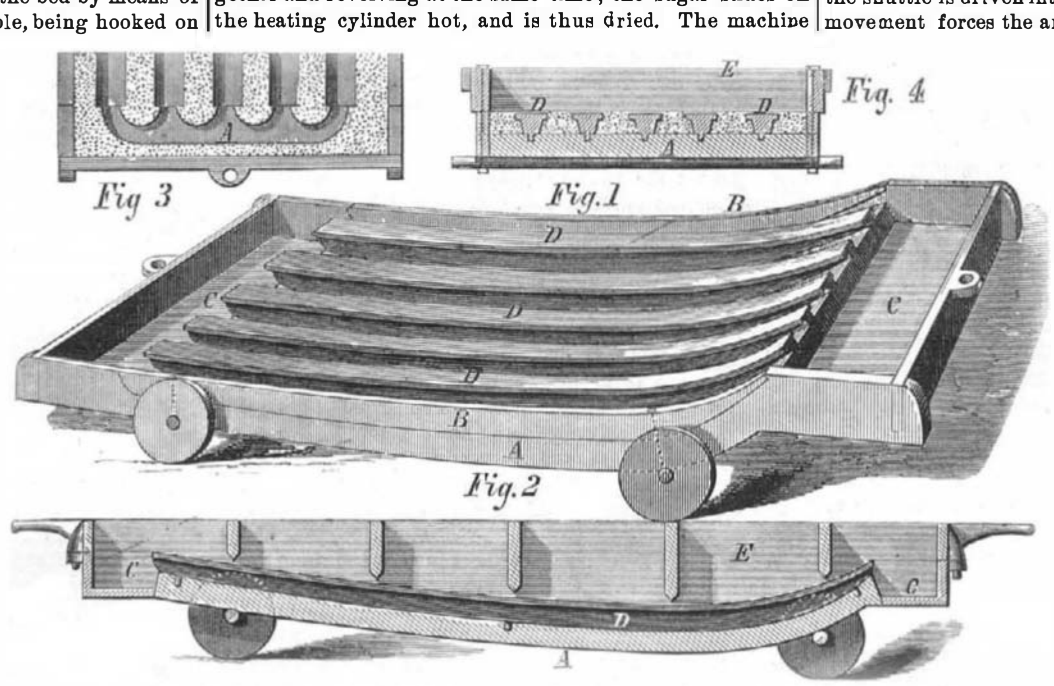
MOLD FOR CASTING AND CHILLING SLEIGH SHOES.

The improvement now illustrated is designed to save the time and expense involved in grinding and polishing sleigh shoes, by giving them smooth and hard faces in the casting, without, at the same time, materially injuring their strength or incurring liability to loss in the process.

A, in the figures, is the lower part or nowel of the flask. the bed of which is cast in one piece and of a shape to conform to the face of the shoe intended to be cast. The sides, B, are cast separate and are fastened to the bed by means of bolts. The ends, C, are made detachable, being hooked on to the bed casting in the manner shown in Fig. 1. This is doue to preserve the flasks, as, if they are made in one piece with the bed, they are apt to crack off. At D are shown the patterns, which are placed upon the bed of the nowel and kept in place by dowels. The latter serve also the purpose of core prints. When sand has been placed in the nowel, as seen in cross section in Fig. 4, and the patterns have been withdrawn, a connecting chamber is formed at one end thereof, in the manner shown in the plan view, Fig. 8. The cope, E, which is a wooden frame with transverse ribs, and which is provided with handles at its ends, is then applied to the top of the nowel, as shown in section in Fig. 2, and the process of casting is carried out. The metal is chilled as it comes in contact with the smooth surface of the bed, and the shoes are withdrawn from the mold ready for service. The nowel is mounted on wheels for convenience in moving it.



