ary rule by the one process gives the correction for cushion and clearance. That the result as obtained by the rule was not expected to agree with that of actual measurement of the water passed through engine is evident from the following, which I copy from the circular in which it was printed: "It is not claimed that the theoretical rate of water consumption, as deduced from the diagrams, can ever be realized in practice. A certain amount will always be lost from condensation, leakage, and unevaporated spray in the steam, which no process of calculation makes allowance for." Your correspondent is in error in his calculation. The volume of steam at 16 lbs. pressure is 1515 according to Roper's "Handbook," and 1573 in the American *Engineering*, in lieu of 954. He has taken the terminal pressure about 2 lbs. too low, as I judge from appearances, not having means at hand to measure it.

Jackson, Mich. JESSE WARRINGTON.

Marbleized and Granite Ware.

To the Editor of the Scientific American:

My attention having been called to certain statements in the newspapers concerning poisonous enameled ware, known as "marbleized" and "granite" iron ware, I desire to state in your columns that, in order to arrive at the facts in the matter, I have made several analyses of these wares, obtained directly from the manufacturers and from dealers and agents in the city, with the following results:

Marbleized ware.—In No. 1 the enamel was found to be a silicate containing crude iron and a small quantity of lead. No. 2 was a similar vessel, obtained from another dealer; but it contained, besides the silicates mentioned in No. 1, a little arsenic (about 0·2 per cent). No. 3 contained considerable lead, but only a trace of arsenic. No. 4 was a small dipper or ladle, obtained directly from the manufacturers, contained neither arsenic, lead, or other objectionable ingredient. In five different analyses of the granite ware I found no trace of arsenic or other soluble metals. Some pieces of it, however, contain a little antimony, which, although generally considered an objectionable ingredient in such enamels, is not liable to produce any bad effect, under ordinary circumstances, in this instance. I have also made several analyses of white enameled ware; and in two cases out of three I have discovered traces of lead in them.

It has frequently been said that lead, in some form or other, is becoming an apparently essential ingredient in our daily nourishment. If we take lead in our drinking water, lead in our earthenware and crockery, lead in our tinned goods and solder, lead in our non-poisonous (?) enameled ware, lead in our paints and the wrappings of our cured meats, and if we are to place any confidence in the adaptation-to-circumstance theory, may we not expect to see, in the not far distant future, the average citizen take his food with an exquisite relish due to *sauce de plomb?* But at the present time many of us are not of the "fittest" in this respect, and we offer to our health officers a modest suggestion, that the plumbiferous and arsenical additions to our food be somewhat restricted.

It is, perhaps, in justice, due to the manufacturers of these marbleized and granite wares to say that the greater part of their goods—all, in fact, of the "granite" ware—now offered for sale in our markets are perfectly free from all deleterious substances, as is certified to by many of our best chemists—Professors Henry Morton, Drs. Wood, Hayes, Nichols, Silliman, Doremus, and others—and that the wares, as now manufactured, are as they should be.

New York city. W. H. FULLER.

PRACTICAL MECHANISM.

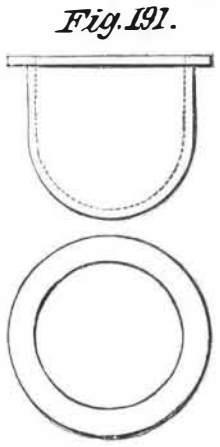
BY JOSHUA ROSE.

NEW SERIES—NO. XXVI.

PATTERN MAKING.—SWEEP WORK.

The above title applies to a class of work, generally of large size, in which boards or sweeps fixed to a revolving spindle serve instead of patterns to form the moulds. This arrangement of course will only produce circular moulds; patterns may, however, be used in conjunction with the sweeps, as we shall endeavor to illustrate further on. The spindle above named is a light vertical shaft revolving in a step below and a bearing overhead: when a part of a mould has been swept up, the spindle can be raised out of the step sufficiently to enable the work to be removed and preparations for the next piece substituted.

Fig. 191.



