DISSTON

LUMBERMAN'S HANDBOOK

Henry Disston & Sons, Inc.

The DISSTON LUMBERMAN'S HANDBOOK

A practical book of information on the construction and care of saws.

REG. U.S. PAT. OFF.

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FOREWORD

THE HISTORY AND DEVELOPMENT OF THE HOUSE OF DISSTON

As far as can be learned the first saws of any kind manufactured in the United States were made by William Rowland, who started in business in Philadelphia in 1806. In 1823 Aaron Nichols opened a small plant in Philadelphia, and in 1828 or 1829 a firm in New York City took up the making of circular saws from English steel. These were probably the first circular saws made in this country. Noah Worrel began, in New York, about 1835, to make trowels and small circular saws. About 1833 William & Charles Johnson commenced the manufacture of saws in Philadelphia and it was with this concern that Henry Disston learned his trade.

In 1840 the firm of William & Charles Johnson failed and Henry Disston accepted from them some tools, steel, and such material as he could get in the saw manufacturing line on account of wages due him and began the manufacture of saws in his own name. After this there were several small industries started, such as Jonathan Paul in 1840, J. Bringhurst in 1842, James Turner in 1843 and Walter Cresson in 1845. These latter were each in turn bought out by Henry Disston.

Previous to 1855 all the crucible steel used in this country in the manufacture of saws was brought from England. In that year, Henry Disston built and operated the first successful crucible-steel melting plant for saw steel in the United States. The crucible steel so made by Henry Disston was hauled from the works to a mill some 5 or 6 miles away and there, under his guidance, was rolled into sheets and taken back to the Disston Works to be made into saws. After making steel in this way for several years, Henry Disston built a rolling mill and from then on used his own make of steel for manufacturing saws.

It was a long and hard struggle for Henry Disston to secure recognition and command trade for his American-made goods, but how he succeeded is now well known.

Up to this time the American market was supplied almost entirely by the foreign manufacturers, but the growth and development of this business in the United States since then has been phenomenal. Now, and for some years past, there have been practically no saws of any foreign manufacture imported into the United States, while on the other hand the American-made goods are exported very largely to all parts of the civilized globe.

But little or no advances were made in the manufacture of saws previous to the time of Henry Disston, and practically all the improvements in quality, style, and methods of manufacture were made by him and his successors. To them is due the credit of placing American-made saws in their present position—at the head of the markets of the world for quality, finish, and correctness of pattern. Improvements on the old time patterns have been made from time to time, the aim being to make each as perfect and as suitable as possible for the particular class of work for which it is intended.

The House of Disston has a very large export trade, shipping great quantities of saws, files, and other goods to all the South American States, England, France, Germany, Russia, India, Australia, South Africa, in fact it is impossible to name a country in which saws are used where the Disston goods are unknown. In these foreign countries, as well as at home, they are looked upon as second to none, in support of which fact the large business will testify.

The first patent issued for a saw in the United States was to L. R. Bump, in 1828, for a Barrel saw.

A Mulay saw was patented in 1832.

The first circular saw patented was by L. Hitchcock, in 1833.

A Bilge saw with inserted teeth was patented in 1835.

It is generally conceded that the idea of a band-saw was conceived as early as 1808, by Wm. Newberry. However, this type of saw is of comparative recent introduction, having been merely a curiosity for years.

Some time after the close of the War—before 1866—Henry Disston went to Paris. There he learned of a new band-sawing machine and brought back two of these machines with saws.

The band-saws used were ⅜ inch wide and with the larger machine there were some slightly wider saws.

These were the first band-sawing machines in this country, as far as can be learned, and when they were first installed in the Disston Works there was hardly half a day's work done in the shops, for the curiosity of the men was aroused and all must have a look at the new machines. It took some little time to educate the men to work on these machines for they all had fear that the saw might break and cut off their arms.

Henry Disston had been trying for sometime to obtain a machine with which to saw out handles. He gladly seized this opportunity, and it was not long before he installed two other band-sawing machines which were made in this country.

Prior to this, with the old walking-beam jig saws then in use, the handles were sawed inside and outside and a man could only do about 20 dozen a day. But when the band-sawing machines were in operation there was always plenty of "sawed-out" work.

The first band-sawing machines spoken of above were constructed of iron frames somewhat similar in form to those now in use, the later improvements consisting mainly of changes in guides and tightening mechanism. These machines, unfortunately, were lost in the fire which destroyed the plant of Henry Disston in the latter part of 1872.

The six inch wide band-saws exhibited by Henry Disston & Sons at the Centennial Exposition in 1876 were looked upon as great curiosities. Considerable trouble, at that time, was experienced in running what were then termed "such wide saws." At the present time Henry Disston & Sons are making band-saws as large as 18 inches wide, 64 feet long—some with teeth on both edges so as to cut both ways—the forward and backward movement of the log—these saws being as large as 17 inches wide, 53 feet long. These are the largest saws of the kind ever made and are working satisfactorily.

The House of Disston has made inserted tooth circular saws for cutting metal, as large as 87 inches in diameter, 1 inch thick, and cutting a kerf $1\frac{3}{16}$ inch, with teeth of air-hardened steel, adjustable in the blade. The first of these saws was made in 1893 and was considered the largest of its kind in this country at that time. In 1905, Henry Disston & Sons made the largest inserted tooth circular stone saws ever manufactured. These are capable of sawing at the rate of 16 inches per minute.

They were 100 inches in diameter, one-third inch thick, weighed 800 pounds each, and contained 180 teeth, in each of which was embedded a diamond for cutting purposes. Since these were put in use, duplicate orders have been received from time to time.

Large as the above saws are, they were eclipsed in size by the two circular cut-off saws made in the Disston Works, April, 1920—the largest saws in the world. These saws, 108 inches in diameter, each saw containing 190 inserted teeth, weighed approximately 795 lbs. They were built to run at a speed of 130 miles an hour, for sawing immense logs into shingle bolts.

The size of these saws will be better appreciated when one realizes that a 54 inch circular saw, ordinarily considered a large one, weighs approximately 125 lbs., while the 108″ saw, just twice the diameter, weighs more than six times as much.

The successful manufacture of such giant saws affords a striking example of Disston facilities and experience.

With reference to improvement in quality of goods, so far as saws are concerned there is such a material difference in these that it would be difficult to explain. For instance, take circular saws as made years ago. Then a 54 inch or 56 inch saw was about the largest made. These were ground by two men, one on each side of the grindstone, who ran the saw over the top of the stone. When it came to "balancing" this saw, to make it run without "wobbling" as the term is, it was placed on a mandrel supported by uprights, and given a slight turn. Naturally the heavier part would settle or turn down. Pieces of steel or rings were then hooked to the teeth on the upper or lighter portion of the saw to balance it and to determine the quantity of metal to be ground off the heavy side. This was done mostly by guess, but nevertheless the saw had to be made so it would balance. The saws of to-day are ground on automatic machines which make them true to gauge throughout, and it is not necessary to do any work for balancing. Again, saws are made to-day over 100 inches in diameter, and by the Disston method of grinding they are made true and perfectly balanced.

This does not mean a sacrifice of quality for price, because the saws can be made much better at less cost by these new machines. With the old methods it took two men a whole day to grind one saw whereas now one man can grind five or six saws of the same size in a day.

Saws were formerly hardened and tempered from the furnace bottom. The smither had a whole day's work to straighten one of these circular saws. To-day, however, Disston saws are so hardened and tempered by a special process that they come out flat and even. A man can now smith in one day eight saws of the same type that required a whole day with the old method. The quality of the saw is better because less hammering on a circular saw means that the saw will run better and hold its tension better.

This is a further reduction of cost with an increase in quality and efficiency in the goods. The improved processes and machinery insure an accuracy and uniformity not otherwise obtainable.

The same thing applies to handsaws and smaller blades. In the early days all the teeth were put in by a treadle press, eleven dozen being a good day's work, while with the appliances of to-day a man will cut 120 dozen, and cut them better and more accurately. This follows also as to the grinding and other processes.

In comparison with past methods of manufacturing, and considering the present enormous consumption of saws and tools, were it not for the up-to-date manufacturing equipment and the organization of concerns of great magnitude, the cost of the goods would be almost, if not actually, prohibitive, nor could the demand be met or satisfied.

On the other hand, the possession of adequate means and facilities for immense daily output enables the production of goods of uniform high quality at lowest possible cost, by which the user or consumer assuredly profits.

Then again, such organizations command the opportunity to experiment. These experiments lead to the improvement of old, and invention of new, articles in their lines.

In the sharpening of saws a great many files are consumed and it was on this account that Henry Disston decided to make his own files. To decide was to act and in 1869 a plant was established fully equipped with the latest appliances and machinery. Skilled workmen were secured. From that time on improvements were made wherever possible in order to obtain a file superior in quality, shape, and teeth. To-day there is no better plant of its kind or one of its size that has a greater output of a superior quality, making the multiplicity of all kinds of files necessary to the trade. At least 35,000 dozen Disston Files are used annually in the Disston Saw Works.

All new ideas, inventions, and suggestions in the way of improvements are fully tried out. For this purpose a special department is maintained wherein a staff of mechanical engineers, designers, and machinists is employed. This department is fully equipped and therein all specially designed Disston machinery is built, and that already installed is kept in up-to-date working condition. As soon as improvement is effected, old machinery is discarded whether or not it is worn out.

With the invention and installation of perfected machinery comes a corresponding and direct benefit to the mechanic, both from a physical and financial standpoint. For while there is a greater and better output and consequent increase in earning capacity, the physical strain is lessened and the surroundings become more healthful. For instance, before oil was introduced for firing the furnaces, the hauling of coal for both the small and large furnaces, the raking and cleaning out of ashes several times a day tended to raise dust and cause discomfort. Now the shops are kept clean and comfortable. The ground floors of cement are washed weekly. Metallic lockers and enameled iron wash stands are provided and general improvements have been made throughout for the comfort and well-being of the employees. Shower baths have been installed for the use of those employed in the polishing and grinding rooms, while in all departments where there is dust—emery, sand, sawdust, shavings, etc., there are large pipes connected with exhaust fans which carry the dust out of the buildings and into independent pits. Various iron bridges connect the second stories of the different buildings so that in case of conflagration employees can pass easily from one building to the other. These bridges, in connection with the fire escapes, are considered the best method of procuring safety.

In no factory is the well-being of the employees looked after or considered to a greater extent, (nor does a better affiliation exist between the employer and employees,) than in the establishment of Henry Disston & Sons, Inc. In connection with this it may be stated that there are twenty-one men having service records of fifty to sixty-two years; eighty men, forty years and upward; one hundred and eighty-eight men, thirty to forty years; three hundred and thirty men, twenty to thirty years, and six hundred and nine men, ten to twenty years, while working beside these 1228 men are more than 2300 younger saw and tool makers of highest skill—very largely sons and grandsons of the older men, which speaks for progressiveness. All the old employees, incapacitated by reason of age, are retired with a pension for the remainder of their lives.

THE HOUSE OF DISSTON WAS THE FIRST:

To make crucible sheet steel in the United States, and is the only saw manufacturing plant making its own steel for the full line of saws.

To build and install an electric furnace in the United States, in which crucible steel was made.

To build and install automatic machines for toothing saws, cutting an average of 1500 teeth per minute.

To build and install automatic machines for toothing graduated rip saws.

To introduce improved processes for filing saws.

To harden saws under specially designed dies, thus keeping the saws flat.

To temper saws under hot dies, which operation insures uniformity of temper.

To use automatic hammers in smithing saws.

To use automatic machines for grinding saws.

To "stiffen" saws—an operation which restores the natural spring to a saw after it has been worked on.

To introduce in the United States band sawing machinery for the cutting of wood in making saw handles.

To make hacksaw blades for power machines.

Saw manufacturing plant in the United States to make its own files.

In the United States to make inserted tooth circular saws for sawing metal.

The House of Disston originated and patented many saws and tools including inserted teeth for circular saws for cutting both wood and metal, gullet tooth circular saws, etc., cross-cut saws, skew-back handsaws, etc., various small saws, new and improved machinery, processes of manufacturing. And in addition to these we have a number of other valuable improvements not patented and which are used exclusively in the Disston Saw Works.

DISSTON STEEL

The strongest material, that is, **steel** of highest quality, is required for the making of saws.

The evidence before us in the great quantity of steel annually produced, the many plants engaged in its manufacture, the fact that we see it on every hand and put it to use, easily and familiarly, may lead us in error to assume that steel of high quality is readily produced. Not so, however, for it is necessary, by the exercise of great care, extreme accuracy and experience, to combine in "Saw Steel," certain expensive elements or alloys to produce a steel capable of resisting the greatest strain. Each tooth of a good saw must be sufficiently hard to withstand the wear and retain its sharp edge the longest possible time. It must be tough enough to swage readily and perfectly without flaw. It must be stiff enough to require force to bend it and at the same time so tough that it will bend without strain or fracture. No chain is stronger than its weakest link, no saw better than its weakest tooth.

Steel, therefore, is required absolutely free from blowholes, pipes, seams, splits, and other physical defects. It must be uniform in hardness—in a word, perfectly homogeneous.

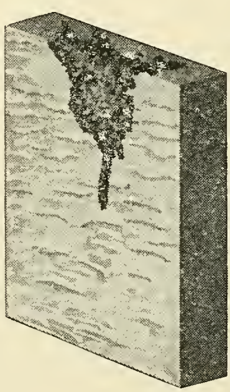


Fig. 1
Pipe defect

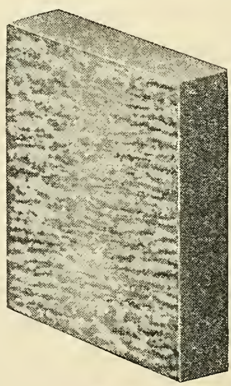


Fig. 2
Honey-combing defect

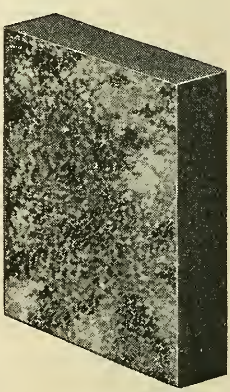


Fig. 3
Sponginess

Steel of 60,000 pounds tensile strength, considered perfectly safe for the construction of a boiler, a bridge, or building, is not one-third strong enough for the making of a satisfactory saw.

After repeated and unsuccessful efforts to procure steel of desired quality, Henry Disston in 1855 erected a crucible steel plant expressly adapted to the manufacture of **saw steel** and since, by constant effort and unlimited expenditure of time and money in research and improvement of process and machinery, the plant has been extended and enlarged until now it is undoubtedly the largest and best of its kind in the world.

Figures 1, 2, and 3 show defects as they originate in the ingot under usual methods.

There is another serious defect which cannot be discovered in the fracture of the Steel. That is *segregation* which is brought about, especially in large masses of cast steel, by a separation of some of the elements from the root. These segregate and collect into "pockets" or portions. This results in an un-uniform quality of steel which is harder and stronger in some parts than in others.

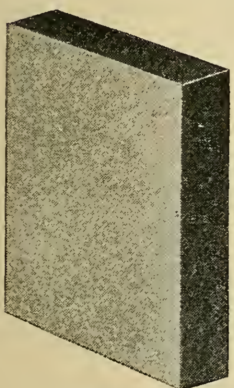


Fig. 4
Sound and uniform

In the Disston "special process" this segregation is perfectly overcome by so casting the ingots that the cooling is uniform throughout and by the use of certain rich alloys as a mordant in a particular manner known only to a few experienced workmen.

This means the production of a steel perfectly sound, free from blow-holes, sponginess, pipe, and all other physical defects, and *absolutely uniform in quality*. See Fig. 4.

Steel of high quality cannot be produced from cheap or inferior material. By the selection of best materials, Swedish refined iron, and carefully melted in plumbago crucibles, the Disston product is of highest quality and superior strength; a recent test of a sample showing

Tensile strength	220,000 lbs.
Elastic limit	168,000 "

Taken from the mould in which it is cast, the steel ingot in the form of a solid block, in weight 200 to 800 pounds as required, is very carefully inspected. The surface flaws, if any, are removed by chipping, the ingot is then very carefully heated and hammered to a "saw slab" of dimensions required. After being very carefully inspected again it is sent to the mill to be rolled into a plate or plates. Here again great care must be used in the heating and working, for large saw plate ingots of considerable size must be drawn to large dimensions without injury to the quality of the steel. As the steel itself is hard and tough, mills of enormous strength and nicety of working parts are essential to produce saw plates of uniformity. Great care is taken to avoid the injurious strains that careless rolling and working may often develop.

After the plate is rolled it is very carefully heated to a certain uniform temperature to soften it and bring it to a condition of uniformity. It is then pressed under dies and flattened. after which it is carefully trimmed and inspected.

GENERAL INFORMATION ABOUT CIRCULAR SAWS

STYLES OF TEETH FOR CIRCULAR SAWS

The illustration below represents the general styles of teeth for circular saws, from which selection may be made of the

Fig. 5

style desired. These cuts show shape only, the teeth being made in various sizes.

SOLID TOOTH SAWS

Teeth Nos. 2, 4, 5, and 17 are for cross-cutting; Nos. 11, 12, 13, and 14 for ripping; Nos. 1, 6, and 8 for cross-cutting or ripping; No. 18 for mitreing or cross-cutting. The "slotted rim" is adapted to any pattern of solid tooth saw. The slots allow for expansion and contraction in the rim of the blade, thus lessening the risk of breakage, particularly in operating circular cut-off saws.

Special patterns of solid tooth saws made to order.

Fig. 6. Slotted rim

INSERTED TOOTH SAWS

The Chisel Point is the best form of inserted tooth for general mill use. No. 10 is used principally on the Pacific Coast. No. 16 for thin saws, re-sawing, etc. The American, Trenton, Prosser, Dunbar, and Goulding are styles formerly made by the American Saw Co.

DISSTON STANDARD GAUGE

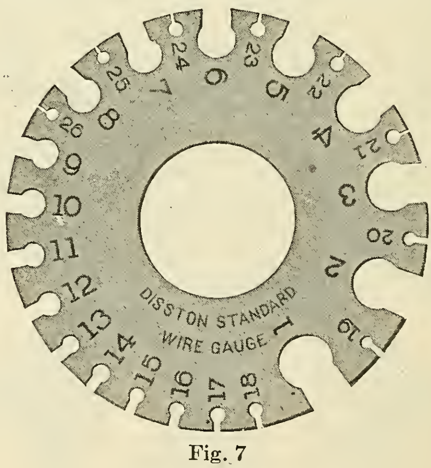


Fig. 7

The Disston Gauge corresponds exactly with the Stubbs and Birmingham Gauges

LIST OF EQUIVALENTS OF GAUGES

Gauge	Approximate Fractional Part of Inch	Millimeters	Disston, Stubbs, or Birmingham	American or Brown & Sharp	London
0	22/64 Scant		.340	.32495	.340
1	19/64 Full	7.62	.300	.28930	.300
2	9/32 Full	7.21	.284	.25763	.284
3	17/64 Scant	6.57	.259	.22942	.259
4	15/64 Full	6.04	.238	.20431	.238
5	7/32 Full	5.59	.220	.18194	.220
6	13/64 Scant	5.18	.203	.16202	.203
7	3/16 Scant	4.57	.180	.14428	.180
8	11/64 Scant	4.19	.165	.12849	.165
9	9/64 Full	3.76	.148	.11443	.148
10	1/8 Full	3.40	.134	.10189	.134
11	1/8 Scant	3.05	.120	.09074	.120
12	7/64	2.77	.109	.08081	.109
13	3/32 Full	2.41	.095	.07196	.095
14	5/64 Full	2.10	.083	.06408	.083
15	5/64 Scant	1.82	.072	.05706	.072
16	1/16 Full	1.65	.065	.05082	.065
17	1/16 Scant	1.47	.058	.04525	.058
18	3/64 Full	1.24	.049	.04030	.049
19	3/64 Scant	1.06	.042	.03589	.040
20	1/32 Full	.89	.035	.03196	.035
21		.81	.032	.02846	.0315
22		.71	.028	.025347	.0295
23		.64	.025	.022571	.027
24		.56	.022	.0201	.025
25		.51	.020	.0179	.023
26		.46	.018	.01594	.0205
27	1/64	.41	.016	.014195	.01875
28		.36	.014	.012641	.0165
29		.33	.013	.011257	.0155
30		.30	.012	.010025	.01375
31			.010	.008928	.01225
32			.009	.00795	.01125

HOW TO ORDER CIRCULAR SAWS

When ordering circular saws, the following directions should be given explicitly:

Diameter in inches.

Thickness or gauge at centre.

Thickness or gauge at rim.

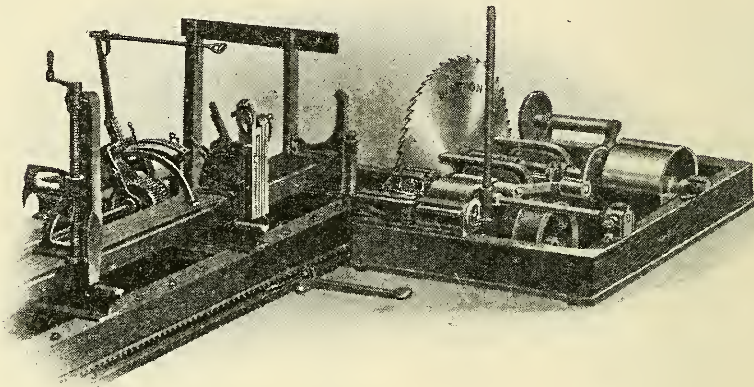


Fig. 8-A. LEFT-HAND SAW

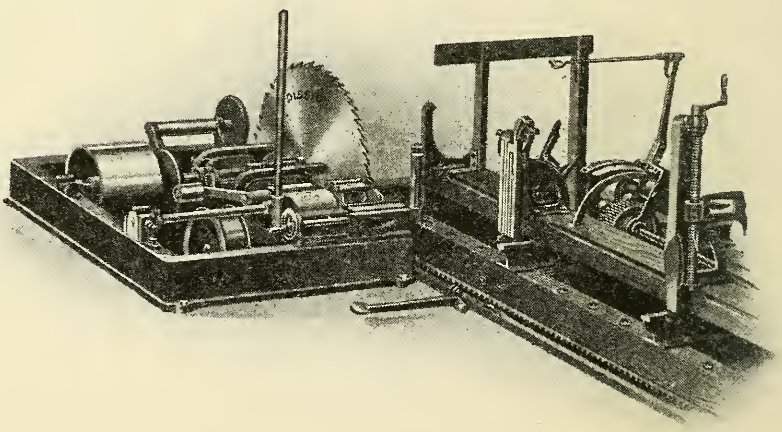


Fig. 8-B. RIGHT-HAND SAW

Right- or left-hand (see above illustrations).

Rip or cross-cut tooth.

Style of tooth (see illustrations on page 13).

Solid or inserted tooth.

Number of teeth.

Size of mandrel hole.

Size of pin holes.

Distance from centre to centre of pin holes.

Greatest feed at each revolution, in inches.

Kind of timber to be sawed.

Number of revolutions per minute.

Horse power of engine.

Daily output of mill.

All stock saws, 40 inches in diameter and larger, have 2-inch mandrel holes and ⅝-inch tug-pin holes, 3 inches from centre to centre. If a different arrangement is wanted, send full pattern of holes.

HINTS FOR OPERATION OF CIRCULAR SAWS

A GOOD SAW

Disston Saws stand at the head of the market on their merits, and although they are unequaled for quality of material, workmanship, toughness, and elasticity, it is quite important that they should be adapted to the speed of the mill and the kinds of timber they have to cut. Upon the saws, to a large extent, depends the capacity.

When in need of saws write us giving a full description of the mill and timber they are wanted to cut, and we will guarantee to furnish saws adapted to the requirements.

To secure proper quality and quantity of output, saws must be resharpened before they become so dull that they "drag and pull." The time spent in keeping saws properly set and sharpened is most important, and is one of the best investments connected with a woodworking establishment.

SOME OF THE CAUSES OF COMPLAINTS AGAINST SAWS AND SAW MAKERS

Insufficient power to maintain regular speed.
Too thin a saw for the class of work required.
Not enough or too many teeth for the amount of feed carried.
Weak or imperfect collars.
Collars not large enough in diameter.
Ill-fitting mandrel and pin holes.
Uneven setting and filing.
Points of teeth filed with a "lead,"—not square across.
Not enough set for proper clearance.
Too much pitch or hook of teeth.
Irregular and shallow gullets.
Out of round and consequently out of balance.
A sprung mandrel, or lost motion in mandrel boxes.
A carriage track neither level nor straight.
Carriage not properly alligned with saw.
Lost motion in carriage trucks.
Heating of journal next to saw.
Guide-pins too tight or not properly adjusted.
Backs of teeth too high for clearance.
Attempting to run too long without sharpening.

SETTING THE CARRIAGE TRACK AND HUSK OR SAW FRAME

It is very essential to good work that the foundation of the mill should be amply strong to withstand the shocks to which it is subjected in turning logs. The track stringers should be good sound heart lumber, preferably Yellow Pine, as this is a firm wood and will resist moisture. The size of the stringers should not be less than 8″ x 8″ and as few pieces as possible to make up the necessary length. These stringers should be set perfectly level and parallel with the mill house and *gained* into the girders and joists of the mill floor or foundation timbers.

They should be secured by keys and bolts so that they will not change position when logs are rolled against the head blocks. The track irons, particularly the *V* side, should be firmly bolted to the stringer and when finished be perfectly straight and level.

It is quite as important that the saw frame should be firmly secured to its place as that it should be level and solid, for the vibration and strain are of such a nature that the frame will change position quickly unless it is *very* firmly secured. The slightest change would make a vast difference in the running of the saw and necessitate relining. When putting in the husk stringers, use well seasoned wood and put them down in such a manner that they cannot possibly change their position, then find the position of the husk on the stringers and fasten down securely with through bolts.

LINING THE SAW WITH THE CARRIAGE

The amount of "lead" required for circular saws should be the least amount that will keep the saw in the cut and prevent it heating at the centre. If the lead into the cut is too much, the saw will heat on the rim; if the lead out of the cut is too much, the saw will heat at centre. We, therefore, give the amount generally used, which is one-eighth of an inch in twenty feet. No two saws have exactly the same lead.

Of the various methods used for lining a saw with the carriage, we give what we think will be the most easily understood: First, see that the mandrel is set perfectly level, so that the saw hangs plumb and true when screwed between the collars, and is flat on the log side. Draw a line running ten feet each way from centre of mandrel and parallel with the V track. Fasten a stick to the head-block so that it comes up to the line at the end in front of the saw. Run the carriage forward the twenty feet, move the rear end of line one-eighth of an inch away from former parallel position, then slew the end of the mandrel either forward or backward until it is exactly at right angles to the new position of the line, and the saw parallel with this line.

All end play must be taken out of the mandrel and carriage trucks when lining a saw to the carriage. The track must be laid solid, level, and true, so that the carriage will run straight and smooth.

COLLARS FOR SAWS

For a perfect running saw it is indispensable to have the collars and stem of mandrel true and well fitting. Any imperfection in these points is multiplied as many times as the saw is larger than the collars; they should fit exactly.

For large saws we prefer collars that have a perfect bearing of about an inch on the outer rim. The part under the rim should be recessed, as a recessed collar gives better contact with the saw than a flat collar. Examine the collars carefully to see if they are true; if not, have them made so. Also be sure that the stem of the mandrel fits the hole nicely and offers no obstruction to the saw slipping up to and against the fast collar easily. We advocate the use of six inch collars for portable and semi-portable mills. Collars for steam feed mills should be larger.

Test the saw with a straight edge, and if it is found true, place it on the mandrel and tighten up the collars with a wrench. Test again with a straight edge to see if the shape of the blade has been altered. If the saw is not true, the fault lies in the collars and will be likely to damage the saw. The best results cannot be obtained from the mill until the defects are remedied.

We finish all our circular saws by a process which insures each side of the saw plate being perfectly true throughout its entire surface. By this invaluable process, every particle of uneveness is removed. The saw never requires packing (providing the collars are true), and all the trouble which has hitherto perplexed the sawyer, in this particular, is removed.

ADJUSTING SAW TO MILL

See that the saw slips up to the fast collar freely and hangs straight and plumb when tightened up; that the mandrel is level, in proper line with the carriage; and that it fits in its boxes as neatly as possible without heating. For when the mandrel heats, by transmission, the saw will heat also and thus expand in the centre, which will make it work badly, injure, and perhaps, ruin it. We do not warrant a saw to run on a mandrel that heats. While it is possible to make a saw that will admit of a certain known degree of expansion, nevertheless a heating mandrel *always* will give more or less trouble.

To get the best results from a mill this must be overcome. (See article on mandrels for circular saws, page 80.)

Take up all end play or lateral motion in the mandrel as the grain of the wood will draw or push the mandrel endwise, no matter how well the saw is kept. See that the carriage track is level, straight, solid, and in proper line, also that rolls or trucks have no end play. Keep all gum or sawdust off the tracks.

SAW GUIDE

In the operation of large circular saws the guide block and correct adjustment of guide pins play a very important part. As all the sawing is done above the center of the saw it is essential that the guide block and pins should be as high and close to the log as possible. See cut.

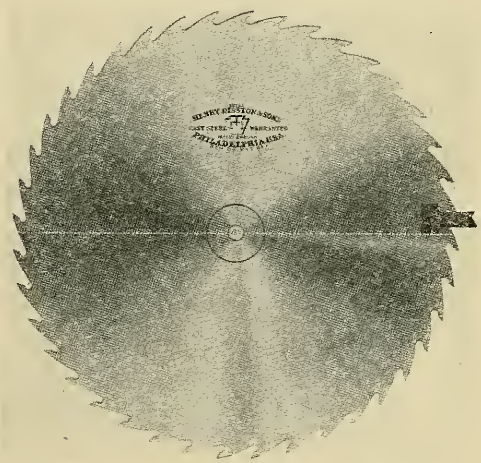


Fig. 9. This shows the correct position of the guide block.

Some sawyers have the guide blocks set low to allow knots and crooks in and on the logs to pass over the block without striking—to prevent disturbing its position. This is a mistake, for the lower the block and pins the less support they give the saw and the easier the saw is deflected from a straight line.

The guide block should be set and securely bolted to the saw frame as high as possible to allow the nose of the head blocks to pass over the top of the guide block freely.

There is a small percentage of logs that are so crooked or have such large projecting knots that there would be danger of the crooks or knots striking the guide block. Logs of this character, usually can be placed on the carriage in a position to make a first cut safely. This cut removes all, or a portion of the crooks and knots. In subsequent cuts no part of the log would be below the level of the head block.

SPEED OF SAWS

This is a very important point for consideration, as a hundred revolutions, more or less, will always make a difference in the running of the saw. We can adjust the tension of saws to overcome a slight variation in speed, provided full information is given with the order. However we would advise a uniform speed at all times. Our experience has been that saws work better when run at a uniform speed even if it is necessary to reduce materially the number of revolutions below that given in the table, than to have a variable speed. If the power is too light to maintain the standard speed, run the engine at a higher *regular* speed; put a larger diameter receiving pulley on the mandrel, and the results will be better both as to quality and capacity. This will be much better than wide variations in speeds, even if the speed, as previously stated, does fall below that given in the table. Regularity is most desirable. Following is a table of speeds:

SPEED OF SAWS RUNNING 10,000 FT. PER MINUTE ON THE RIM

72 in.,	530 revolutions	per min.			36 in.,	1,080	revolutions	per min.	
68 "	560	"	"		32 "	1,225	"	"	
64 "	600	"	"		28 "	1,400	"	"	
60 "	640	"	"		24 "	1,630	"	"	
56 "	700	"	"		20 "	1,960	"	"	
52 "	750	"	"		16 "	2,450	"	"	
48 "	815	"	"		12 "	3,260	"	"	
44 "	890	"	"		10 "	3,920	"	"	
40 "	980	"	"		8 "	4,600	"	"	

For portable mills using saws 44 to 60 inches in diameter, having available 12 to 15 H. P. to drive saw, we advise a speed of 300 to 350 R. P. M., 18 to 20 H. P. 350 to 400 R. P. M., over 20 to 25 H. P. 400 to 450 R. P. M., over 25 to 30 H. P. 450 to 500 R. P. M., over 30 to 35 H. P. 500 to 550 R. P. M., over 35 to 50 H. P. 550 to 600 R. P. M.

RULES FOR CALCULATING SPEED, ETC.

PROBLEM 1. The diameter of driving and driven pulleys and the speed of the driver being given, find the speed of the driven.

RULE. Multiply the diameter of the driver by its number of revolutions, and divide the product by the diameter of the driven; the quotient will be the number of revolutions of the driven.

PROBLEM 2. The diameter and revolutions of the driven pulley being given, find the diameter of the driver.

RULE. Multiply the revolutions of the driven by its diameter and divide the product by the revolutions of the driving shaft; the quotient will be the diameter of the driver.

SPEED INDICATOR

Working parts encased.

Efficient.

Indispensable.

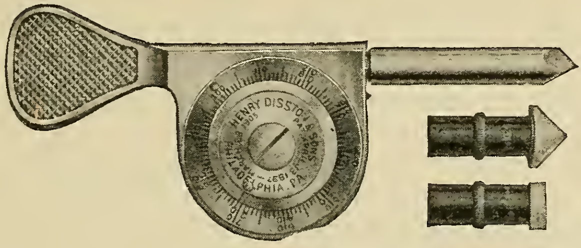


Fig. 10

Millmen and Sawyers should know the correct speed of all saws and machinery operated by them. It is very important that exact speeds be given with all orders for large circular saws. We guarantee the accuracy of the indicator illustrated above and advocate its use.

THIN AND EXTRA THIN LARGE SAWS

As we have said in the preceding pages, all saws and saw-mill machinery must be kept in the proper shape to obtain the best results. This is especially necessary in running thin saws. While a thick or standard gauge saw will give very fair results where only medium skill in the management of saw and mill is used, a thin saw will fall far short of giving fair results under the same methods and management. A thin saw cannot reasonably be expected to stand as much crowding as a thick one and requires more skill and better appliances to give good results.

It is always necessary to have enough set in a saw to give sufficient clearance, which means enough to prevent the log from rubbing on the body of saw.

In the usual gauges of large circular saws, say 7, 8, and 9, used in the ordinary manner on the average feed and lumber, 3/32 of an inch equally divided (3/64 on each side of saw) is about the least clearance that should be used, except in hard wood and frozen timber, when less clearance is necessary. A thin saw requires just as much clearance as any other saw, consequently, in proportion to thickness, the thin saw has the most strain to bear. For this reason alone the best skill and mill are required to run a thin saw successfully. We do not wish to convey the idea that we do not make thin saws, but simply desire our customers, who contemplate installing them, to appreciate the differences in working between thick and thin saws. The difference in thickness between 8 gauge and 10 gauge is 1/32 of an inch. The set for clearance of each being the same, 1/32 of an inch is all it is possible to save in kerf. Between an 8 gauge and 11 gauge the difference is 1/32 of an inch full. Hence the saving in the instances above is very small—so small, in fact, that in nine cases out of ten it is offset by reduction in capacity or in poorly manufactured lumber.

As to saving in power, the difference in nineteen cases out of twenty is not in favor of the thinner saw. Being so much lighter, it will deviate from its line much easier. Any deviation, ever so slight in the length of the cut, will consume by friction all the power saved by the difference in kerf.

These are plain facts that any man who knows the gauges can figure out for himself, and we advise every mill man to study the subject well before ordering extra thin saws. If the mill, skill of employees, and value of timber is such as to justify extra thin saws, then have them by all means, and we claim that our saws, in workmanship, toughness, elasticity, and standing-up quality of steel are unequaled, whether thick, thin, or extra thin.

In ordering, please note that thin saws require more teeth than heavier saws to do the same class of sawing. This equalizes the strain on the rim and prevents springing of the teeth.

Regularity of speed is desirable with all saws, but particularly so with thin ones, as they depend more than the others upon the velocity to hold them up to their work. In extra thin saws, one sixth more speed than given in the table will be advantageous.

INSTRUCTIONS FOR SETTING AND SHARPENING (OR FITTING) CIRCULAR SAWS

The best saw that could be made would not manufacture lumber in a satisfactory manner, nor be safe from possible vital injury unless kept properly set and sharpened. It is therefore very necessary that all saws should be kept in the best possible condition. The contrary is too often the case.

The most general cause of trouble is a dull or improperly fitted saw.

Fig. 11. Spring set briar dress

There are two styles of "fitting" rip saws; the "swage-set and square dress," and the "spring-set and briar or slightly beveled dress."

The swage-set is best adapted to and recommended for mills of moderately large feed and capacity, while the spring-set and briar dress is best adapted to mills of light power and capacity. The reason for this is found in the fact that one tooth of the swage-set and square dress style practically equals in capacity two teeth of the spring-set and briar dress pattern. It thus follows that up to its limit of capacity a saw with the spring-set and briar dress fitting will run easier than a saw containing the same number of teeth that are swage-set and square-dressed.

Fig. 12. Swaged teeth

To properly fit up a rip saw with swage-set: first see that the saw is perfectly round. No saw will give good results if it is "out of round." Each tooth in the saw should do the same amount of cutting. If the saw has long and short teeth, the long tooth will be subjected to a strain that should be equally divided between two, three, or four teeth.

This renders the saw liable to accident, and at best largely reduces the capacity of the mill and turns out poorly manufactured lumber.

If the saw is not round it should be made so by "jointing," until all the teeth are of the same length. In the absence of a saw-sharpening machine, the jointing can be accomplished best by holding a piece of grindstone against the top of the teeth while the saw revolves at a medium or moderate speed. If a piece of grindstone is not available, take a piece of soft emery wheel or any other kind of stone that will grind the long teeth down to a common length.