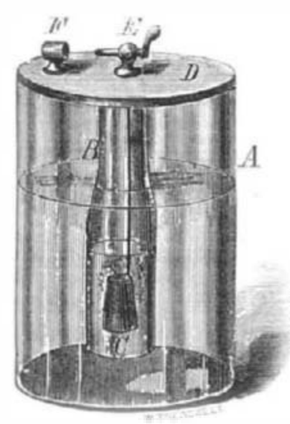
BUTMAN'S MOLD FOR CASTING AND CHILLING SLEIGH SHOES.

It is claimed that shoes produced in this way are superior to the old ones and command a higher price, while there is a saving attending the use of the new mold.

Patented through the Scientific American Patent Agency for Volney A. Butman, of Ironton, Wis., June 11, 1872. Further information may be had by addressing V. L. Benjamin, Fond du Lac, Wis.

HOW TO MAKE A CHEAP HYDROGEN LAMP.

The principle on which the hydrogen lamp is based is the property of platinum sponge to absorb large quantities of oxygen, so that, when a jet of hydrogen is directed upon it, a rapid combination of the gases ensues, attended by the evolution of intense heat and faint light. The lamp is useful not as a means of illumination but for supplying the place of matches, or other means of obtaining fire whenever a quick light is required.



Our figure represents the ordinary form of construction. A is a glass vase, B a bottomless glass vessel attached to the metal cover D, C is a cylindrical piece of zinc suspended by a wire from the cover, E is a stop cock kept closed by a spring and readily opened by the pressure of the finger. F is a metal capsule, in which is placed a small portion of platinum sponge. To set the instrument in operation, a weak solution of sulphuric acid and water is poured into A. This attacks the zinc, causing hydrogen gas to be evolved, which fills the space in B and forces out the water. The stop cock should be kept open until the atmospheric air is entirely out of the receptacle. As soon as the pure hydrogen issues, the jet should be directed upon the platinum sponge, which will immediately become incandescent and ignite the hydrogen which will burn with a pale blue flame. When the hydrogen in B is exhausted, the light will be extinguished, the solution in the outer jar will again enter to its proper level, again attacking the zinc, when the same process will be repeated. Such a lamp will remain in working order until the power of the acid is exhausted or the zinc destroyed. It generally stays in good condition, giving fire immediately, for from two to three weeks.

As we have lately received several queries of how to construct this lamp cheaply, we add the following method, the materials being the least expensive and the easiest attainable that we can suggest. The outer vase may be made from a good sized preserve jar by cutting off the upper portion by means of a woolen string moistened with turpentine. For the inner tube, B, an ordinary lamp chimney will answer. The cover, D, can be made from sheet brass and the chimney attached to it by some good cement. The stop cock can be turned by a metal worker, from whom also the piece of zinc may be obtained; or the pewter cock from the top of a seltzer or mineral water flask, that can be readily bought from any druggist, may be employed, bending the tube, used for the exit of the water, straight and reducing its orifice to a very small hole. An empty metallic cartridge case will do for F. The platinum sponge can be purchased from any dealer in chemicals at a small cost. The proportions of water and acid used are about one ounce of the acid to a pint of water.

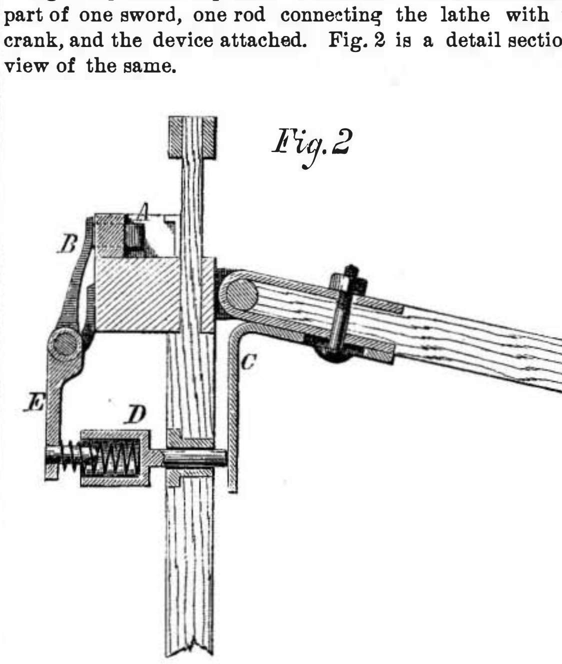
New Sugar Dryer.

