PRACTICAL MECHANISM.

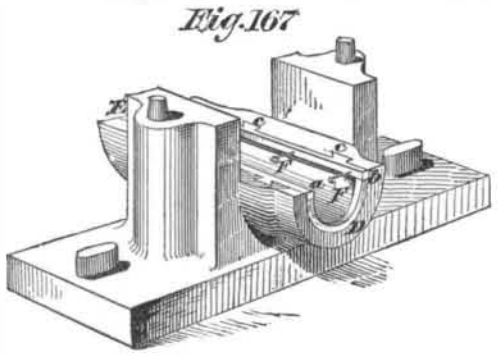
BY JOSHUA ROSE.

NEW SERIES—No. XXIII.

BENCH WORK.

The method to be pursued to make the pattern for the brass is as follows: Take a piece of wood of sufficient size to form the body of the brass, and make it of the necessary size and form, observing the directions above given as to the bevels; and make the flanges by turning the two halves in one, as explained in a previous example, omitting to turn out the inside, as this would effect no saving, and such boring would weaken the flange and render it liable to split in attaching it to the body of the pattern. To fasten the flanges, glue them on; and when dry, insert brads, setting the flanges by lines. Then pare out the flange even with the bore of the brass. In many cases brasses are dispensed with, and Babbitt metal is employed in their stead. The requisite form of casting for this purpose is shown in Fig. 167, the Babbitt metal be-

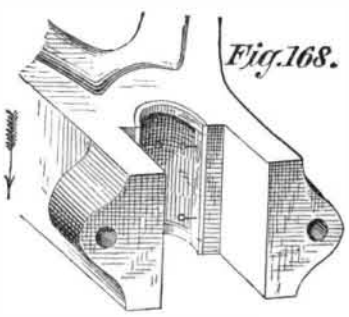
Fig. 167



ing contained within the thin ridges which extend all around the edges of the half circular bearing. In addition to this, however, the machinist sometimes drills small holes in the cavity for the Babbitt metal. The ridges are cast solid with the box, and the two at the end (D and E in Fig. 167) make no difference to the moulding, since they will leave the sand readily and easily. But the ridges or strips that extend lengthwise of the bearing must be made detachable from the pattern, the strips referred to being held in position by the dovetails shown at C. The recesses to receive the dovetails are first cut out, and the dovetails are made to a neat fit therein. Then we take the strips required to form the ridges; and having just spotted the faces of the dovetails with glue, while they are in their places we press the strips against them for a moment, and adjust the strip and leave it in position, for the glue to dry. By this means the dovetails are fastened to the strips exactly in the required position. When dry, the strip with the attached dovetails may be withdrawn from the pattern, and should then be more securely fastened together by the addition of screws or nails. In many cases wires are employed in place of the dovetails; they are being inserted as shown in Fig. 167, at F; and when they are used, it becomes a consideration whether the moulder can conveniently extract them. If he can, they are preferable to the dovetails, as these latter are sometimes apt to stick.

Bearings of this class (Babbitt metal) are often formed in the framework of a machine, or in other patterns that do not permit of being moulded in the direction suitable for the above example. Fig. 168 represents such an example, which

Fig. 168.



requires to be moulded in the direction denoted by the arrow. It will be advisable to core out the whole space for the cap and bearing, the core box in this case being fitted with the strips in a manner similar to that above described for the Babbitted pillow block. The pattern in this case is made as shown in Fig. 169, the space for the bearing being blocked up, and the block extending through, as shown at A, to form a core print. The core box shown beneath may be, in the smaller sizes, cut out of the solid wood, the part, B, being made thick because it includes the thickness of the ridge on that end, and also the depth of the print, as shown at A. The reason that the block or core print protrudes, at C, is that a ridge may be formed in the mould to steady the core while inserting it in the mould; and the depth of the core box, at E, must be made to suit it. It will be noted that the core prints, at F F, are carried to the top of the pattern; and it will be readily perceived that they must be so made in order that the pattern may lift from the sand. Then, after the mould is made, the core for the hole is first inserted, and then a small core is fitted into the recess in the mould, and thus is the top part of the recess (above the core print) stopped off. The circles marked on the faces of the prints, F, are to be painted on the pattern in black varnish, and their purpose is to denote that the core proper is round. If these black circles were not made, the pattern maker would require to make a similar circle and cross marks with chalk or pencil that the moulder may know how the core is to be left.

