SCIENTIFIC AMERICAN

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AMERICAN INDUSTRIES.—No. 67.

ASBESTOS

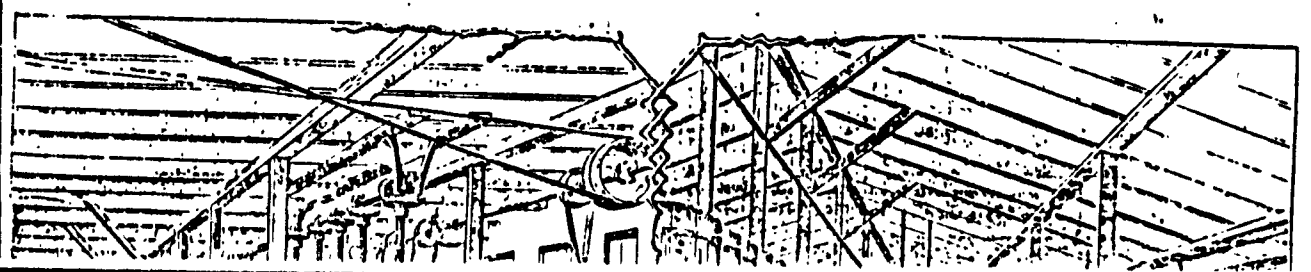
That American mechanics, inventors, and business men are pre-eminently practical is acknowledged the world over. They are always pronounced utilitarians—making the first count in their valuation of almost every new article answer to the questions: What is it worth to us to-day? How much can we save by its use? Will it meet our necessities better than what we have heretofore used? It is important that these and similar queries be answered in a plain and straightforward way, in regard to every new product whose manufacture is destined to take a permanent place in our industries. But what reply would such inquiries have elicited twenty years ago, supposing them to have been then made, as to the usefulness of asbestos, or anything made therefrom? The probability is that comparatively few people at that time even knew that there was such an article. A few students, however, might have furnished some very curious facts about it—how the ancients used to wrap the bodies of their dead in asbestos cloth to keep their ashes separate from those of the funeral pile; how Charlemagne had a tablecloth made thereof, and astonished his guests by throwing it into the fire after dinner, whereby it was cleaned without burning; how an Italian chevalier had a complete dress of asbestos, with which he made successful experiments in testing its protective qualities for firemen's uses; how numerous tricks in fire handling have been performed by its aid, etc.; but with all this there had been developed nothing of any considerable practical value, and the possibilities of future usefulness in this fine fibered, fire and acid proof mineral were, apparently, no better than they had been when the pyramids were built.

Asbestos (from a Greek word meaning incombustible) is a variety of the hornblende group of minerals, and the chemical composition of the whole family is chiefly silica, magnesia, alumina, and ferrous oxide; but the qualities vary widely. In color it is usually from white to gray and green—sometimes yellow, when impregnated with iron—with fine, crystalline, flexible fibers of a silky luster, and feels somewhat oily to the touch, although in its native state it is as little suggestive of the uses for which it may be made available as the rough iron ore is of a chronometer. A few years ago it was supposed to be very rare, but since there has been a demand for it in considerable quantities new sources of supply have been opened up, and it is now found in many parts of Europe and America, the best quality coming from this country. The inquiry for asbestos for manufacturing purposes had, we believe, its commencement with the foundation of the industry which we illustrate in this paper with engravings of the manufacturing establishment of the H. W. Johns Manufacturing Company, which has grown out of the business established by Mr Johns in 1858.

It was not until 1868 that Mr Johns made known to the world his discovery of the practical value of this remarkable mineral, and the nature of his patented inventions. That he has labored intelligently in this comparatively new field is proven by a gratifying success and a world-wide reputation, for his asbestos products are in use wherever materials for structural and mechanical purposes are employed. Every year additional improvements and processes have been made by Mr. Johns, and, as the various branches of the industry became better known, it is not strange that he has had many imitators in his line of manufacture.