After jointing, file all the teeth to a keen point, taking care merely to file out the marks of the stone, thus leaving all the

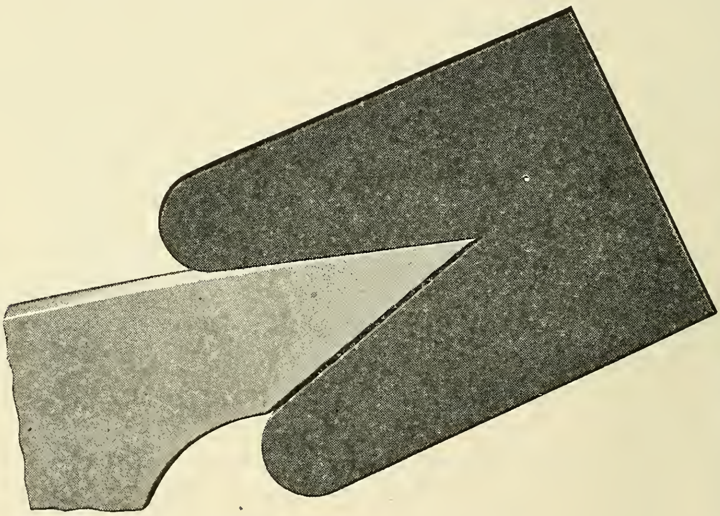


Fig. 13. Gauge by which to file and regulate the shape of the saw teeth of large saws

teeth of the same length, and as nearly as possible the same shape. The teeth cannot be swaged or upset to advantage unless filed sharp and to the proper shape. To do this without a gauge requires considerable practice and experience. A gauge, like that shown in the illustration, is furnished gratuitously upon application and one is included with every swage.

The next operation is "swaging" the teeth for clearance, which, under ordinary conditions, should be two gauges on either side of each tooth. Taking for granted that the back of the tooth is in good shape, the swaging must be done from the front or *under side*. This gives the proper "rake" and saves unnecessary reduction in the diameter of the saw.

Swaging consists, first, of holding the convex side of the swage or up-set on the tooth, striking it half a dozen or more firm hammer-blows until the tooth is spread to the desired width as shown on section of tooth H, Fig. 38, page 45; then use the straight or flat jaws. By moving the swage from side to side, two or three blows will flatten or square up the tooth, and bring the corners out full, as shown on section of tooth G, page 45.

In swaging, care must be taken to hold the swage at such an angle that the lines or contour of the backs of the teeth are not changed as the swaging marks should show principally on the fronts of the teeth where practically all the filing will be done. The operator must also be careful not to hold the swage at materially different angles as this would have a tendency to fracture the teeth. It would also make the saw badly out of round by driving some teeth down and others up.

Another method of swaging is by means of the Eccentric Swage, the eccentric dies of which exert a powerful pressure which rolls and spreads the edge of the tooth. As the tool is mechanical, every tooth is given a uniform swage.

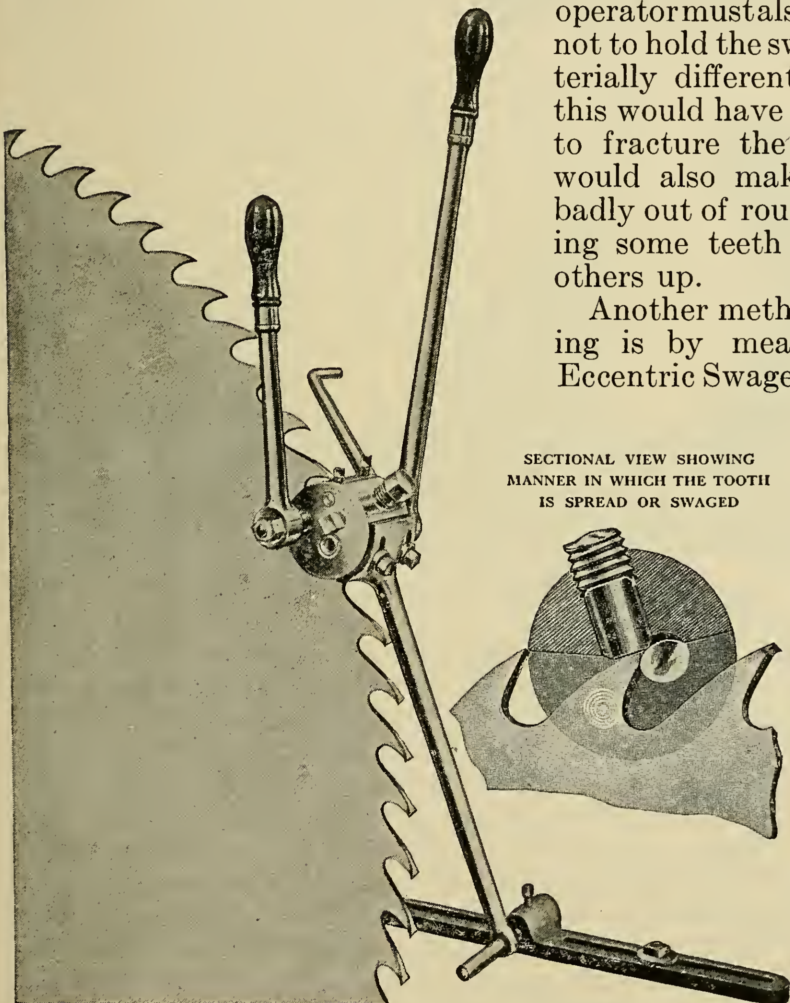


Fig. 14. Disston Eccentric Swage No. 0. Adapted for circular saws from 6 to 12 gauge in thickness

Following swaging, the saw must be jointed again and each tooth then filed or ground until brought to a keen point. If filed by hand, due care must be taken to file square across the teeth so that all cutting-edges will be at right angles to the side of saw. If the saw is not filed square it will "lead" in or out of the log according to the side of the saw bearing the high corners. High corners on the log side of a saw will cause it to run into the log, and vice versa. It is also important that the same "hook" or pitch line and general shape of teeth be maintained.

The next operation consists of "side-filing" which simply means bringing all the points to one uniform width. It is very difficult to swage or set a saw so accurately that all the teeth are *exactly* the same width. As a slight variation in the widths of the cutting points of a saw will not only cause it to work badly but will make rough lumber, it is therefore desirable that all the points of the teeth be made exactly the same width, which is readily accomplished by the use of the Disston Side File. After this the corners should be relieved backward from the cutting edge. This is particularly true when at work in frozen timber.

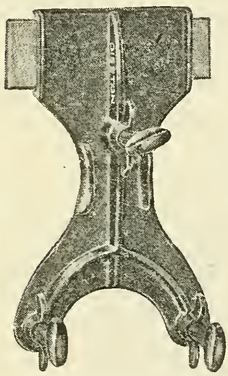


Fig. 15
DISSTON IMPROVED
SIDE FILE

Made in three sizes

This file must be adjusted by means of the set screw to conform to the width of set desired. The jam-nuts are for the purpose of securing the set screws in the desired position. When the side file has been properly adjusted it must be held in position against the saw-blade, by means of the clips, the points of the set-screws only touching the blade. Each tooth in succession must be filed until the set of tooth conforms to the gauge of the set-screws. Thus all uneven or overhanging corners will be removed.

This completes the operations of setting and sharpening, or fitting the saw, and if the work is done according to these directions and the saw is properly operated on a correctly adjusted mill, it will saw easy and true until dull again. However, it should be re-sharpened before it is allowed to get so dull as to show a tendency to pull extra hard, leave its true line, or heat up. There is no economy in attempting to run a saw too long without sharpening. Many hours time have been wasted and many saws ruined through the false economy of not sharpening them often enough. We have never seen a saw mill where it was not true economy to sharpen saws from two to four times in a full day's sawing. A saw, properly swaged or set, will stand from two to five filings before it needs re-swaging or re-setting.

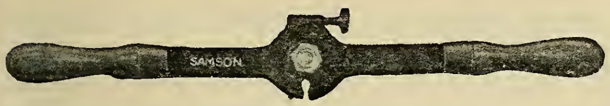


Fig. 16. DISSTON SAMSON SAW-SET

The operation of fitting a "spring-set," or briar-dress rip saw is the same as the foregoing in all respects except that the swaging is omitted and the points of the teeth are bent alternately right and left with a "Samson" or similar setting tool to give the necessary clearance to each side of the saw. Then all the teeth are filed straight through or square to the side of the saw on the fronts. Each alternate tooth is slightly beveled on the back as in Fig. 17.

Fig. 17. To show bevel on backs of teeth.

SHARPENING CUT-OFF SAWS

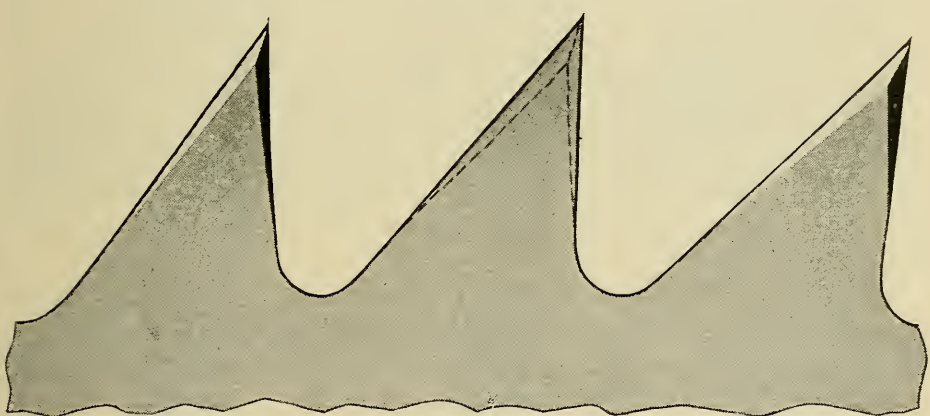


Fig. 18. Correct "fitting" of circular cross-cut saw.

Circular cut-off saws are fitted the same as briar-dress rip saws, except that the teeth are given more bevel both front and back as shown in Fig. 18.

There are several different kinds of tools on the market for setting small circular saws, but the most efficient one we know of is our circular saw setting-stake, with which tool each tooth is given practically the same amount of set.

Probably half the saws sent back to the factory for repairs have been injured or ruined through neglect on the part of the owners or operators, who really know how to fit saws properly, but who put off the re-setting and sharpening of their saws as long as they can force the saw through a cut of any kind. Other men, through lack of experience do not know how to "fit" saws. The result is the same in either case. After wasting time and lumber enough to pay a careful and capable fitter or sawyer, who would without injury to the saw or unnecessary wear to appliances turn out the maximum amount of well manufactured lumber for the power available, the careless or inexperienced men must send their saws to the factory for repairs or purchase a new saw. Due regard for a few simple rules would have saved the saw, a quantity of lumber, and a great deal of lost time.

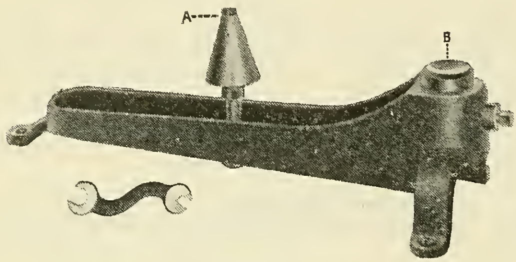


Fig. 19

DISSTON IMPROVED ADJUSTABLE SETTING-STAKE FOR CIRCULAR SAWS

This valuable tool can be adjusted to set any saw from six to thirty inches in diameter. The cone "A" is moved in or out to suit the diameter of the saw, and raised or lowered, as may be required. The movable anvil "B" is made of hardened steel, and some portions of the face being beveled more than others, the operator can regulate the amount of set as desired.

The saw is like a razor or any other cutting tool. It will not work unless it is kept in order. An attempt to *force* it when not in order means a broken saw or a repair bill.

NOTE: Do **not** file square corners in the gullets of the saw as it prevents proper circulation of saw-dust and is very liable to cause breakage as shown at "D" in Fig. 20. This

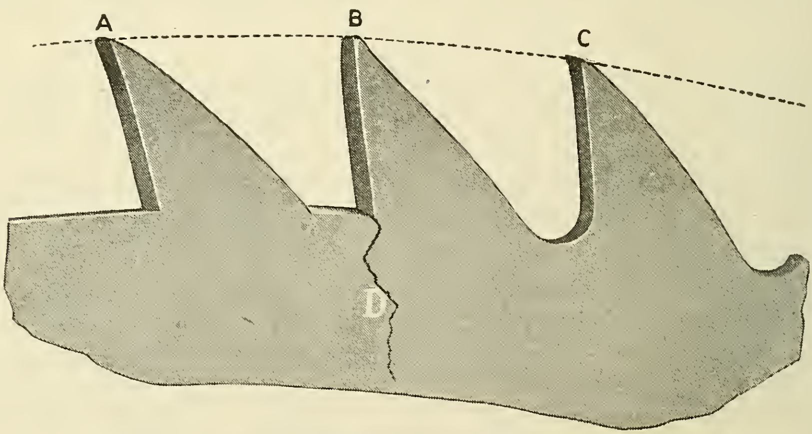


Fig. 20 Crack resulting from square gullet, shown at "D".

is particularly true when the teeth are dull, or in frosty weather. *Our warranty does not cover saws broken from sharp corners filed in gullets.*

It will be observed in this illustration, Fig. 20, that in addition to having sharp corners in the gullets, teeth "A" and "B" are very dull; tooth "C" shows how the points and gullets should be dressed. The gullets should be kept rounded out, either with a gummer or a file.

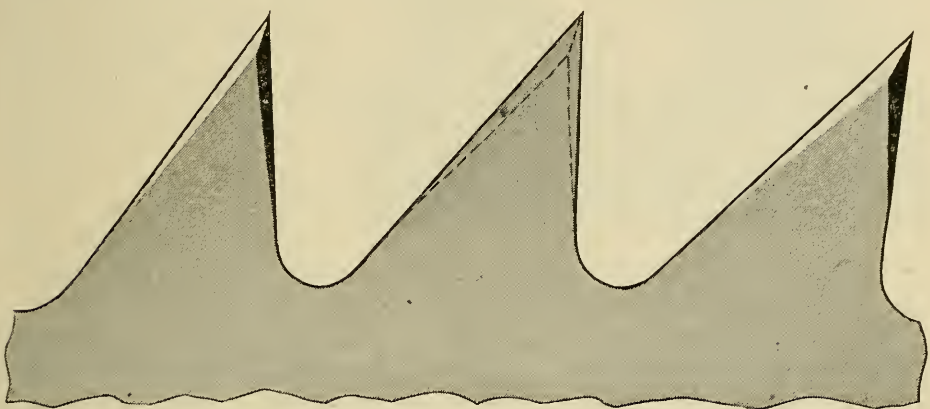


Fig. 21. Teeth properly shaped for soft wood

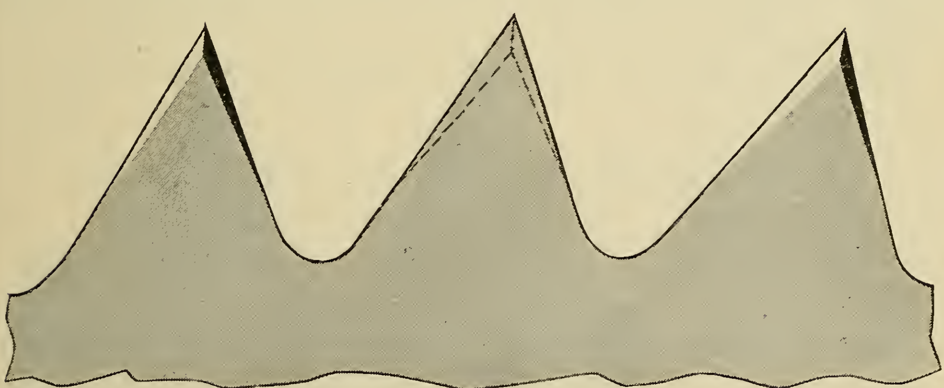


Fig. 22. Teeth properly shaped for hard wood

Fig. 21. shows proper shape of tooth for cross-cutting soft wood. Fig. 22 shows the tooth best adapted to cutting hard wood, space of teeth or distance from point to point being governed by conditions.

Cut-off saws, with the front of the tooth undercut into a round gullet, are the best (see Fig. 23). If the teeth are kept in this form, less time will be required in filing, and the bad results from running a dull saw will be prevented. Use as little set as possible. File as soon as the saw becomes dull, thus saving time and power, reducing the strain and liability of breakage of the saw.

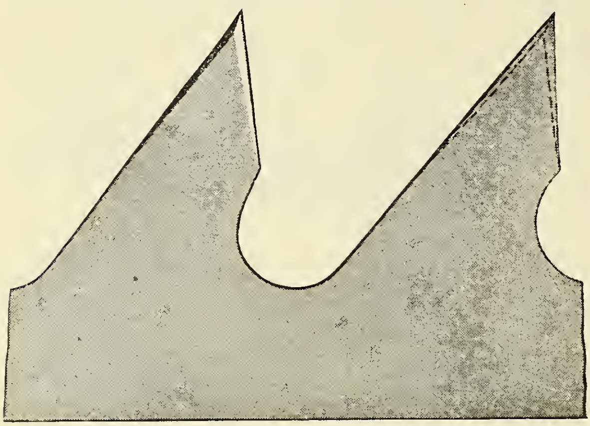


Fig. 23. The best tooth for cut-off saws.

We can furnish cut-off saws with rounded or undercut gullets as shown above and give any desired amount of rake or space of teeth.

The great loss, caused by breakage of circular cross-cut or cut-off saws, to the mill man and manufacturer of saws induces us to call particular attention to the general neglect in the keeping of these saws in order for the work they have to perform. The same care is not given to cut-off saws that is given to the larger saws for ripping lumber.

Nearly every case of broken cut-off saws that has come to our notice, has been caused by the careless manner in which they have been filed or gummed. If the time, labor, and files consumed in filing the long bevel down the backs and fronts of teeth, were used in filing the gullets down with a round file, or cutting them out carefully with a round face emery wheel, many saws would be saved and much less power consumed.

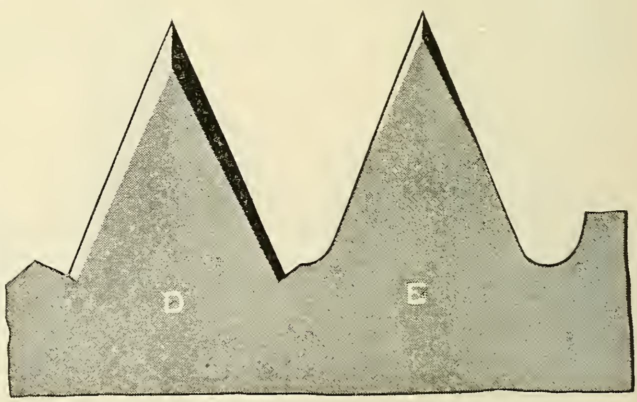


Fig. 24. Correct and incorrect bevel.

Filing long bevels on the teeth forms square notches in the gullets, which not only cause cracks to start, but also prevent free circulation of saw dust. See Fig. 24, tooth D.

The bevel on cross-cut teeth should never extend into the gullets. In fact only a small portion of the tooth from the *point* needs beveling. The remainder of the tooth and gullets should be dressed straight across, as shown in Fig. 24, tooth E. In heavy cutting the front of the tooth should be filed with very little bevel and the bevel on the back of the tooth should be increased to compensate for the lack of bevel on the front. This will prevent much of the lateral strain and chattering caused when the teeth are forced out of line into the sides of the cut. Saws, particularly if they are dull, are frequently broken from this cause.

SAWS FOR COLD WEATHER USE

As many saws are broken in winter, the greatest care should be taken to prevent any undue strain. Keep the points out full, square, and sharp, or the saw will dodge out of the cut. This is particularly true in slabbing, as the corners on the log side do the most cutting and soon get dull in sawing knotty frozen timber. Use no more set than is absolutely necessary. Have the teeth widest at the extreme points, but do not have them weak. Taper the set nicely from point to back. Sharp corners should never be filed in the gullets as cracks are sure to start from such misuse of the saw, particularly in cold weather.

SHARPENING AND GUMMING WITH EMERY WHEELS

In sharpening or gumming saws with emery wheels always use a good, free-cutting wheel, and never put so much pressure on it or crowd it so fast that the teeth are heated to such an extent they become blue. For when teeth are blued, glazed, or case-hardened by the emery wheel, they are apt to break or crumble in the cut or the next time they are swaged. Joint the emery wheel occasionally to retain the shape of its face and to remove glaze.

When gumming, it is best to gum around the saw several times instead of finishing each tooth at one operation. By going over the teeth several times, they are less liable to case-harden or blue, and a more uniform gullet is obtained. After gumming, it is advisable to file all around the saw, taking care to remove the fash or burr left on the edges, and all glazed or hard spots. Gumming and sharpening with the emery wheel will cause the saw to "let down" or lose its tension much quicker than the use of the file or burr-gummer. The emery wheel heats and expands the rim of saw, putting it in the shape generally termed by mill-men "buckled," which makes it appear loose and limber and causes it to run "snakey" in the cut. Many saws are condemned just from this cause and thrown aside as worn out, when by proper work and hammering they can be made as good as new saws of the same size.

In sending us old saws for repairs *mark plainly on the case from whom they come.* Write us full information about the work to be done. We will furnish repair blanks on request. We will guarantee to put as good and durable tension in the saws as they had originally.

TRAMMEL FOR CIRCULAR SAW TEETH

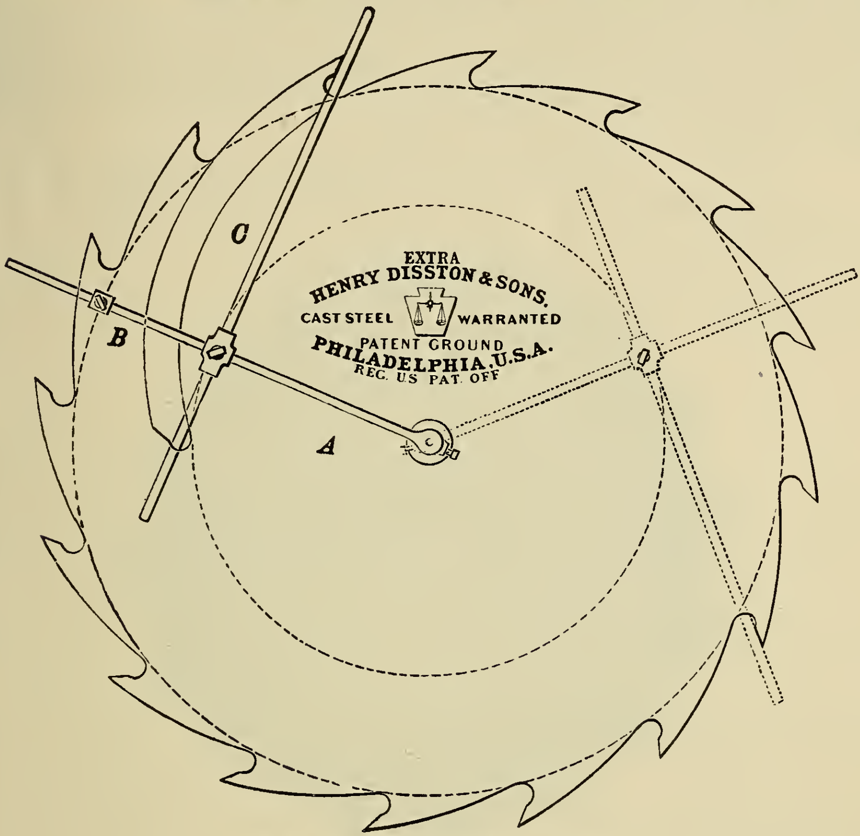


Fig. 25. Trammel in position on saw.

The above illustration represents a device for laying out the teeth of circular saws and keeping them in order. By its use the teeth can be kept in proper shape and regular in depth, and an equal amount of pitch can be given to the front of each tooth.

To rod *A* is attached chuck *B*, which holds a steel point for marking a circle for the bottom of the teeth. If all the teeth are on this circle, they will be equal in depth. The strip of steel *C* can be set at any distance between the centre and the edge of the saw, and it will give the same pitch to the front of each tooth. The ordinary pitch is that which is obtained by placing the steel strip at a distance of three-fifths from the centre towards the edge of the saw-plate. There is a diversity of opinion concerning the proper pitch to be given to the fronts of teeth,—knotty timber requires less than clear timber,—with light power and light feed more can be used. The pitch can be increased by moving the steel strip nearer to the rim of the saw, but should the teeth become weakened, the backs or tops of the teeth should be strengthened, or they will either break or chatter in the work.

GULLET-TOOTH CIRCULAR SAW

Fig. 26

By reference to the above illustration, it will be observed that the back or point-line of each tooth is the continuation of the spiral lines *Z*, and the sharpening is done mainly by the reduction of the gullet or throat only. This is readily accomplished by the use of our patent gummers. (See page 41.)

The course pursued by this cutter is spiral, and while it is in the act of reducing the front or throat of tooth *D*, it is prolonging the back or point-line of tooth *C*. The illustration represents a two-inch tooth or gullet. The saw *B* is the saw *A* worn down. When the saw has been reduced on the centre line from *G* to *F*, it has been worn away six inches. Yet this same saw has presented a cutting surface on spiral line *Z*, from *G* to *Y*,—a distance of twenty-four inches. This is only one of the advantages claimed for our patent gullet-tooth. The throat or gullet, being chambered out on a half circle, forms a larger receptacle or chamber for dust, and thus a one-and-a-half-inch tooth of this pattern will keep a saw as free from choking as a two-inch tooth of the ordinary shape.

The saving of the saw-plate by the use of a smaller tooth is evident to the most casual observer.

In sharpening, a saving in time and files is effected by taking a good, deep, full cut, instead of a light, scraping one. A tooth becomes dull on its face in proportion to the depth of cut taken at each revolution of the saw. For instance, when each tooth cuts a thirty-second of an inch, it takes thirty-two teeth to cut one inch, whereas when each tooth cuts one-sixteenth of an inch, it takes only sixteen teeth to cut the same amount. In other words, the fibre or grain of the lumber has to be broken thirty-two times in one instance, and only sixteen times in the other.

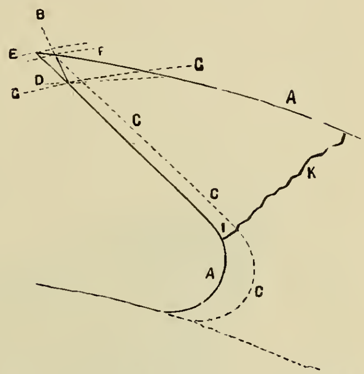


Fig. 27. Filing back on the clearance line

When the tooth starts to break the fibre one-sixteenth of an inch in the log, it will do it with nearly as much ease and consume very little more power than if the cut were only a thirty-second of an inch per tooth. Of course one tooth, in this example, becomes dull for one-sixteenth of an inch under the point, and the other for only one thirty-second of an inch. However, to bring up one tooth consumes nearly as much saw-plate, time, and files as the other. It is easy to give too little or too much feed. Judgment should be used in this as in everything else. The greatest amount of feed that the saw and power will readily take care of is the best feed for the saw.

Fig. 28. Showing old and gullet style tooth

On tooth, Fig. 27, *AA* are the original lines of the tooth, dotted line *B* shows where the point first wears, dotted line *CCC* shows how the tooth should be filed back on the clearance line. Too frequently, on account of the long surface to be filed, operators file the top of the tooth only as represented by the dotted line *D*. It is plain to be seen that by filing back on the dotted line *CCC* the saw has been reduced in diameter only from dotted line *E* to *F*, while by filing from the top of the tooth the reduction will be as shown by dotted lines from *E* to *D*.

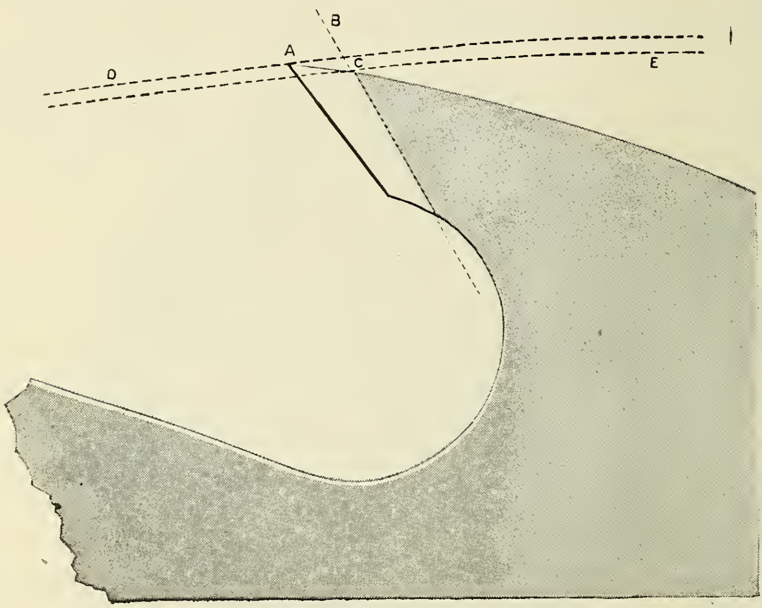


Fig. 29. Illustration of tooth after cutting 300,000 feet of lumber

This shows that by filing on top,—the incorrect method,—five times as much of the saw has been worn away as by proper filing. This difficulty is overcome by the use of the gullet tooth, as represented by cut Fig. 28.

Fig. 28 shows the outlines of both the straight tooth and the gullet tooth. By using the latter only a small space is left to file and gives no excuse for filing on top.

Fig. 29 represents a section of our gullet-tooth saw (kept in order by a chambering machine) after cutting 300,000 feet of hemlock lumber. Dotted line *D* and point *A* show the original diameter of the saw. Dotted line *E* and point *C* show the saw after cutting the above amount of lumber, reducing the length of teeth only three-sixty-fourths of an inch, as can be seen plainly between dotted lines *D* and *E*. According to this, a fifty-inch saw will cut 6,000,000 feet of lumber and only reduce the diameter of the saw to forty-eight inches, showing the great advantage derived by using our Patent Gullet Tooth Saw and Gummer.

The accompanying illustration, Fig 30, shows the condition of the teeth of a large circular saw sent to our factory to be gummed. The owners had been using some gummer upon the saw, which actually did more harm than good. As shown by line *B* the ragged throat so obstructed the circulation of saw dust that the owners were compelled to send the saw to the factory to be gummed out. Dotted line *C* shows the condition the gullet would have been in had our chambering machines been used.

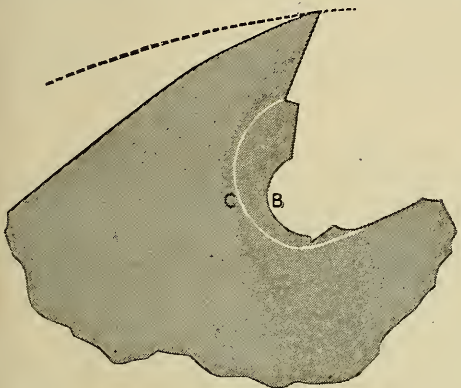


Fig. 30
BAD CHAMBERING
Illustration reduced to one-half actual size

Figs. 31 and 32 show, by periphery lines, the difference in the wear of the saw. It is of the greatest importance to file back on these clearance lines. The point on the face of the tooth is very small. The smaller it is the less filing it takes to keep it sharp. One stroke of the file on this point will effect more than ten strokes on the face of a tooth that has to be filed from the point to the bottom of the gullet. When there is so little point to keep

Fig. 31. Teeth for soft wood

Fig. 32. Teeth for hard wood

back, it will be found easier to sharpen the saw from the face rather than to file from the top, and a saving in the diameter of saw is effected.

When we know the kind of lumber to be sawn, the speed, feed, and capacity of mill, we make the teeth best suited for the work. This saves waste of saw and the extra time it requires to keep unsuitable teeth in order. For instance, for one-inch feed, we do not recommend over twenty-four teeth and would not (where our gummer is used) give over one-and-a-quarter-inch depth of tooth; for a five-inch feed, not less than fifty

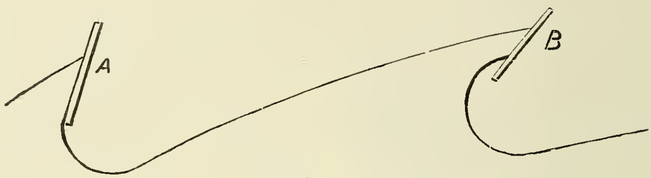


Fig. 33

teeth, and depth to correspond; for a three-inch feed, we would give thirty-two teeth.

The gullets of the saw should be chambered out, or gummed as soon as the teeth have been worn back enough to allow the file to strike the back of the chamber as shown in Fig. 33, tooth *A*. Tooth *B* shows full gullet.

TOOLS FOR FITTING CIRCULAR SAWS

VICTOR SELF-FEEDING SAW GUMMER

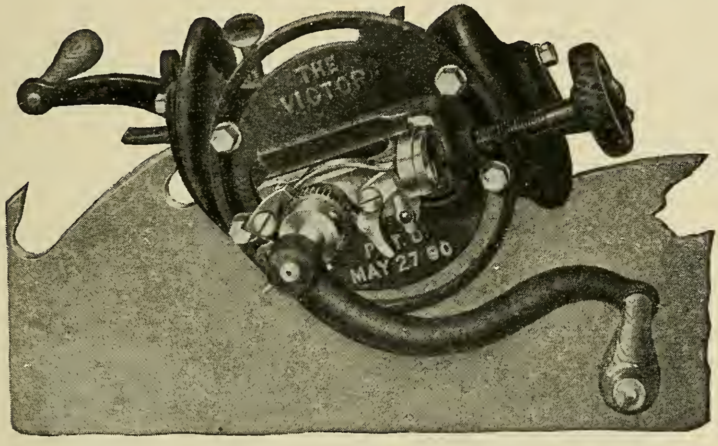


Fig. 34. Victor Gummer, adjusted to gum circular saws

The Victor is made of the very best material, the lighter parts being of malleable iron and the shaft of steel. This makes the tool lighter, and at the same time stronger, than other gummers. The Victor will gum all saws, from a small circular saw with a ⅜-inch gullet, to the largest made, with a 1½ inch gullet; also all mill, mulay, and cross-cut saws. The illustration shows the Victor gummer in position for work on a sixty-inch circular saw.

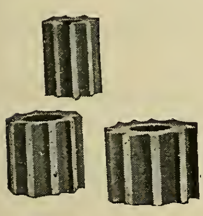


Fig. 35. Gummer Cutters for Victor saw gummer.

Place the gummer on the saw with the feed-screw towards the front of the saw, the carriage drawn well back, and the cutter resting on the back of the tooth next to the gullet to be gummed. The feed-screw should point in the direction you wish the cutter to cut. When in position, clamp the machine to the saw by tightening the two clamp-screws at the bottom of the clamps.

Set the notch of the brass gauge over the point of the tooth and secure it by means of the screw. Then to adjust the gummer, so it will take the same position on each tooth, set the screw or "L" gauge down on the teeth. Throw the pawl into the ratchet-wheel on the cutter-shaft, which will prevent the cutter turning backwards while at work. The cutter is very liable to be broken if reversed while in the gullet.

Stand behind the saw, try the crank and if it does not turn freely, back the cutter until it does; then throw the feed-pawl into the circular rack on the feed-screw and gum until the gullet is chambered to the required depth.

Then set the stop that is under the cutter-shaft up to the rocking-lever to prevent the feed-pawl from turning the feed-screw. This will cause the feed to stop at this point and make all the gullets the same depth. The first tooth being gummed, throw out the feed-pawl and screw back the cutter to the starting point. Loosen the clamp-screws and move the gummer to the next tooth, placing the brass gauge on the point as before. Screw up the clamp-screws, throw in the feed-pawl, and gum until you reach the stop, which has been adjusted on the first tooth.

If all the gauges and stops are properly adjusted on the first tooth, all the gullets will be of the same depth. If, when you first put the gummer in position, the feed-screw does not point in the direction you wish to gum, loosen four screws that hold the clamp to the circular plate and turn the plate until the feed-screw reaches the proper position. Then tighten the four screws and clamp the machine to the saw. The gummer can be set to gum at any angle from horizontal to perpendicular simply by turning the circular plate.

We make three sizes of cutter-shafts for this gummer. The No. 1, or large shaft is the same diameter as is used in our No. 1 gummer, and is suitable for 1, 1⅛, 1¼, 1⅜ and 1½ inch cutters.

The No. 2 or medium shaft is suitable for cutters ½, ⅝, ¾ and ⅞-inch.

The No. 3 or small shaft is made specially for ⅜-inch cutters.

DOUBLE-GEARED NO. 1 SAW GUMMER

Before using the gummer see that the oil holes are clear. A few drops of oil will be sufficient for from three to five hours' use. After using the gummer remove the chips or turnings that accumulate back of the cutter. If allowed to remain they will cause trouble by getting into the working parts of the machine. Run the cutter back by means of screw *G* as far as necessary. Then place the machine on the saw, with the cutter close up in the chamber of the tooth to be gummed.

If the teeth are regular and the same distance apart, start the cutter in any chamber; but if they are irregular, make them even by commencing in the smallest tooth. After gumming the saw a few times the teeth must become regular. *E* is a set screw to regulate the depth of gullet. Fasten the machine

Including cutter-holder and three cutters of any of the following sizes, 1, $1\frac{1}{8}$, $1\frac{1}{4}$, $1\frac{3}{8}$, and $1\frac{1}{2}$ inches. When ordering, specify the size wanted. One-inch cutter is the smallest size that can be used on this gummer.

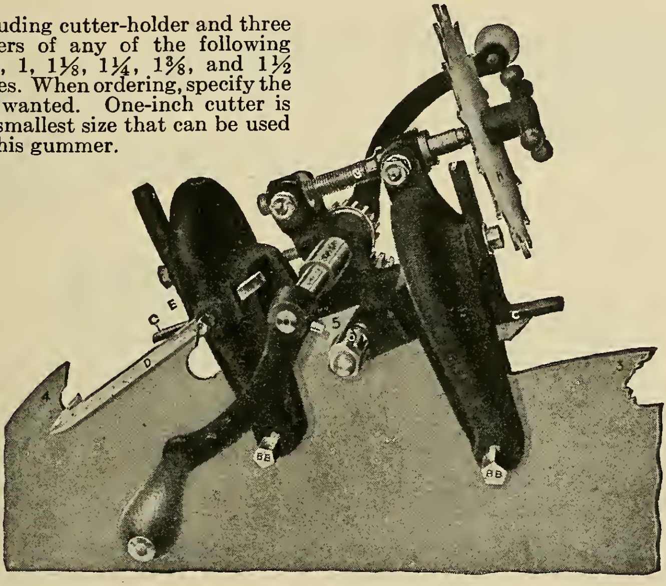


Fig. 36. A chambering machine for circular saws 40 inches or more in diameter

to the saw by means of the screws *BB*, and proceed to gum the first tooth. One of the points of the star being struck at each revolution, by a projection on the handle the cutter is fed steadily in until arrested by set screw *E*. Move the machine forward to the next tooth, after having run the cutter back and proceed as before until all the teeth are gummed. Should the gullet or chamber be worn smooth, and the cutter fail to bite, rough the gullet with a file. The cutter is arranged to slide on its axis. When one portion becomes dull, a new sharp cutting surface will be presented, by moving a washer from one side of cutter to the other. Therefore continue to change the washers until the whole face of the cutter becomes dull.

