PRACTICAL MECHANISM.

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NUMBER XXXVII.

LINING OUT WORK.

For measuring purposes, the usual inside and outside calipers are employed, in conjunction with a pair of compass calipers, namely, a tool composed of one inside caliper leg and one compass leg, the use of which is to find the true center of either inside or outside work.

For making parallel lines upon shafts or other round work, we have the angle piece, shown in Fig. 168. It is

Fig. 168.

apparent that, if it is placed (as shown) upon a piece of round work, in such position that the edges, A and B (C being the work), will contact with the work, those edges will stand true and parallel with the work, and may therefore be used as a guide whereby to draw the lines.

Our next requisites are termed centers or center pieces, their uses being to stand in holes or between jaws, and to receive center marks or lines. For use on small work, especially in holes that are rough, that is, those which have not yet been cut true, pieces of lead, such as are shown in Fig. 169, are the best, because they may be stretched larger or

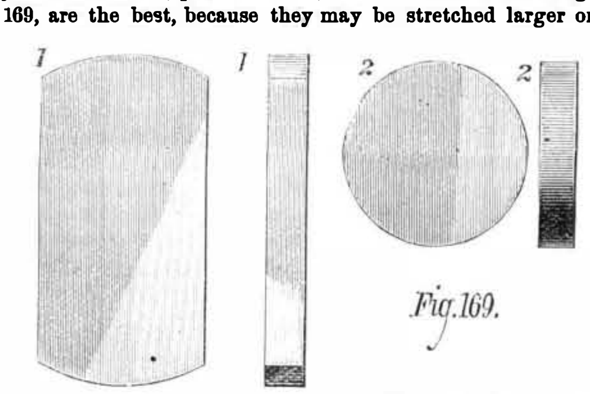


Fig. 169.

compressed smaller, to suit any required size of hole, by a few blows with the hammer, and because the lead will conform itself to the uneven shape of the hole, and will therefore hold fast and not be liable to move: and furthermore, because a few blows will deface any lines which may have been made upon the face of the lead in service upon a previous piece of work. Again, it may be necessary to first mark a center line, and subsequently other lines; and then drawing a wet finger across the old lines on the lead will dull them, while the newly made ones will be bright, and thus remain distinct. For holes that have been trued out, similarly shaped pieces of sheet brass may be used, the form shown in No. 1 being for the larger, and that shown in No. 2 for the smaller sized holes; these brass pieces may be filed up very true, and have a centerpunch mark in their exact center, thus obviating the necessity of finding the center at each time of using.

For use on holes of comparatively large dimensions, that is to say, above 4 inches in diameter, the center piece shown in Fig. 170 is very convenient. A represents a piece of wood, and B, a small piece of tin or sheet iron, having its corners bent up so that they may be driven into the wood and thus made fast in position to receive the center. Such a center is very easily and readily made, and may be used on rough or finished work If the surface of the work upon which either of these centers is used is flat, the ends of the centers must of course be also flat; and in the case of the last described, a piece of paper, leather, or other material may be inserted in one end to make up any small deficiency in the size. The center punch used for marking out should be as shown in Fig. 171, the object of making its diameter so small toward

Fig. 171.

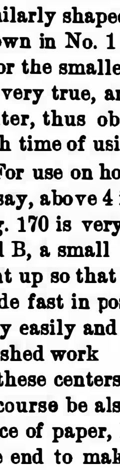
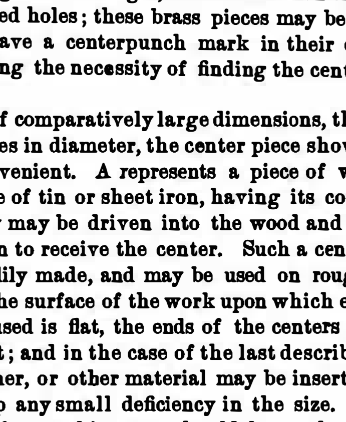


Fig. 170.

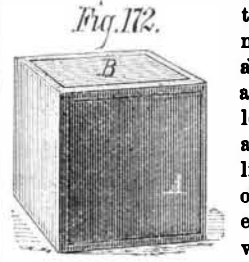


the point being that it shall not obstruct a clear view of the line. A heavier centerpunch may of course be employed to increase the size of the centerpunch marks when the same is necessary. The hammer should also be a small one, weighing about ¼ of a lb., and having a ball face to efface any centerpunch marks erroneously marked or to be dispensed with, an ordinary hammer being employed to perform any necessary operation other than the simple marking out.