The main departments of the factory will be readily distinguished at a glance from our artist's representation. The

[Continued on page 130]

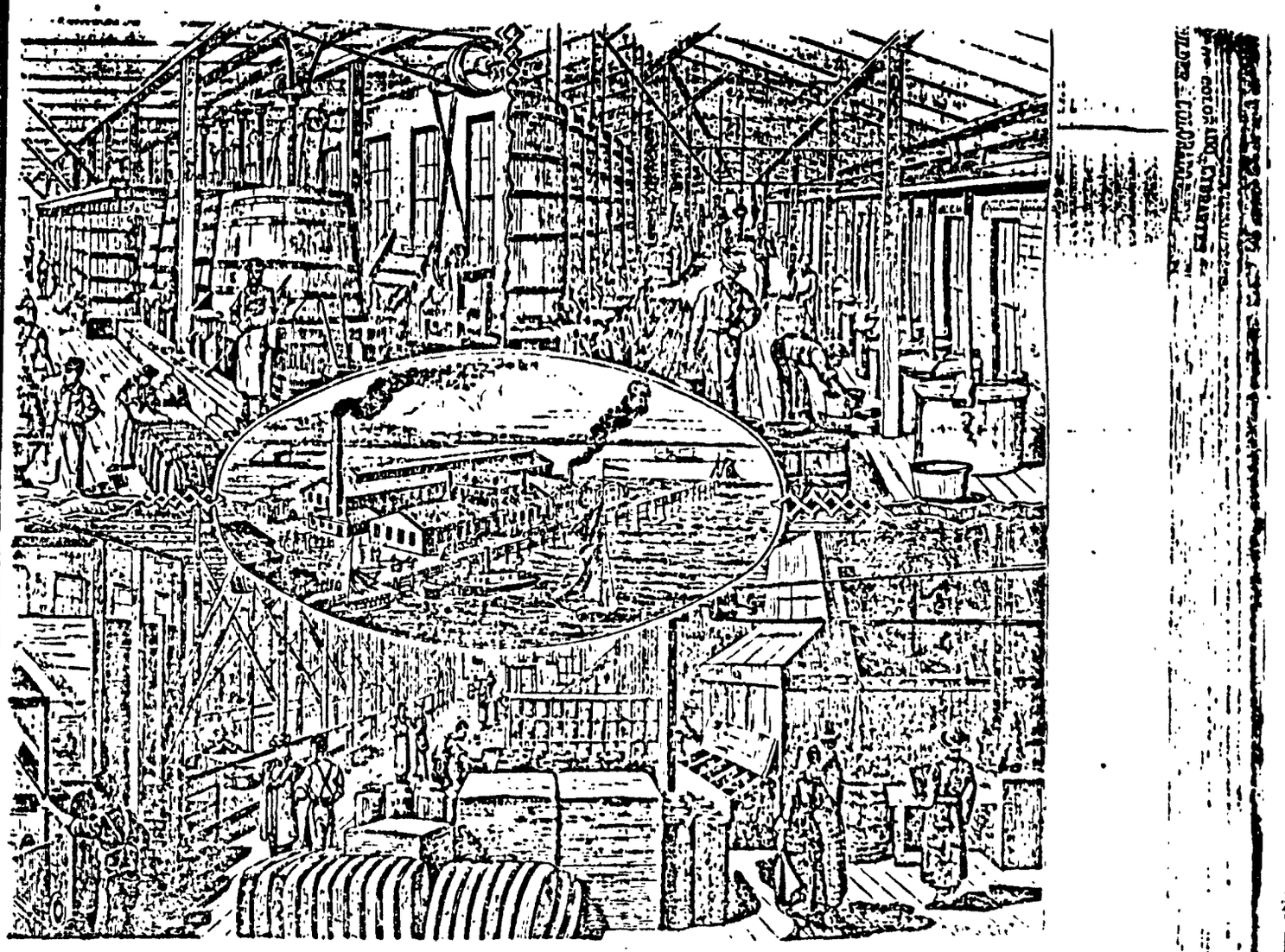


Scientific American on the H. W. Johns Manufacturing Company's Asbestos Works (1881)

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ASBESTOS WORKS OF THE H. W JOHNS MANUFACTURING COMPANY.

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ASBESTOS.

(Continued from page 127.)

location is a most convenient one in Brooklyn, at a point on New York Bay where there are admirable dock facilities for receiving and shipping goods.