To take the cutter off the shaft, put the pin, hanging to the gummer, in the hole in the ratchet wheel. This is to keep the shaft from turning while unscrewing the nut, which has a left-hand thread. The hand wheel on the end of the feed screw, outside of the star, is to allow the operator to feed easily and gently with the hand when starting to cut rough gullets, until the cutter gets a bearing, when by tightening the jam-nut on the opposite side of the star, the machine is made self-feeding. The ratchet by which the cutter is moved effectually prevents any back motion.

This gummer is a valuable machine, and should be in the hands of every mill-man. It saves power, files, and time, and is so easy to operate that any one of ordinary intelligence can be taught to use it.

CUTTER GRINDER

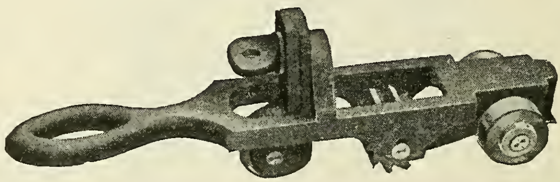


Fig. 37. Cutter grinder for holding the gummer cutter in position during process of sharpening

To grind the cutters the stone should have a perfectly straight face and turn from the operator. Lower the adjustable frame of the grinder until the cutter touches the stone, then adjust the spring in proper position. When properly adjusted, the backs of the teeth of the cutters can be ground so that the cutting edge will be a little higher than the rest of the tooth, and the entire cutter round and sharp.

Furnished with either No. 1, 2, or 3 (Pin) shaft.

"CONQUEROR" SWAGE, JUMPER OR UPSET

Trade Mark Registered U. S. Patent Office

Swages, Jumpers, or Upsets are for the purpose of spreading the points of the teeth and for bringing out corners reduced by wear, thus saving time, saw, and files, if properly used.

The teeth of a saw must be swaged to a sharp, keen edge. The bottom of the openings in the Conqueror are slotted.

Therefore with this tool it is impossible to blunt or injure the fine cutting edge of the tooth, which is a frequent result with solid swages. One of the principal drawbacks in the manufacture of solid swages is the difficulty experienced in hardening them properly at the bottom of the openings. This portion of the swage does all the work, and should be hardened in the most perfect manner. The Conqueror is hardened before the sleeve is driven on, and the hardening composition passes freely through the slots at the bottom of the openings, thus insuring an even and correct hardening in that portion of the swage where it most required.

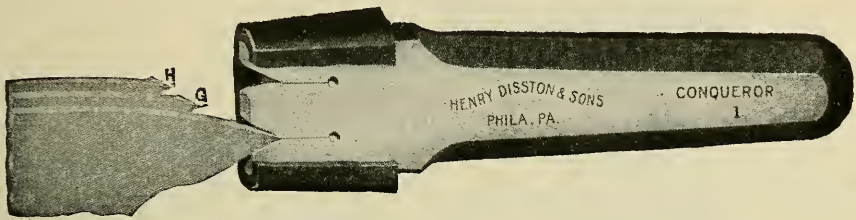


Fig. 38. No. 1 "Conqueror" Swage for large circular saws

DIRECTIONS FOR USING THE CONQUEROR SWAGE

File the tooth sharp to the shape of the gauge packed in each box, in order that the swage may operate on the point. Oil the point of the tooth, then apply the rounded or convex jaws of the swage—these take their bearings on the centre of the tooth, spreading and shaping it as shown in section "H" of the above sketch.

Now apply the square or flat opening—this will square up the point of the tooth, as shown in section "G" of the above sketch.

If the first operation with both dies does not give sufficient spread, file the tooth again to fit the gauge and proceed as before.

In swaging use a light hammer, and do not strike too heavy a blow. Oil the tooth frequently.

Hold the swage in proper line (see position of swage in relation to tooth in cut) so as not to drive the point of the tooth below the cutting line.

The Conqueror Swage is made in seven different sizes to suit all thicknesses of saws.

MACHINE FOR SETTING CIRCULAR SAWS

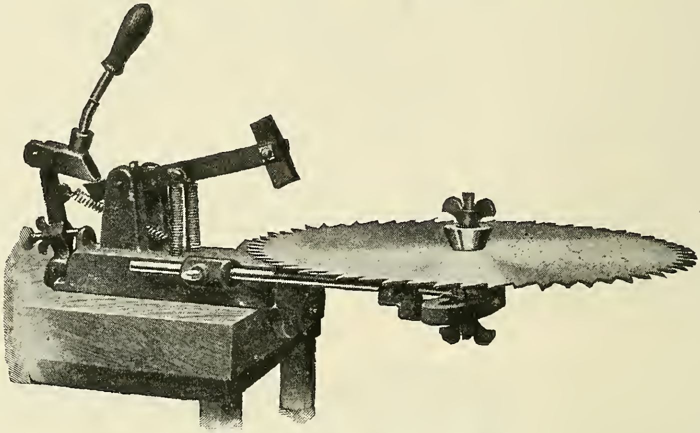


Fig. 39. Circular saw setting machine

Aside from character of steel, temper, and workmanship, the successful operation of circular saws depends largely upon the manner in which saws are fitted. To obtain best results the teeth should be properly and evenly set. This machine does the work perfectly, insuring easy running and smooth cutting.

This tool is adjustable for saws from 5″ to 24″ diameter.

The force of the blow from the hammer can be adjusted to any thickness of saw.

The set of each tooth must necessarily be uniform, as the hammer strikes every blow with equal force at the same angle. It is adjustable to give heavy, medium, or light set, and will do more and better work than any other machine of its kind.

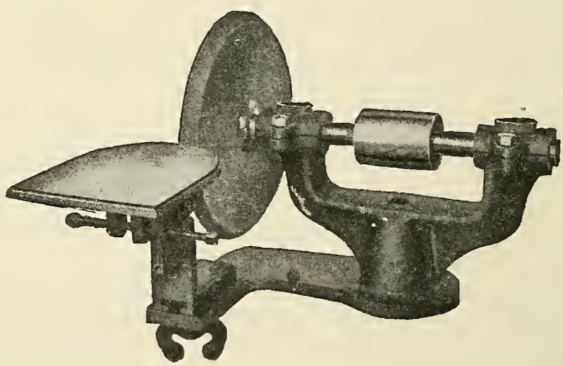


Fig. 40. BORTHWICK'S STATIONARY SAW SHARPENING MACHINE or emery wheel gummer. EMERY WHEELS of superior quality, for gumming and sharpening saws. The stock size is 12 inches diameter, ¾-inch thick, 1-inch hole, with beveled edge. Special sizes made to order.

INSERTED TOOTH CIRCULAR SAWS

CHISEL POINT CIRCULAR SAWS

Fig. 41. Chisel tooth saw

Inserted tooth saws were first introduced with the object of preserving the diameter of the saw plate.

The first patterns were crude affairs, consisting of square pieces of steel set in the rim of the blade and secured with a rivet. Scores of designs were presented from time to time, each possessing some improvement in the shape of the teeth and means for securing them. Later inventions sought to facilitate the removal of the worn out teeth and the insertion of new ones.

We manufacture different forms of inserted tooth saws, some of which are illustrated and described in this handbook. The highest development of the art is the improved chisel-point saw illustrated above, which comprises everything desirable in the method of securing the teeth in the blade by means of rotary locking holders or shanks, requiring but a few moments to replace the teeth. This is done without making the slightest alteration in the tension of the blade.

The No. 33 style provides ample throat room and clearance to suit all classes of work to which this pattern of saw is applicable.

These chisel-point saws are constructed on scientific principles, and to secure perfection, special machinery is employed.

The points and holders in each size are exact duplicates, and when ordered in accordance with instructions, are guaranteed to fit.

USES OF CHISEL-POINT SAWS

Chisel-point saws are unexcelled for board saws in saw mills, from the smallest water power to the largest steam mills employing independent steam and shot-gun feeds—for lath bolters, gang edgers, single edgers, shingle bolters, saws for heavy bench work, short log saws, grooving saws, clap-board saws, boxboard saws, ice saws, handle, stave, spoke, knee, and heading bolters, twin saw sizers, etc.

HOW TO ORDER CHISEL-POINT SAWS

Full directions and a list of particulars necessary to order saws of this description will be found on pages 16 and 17.

These particulars should be carefully given, and in cases where the gauge and number of teeth are left to our judgment, it is necessary to specify the horse power available to drive the saw, the speed both in and out of the cut, the greatest feed in inches per revolution, the kind of timber to be sawed, and the daily capacity of the mill.

It is essential to give the *exact* size of the centre hole. If the centre hole is altered after the saw leaves our hands it is liable to throw the saw out of round and consequently out of balance.

STYLES OF TEETH

These are made in several sizes to suit different classes of work and the kind of timber grown in various localities.

The popular sizes are Nos. 1, 2, 33, 4½, and 6. No. 1 being the largest, is designed principally for the heavy timber of the Pacific Coast. The No. 4½ and No. 6 are the smallest sizes, permitting the insertion of the maximum number of teeth for board saw mills carrying high feeds and also being suitable for edgers, bolters, and lath saws.

For general sawing, hard and soft-woods, in small and medium-sized mills the No. 33 pattern cannot be excelled. This size is also used for rift saws, heavy edger saws, and bench saws.

The No. 2 pattern, though used largely in the firs and pines of the Pacific Coast, is useful for general sawing of both hard and soft woods where a greater amount of throat room is desired than the No. 33 provides. This is a good all around tooth and has proved its efficiency in the Southern States and in the Middle West.

HOLDERS

In sawing sandy or gritty logs, the edges of the inner circles of the holders are liable to wear and become rounded. This permits a portion of the dust to pass down between the side of the saw and the log, instead of being properly chambered and carried out of the cut. The tendency then is to create friction and heat, which is detrimental to good work. To prevent this, the edges of the inner circles of the holders should be filed across and kept square. Holders which have become thin from long usage should be discarded and replaced.

The swaged pattern of holder, which is one-and-one-half gauges heavier in the throat than the sawplate proper, will be supplied if specified.

Holders of the swaged and slotted pattern are made in all sizes for those who prefer the slotted pattern of holder.

SPECIAL HOLDERS

When the sockets holding the shanks are worn large it is advisable to order the special sizes of shanks or holders designed to take up this wear. There are two special sizes; one is 1/64″ and the other 1/32″ larger in the circle than regular sizes.

Unless the shanks fit snugly, they are liable to break or cause the points to break. A shank that has become strained or compressed through accident can be expanded by removing it from the saw, laying it on an anvil, and striking it sharply on both sides, on the inner circle; consequently there is no reason for the shanks or bits ever fitting loosely. It must be noted, however, in hammering the shank, unless an even number of blows are struck on each side, the shank will be bent out of shape.

GUIDES

Millmen often make the mistake of setting the guides too close to the rim when operating inserted tooth saws. This is an important item, and the operator should see that the guides CLEAR THE HOLDERS by at least one-quarter of an inch. Otherwise the saw will run unsteadily and the holders and points will be turned out of place.

INSERTING NEW POINTS

Oil the grooves carefully. Place the new point or bit squarely on the head of the shank. If the point should not turn into position readily, lift the wrench enough to permit the ball or head of the holder to assume its proper place in the point; then start again and the point will be found to move steadily into position. Do not use undue force, the stops should meet lightly, and no additional pressure should be applied to the wrench when the heel of the bit has reached the shoulder.

SHARPENING CHISEL-POINTS

The points or bits should be sharpened or filed without taking them out of the saw, thereby preventing unnecessary wear. The temper of these points is such that they may be sharpened by the use of a good file. The following illustration shows the file specially designed for this purpose.

CHISEL-POINT FILE

Made 8, 9, and 10 inches in length

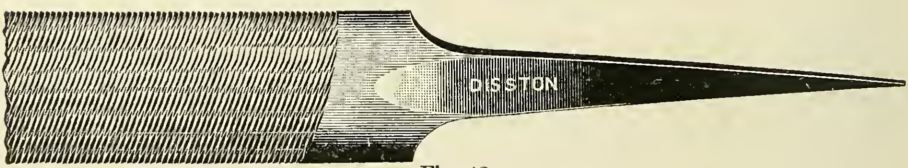


Fig. 42

Most of the filing should be done on the front or the throat of the tooth. It is only necessary to file enough on the back to remove the burr. Very little work is required to sharpen points. Care should be exercised to keep the cutting edge at right angles to the side of the saw. Do not use a square-cornered file, as this will leave a sharp nick under the point. A bit left in this condition is liable to break and injure the blade.

Fig. 43-A

Fig. 43-B

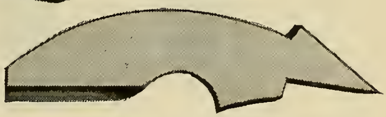


Fig. 43-C

Fig. 43-A shows the point when new. Fig. 43-B shows the point when it has been properly filed until worn out. Fig. 43-C shows the point improperly filed, which method weakens it.

Should a bit be broken by accident, the new one must be dressed to the length and width of those in the saw.

SWAGING POINTS

If the bits are to be swaged, the work should be done with the Conqueror Swage and a light hammer, drawing out the corners just enough to square the points; then the set should be dressed with a side file. Relieve the corners so as to give proper clearance. In swaging, be careful not to strike hard enough to upset the shoulder or strain the shank, for the saw is liable to be ruined in this manner.

To save the saw, when swaging "Points" it is best to use a swaging plate which may be held in a vise. This, which is practically a small section of a saw, holds one tooth. It can be supplied at small cost.

DRESSING POINTS

Particular attention is called to the necessity for keeping the cutting edges of the points at the proper width. It is desired that this important item may not be lost sight of, since most complaints may be traced to a disregard of this requirement. If the points are filed so that they are wider behind the cutting edges than on the extreme corners, good work cannot be accomplished. The following diagrams, (Fig. 44) C, D and E, were taken from bits removed from saws, concerning which complaint was made. The reason is at once apparent. Diagrams A and B show two styles of side dressing, either of which is good, depending on the class of work in hand. The spread should be distributed evenly on both sides of the saw.

A B C D E

Fig. 44

WIDTH OF CUTTING-EDGE

Chisel-points are made in various widths of cutting-edge. A small booklet, containing a list of these sizes, will be supplied on application. The regular width is furnished, unless directions are given to the contrary. The booklet mentioned gives full instructions on this particular.

"FITTING" SAWS TO CUT FROZEN TIMBER

Before starting to cut frozen timber, equip the saw with a new set of swaged holders, laying aside the old ones for summer sawing. This expenditure will be found a paying investment. The swaged holder is a gauge and a half heavier in the throat than the sawplate proper, and is designed to hold and carry out of the cut the finest dust, which would, otherwise, pass down the side of the saw, freeze to the log, and force the saw out of line.

For winter work it is not desirable to use a side file, which will leave flat places on the sides of the points parallel to the sides of the saw. Should a side file be used, be careful to see that the bits are "relieved" behind the points to the extreme edge by giving them clearance through a slight under-cut and back-cut with a hand file. To do successful work in this class of sawing the corners *must be sharp*.

It is possible to use narrower bits than in summer sawing. In some sizes a special short bit, particularly designed for winter work, is made. This short bit is illustrated and described in the pamphlet "Chisel-Points and Holders."

A number of our customers operate chisel-point saws very successfully in winter by using worn points, discarded during the summer months; they should be selected in sets of even length so that the saw will be round.

The old points may be swaged a trifle. Use no more set than is absolutely necessary. Taper back nicely from the points by careful side dressing, with the teeth widest at the extreme points, and do not allow the corners to become round, or the saw will dodge out of the cut, particularly in slabbing. The corners next to the log do most of the cutting, and soon become dull in frozen timber. Consequently it is necessary to watch for this so that the saw will not be allowed to run out of the cut and become strained or buckled.

DIRECTIONS FOR ORDERING CHISEL-POINTS AND HOLDERS

Every chisel-tooth saw of our manufacture has a *shop number*, which will be found directly under our brand, midway between the eye and the rim. Invariably give this number when ordering points and holders.

When there is the slightest doubt about sizes, or gauges, or where the shop number cannot be obtained, send a sample tooth or holder (an old one will answer) with the order.

The gauge of both teeth and holders should be the same as the saw plate (except in special cases), and this may be

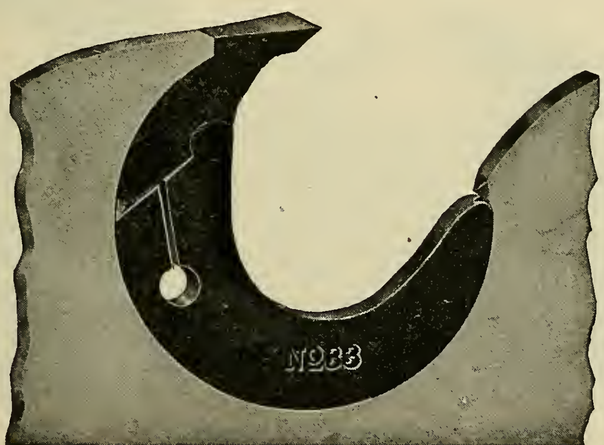


Fig. 45. No. 33 chisel tooth, full size

determined by applying a Disston Standard Wire Gauge, which corresponds exactly to the Stubbs or English Wire Gauge.

To fill an order properly, we must know the size of the tooth, the gauge, and the width at the cutting edge. Teeth of standard width of cutting-edge are always sent unless otherwise specified.

The size of the holders or shanks always corresponds with the size of the teeth used. If No. 33-8 gauge teeth are used, the proper size of holder to order is No. 33-8 gauge. In instances of special styles, specify the pattern stamped on the holder in addition to the number and gauge of the tooth, also whether solid, swaged, or swaged and slotted.

IMPORTANT NOTICE

When returning chisel-tooth saws for repairs please leave all the teeth and holders in place, for they are needed in adjusting the tension. Unless teeth and holders are returned we shall supply a new set at regular prices. Be sure to mark the name of the shipper on the case, for purposes of identification.

INSERTED TOOTH SAWS
NO. 10 PATTERN

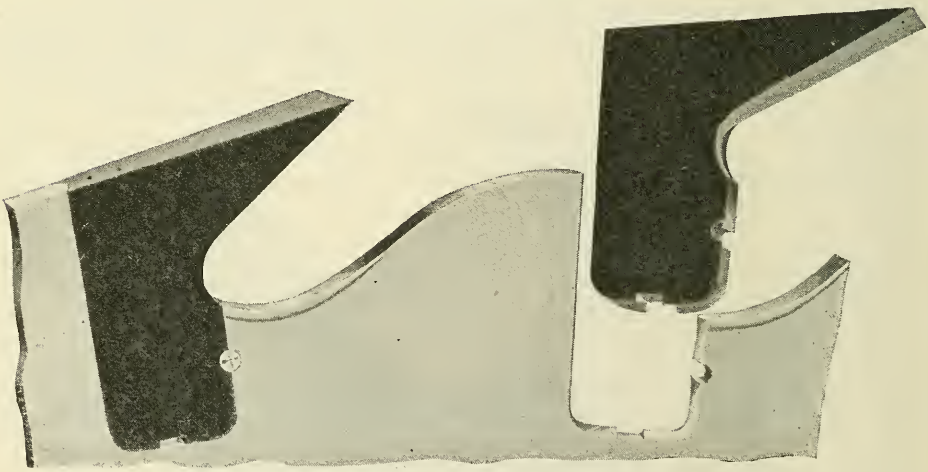


Fig. 46. No. 10 pattern tooth

This style of tooth is sometimes termed the Spaulding Tooth, and is used principally in heavy mills on the Pacific Coast. The No. 10 tooth is made in three sizes suitable for small, medium, and large timber.

INSERTED TOOTH RE-SAWS, NO. 16 PATTERN

The difficulty occasioned by wearing down or reduction in diameter of re-saws, has created a demand for an inserted tooth saw of this class. To supply this want, we are now making re-saws with the improved re-saw inserted tooth, of which the above is a representation. The advantages claimed for this style of saw are numerous, the most important of which is that the original diameter of the saw is retained. This point will readily be seen by all practical operators and sawyers; for the saw must be the proper diameter and thickness at rim and centre to give the best results. If the diameter is decreased, the periphery or cutting edge is brought closer to the heavy centre or flange of the saw, not only cutting out a heavier kerf, but bringing an undue strain upon both saw and machine and causing the pieces being sawed to take a short, sharp spring-off. In sawing short stuff where flanged saws are used, the flange or collar, by its close proximity to the cutting edge of the saw, splits a portion of piece from the bolt instead of sawing it. This gives very unsatisfactory results both as to quality and quantity of work done. Therefore, if the saw is right at the start, by retaining original thickness and size, these difficulties are entirely obviated. To do this, inserted tooth saws must be used, or the solid tooth saw must frequently be replaced.

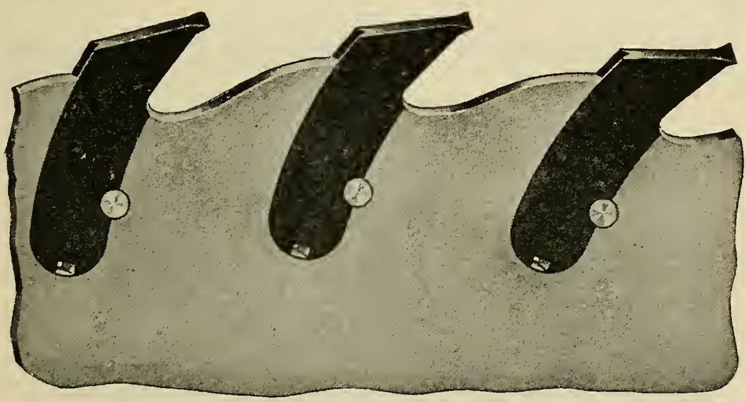


Fig. 47. Inserted tooth saw, No. 16

This saw can be made in gauges from 12 to 17 at the rim. By replacing the teeth when they are worn out the saw is practically renewed at a very small expense.

These saws are no experiment. They have been used for years with satisfactory and economical results, and we give the same warranty with them that we give on all goods bearing our brand.

INSERTED TOOTH CIRCULAR CROSS-CUT SAWS

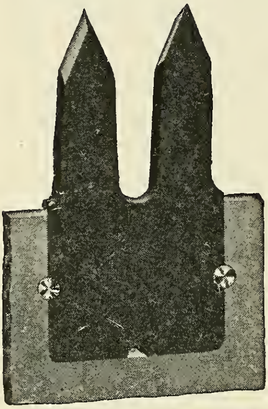


Fig. 48. Two-prong

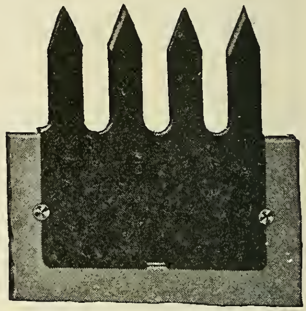


Fig. 49. Four-prong

This style of saw is particularly adapted for use in pulp, paper, shingle, and stave mills, also for slab and slasher saws, and where logs or cants are cut into short lengths or bolts. Thorough tests covering a trial for some years, of both two and four-prong patterns, have demonstrated them to be a decided success. The teeth are high in temper, thus giving superior edge-holding quality.

They are designed for use only in saws 36 inches in diameter and larger. They are made in 4, 5, 6, 7, 8, and 9 gauge only, and can be sharpened readily on an automatic saw sharpener.

SPIRAL TOOTH CIRCULAR CUT-OFF SAW

Patented May 5, 1914

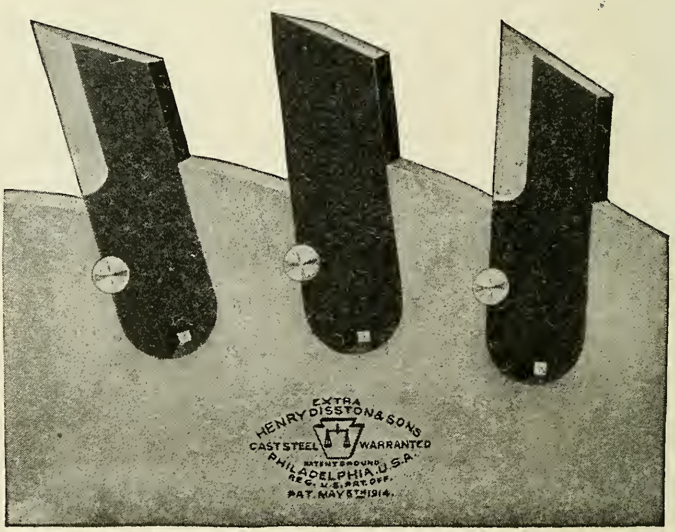


Fig. 50. Spiral tooth cut-off saws

A rapid, smooth cutting, easy running saw. Superior to any other form of cut-off saw of inserted tooth type.

The teeth are inserted in the blade on spiral lines, which give full clearance to each individual tooth and also perfect clearance to the blade in the largest cuts.

The manner in which the teeth are inserted in the blade does away with the necessity of setting or springing the teeth for clearance.

The only operation for keeping the saw in running order is to sharpen the teeth, which is readily accomplished through the use of any of the standard automatic cut-off saw sharpeners of the proper size.

We recommend and guarantee the spiral tooth to give economical and satisfactory service in all kinds of cut-off work on large timber and logs, and particularly where the greatest capacity is required, such as cutting logs into pulp-wood length, stave bolts, and shingle blocks.

DIAMOND-POINT INSERTED TOOTH CIRCULAR ICE SAW

Patented Nov. 16, 1915

Fig. 51. Diamond-point ice saw

This is an improvement on the regular square-bit chisel tooth which has stood the test of time in so many plate and natural ice harvesting plants.

The diamond-shaped point, through making a pronounced **V** in the bottom of the groove, centers the cleavage point, and therefore allows the floats and cakes to be barred-off with materially less flanging than is possible when the bottom of the groove is flat or square.

INSERTED TOOTH SAWS

American Saw Co.'s Designs

We continue to manufacture and supply all of the styles of inserted tooth saws and the teeth, bits, springs, or holders, formerly made by the American Saw Company, of Trenton.

TRENTON TOOTH, 1894 Style

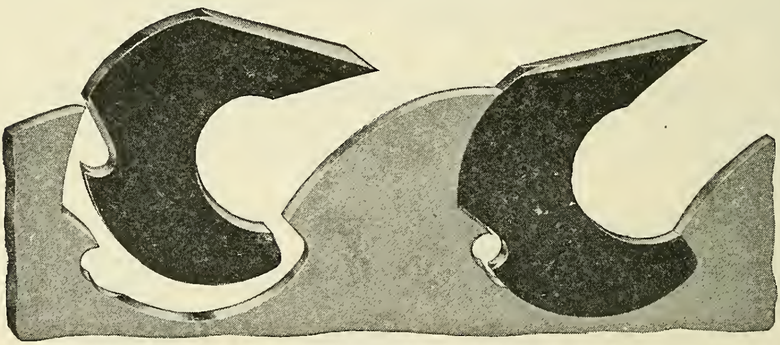


Fig. 52

We are prepared to supply the American Tooth, the Trenton Tooth regular, the Trenton Tooth 1894 style, the Brooke Bit and Spring, the Dunbar Tooth, the Risdon Tooth, the High Speed Tooth, the Prosser Tooth, and the Goulding Bit. These teeth are sharpened and dressed the same as a solid tooth saw, and the directions in this handbook for the dressing of solid tooth saws will apply. The teeth are all ribbed on the back to lessen the amount of swaging necessary.

When sharpening, the same cutting angles should be preserved, and the gullets kept round, either with a round file or by the use of a proper gummer.

When changing teeth, first drive them into position by placing a swage on the cutting edge and striking a blow with a light hammer. Care should be exercised not to expand the rim of the saw by riveting too tightly, for if this operation is not done properly the tension of he saw will be destroyed. It is only necessary to rivet enough to secure the tooth firmly. The surplus metal must then be chipped off with a cold chisel in order that it may not interfere with the running of the saw.

For those who prefer this form of inserted tooth saw to the chisel point, the Trenton Tooth 1894 style is recommended. The Trenton Tooth is made in two sizes, No. 1 (large) and No. 2 (small).

SAWS FOR SPECIAL PURPOSES

SHINGLE AND HEADING SAWS

Fig. 53-A. Left-hand

Fig. 53-B. Right-hand

When ordering shingle saws give full specifications, as follows: diameter of saw, in inches, thickness or gauge at centre, thickness or gauge at rim, number of teeth, right or left-hand, and speed of saw.

If we are to furnish the flange, state size, and maker's name of machine, or send correct and full templet of old flange, giving size and location of holes.

If we are to furnish the saw only, send the flange to us that we may fit it to the saw. If you cannot forward the flange, send templet of holes and sample of screw by which to drill and countersink saw.

Fig. 54-A

SCREWS FOR SHINGLE SAWS

Particular attention is called to the importance of using screws that are suitable to the thickness of the saw. We frequently receive screws as samples by which to drill and countersink, that have heads entirely too large for the thickness of the saw,—which require the flange to be countersunk (as shown in Fig. 54-A). This reduces the length of thread in the flange making it impossible to bind the saw firmly to the flange.

Fig. 54-B

Fig. 54-B shows the correct size the screw-heads should be to obtain a good bearing for the screw-heads on the countersink in the saw. The full thickness of the flange is retained for the thread.

In no case should screw-heads be deeper than the thickness of the saw. Thin saws require smaller screw-heads than thick saws.

FLANGES OR COLLARS for SHINGLE AND HEADING SAWS

The flanges to which shingle saws are attached are usually made of cast-iron and are necessarily much heavier and stiffer than the saws. This being the case it is perfectly manifest that, if the faces of the flanges are not true, no saw, no matter how accurately ground or hammered, will be flat or true when screwed fast to a stiff, untrue flange. Nor can any saw reasonably be expected to do good work under such circumstances.

Cast-iron flanges are easily and frequently sprung out-of-true when "shingle bolts" break loose from the dogs and are jammed between the saw and the frame of the machine.

All flanges should be carefully examined before new saws are put on them and if a flange shows out-of-true, it should be sent to the factory for correction. It is always a good plan to send the old flanges when ordering new saws. Then, if the flanges are sprung, the manufacturer will correct the trouble. The charge for this will be merely nominal and nothing in comparison with the amount that might be wasted, in time and material, trying to run perfect saws on imperfect flanges, besides running the risk of ruining the saws.

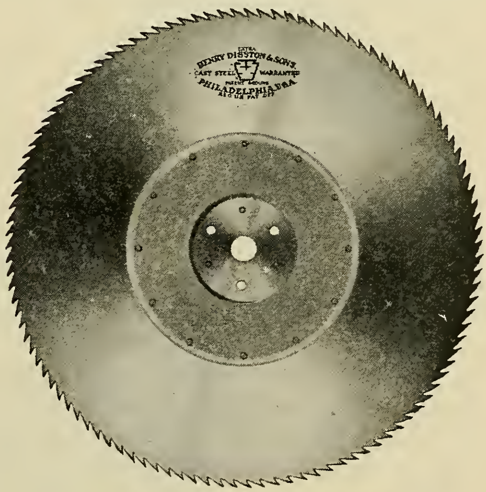


Fig. 55. Shingle or heading saw showing collar and flange

SET GAUGE FOR SHINGLE, HEADING, AND VENEER SAWS

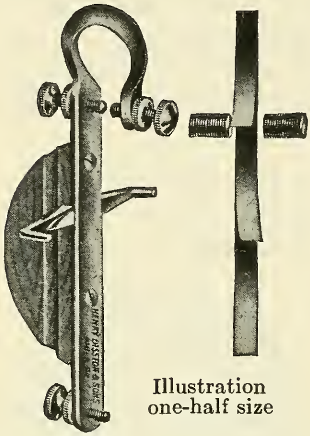


Illustration one-half size

Fig. 56

The illustration represents a gauge for regulating the amount of set for shingle, heading, and jointer saws.

As shown, the gauge is a simple contrivance, having three set screws and two projecting arms, and is operated from the flat side of the saw.

The amount of set required being known, first adjust the gauge to the flat side of the saw by use of the bottom screw and side arms. Then turn the upper or gauge screw on the left hand side until it rests lightly on the side of the plate or tooth,—before it has been set. Reverse the gauge screw until the amount of set wanted is shown between the end of the screw and the tooth. Fasten in this position by the jam on the screw, then adjust the right side of the gauge in same manner, and the tool is ready for use.

VENEERING SAWS IN SEGMENTS

LEFT-HAND RIGHT-HAND

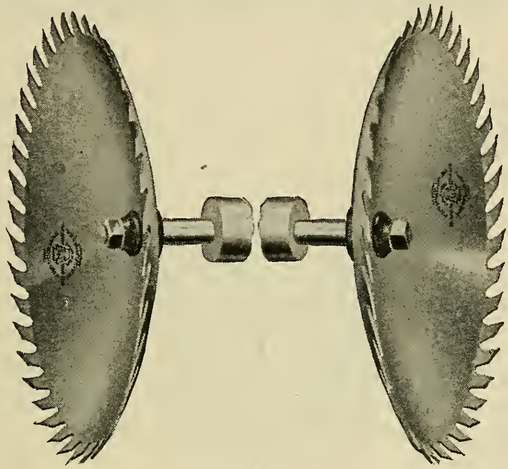
Flat or countersunk side Flat or countersunk side

Fig. 57

Segment saws are used both for re-sawing boards and planks into thinner stock, and for cutting veneers. But since the advent of the band re-saw, the segment saw is used principally for sawing veneers. Usually the stock from which the veneers are cut is very valuable wood. Therefore manufacturers save as much of the stock as possible by reducing the saw kerf to the finest practicable width. To do this, a large cast iron plate or flange is used to make up the centre of the saw,—the segments being attached to the flange by countersunk screws.

The segments, when new, are from 12 to 15 inches deep, usually 7 or 8 gauge at the heel and taper to 19 gauge or thinner on the toothed edge. The countersunk side of the whole saw is flat; all the taper of flange and segments being on the other side of the saw. The veneer, only one-eighth inch or less in thickness, readily springs away from the thick part of the flange, leaving it practically free from friction and heat which, while less detrimental to the operating of segments saws, is always objectionable.

CONCAVE SAWS



Left-hand Fig. 58 Right-hand

Concave saws are used in the manufacture of barrel heads, keg heads, etc. They are dished and tempered by an entirely new and patented process, and are of good quality in every respect. To keep concave saws in order, set both sides of the teeth alike. File the front of the teeth square and bevel the backs a trifle. Have the same amount of rake on the fronts of all the teeth. Keep the gullets round. Do not run a dull saw.

BILGE AND CYLINDER SAWS

Fig. 59. Bilge saws

Fig. 60. Cylinder saw

We are prepared to furnish these saws of a superior quality, ground and tempered by our special process. They are made of the best Disston-made steel and will give satisfaction. We repair and re-steel old cylinder or barrel saws.

This is a second type of cylinder saw. We make all patterns of cylinder saws, both brazed and open joint, and bottom saws with or without heads.

Fig. 61. Cylinder saw

Used for cutting out round holes, also round sections such as tops for shoe brushes, basket bottoms, etc.

RE-FILING CYLINDER AND BILGE SAWS

The instructions and sketch below give a correct rule for filing and keeping this class of saws in proper order. While 9/16 of an inch is given as a base for the depth of the teeth, this is subject to variation to suit the different conditions.

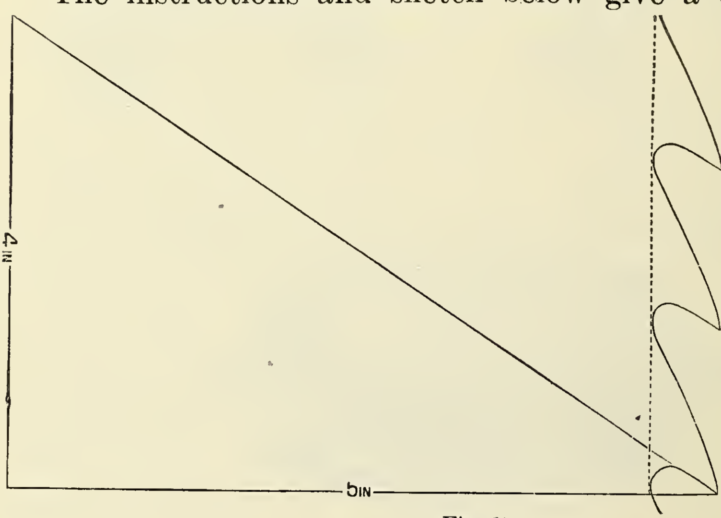


Fig. 62

To Obtain the Correct Depth of Teeth.—See that all the points of the old teeth are even. If not, raze off until they form an even edge. Chalk the surface of the saw to retain a pencil mark, on which scribe a line 9/16 of an inch from the end of the razed points, like the dotted line on the sketch.

Proper Pitch for Front of Teeth.—Draw a line 6 inches lengthwise with the axis of the saw. From the end of this step off 4 inches parallel with the edge of the saw. Then draw a line from this point to the point of the tooth which will give the angle or pitch.

It is only necessary to lay out two teeth in the manner suggested, after which a tin templet can be cut to correspond with them and the balance of the teeth marked out accordingly.

To Shape the Teeth and Gullets a 3/8 inch round file is generally used, the balance of the tooth being finished with an ordinary mill file, shaping the front and back of the tooth as shown on the sketch. Particular attention should be given to file the gullets round at the bottom, for sharp, square corners will cause breakage.

When dressing the teeth, file the cutting edges square with the face or front of the teeth. The set should be merely sufficient to clear the saw, and should extend no more than one-third the depth of the tooth. A uniform set can be obtained by using a metal templet and springing each tooth to this.

If a swage set is used on cylinder saw, the work can be done either with an ordinary up-set swage or with an eccentric swage.

CHAMFERING SAW

These saws are used in conjunction with concave saws for cutting a chamfer on the heads of barrels and kegs. The teeth are milled to make a shear cut. The front of the tooth beveled to 60°.

Fig. 63

These are usually made 6 and 6½ inches in diameter. Special sizes and patterns will be made on order.