Fig. 169.

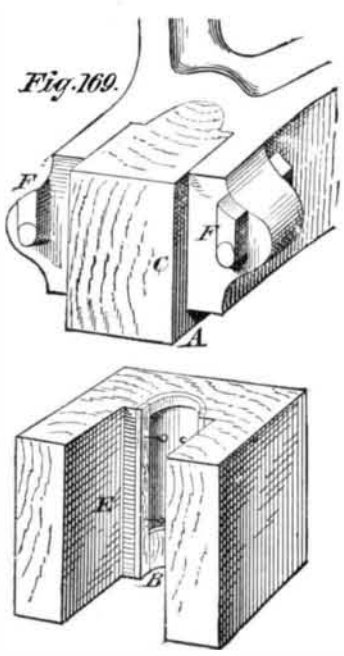
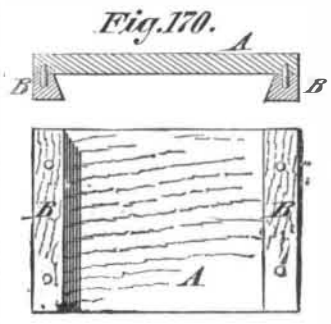


Fig. 170 is a representation of a pattern for a slide; it has the projections simply set on with pegs, to prevent the pattern being locked in the sand. In moulding this piece, a false core is laid between these projections. After the cope is lifted, the plate, A, may be taken out; and after removing the false core, the pieces, B B, can be withdrawn.

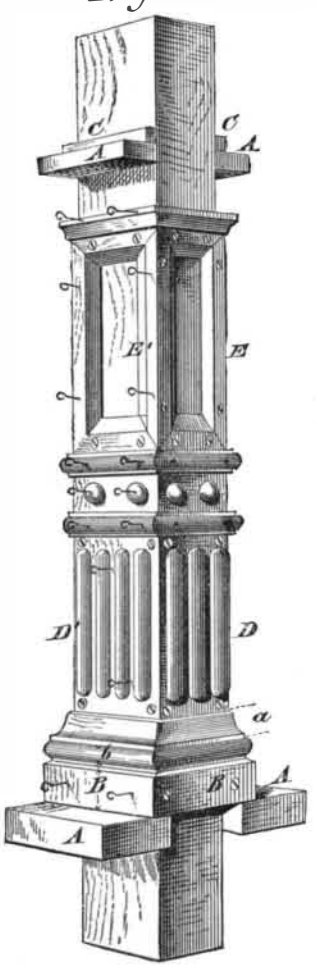
Fig. 170.



Our next example shall be for a square or rectangular column, which, though very simple in construction, yet necessitates a departure from the ordinary method pursued in pattern making, the object being to save the making of an entirely new pattern for every required column. In view of the thousands of columns of this kind that have been cast, it is not to be wondered at that measures have been taken to cheapen the cost of the pattern, and lessen the labor in preparing the mould; but it is to be remarked that no one has been able to invent a permanent mould for this class of work. In cast iron columns, the strict rules of architecture are not rigidly followed. The slight but graceful curve prescribed for every column and pilaster is frequently neglected, and various parts of the column are modified in their contour: to their detriment, as may be easily seen by comparing the details of a stone building with those of an iron one.

