

special work, and was sufficiently long to do this raised beading.

A skilful machine man was selected to do the work, with the assistance of the regular shaper man. This man, after careful observation and reflection conceived a way by means of which he could accomplish this work entirely by machine, with no hand work outside of sand-papering the beads.

His first step was to make the cutters. The two centers were made of iron, projecting through wooden face-plates (circular in form) at each end, which held the post. One face-plate had saw kerfs spaced off at equal distances around its diameter. There was a saw kerf in the first piece, which was secured to the form or straight-edge. A piece of saw blade was used as a stop, and was inserted into these kerfs as the different beads were worked. The form or straight-edge ran against the lower collar on the spindle, and the posts were entered and fed along by hand.

The important features of the work were having one extra spindle long enough, the proper arrangement of the two centers to get the same taper as the posts, and dividing off the proper distances on the circular face-plates so that all the way around the beads would be the same and come out right at the last bead. After the posts were completed the balusters were beaded with the regular fluting attachment for a shaper. This attachment does an endless variety of such work, and can be had for a reasonable price from the manufacturers. This is, I think, a valuable shop kink or wrinkle, and may be of benefit to other woodworkers.

I believe a shaper is one of the most important machines in a mill, because of the endless variety of work it can do. I think it also necessary to have an extra

It may cost a little more, but it is a great deal cheaper in the end, as a great deal of time is saved in grinding the bevels, and it is far better. Shaper cutters as a rule are never made until they are really needed, and then in a hurry, and grinding the bevel on the two edges always takes time. It is often the case that small spindles are sprung and ruined by carelessness in not getting the two cutters exactly the same width in grinding them; if the cutters are not the same width exactly, in tightening down the nut with the wrench the collars draw the spindle over, and as a result the spindle is sprung. I have seen a spindle ruined from this cause.

Speaking of the rapid manner in which work can be done on a double-spindle shaper, I say double-spindle shaper, because I believe a single-spindle shaper is only a makeshift outside of a very limited line of business. At present there is a large sale for 1 1/2 x 1 1/2 square-pointed

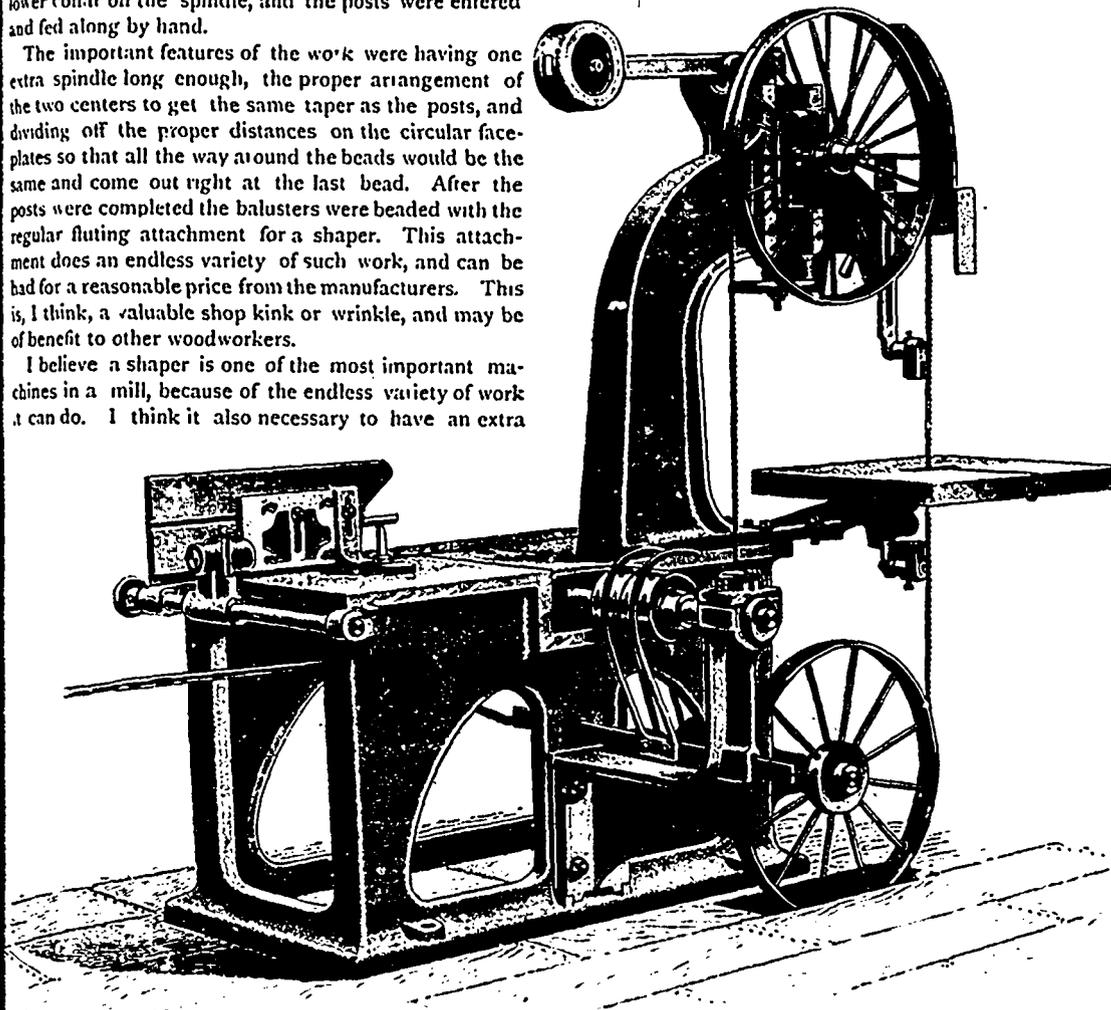
In belting a shaper there should be binder pulleys attached to the countershaft frame or stand. Several makers build shapers on this plan. The advantage of this is the belts run steadier at a high speed and it prevents that disagreeable flapping motion, which gives a slight jar to the shaper top or table, when it becomes worn by use. With the binder pulleys attached to countershaft, the belts run at the right place on the spindle pulleys and do not drop down when they become slack, and belts last longer where this arrangement is carried out. These binder pulleys should have an adjustment back and forward, on slides properly and simply arranged, to take up the slack of the belts when they become stretched.