GROOVING SAWS
Solid Tooth

These useful tools are too well known to require special mention. They are ground thinner at the centre than at the rim, so that little or no set is required to keep the extreme points of the teeth perceptibly wider than body of the teeth. We make these saws with

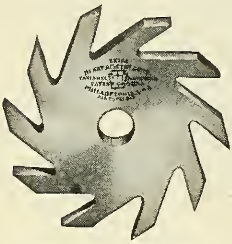


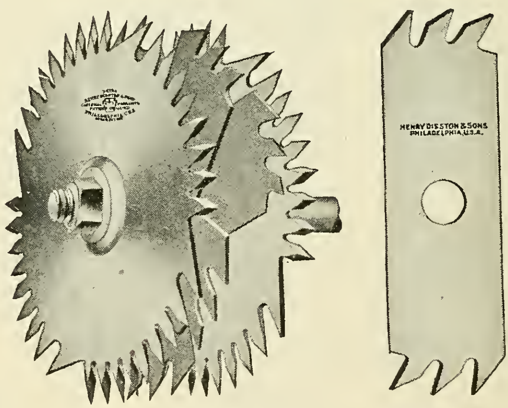
Fig. 64. Regular

any thickness at edge or centre that may be wanted. In ordering grooving saws, state whether they should be straight or hollow ground. If a hollow ground saw is desired give the size of the collar.

We manufacture grooving saws with various patterns or shapes of teeth (solid and inserted) to cut grooves of any width, depth, or special shape on bottom or side.

Fig. 65. Special

KEYSTONE GROOVER OR DADO HEAD



Inside cutter

Fig. 66

This head consists of two outside saws, each ⅛ inch thick. These operated singly will cut a groove ⅛ inch wide. The two saws placed together will cut a groove ¼ inch wide. With the addition of inside pieces placed between the saws, grooves of any width may be cut from 5/16 inch up by sixteenths.

The construction of this head and its adjustment for various widths of grooves is simple, and it is easily kept in order.

LOCK-CORNER CUTTERS

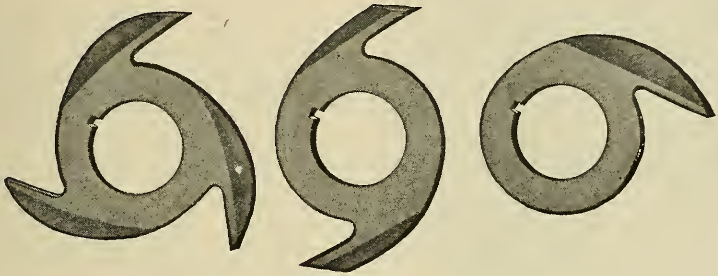


Fig. 67

These are used for dovetailing and are made in any diameter, thickness, and with any number of teeth, suitable for the various widths of grooves desired.

THIN RIM CIRCULAR SAWS

These are used for cutting window frame pockets and on other work where a thin saw is desirable and where it is not practicable to use a saw ground thin all the way to centre. It will be noted that the centre of this saw is left heavier than the rim, to give strength and stiffness.

Fig. 68

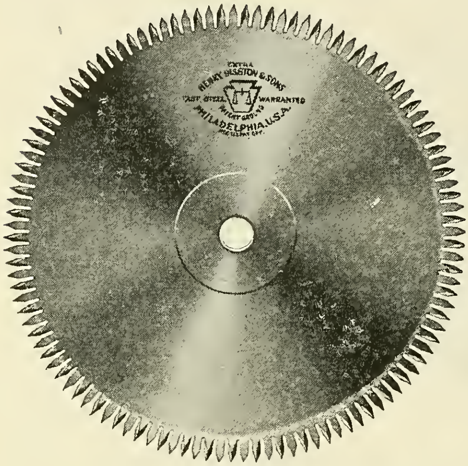


Fig. 69

CIRCULAR MITRE SAWS

These saws are ground to run without set. They are especially adapted for smooth cutting, such as cabinet and cigar box work.

When ordering, give the size of the centre hole, also the diameter of the collars on the mandrel.

CIRCULAR MITRE SAW

With Cleaner Tooth

This style of saw can be made either for ripping or cross-cutting. When made for ripping a greater number of cleaner teeth are put in than when made for cross-cutting. This style of saw cuts equally smooth in either ripping or cross-cutting.

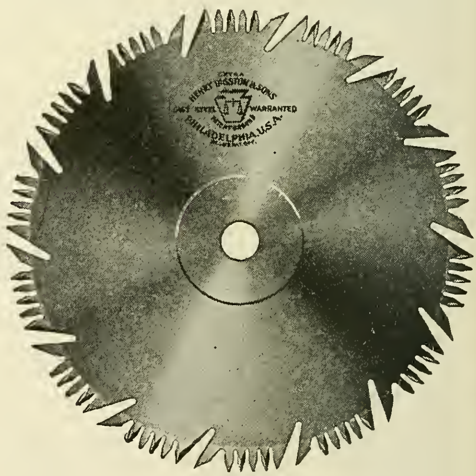


Fig. 70

HAMMERING AND ADJUSTING CIRCULAR SAWS

Tensioning

The many inquiries we have in regard to the method of hammering and adjusting the tension in saws has induced us to print a few simple instructions on the subject. If carefully followed these can not be other than a benefit to beginners and others seeking information in this line. All saws of whatever kind, if properly made, are what we will call "loose," through or toward the center to suit the speeds and different kinds of work for which they are intended. The object is to keep the edge strained on a straight line, to prevent it from chattering or cutting a zig-zag kerf through the timber. What applies to any one kind of saw in the method of hammering, applies to all. The circular saw, however, is the most difficult to treat. Even after the most careful instructions, practical experience and close observation on the part of those having these saws in charge, is necessary before they can be successfully hammered.

The strain in running and the process of gumming will stretch the edge of the saw and it will begin to run snakey, rattle in the guides, and make bad lumber. However, before concluding that the saw must be hammered to adjust the tension, see if there is not some other cause for the trouble, such as improper lining, the adjustment of the guides, the collars, the saw out of balance, and the dressing of the teeth. These matters, however, are all referred to in this hand-book, and are only mentioned here for those who have not had experience. Our object here is to treat on the hammering necessary to keep the saw true and in proper tension. This means that it must be open sufficiently and properly from the edge toward the centre to suit the motion of the saw and the feed of the mill.

The tools required are—anvil, one round-face and one cross-face hammer, two straight-edges—one from 14 to 18 inches long, one about 48 inches long—and one try-mandrel. We find that these tools for fitting up saws are being put in many of the large mills. The men who handle the saws are making themselves proficient in the hammering of the saws to suit their wants. This knowledge they have acquired by perseverance and practical experience, the only way in which it can be obtained.

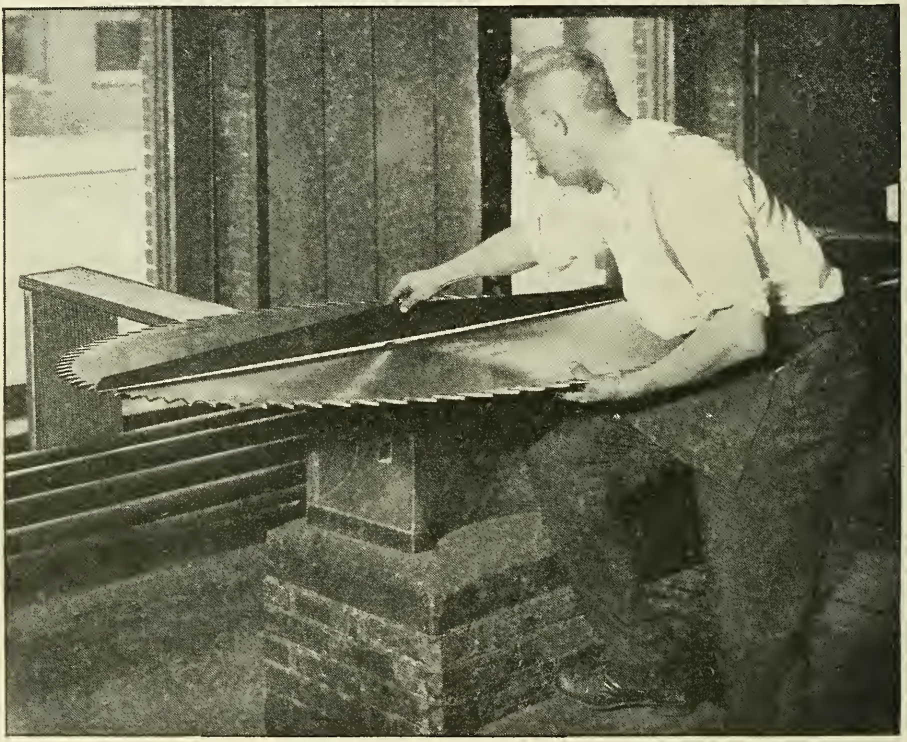


Fig. 71. Appearance of a saw having correct tension

In studying the subject of how to hammer circular saws, it would be well for those who have charge of the saws, to examine them when first received for the tension, assuming that they are correctly tensioned for the speed and conditions given when they leave the maker. All the saws made by us are as true as it is possible to make them. Figure 71 shows a saw properly tensioned. It must be remembered, however, that different speeds and feeds call for different adjustment of tension. A saw that has lost its tension appears as that shown in figure 72 and needs hammering with a round-face hammer, along the lines shown in figure 73–A. Before commencing to hammer to restore the tension, examine or test the saw all around with a straight edge, as shown by figure 74. If any part of the saw between the rim and the centre falls away from the straight-edge, mark around this spot as shown by figure 73–B, and do not hammer as much, if any, at that place. In testing

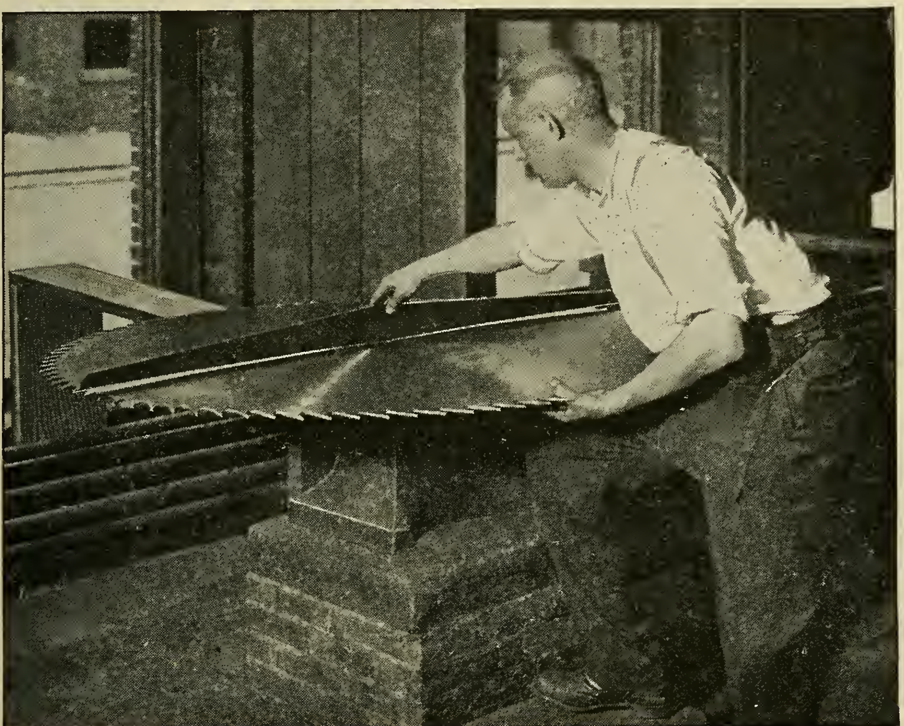


Fig. 72. Appearance of a saw that has lost its tension

for the tension (see Fig. 74), be sure to have the straight-edge at right angles with that part of the saw which rests on the board that extends back from the anvil, and with the opposite edge which is being raised with the left hand. The straight-edge is held and gently pressed down with the right hand. Do not lean the straight-edge to one side but hold it straight up, or it will fall to the form of the saw and not show what is desired. A straight-edge reaching from the centre hole well out to the edge of the saw is the best to use to judge the tension in hammering, and when this straight-edge is applied as above, the saw should fall away from a straight line as shown by figure 74. This will show that the centre of the saw is stiff, as it must always be to run properly and do good work. If a short straight-edge about 6 inches long were pressed directly over the centre, it would show the saw to be nearly flat or of equal tension at

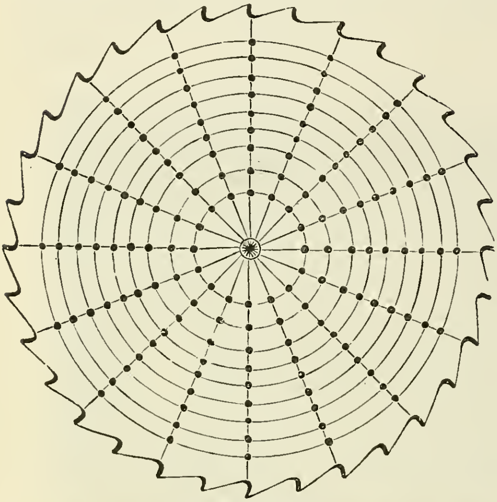


Fig. 73-A

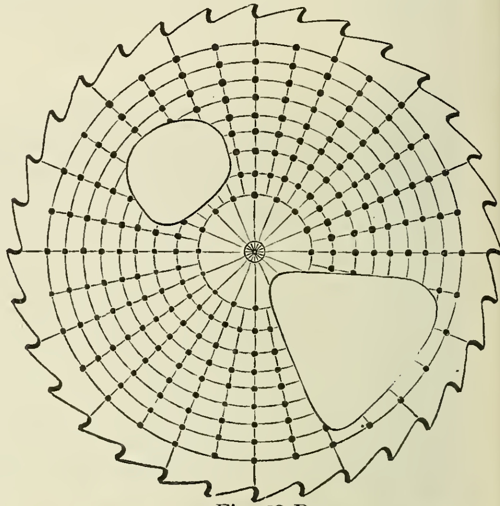


Fig. 73-B

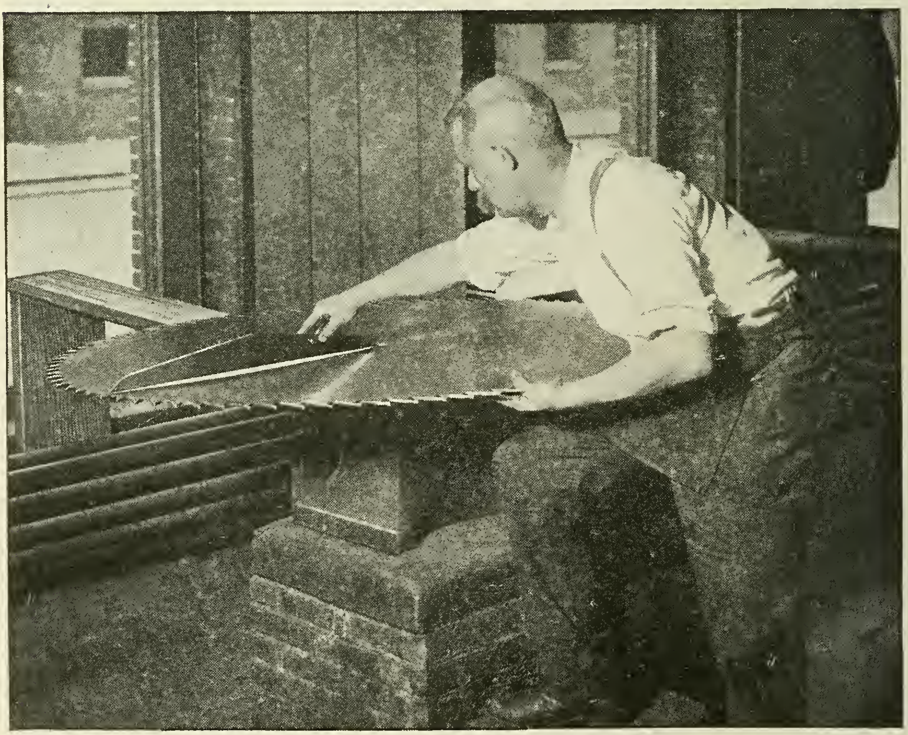


Fig. 74. Testing for tension with a short straight-edge

that part. It is very seldom necessary to hammer a saw at the part covered by the collars.

When ready to hammer, as at figure 73–A, see that the face of hammer is ground so that the blow will be round. Do not strike too heavily. It is better to go over the saw a number of times

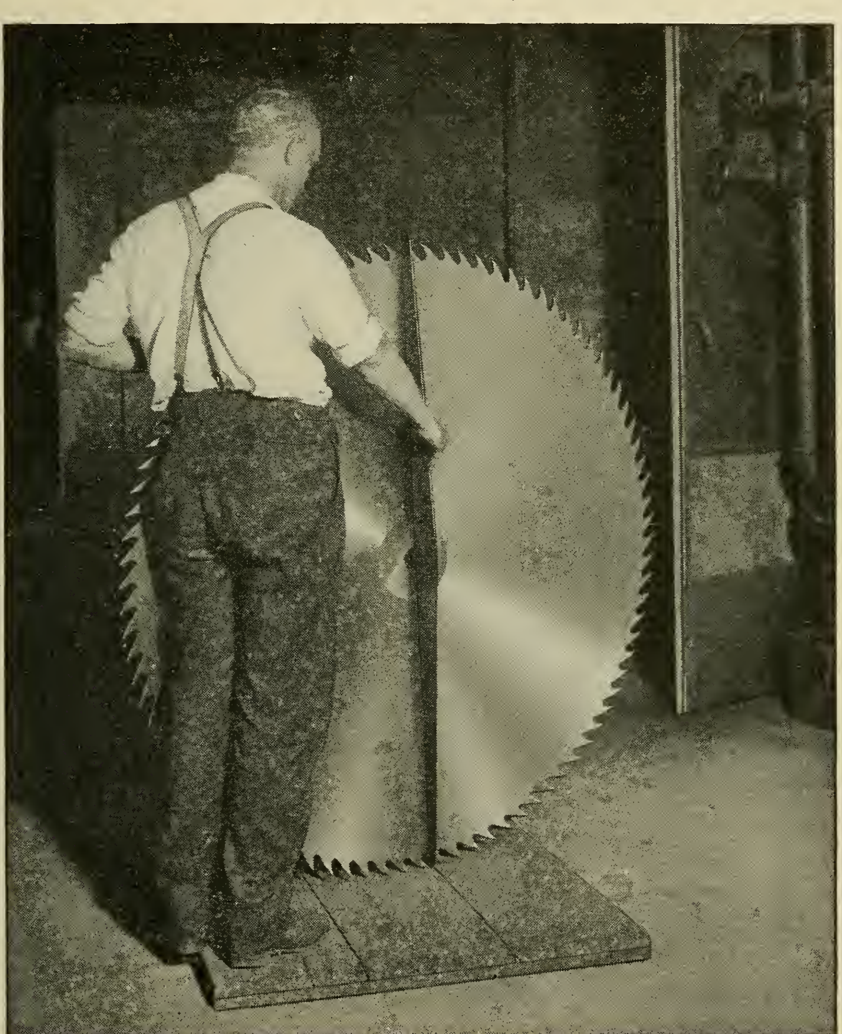


Fig. 75. Testing with a long straight-edge to see if the saw is true

than to hammer too much at one operation. Blows which are too heavy may put the saw in worse shape than it was before it was hammered.

After hammering one side, mark off the other side and repeat the operation with as near as possible the same number and weight of blows as struck on the first side, and, if possible, directly over them. Now, stand the saw on the floor. Hold it up straight and test it with the long straight-edge as shown

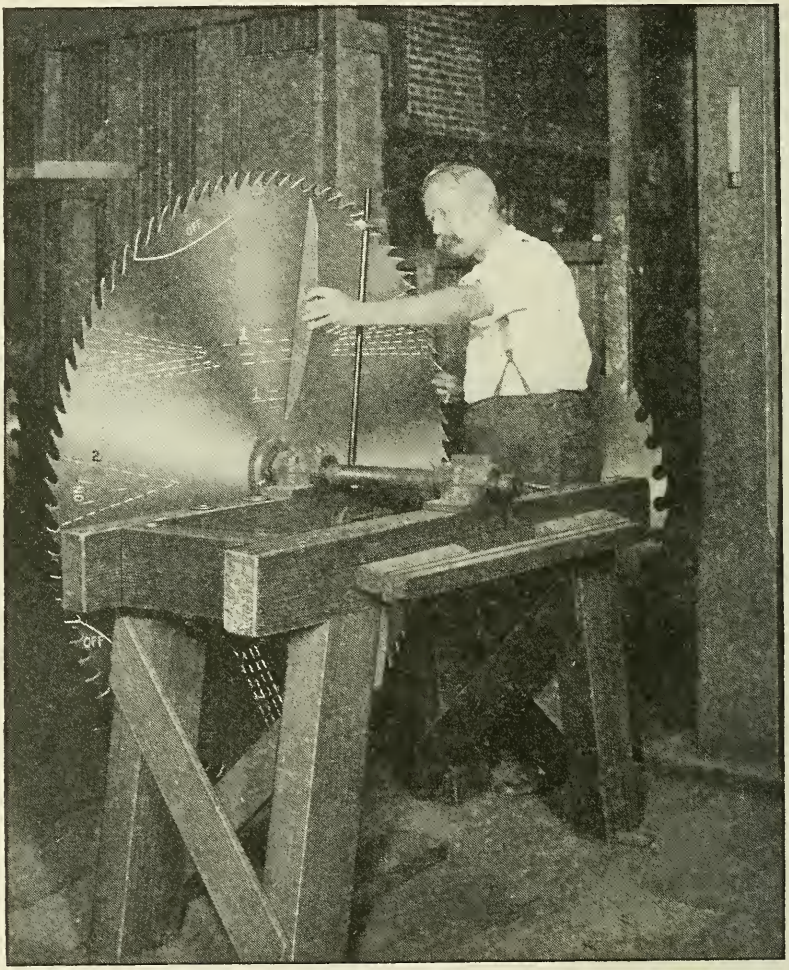


Fig. 76. Testing with the saw on a mandrel and marking for further tensioning

by figure 75. If the hammering has been done alike on both sides, the saw will be very nearly true. If, however, it shows full on one side and dishing on the other, mark these places that are full.

Place the saw on the anvil with the round side up. Hammer lightly on the full places. Test again with the long straight-edge, and if it appears true, put it on the anvil and test it as explained, to see if it has the proper tension. If not, repeat the operation with the round-faced hammer until desired tension is obtained. After again testing with a long straight-edge, put the saw on the try-mandrel to test it with the short straight-edge for running true. This mandrel must also be true, which can be determined by changing the position of the saw on the

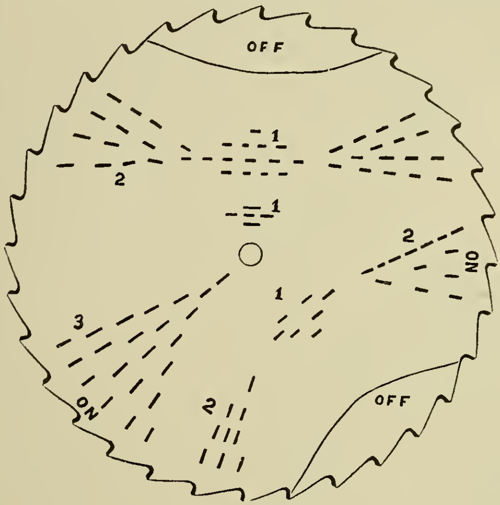


Fig. 77.

mandrel to see if the same parts of the saw run off and on at the pointer. Mark the places as they run off or on as shown by figure 76, while turning the saw around slowly. Where the saw runs off, lumps will probably be found as at 1, 1, 1, or what is termed twist lumps as at 2, 2, 2 of figure 77, or both may occur. These lumps must be taken out with a cross-face hammer and struck as shown in the direction that the straight-edge shows the lumps to run. The saw also may be thrown out of true by lumps running toward the center as No. 3, figure 77; in this case the saw will be on or off at points about opposite each other. This part of the hammering must be done carefully, and if the hammer is of the proper weight and the face properly ground, the saw can be made to run true without altering the tension to any great extent. The testing on the mandrel by an inexperienced hand should be done with the full side of the saw towards the pointer. Knocking down the lumps from that side will make the plate flat. When the saw is fairly flat, test from both sides and operate in like manner and get the same results. Now put the saw on the arbor and if for a high motion, it will sway gently from side to side in getting up to full speed and then run steady. However, if it acts as heretofore stated (runs

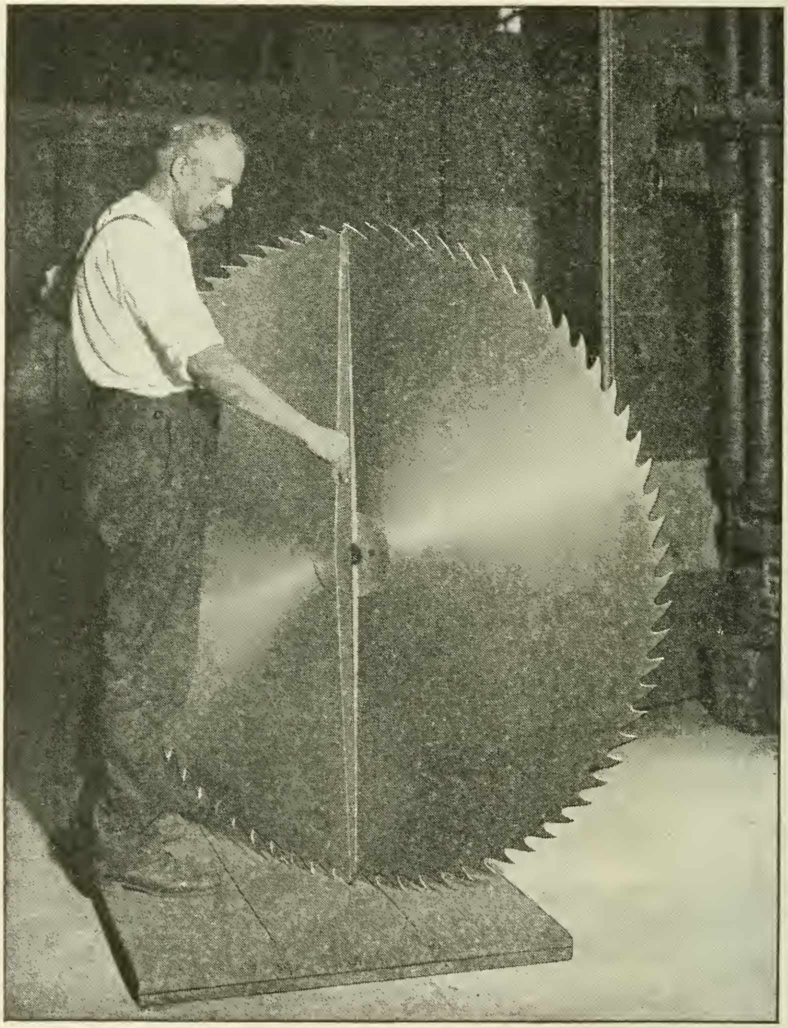


Fig. 78. Testing to see if the saw "falls away" from the straight-edge

snakey and rattles in the guides), it needs to be made more open toward the centre. An experienced man will stand the saw on the floor. Taking hold at the top edge he will give it a sudden shake. If the centre vibrates and the edge stands stiff, he knows it to be open towards the centre. He will also test by leaning the saw over, to see if it falls away from the straight-edge sufficiently as shown by figure 78. Consequently he knows it to be right before putting it on the arbor. If the saw is too open at the centre it will run from side to side, mostly out of the log, and needs to be hammered as shown by figure 79–A. The distance in from the edge of the saw, to begin hammering depends upon how near to the rim the tension has been carried. If the tension (or drop) extends from the centre to

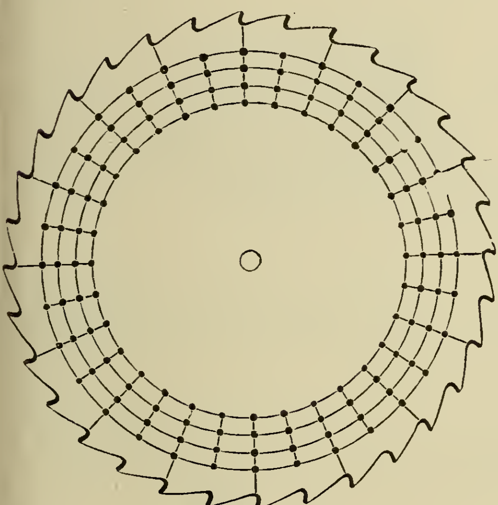


Fig. 79-A

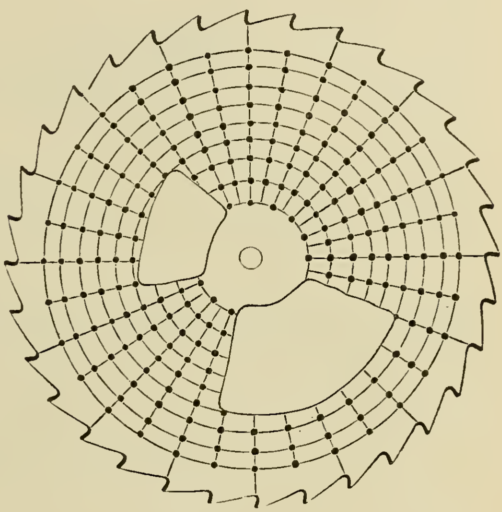


Fig. 79-B

the first circular line in the illustration, hammer in to that line; if to line 2 or 3, hammer to those lines, or the looseness may be irregular, as shown by figure 79–B, and will need to be hammered as shown to regulate the tension. After this is done proceed, as explained, with cross-face hammer to free saw from twists and lumps to make it run true. If the saw should be buckled by an accident, true it with the cross-face hammer as explained by figures 75, 76, and 77 before regulating tension and final truing. Do the same in case of buckling by burned spots or sharp lumps over the collar line. To remove or level these lumps, lay two thicknesses of strong, heavy paper on the anvil, place the saw on the anvil with the spot or lump resting on the paper and by giving a few well directed blows the lumps can be hammered down without expanding the metal as it would if straightened on the bare face of the anvil.

When hammering with the round-face hammer, work on lines drawn from the edge towards the centre. This will prevent putting twist lumps in the saw and obviate much of the trouble in truing with a cross-face hammer. It is very important to have the blows distributed properly. Hammering too much at one place would cause a loose spot or lump that would be difficult to take out. Also it might burn a blue spot on the saw in the cut.

If it is necessary to go over the hammering more than once for tension, make additional lines between those lines that have already been hammered on. The dressing of the faces of the hammers is important; the round face should be nicely rounded so that when a light blow is struck on the oiled surface of the saw, it shows about a half inch in diameter. A cross face hammer should show a blow three-quarter by three-eighth inch. A sharp cutting blow is not effective either in knocking down a lump or stretching the metal.

In conclusion, we make the following suggestions to beginners:

Do not be discouraged by the failure of first attempts. Make yourself perfectly familiar with the instructions given and persevere in properly applying them.

Carefully study the amount of opening towards the centre that the saw requires for tension to suit the motion and feed used. For regulating this, always use the round-face hammer.

The stem of the try-mandrel need be only one inch or less in diameter with bushings used for larger arbor holes.

Beginners in the art of hammering should take a small circular cross-cut saw (one that can be handled easily), for this class of saws, as a rule, is given very little attention in the mills. Go through the operation as instructed and, if successful it will show advancement in the art and the ability to operate on larger saws without the same risk of failure.

In regard to large circular saws cracking and breaking over the collar line,—the saws when first put in use have been hammered or left open enough for a certain speed. If the speed is reduced while in the cut, the saw will run either in or out of the log (most generally out), forming as it were, a wedge between the saw and headblocks. This eventually will crack or break the saw at or near the collar line by forcing it over this rigid point, hence the importance of maintaining a uniform speed and having the tension adapted to it. In mills where steam feed is used great care should be taken not to crowd the feed on the saw when it loses its speed from any cause, such as insufficient boiler, engine, or belt power. For if the feed is not decreased in proportion to the speed, the saw will be "crowded out" and forced over the collar just as though the tension were not properly adjusted.

ANVIL, HAMMERS, AND STRAIGHT EDGES FOR REPAIRING SAWS

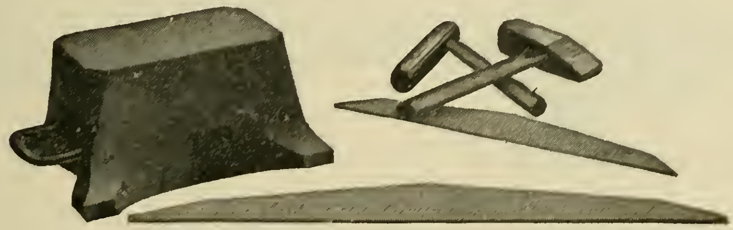


Fig. 80

The above are illustrations of the tools necessary for altering or adjusting the tension of circular saws. (See page 69.)

SWAGE BAR HAMMER

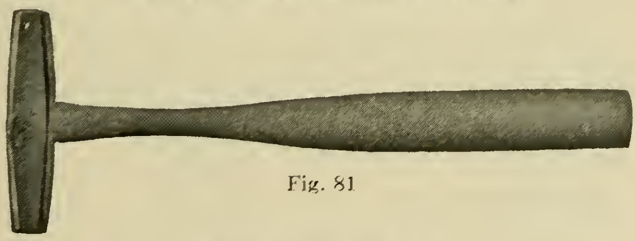


Fig. 81

SWAGE BAR

Fig. 82

These illustrations represent our swage bar and hammer for use in swaging the teeth of circular and gang saws. We make the hammers in two sizes; the bars of any shape, size, or weight desired.

CIRCULAR SAW MANDRELS

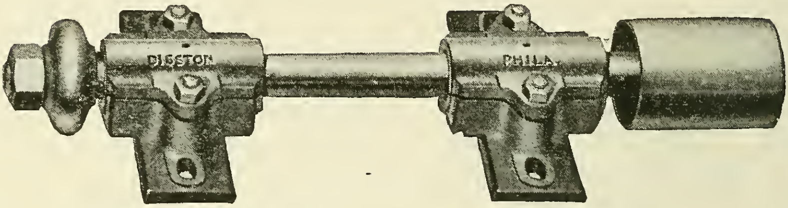


Fig. 83. No. 000, Pulley on end, self-oiling boxes

Our stock mandrels with a pulley on the end or in the centre range in sizes suitable for saws 10 to 38 inches in diameter. Special sizes will be made to order.

In order to obtain the best results and the maximum output from circular saws a good mandrel is an absolute necessity.

The Disston Mandrels are superior in quality and workmanship.

The shafts of steel, accurately turned, possess in the various sizes a safe margin of strength to prevent springing or undue vibration under the heaviest feed or pressure that may be put on the saw they are designed to carry. All collars or flanges are of sufficient diameter to give proper support to the saw, accurately machined and recessed, giving a perfect bearing on the blade. The pulleys are turned up after being placed on the shaft. The boxes, extra long and heavy, are of grey iron, well fitted and babbitted, insuring true balance and smooth running.

A mandrel should not be too light for the work to be done or it will spring, causing it to heat. See that the bearings are well proportioned and fitted. All bearings should be at least three times as long as the diameter of the mandrel. The boxes should fit neatly enough to prevent lost motion, but not so tightly on the quarters as to cut off the supply of oil. One of the main causes of mandrels heating is want of the proper lubrication. The cutting of channels from the front side of the bottom half of the boxes running down and under the shaft to the point of hardest bearing will be a great benefit in all cases where self-oiling boxes are not used. Where there are no self-oiling boxes use a good heavy body oil or lubricant. In some mills where there are three bearings on the mandrel, heating is caused by getting bearings out of line when shifting for lead or adjustment. Again, some arbors have the collars for preventing end motion against the box nearest the saw. They should be on the other end, as the bearing nearest the saw has the most strain on it at all times. Heating is often caused by a short and tight belt. Where there is trouble with a heating journal and slipping belt, it would be advisable, as well as economical, to increase the diameter of the receiving pulley on the mandrel, even at the sacrifice of some of the speed. Belts should be of good length, and in all cases should have the strain on the lower side and the slack at the top. When practicable, put a balanced tightener or stress pulley on the top, placing it so that it will give as much lap of belt on the pulley as possible. This will take much strain off the mandrel, rendering it less liable to heat. A saw running badly from other causes, by undue crowding and straining, will frequently cause a mandrel to heat that would otherwise run cool. See suggestions on keeping saw and mill in order.

DISSTON CIRCULAR SAW MANDRELS

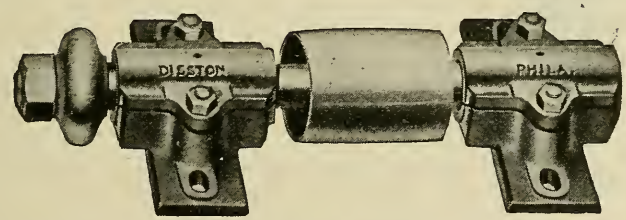


Fig. 84. No. 60, Pulley in center with self-oiling boxes

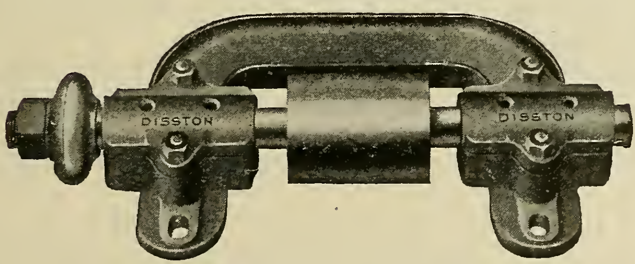


Fig. 85. No. 201, Yoke, with self-oiling boxes

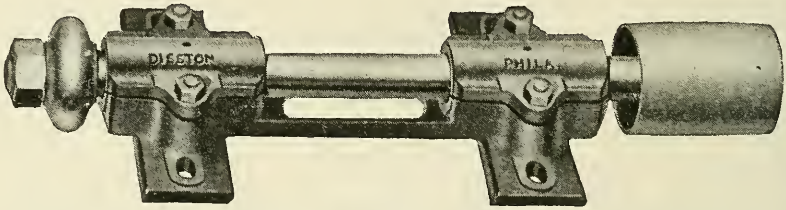


Fig. 86. No. 301, Connected box

The boxes of Nos. 201 and 301 mandrels being yoked or connected makes it impossible for the journals to get out of line with each other.