Asbestos materials are woven, felted, or matted fabrics, and sheets of various thickness and thickness, used for filtering acids, for non-conducting and fireproof coverings, linings, and for many other purposes. Mill boards of one sixteenth to one-half inch or more in thickness are used for packing gaskets around steam, fire, oils, and acids; also for fireboxes, coverings for locomotive boilers, etc. Sheathings, in sheets and rolls, make fireproof linings under weather-boards of wooden buildings, and in fire and boiler rooms. Steam packings, in the form of rope, wick, loose fiber, etc., are for use in stuffing boxes around valve stems and other moving parts of steam engines, acid and oil pumps. Cements and coatings in great variety are employed for repairing gas and other retorts, and for use around furnaces, acid works, etc.; roof cement for covering and repairing roofs, and jointing cement for steam and other joints; while the concrete coating is used for rendering beams, posts, girders, and other woodwork fireproof. The following facts are given under the authority of Mr. Johns: A stick of wood thus coated and thrown into their furnace, for experiment, was taken out in its original form after this exposure, the asbestos coating, however, then covering only charcoal. Fireproof paints are used for interior woodwork. The largest drygoods firm in New York had their stores and warehouses thus painted, the total woodwork covered amounting to four and a half acres. Besides the above are asbestos paper, thread, and numerous other articles, widely varying in their character and adaptations, which form an interesting portion of the business of the establishment, but they are less important to a large class of persons than H. W. Johns' asbestos roofing, liquid paints, and boiler coverings.

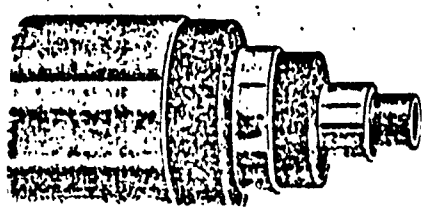
The department for the manufacture of asbestos roofing, and the machinery employed therein, which forms the subject of one of our engraved views, represents a branch of business to which Mr. Johns first devoted his attention, having commenced it in 1858. The machine which is shown in this department is the result of a long series of experiments by Mr. Johns, and by its use the whole operation of manufacturing roofing from the raw materials is completed. Some two miles of this fabric, about 40 inches wide, is turned out daily by this machine. It is furnished in rolls containing about 200 square feet each, and the covering of a roof is quickly accomplished. The Johns patent asbestos roofing differs from that followed in other establishments, and, although paints form only one of several classes of goods made by this company, their production in this class alone is claimed to be larger than that of any other manufacturers in this line in this country.

The purest linseed oil and colors enter into the composition of these paints, and they contain no water, alkalies, benzine, or other deleterious or useless adulterations or dilutions. They are furnished only in liquid form, ready for use, in all the standard shades, and of qualities suited for out-door work or interior decoration. They work freely under the brush in cold as well as warm weather. They are not intended to compete in price with any of the low grade paints sold in the market, but the company claim that by their superior durability, they are less expensive than anything else offered in this line.

The way in which these liquid paints are ground and mixed is said to cause a more intimate combination of the



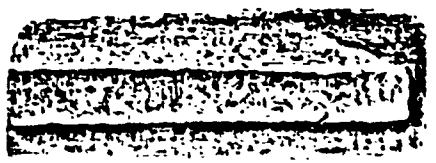
ASBESTOS GRINDING.



ments. For pipe coverings they especially recommend their asbestos lining felt, a representation of which is given in our engraving. It consists of a pure asbestos sheathing, to one side of which is attached "Sorbed" asbestos. It is furnished in sheets and rolls, and forms an insulating cushion or non conducting lining, over which is placed a layer of hair felt and then one of non porous fireproof sheathing, while, if still further protection is required, another layer of hair felt surrounded by non porous fireproof sheathing is added. The protection which this manner of covering affords, and the manner of its application, will be readily understood from the illustrations.