Square iron columns are usually made parallel throughout their lengths; while, on the end view, two of the sides incline towards one another on account of the draft or taper given to the pattern. Round column patterns are not made parallel, but are smaller at the cap than at the base. The curve above mentioned is given to the shaft; but as the pattern is made to serve for all lengths of columns of that diameter, the curve can only, in most cases, be an approximation. In foundries that make a specialty of this class of work, numbers of blocks of various sizes and lengths are kept, and they simply require the addition of such ornaments as the design comprises, which ornaments, such as mouldings, flutings, and the like, are often ready to hand to complete the column pattern. These blocks are, for small columns, made solid; but for large columns they are constructed like boxes or troughs, with pieces filled in at short distances to give strength. (See Fig. 172). Fig. 171 is a perspective view of a block, mounted with mouldings and other ornamentation so as to form a column pattern ready to go into the sand. The base, B, and its mouldings, *a* and *b*, are to be cast solid with the shaft of the column: this, however, as may be inferred from what has been said, is not compulsory. It will be seen that the base forms a guide for the stopping-off blocks, A A, at that end; at the other end of the column the guides, C C, are attached. The distance between the stopping-off blocks, A A, is of course the length of the column, *plus* shrinkage and *plus* the amount left for cutting off to square up the ends of the cast column. The wires shown are for the purpose of holding the ornaments in position upon the block. The ornaments on the face are held by loose pegs, except the cabling, D, and the paneling, E, which are made fast on the face by nails or screws.

Fig. 171.



Let it be required to prepare a pattern for a column 12 feet long, of 12 inches face, and 14 inches deep, to be of the style shown in Fig. 171. Select a block similar to that shown in Fig. 172, in which the top piece is shown removed so that the distance pieces may be seen. We will suppose our column to require mounting on the face and one side; then ½ inch or ⅝ inch will be taken up on the face and side by the margins, E, which form, with their mouldings, the paneling: therefore, if ½ inch margins are used, the block

Fig. 172.

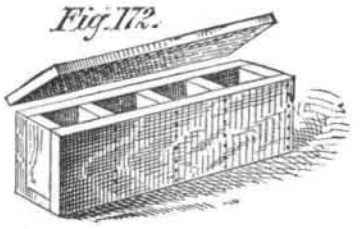
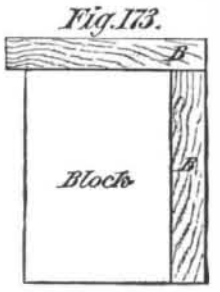


Fig. 173.



should measure 11½ by 13½ inches, and ⅛ less if ⅝ margins are employed. The length of the block is immaterial, so that it be not less than 20 inches longer than the column: this excess is for core prints at the ends of the pattern. Lay off upon the block the length of the column pattern; this will be 12 feet + 1⅛ inch for shrinkage + ⅛ or 3/16 inch at each end for squaring up. Space off upon the block the position of the various members and apply them as directed. It must be noted that the mouldings and base pieces on the face overrun those upon the side, and also extend according to their contour over the side that is not mounted (see Figs. 171 and 173). The reason of this is that by removing these face mouldings and base pieces, except the cabling and paneling (which are fast), the moulder can make a bevel parting. When the parting is made, the pieces are then replaced and will be taken up again by the cope. A rectangular column is invariably moulded with the face up, because of the facility such a position gives for supporting the main core by means of the cores which make the openings always formed at the back of these columns.

For stopping-off the column to the right length, we simply prepare four pieces, as shown at A, Fig. 171, of a length equal to the depth of the column at the ends, not including the base piece, as that will be stopped-off in the cope. In ramming up the column, when in the sand, these pieces are bedded in, in the position shown. Some provision is necessary to prevent them from being rammed out of the perpendicular; this is provided in this case by the base pieces, B; but at the other end of the column temporary strips are braded to the block, as shown at C. To find the place for these guiding strips, add to the length of the column pattern the thickness of the stopping-off piece, square a line at this point down each side of the block, and nail on the guides outside this line but with one edge touching it. Columns are often cast without bases or caps, these latter being cast thin and attached by screws after the columns are set up.

