

THE SHAPE AND SPACING OF BAND SAW TEETH.

By "MILLMAN."

A man that should undertake to collect and illustrate all the various shapes of band saw teeth would have an almost endless job upon his hands, but he would have a most interesting collection and a wonderful variety of shapes, and perhaps every one of the essentially different shapes would have a saw filer to vouch for its special adaptation to his work. Years ago, when the bandsaw was a new device, the teeth were spaced from 3 to 4 inches and speeded about 4,000 to 5,000 feet per minute. Then presently the spacing was reduced quite generally to about 1 to $1\frac{1}{4}$ inch and the speed increased a thousand feet and more, but with the increase in speed the spacing was increased to $1\frac{1}{2}$ or $1\frac{5}{8}$ or $1\frac{3}{4}$ -inch, and for fibrous woods to 2-inch. I have known band saws to be run in white and Norway pine with a $2\frac{1}{2}$ inch spacing, in late years, but this was really an experimental test and the filer soon knocked out every other tooth and found the $1\frac{1}{4}$ -inch spacing distinctly preferable. Now, regarding general principles that should govern shapes of teeth, there are a few to which the majority of filers will assent, and these may be itemized as follows:

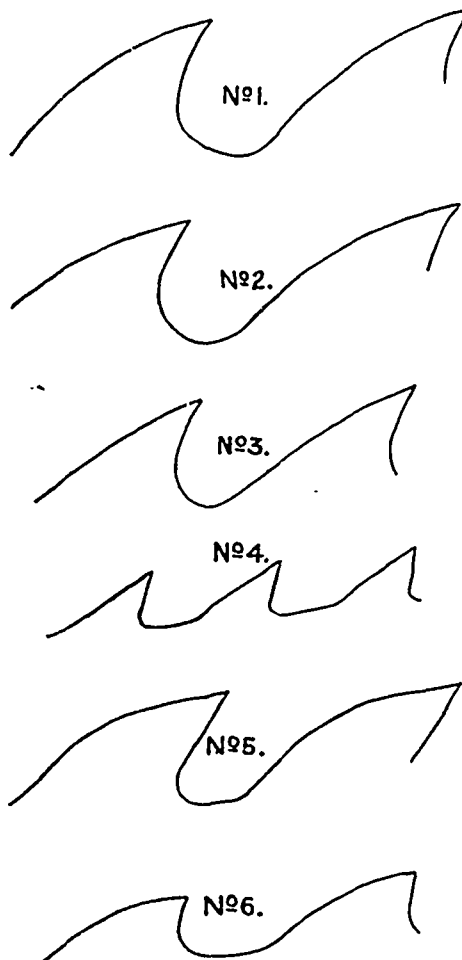
(1) A longer spacing for teeth run at a high speed than for those run at a slow speed. (2) High speed, with plenty of hook and good throat room, insures the highest work. (3) More hook for soft than for hard woods. (4) Longer teeth for soft woods and summer sawing than for hard woods or winter sawing. (5) High speed with teeth close together make fine dust, and this will not pocket well in the gullets of the teeth. (6) Faster speed for soft than hard woods. (7) Faster speed for unfrozen than for frozen timber. (8) A saw with teeth all perfectly fitted and each doing its share of the work may have longer spacing than if otherwise fitted.

There are localities in which a similarity of shapes in general use prevail, and on this point my observation or information is as follows: In the Pacific northwest a 2 inch spacing with gullet $\frac{7}{8}$ or 1 inch deep. To produce this tooth an emery wheel must be used ranging from $\frac{3}{4}$ to $\frac{7}{8}$ or 1 inch thick, with edge shaped to produce the base outline preferred. The same, or a $1\frac{3}{4}$ spacing, in California. In the cypress of the south, a $1\frac{3}{4}$ spacing, with a horizontal base line for gullet, has been very common. In the hardwoods of the middle south or the north, a $1\frac{1}{4}$ to $1\frac{1}{2}$ spacing, with a $\frac{5}{8}$ gullet. In the northern white pine and hemlock, spacing of $1\frac{1}{2}$ to $1\frac{3}{4}$, with a $\frac{3}{4}$ gullet. In the cottonwood districts a $1\frac{1}{2}$ spacing with extreme hook of 8 to 10 inch in 12. The above is a generalization merely, and from any of these general types may be found radical deviations in each locality.

It is an indisputable fact that changes in the shape of teeth more commonly employed are going on, and these changes are in the direction of more hook, a consequently necessary higher back, a round gullet deviating but little from an almost true circle, rising easily to the crown of the back, and an approximate depth of $\frac{3}{4}$ for $1\frac{1}{2}$ spacing, $\frac{7}{8}$ for $1\frac{3}{4}$ spacing, and 1 inch for 2-inch spacing. The hook of these teeth ranges 6 to 9 inches in a 12-inch saw, rarely more, and where more hook is claimed, it can be measured only on the face of the swaging and note below. There is such a thing as too much hook, for the

more hook the higher the back required to afford proper strength for the tooth, and there is an obvious limit to the height of the back. The competent filer in adopting a shape for his saw teeth will be governed by his personal experience and that of other successful filers. He does not need to adopt some abnormal tooth, difficult to produce even with the most adjustable sharpener, difficult to maintain when produced, without constant dressing of the emery wheel, difficult to swage and sidedress because of its pitch and hook, and in no way effective except as an illustration of an extreme idea. However, it is probable that some filers hold their jobs on the strangeness of their saw teeth, and more probable that a greater number "get the run" for the same reason.