Let it be required to produce a casting such as is shown in Fig. 191, a sort of pan or boiler, often used. Fig. 194 is a sectional view of the mould complete; it is formed of two parts, the lower being called the "seat," and the upper the "cope." Figs. 192 and 193 illustrate the method of forming each of those parts. The material used by the founder is called loam, a clayey, plastic composition, very soft. After a certain quantity of this material has been piled up, the sweep is revolved: it shears down the high places and indicates the holes or hollows. Into the latter more material is placed, and the sweep is passed round again, and so on until the job is perfected. It will be noticed in Fig. 194 that the two parts of the mould are retained in their proper position by a projection on one fitting into a recess in the other; this is the seat proper and is indicated throughout by S S. The pattern maker's part is to form the sweeps, which he does in the following manner: On a piece of board of the proper thickness for a sweep, the size of which depends on the size of the work, he draws an outline of the job, interior and exterior, from the center outwards; and beyond this he lays off his seat, as shown at Fig. 193, the dotted lines representing the interior of the piece. He has then simply to cut away to the interior line, and also the step at S, and one board is finished, unless he knows the diameter of the spindle and the position of the holes in the carrying bracket attached thereto, in which case he is supposed to cut off, parallel with the center line, a portion equal to the radius of the spindle, as a recess for the hub of the bracket, B, and to bore the holes for the bolts. The board, Fig. 192, when reversed, should fit that in Fig. 193 at the lower part, and be of a shape to coincide with the dotted line. Its length must be enough to extend to the center, *minus* the radius of the spindle, as shown in Fig. 192.

Fig. 192.

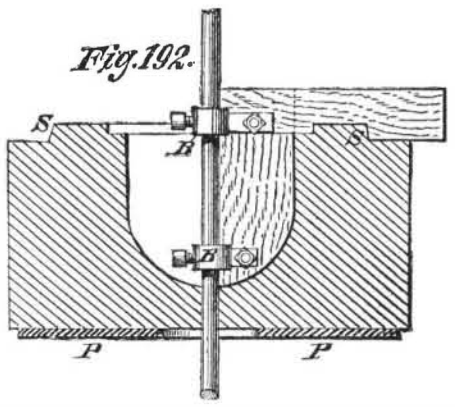
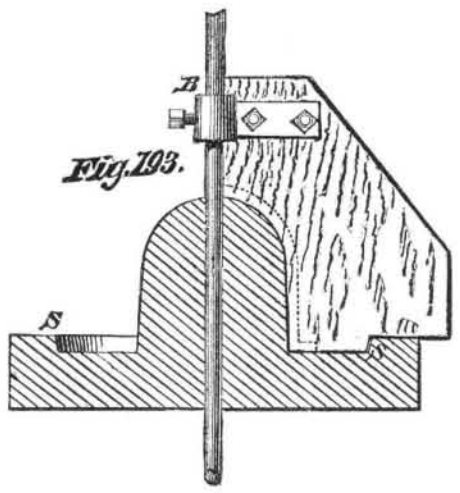
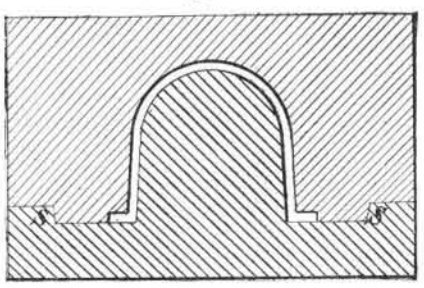


Fig. 193.



It will be seen by the lines showing the grain of the wood that the board in Fig. 192 is formed of two pieces, lapped at the corner to give strength: and to avoid too much cross grain, battens may be added when it is thought necessary. As I have already remarked, in striking up cores with a horizontal spindle the working edge of the board should be beveled; and it is hardly necessary to say that the same is applicable in this case. P P, Fig. 192, is a circular plate of cast iron, used to support the mould while soft; it is not shown in Fig. 193. By the same method, only varying the outline of the sweeps, a large class of circular work may be produced, including vases, speed cones, etc. Sometimes it is necessary to cast brackets, pipes, or other projections upon the main piece; to do this patterns must be made of those projections, and as many patterns as there are projections. The height at which it is required to bed in these brackets, etc., must be indicated to the moulder by a small V cut into the sweep; this will produce, as the sweep revolves, a line upon the mould. For the rest, unless simple directions can be given, the pattern maker usually visits the foundry, and assists in placing, or at least in verifying, the position of the pieces. When the mould is sufficiently hard, and before it is baked, these patterns are withdrawn.

Fig. 194.