Straight edges and a pair of parallel strips, or winding strips as they are sometimes called, together with a few parallel pieces, will complete the tools necessary for any ordinary marking out. A straight edge about an inch wide and a foot long, made out of saw blade, is an excellent tool, since it may, by a little pressure of the fingers, be bent hollow or round to conform to the surface of the work, as is sometimes highly advantageous. Parallel strips are pieces of metal of equal thickness, intended to lift a piece of work from the surface of the table, so that any projecting piece or part will clear and not tilt the work to one side. They need not be made square, but are preferable if the thickness one way is two thirds that of the other way, so that they may be turned on either side as the case may require. Pieces of old piston rings form very good parallel pieces, and are in many instances very easily obtained.

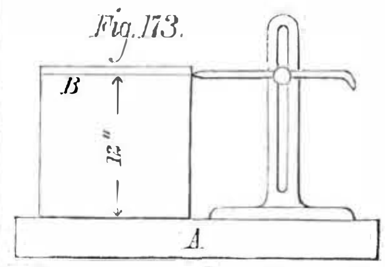
Before proceeding to mark out a piece of work, it should be roughly measured so as to ascertain, before having any work done to it, that it will clean up. The square should also be applied to see if it is out of square, and thus to find out if it is necessary to accommodate the marking out to any particular part that may be scant of material (or stock, as it is often termed). The surface of the work should also be examined; so that, if any part of it is defective, the marking off can be performed with a view to remedying the error, whether of excess or defect. Now let us mark off a block, say of 12 inches cube, and we shall find that we must not mark it out all over until one of the faces has been planed up. Suppose, for instance, we mark it out as shown in Fig. 172. The inside lines on faces A and B are the marking-off lines: if, then, we cut off the metal to the lines on A, we shall have removed the lines on B, and *vice versa*; and there is no manner or means of avoiding the difficulty, save as follows: We may mark off one face and let the block be cut down to the lines, before marking the other face; or we may have a surfacing cut taken off one face, and then perform the whole of the marking off at one operation. The latter plan is preferable, because it gives us one true face to work from in marking off, and obviates the necessity of having to prevent the rocking of the work upon the marking-off table, by the insertion of wedges, which is otherwise very commonly requisite. It is preferable, then, upon all work easily handled and chucked, and in which the lining off must be performed on more than one face, to surface one face before performing the marking out; and supposing our block to have one face so surfaced, we will proceed.

Fig. 172.



We first well chalk the surface of the work all round about where we expect the lines to come, which is done to make the lines show plainly; we then place the work upon the table with the surfaced face downward; and placing a rule alongside of it, we set the scriber so as to take off the necessary amount from the top, as shown in Fig. 173 (A being the plate), and mark the line, B, around all four faces of the work. We then turn the work on the plate so that the true face stands perpendicularly, setting it true by wedging it, so that, a square being placed with the back to the face of the table and the blade against the surfaced face of the work, the latter will stand true with the square blade, as shown in Fig. 174. A being the marking-off table, B the square, and C the surfaced face of the work. We then (with the scribing block) mark, across the surfaced face of the work, two lines, 12 inches apart and of equal distance from the top and bottom faces of the work, as shown in Fig. 175, at A and B. Our next operation is to mark off, on the surfaced face of the work, two more lines, standing at right angles to the lines, A and B, in the above figure; so that the surfaced face will have four lines upon it. These last two lines we mark without moving the work, by placing a square with its back resting upon the table, the square blade standing vertically and at the necessary distance from the edge of the block, as shown in Fig. 176, A and B being the lines drawn by the scribing block, and C C, the square in position to draw one of the necessary perpendicular lines, the other, shown at D, being supposed to have been marked from the square while it was turned around. Here, then, we have the lines for four of the faces, marked upon a face already surfaced to the size, thus disposing of five out of the six faces; and since the line for the sixth face stands diametrically opposite to the surfaced face, the latter has only to be kept down evenly upon the table of the planer to ensure the sixth face being cut true: after which, and when each of the remaining four sides is chucked to be operated on, we have a true face to place next to the angle plate, and a true one against which to apply the square to test if the work is held true. Thus we find that the surfaced face of the work, when used with the face of the marking-off table and the face of the planer table, becomes a gage by which (with the aid of the square) all the other faces may be marked and cut true.

Fig. 173.



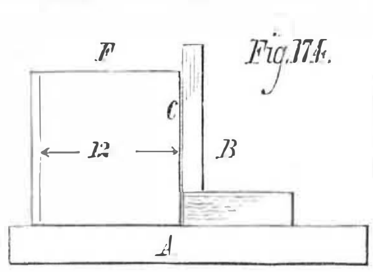


Fig. 174.

Fig. 175.