The above mandrels are made with a pulley on the right-hand side, and with left-hand thread, unless otherwise ordered.

CORDWOOD MANDRELS

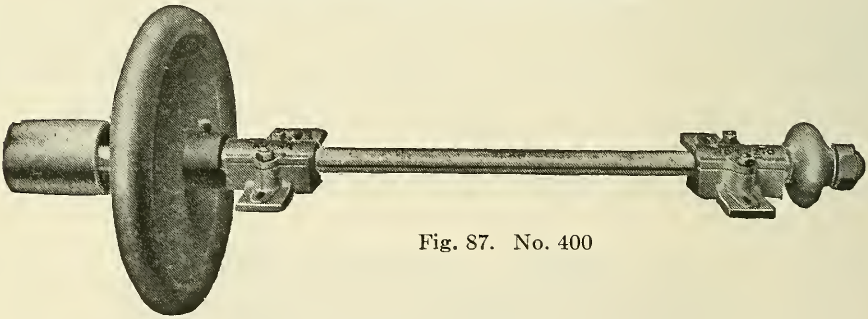


Fig. 87. No. 400

The No. 400 Cordwood Mandrel is made with a pulley on the left-hand side, and with right-hand thread, unless otherwise ordered.

All these mandrels have self-oiling boxes and require no additional attention in this respect for a long time after the oil reservoir has been filled, the oil being carried to the bearings by a ring revolving on the shaft.

We also make a mandrel of the same style, but larger in size, called the No. 401.

BAND SAWS

LEFT-HAND AND RIGHT-HAND SAW MILLS

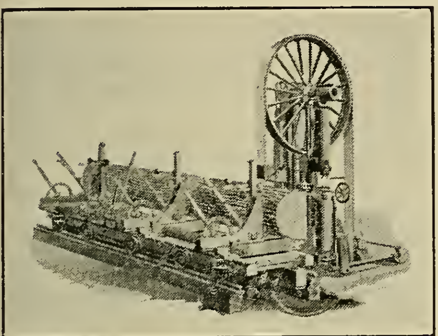


Fig. 88-A

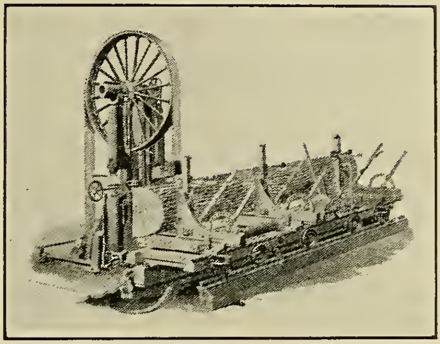


Fig. 88-B

When ordering band saws, be particular to state whether right or left-hand saws are desired; also give full particulars as to gauge, style of tooth, back edge, etc. If the saws are to be crowning on the back we finish them with 1/64″ crowning to each 5 feet in length, unless otherwise instructed.

We will supply, on application, an order blank giving details to be specified. If this is properly filled out it will enable us to make up the saws exactly as required.

The above illustration gives a view of two mills, in which the "hand" of the saw can readily be determined. Fig. 88-A shows the design of a left-hand mill, the log being on the left side of the saw when standing facing the mill. Fig. 88–B shows a right-hand mill, the log being on the right-hand side of saw.

HINTS FOR THE OPERATION OF BAND SAWS

The life of a band saw depends *very* largely on the way it is handled, particularly when it is new and before it has been perfectly adapted to the wheels on which it is run. Many men expect a new saw to do more work than one that has been perfectly adapted and adjusted to the wheels and the alignment of the mill. This is a mistake, for there are peculiarities about every mill, and until a new saw is adjusted to the face of the wheels, *their aligning or tilt*, the speed and feed, they cannot be expected to give as good results as the saw which has been adjusted to the mill.

There is a certain quality about a new band saw which we can best describe by calling "surplus" elasticity, and until this quality is brought down to its proper bearing by the judicious use of the hammer and saw stretcher in connection with the first "runs" of the saw, it will not be at its best. The manufacturer is not in a position to subject the saws he sends out to the same strains they receive in the mills. Hence a saw will change more on the first run than on any succeeding one. It should be gone over with *extra* care the first time it comes off the wheels. In fact, if the system were more generally followed of running a saw only half an hour on its first run, then taking it off and touching it up wherever necessary, there would be fewer cracked blades, and the life of all saws would be materially increased.

All experienced filers and mill men know that excessive speed, too much tension, uneven tension, case-hardening, or glazing from the emery wheel, gum adhering to face of wheels, crystallization from too heavy hammering, cuts on the surface of the saw from sharp-faced hammers, vibration of either machine or saw, sharp angles in the gullets, imperfectly adjusted guides, backs of saws too long or too short and excessively cross aligned to make them "track," insufficient throat room and hook, and crowding the saw against the guard wheel, will cause it to crack. These are all well-known causes of breakage, yet notwithstanding the knowledge that all band saws are more or less subject to these conditions, too often the cause of fracture is attributed to the quality of the steel or over-hardness.

In justice to the saw manufacturer, due consideration should be given the fact, that the saw is only *one* item, while each and every one of the above named causes is a great factor in producing cracks in band saws.

We receive many letters from band mill owners and operators asking our advice as to the best manner to fit, tension, and operate the saws to attain the best results in respect to quantity and quality of the lumber made and at the same time to get the most wear out of the saws. The best advice we can give our band-mill friends is to employ experienced and skillful bandsaw fitters. Such men, compared with inexperienced bandmen, will save their wages many times over in the quality and quantity of the lumber manufactured, to say nothing of the saw bill. Inexperienced men invariably spoil a large proportion of the lumber manufactured and ruin one or more sets of saws before they realize the trouble lies in their lack of knowledge. The services of competent bandsaw fitters are indispensable to the successful operation of bandsaws. It is impossible to lay down a set of rules to fit all cases, or to answer correctly any single one without knowing all the conditions under which the saws are run. However the following paragraphs will give a few of the most important points in reference to the care and management of the band saw which, if followed out carefully, will benefit those who have heretofore neglected any of these points.

Vibration is one of the greatest causes of bad results in the use of band saws and, knowing this, particular attention should be given to the wheels and their shafts, the journals and boxes. The wheels must be round and in perfect balance and the shafts must run free in their boxes with no lost motion.

Band mill builders are giving less crown to the wheels than they were a few years back,—some are making flat wheels. Each style has its advocates and will give good results when properly handled. As some mill builders give 1/64th of an inch crown in a 12-inch face wheel, it seems a question of education or preference with the operators.

Perfectly uniform tension is the important point, for if a saw has fast and loose spots in it, the tendency to crack is largely increased, the fast spot cracking from undue tensile strain and the loose spot from constant buckling of surplus metal.

The principal tools required for tensioning band saws are an anvil, leveling block, a cross face hammer, a round or dog head hammer, a twist face hammer, each weighing about 3½ pounds, and a roll saw-stretcher (see page 109, for complete outfit). The anvil should have a flat face and be perfectly true. Strike light fair blows, using care not to cut or mark the surface of the saw with the hammer, as cracks are apt to start from such marks, particularly when occurring near the edges.

Instructions for Setting Up and Operating Band Saw Mills

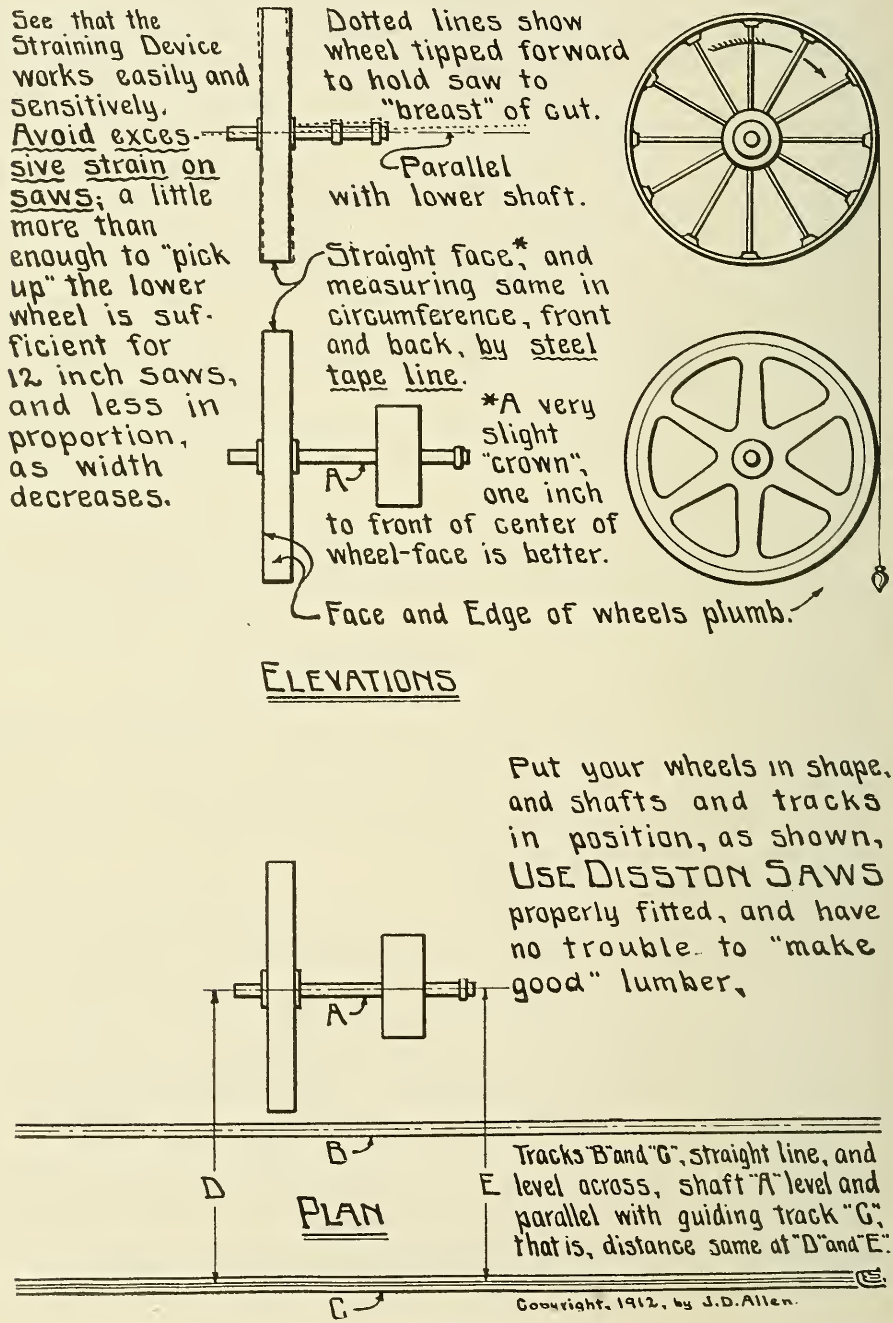


Fig. 89

DIRECTIONS FOR LEVELLING AND TENSIONING BAND SAWS

Large bandsaws, when running idle, should travel in a true plane, with the cutting-edge projecting over the edge of the wheels about the full length or depth of the teeth. This can be accomplished only by true alignment of shafts, proper tilt of wheels and, as regards the saws, accurately made brazes, correct tension, right amount of hook to the teeth for the kind of timber to be cut, properly swaged and fitted. Assuming the foregoing adjustments have been made, the saws will travel in a true plane and hold their position on the wheels without any material lateral motion either in or out of the cut.

Tension means strain and is obtained by stretching the blade between the edges with the tensioning rolls or hammer. If a hammer is used, one with a round face is preferred. The saw must be made flat or level before tensioning. Examine carefully with a straight-edge for lumps across and lengthwise, trace lumps to their full extent and remove by striking with a long or a cross-face hammer as the direction of the lump may require. Be careful not to cut the lump into several small ones by spreading the blows. Hammer lightly and closely,—the nearer the blows come together the better. Examine frequently with the straight-edge. Reverse the saw occasionally for inspection, as a beginner is apt to hammer more than is necessary, thus dishing the blade. A little practice and close attention will soon enable the learner to flatten or level the saws correctly.

The next operation after levelling the saw is to examine for tension by using a tension gauge.

The proper amount of tension varies according to the feed of the mill and crown of the wheel, but under no circumstances do we think it judicious from any point of view to put in so much tension that the saw will not lie flat from its own weight on the levelling table.

Raise the saw, as shown in Fig. 90, holding the tension gauge at right angles to the blade. Mark all fast spots with a crayon, tracing from the beginning and end of each spot. The fast spots are indicated where the centre of the blade shows as a lump under the tension gauge as in Fig. 90.

Roll or hammer between marks until the saw shows under the tension gauge as seen in Fig. 91. Test after each line through the rolls. Roll from the centre of the blade to within about three-quarter of an inch of the edges. If the hammer is used for tensioning, the blows must be applied on both sides of the blade to prevent dishing. Do not tension on a cast iron block, which is to be used only when lumps are being removed. A hard-faced anvil should always be part of the equipment.

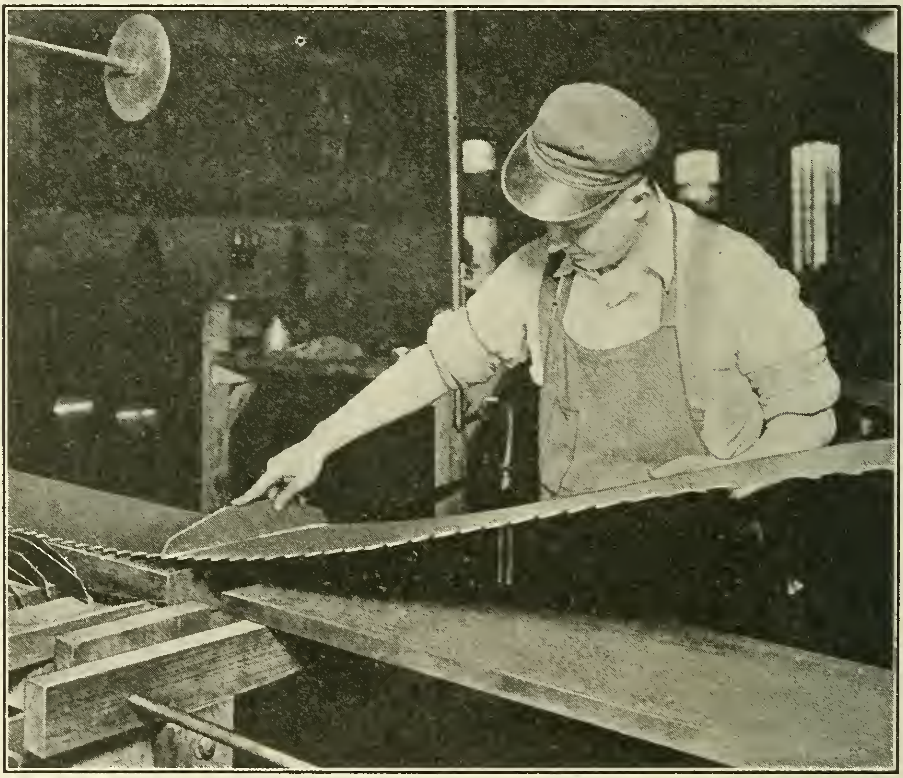


Fig. 90. Showing lump or "fast" spot

Examine with a straight-edge each time a roll or hammer is used for tensioning and remove any lumps which may have developed. If too much drop shows under the tension gauge, as shown in Fig. 92, roll or hammer on both edges until the drop properly fits the gauge on both sides of the saw.

Examine the back-edge of the saw with a back gauge. See Fig. 93. Mark the extent of the hollow on the back of the saw, if there be one, and roll or hammer from mark to mark. Begin at the centre of the saw and work to the back edge by rolling parallel with the saw. Repeat, if necessary, until the back is stretched to fit the gauge. If the back should be full or lumpy, follow the same course, working from the centre of the blade towards the tooth-edge.

Examine the saw with a straight-edge for lumps and with a tension gauge for irregular tension. Make corrections as the

Fig. 91. "Drop" in blade fits tension gauge

work progresses. When ready for the wheels, the saw should lie flat on the levelling block and fit the tension gauge on both sides when curved and tested as in Fig. 91.

Fig. 95 shows the test for tension on the up bend or outside curve with a short straight-edge. If the saw is correctly tensioned an almost perfect curve will show under the straight-edge between both edges of the saw. If it shows flat, trace its extent and stretch it with a roll or hammer until it shows an even curve.

After the saw has been properly tensioned it should be accurately fitted. The swaging and fitting of the teeth are practically the same as in a full swaged circular saw. The swaging is side dressed or shaped to a uniform width with an under and back cut in order to leave the extreme point of tooth a trifle wider than the rest of the tooth. The full amount of swage

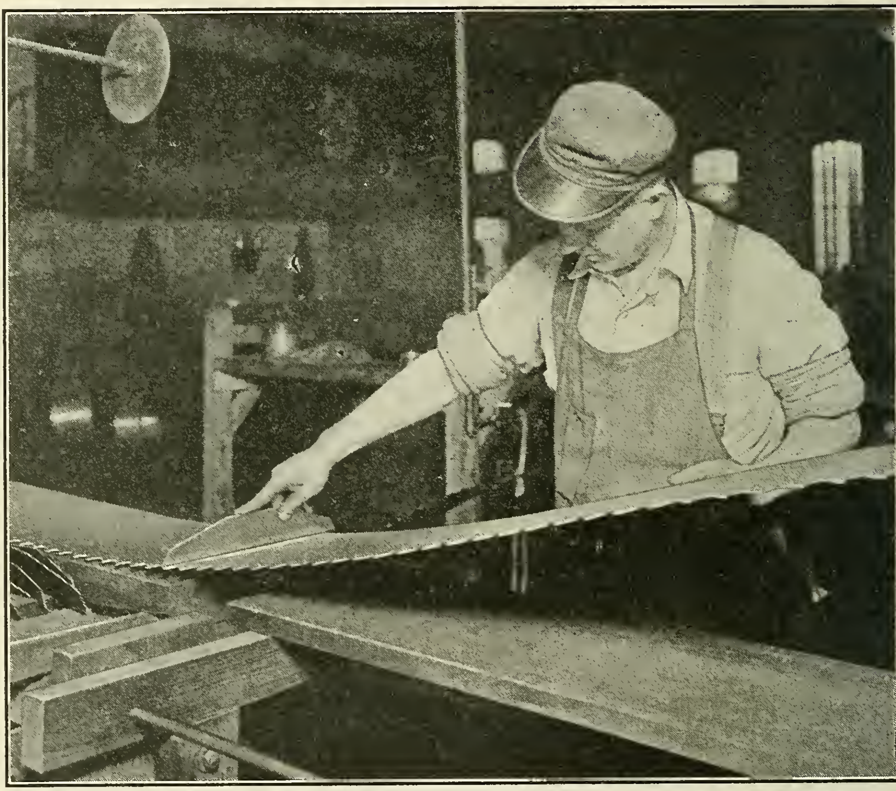


Fig. 92. Too much "drop" under tension gauge

when side dressed should never exceed No. 8 gauge in a 14 gauge saw and for hard timber may be even less. It is advisable to run with as little swage as practicable. The tensile strain on the saw, the power required, and the waste of lumber in the kerf depend to a certain extent on the degree of swaging. It is also necessary to re-sharpen bandsaws frequently. Many saws are ruined because they are run after they have become dull. No band saw should be run longer than two and a half hours on one sharpening.

Well tensioned and well fitted bandsaws, when properly handled, will stand the maximum feed and manufacture good lumber. But, after the corners of the saws become worn or dull the saws will dodge or leave the line, which has the effect of destroying the tension and fracturing the saws.

In sharpening use a medium soft emery wheel and do not crowd it on its work as this would result in case-hardening the gullets. Cracks are liable to start from any of these case-hardened spots.

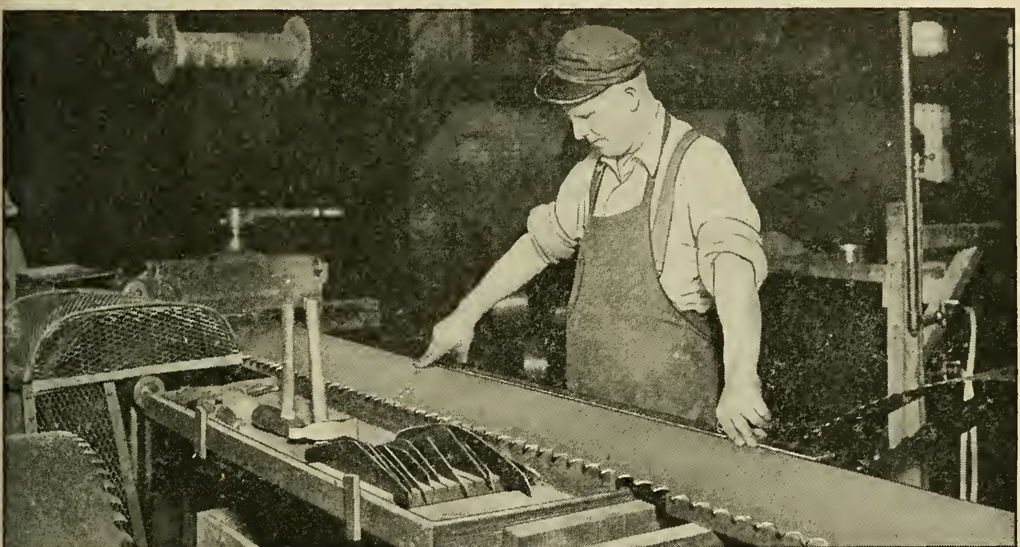


Fig. 93. Testing the back of the saw

Do not give the teeth sharp gullets. This concentrates the bend of the saw too much at one point as it runs over the wheels. Use a round gullet, as large as practicable, with no sharp corners or abrupt angles.

Never let the back edge of the saw come in contact with the back guard wheel or any other hard surface, as case-hardening is bound to ensue from which cracks will surely result. Should the saw be accidentally forced against the guard and case-hardened, remove the glaze at once by holding a piece of soft emery wheel against the back edge while the saw is running slowly. Do not take for granted that the back edge of the saw has not been in contact with the guard wheel. Try a file on the edge of the saw frequently, as only one revolution with

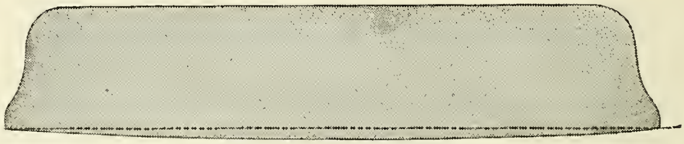


Fig. 94. Tension gauge
Made in lengths from six to twelve inches, with curved edge adapted to face of the wheels and the tension required.

the back edge against the guard is necessary to bring about case-hardening. This is done so quickly that it often happens without the knowledge of the operator.

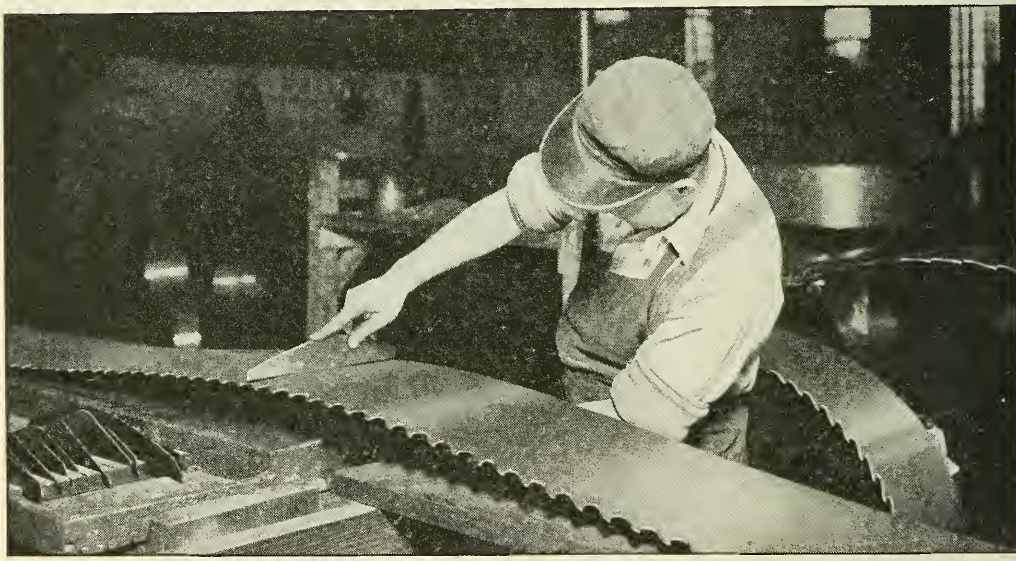


Fig. 95. Testing tension on the up-bend

The majority of the large mills are now using the roller or stretching machine for putting in the tension. The desired effect can be attained in a shorter time and with less injury to the saw than if the tension were put in by a hammer. It is necessary, however, to use the hammer for finishing and regulating, after the use of the stretcher.

TWISTS—HOW TO LOCATE AND REMOVE THEM

Twists in band saws are termed as follows: long-face, cross-face, and double. The terms "long-face" and "cross-face"

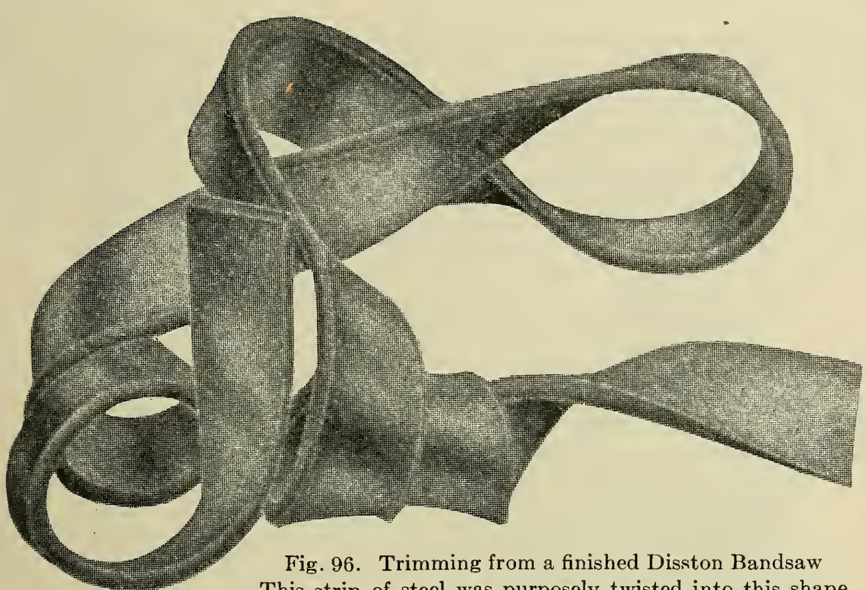


Fig. 96. Trimming from a finished Disston Bandsaw
This strip of steel was purposely twisted into this shape. It is one of the severest tests to which a tempered piece of steel could be subjected. It shows the superiority of the tension holding cutting-edge and the setting or swaging qualities of Disston Band Saw Steel.

come from the hammer used in the removal of twists. The long-face and cross-face hammer is that one which has two faces; one, a long face in line with the handle, the other at right angles with the handle.

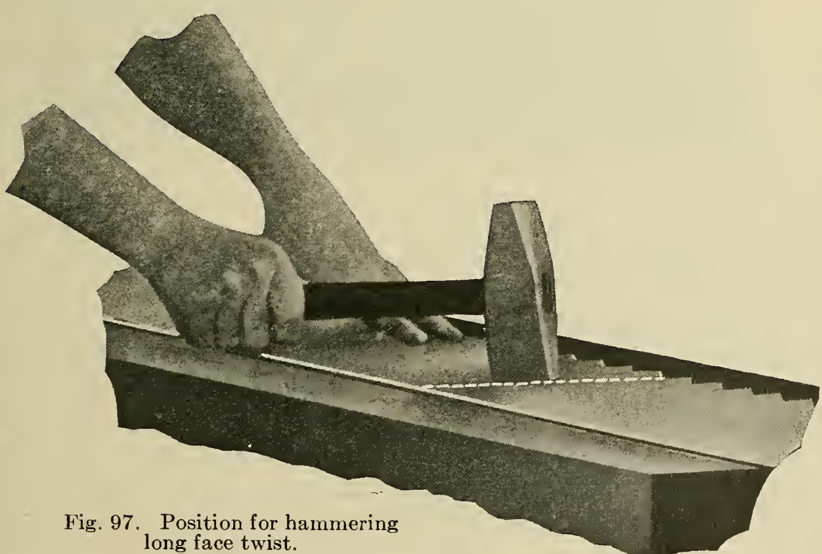


Fig. 97. Position for hammering long face twist.

A long-face twist is that which requires the use of the long-face hammer, and is determined in the saw by the way the saw lies when resting on the floor. If the filer is standing at the end of saw and the opposite end inclines to the right, that is a long-face twist, and must be taken out by the filer at the bench standing with his left to the saw and hammering diagonally across the saw with the long-face hammer.

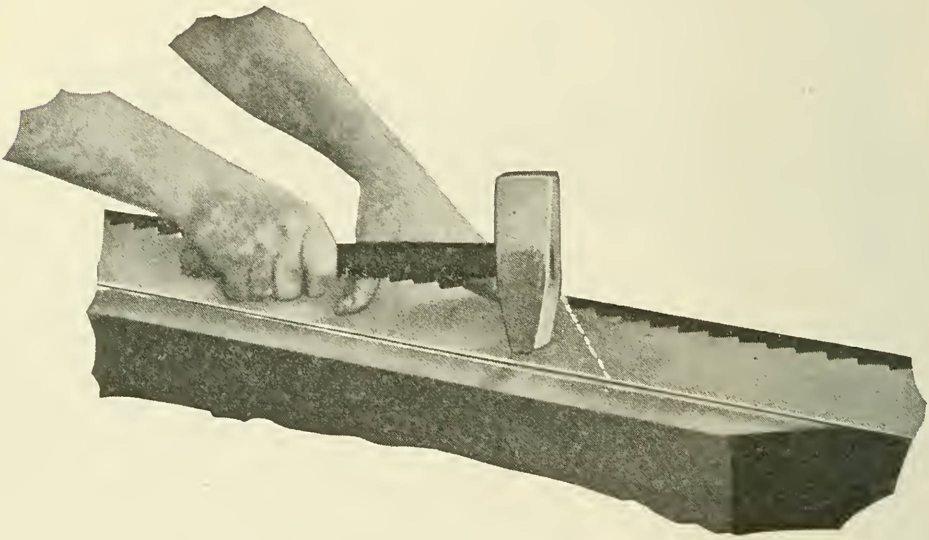


Fig. 98. Position for hammering cross face twist

On the other hand, should the saw be inclined to the left at the opposite end, that would be a cross-face twist and should be removed with a cross-face hammer while the filer is standing with his left side to the saw striking diagonally with a cross-face hammer.

Most twists in bandsaws are due to accidents while the saws are running, such as striking iron, or dodging in or out of the cut. In such cases the twist generally runs clear around the saw, and the filer, after determining whether it is a long-face or cross-face twist, proceeds to hammer by placing the blows very close together from edge to edge all around the saw. When one side is covered, hammer the opposite side in same manner as the first, which will cross the blows of the first side. When the second side is covered, place the saw on the floor and note the effect. If there has not been enough hammering repeat until the saw stands evenly on the floor.

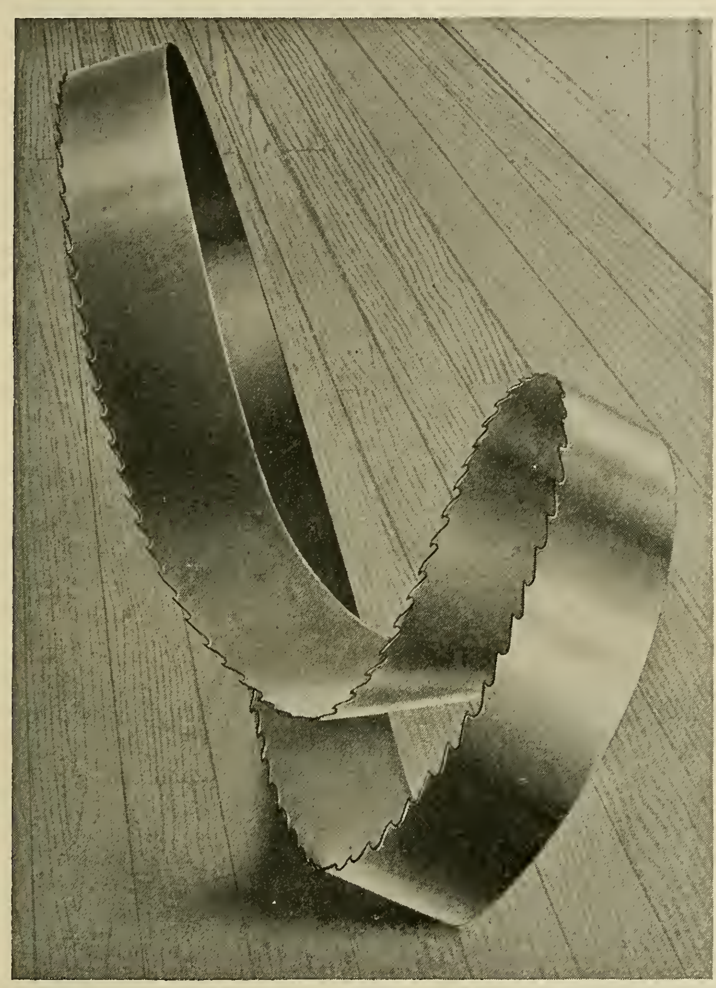


Fig. 99. This shows a band saw with a cross face twist.

A double twist means that saw has both kinds, and they must be located by the way the saw lies on the leveling table. Trace with a straight-edge as though hunting for lumps, but hold the straight-edge diagonally on the saw. If the saw shows a hollow, examine across the hollow where a diagonal lump is likely to show. This should be hammered in the direction indicated by straight-edge. Mark the opposite side of the saw, trace in the same manner, and the twist will be seen to run across the lump taken out on the other side. Trace as at first and hammer until the lump removed.

Examine for tension in the meantime and if any fast places are found, open them with the roll, as it is impossible to remove twists while the saw is long on the edges.

THE CARE OF BANDSAW TEETH

If the saw chatters in the cut, runs snakey at times, and does not make the lumber as smooth as it should, the difficulty may be in carrying too much swage, particularly when sawing hardwood. Usually about three gauges more than the thickness of the saw is sufficient. Sometimes even a trifle less than this will work satisfactorily provided the blade is perfectly flat and evenly tensioned. Make sure that the teeth are properly dressed after swaging, otherwise they soon become dull, or the slender corners drop off.

The eccentric swage, in forcing out the corners, causes a depression or dent just under the points of the teeth. To face the teeth properly the fronts of the teeth must be ground sufficiently to take out most of this depression and to thicken the points to the required stoutness with which to stand the shock of cutting through knots without dropping corners. Swage just enough—no more—to get a dressing on the corners. If too much, the points will buckle when shaped. By compressing more than is necessary the points are apt to be injured, causing them, in many instances, to drop off. Therefore it is best to swage lightly and it will not be necessary to shape heavily.

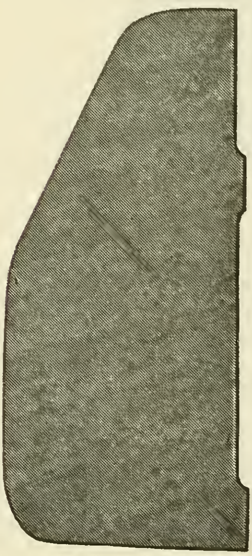


Fig. 100. The set gauge

When the teeth are all thoroughly swaged and shaped, examine with a set gauge, see Fig. 100, to see if any are bent. Test by holding the gauge on each side alternately as shown in Fig. 101. If any of the teeth are out of line, bend them with a set wrench as in Fig. 102, to the right or left as may be required, until all are even. Extreme care should be taken to have all the teeth in a perfect line, for any of the teeth, if even slightly bent, will cut roughly and in passing through the board will naturally incline out of the cut, frequently breaking off.

After the teeth are nicely swaged, shaped, and straightened, the saw is ready for the automatic sharpener. Unless care is used

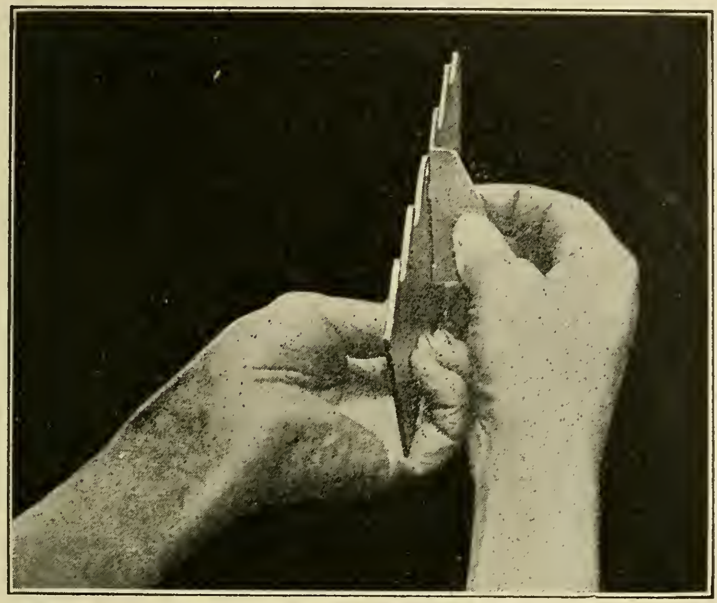


Fig. 101. Application of set gauge

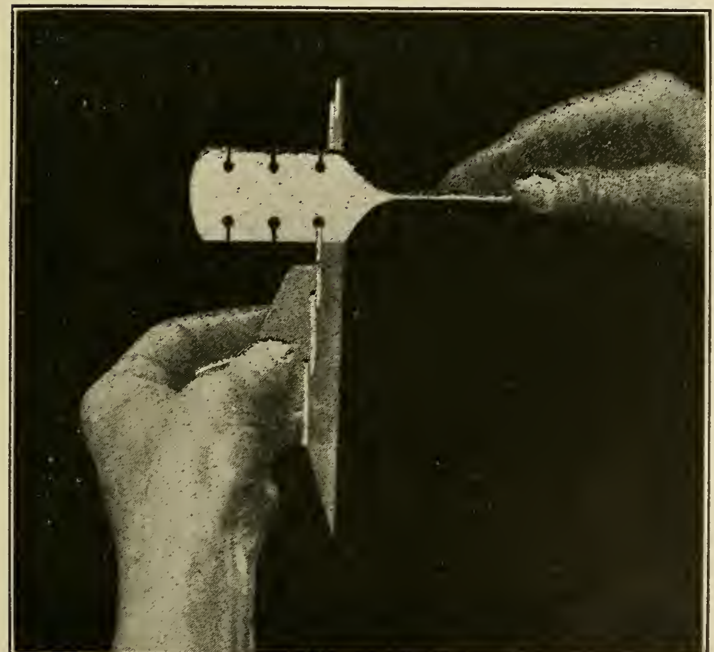


Fig. 102. Straightening tooth with set wrench

in operating this machine all the good work just done will be spoiled. Bear in mind that the points are delicate. Do not try to get the work done in one time around the saw, but cut lightly several times until the teeth are well faced. This does not mean to take out all the depression made by the swage, but most of it. Of course, enough cutting must be done in the gullets and on the backs to keep the teeth in shape, and ground to point, as the automatic sharpener will keep the teeth even when all are brought up to a cutting edge. If they are not ground to point there will be high and low teeth.

