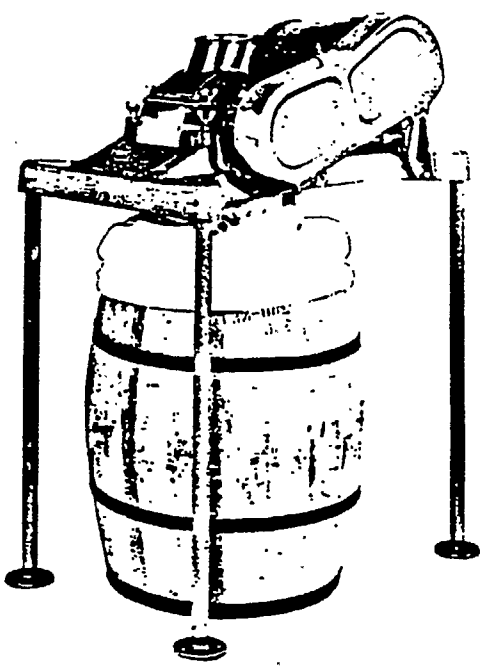
Included in these basic features are

- patented, reversible chambers in multiple widths
- over 200 blade styles and screen openings
- water-jacketing for temperature controlled processing
- feed throats for gravity-drop, screw or pump feeds, airveying
- sizes from 300 HP to 1½ HP (*Model M* equipped from 5 HP to 1½ HP)
- belt, gear, chain, direct and variable speed drives
- stainless steel



A17206

CODE S44M5. The basic manually-fed, belt-driven unit with Standard throat and holding pan for product. Available with patented reversible chambers, stainless steel, selection of blades and screens, various rotor speeds, 5 HP to 1½ HP. Suitable for Production, Pilot Plant or Laboratory needs. Disassembled view illustrates complete stripping of parts, accomplished in seconds without tools, for thorough cleaning. Used for dry and/or liquid products to pulverize, granulate, emulsify, blend, disperse and similar operations . . . a truly universal, all-purpose processing unit.



CODE MA44M5. Identical to basic unit but equipped with short, round, angle-throat inlet to permit close coupling (with readily removable sock for dustless operation) to outlet of conveyor. Ideal for limited headroom under flaker chute of roller dryer. Will handle output of two-roller dryer on dried milk with 3 HP motor. (Single flywheel chamber shown.)

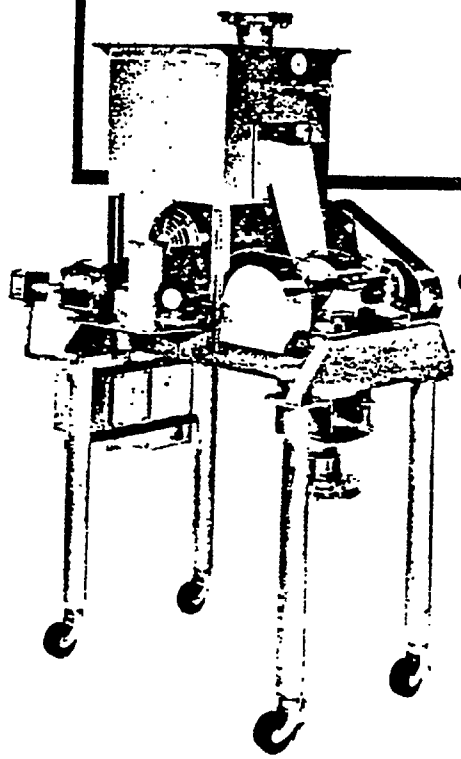
Patented — Patents Pending

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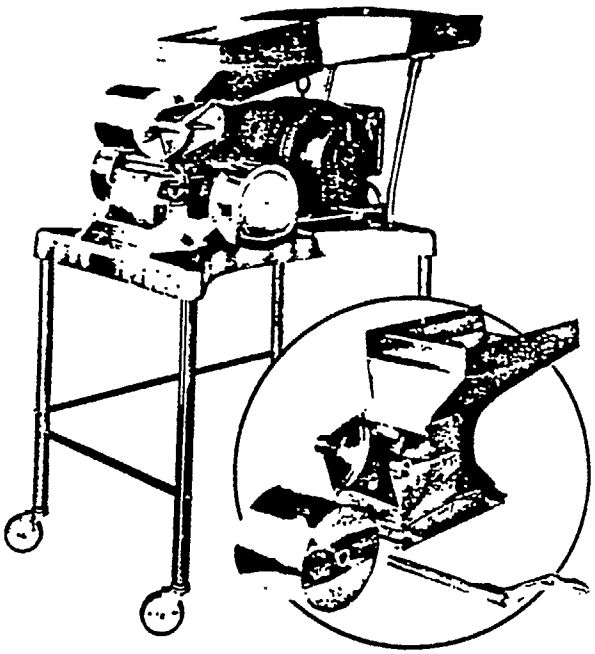
The Model M is Ideal for Research and Pilot Plant processing

. . . as it has the two-fold advantage of being small but with its results permitting accurate up-scaling to the Model H 300 HP units. In addition, its output is sufficient to meet many production needs, and it often serves valuable interim production requirements after *Research*, while market analyses are being made.