The ornamentation of columns is varied constantly, depending upon the taste of individuals; therefore it is impossible to lay down precise directions in this matter. It is thought, however, that the above remarks will be of service, and I may add that, in place of cabling, fluting is often employed. This is never to be cut out of the block, but formed in extra pieces. The cabling on the side is made by fastening the strips to a piece of board, and this is attached to the block by wires. Fig. 174 shows this arrangement. Baked or dry sand is not used for the main core of square columns, and we proceed to describe the method of making the greensand core now invariably adopted. Fig. 175 shows a sort of universal core bore, employed for making these cores. A is a cast iron plate, laid upon the floor of the foundry, generally in close proximity to the mould; upon this are set up two stout boards, B, about two

Fig. 174.

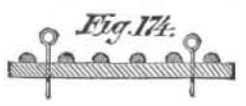
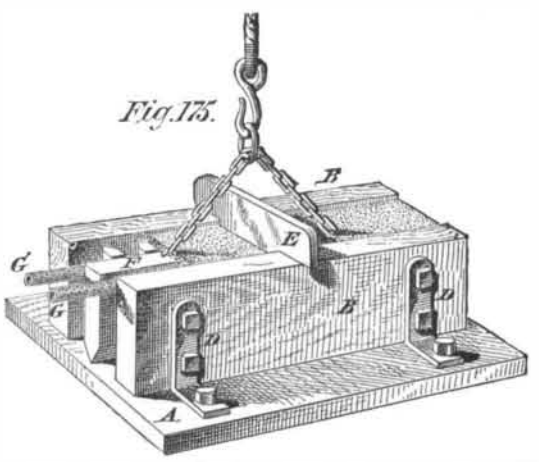


Fig. 175.



inches thick. These boards are adjustable, so as to take in any breadth of face, by the brackets, D, moving along slots in the plate. Nipping screws in the brackets admit of the boards being pressed together on the end pieces, which must be changed for every width of column; the height of the core is regulated by means of the strike, E. On account of the exceedingly fragile nature of a greensand core, it is necessary to imbed within it a strong bar of cast iron, called a core bar, such as is represented at F, Fig. 175. It consists of a strong center bar with pieces cast solid with it, ranged on each side, called wings; the bar itself is made to taper off to a narrow ridge towards the under part, as also are the wings, which taper at the edges. The sand, being rammed between these wings, is able not only to sustain itself, but

also a small portion extending beyond them, namely, to the correct outline of the core. The bar is generally from half an inch to one inch smaller than the core, as will be seen in the sectional end view, Fig. 177. A notch is cut out of

Fig. 176.

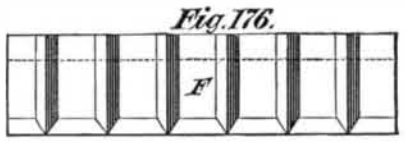
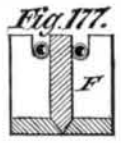
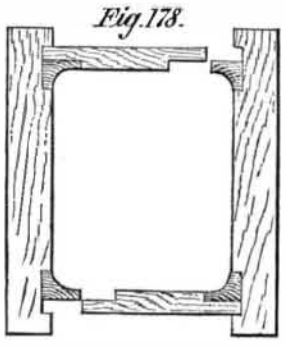


Fig. 177.



each wing to admit of the insertion of a perforated tube on each side for ventilation. The core bar, F, and the perforated tubes, G G, are shown in Fig. 175, imbedded in the core.

Fig. 178.



As there are not any core prints required to form the openings at the back of the column, the cores for these openings are made in a box not thicker than the intended thickness of metal in the column. Such a box is shown in Fig. 178, though, for the sake of cheapness, when the columns are not more than half an inch thick, the core box is sawn out of one piece.

Fig. 179.