Remember that too slender a tooth will cause chattering in the cut, and will make "wash-board" lumber.

Look after the sharpener frequently. Do not allow lost motion. Remember that emery dust will get into the running parts and cut. If this is not cleaned out the machine soon will be missing the teeth.

Grind the entire surface of the tooth and the gullet every time in order to present new steel to the work after each sharpening operation.

STANDARD SHAPES AND SPACING OF TEETH IN DISSTON BAND RIP SAWS AND RE-SAWS

(any space and depth desired)

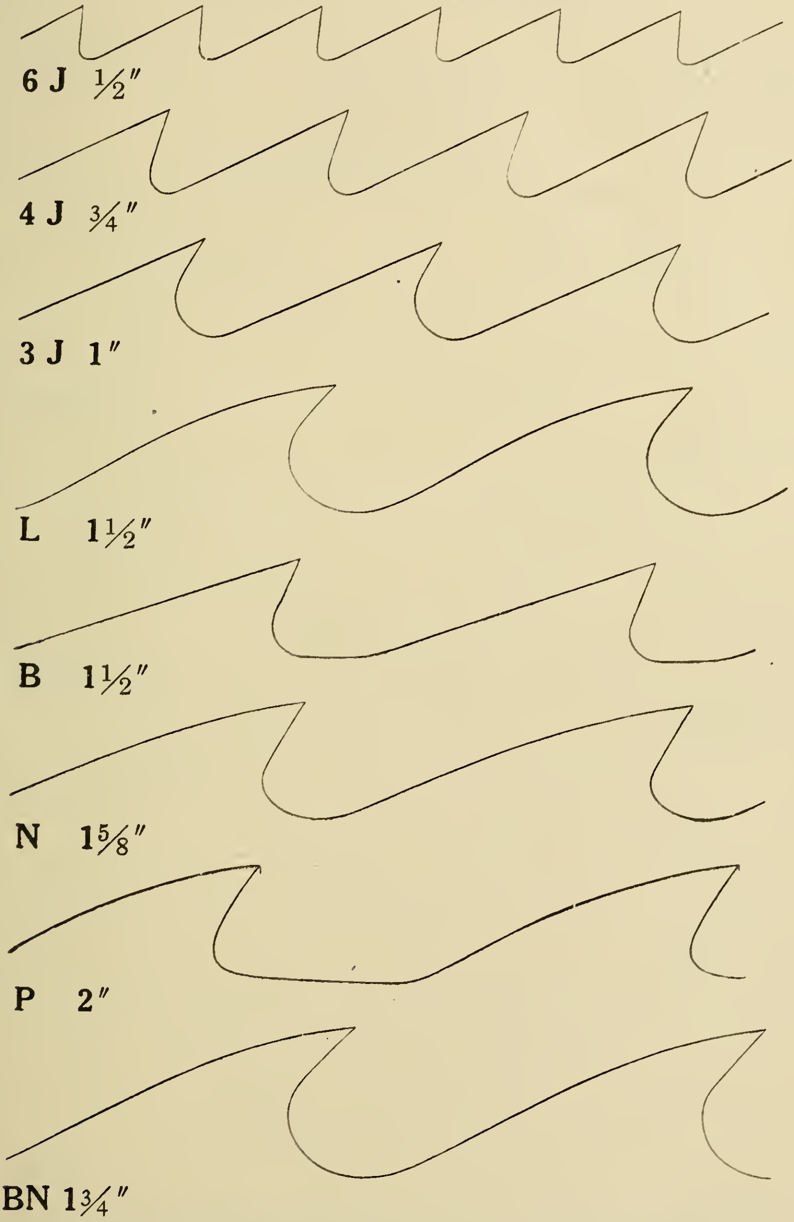
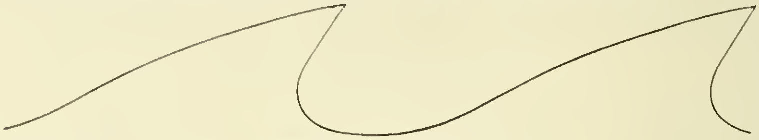


Fig. 103. Above illustrations full size. Order by letter on illustration and state space desired. Special patterns made to order.

BAND RIP SAWS AND RE-SAWS

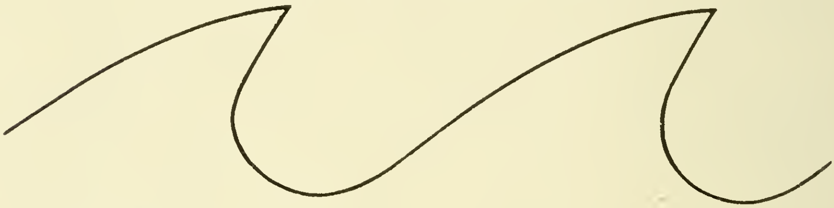


2 G 1¾″

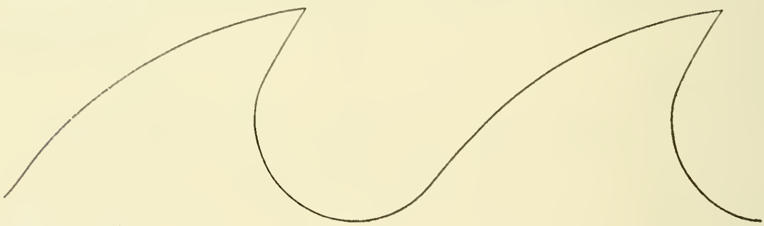
Fig. 103. continued

LOG BAND

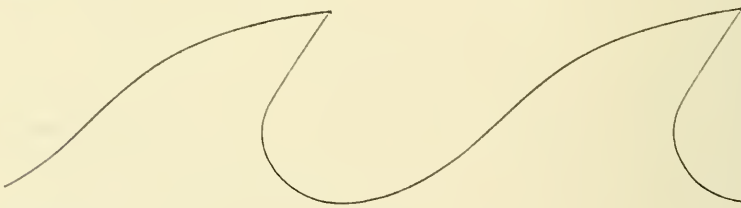
(any space and depth desired)



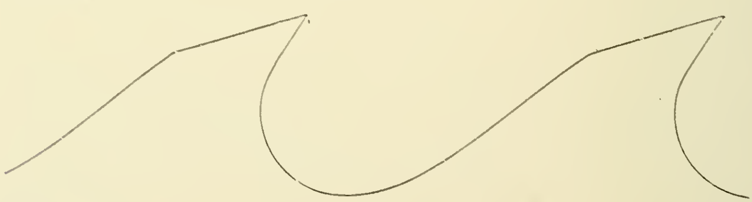
L 1¾″



BL 1¾″



I 1¾″



H 1¾″

Fig. 104. Above illustrations full size. Order by letter on illustration, and state space desired
Special patterns made to order.

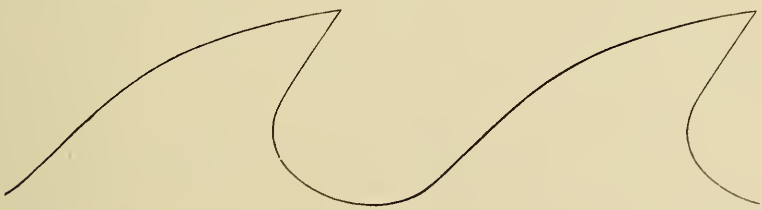
LOG BAND

(any space and depth desired)

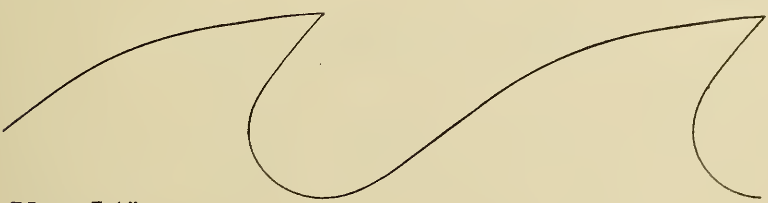
I G 2″

I J 2″

W 1¾″



AC 1¾″

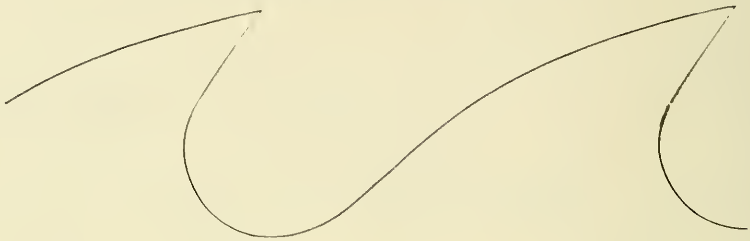


X 1⅞″

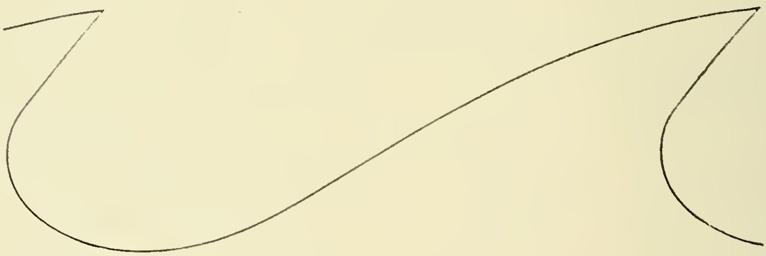
Fig. 104 continued. Above illustrations full size. Order by letter on illustrations, and state space desired. Special patterns made to order.

LOG BAND

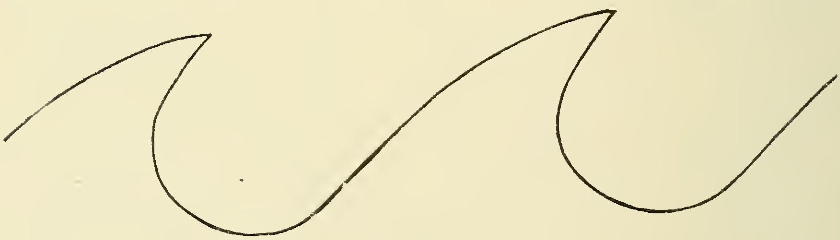
(any space and depth desired)



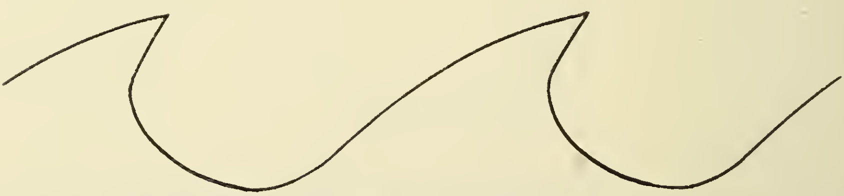
L 2″



L 2¾″

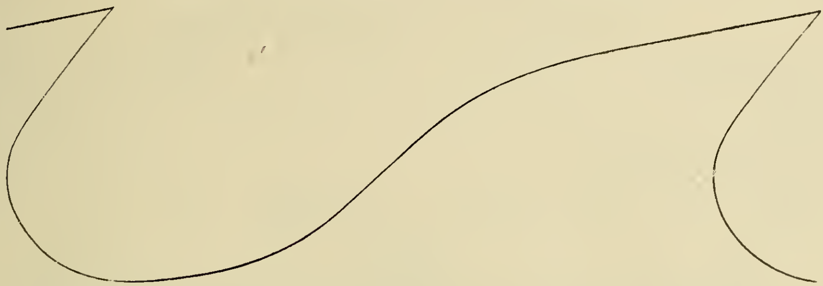


NR 1¾″

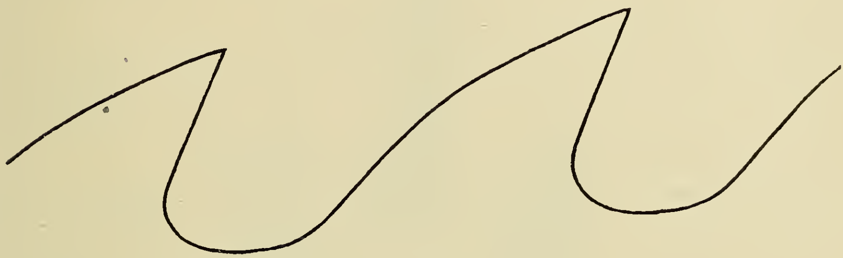


C 1¾″

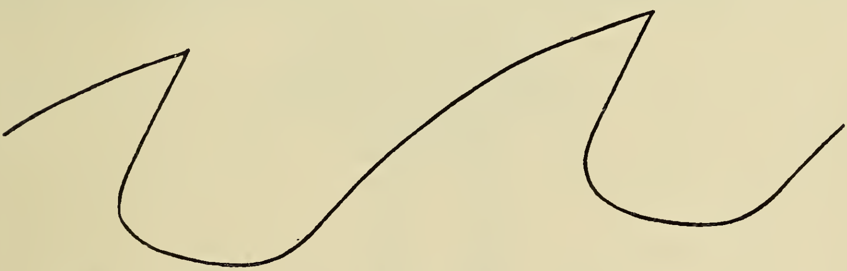
Fig. 104 continued



T 3″



AT 1¾″



AT 2″ Fig. 104 continued

BAND CROSS-CUT TEETH

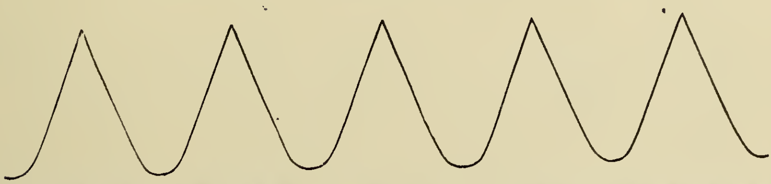


Fig. 105. Above illustrations full size. Order by letter on illustration, and state space desired
Special patterns made to order.

BRAZING BAND-SAWS

The process of joining the ends of a band-saw is called brazing.

When cutting off the ends be sure to allow for the proper spacing of the teeth.

Square the ends of the saw carefully, then prepare them to be lapped by bevelling the upper side of one end and the lower side of the other, by filing, grinding, or milling. The laps must be uniform, smooth, flat, and must taper to a knife edge. Test with a straight-edge and remove, with a file, any high spots, for the closer the laps fit, the less solder will remain in the joint and the stronger it will hold.

Saws up to 7 inches wide should have ½ inch laps; 8, 9, and 10 inch saws, ⅝ inch laps; 11 to 14 inch saws, ¾ inch laps, and saws over 14 inches, ⅞ inch laps, though, of course, wider laps may be used, at the discretion of the filer.

After the ends have been properly scarfed or bevelled, place one end at the center of the brazing clamp, directly over the irons with the back of the saw against the ledge of the clamp. Then tighten the end clamp to hold the blade in place. Position the other end in the same manner. The back edge of the saw must be straight and even. The point of the top lap must cover and fit the lower lap perfectly, and the points of the teeth must be spaced properly. When the ends are secured in position, raise the top end and clean the laps with a diluted muriatic acid, and wipe dry with clean white waste, or a rag. Cut a strip of silver solder a trifle longer, and 1/16th of an inch wider, than the laps. Clean the solder in the same manner as the laps and place it carefully between the laps. Fit the irons, which must be straight and even, in the clamp, to raise the saw slightly at the brazed point.

Place the irons in the furnace, and bring them to an even cherry-red heat. Just before the irons are ready for application, cover the inside of the laps with zinc chloride flux or borax paste. As the irons come from the furnace, wipe off the scale. Apply them quickly, as originally adjusted, and secure the clamp firmly and evenly. As soon as the clamp is tightened, loosen the other clamps which hold the saw in position. This is to allow for expansion, and insures better finish when the, braze is dressed. Remove the irons as soon as they are black and cool the brazed part of the saw with oil. At the hammering bench, file off the excess solder.

As the heating has made the blade very fast at the brazed point, open it well with a roll or hammer to fit the tension gauge. Trace the lumps with a straight edge and flatten them with a hammer. Reverse the saw and hammer the other side of the blade until the saw shows the same on both sides,—with

BRAZING CLAMP

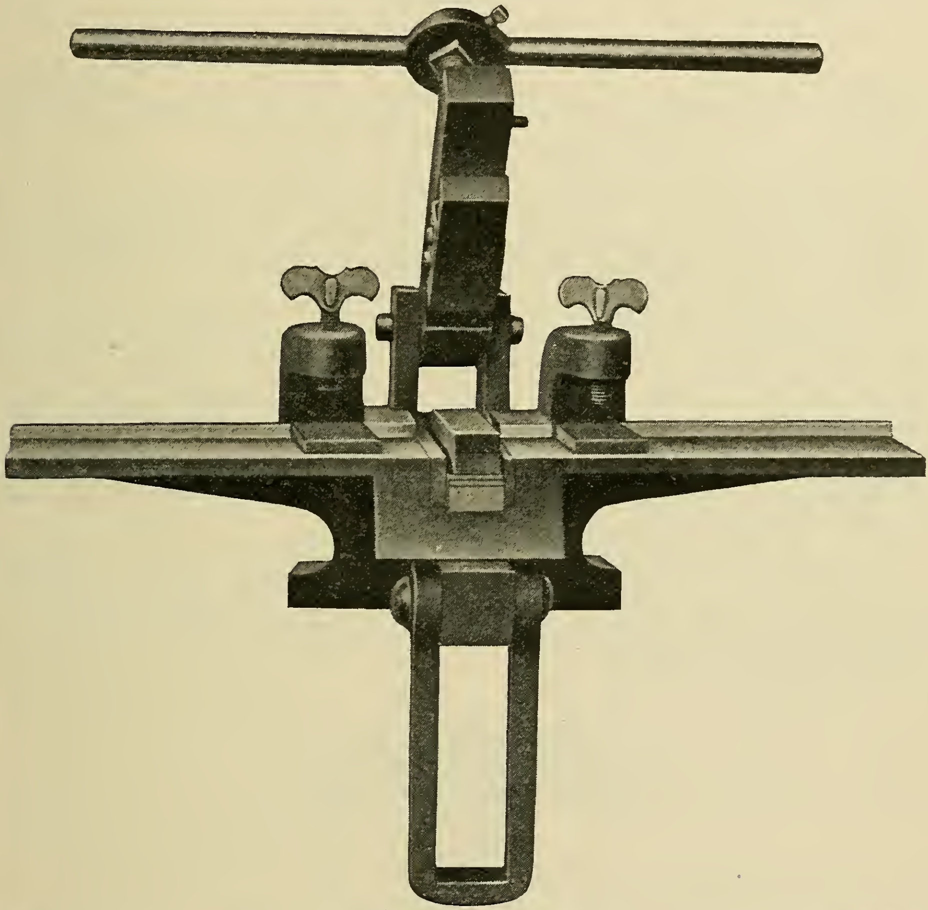


Fig. 106. This style of clamp for brazing band-saws is furnished up to three inches in width

a straight edge for flatness, and with a tension gauge for tension. When satisfied that the saw is properly flattened and tensioned, place a curved block under the brazed portion. Clamp the saw to the bench on each side of the block. Then file the surface carefully and polish it with emery cloth. Use a wire gauge to measure the thickness of the blade and do not reduce it too much. When this operation has been completed, test with a straight edge and flatten if necessary.

Next, cover the brazed part with a heavy oil and heat carefully with a blow torch until the bright part turns a straw color. This will stiffen the braze and prevent bending while it is being handled.

Refit and the saw should be ready to run.

CARE OF BRAZES

The brazed part of a band saw and about an inch of the metal on each side of the braze is a little milder in temper than any other part of the blade.

For that reason this part of the saw is more subject to bends when saws are being changed or handled in the filing room. Also the brazed part is more liable to "pull-tension" than any other part of the blade.

Irregularity of tension or bends in a band saw are two of the most common causes of cracks. It is, therefore, of great importance that the brazes in every band saw should be examined at the end of each run. If any bends are found in the brazes, or if the tension has pulled to any extent, the bends should be straightened and the tension restored before the saws are allowed to make another run.

It must be remembered that the brazed part is the weakest part of a saw, and unless the brazes are kept in proper condition, the chances of cracks in the saws and possible serious accidents will be greatly increased.

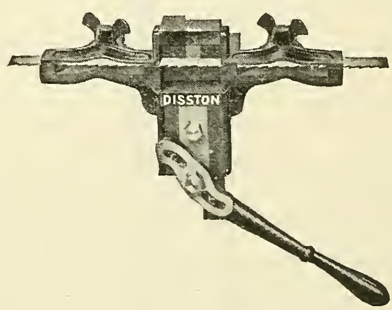


Fig. 107. Lever brazing clamp

Specially designed for quickness of operation in brazing narrow bandsaws up to one inch in width. Made of grey iron, japanned

One movement of the lever opens the jaws, another closes them, holding blade under pressure, firmly in position

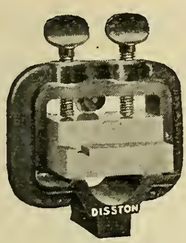


Fig. 108
Lap filing vise

LAP FILING VISE

It is essential, for a good joint, that the "laps" of bandsaws should be accurately and uniformly filed. With the assistance of this vice the filing is easily made square and true. Made of grey iron, japanned, hardened steel blocks

BRAZING TORCH

A convenient and powerful heating apparatus

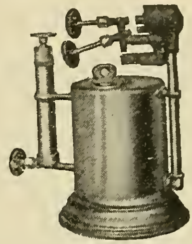


Fig. 109
Brazing torch

DIRECTIONS FOR USING LEVER BRAZING CLAMP ON NARROW BANDSAWS

The parts to be brazed must be cut so the teeth at this section will be properly spaced and matched to set alternately.

Scarf or bevel each end, on opposite sides, to a knife-edge, making the laps one-half inch wide on saws 20 gauge and thicker, and three-eights of an inch wide on saws under 20 gauge. The bevels should be perfectly square and the taper uniform, otherwise a good joint cannot be made.

Clamp the ends of the saw, with the laps in position, in the brazing clamp, making sure that the back edge is straight. Then cover the surface of the laps with a thin coating of borax paste. This is made of powdered borax and rain or distilled water.

Insert between the laps a piece of clean silver solder cut to fit, or a trifle larger than, the laps. Apply heat with a gas blow-pipe, kerosene or gasoline torch, until the parts are red and the solder is melted. Then move the lever to bring the jaws of the clamp together, holding the parts firmly until the brazed portion is black. Open the clamps and apply flame to reduce the temper, as the application of the clamp jaws has had a chilling effect and hardened the braze.

A stiff braze is desirable, therefore care should be taken not to reduce the stiffness to such a degree that the braze will bend easily.

Straighten the sides and edges with a hammer on an anvil, finishing the sides with a file and emery-cloth, maintaining an even thickness. If left too thick the braze will catch in the saw-guide and break.

When finished, stiffen with a torch, applying the flame until the braze takes on a straw or blue color.

BRAZING TONGS

The foregoing directions also apply when using tongs in brazing. The tongs to be used should have suitably sized jaws for the joint. They should be heated to a bright red, sufficiently to melt the solder. Quickly scrape off all the scale between the jaws and hold the joint with the hot tongs until the solder has thoroughly melted. Remove the hot tongs carefully and repeat the operation with another pair that has been heated

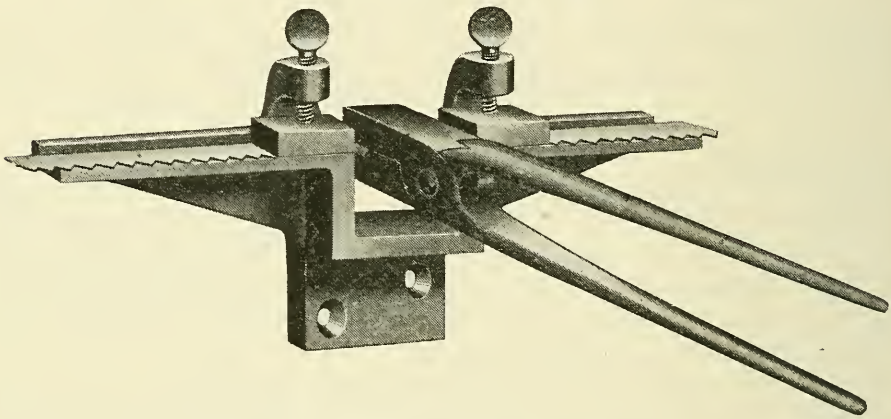
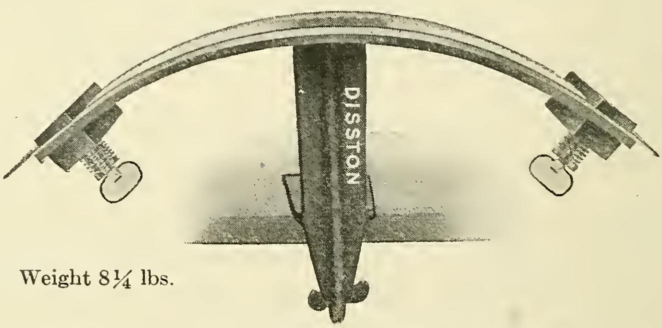


Fig. 110. Small brazing clamp and tongs

to show a dull red. This will set the solder and prevent the joint from being chilled too suddenly. It would be well to have a pair of cold tongs to clamp over the jaws of the hot tongs, holding them firmly to the joint, as the hot iron must fit nicely and press evenly over the whole width of the saw. Dress the joint as described in the instructions for use of the lever brazing clamp.



Weight 8¼ lbs.

Fig. 111. Braze finishing clamp for narrow bandsaws
A convenient and handy braze finishing clamp. The upper part of the fasteners, at each end, is upheld by a spring, permitting the quick insertion and removal of the bandsaw. For ease in working, the face of the clamp is curved.

BREAKAGE OF SMALL BAND SAWS

Among the most frequent causes of breakage the following may be named: The use of inferior saws of unsuitable gauge for the work; pulleys being out of balance or too heavy; the use of improper tension arrangements; not slackening the saw after use thus preventing the free contraction of the saw blade cooling down after work; the framing of the machine column being too high or too light thus causing excessive vibration; the joint in the saw not being of the same thickness as the rest of the blade; improper method of receiving the back thrust of the saw and consequent case-hardening and cracking of the back of the saw blade; using band saws with angular instead of rounded gullets at the roots of the teeth; top pulley over-running the saw; working dull saws; feeding up the work to the saw too quickly; allowing saw dust to collect on the face of the saw-wheel thus causing it to become lumpy and uneven. Stopping or starting a machine too suddenly especially while using a light blade, will almost certainly snap a saw in two.

Always endeavor to have a full knowledge of the working and condition of each saw in your charge and examine each blade carefully as it comes off the wheels. Close application in studying the conditions under which the saw works, along with good judgment as to when it is properly fitted for its particular work, is *what is wanted in every filer* who wishes his band saw to run successfully.

LIST OF MACHINES AND TOOLS TO MAKE COMPLETE OUTFIT FOR BAND SAW FILING ROOM

1 Automatic sharpener
1 Roll saw stretcher
1 Scarfing machine
1 Fitting-up clamp
1 Set of pulleys and stands
1 Brazing clamp
1 Re-toother and shear
1 Forge for heating brazing irons
1 Set guage
1 Tooth wrench
1 Back guage 5 or 6 feet long
1 Short straight edge
1 Tension gauge
2 Hammers—1 cross face
1 dogs head
1 Eccentric swage
1 Swage shaper
1 Levelling block
1 Anvil—hard face
10 Inch Disston mill bastard files

We are prepared to furnish any of the tools on this list and will be pleased to supply description with price on any article or machine required for keeping, fitting, and repairing saws.

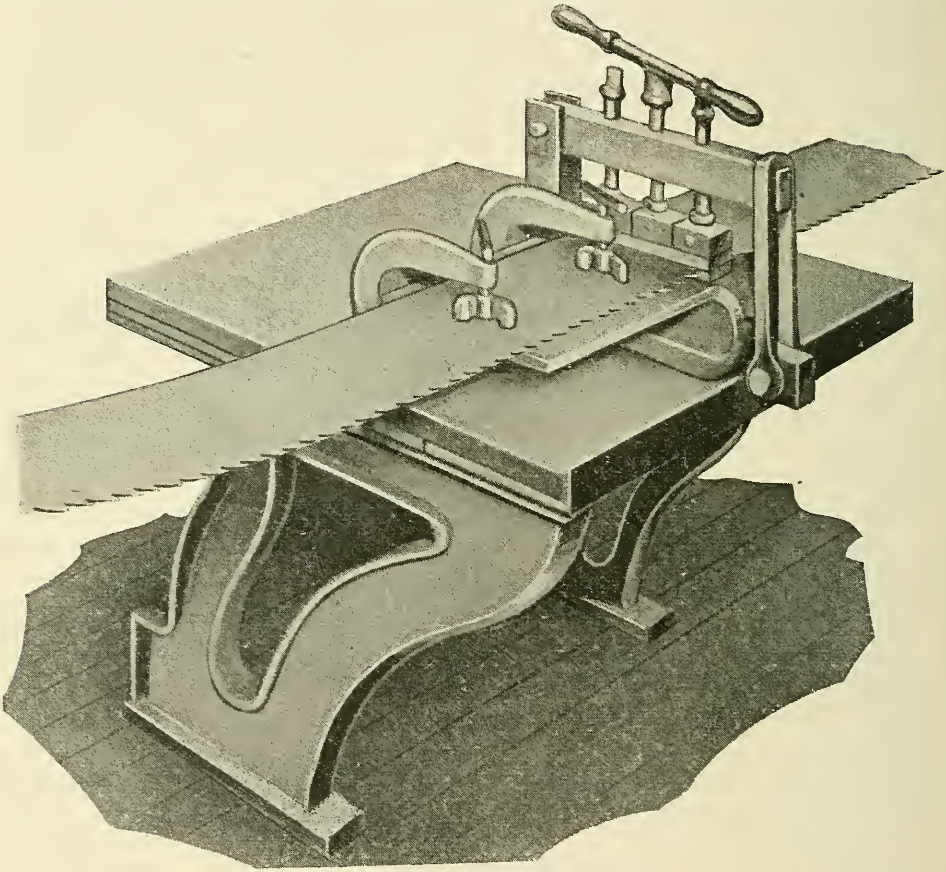


Fig. 112. Clamp for wide band saws

BRAZING CLAMP FOR WIDE BAND-SAWS

This Fig. 112 is the style of clamp used in the Disston Band-Saw Department for brazing wide band-saws.

ECCENTRIC SWAGE FOR BAND-SAWS

These are made in three sizes. No. 1, adapted for saws 12 to 16 gauge; No. 2, 16 to 19 gauge; No. 3, 20 gauge and lighter. By use of extra brackets this tool can be used for cylinder and circular saws. When ordering, state thickness of the saws on which the swage is to be used and send a sketch of the teeth.

When the Disston Eccentric Swage is ordered, in the absence of other instructions, the No. 1 will be adjusted for our standard pattern of L tooth, 1¾ inch spacing, per full size cut of tooth shown.

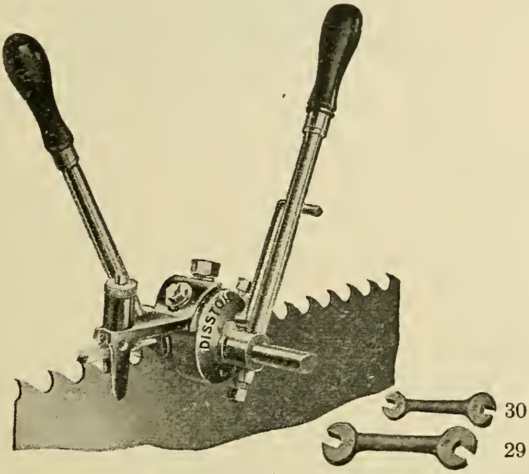


Fig. 113. Eccentric swage for band saws

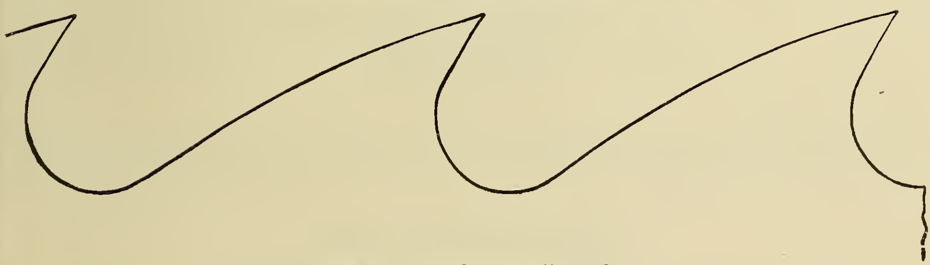


Fig. 114. The L1¾" tooth

When ordering, specify the number of part and state whether for No. 0, 1, 2, or 3 Eccentric swage. (No. 0 for circular saws.)

SWAGE SHAPER FOR BAND AND GANG SAWS

Having each tooth in a band or gang saw of the same width is quite as important as having them of a uniform length.

This swage shaper is the best tool of its kind on the market. It combines solidity with simplicity, and has very few parts to get out of order. No wrench is necessary; the shaper can be taken apart by the loosening of three thumb-screws. The dies fit snugly in the body, and will not twist or come out of line.

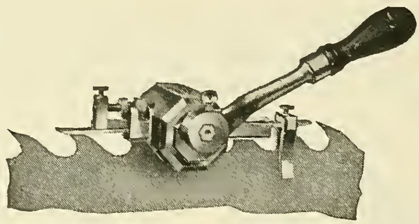


Fig. 115. Swage shaper for band and gang saws
Patented October 27, 1914

Fig. 116. A, B, and C show three stages in shaping teeth

All wearing parts are made of the best tool steel, accurately machined and milled to a perfect fit.

This swage shaper is designed to make all the teeth uniform in width and at the same time to give them the "back" and "under-cut" necessary for proper clearance and smooth sawing. It can be adjusted readily to shape the teeth on saws of any thickness rapidly.

When ordering, it is necessary to state the thickness of saw and the space of the teeth on which the shaper is to be used.

SWAGE SHAPER

Do not neglect your swage shaper. Examine it from time to time, after considerable use, to see if the dies are becoming worn by reason of the saw teeth frequently coming in contact with the same spot. If they are worn, then the swage on the teeth is not given sufficient back clearance to allow the side-dress to do its work without unnecessary friction. A saw with teeth improperly side-dressed will run "snakey." Keeping the dies in good condition and properly adjusted means a saving in labor and expense.

HOLDER FOR GRINDING SWAGE SHAPER DIES

With this adjustable holder a die is ground quickly and uniformly, without the use of a gauge.

Fig. 117. Holder for grinding swage shaper dies

Positions 1 and 2 are for grinding the angles which must be of equal length on each pair of dies. Position 3 is for shortening the die and squaring the face. It is necessary to grind the face only when the dies are of unequal length or when the bevel becomes too long.

This tool can be used on the table of any grinding machine, the only requirement being a stop-plate for the holder to rest against.

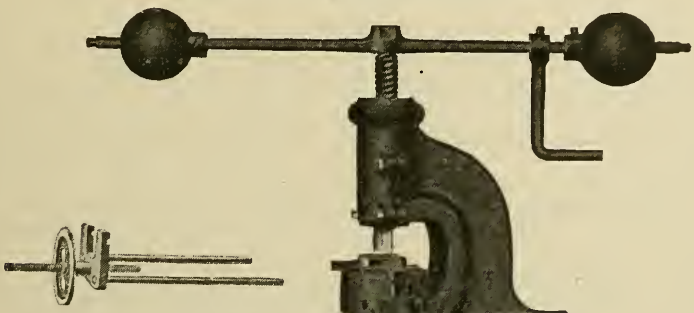
Furnished free with each swage shaper.

STOP PLATE FOR GRINDING TABLE

Fig. 118

This illustration shows how the stop plate for the holder to rest against is screwed to the wheel side of the grinding table.

HAND-SCREW PRESS



Band saw attachment

Fig. 119. No. 2 press, fitted for gumming band saws

This press is made in two sizes or weights, and in a style rendering it strong and durable for punching, slotting, toothing, or shearing purposes.

The No. 1 press weighs 460 pounds, and is adapted for gumming saws or punching steel up to 5 gauge (7/32 inch) in thickness.

The No. 2 press weighs 250 pounds and will gum saws up to 8 gauge (5/32 inch) in thickness.

The above illustration shows the No. 2 press fitted for retoothing band saws. Special dies and punches, or shear blades will be furnished on order.

This is a very desirable and powerful machine, and we recommend it as superior to any other pattern for retoothing band, gang, and other saws, as well as for general purposes.

MOHAWK BAND-SAW GUIDE

An important and vital feature of a band saw machine is the saw guide. To insure even and easy running it is necessary that the blade should move with all possible freedom and the

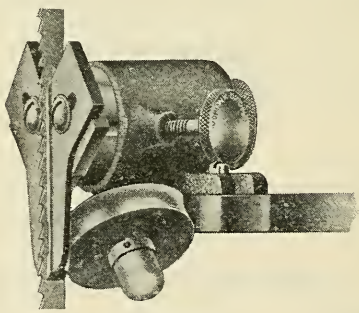


Fig. 120

No. 1. Guide complete for saws up to 1 inch wide
No. 2. Guide complete for saws up to 2 inches wide

best guide is one that offers the least resistance to the motion of the blade.