For boiler coverings, or where large surfaces giving but great heat are to be protected, the company recommend their asbestos cement felting, which partakes of the nature of a felt and a cement. It is composed of asbestos and a cementing compound, applied as a mortar, and forms a light porous covering, possessing superior non conducting properties. It is claimed that there is no danger of its cracking from the expansion or contraction of the surface to which it is applied, the flexibility and strength of fiber of the asbestos keeping it always in its place, and it can be applied to heated as well as cold surfaces. In this connection we would state that the invention covering the application of this important function or use of asbestos, that is, the employment of its fibers as the indestructible binding or tying material in felts, cements, coatings, etc., in lieu of other fibers, such as hair and the like, as formerly used, was patented through the SCIENTIFIC AMERICAN office in 1868.

In the representation showing necessarily only a portion of the department for the preparation of crude asbestos for

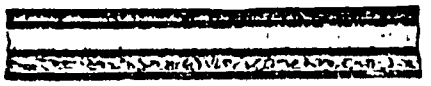


Weaving.

its manufacture into the various articles made at this establishment, are several machines designed especially for the purpose by Mr. Johns. The different kinds of asbestos, of which there is always an extensive variety on hand, require varying treatment, not only as to the goods to be made, but from the quality of the crude material, and it has only been by years of experience that the processes of manufacture

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and it ...chinery employed therein, which forms the subject of one of our engraved views, represents a branch of business to which Mr. Johns first devoted his attention, having commenced it in 1858. The machine which is shown in this department is the result of a long series of experiments by Mr. Johns, and by its use the whole operation of manufacturing roofing from the raw materials is completed. Some two miles of this fabric, about 40 inches wide, is turned out daily by this machine. It is furnished in rolls containing about 200 square feet each, and the covering of a roof is quickly accomplished. The Johns patent asbestos roofing differs from other composition roofing, and is claimed to be almost equal to tin, while it costs only about half as much. Its structure will be readily understood from the small engraving. The actual thickness is about one tenth of an inch. It consists of a manila lining, upon which is a layer of waterproof composition, then a strong canvas, another layer of waterproof composition, and a surface layer of asbestos-coated felt. This composition is claimed to be acidproof as well as

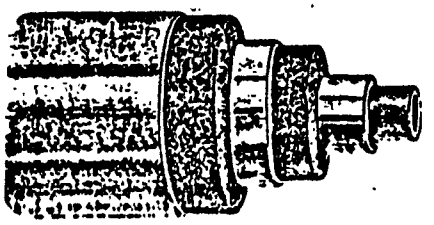


Roofing.

waterproof. It is also said to be equally adapted for use in all climates, and for flat or steep roofs. An occasional application, at slight expense, of the asbestos roof coating, keeps a roof in good order, and the white fireproof coating with which the surface is finished makes a light roof, which is not only air and water tight, but an effective nonconductor of heat, and one that will protect the roof against fire from adjoining buildings.

Asbestos roofing has been in use for many years, and it has met with the approval of manufacturers and railroad officers for roofs of railroad buildings, bridges, warehouses, and for factories, etc., for which purposes it is especially adapted.

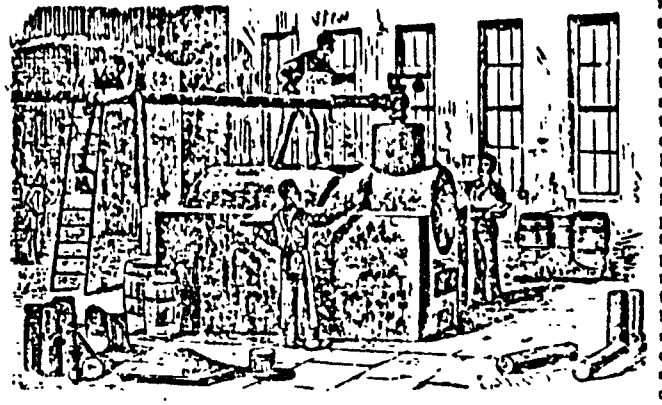
The utilization of asbestos in the manufacture of paints attracted the attention and became the subject of experiment with Mr. Johns at an early period in his investigations, and it forms a valuable ingredient in the fireproof paints referred to in the foregoing list of asbestos materials. This company also manufacture on an extensive scale a superior grade of pure linseed oil paints, in liquid form, for general structural purposes, which are designated by the peculiar trade mark which is shown at the head of this article. Our artist has made two representations of departments where the manufacture of these paints is carried on, which give but an incomplete idea of



Pipe Covering.