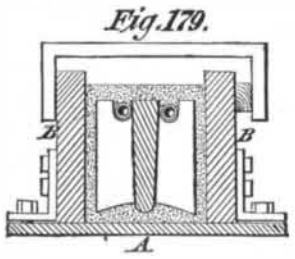


Fig. 179 is an end view of the core box, with core, shown in Fig. 175, but with the addition of the wooden binder, which serves to assist the brackets in holding the sides. B, of the core box together, which is necessary when the core box is very deep.

Communications.

Our Washington Correspondence.

To the Editor of the Scientific American:

The House bill relating to infringements, referred to in a previous letter, have been postponed to next December; in consequence of so much opposition being made to it, the Committee on Patents have been authorized to sit during the recess to revise and amend the patent laws. This bill will probably receive further consideration, when it is to be hoped that the obnoxious features will be eliminated or the bill dropped altogether. I understand that, among other amendments, the committee will be requested to consider the following: Separation of the Patent Office from the control of the Interior Department. The Commissioner and other officials, down to and including the examining corps, to hold their positions for life, or during good behavior. All the receipts of the office, under proper safeguards, to be used for facilitating its business. All agents, before being admitted to practice in the Office, to pass an examination as to competency. Everything relating to transfers of patents, including licences, to be recorded within sixty days. That owners of reissued patents shall be able to sue for infringements that occurred before the reissues were granted for such points as were covered by the original patents; and that applications and oaths for reissue applications may be made by the assignees of entire interests. These amendments to the present law I believe on the whole to be good sound doctrine, and such as will commend themselves to the majority of the people, whether inventors or not.

There is another point that should be considered, and that is the question: What to do with the models, where to put the vast accumulation (some twenty thousand per year), that are constantly arriving and have to be disposed of some how? There is yet room for a gallery on one side of the south hall, if Congress would but allow the Patent Office to use some of its own funds to build it; but, even if built, there would not be more than sufficient room to properly dispose of the models now lying around loose on the floors, stacked on the tops of the cases, and piled up one upon another on the shelves of the model cabinets until the under ones become broken from the superincumbent weight, and from the handling they receive in taking them in and out of the cases to make examinations. So many models have been destroyed by this method of storing in times past that there are cartloads of broken pieces stowed away in out-of-the-way corners.

If a little "more light" could be let in through the ceilings of the north and west halls, there is room for an additional gallery in each of them; but even these, if built, would soon be filled at the present rate of increase. In view of this, why not in future dispense with the models in such cases as do not actually require one to illustrate the invention? As the law now stands, the Commissioner can dispense with the model if he chooses, and for a year or so there were many patents issued without models being required; but for four or five years past, models have been required in all cases in which a model could be used. In the majority of applications models are not necessary to show the invention, and the only use for them in such cases is that they may be placed in the model room in order that inventors and others may see them when making preliminary examinations. As a printed copy of the drawing, suitably mounted on stiff cardboard and placed in the model cases or in adjacent portfolios, would answer quite as well, and not take up one hundredth part of the room, the model in nine cases out of ten might as well be dispensed with as not, and the inventor saved the expense of furnishing and the Office the expense of finding room and taking care of it.

Another point that should be considered by the Patent Commissioner is the necessity of having a complete system of digests published, after the style of the English abridgements. Some of the examiners have prepared partial digests of various subdivisions of their classes for their own use, but these are not accessible to most people; and some three or four such digests have been published, but at such high prices that the majority of inventors cannot purchase them, and they are therefore comparatively useless as compared with the great good that such publication would do if they could be issued at about the cost of printing, to say nothing of the advantage such digests would be to the examiners themselves in making their researches.