C. H. Hersey, of South Boston, Mass., is the inventor of a new machine for drying sugar and other substances, which is said to be simple and effective. The machine consists of an outer cylinder from five to six feet in diameter and twenty-five feet long, inside of which is a steam cylinder about three feet in diameter and twenty feet long. The sugar is carried around in the outer cylinder by ledges on the inside of the cylinder, and is dropped in a continuous shower upon the outside of the steam cylinder, both cylinders being connected together and revolving at the same time; the sugar slides off the heating cylinder hot, and is thus dried. The machine stands inclined slightly, so that the sugar going in at one end is gradually worked forward to the other, where it falls into a revolving screen, which separates it into the various grades of coarse and fine sugar. The capacity of the machine exceeds thirty barrels per hour.

LAW'S SHUTTLE BINDER.

The invention we illustrate in the annexed engravings consists in an improved method of actuating the mechanism by which shuttle binders are operated.

Fig. 1 represents a portion of the lathe of a loom, showing part of one sword, one rod connecting the lathe with the crank, and the device attached. Fig. 2 is a detail sectional view of the same.



The shuttle boxes are situated at the ends of the lathe beam and the shuttle binding levers, A, are pivoted in the sides of the boxes in the ordinary way. The protecting rod is provided with arms for operating the levers, shown at B, as in other looms. For producing the proper motion in this rod, the inventor provides the following simple and ingenious arrangement:

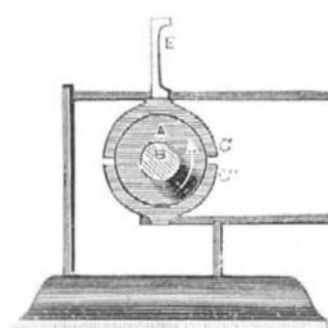
The arm, C, is attached in the manner shown in Fig. 2 to one of the rods which connect with the cranks; in a hole made through the opposite sword is placed the pusher, D, and to the protecting rod is affixed the arm, E. A spiral spring is connected at one end with E, and the other end is carried by the socket of the pusher, D, as delineated in Fig. 2. The device is brought into action by the downward movement of the crank, which takes place at the same time that the shuttle is driven into one of the boxes. This downward movement forces the arm, C, against the pusher, D, which presses outward, with a yielding pressure, the arm, E; the effect of which is to force the upper arms of the rod, B, against the binding levers, A, and thereby retain the shuttle in whichever of the boxes it may happen to be in, until the crank rises enough to carry the arm, C, away from the pusher. As soon as this occurs, the device ceases to operate, and the rod is turned by a spring (which may be seen in Fig. 2) so as to throw the arms, B, away from the levers, A, and release the shuttle just in time for it to be thrown.

The inventor claims that with this binder the shuttle is prevented flying out of, or turning in, the box and the cops do not break on the shuttle spindle. It renders needless the usual springs on the binding levers, and effects saving in power and supplies, while its own first cost is a mere trifle.

Patented through the Scientific American Patent Agency, June 11, 1872, by Mr. Henry H. Law, of Gloucester, Camden Co., N. J of whom further information may be obtained.

Apparatus for Testing Lubricators.

