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DISSTON

HANDBOOK ON SAWS

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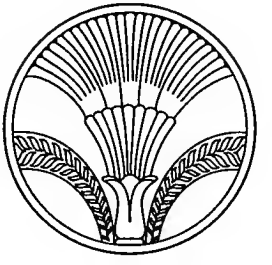

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These numerous awards from different parts of the world are significant of the excellence of Workmanship, Quality and Efficiency, and confirm the judgment of the vast army of users as evidenced by the enormous and ever-increasing demand for Disston Brand Goods.

DISSTON

Lumberman Handbook

CONTAINING A TREATISE
ON THE CONSTRUCTION OF

SAWS

AND HOW TO KEEP THEM
IN ORDER. ☞ TOGETHER
WITH OTHER INFORMATION
OF KINDRED CHARACTER.

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HENRY DISSTON & SONS
INCORPORATED
Keystone Saw, Tool, Steel *and* File Works
PHILADELPHIA, U. S. A.

BRANCH HOUSES:

CHICAGO, ILLS.
SEATTLE, WASHINGTON
NEW ORLEANS, LA.
SAN FRANCISCO, CAL.
VANCOUVER, B. C.
CINCINNATI, OHIO
BOSTON, MASS.
MEMPHIS, TENN.
PORTLAND, OREGON
TORONTO, CANADA

APRIL, 1919

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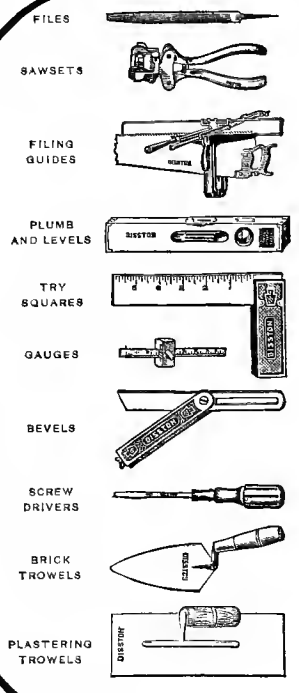


The

SAW or TOOL

with "DISSTON" on it

is Guaranteed

SUPERIOR in QUALITY and FINISH

to any saw or tool

without "DISSTON" on it.

"If you want a Saw or Tool it is best to get one with a name on it which has a reputation. A man who has made a reputation for his goods knows its value, as well as its cost, and will maintain it."

1840

Henry Disston

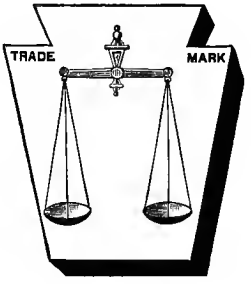
FAC-SIMILE OF LABEL PRINTED ON ALL DISSTON SAW BAGS

INDEX.

NOTE:

The various articles in this book, describing the making of the goods, are essentially short, and while giving the general or most important processes many intermediate operations are not mentioned, which, of course also have an important bearing on the workmanship and quality of the finished tool.

The interior views of the factory are from photographs of Sections only of Departments, and while serving to give some idea of the facilities, etc., do not by any means convey an adequate impression of the immensity of the Plant, which can only be appreciated by a trip through the Works.



TERMS OF WARRANTY.

ALL GOODS branded Disston are fully guaranteed as to material and workmanship.

If at fault in any particular all necessary repairs will be made free of charge, or the article replaced, if returned within thirty days from date of delivery.

This warranty does not cover saws improperly refitted—the filing of square corners in the gullets, case-hardening by excessive emery wheel gumming, reaming, or altering center holes of circular saws.

HENRY DISSTON & SONS,
INCORPORATED.

PAST and PRESENT

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, started a small plant in Philadelphia, and in 1828 or 1829 a firm in New York City commenced the making of circular saws from English Steel, which were about the first circular saws made in this country. Noah Worrel started in New York about 1835 to make trowels and small circular saws. In 1833 William & Charles Johnson commenced the manufacture of saws in Philadelphia and it was with this concern that Henry Disston learned his trade.