COMBINED SAW BENCH AND BAND SAWING MACHINE.

THE novel saw bench herewith illustrated, and described in the Timber News and Saw Mill Engineer, of Liverpool, Eng., will be interesting to all woodworkers. It is planed perfectly true on the surface, and is fitted with strong parallel fence, regulated by hand wheel and screw. The framing for the circular saw is massive, cast all in one piece, and has planed facings to receive all the parts fitting to it. The saw spindle is of steel, and works in long gun metal bearings; the fence is made to cant, for cutting work on the bevel. It is also arranged so that it will turn over the end of the bench, for cross-cutting when cutting deep stuff. Fences of this class are apt to give way a little at the end nearest the saw; to prevent this occurring in the above machine the makers fix a stay behind the fence, to be used when required. The band saw apparatus is made very strong, and has wrought iron pulleys 30 in. diameter, covered with india-rubber tyres. The table is made to cant, for cutting work on the bevel. The top pulley is also fitted with canting motion. The tension of the saw under heat is taken up by weight, or, if desired, by a spring. These combined arrangements make a very complete and substantial machine.

STEAM MORTISER.

THIS figure represents a machine for cutting mortises in timber. The operation is simple, and is performed by means of a reciprocating chisel. By means of an ingenious link motion the stroke of the chisel can be regulated by the foot-lever, which brings it down into



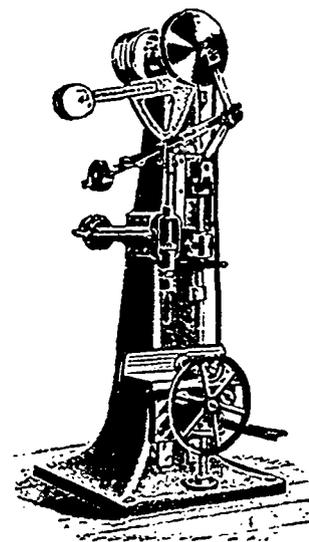
COMBINED SAW BENCH AND BAND SAWING MACHINE.

long spindle for a shaper, for special work that often comes in. In a small or medium sized mill it is invaluable, for the reason that the other machines are apt to be crowded and the work delayed, whereas on the shaper it could be gotten out quickly. Take, for example, a small mill where one hand-jointer has to do all the jointing of door and window frames, cabinet work, mantles, brackets and a variety of other work. With a double spindle shaper, with one long spindle a great deal of this work can be done, such as working face molds on mantel breasts, reeding such work, and chamfering large and small posts and columns. A spindle 13 inches above the table is long enough, but this spindle should not be less than 1 1/2 inches in diameter at the smallest part above the table between the collars, not less than 1 1/4 inches below the table between the bearings, nor less than 1 1/2 inches in the bearings, as it would not do good work.

All shapers should have three different changes of collars: One set of collars as small as the spindles will allow, for small curves or the small places; one set medium size, for ordinary work, and one large set, say about five inches diameter, for shaping pickets and such work, which cut faster and do better work.

In regard to cutters for shapers, a good plan is to have steel of different widths and in lengths already beveled.

pickets. Most of these pickets are done on a picket-header, and there is a close margin of profit. After some delay in pointing these pickets, we by accident found a better, simpler and much quicker method. A "jack" or form was made V-shaped to receive the pickets to be pointed, which were held securely in place in the "jack" by small pointed iron pins. The cutters were beveled to an angle of 45 degrees in pairs on each spindle, one bevel up and one bevel down between each set of collars. It will be readily seen that the right-hand spindle cutters cut two corners, and the left-hand cutters cut the other two corners, the pickets being diamond-pointed to a finish without changing or turning them over, which would have to be done if an ordinary flat form or pattern were used, and pieces would have to be nailed on each edge to keep the pickets in proper place on the pattern. In this case, if the pickets were not dressed exactly alike all around, they would not fit in between the pieces the same, and the point would not come out perfect, causing some delay; whereas with the V-form all this is obviated and made much simpler, whether there is a slight variation or not, and the operation is so easy that an intelligent boy pointed the pickets with perfect ease in half the time it would take any other way.



STEAM MORTISER.

the timber from a state of rest to its full throw, so that when entering the timber the stress on the chisel may be brought on gradually, and so obviate any excessive jar to the foot of the workman and undue strain on the chisel. These machines are usually provided with a boring apparatus, by means of which a hole may be first bored into the timber before mortising, to relieve the chisel. This is found of advantage when working hard wood.

PUBLICATIONS.

Elizabeth Stuart Phelps, Mrs. A. D. T. Whitney. Rev. Robert Collyer, and Walter Besant are all going to tell in The Ladies' Home Journal of either the man or women who most influenced their lives.