A good illustration of the manner in which pattern work may be used in conjunction with sweeps is furnished in the ordinary engine cylinder. Fig. 195 is a sectional elevation of a complete mould; Fig. 196 is a horizontal section of the same, on the line A B, showing the outlet for the exhaust steam. This mould is composed of four parts that are swept or struck up, namely, S S the seat, A B the body, C C the cope, and M the main core. The latter may be struck upon a horizontal arbor or formed in a box. In addition to the parts above enumerated are the two steam port cores and the exhaust port core, all formed in core boxes. The procedure is as follows: With a board shown in Fig. 197, the seat, S S, is struck up: upon this when dried is placed a flange of wood. It is set centrally; the seat is also carefully beveled and set by the spindle. A pattern of the slide face, with the parts in which the steam and exhaust passages occur, is set in position on this flange; the top flange of wood is now added, and temporarily fixed to the slide face pattern, and shored up on the opposite side, so as to maintain it true and level. With the board, Fig. 198, is formed the body, A B; the shape of the exterior of the mould is not important; it is left rough, but some mark must be made so as to be able after removing it from the seat, to restore it to the position as before. When the body has dried sufficiently, the pattern flanges and slide face are withdrawn, the body being lifted from the seat for this purpose by means of bolts passing through it, and terminating in a cast annular plate at the bottom. The projecting flanges on the slide face are attached by wires or dovetails; otherwise the piece would be locked in the mould. The side print for the exhaust port is attached also by a loose wire. Fig. 199 is a board for sweeping up the cope, C C. The whole of these boards are represented as carried to the center of the spindle; allowance must therefore be made for the spindle and bracket. For very large cylinders, wood flanges are not used, the sweeps being made to a shape to perform the whole of the work.

Fig. 195.

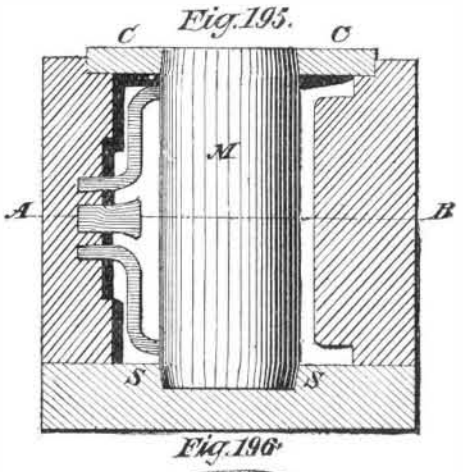


Fig. 196.

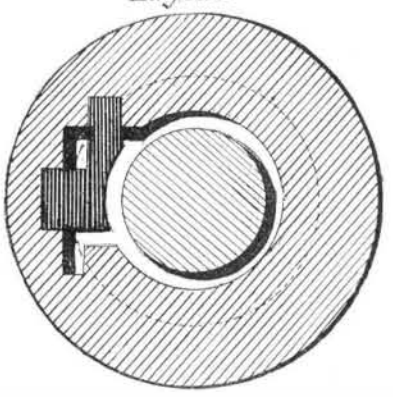


Fig. 198.

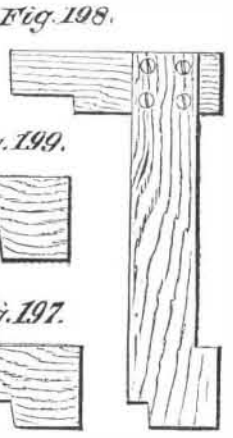


Fig. 199.

Fig. 197.

Rye for Pasture.

A correspondent of the Elmira (N. Y.) Farmers' Club writes as follows: "Farmers who are in want of first-class pasture at least expense, for this season, should prepare a lot for the purpose and sow the same to winter rye; and they will soon have a pasture for sheep, calves, poultry, in fact any kind of stock; and for young lambs it cannot be excelled. Heavy stock will trample it into the ground, to some extent, if put on early in the season, but later they can be kept on it at a profit. Winter rye sown in the spring will not head out till the second year, but will stool out so as to cover the ground, producing a luxuriant mass of feed that will pay every experimental trial. It can be cut for soiling purposes the second year for grown-up stock, or it can be raised for pasture, as stated before, or it can be allowed to attain its growth and mature a crop to harvest. It will also stand drouth very well, and enrich the land. From one and a half to two bushels per acre should be sown, according to the wealth of the land."

THE EDSON RECORDING GAUGE.—A fully illustrated description of this important invention was published in No. 70 of the SCIENTIFIC AMERICAN SUPPLEMENT.