The above cut illustrates a guide calculated to prevent the friction at the back of the blade. The wheel forming the back-guide has a concave surface on its periphery, and is set on an angle so that the back of the saw passes diagonally across the periphery of the wheel and revolves it. Thus the point of bearing of the wheel against the back of the saw is constantly changed and prevents the saw from grooving the surface of the wheel by a continued action in any one place. The saw has a bearing of 11/16 of an inch at the back and will not twist or turn even if the side pieces are removed. The wheel runs on ball-bearings. It requires very little oil, and is always in proper position. The shouldered-screw adjusts for saws of different widths. The thumb-screw at the side adjusts for different gauges. Wood and metal side pieces are sent with each guide.

IMPROVED SETTING MACHINE FOR NARROW BAND-SAWS

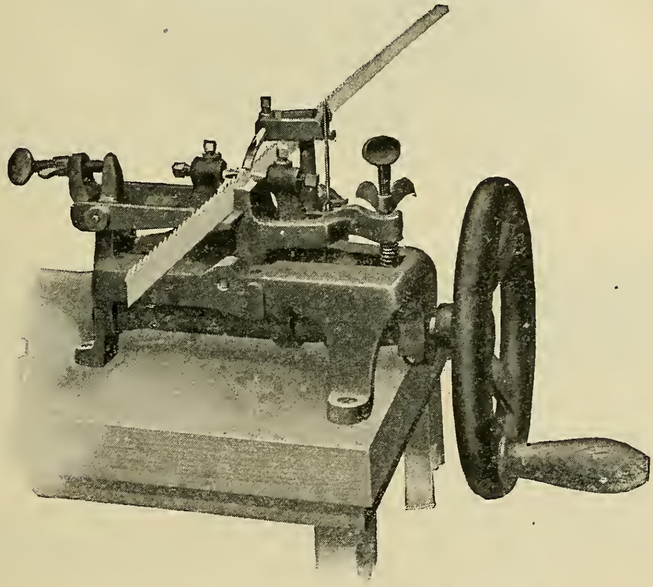


Fig. 121. Narrow band-saw setting machine

This is a simple, practical, and durable tool. It will set saws ⅛″ to 1½″ wide, with teeth 1/16″ to ⅝″ space, setting the points of the teeth uniformly. The vise, automatically gripping the blade while the tooth is being set and prevents twisting when used on narrow saws.

The machine should run 100 revolutions per minute, enabling the operator to set a saw in four to five minutes.

AUTOMATIC FILING MACHINE FOR NARROW BAND-SAWS

This tool is simple, efficient, and accurate. It is strongly made easily adjusted, and requires no attention after it has been started.

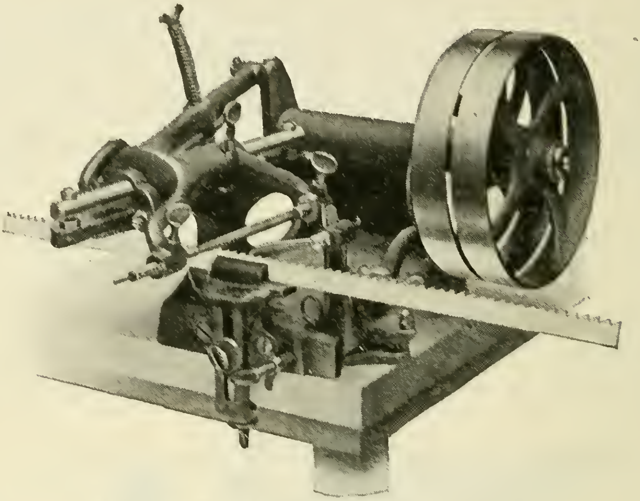


Fig. 122. Narrow band-saw filing machine

It will take saws $\frac{1}{8}''$ to $1\frac{1}{2}''$ wide, with teeth $1/16''$ to $\frac{5}{8}''$ space, and will file old saws with uneven teeth as perfectly as new ones. If all teeth are filed to the same height, the saws will stay sharp longer. Each tooth doing its proportionate amount of work prevents breakage.

This machine uses 6″ taper saw files, and should run 50 to 60 revolutions per minute.

RECIPROCATING SAWS

(Saws which move up and down or back and forth, such as cross-cut saws, drag saws, mill saws, gang saws, pit saws, etc.)

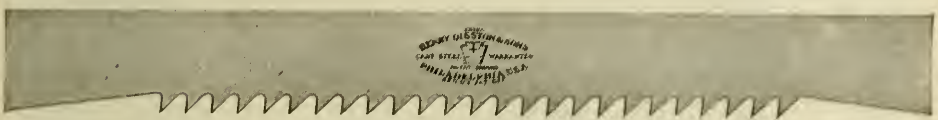


Fig. 123. Mill saw

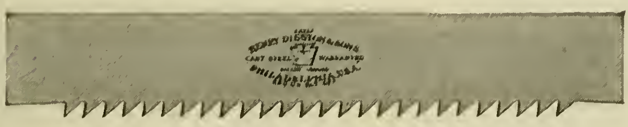


Fig. 124. Gang saw

Fig. 125. Pit saw

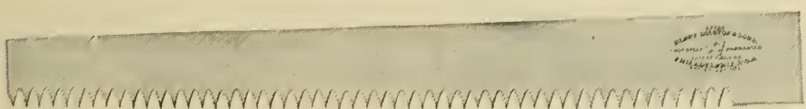


Fig. 126. Tapered butting or drag saws. Power or motor driven

We manufacture a complete line of mill, mulay, gang, deal, drag, pit, whip, futtock, pond ice, and hand ice saws,—in fact, all varieties of saws in use. They are made of a Disston Steel peculiarly adapted to withstand the strains to which these saws are subjected when in use. For quality of material, temper, tension, and edge-holding qualities they have no equal.

DRAG-SAWS FOR MOTOR-DRIVEN MACHINES

Fig. 127. A motor driven drag saw in action

The advantages of these machines in the saving of time, labor, and expense are being more generally recognized. While of great benefit to the farmer, who finds it an untiring worker in building up his pile of firewood, etc., it is also employed by a number of loggers, by shingle, stave, and spoke mills, etc., where logs are cut into short bolts,—formerly done by slow, laborious handwork.

We manufacture a special line of drag saws with various styles of teeth, to meet the demands of users of these machines.

TOOLS FOR RE-FITTING DRAW SAWS

It is of the utmost importance that the teeth of drag saws, as with all saws, be maintained in good cutting condition, otherwise the results will be very unsatisfactory,—poor lumber, uneven cuts, and in addition, extra power and time will be consumed in operating a dull saw or one improperly fitted.

To assist in obtaining uniform results, first in filing, then in setting, we fully recommend the use of the Disston No. 2 Imperial Drag Saw Tool (instructions for the use of this tool are similar to those for the Imperial cross-cut saw tools given on page 129) and either the No. 1 or No. 2 setting block illustrated below. For sharpening use the Disston Imperial Saw File, 8 inch.

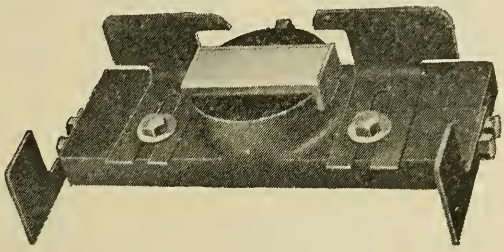


Fig. 128. Disston No. 1 Adjustable Setting Block

The No. 1 block is made of a solid casting. The anvil has a chilled face, insuring a good, hard surface. The gauges are adjustable to the various widths of set required.

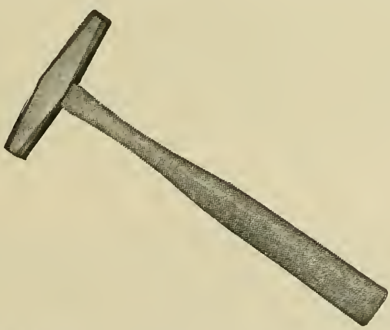


Fig. 129. Setting hammer. Special in form and weight for setting saws

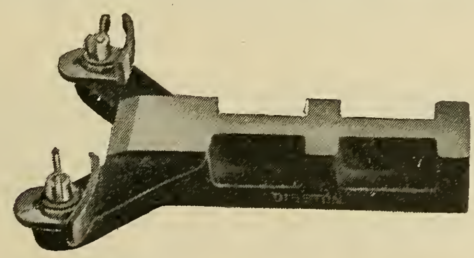


Fig. 130. Disston No. 2 Adjustable Setting Block

The No. 2 block is made of a solid casting with a removable steel anvil. The anvil has four different bevels for different patterns of saws. The gauges are adjustable to the various widths of set required. Hand saws, cross-cut saws, and drag saws can be set on this block.

CROSS-CUT SAWS

The perfection of temper in all saws is controlled very largely by the quality of the steel.

As manufacturers of our own steel, being thoroughly familiar with its make-up, we are able to adjust the hardening and tempering processes to a degree which gives that perfect combination of hardness and toughness which produces the "edge and set-holding qualities" for which the Disston Saws are renowned.

With the possible exception of material and tempering, grinding is the most important thing in saw-making. Our methods and machinery for this work are of our own design and used exclusively by us. The Disston process of grinding gives the saws the maximum amount of clearance without sacrificing their elasticity and stiffness. It insures an even thickness on the cutting-edges, with a relative and uniform thickness throughout the body to a thin or extra thin back.

In the blocking, polishing, stiffening, and final processes of manufacture, the same high order of skill is exercised as in the hardening, tempering, and grinding. Saws of the highest quality and efficiency that human ingenuity coupled with skill is capable of producing, are the result.

No expense or care is spared in our efforts to produce the best saws in the world, and we guarantee that Disston Saws, under the same conditions, will run easier, cut faster, and last longer than any other brand of saw on the market.

Illustrations of Different Patterns of Cross-Cut Saw Teeth

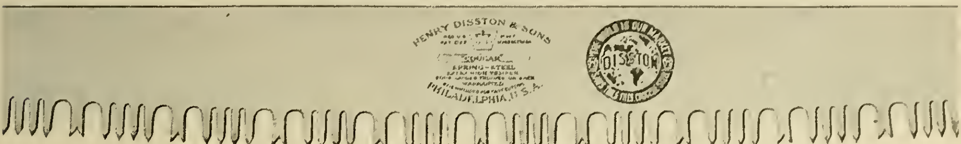


Fig. 131. Cougar. Trademark Registered U. S. Pat. Off.

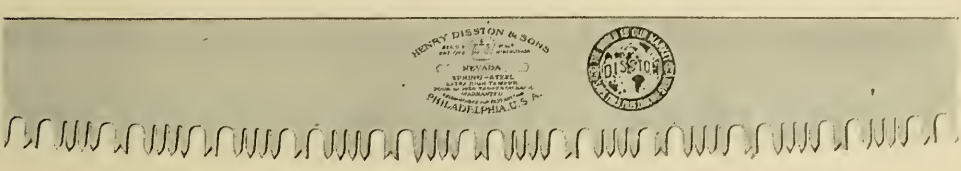


Fig. 132. Nevada, No. 497

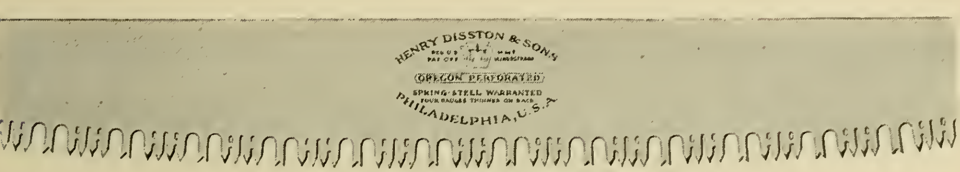


Fig. 133. Perforated Oregon, No. 475

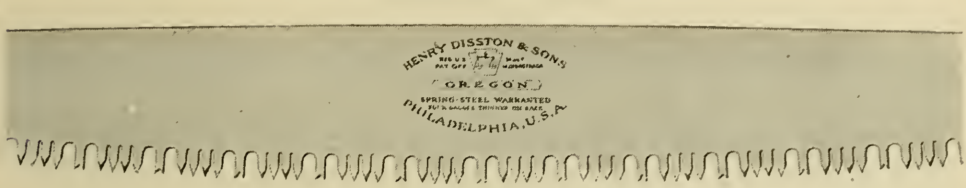


Fig. 134. Oregon, No. 473

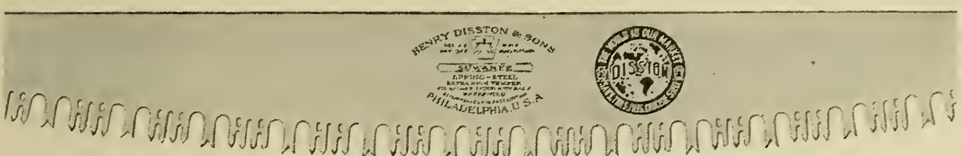


Fig. 135. Suwanee, No. 495

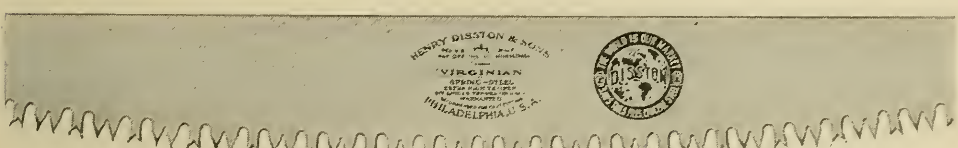


Fig. 136. Virginian, No. 289

Illustrations of Different Patterns of Cross-Cut Saw Teeth

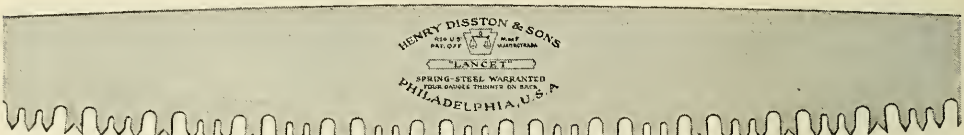


Fig. 137. Lancet, No. 365. Trademark Registered U. S. Pat. Off.

Fig. 138. Great American, No. 1. Trademark Registered U. S. Pat. Off.

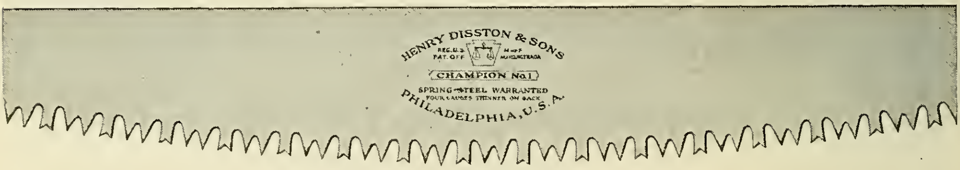


Fig. 139. Champion, No. 1

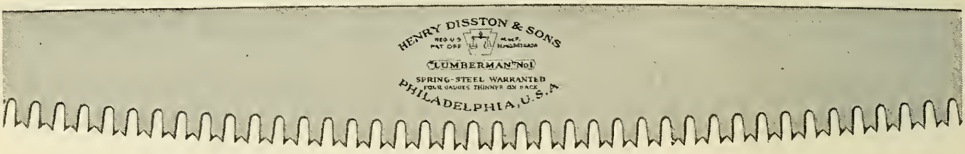


Fig. 140. Lumberman, No. 1. Trademark Registered U. S. Pat. Off.

Fig. 141. Perforated Lance, 477

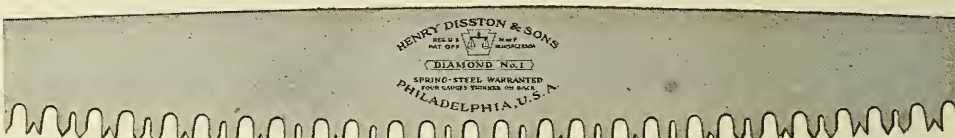


Fig. 142. Diamond, No. 1

Illustrations of Different Patterns of Cross-Cut Saw Teeth

Fig. 143. Plain, No. 1

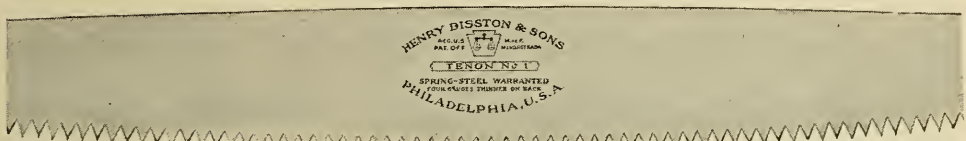


Fig. 144. Tenon, No. 1

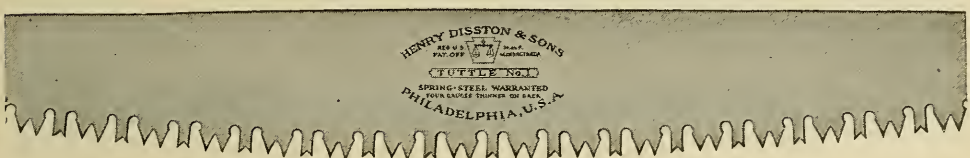


Fig. 145. Tuttle, No. 1

The above patterns represent a general line of cross-cut saw teeth. We make various other styles and shapes, however, as shown in our catalogue.

DISSTON HIGH GRADE CROSS-CUT SAWS

Particular attention is invited to the merits of the **Virginian** and the **Suwanee Cross-cut Saws.** These saws are designed especially for heavy and rapid cutting, and represent everything in the way of material, temper, and workmanship that is most desirable in cross-cut saws. The steel is the best that can be produced. The widths of plates are fixed at those points which our many years of experience and careful observation have proved the most advantageous in fast cutting saws. The temper is as high as due regard to necessary toughness will admit. The shape and spacing of teeth, the size, and the position and depth of gullets have much to do with the results to be obtained from cross-cut saws.

Add to this the fact that the saws are ground to a perfectly uniform thickness throughout the tooth-edge and tapered to an extra thin-back on lines that conform to the breast of the

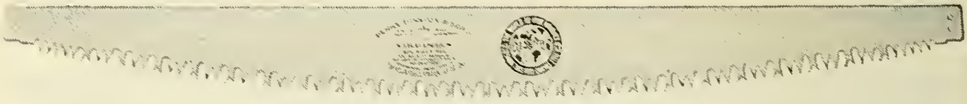


Fig. 146. Virginian, No. 289

Fig. 147. Suwanee, No. 495

saws. Then we have saws which for rapid cutting and easy "running," have never been equaled.

Disston Felling Saws as the name implies, these saws are made especially for felling timber and differ from the regular cross-cut saws only in shape and weight. The high grade steel used for our wide saws and the same workmanship are employed in the make-up of the felling saws.

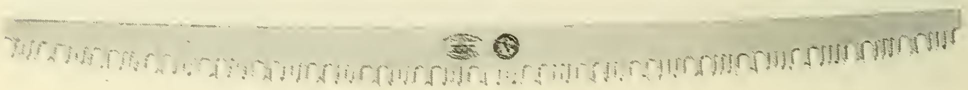


Fig. 148. Cougar Felling, 448. Trademark Registered U. S. Pat. Off. For Pacific Coast

Fig. 149. Nevada Felling, No. 496. For Pacific Coast

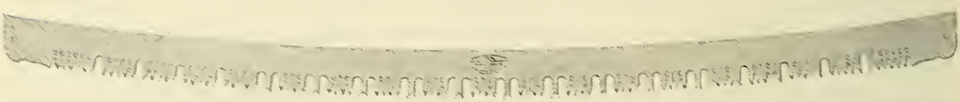


Fig. 150. Triumph Toledo, 598.

The blades are made as narrow as a fair margin of strength and a proportionate amount of wear permit. They are ground on special lines which give the greatest possible stiffness and at the same time the proper clearance to prevent kerf-binding.

Fig. 151. "Beaver" Hollow Back No. 494 for felling and buck sawing
Trademark Registered U. S. Pat. Off.

The "Beaver" is a medium width, thin-back, strictly high grade saw, designed specially for both felling and buck-sawing, and ordinary cross-cutting.

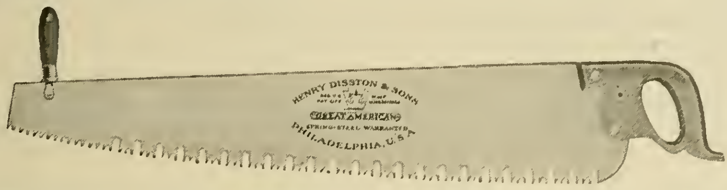


Fig. 152. "Great American," No. 373, one-man cross-cut saw with a supplementary handle. Trademark Registered U. S. Pat. Off.

This engraving represents a cross-cut saw, especially adapted for the use of one man. The "Great American" one-man cross-cut saw is made and ground on the same principle as our No. 7 hand saw. We have improved the file for keeping this tooth in order, and it should be ordered with the saw.

Bridge-builders, mill men, railroad and other contractors—in fact, all large establishments—will find this a very useful tool. For cutting off girders, joists, blocking, or heavy lumber of any kind, it is just what is required. This saw will pay for itself in a few days, as the labor of one man is saved.

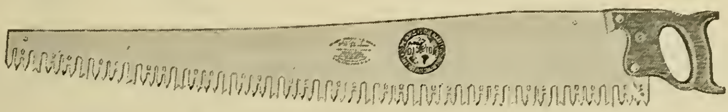


Fig. 153. Cedar Savage, No. 410, one-man cross-cut saw

THE RAKER OR CLEANER TOOTH OF CROSS-CUT SAWS

The question of the proper length or height of the "Rakers" or cleaner teeth in cross-cut saws is frequently brought up and statements are sometimes made that the "Rakers" do all the work, and therefore should be on line or even with the cutting points of the saw. The latter claim will appear ridiculous to experienced cross-cut saw users but since new men are constantly entering the field who are not expert saw fitters, an explanation is worth while, for quick progress can only be made in profiting by the experience of others.

When considering the subject of rakers, it must be borne in mind that several patterns of saws are made and used without raker teeth which do good work, especially in dry seasoned timber. It was the development of the cross-cut saw for the particular use of logging operators which led to the introduction of the raker for quick clearing action.

In this article we shall dwell only on that type of saw, it being a discovery which led to faster cutting; the raker planing out and keeping the cut free from sawdust, which would interfere with the cutting or scoring teeth.

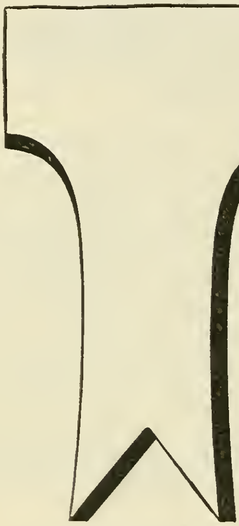


Fig.154
Plain raker

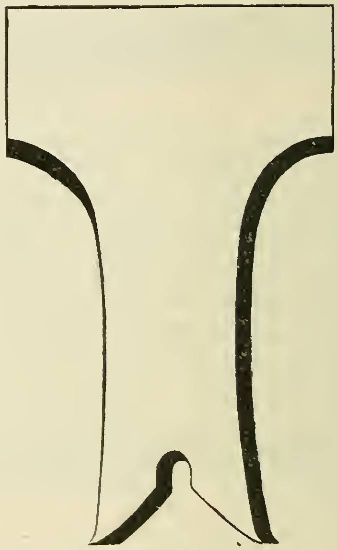


Fig. 155. Swaged raker

When cross-cutting timber or lumber, that is, cutting across the grain, the points and edges of the cutting teeth strike the fibre of the wood at right angles to its length, severing it from the main body on each side of the saw. In other words, the cutting teeth do the *scoring* while the *rakers* plane and clean out the remaining ridge of wood which is thrown out in the form of a shaving as shown in Fig. 156.

The scoring teeth properly beveled leave a space between the knife-edges of the tooth. This necessitates the employment of some agency for the removal of the ridge of wood left between the scorings made by the cutting teeth. This action is accomplished by providing, at short intervals, a tooth which is filed straight across and left slightly shorter in length than the cutting teeth. This tooth is termed a "Raker" or cleaner by reason of its function of raking or planing out the cut.

We now reach the question: "What is the proper length for the raker?"

Some rakers are left but one one-hundredth of an inch shorter than the cutting teeth, and from that anywhere to one thirty-second of an inch, a gauge being used to insure uniformity. The length of the raker is determined by the kind and class of timber to be cut. For the very hardest and driest woods they should be one one-hundredth of an inch shorter than the cutting teeth, while for hard, green woods the rakers should be one sixty-fourth of an inch shorter than the scoring teeth. From that the length varies to an extreme of about one thirty-second of an inch when cutting softer woods according to the condition of the timber.

The rakers absolutely must be shorter than the cutting teeth, for if they are too long they will not allow the cutting teeth to come in proper contact with the work and the saw

Fig. 156 shaving

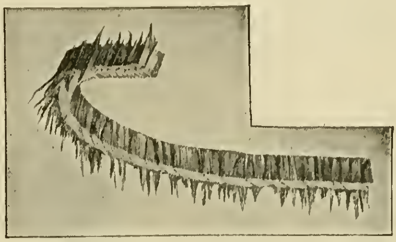


Fig. 157 planing showing "whiskers"

will not cut freely. Even if just a slight fraction too long they will prevent the saw from doing good work and the sawdust or thick shavings will have what the woodsmen term "whiskers" as shown in Fig. 157. This proves that the rakers are too long, for they go below the scoring of the cutters, breaking the fibre and tearing it out.

When the rakers are in this condition the sawing is difficult and the saw hard to pull through the cut. On the other hand, where the rakers just clean out the cut, leaving a faint mark of the scoring teeth, they are then of proper length and the saw will cut fast with the least exertion.

It is well to understand that extra weight is of no benefit in a cross-cut saw. The chief points are the cutting teeth, the rakers, the grinding or taper, and the quality of the steel which naturally is the foundation upon which rests all subsequent work. Beyond all other points remember that *the rakers are the controlling factor of saw efficiency*, for if too long they cause the saw to ride or jump and prevent the cutting teeth from scoring, while if properly fitted they steady the blade, draw it into the wood, bringing the cutting teeth into more active work.

This article is not based on theory, but is the result of long experience and practical tests made in various kinds of woods in all parts of the country with saws "fitted up" with rakers of various lengths—from very short rakers to those equal in length with the cutting teeth. Each saw was put to actual work, and records made of the time consumed in cutting, and the number of strokes required to cut a given size log. Consideration was given also to the power required and the smoothness of the cut.

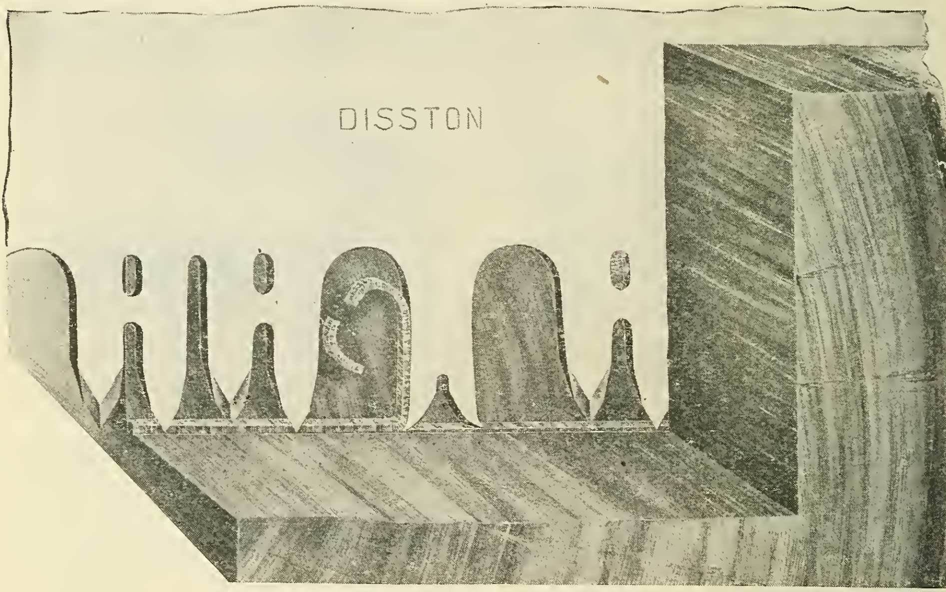


Fig. 158. The cutting teeth score and the rakers plane

Not one only, but several tests were made of each saw, then a comparison of all records determined beyond doubt the particular style of "Fitting" (*i. e.*, length of raker, bevel or fleam of tooth, etc.,) productive of greatest results. To make it more conclusive, the outcome of these demonstrations agrees with the general experience of well-qualified, practical woodsmen.

You will see from the foregoing that Disston Saws are made for practical use,—not merely to sell,—and when properly fitted will *run easiest, cut fastest, and last longest.*

CARE OF CROSS-CUT SAWS

It is a well understood fact, though often unheeded or neglected, either through carelessness, hurry, or possibly from lack of experience, that in order to obtain the highest results from any cutting tool that tool must be kept in the best possible condition. It matters not how well a tool may be made, nor how high the quality, it will render but poor service if not kept in proper order.

This is particularly applicable to saws. As a rule, if the user becomes dissatisfied, the blame is placed on the quality or style of saw, when usually the saw merely needs resetting and re-sharpening. This will make the saw cut faster, and run easier, and will lengthen its life.

With this in view, particular attention is called to instructions for setting and sharpening or fitting cross-cut saws with the use of the new and improved Disston Imperial Cross-cut Saw Tools. These, if properly followed, will enable the sawyer to obtain better and greater results with the least possible exertion.

DISSTON IMPERIAL CROSS-CUT SAW TOOLS

This set of tools includes a jointer, raker-tooth gauge, setting block or anvil, and setting gauge.

We call special attention to the following points in the make-up of the IMPERIAL:

The parts that rest and slide on the cutting teeth of the saw, while "cutting down raker," in all tools are subject to the greatest wear. In the Imperial these parts are not only made of high-grade steel, specially hardened, to give great durability, but are also easily detached by the mere loosening of a screw. This, while holding the parts firmly, also permits of renewal of worn parts, thus prolonging indefinitely the efficiency of the tool, and overcoming a feature so objectionable in other cross-cut saw tools.

The raker gauge is also made of steel and hardened to such a degree that the best superfine file will not cut it.

Another important feature, found in no other cross-cut saw tool, is the improvement in the screw adjustment to set the raker gauge, whereby the gauge can be adjusted to the smallest fractional part of an inch to obtain the particular length of

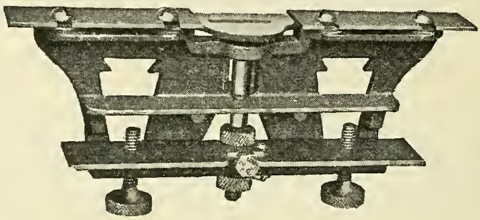


Fig. 159

raker desired. When adjusted and locked with the two lock-nuts on the lower end of raker gauge, the gauge cannot work loose and will remain in its position indefinitely, requiring readjustment only when a different length of raker is desired to suit the changes necessitated by the kind of timber to be cut.

Notice the long bossed rib which forms a rest for the jointer file, and affords a firm bearing. The slight curve which is given to the file insures quick, direct action on the teeth.

The material entering into the make-up of the Imperial Cross-cut Saw Tools is the best that can be procured for the purpose, the workmanship is most thorough, and we unhesitatingly pronounce it a cross-cut saw tool that fills a long-felt want.

Setting and Sharpening (or "Fitting") with the "IMPERIAL"

To fit up a cross-cut saw properly, it is necessary:

First—That the teeth be uniform in length. To accomplish this, place a file edgewise in the frame and secure it by thumb-screws. Pass the tool lightly over the teeth until the file touches the shortest cutting tooth. See Fig. 160.

Second—Where swaged rakers are used, the swaging should follow the jointing. The two points of the rakers are first filed to sharp edges without reducing their length, after which each raker point should be swaged or bent outward and downward by the use of the swaging hammer as shown in Fig. 161. This reduces the length of the rakers from 1/100 to 1/32 of an inch according to the kind of timber to be cut. The uniformity in the length or height of raker points can readily be gauged by the use of the graduated gauge as shown in Fig. 163.

The faces of the gauge are marked from one to six, the gauge being held rigid by a small roundhead screw. To adjust the gauge loosen the screw and turn the gauge so that the face opposite the number wanted projects above and parallel with the steel plate, against which the teeth of the saw rest. Then tighten the screw. The points of the rakers should just touch the face of the gauge. The face marked (1) makes the raker 1/125 of an inch shorter than cutting teeth; (2) 1/64; (3) 1/50; (4) 1/40; (5); 1/35 (6) 1/32.

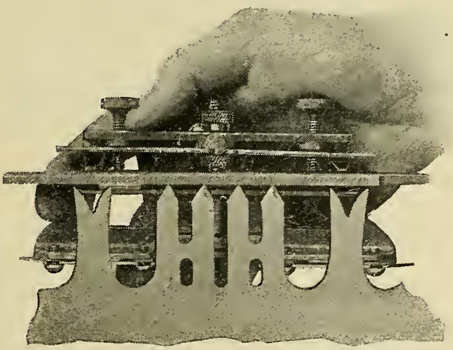


Fig. 160. Jointing

Third—To *"fit"* the straight or unswaged raker—where preferred—place the gauge over the raker teeth, as shown in Fig. 162, adjust for length of raker required, and file them down. Then file to a sharp edge.

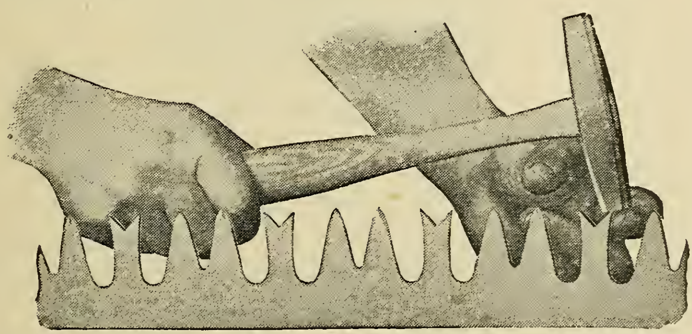


Fig. 161. Method of swaging rakers

Care should be taken to have the rakers shorter than the cutting teeth. If the rakers are too long they will not allow the cutting teeth to come in proper contact with the work and the saw will not cut freely. For the very hardest and driest woods the raker should be 1/100 part of an inch shorter than the cutting teeth. For hard green wood the rakers should be 1/64 of an inch shorter than the cutting teeth, and graduated from 1/64 to 1/32 of an inch, according to conditions and timber when cutting softer wood.

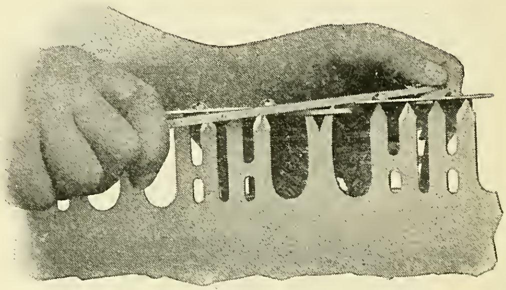


Fig. 162. Filing raker tooth

Fourth—When filing, bring each tooth to a keen cutting edge, taking care not to reduce the length of the tooth any more than is necessary to remove the marks of jointing. The amount of bevel to the tooth should be determined by the class of timber to be cut. Hard wood requires less bevel than soft wood.

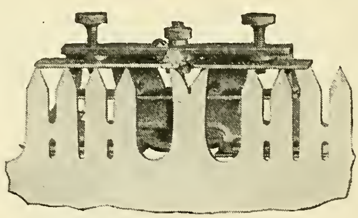


Fig. 163. Graduated gauge

Figures 164 A and 165 B illustrate a style of "fitting" which we strongly recommend, particularly for very hard or dry stock. This style of fitting produces a long knife-like edge which, through a shearing cut, readily severs the fibre of the hardest wood.

Note particularly how the saw is filed when new and keep it as near that shape as possible.

Fifth—If a saw requires setting, lay the block or anvil, Fig. 166, on some convenient flat, solid surface and hold the saw so that the *point* of the tooth projects over the beveled edge of the anvil about one-quarter of an inch. Give two or three blows with a light hammer, striking the tooth always about one-quarter of an inch from the point. It is very important

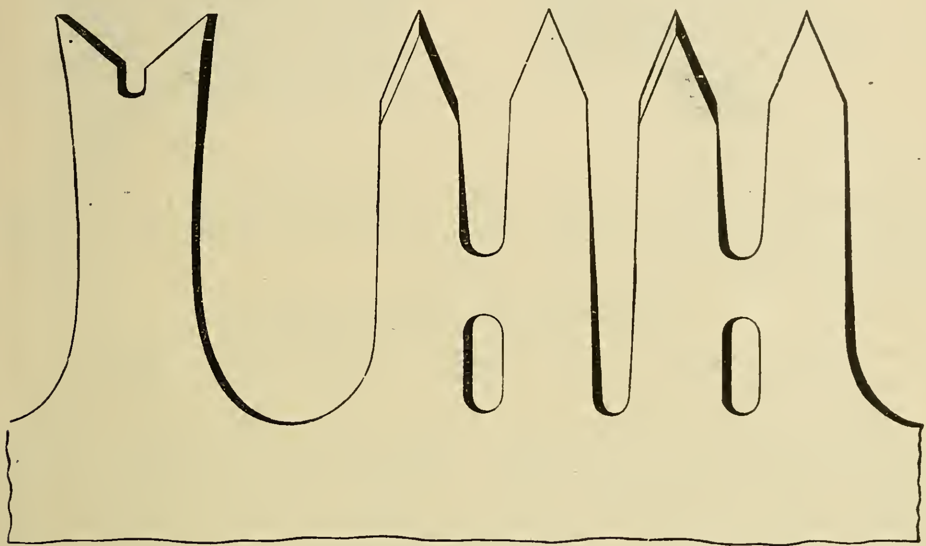


Fig. 164 A

that the "set" should be perfectly uniform, that is, exactly the same amount of set to all teeth. This can be regulated by

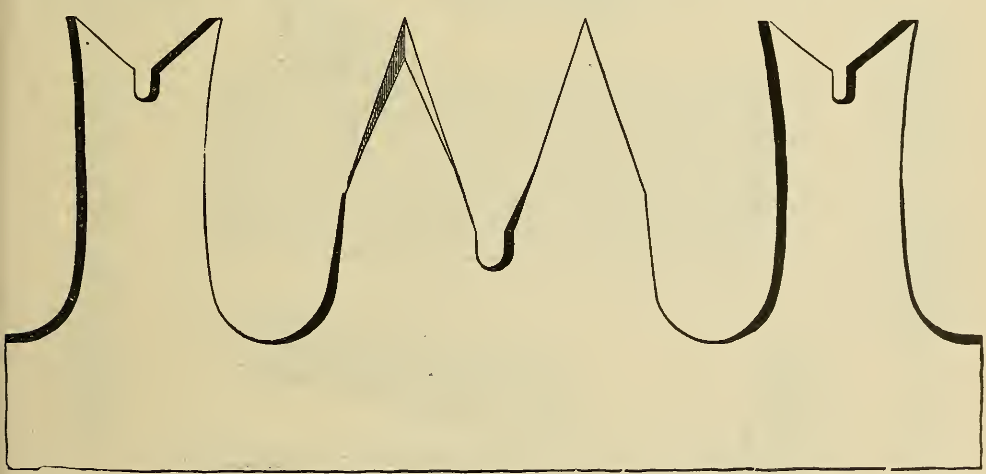


Fig. 165 B

the use of a *set gauge*, Fig. 167. The amount of set required is largely determined by the kind of timber to be cut and the manner in which the saw is ground. The Disston extra thinback saws when

Fig. 166. Setting block

Fig. 167. Set gauge

properly filed do not require more than 1/100 part of an inch set to each side of the saw in general sawing, and can be run with less set in hard, firm-grained timber.