A is a friction drum or pulley of cast iron, about 3 inches diameter, keyed on a shaft B. C and C' are two clips or saddles of brass, each extending nearly half round the circumference of the drum, and pressed to it with a constant pressure by means of the two weighted levers, D D'. E is a thermometer fixed on the top saddle or clip C, and serves to indicate the heat caused by the friction of the drum revolving between the two saddles, C C'. The method of using is as follows: The shaft, B, and pulley, A, are made to revolve at a speed of 1,800 or 2,000 revolutions per minute, the number of revolutions being shown by a counting machine indicating up to one million, but which is not shown on the sketch to avoid complication. It will be evident that this velocity, continued several minutes, will generate considerable heat, and that this heat is raised by a less number of revolutions when a bad oil is used than when an oil of superior lubricating power is used. For instance, if it requires 50 revolutions to raise 1 degree of heat in one oil, and 100 revolutions



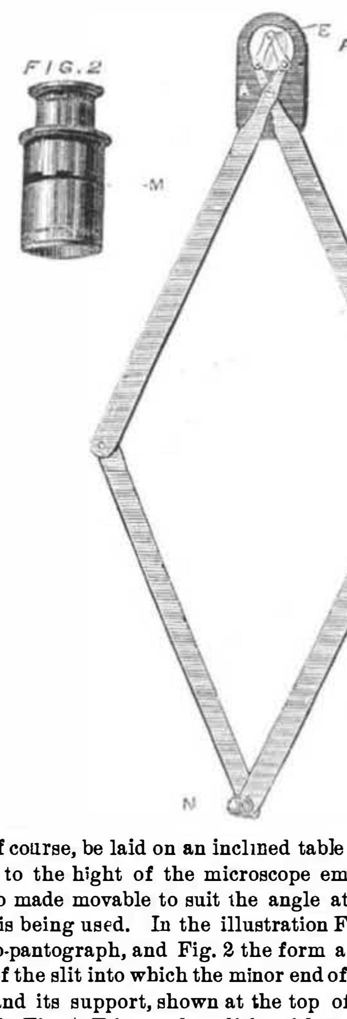
in another, it is evident that the quality of the first will only be half as good as the second. Before starting the machine, the temperature at which the thermometer stands is noted; this, of course, will be the temperature of the room or workshop. A portion of the oil or grease to be tested is poured or smeared on the friction pulley, and the saddles, with their weighted levers, allowed to press on the drum. The machine is then started and allowed to run till the thermometer indicates a temperature of 200° Fah. When it is stopped, and the number of revolutions it has made is taken from the "counter," then the number of revolutions, divided by the number of degrees of heat that the thermometer has been raised, will show its lubricating power. After the first trial, the machine is allowed to rest twenty four hours, and then it is started again without adding any more oil, and without breaking the contact of the saddles with the drum. The number of revolutions of the drum is again taken, and divided by the number of degrees of heat raised in this second trial; and if the result is not more than from 10 to 20 per cent less than the first trial, the oil may be considered good. In very bad oils, the saddles are found to be so fast glued to the drum that the machine cannot be started a second time, and in some cases it requires considerable force to break the contact or adhesion between the drum and the brass saddles.

This apparatus is the design of Jno. Bailey & Co., of England, and is said to operate extremely well.

AT the recent exhibition of the Royal Agricultural Society, England, some of the portable farm steam engines were fitted with the electrical indicator which shows upon a dial the temperature of the water contained in the boiler.

Copying from the Microscope.

One of the latest inventions for rendering the copying of an object as seen in the microscope both accurate and easy was recently described, by Mr. Isaac Roberts, F. G. S., to the Royal Microscopical Society, and an illustration was published in their *Journal*. The instrument consists essentially of two parallelograms, having their major and minor sides and angles respectively proportioned in all positions in which the instrument can be placed. The major and minor sides rotate freely about the common center or fulcrum, which is fixed to the eyepiece of the microscope in the focus of the eye-lens. A pencil is attached to the major end joint of the instrument, and a small glass disk, ruled with a micrometer-lined cross, is attached to the minor, or eyepiece, end joint, in the position where pointers are placed. To see both cross and object at the same time, similar focussing is necessary to that which is employed to see an object and a pointer. When drawing, the hand merely moves a pencil over the paper, and at the same time and by the same action guides the micrometer cross lines over the field where the object appears in the microscope. The drawing paper