In my last, I stated that a bill had been passed appropriating money to build a national museum. I have since found, however, that my information was incorrect, and that it had only passed one House. It therefore failed to become a law, and the immense collection of Centennial exhibits will have to be stored for a year or so longer, and many of the articles be irretrievably ruined, and some of them may be withdrawn altogether. The collection is a very large one, and should be properly displayed and taken care of. The following is a list of the more important donations:

Argentine Republic: Almost the whole of the exhibit in Agricultural Hall, and the most of that in the Main Building, comprising ores, metals, pottery, tiles, stuffed animals, woods, fibers, leather, agriculturaland fishery products.

Brazil Specimens of iron, coal, hides, leather, tiles, pottery, woods, vegetable fibers, food substances, gums, resins, etc.

Chili: A collection of minerals, artificial stones, tiles, terra cotta, and an extensive variety of grains, seeds, and other vegetable products.

China: The entire collection made by the Commissioner of Customs, including a complete representation of the manners and customs of the Chinese, having numerous full-sized figures beautifully executed and suitably dressed. Many hundreds of clay figures about one foot high representing the different classes and races of the empire, with specimens of their food, medicines, domestic utensils, musical instruments, samples of their manufactures, buildings, etc.

Egypt: Collection of minerals, tiles, pottery, garden products, woods, and a large collection of objects illustrating the manners and customs of the natives of Soudan, Nubia, and Abyssinia.

France: Messrs. Havilland, of Limoges, presented a pair of Centennial memorial vases valued at $17,000.

Germany: Tiles, cements, asphalt work, and manufactures in metals. Krupp, the great iron manufacturer, presented an extensive display, illustrating the mineralogy and metallurgy of Germany, with samples of his different manufactures.

Japan: Pottery and tiles, and a large exhibit of fishery products and apparatus, skins and hides of animals, food preparations, and a series illustrating the manufacture of tea, silk, and bamboo articles.

Mexico: Minerals, ores of gold and silver, obsidian, woods, fibers, pottery, and terra cotta, an iron meteorite weighing 4,000 lbs., etc.

Norway: A large collection of ores and other specimens exhibiting the metallurgy of iron, copper, nickel, etc., and a collection of the eatable fishes of Northern Europe, food preparations, etc.

Portugal: A very extensive exhibit of ores, minerals, etc., samples of industrial and vegetable products.

Russia: An enormous collection exhibiting the metallurgy of copper and iron, a very valuable collection of the minerals of Siberia, samples pottery, tiles, cements, etc.

Spain: A large collection illustrating the mines and mining of the kingdom, also its manufacturing and agricultural products.

Sweden: The entire exhibit of this country in the Agricultural Hall and photographs of arctic scenery.

Turkey: Illustrations of its metal work, mines, minerals, tiles, pottery, domestic and household utensils, etc.

Great Britain: A very large collection of the private exhibits of tiles, terra cotta, pottery, mosaic work, from Minton & Hollins, Doulton, and others. Among these are some very large vases, a terra cotta pulpit, and a group showing an allegorical representation of America, embracing several colossal figures, valued at $15,000. A complete collection, embracing over 300 varieties of wool from all parts of the world.

In addition to these, smaller collections from nearly all the other countries in the world that had exhibits in the Centennial have been received, making a most complete series of illustrations by which the manners, customs, manufactures, minerals, etc., of the different peoples of the world can be studied, the whole of which it is estimated to be worth over a million of dollars, and comprising a considerable section of the Centennial Exposition which may be examined by ourselves, our children, or children's children at leisure and without cost.

Congress, before adjourning, passed several acts authorizing the extensions of patents, but I have been unable to get a list of them yet, although I have made many attempts to obtain them. There is no accessible list of the bills that are passed, and no way of finding out until all the bills are printed.

The new Secretary of the Interior is fairly—or unfairly—besieged by applicants for office, but, as far as I can find out, with very poor success, and it is believed that very few changes will be made in the Patent Office. The present Commissioner, it is generally considered, is "the right man in the right place," and is likely to stay unless the President ignores the civil service reform altogether in his case.