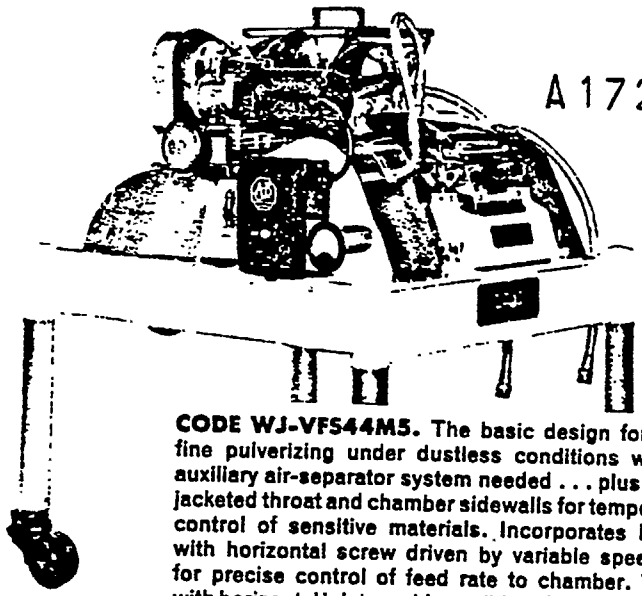
Some Research variations of the *Model M* which led to plant-size, continuous-production systems are shown.



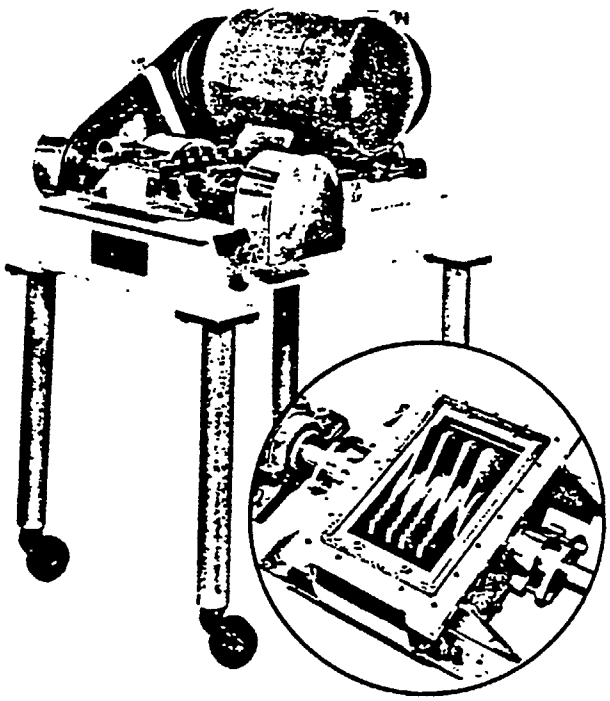
CODE SpVFH44SOM5. Unit designed for *oxidation-free* comminution with product path completely sealed from holding hopper inlet through discharge, permitting introduction of nitrogen, argon or other inert atmosphere into area thus isolated. Hopper incorporates vibratory feeder and special gravity-drop *slot-throat.* Remote outboard bearings with *forced oil* lubrication.



CODE VHPRO44M5. *Self-cleaning feature* achieved with basic Type VHP throat equipped with rotatable roller. Useful for continuous operation on sticky products which tend to bridge throat opening. Ductor blade can be placed to continuously scrape accumulation clean on inside of throat *or on outside,* to be proportioned back with original product.