should, of course, be laid on an inclined table capable of adjustment to the hight of the microscope employed, the top being also made movable to suit the angle at which the micro cope is being used. In the illustration Fig. 1 represents the micro-pantograph, and Fig. 2 the form and approximate position of the slit into which the minor end of the micropantograph and its support, shown at the top of Fig. 1, are inserted. In Fig. 1, E is a glass disk with micrometer cross lines ruled upon it. It is cemented over a small hole drilled through the center of the rivet forming the joint of the minor extremity. A is a center, or fulcrum, around which the parts of the instrument freely move. N is a holder for a drawing pencil, placed over a hole drilled through the rivet forming the joint of the major end of the instrument. In Fig. 2, M s a slit for the insertion of the minor end of the micropantogra h, with its support shown behind E A in Fig 1. The instrument being firmly fixed in position in the eyepiece to draw any object, it is only necessary to place the eyepiece in the microscope, adjust the drawing table to the hight and inclination of the plane of the pantograph, and with the right hand forefinger and thumb guide the pencil with slight pressure over the paper, at the same time looking through the eyepiece at the object and guiding the center of the micrometer cross lines over the respective parts of it; an accurate drawing of the object will thus be traced upon the paper. For those, however, who may desire to make for themselves, it is only necessary to say that the the length of the minor sides of the parallelogram within the eyepiece is ½ inch; of the major sides 5¾ inches, the instrument when extended to the full length measuring 12½ inches

Fool's Gold and How we may Know It.

The following story is going the rounds of the papers, and would be decidedly rich if it were only true:

A verdant looking Vermonter appeared at the office of a chemist with a large bundle in a yellow bandanna, and opening it exclaimed: "There, doctor, look at that." "Well," said the doctor, "I see it." "What do you call that, doctor?" "I call it iron pyrites." "What, isn't that gold?" "No," said the doctor, and putting some over the fire, it evaporated up the chimney. "Well," said the poor fellow with a woebegone look, "there's a widder woman up in our town has a whole hill of that, and I've been and married her!"

That the poor fellow had married the widow for the sake of the hill of pyrites is very probably true, but that the pyrites evaporated up the chimney is simply impossible, and such a statement is to be regretted because the inexperienced may be led to believe that, if a bright, yellow metallic looking mineral does not evaporate when strongly heated, it must be gold. There are several minerals which are sometimes mistaken for gold, but the two which are most apt to give rise to deception in this matter are pyrites and mica, and hence they are sometimes called fool's gold. The method of distinguishing between them and gold is very simple, and requires no complicated apparatus. Gold is malleable, that is, it can be beaten out into thin leaves under the hammer, while the others crumble to powder. Moreover, gold is easily cut with a knife, while if we attempt to cut pyrites it breaks up, and mica separates into thin flakes. It is when mica is in fine powder, however, that it most resembles gold, and in such cases, its weight betrays its character. Gold is nearly twice as heavy as lead, and, even by poising it in the hand, we can tell that lead is much heavier than mica.

Estimation of Sulphur in Organic Compounds.

Chemists have always experienced more or less difficulty in ascertaining, with exactitude, the amount of sulphur contained in organic compounds, the usual methods and agents employed for that purpose being slow and uncertain in results. W. S. Mixter, of the Yale Scientific School, has devised an effective apparatus by which he burns the sulphurous substances in oxygen and condenses the sulphur in the form of sulphuric acid. This method presents an easy method of effecting the separation and permits the estimation of the sulphur with much exactness.

The following results, obtained by the author, in the order they are given, shows the applicability of the method, while some of the details mentioned may help to explain the use of the apparatus.