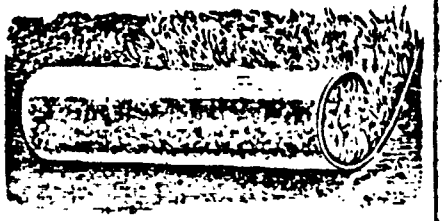
ingredients than can be effected by the ordinary processes with oil and turpentine, and therefore greater richness and permanency of color and beauty of finish are attained. For roof painting the company have a special preparation which, either alone or in combination with their asbestos cement, they particularly recommend for rough usage and in exposed situations, and also for the preservation and repair of old leaky tin and other roofs. The roof paints are made in a variety of shades, and are durable preservative coatings for iron work exposed to the weather or in contact with the earth or salt water.

The use of asbestos, alone and in connection with other materials, for covering steam and hot-air pipes, boilers, etc., thus preventing the radiation of heat and economizing fuel, has formed one of its most popular and valuable applications. There are many different combinations and ways of applying it, and the company have patents on many feasible and valuable processes, extending back to its original adaptation to such uses, and covering also recent improve-



Wadding.

its manufacture into the various articles made at this establishment, are several machines designed especially for the purpose by Mr. Johns. The different kinds of asbestos, of which there is always an extensive variety on hand, require varying treatment, not only as to the goods to be made, but from the quality of the crude material, and it has only been by years of experience that the processes of manufacture have been perfected. Asbestos, of which we give an illustration of a fine sample from this country, comes in irregular solid blocks, generally not larger than stove coal, but



Lining Felt.

by a gentle attrition, without breaking the fiber, a piece as large as an egg may be made to fill a half-bushel measure of what looks not unlike the finest wool. Upon the length, strength, flexibility, and fineness of the fiber depends the value of the different varieties.

Prior to 1858 Mr. Johns had been for several years prosecuting experiments looking to the industrial utilization of asbestos. For a long time he found it extremely difficult to obtain such samples as were needed in making his experimental trials, and he was, for a period, accustomed to search the country for it, after the manner of an amateur geologist. He succeeded in finding some asbestos beds in the vicinity of New York; but when he had completed all the other preparations by which he would be able to put forth a manufactured article, it was a matter of grave doubt with him whether it would be possible to secure a permanent supply of the raw material. He therefore, at the commencement of this enterprise sent out descriptive advertisements, in reply to which samples began to come in from various quarters, many of them not being asbestos at all, and others of little or no value, but in this way the supply has ever since been steadily increasing, so that in a little over thirteen years he has built up an entirely new industry of large magnitude, one which has proved of great value to the

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a wide field for future growth. It is worthy of mention that the largest contract ever made for paints, i. e., that for painting the Metropolitan Elevated Railroad of this city, was awarded to this company, and their liquid white has been exclusively used for several years upon the United States Capitol at Washington.

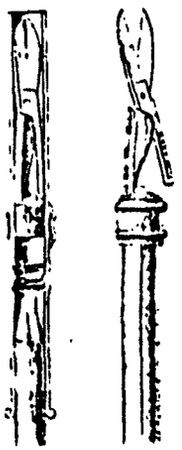


Asbestos.

The New York office of the company is at No. 87 Maiden Lane, where illustrated catalogues, descriptive of their inventions, can be obtained, and their goods are sold by dealers in all the principal cities and towns in this country and abroad. The London house of Messrs. Witty & Wyatt, No. 9 Pencburch street, E. C., have the sale of these goods in Great Britain and the English colonies.

PENCIL HOLDER AND SCISSORS.

A handy combination of pencil holder and scissors is shown in the annexed engraving. The pencil holder may be of any of the usual forms. The one illustrated is what is known as a pencil-point protector, having a shoulder in the middle to limit the extent to which the pencil can be inserted. The tube beyond the shoulder is fitted to receive a small pair of scissors, which are attached to a block connected with an external sliding sleeve, by means of which they are projected from or drawn into the tube.



This invention was lately patented by Mr. H. C. Benson, of New York city.