To produce any shape of saw tooth, two things are essential: A good, adjustable and accurate working sharpener and an emery wheel of suitable grain and hardness, dressed for the work.



This wheel may be straight or concave, round or bevel edged, but must be distinctly one that will hold its shape with least possible wear during the feed of the saw once around. Uniform shape or sharpening of teeth cannot result when the filer stands at the machine adjusting the wheel more or less to the face or back, every few teeth. And really, after all, the matter of hook, spacing, shape of gullet and speed of the saw are probably less important than the swaging, sharpening, and shaping of the teeth. Teeth of a length, sharp, with corners perfectly cleared and uniform, are what you want, and any filer who doesn't work close on these elements, absolutely essential to good cutting, may better develop expertise in these directions, and chase the other phantoms later on.

There are filers whose saws make big cuts, the styles of teeth used being as diverse in hook, spacing, depth and outline of gullet as the possible extremes in these guards. Based on results, you may assert that any one of these various outlines

in use is the best, but keep carefully in mind the saw which does the best work is run in a mill with perfectly faced wheels, steady straining device, solid foundation, carriage line, guides set right, and is controlled by an expert sawyer. Also that the saw is made of good steel, is expertly tensioned, perfectly and that it cuts fast and true, because all necessary conditions that contribute to the results have been met.

Referring to the shapes of saw teeth set forth herewith, a little comment may be of interest. Tooth No. 1 is from $14\frac{1}{2}$ -in. by 60-ft. band, and No. 2 from the band saw in a Columbia saw mill cutting fir and spruce, affords perfectly and satisfactory results. No. 3 is from a 12-in. by 51-ft. 16-gage saw that drops twelve 12-in. by 16-ft. boards a minute on good logs out of the Mississippi. In this mill there is another band saw used, 12 by 45-ft., 14-gage, with same style of tooth, drops 16 boards of above size per minute. The saws are sharpened on the same sharpener, five gages of clearance used. The filer in charge of this saw-fitting comments regarding these teeth as follows: "I always regulate the spacing and depth of teeth according to the species of the saw, kind and quality of the timber, whether frozen or not, very knotty, many boom knots, gravel or shells, whether canting or sawing, but there is a happy medium that will do the work for nearly all, except white oak, hickory and iron, and tooth No. 3 shows this. I have traced off my saw, and a tooth on which I stake my reputation. In different mills I have run this tooth in white and Norway pine, hemlock, cottonwood, elm, sycamore, basswood, ash, wild cherry, frozen red spruce, yellow pine, balsam fir and mountain white pine, and with proper clearance for the timber to be sawed, it is a free, easy cutter and does the work enough for anything. We run into more knots, spikes, stones, etc., and if I had a longer spacing it would necessitate a piece in the saw. When we were filling in the real cork pine, free from knots, plugs, gravel, spikes, etc., I should run the spacing one inch deep, just the same shape. The principal thing in shaping saw teeth is to have plenty of hook, so that the teeth will cut a round gullet and plenty of strength. The more the feed, the more sawdust room, for you can split a log with a saw. In most cases the teeth have a larger capacity than the tension, and as they commence changing the teeth the filer must change them, and get them into such shapes that the grinder has to be a contortionist to follow the lines. Whilst this tooth of mine may not be the best in the world, it is a good one, and will do anyone's work if given a chance."

Tooth No. 4 shows the shape used for resaws in the same plant. Tooth No. 6 is the outline desired by English or German band saw builders, and the sharpeners, swagers, and filers shipped for export for these concerns are justified to work on this template. The band saw rarely exceed 5 or 6 inches wide, and about 14-gage, and cut variously the European hardwoods, Canada and Swedish deals, yellow pine, and the cabinet woods of the tropics. In America the tooth seems undesirable, but found satisfactory by the operators, and passed the test. Tooth No. 5 is one of twenty or more templates submitted by a leading saw manufacturing establishment, for which a right hand and a left hand double cut sharpener was required.

Finally, if you must be an enthusiast as regards shape of teeth as regards spacing, hook, gullet, etc., don't expect a special choice in this respect will allow you to run your saws successfully with backs hollow, improper tension, crooked guide rail, crooked piston rod, top wheel too far back so that the saw has to keep climbing the front edge, too much swage, improper sharpening and sidedressing, etc. Vigilance at every point is the only guarantor of success. The Wood-Worker.