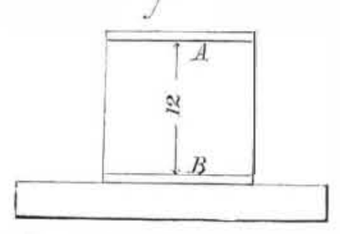
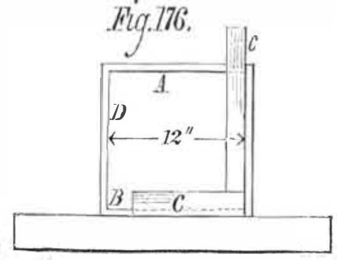


Fig. 176.



It is obvious that, had either one of the faces of the work been faulty, we might have taken off it as much metal as possible, leaving only sufficient to clean up the face diametrically opposite. It often happens that an apparently faulty face shows to more advantage by having a cut taken off it; especially is this the case in iron castings, in which there may be more air holes beneath than upon the surface, which defect may be sufficiently serious to spoil the work. It is therefore preferable to take the surfacing cut off the defective face, so that the degree of defect may be discovered before even the marking out is performed.

The lines being marked, our next procedure is to make light centerpunch marks at short intervals along them, so that, if the lines become obliterated through handling the work, the centerpunch dots will serve instead. These dots should be marked very true with the lines, otherwise they destroy the truth of the marking; because the machine operator, in setting the work in the machine, is usually guided by the dots.

By this method, we may mark off any body whose outline is composed of straight lines, and whose diametrically opposite faces are parallel, no matter what the length, breadth, and thickness of the body may be. It is not, however, at all times desirable to perform all the marking out at one operation. Suppose, for example, our work had been a piece of metal 1 foot square and ⅜ of an inch thick: were we to face off one of the broad faces before marking off, we should find it very difficult to set our work upon the rough edge, and set it true to the square, as shown in Fig. 174; whereas, were we to face off one of the edges first, we have ⅜ of an inch only against which to try the square when setting the planed edge perpendicular. In such a case, therefore, it is best not to mark off the edges until the body of the work is cut to the required thickness.

Locomotive Steam Saver.

Mr. James Metcalfe, locomotive foreman at the Manchester and Milford workshops, Aberystwyth, sometime ago conceived the idea of being able to utilize the exhaust steam, not by condensation as in some classes of engines, but by carrying a portion of it along a duct direct from the blast pipe to the injector, and so forcing it into the boiler again. The question was not, of course, as to the advisability of accomplishing this desirable end, but as to the possibility of doing so. After a careful investigation, Mr. Hamer, the manager, gave Mr. Metcalfe permission to try the experiment, and an engine was fitted with the new apparatus, which we will now attempt to describe in general terms. The two parts of the engine brought into requisition are the blast pipe, whence the exhausted steam now escapes after it has done its work, and the injector which, by the aid of steam forces cold water into the boiler. A duct inserted at the base of the blast pipe catches a portion of the steam and conveys it to the injector, where it is introduced below the point where the steam at present catches the cold water. The water and the exhaust steam are forced together into the boiler at the same time. When the boiler is filled, the exhaust steam is conveyed through an extended overflow pipe into a hot water tank, and thence it is reconveyed at boiling point through the same tube back into the boiler along with the exhaust steam and cold water. The invention has been at work for three months on the Manchester and Milford Railway with most satisfactory results. The saving per annum on each engine is estimated at no less than $500, which represents an annual possible gain to some of the largest companies of more than $500,000 a year.

Removal of Stains with Magnesia.

Carbonate of magnesia—magnesia that has been previously calcined is best—is dried in an oven and mixed with sufficient benzine to form a soft friable mass. In this state it is put into a wide-mouthed glass bottle, well stoppered, and kept for use. It is spread pretty thickly over the stains, and rubbed well to and fro with the tip of the finger. The small rolls of earthy matter so formed are brushed off, and more magnesia is laid on and left until the benzine has evaporated entirely. Materials that will bear washing are then cleaned with water: on silks, alcohol or benzine should be used instead. The process may be applied to textile fabrics of every description, except those containing very much wool, to which the magnesia adheres very tenaciously. It may also be used for stains, old or new, on all sorts of woods, ivory, parchment, etc., without risk or injury. Ordinary writing ink is not affected by it, but letterpress ink quickly dissolves, owing to the absorption of the fatty matter in the ink.

The Allied Attack upon Sebastopol.

Mr. E. J. Reed says: "A faint idea may be formed, perhaps, of the extent to which the place was fired upon when I say that from a tax of 6d. per cwt., which the government levied upon the proceeds of the sales of old iron, shot, and shell, picked up and sold by the people a sum of nearly $75,000 was realized."