The patent attorneys of this city have organized an association under the general incorporation act, known as the "Patent Office Bar Association of the District of Columbia." The objects of the association, as set forth in its constitution, are "to maintain the honor and dignity of our profession and increase its usefulness, promote the proper administration of the patent laws, and the protection of the rights and interests of inventors and patentees, and to secure a proper standard of character and qualification, and a prompt responsibility to public judgment among the practitioners before the Patent Office." Qualification for membership consists in being of lawful age and good moral character, and qualified by education, training, and experience to pursue properly the business of patent solicitors or attorneys. One of the objects of this association is believed to be the preventing from practising of the large number of irresponsible shysters who abound in Washington, who know nothing of patent law or practice, but who have the effrontery to advertise themselves as patent attorneys, and by offering to "put cases through" for very low fees, or on the "no patent, no pay" system, defraud their trusting clients and bring disgrace on a respectable body of gentlemen who have to suffer the obloquy of the wrong-doings of these miscreants. Several of these fellows have been debarred from practising for defrauding their clients, and it is probable the others will be shortly.

Washington, D. C. OCCASIONAL.

Lightning Rods—How the Centennial Buildings were Protected.

To the Editor of the Scientific American:

Your recent articles upon lightning rods supply much-needed information relative to the most important requisites for protection. The following system, as applied to the Centennial Machinery Hall, combines great economy with the most perfect protection and security, and may frequently be adopted with advantage for large buildings.

The tin roof of Machinery Hall has an area of 14½ acres, and this is utilized as a lightning conductor in this manner: Rising above the roof are 100 wood terminals (used as flag poles), to each of which is attached a copper wire rope ⅜ inch in diameter, its upper end rising a few inches above the top of the pole; at its lower end the wires are spread out, and 3 inches of its length is firmly soldered to the tin roof. Earth connections from this massive roof conductor are made at ten different places by soldering one end of copper ropes to the tin roof, the other end being firmly attached to 8 inch city water pipes in the ground. Thus it will be seen that every square foot of this huge building is covered and thoroughly protected by an ample conductor; and it is believed there is no building in this country so perfectly protected as this. The total cost was only one tenth the amount requisite to protect it in the usual way with rods, or less than $50 per acre.

Earth connections being all-important in all cases, I would recommend the following for country buildings: Extend the lightning rod underground, say 20 or more feet from the building; fasten and solder to its end a sheet of copper 2 by 4 feet; dig a pit 3 by 6 feet, and 4 to 6 feet deep; put 2 inches in depth of finely broken charcoal over the bottom, then put in the plate and rod, with another layer of charcoal and a few inches of earth; then fill up to surface with loose cobble stones, leaving it so that the rainfall can freely find its way down to the copper plate; water from the roof may be led into the pit. One such earth termination is of more value than half a dozen of the usual kind.

Philadelphia, Pa. J. D. RICE.

Heating with Natural Gas.

To the Editor of the Scientific American:

In your recent article on wholesale heating, you ask why some town does not immortalize itself by using natural gas as fuel. It is used extensively throughout the Pennsylvania oil regions; and this town is supplied by a well three miles distant, through a three inch pipe, which is being replaced by a five inch one, to be continued to adjacent towns. The gas is used direct from the well without a gasometer; and owing to the variation of pressure, it is somewhat dangerous in careless hands. For lighting it is but little inferior to coal gas. With a good fishtail burner, it burns without smoke, and with almost as brilliant a flame as the best artificial gas. The present pressure at the well is about 65 lbs. per square inch; and with a gasometer to equalize the pressure, it would be the best and safest fuel in use. M.

Millerstown, Pa.

An Electrical Balance.

At a recent meeting of the Institute of Mining Engineers, Dr. P. De P. Ricketts exhibited an electrical phenomenon with an analytical balance. By rubbing the glass case the balance was thrown out of adjustment, which could be restored by discharging the electricity of the glass. The possibility of errors in analysis resulting from this cause were apparent.