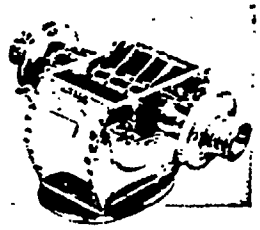


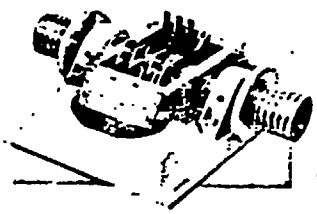
CODE WJ-VF544M5. The basic design for ultra-fine pulverizing under dustless conditions with no auxiliary air-separator system needed . . . plus water-jacketed throat and chamber sidewalls for temperature control of sensitive materials. Incorporates hopper with horizontal screw driven by variable speed unit for precise control of feed rate to chamber. Throat with horizontal inlet provides solid surface with breaker bars to aid in pre-breaking lumps, resulting in finer grinds and dispersions as well as increasing screen life. Nozzles can be provided in throat for injection of steam, inert atmospheres, or infrigidative liquids. Speeds up to 10,000 RPM with 5 HP and 7½ HP motors.



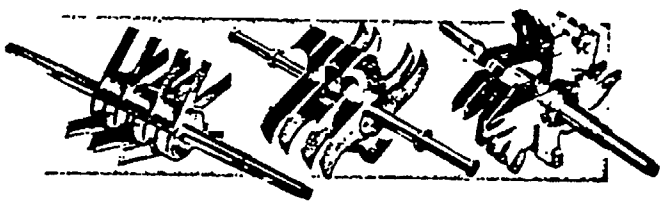
CODE LH-PG-53MDO5. Unit featuring *high-pressure liquid operation* in a closed system affording total exclusion of air . . . oversize rotor shaft with remote outboard bearings permitting high-pressure shaft seals . . . fixed, broached blades of special length to provide maximum smoothing of product.

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Reversible comminuting chamber is an exclusive, patented feature of FitzMills. This permits using dual-purpose blades with knife or impact edge available for comminuting action by simply reversing the chamber in its mount. Knife edge is normally used for granulating or chopping . . . flat impact edge for pulverizing, pureeing, and emulsifying.



Over 200 blade styles are available in swinging and fixed designs, with special spacing patterns when needed.

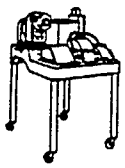
FitzMill

SPECIFICATIONS

The complete series of Comminutors manufactured by the Company are designed to meet any production processing rate. The general size ranges are *Model M, Model D, Model K, Model F* and *Model H* having the following specifications . . .

Model Identification	Screen Area Sq. Inches	Rotor Dimensions Inches Length	Diameter	Maximum Horse Power Applied	Number of Blades
M5	63	4¼	8	5	16
D6	109	5¾	10¼	15	16 or 32
D12	257	12	10¼	20	32
K7	154	6¾	12¼	40	16 or 32
K12	272	11¾	12¼	50	32
K14	318	13¾	12¼	50	32
F8	199	7¾	14¼	50	16 or 32
F12	309	11¾	14¼	60	32
F16	419	15¾	14¼	60	32
F20	529	19¾	14¼	75	48
H30	886	28¾	17	150	48

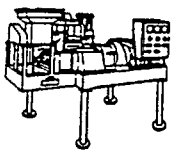
FitzMill Equipment is designed to meet many specific processing requirements. A few of these machines are shown here. Individual bulletins are available at your request.



COMMINUTOR—for universal, all purpose size reduction and blending of dry materials, liquids, or mixtures of them.



HOMOLOID—primarily adapted to production of emulsions, colloidal suspensions, dispersions, and ointments but also applicable to dry products.



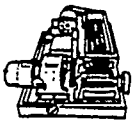
SOLIDATOR—for instantaneous, continuous compacting of powders by pressure alone.



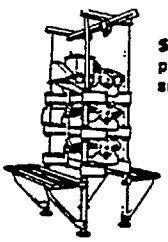
TEMPERATURE PROCESSING—units with features for simultaneous heating or cooling, with comminution or blending for continuous chemical reactions, cooking, viscosity control.



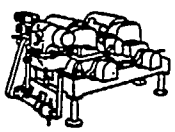
SUNDERING—varied design principles for initial pre-breaking of bulk, pressed, frozen or baked products preceding further processing.



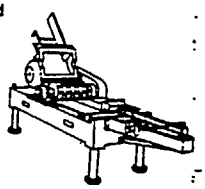
PROPORTIONING-BLENDING—multi-function units provide continuous proportioning and intimate blending with granulation or fine grinding when desired.



SPECIAL EQUIPMENT DIVISION—complete—processing systems designed, tested, fabricated and supervised for individual needs.







FitzMill TESTING AND DEVELOPMENT LABORATORIES



. . . Modern, fully equipped laboratories maintained for testing products and developing new processing methods. Comprehensive variety of testing equipment includes climatic control. Verification of recommendations on systems and machines permit accurate scaling for guaranteed plant performance and provides industry with most advanced and highest efficiency equipment.

THE FITZPATRICK COMPANY

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