## HOW TO SET SHAFTING IN LINE.

BY JOSHUA ROSE, M.E.

We have already referred to the loss of the driving power which arises from a want of proper condition in the line shafting of our manufactories, and it now remains to give practical directions for setting the shafting in proper line; for no matter how correctly a line of shafting may be set, it is merely a question of time for it to get out of line and require readjustment. Among the main causes for this is, that there is usually more power rrquired to be delivered to machines on one side of the line of shafting and between any two of the shafting hanger-bearings than on the other, and the difference in the sizes of the pulleys and their difference in distance from the hangers or bearing boxes. The farther the pulley is from the bearing, the greater its leverage, and hence, all other elements being equal, the more its tendency to cause the wear of the hanger boxes to place the shafting out of line.

The adjustment of line shafting is a job that it will pay to do thoroughly well; hence, only the most approved methods of accomplishing it should be resorted to.

In some cases it is attempted to line shafting from plumb-lines hung over and suspended from the shafting. This, however, is a decidedly inferior method, because such lines are apt to swing, making the operation a troublesome one. Variations in the size of the shafting, again, are elements rendering the operation difficult, and, furthermore, such lines form no guide for the horizontal adjustment, which is quite as important as the vertical.

In other cases, a horizontal line is stretched below the line shafting, and a staff, with a sort of calipering gauge at the top, is used, but in this case the sag of the horizontally-stretched line is a disturbing element. There is, indeed, but one thoroughly accurate method that I know of that will make a true and reliable job, and that method is as follows:

At each end of the line of shafting we nail a piece of wood, so that it will sustain a tightly stretched and strong, fine, and evenly twisted fine line. This line we stretch as tightly as possible (so as to keep it straight), placing it say 6 inches below and 4 inches on one side of the line of shafting, and equidistant at each end from the axial line of the same, adjusting it at the same time as nearly horizontally level as the eye will direct when standing on the floor at some little distance off and sighting it with the line shaft. In moving either end, however, it must be hasting, It is a good plan, however, to set the stretched line horizontally true with a spirit-level, taking care not to deflect the line by contact with the spirit level. The line should stand far enough out from the shafting, and it is obvious that the arms of line whole line of shafting, and it is obvious that the arms of line which must pass through those arms as shown in Fig. 1.



We next prepare some wooden frames technically termed targers, the construction of which is shown in Figs. 2 and 3. These consist of a vertical piece, planed true on the edge A, and be true with the planed edge A, being marked therefrom by a carpenter's scribing-gauge.

Open this frame we hang a line suspending a weight and forming a plumb-line, and it follows that when the target is so down with the scribed line, the planed face A, Fig. 2, will stand



vertical. To facilitate this adjustment, we cut a small V notch at the top of the scribed line, as shown at C in Fig. 3, the bottom of the V falling exactly even with the scribed line, so that it will guide the top of the plumb-line even with the scribed line at the top; hence the eye need only be directed to causing the two lines to coincide at the bottom. To ensure accuracy, the planed edge A, Fig. 2, should not be less than a foot in length.



These targets we erect beneath the line of shafting as shown in Fig. 4, placing one target alongside of each shafting hanger, the adjustment being made as follows: The planed edge A is brought so as to just touch the stretched line shown in Fig. 1, without deflecting it at all, and at the same time the plumb-line B, Fig. 2, is brought to exactly coincide with the scribed line B, Fig. 3. When so adjusted, the two arms of the target are nailed to the pos carrying the shafting hanger. In making this adjustment, two nails should be slightly inserted so as to sustain the target, the target being tapped with the hammer until correctly-placed, when the nails may be driven houe, taking care that the adjustment is not altered by driving the nails. Fig. 4 represents two of the targets in position.

We have now in the planed edges A of the targets a rigid substitute for the stretched line, forming a guide for the horizontal adjustment; and, to provide a guide for the vertical adjustment, we take a straight-edge and place it as shown in Fig. 5, in which A A is the line of shafting, B is a shafting hanger, C C C C are targets, and F F is the straight-edge. We first place this straightedge against the planed face of the end target at D, and, placing a spirit-level upon it, we set it level; we then scribe a plain mark on the edge A of the targets, at each end of the straightedge—a line as shown at D. Carrying the straight-edge to the next pair of targets, we place one end even with the line already marked on the edge of the second target, adjust the straight-edge level with a spirit-level, and mark a line on the edge of the next target. By continuing this process through all the targets, we shall have marked on their edge faces (A, Fig. 2, and D, Fig. 5) a horizontal line, say 15 inches below the line of shafting.

We next make a woolen gauge or square, such as shown in Fig. 6, the edges. A and B being at a right angle, one to the other, and our line on the edges of the targets being 15 inches below the top of the shafting; we mark on the side face of this square the line C in Fig. 6, which must be 15 inches below the edge A. The application of the gauge or square is shown in Fig. 7, it being obvious that if the shafting is parallel we must ad-