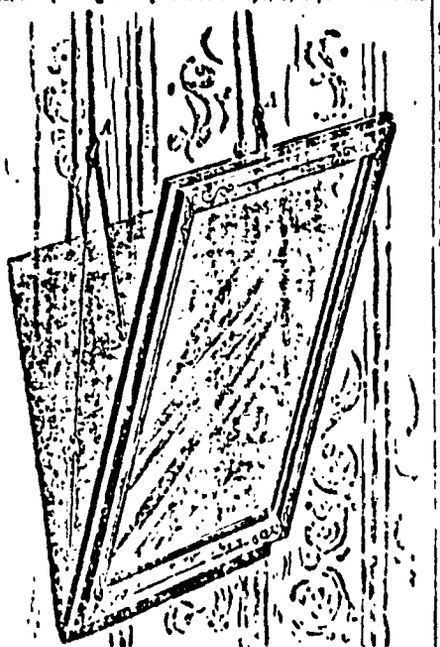
Action of Vegetable Acids on Tin.

Professor Charles E. Munroe, of Annapolis, states that the ordinary fruit acids, such

NEW ADJUSTER FOR MIRROR AND PICTURE FRAMES.

It requires no little skill to hang a series of pictures at a uniform angle, and it is often difficult to attach the cord to a mirror so that it will have the desired inclination without bracing or propping of some sort. To avoid these difficulties Mr. Charles A. Simpson, of Saxonville, Mass., has invented a very simple and inexpensive attachment for frame hangings, which is readily applied and holds the frame at any desired angle.

The frame is hung with cords in the usual way, but the screw eyes are so located that it may hang a little straighter than the desired angle. Near the lower corners, on either side of the frame, is placed a screw eye, C. A cord, D, attached to the picture cord by means of a common hook, A, and passing through the screw eye, C, is provided at the



SIMPSON'S ADJUSTER FOR HANGING FRAMES.

end with a flat hook, B, which clamps the cord by being carried by means of the weight of the frame. The hook, B, may be moved up or down on the cord D, to alter the inclination of the frame.

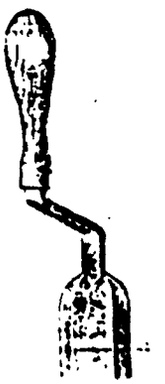
In making the test the supports of the elevator were severed, and the elevator was allowed to drop a distance of 123 feet, retarded only by the safety cushion. The inventor had faith enough in his protective device to trust his life to it, and made the hazardous trip not only without harm but without serious discomfort. The motion of the elevator was arrested with so little shock that several eggs on the floor were not cracked, nor was a goblet of water overturned. No record was made of the pressure of the air in the well or of the time covered by the fall. The motion of the elevator was very rapid until within a few feet of the bottom. The efficiency of the safety cushion was amply demonstrated.

Iridium for Electric Lights.

The latest material offered for an incombustible "burner" for the electric light is iridium. Mr. Holland, gold pen maker of Cincinnati, claims to have discovered a flux by means of which he is able to fuse iridium in an ordinary draught furnace. He casts the metal in any shape desired, and in bars or ingots weighing as much as ten ounces. The metal thus fused and cast defies the file and resists all acids. The only mechanical way of cutting it is by friction with a copper wheel charged with diamond dust or fine corundum. Mr. Holland claims, further, that the cast iridium makes suitable "burners" for the electric light, and that so used the metal is durable without protection from the atmosphere.

IMPROVED HAND HOE.

The engraving shows an improved hand hoe adapted to universal use in the cutting away of grass or manipulating the soil about plants. The novelty consists in the peculiar form of the blade, which is constructed of a main body portion setting off to one side of the longitudinal axis of the handle in a parallel plane therewith, and a curved or upturned end portion, which, as well as the main portion, is sharp upon both edges.



This useful tool was recently patented by Mr. Robert L. Turner, of Olena, Ohio.

RECENT INVENTIONS.

Mr. George W. McKenzie, of Dyersburg, Tenn., has patented an improvement in baling presses by which great pressure is exerted upon the bale, and which is

UNIVERSITY OF COLORADO BOULDER - COLO.