	Weight taken.	Per cent found.
1. Iron pyrites (mixed with carbon).	0·0658	51·20
2. " "	0·0597	51·26
3. Sulphur	0·2070	99·76
4. "	0·2807	99 92
5. "	0 4951	99·93
6. "	0·5882	100 02
7. Carbon disulphide	0·7725	84·12
8. " "	0 4598	84 16
9. Bituminous coal	0 6640	2·97
10. " "	0·7860	2 99
11. Wool	0·4640	3 44
12. "	0·4675	3·46
13. Tobacco	2 0720	0·37
14. "	2 1370	0·36

Manufacture of Envelopes.

One of the most interesting mechanical novelties to be seen at the International Exhibition in London, is the envelope machine of Fenner and Co. of that city. All the manual labor, that is required in attending to the machine, is limited to the supply from time to time of a pile of envelope blanks, and the occasional removal and banding of the finished envelopes. Thus the entire and various processes, of feeding, gumming, stamping, folding, delivery, and collection, are performed automatically by a series of mechanical operations devised with the utmost ingenuity and carried out in perfection; the machine withal being excessively compact and well arranged.

The pile of envelope blanks being placed in position on a plate at one end of the machine, which may be done either at rest or in motion, the feeding process is effected by the simple aid of intermittent suction. An elastic tube has a trumpet-shaped brass mouthpiece which descends on the uppermost blank, and at the moment of contact the air is exhausted by a stroke of the air pump, when the mouthpiece rises with the blank attached, the suction being maintained just sufficiently long to enable the arm and grippers, rapidly projected from the other side of the machine, to seize the blank, when the attachment to the mouthpiece ceases and the arm shoots back, drawing the blank into position over the folding box and there rapidly releasing it. At this moment, the stamping is effected by the action of a hammer and die, and the gum is applied in due place on the edges of the side flaps, whereupon a plunger head, of the rectangular form and size of the envelope, descends, carrying the blank down into the folding box; the flaps, thus raised into a vertical position, are then enclosed and folded down in proper sequence by slides working in the thickness of the folding box; and finally the bottom of the box rises and completes the operation by pressing the whole against the slides, so that the edges are made sharp and the adhesion is effected and secured. The slides are then withdrawn, and the bottom of the folding box drops, allowing the envelope to drop in a vertical position into the delivery trough underneath, running across the machine, wherein, by a simple contrivance and combination of guides, holders, and pressers, the envelopes as they drop from the folding box are successively, uniformly, and regularly arranged, and worked along the trough ready for removal and banding by the attendant.

These manifold operations are successively and successfully wrought with such speed, and almost simultaneity, that the finished envelopes are turned out complete at the rate of 50 per minute or 3,000 per hour.

A New Quicksilver Ore.

Professor J. D. Whitney has discovered a new ore of mercury in California, which, according to an analysis made by G E Moore, consists of sulphide of mercury 98 92 per cent, sulphide of iron 0·83 and quartz 0·25; its color is black, streak black, specific gravity 7·70, and no trace of crystallization. It appears to be identical with the amorphous modifications of sulphide of mercury. It is proposed to call it *meta-cinnabar*. The associated minerals are usually copper and iron pyrites, and a few crystals of cinnabar. The occurrence of the cinnabar has hitherto escaped notice, as it has been mistaken for black cinnabar, from which it differs, however, in the absence of crystalline form, in its black streak and lighter specific gravity. It promises to become an important ore in the quicksilver mines of California and some of the other Western States.

Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

Force of Falling Bodies.

To the Editor of the Scientific American:

