

amount coming to him that he would have had by nailing the boxes by himself altogether. Now, there are really two points to this incident. One is the stimulating of men to devise ways and means of reducing the cost of work, and the other is that in a certain measure it solves the problem of employing boys in the factory. If the proprietor had employed the boys to do the nailing, there would have been lots of protest on the part of the men, but having arranged it on a piecework system so the men themselves get the benefit for training the boys, and looking after them, the men, instead of objecting to the boys, sought to have them help at the work.

There are many other things of this kind, many instances that could be related, if the different manufacturers would take the trouble to tell of their efforts. Of course, there are some on the other side in which there are cases of what might be termed abuse of employees working the piecework system, slighting their work, etc., but where this occurs to any great extent it is due in some measure at least to lack of attention and proper supervision. It doesn't matter whether you are doing piecework or having day labor, to get the best results and the best quality of work there must be rigid supervision—there must be competent superintendents and foremen, and they must attend to their duties diligently. If they do this they will get good results either way, day labor or piecework. If they don't they may expect poor results, no matter how the work is arranged; so really a lot of it depends in the end on the foreman as well as on the management and methods.

SAWS FOR CUTTING STAVES.

Saws are being made and advertised to saw slack staves, and I am glad to note the change, especially if in sawing the staves we are not compelled to consult the grain of the wood, as in cut staves. I know that in practice a large amount of the best of timber is wasted in trimming bolts by the stave-cutter, quite enough, I believe, to make up for the saw kerf that would be wasted in sawing. To cut staves successfully the grain of the wood must be consulted and the bolt trimmed so that the stave knife will cross the grain going through the bolt in such a way that it will come out nearer the heart of the tree than where it started into that cut, but not exactly toward the heart. It should be remembered that when the knife, in cutting, approaches the heart, it must leave the heart below the direction of the cut, because if the cut goes exactly toward the heart, or leaving the heart above the direction of the cut, it makes the staves rough at first, and they warp and cup after they are made into a barrel. The saw will not make staves quite as smooth as the cutter will when the wood is perfect, but if the wood is defective, knotty or cross-grained, the saw will do the smoother work.

Then the matter of cooking the bolts must be considered as of great importance, especially when you cut more staves than the waste steam of the place will cook conveniently. I believe a good way to solve the problem would be to have the factory fitted with a cutter and a saw, too, then select the first-class bolts, such as will make flour barrel staves, and cook and cut them, letting the waste steam do the cooking, while the inferior bolts are sawed into staves without cooking. Thus the waste steam could cook the flour barrel stock alone, and the inferior stock for potatoes, salt, sugar, lime, cement and all second and third-class stock could be sawed without steaming and with very little, if any, more waste in kerf than would be made in trimming the bolts. A stave-cutter must have a full crew of men all the time, else they let the bolts get cold after they have been steamed and must be steamed again,

whereas a saw can do good and profitable work with a few hands and never a cent of extra expense for restreaming. The space occupied by steam boxes is great when bolts must be steamed for 40,000 or 50,000 staves a day.

The stave-cutter and the stave saw are like all other machines in that they must be kept in order to do passable work. If one is kept in order and the other is out of order, the one that is in order will take the prize every time. To learn to keep a machine in first-rate shape one must possess two qualifications—he must be anxious to know and willing to do the work. Then all he has to do is to read how it is done and go at it and do it the best he can, then read it again and do it again the best he can, keeping up reading and doing until it is fixed on his brain and his hands become accustomed to it.

A stave saw requires very little adjustment by the operator. The carriage must lead off a little, just enough to require very little, if any, set on the block side. This acts as a guide to steady the saw, and it makes smooth stock if the teeth are all sharp, of equal reach and in perfect joint. The throats must be round and of sufficient capacity that the centrifugal force will discharge the sawdust. All, or nearly all, the set must be inside the saw; just enough to give clearance is all that is needed.

To keep a stave-cutting machine adjusted properly the operator must understand and consider all its parts. The cutter consists of only five parts besides the knife—the two ends, which make the legs on which the machine stands, the knife-back, the hornback and the tumbler. The knife works stationary, while the tumbler vibrates down and up, bringing the belt against the solid knife. The stave bolt drops by its own weight against the hornback, which constitutes the gage for thickness of the staves; the hornback is fastened to the ends by a bolt in the middle at each end, and at each side of each end is a setscrew, these center screws and setscrews enabling the operator to adjust the thickness of the staves as desired. The knifeback is provided with a center screwbolt and two setscrews at each end, exactly like the hornback, which enables the operator to set the edge of the knife forward or backward to the most delicate adjustment, to cause the knife to draw to the wood according to requirements. When a man understands the adjustment of the hornback and the knifeback, then learns to properly trim his bolts and hold them to the gage, he can properly call himself a stave-cutter. Of course, it will be presumed that he will have learned to grind his knife.

LITTLE WOODEN BARRELS.

Among the all but endless variety of things of wood are little wooden barrels. They are turned out of white birch, and come in many sizes, from tiny affairs an inch and a half high up to barrels ten inches high.

The biggest of them are turned with a hand manipulated tool, but those ranging from six inches downward are turned each with a cutting tool having an edge so formed that it turns the barrel all at once. They set a block of wood in the lathe and adjust the cutting tool and it turns the barrel into shape complete as quickly as a man turning with a hand tool could have turned one of the hoops on it; and on the smallest barrels one man can run three or four machines.

These little barrels are sold in the aggregate in great numbers, millions of them yearly. A single tack manufacturing concern buys them in car load lots of 2,000 gross, or 288,000 barrels at a time. Great numbers are used by confectioners who fill them with candy, and they are used to contain bottles, etc.