HAMMER AND ANVIL

For Setting the Teeth of Cross-Cut Saws

High grade cross-cut saws are necessarily made with a special temper for the purpose of holding their set and cutting-edges the longest possible time. Being so high in temper, it is almost an impossibility to set them with the old-fashioned lever spring-setting device. Hence the demand for tools that will

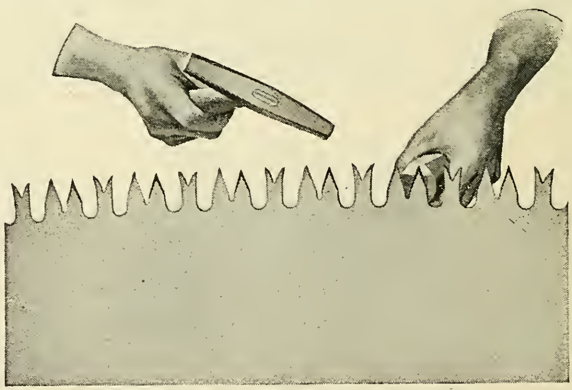


Fig. 168. Anvil and hammer in use

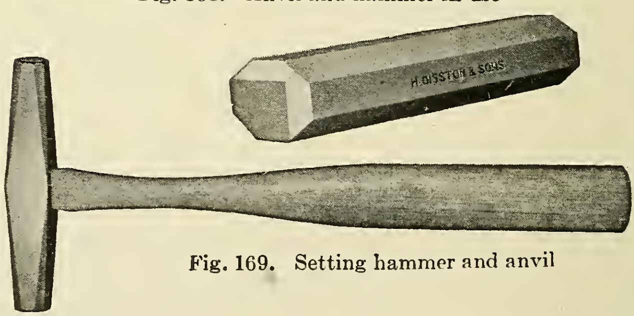


Fig. 169. Setting hammer and anvil

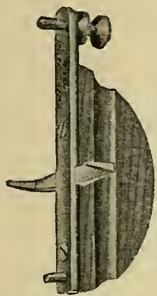


Fig. 170
Adjustable set gauge for cross-cut saws.
A light and convenient gauge for regulating the set on teeth of cross-cut and one-man saws.

do the work properly and with the least trouble. This led to the method shown in Fig. 168 which is so plain in its operation that it needs no explanation. These tools are the simplest for setting cross-cut saws. Both the hammer and anvil are made of tool steel and fully guaranteed.

The hammer is of a weight best adapted for the setting and swaging of saw teeth. The anvil, octagon shape, is 1½ inches in diameter, 5 inches long, which gives the necessary body and weight. The faces are accurately machined to give them a good true bearing and proper angles to form the set. This enables the filer to adjust the set to the exact degree suitable for the character of timber to be cut, the setting being done while the saw is in the vise or filing clamp.

To secure the best results from cross-cut saws they must be properly set and sharpened, which can only be accomplished by an experienced filer supplied with proper tools. The setting hammer and anvil herewith illustrated, and the Disston Imperial Cross-cut Saw Tools, are recommended as best for the purpose.

DISSTON HANDLES FOR CROSS-CUT SAWS

Fig. 171
Old Climax
No. 103.

All Disston Handles are made of carefully selected, well-seasoned wood; beech and maple being principally used, and are of such shape as to give a comfortable grip. The fittings used are of best malleable iron, well made and finished, and of designs particularly adapted for the purpose.

Some patterns of handles are made to fit on the saw. In the loop handle, for instance, the loop is slipped over the end of the blade, and is then tightened by turning the handle. Others are adjusted to the edge of the blade. The pin of the bolt is

Fig. 172
Sectional View
No. 122
This handle has a heavy, malleable iron cap with a long neck, tapped for a loop rod. The wood is thoroughly seasoned and well finished. The heavy ferrule is of malleable iron. There is an anti-friction washer. The loop rod is of malleable iron, extra heavy and strong. The threads are well-cut.

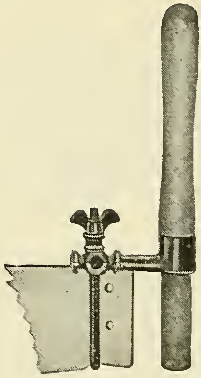


Fig. 173 A. No. 113. A reversible handle

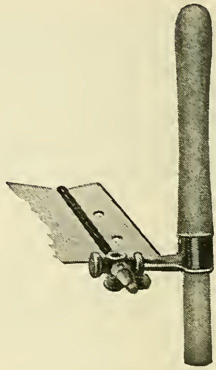


Fig. 174 B. No. 113. (Reversed)

inserted in a hole at the end of the saw, and is tightened by screwing up a thumb-nut.

The most perfect handle is one, which while strong and durable, permits of a quick adjustment and removal. Particularly so is this the case with those used for felling saws, where it is often necessary to remove the handle to withdraw the saw from the cut the moment the tree is about to fall.

Another important feature in certain patterns is the fact that they are reversible, thus enabling the use of the saw in various positions.

FILES

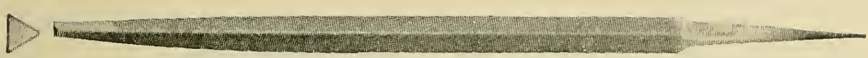


Fig. 175 SLIM TAPER

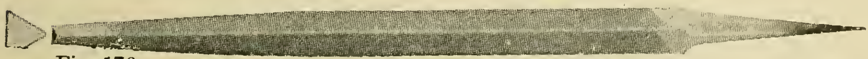


Fig. 176 TAPER

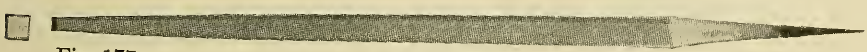


Fig. 177 SQUARE

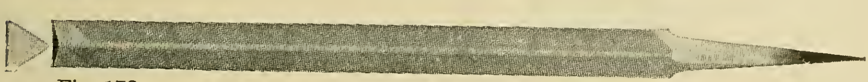


Fig. 178 BLUNT BAND

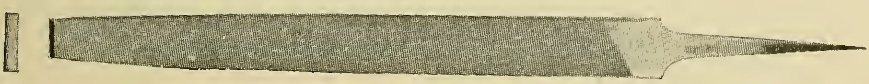


Fig. 179 MILL

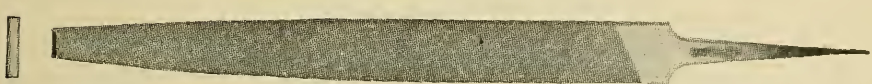


Fig. 180 FLAT BASTARD

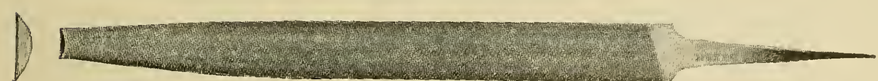


Fig. 181 HALF ROUND

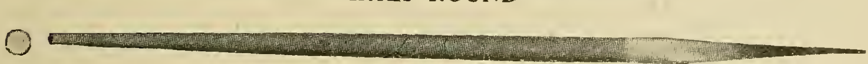


Fig. 182 ROUND

Fig. 183 HALF ROUND WOOD RASP

For a manufacturer to make a good file is one thing. For a manufacturer to make every file a good file is another, and much more important thing.

Disston Files are known everywhere for their uniform good quality. One reason they are preferred is because buyers know that every Disston File is a good file.

Disston Files are made from the famous Disston Steel. Having our own steel works, we can have always just the grade of steel best suited for the purpose.

We are one of the pioneer file makers of the country, and many of our file makers have spent their lives in the Disston File Shops —real expert workmen who are on the job year in and year out.

Much of our file-making machinery was invented or developed in our own plant. Workmen who have made a life study of file-making, naturally have developed machines that make better files—and make every file a better file.

We use over 35,000 dozen Disston Files in our own factory every year for filing Disston Saws. This constant use of our own product, day after day, gives us an absolute and definite check on quality and on uniformity.

It is the combination of these things—absolute control of the quality and uniformity of our own steel, expert workmanship, machinery developed in our own plant, and a constant check on the efficiency of our files—that allows us to guarantee every Disston file.

MACHINE KNIVES

To produce good knives there are three important requisites, —good steel, good temper, and good workmanship. Disston Knives have attained their enviable reputation through careful and constant attention to these three points.

All our steel is made especially for the purpose intended, and of a superior quality. The welding of the steel face to the back in Disston Knives insures the strongest union possible,—see Fig. 184. The temper cannot be excelled for uniformity and toughness, and our workmanship is the best that skilled labor can produce.

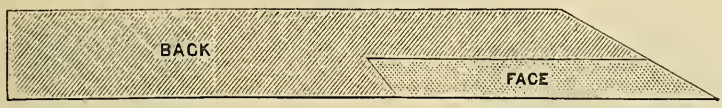


Fig. 184. This cross section of a Disston machine knife shows how the face is welded to the back

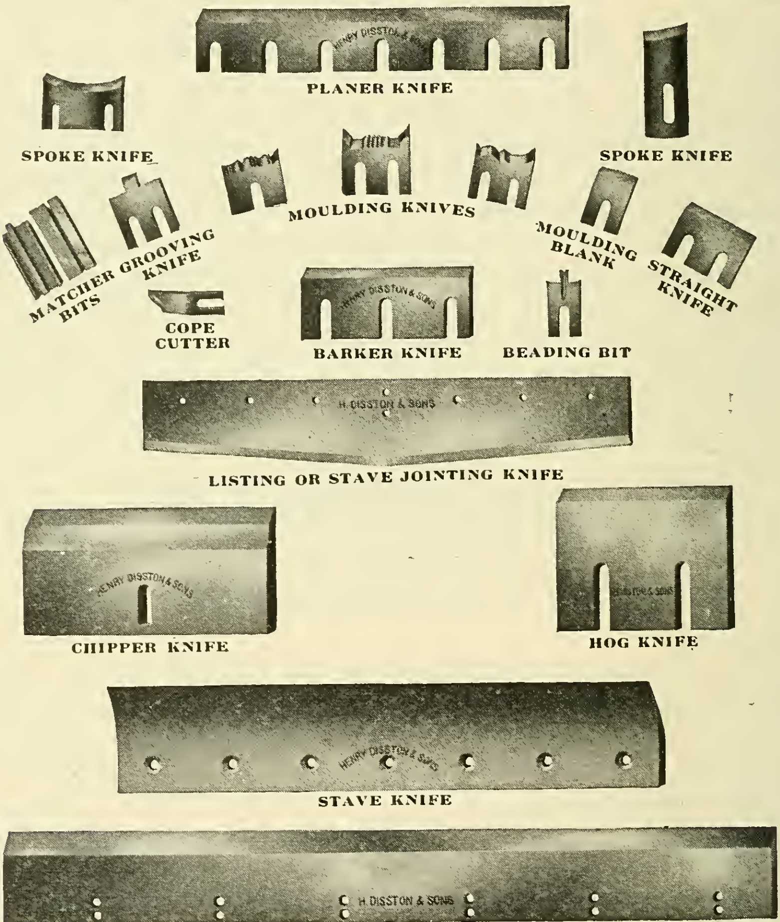
We are prepared to furnish knives of any size or kind for cutting wood, paper, and metal, including planer, chipper, hog, moulding, spoke, stave, stave jointer, mitre, paper trimming, veneer, and bobbin knives, shear and stop cutter blades, moulding cutter blanks, etc.

In ordering planer and similar knives with slots, place a sample knife face down on a piece of paper and mark around it to show the length, position, and size of slots. State width and thickness, number of knives wanted and *number in a set.* Also state temper required, whether high to grind only; medium to file slowly; soft to file easily.

All planing machine knives will be made with square backs, unless otherwise ordered.

Orders for moulding knives should be accompanied with the sample piece of moulding or an outline drawing of the shape of the moulding desired. Otherwise order by pattern number as shown in the National Moulding Book, adopted by the Sash, Door, and Blind Manufacturers' Association, and the Yellow Pine Association's Moulding Book. Also give the width of the cylinder head and the size of the bolt used.

We are pleased to furnish information at all times regarding knives, also diagram sheets for marking out patterns of knives.



Back Knives	Convexed Knives	Listing Knives	Planer Knife Steel
Barker Knives	Excelsior Knives	Matcher Bits	Shingle Jointer
Beading Knives	Gaining Cutters	Moulding Cutters	Siding Knives
Beveled Edge Steel	Hog Knives	Moulding Cutter Blanks	Stave Knives
Chipper Knives	Hoop Knives	Paper Knives	Tenon Machine Cutters
Concaved Knives	Jointer Bits	Veneer Knives, flat or spiral	
	Jointer Knives		

Fig. 185

In our own factory we use quantities of planer knives, moulding knives, shear blades, etc. Therefore we have a practical knowledge of what they should do, and make them so they will do it.

TABLE Shows the Value of the DISSTON WIRE GAUGE which Corresponds Exactly with Stubb's English Gauge

In decimal and fractional parts of an inch. The table also shows the weight of a square foot of sheet steel.

Gauge Number	Fractional Part of an Inch	Decimals of an Inch	Weight Sq. Feet Pounds	Gauge Number	Fractional Part of an Inch	Decimals of an Inch	Weight Sq. Feet Pounds
00000	1/2	.50	20.32	**11**		.120	4.88
	15/32	.4687	19.05	**12**	7/64	.109	4.44
0000		.454	18.46	**13**		.095	3.86
	7/16	.4375	17.78		3/32	.0937	3.81
000		.425	17.28	**14**		.083	3.37
	13/32	.4062	16.51		5/64	.078	3.18
00		.380	15.45	**15**		.072	2.93
	3/8	.375	15.24	**16**		.065	2.64
	11/32	.3437	13.97		1/16	.0625	2.54
0		.340	13.82	**17**		.058	2.36
	5/16	.3125	12.70	**18**		.049	1.99
1		.300	12.20		3/64	.046	1.91
	19/64	.296	12.07	**19**		.042	1.71
2		.284	11.55	**20**		.035	1.42
	9/32	.281	11.43	**21**		.032	1.30
	17/64	.265	10.80		1/32	.0313	1.27
3		.259	10.53	**22**		.028	1.14
	¼	.250	10.16	**23**		.025	1.02
4		.238	9.68	**24**		.022	.90
	15/64	.234	9.53	**25**		.020	.81
5		.220	8.95	**26**		.018	.73
	7/32	.2187	8.89	**27**		.016	.65
6	13/64	.203	8.26		1/64	.0156	.64
	3/16	.1875	7.62	**28**		.014	.57
7		.180	7.32	**29**		.013	.53
	11/64	.171	6.99	**30**		.012	.49
8		.165	6.71	**31**		.010	.41
	5/32	.1562	6.35	**32**		.009	.37
9		.148	6.09	**33**		.008	.33
	9/64	.140	5.72	**34**		.007	.28
10		.134	5.45	**35**		.005	.20
	1/8	.125	5.08	**36**		.004	.16

DISSTON STANDARD WIRE GAUGES

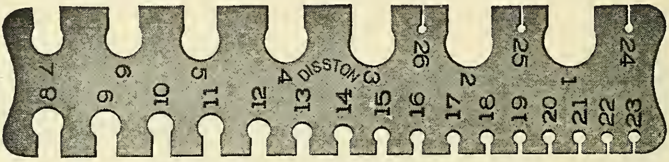


Fig. 186. No. 1. Small gauge, 1 to 26

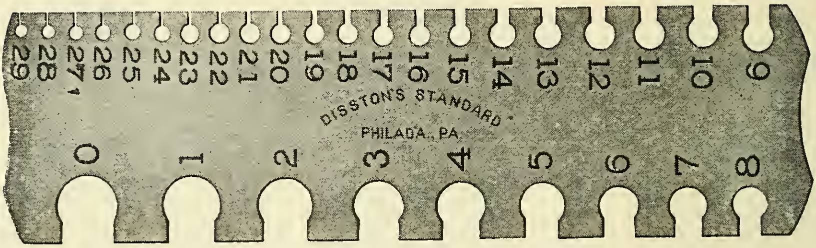


Fig. 187. No. 2. Large gauge, 0 to 29

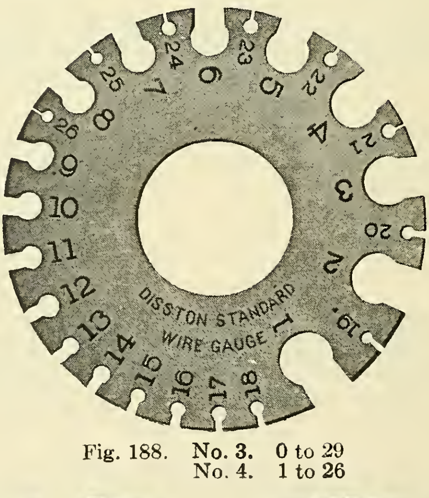


Fig. 188. No. 3. 0 to 29
No. 4. 1 to 26

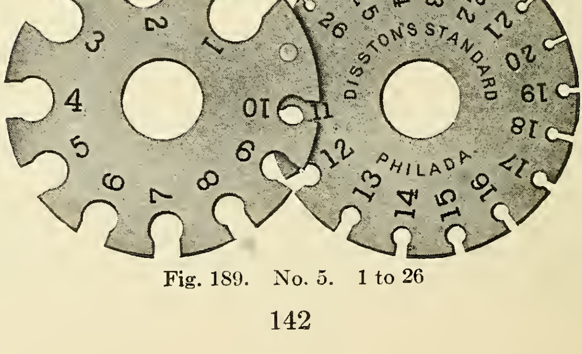


Fig. 189. No. 5. 1 to 26

USEFUL INFORMATION

To find the circumference of a circle multiply the diameter by 3.1416.

To find the diameter of a circle multiply the circumference by .31831.

To find the area of a circle multiply the square of the diameter by .7854.

To find the surface of a ball multiply the square of diameter by 3.1416.

To find the cubic inches in a ball multiply the cube of the diameter by .5236.

To ascertain the heating surface in tubular boilers multiply 2/3 of the circumference of the boiler by the length of the boiler in inches and add to it the area of all the tubes. The actual effective heating surface of a tube, however, is only 1¼ times its diameter, multiplied by its length.

One-sixth of the tensile strength of a plate multiplied by the thickness of the plate and divided by one-half the diameter of the boiler gives a safe working pressure for tubular boilers. For marine boilers add 20 per cent. for drilled holes.

Steam rising from water at its boiling point (212 degrees) has a pressure equal to the atmosphere (14.7 lbs. to the square inch).

To find the horse-power of engines, multiply the area of the piston by the average steam pressure. Multiply this product by the travel of the piston in feet per minute, divide this product by 33,000 and the quotient will be the horse-power.

NOTE. As there is always a very appreciable difference between the pressure of steam in the boiler and on the piston we advocate figuring the average steam pressure on the piston at one-half the pressure carried on the boilers. The result will be nearer the actual power.

HYDRAULICS

A cubic foot of water contains 7½ gallons, or 1,728 cubic inches, and weighs 62½ pounds.

A gallon of water contains 231 cubic inches, and weighs 8½ pounds (U. S. standard).

The friction of water in pipes is as the square of the velocity.

The capacity of pipes is as the square of their diameters. Doubling the diameter of a pipe increases its capacity four times.

The height of a column of fresh water, equal to a pressure of one pound per square inch, is 2.31 feet. (In usual computations, this is taken as two feet, thus allowing for ordinary friction.)

To find the area of a piston, square the diameter and multiply by .7854.

Each horse-power of boilers requires 30 lbs. of water from feed at a temperature of 100 degrees to steam at 70 lbs. pressure.

To compute the horse-power necessary to elevate water to a given height, multiply the total weight of the column of water in pounds by the velocity per minute in feet, and divide the product by 33,000. (An allowance of 25 per cent. should be added for friction, etc.)

To compute the capacity of pumping engines, multiply the area of the water piston, in inches, by the distance it travels, in inches, in a given time. The product divided by 231 gives the number of gallons in the time named.

To find the capacity of a cylinder in gallons, multiply the area, in inches, by the length of stroke, in inches, which will give the total number of cubic inches; divide this product by 231 (which is the cubical content of a gallon in inches), and the quotient is the capacity in gallons.

CARE OF BOILERS

The following rules are compiled from those issued by the various Boiler Insurance Companies in this country and Europe, supplemented by our own experience. They are applicable to all boilers, except as otherwise noted.

ATTENTION NECESSARY TO INSURE SAFETY

1. **Safety Valves.**—Great care should be exercised to see that these valves are ample in size and in working order. Overloading, or neglect, frequently leads to the most disastrous results. Safety valves should be tried at least once every day to see that they will act freely.

2. **Pressure Gauge.**—The steam gauge should stand at zero when the pressure is off, and it should show the same pressure as the safety valve when that is blowing off. If not, then the gauge is wrong, and should be tested by some other gauge that is known to be correct.

3. **Water Level.**—The first duty of an engineer before starting, or at the beginning of his watch, is to see that the water is at the proper height. Do not rely on glass gauges, floats or water alarms, but try the gauge cocks. If they do not agree with the water gauge, learn the cause and correct it.

4. **Gauge Cocks and Water Gauges** must be kept clean. A water gauge should be blown out frequently, and the glasses and passages to the gauges kept clean. The Manchester, England Boiler Association attributes more accidents to inattention to water gauges, than to all other causes put together.

5. **Feed Pump or Injector.**—These should be kept in perfect order, and be of ample size. No make of pump can be expected to be continuously reliable without regular and careful attention. It is always safe to have two means of feeding a boiler. Check valves and self-acting feed valves should be frequently examined and cleaned. Satisfy yourself frequently that the valve is acting when the feed pump is at work.

6. **Low Water.**—In case of low water, immediately cover the fire with ashes (wet if possible), or any earth that may be at hand. If nothing else is handy use fresh coal or saw dust. Draw the fire as soon as it can be done without increasing the heat. Do not turn on the feed, start or stop the engine, or lift the safety valve until the fires are out, and the boiler cooled down.

7. **Blisters and Cracks.**—These are liable to occur in the best plate iron. When the first indication appears there must be no delay in having it carefully examined and properly cared for.

Fused Plugs, when used, must be examined when the boiler is cleaned and carefully scraped on both the water and firesides, or they are liable not to act.

ATTENTION NECESSARY TO INSURE ECONOMY

8. **Cleaning.**—All heating surfaces must be kept clean, outside and in, or there will be a serious waste of fuel. The frequency of cleaning will depend on the nature of fuel and

water. As a rule, never allow over 1/16 inch scale or soot to collect on surfaces between cleanings. Hand-holes should be removed frequently and the surfaces examined, particularly in case of a new boiler, until proper intervals have been established by experience. Scale 1/16 of an inch thick causes a loss of about 13% in fuel, and ¼ inch scale a loss of 38%.

9. Hot Feed Water.—Cold water should never be fed into any boiler when it can be avoided, but when necessary it should be caused to mix with the heated water before coming in contact with any portion of the boiler. If feed water is raised from 55 degrees to 200 degrees, which a good heater should do, it will save 13½% in fuel.

10. Foaming.—When foaming occurs in a boiler, checking the outflow of steam will usually stop it. If caused by dirty waters, blowing down and pumping up will generally cure it. In case of violent foaming, check the draft and fires.

11. Air Leaks.—Be sure that all openings for admission of air to boiler or flues except through the fire are carefully stopped. This is frequently an unsuspected cause of serious waste.

12. Blowing Off.—If the feed-water is muddy or salt, blow off a portion frequently, according to the condition of the water. Empty the boiler every week or two, and fill up afresh. When surface blow-cocks are used, they should be opened often for a few minutes at a time. Make sure no water is escaping from the blow-off cock when it is supposed to be closed. Blow-off cocks and check-valves should be examined every time the boiler is cleaned.

ATTENTION NECESSARY TO SECURE DURABILITY

13. Leaks.—When leaks are discovered, they should be repaired as soon as possible.

14. Blowing Off.—Never empty the boiler while the brick-work is hot.

15. Filling Up.—Never pump cold water into a hot boiler. Many times leaks, and in shell boilers, serious weakness, and sometimes explosions are the result of such an action.

16. Dampness.—Take care that no water comes in contact with the exterior of the boiler from any cause, as it tends to corrode and weaken the boiler. Beware of all dampness in seating or coverings.

17. Galvanic Action.—Examine parts in contact with copper or brass where water is present frequently, for signs of corrosion. If the water is salt or acid, some metallic zinc placed in the boiler will usually prevent corrosion, but it will need attention and renewal from time to time.

18. Rapid Firing.—In boilers with thick plates or seams exposed to the fire, steam should be raised slowly, and rapid or intense firing avoided. With thin water tubes, however, and adequate water circulation, no damage can come from this cause.

19. Standing Unused.—If a boiler is not required for some time empty and dry it thoroughly. If this is impracticable, fill it quite full of water and put in a quantity of common washing soda. External parts exposed to dampness should receive a coating of linseed oil.

20. General Cleanliness.—All things about the boiler room should be kept clean and in good order. Negligence tends to waste and decay.

BELTING

The average thickness of single belts is 3/16 of an inch and a safe working load is assumed to be 45 lbs. per inch in width. This, at a velocity of 60 square feet per minute, is equal to one horse power.

Belt motion should not exceed 3,000 feet per minute. Where narrow belts are run over small pulleys, a distance of 15 feet between shafts, which gives a sag of 1½ to 2 inches in the belt is good practice. For main belts working on large pulleys a greater distance and sag is desirable.

The strongest side of the belt is the flesh side one-third the way through. Therefore run the grain (hair) side on the pulley.

A common rule for determining the width of a single belt 3/16 of an inch thick to transmit any number of horse power, is to multiply the actual horse power by 1,000 and divide by the velocity of the belt in feet per minute, which gives the width in inches.

A belt 1 inch wide, 800 feet per minute—one horse power.

To find the length of a belt, add the diameter of the two pulleys together, divide the result by 2 and multiply the quotient by 3-1/7. Then add the product of twice the distance between centres of the shafts and you have the length required.

The resistance of belts to slipping is independent of their breadth. There is no advantage derived in increasing the width beyond that necessary to resist the strain to which it is subjected.

Long belts are more effective than short ones.

The strain of 350 lbs. per square inch of section is a safe working load. The pulley should be a little wider than the belt.

STRENGTH OF ICE

Ice 2 inches thick will bear men on foot.
Ice 4 inches thick will bear men on horseback.
Ice 6 inches thick will bear logging teams with light loads.
Ice 8 inches thick will bear logging teams with heavy loads.
Ice 10 inches thick will bear 1000 lbs. to the square foot.
This table is for pure sound ice.

LOG MEASURE

To ascertain the number of feet (board measure) in a log of a given size, deduct four inches from its diameter at the small end. Square the remainder. Multiply the product by the length of the log and divide by 16. The result will be the board measure contents of the log. Logs over 24 feet in length are usually measured at centre for diameter.

THE FOLLOWING IS A PARTIAL LIST OF DISSTON PRODUCTS

Adjustable Plumb and Levels
Anvils
  Sawmaker's
  Setting
Automobile Clutch Discs
Back Saws
  Wood
  Metal
Band Knives
  Wood
  Metal
Band Saws
Band Saw Blanks, (not toothed)
Band Saws—Double-Edge for Wood or Metal
Band Saws—Flexible Back—for Metal
Band Saw Brazing Solder
Band Saw Brazing Clamp
Band Saw Filing Machines
Band Saw Guides
Band Saw Levelling Blocks
Band Saw Setting Machines
Band Saw Swages
Bars—Swage
Barrel Stave Saws
Bed Knives
Beef Splitter Saws
Beet Knives
Beet Knife Gauges
Beet Knife Fraisers
Bevels
Bilge Saws
Bolter Saws
Bone Saws
Border Shears
Boy's Buck Saws
Brazing Clamps for Band Saws
Brazing Solder
Brazing Tongs
Brazing Torches
Bread Knives
Brick Trowels
Buck Saws
Bucks—Saw
Bucking Saws—see Cross-cut
Burnishers—Cabinet
Bushings—Circular Saw
Butcher Saws—Blades and Frames
Butcher Block Scrapers
Butting Saws
Cabinet Burnishers
Cabinet Saws—Blades and Frames
Cabinet Scrapers
Cabinet Web Saws
Cake Breakers Saws
Canadian Web Saws
Candy Knives
Cane Knives
Cementer's Trowels
Chain Saws
Chamfering Saws
Chipper Knives
Chisel Teeth and Holders
Chisel Tooth Groovers
Chisel Tooth Saws
Chisel Tooth Sharpening Machines
Chisel Tooth Wrenches
Chenille Knives
Cigarette Knives
Circular Knives
Circular Saws for Bone
Circular Saws for Horn
Circular Saws for Ice
Circular Saws for Ivory
Circular Saws for Metal
  Inserted Tooth
  Solid Tooth
Circular Saws for Slate
Circular Saws for Wood
  Inserted Tooth
  Solid Tooth
Circular Saw Swages
Clamps for Brazing Saws
Clamps for Filing Saws
Cloth Knives
Coke Trowels
Collars—Steel or Cast Iron for Shingle and Resaws
Combination Circular Saws
Combination Hand Saws
Compass Saws
Concave Saws
Conqueror Swages
Coping Saws
Cork Knives
Corn Knives
Cross-cut Saws or Long Saws
  Wide or bucking
  Narrow or felling
  One-man
Cross-cut Saw Tabs
Cross-cut Saw Tools
Currier Blades
Cutlasses
Cutters
  Keyway
  Lock Corner
Cylinder Saws
Cylinder Saw Gummers
Dado Heads
Deal Saws
Dehorning Saws
Discs for Cutting Cold Metal
Ditch Bank Blades
Docking Saws
Doctor Blades
Dovetail Saws
Drag Saws
Double Mill Saws
Eccentric Band-Saw Swage
Eccentric Swages for Circular Saws
Edger Saws
Edging Trowels
Emery Wheel Gummer
Excelsior Knives
Fay Web Saws
Felling Saws—see Cross-cut or Long Saws
Felloe Web Saws
Felt Knives
Ferrules
Fibre Saws

THE FOLLOWING IS A PARTIAL LIST OF DISSTON PRODUCTS

Continued

File Card and Brush
Files and Rasps
Filing Guides and Clamps
Filing Machine for Band-Saw
Flanges for Circular Saws
Flooring Saws
Flexible Back Band-Saws
Fraisers
Friction Discs
Futtock Saws
Gang Saws
Garden Trowels
Gauge Saws
Gauges—Beet Knife
Gauges—Carpenter's Marking
Gauges—Mortise
Gauges—Set
Gauges—Tension
Gauges—Wire
Gin-Roller Blades
Grass Shears
Groovers—Chisel Tooth
Grooving Saws
  Solid
  Inserted Tooth
Grinders—Saw Tooth
Guides—Band-Saw
Guides for Filing Saws
Gullet-Tooth Circular Saws
Gummer Cutters
Gummers—Saw
Hack Saw Blades
  For Hand Hack Saws
  For Machine Hack Saws
Hack Saw Frames
Hack Saw Hand Saw Pattern
Half Back Bench Saw
Hammers for Setting Saws
Hand Hack Saws
Handles
  Saw
  Screw-Driver
  Trowel
Hand Saw Jointers
Hand Saws for Cross-Cutting
Hand Saws for Ripping
Hand Screw Presses
Hand Shears
Handy Kit Saws
Hay Cutter Knives
Heading Saws
Hedge Knives
Hedge Shears
Hedge Trimmers
High-Speed Steel Milling Saws
High-Speed Steel Planing Knives
Hog Knives
Holders for Chisel Teeth
Hooks—Pruning
Hot Metal Saws
Ice Saws
  Hand
  Pond
  Circular
Imperial Cross-Cut Saw Tools
Ink Plates
Inserted Tooth Circular Saws
Interlocking Tooth Circular Saws for Metal
Internal Cutting Circular Saws
  Solid
  Inserted Tooth
Iron Saws
Ivory Saws
Jeweler's Saws
Joiner Saws
Jointers for Hand Saws
Keyhole Saws
Keyway Cutters
Kitchen Saws
Knives
  Band
  Circular
  Saw
  Machine
Knives
  Bed
  Beet
  Bread
  Candy
  Chenille
  Chipper
  Cigarette
  Cloth
  Cork
  Corn
  Excelsior
  Felt
  Hedge
  High Speed Steel Planing
  Hog
  Lawn-Mower
  Leather
  Meat
  Mincing
  Mitre
  Moulding
  Paper
  Perforator
  Pineapple
  Planing
  Pruning
  Rubber
  Slasher
  Slitter
  Stop Cutter
  Tobacco
  Veneer
Lathe and Axe Handle Saws
Lawn Mower Knives
Lawn Shears
Lap Filing Vises
Leather Knives
Levels
  Adjustable
  Mason's
  Non-adjustable
  Pocket
  Shafting
Levèlling Blocks for Band Saws
Lock Corner Cutters
Long Saws (See Cross cut Saws)
Machettes
Machine for Filing Band-Saws
Machine for Setting Band-Saws and Circular Saws
Machine for Sharpening Chisel Teeth
Machine Knives
Magneto Files
Mandrels
Mason's Levels

THE FOLLOWING IS A PARTIAL LIST OF DISSTON PRODUCTS

Continued

Mason's Mitre Rods
Meat Knives
Metal Saws
  Band
  Circular
  Hand
Metal Saws—Interlocking Tooth
Metal Slitting Saws
Midget Saw Punches
Mill Saws
Milling Saws for Metal
Milling Saws—High-Speed Steel—for Metal
Mincing Knives
Mitre Box Saws
Mitre Knives
Mitre Rods—Mason's
Mitre Saws—Circular
Mitre Squares
Mohawk Band Saw Guides
Moulding Knives
Mulay Saws
Nests of Saws
One-Man Cross-Cut Saws
Panel Saws
Paper Knives
Pattern Maker's Saws
Pearl Saws
Perforator Knives
Pineapple Knives
Pit Saws
Planing Knives
Plastering Trowels
Plates—Ink
Plumb-and-Levels
Plumber's Nests of Saws
Plumber's Saws
Pocket Levels
Pointing Trowels
Pork Packer's Saws
Post Hole Diggers
Press—Hand Screws
Pruning Hook and Saws
Pruning Saws
Pruning Saws and Knives
Pruning Shears
Punches for Saw Blades
Rail Hack Saws—Blades and Frames
Raisin Seeders
Rasps
Removable Back Saws
Re-Saws
Rift Saws
Rods for Wood Saws
Rubber Knives
Saw Bucks
Saw Clamps and Filing Guides
Saw Collars
Saw Flanges
Saw Handles
Saw Knives
Saw Maker's Anvils
Saw Punches
Saw Rods
Saw Screws
Saw Sets
Scrapers
  Butcher Block
  Cabinet
  Wall
Screw-Drivers

Screw-Driver Handles
Screw Presses
Screws—Saw
Screw Slotting Saws
Sectional Interlocked Circular Saws
Seeders—Raisin
Segment Saws
Set Gauges
Sets—Saw
Setting Anvils
Setting Machines for Band Saws
Setting Machines for Circular Saws
Setting Stakes
Setting Tools
Shafting Levels
Shapers—Swage
Sharpening Machine for Chisel Teeth
Sharpening Machine for Circular Metal Saws
Sharpening Tools
Shears
  Border
  Grass
  Hedge
  Lawn
  Pruning
  Trimming
Shingle Saws
Ship—Carpenter's Saws
Side Files
Siding Saws
Slasher Saws
Slate Saws
Slicker Blades
Slitter Knives
Slitting Saws for Metal
Slotted Rim Circular Saws
Solder for Brazing Band Saws
Solid Tooth Circular Saws
Speed Indicators
Splitter Saws
Spuds—Tobacco
Squares
  Machinists
  Mitre
  Try and Bevel
Square Hole Saws
Stair Builder's Saws
Stave Saws
Steming Saws for Peanuts
Stone Saws
Stop Cutter Knives
Straight Edges
Superfine Files
Swages
Swage Bars
Swage Shapers
Swiss Pattern Files
Surgical Saws
Sword Blades
Table Saws
Tabs for Cross-Cut Saws
Teeth—Chisel
Tension Gauges
Thin Rim Circular Saws
Tiller Handles and Boxes
Tobacco Knives
Tobacco Spuds
Tongs—Brazing
Tools for Fitting Cross-Cut Saws
Tools for Repairing Saws

THE FOLLOWING IS A PARTIAL LIST OF DISSTON PRODUCTS

Continued

Top Saws for Double Mills
Torches—Brazing
Trimmers—Hedge
Trimming Shears
Trowels
- Brick
- Cementer's
- Circle
- Coke
- Corner
- Cross Joint
- Edging
- Garden
- Plastering
- Plasterer's Finishing
- Pointing
- Tile Setter's

Try Squares
Tile Setter's Trowels
Tubing Saws
Turkish Saws
Turning Web Saws
Universal Cross-Cut Saw Tools
Veneering Saws
Veneer Knives
Vises—for Lap Filing
Wall Scrapers
Web Saws
- Cabinet Pattern
- Canadian
- Chair
- Fay
- Felloe
- Slate
- Turning

Web Saws
- Blades
- Frames
- Rods

Whip Saws
Wire Gauges
Wood Saws
- Blades
- Frames
- Rods

Wrenches—for Chisel Tooth Saws

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