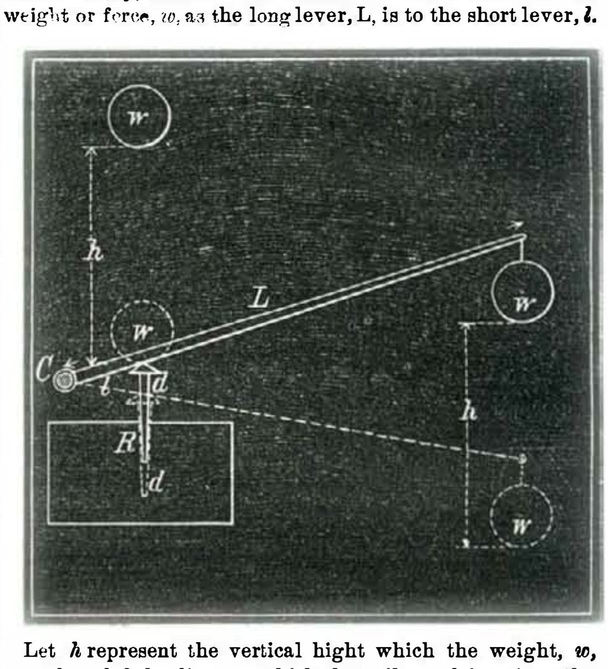
The question "With what force does a falling body strike?" has been frequently repeated in the SCIENTIFIC AMERICAN for the last 25 years, and has generally been answered by the batch of dynamical terms used in colleges and styled "scientific." The answers have invariably made the problem more obscure. Each one generally says that "the problem is very simple," and he pretends to understand the subject perfectly. I am one of those pretenders, and propose to answer the question in my own way, reference being made to the accompanying figure.

Let us assume the case of driving a nail into a piece of wood by the aid of a lever whose fulcrum is at *C*. The applied force is represented by the weight, *w*, acting on the lever, L. Let R denote the force of resistance in the wood, expressed by the same unit of weight as that of *w*, say pounds.

The weight, *w*, acts on the long lever, *L*, and the resistance, *R*, on the short lever, *l*. Then

$$R : w = L : l, \text{ and } R = \frac{wL}{l}.$$

That is to say, the force of resistance in the wood is to the weight or force, *w*, as the long lever, L, is to the short lever, *l*.



Let *h* represent the vertical hight which the weight, *w*, moved, and *d* the distance which the nail was driven into the wood. Then

$$R \cdot w = h : d, \text{ and } R = \frac{wh}{d}.$$

That is to say: the force of resistance in the wood is to the force or weight, *w*, as the hight, *h*, is to the distance *d*.

Now let the same weight, *w*, fall from an equal hight, *h*, directly upon the head of the nail, and the latter will be driven into the wood the same distance as by the aid of the lever. Therefore: the force with which the falling body acted upon the nail is to the weight of the falling body as the hight of fall is to the distance the nail is driven into the wood. The force of the falling body is equal to its weight multiplied by its hight of fall, and the product divided by the distance which the nail is driven into the wood.

JOHN W. NYSTROM.

Philadelphia, Pa.

Fast Small Side Wheel Steamers.

To the Editor of the Scientific American:

I have read J. A. G.'s communication entitled "Small Fast Steam Propellers Again," in your issue of August 10, 1872, with much interest, for the reason that J. A. G.'s first communication was shown to a gentleman of our city, who wished just such a boat to solicit his various customers living on the many navigable waters of the West. After giving the subject some attention, he arrived at the conclusion that a propeller would not answer his purpose, as he desired an extraordinarily fast and light steamer; hence he contracted with the well known hull builder, Mr. D. S. Barmore, of Jeffersonville, Ind., for a hull of the following dimensions: Length 70 feet, beam 15 feet, depth of hold, 3 feet; of an easy model, but with displacing lines very full just above light water line, so that, in going very fast, she would not bury.

This hull is propelled by two side wheels placed amidships, with outer ends of shaft inclined aft ten degrees on a parallel line with keel. The wheels are 12 feet in diameter and with 6 feet buckets, the bucket blades or paddles being corrugated, and a right angled face riveted on to make them have an additional hold on the water, as the angle plate will prevent a splash of water to the center of the wheel. Each wheel is driven by a separate engine, each 10 inches × 36 inches. Balanced oscillating slide valves are used. The boiler is my own patent, and as I have "boiler on the brain," I do not want a very large gratuitous advertisement, but would modestly say: It is a wrought iron sectional safety boiler, the firebox enclosed with tubes filled with water, the same as used on my portable and traction engines; in some respects, it resembles a Root boiler.