ESTABLISHED
1840

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 amount 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 several years successful trial making steel in this way, 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, as now and for some years past there have been practically no saws of any foreign manufacture imported into the United States, whilst 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 and 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 as possible and suitable for the particular class of work for which it is intended.

Henry Disston & Sons, Inc., Philadelphia, Pa. have 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, and 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 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 the idea of a bandsaw was conceived as early as 1808, by Wm. Newberry, but is of comparative recent introduction, having laid for years as a curiosity.

Some time after the close of the War—before 1866, Henry Disston went to Paris where he learned of a new Bandsawing machine and brought back two of these machines with saws. The blades 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, so 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 while to break in the men to work on these machines for they all had fear of the saw breaking and cutting off their arms.

Henry Disston had been trying every way possible to obtain some method or machine by which to better saw out handles than he had been doing. He gladly seized this opportunity, and, proving successful, 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 a plentiful supply 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 BANDSAWS 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," whereas at the present time Henry Disston & Sons are making band saws as large as 18 inches wide, 64 feet long, and are also making them 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.

Henry Disston & Sons have 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, the teeth of which were made of air-hardened steel, and were adjustable in blade. This saw 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, which 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.

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 having a man on each side of the grindstone, running the saw over the top of the stone to grind it. When it came to "balancing" this saw to make it run without "wobbling" as the term is, it had to be balanced by being placed on a mandrel supported by uprights, the saw given a slight turn when 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 to balance and 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, Now the saws of to-day are

ground on automatic machines which make them absolutely true to gauge throughout their entirety and it is not necessary to do any work for balancing. Again, saws are made to-day up to 100 inches in diameter, and by the Disston method of grinding they are made true and perfectly balanced.

This would seem like progress and it is not the sacrificing of quality to price, for the saws can be made very much better and at less cost, from the fact that a man will grind five or six saws in a day where it would have taken two men a whole day to grind one of the same size by the old method.

Again, saws were formerly hardened and tempered from the furnace bottom and a man to smith or straighten one of these circular saws in a day would be doing good work, but the Disston saws are now hardened and tempered by a patent process exclusively our own and one man can do eight saws in a day against one in former years, and the quality is bettered by so doing for the less hammering required on a circular saw the better the saw will run and hold its tension.

This is where the cheapness comes in with a corresponding betterment of quality and uniformity, for the machinery turns them out accurately, whilst when made by hand there were variations in size and shape.

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 do 120 dozen, do them better and more accurately. This follows also as to the grinding and other processes.

In the sharpening of saws a great many Files were 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, machinery and skilled workmen secured. From that time on improvements were made wherever possible in order to obtain a file superior in quality, shape and teeth and 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 is maintained a special department wherein are constantly employed a staff of mechanical engineers, designers, a large corps of machinists employed in the machine shop, which is fully equipped and wherein all specially designed Disston machinery is built and that already installed kept in up-to-date working condition, machinery being discarded irrespective of whether worn out or not as soon as improvement is effected.

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 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 the raising of dust and causing discomfort, whereas now the shops are kept clean and comfortable, the ground floors being of cement are washed up every week. Metallic lockers and enameled iron wash stands are provided on account of their sanitary effect and general improvements made throughout looking to the comfort and well-being of the employees. Shower baths being installed for the use of those employed in the polishing and grinding rooms, whilst 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. Great care has been taken to obtain the best light and thorough ventilation, special ventilators being provided in such rooms and departments where there is considerable heat. Every precaution is taken to allow egress from the buildings in case of fire, various iron bridges connect the second stories of the different buildings so that in case of conflagration employees can easily pass from one building to the other and these bridges in connection with the fire escapes are considered as being 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. 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, thirty to forty; three hundred and thirty, twenty to thirty, and six hundred and nine, 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 under a pension for the remainder of their natural life.

> "With a firm composed of men practical in their line, working on a policy tried and proven, a management fully up to date, a corps of efficient salesmen and an army of competent and skilled workmen, of whom they are justly proud, together with the use of machinery specially invented for various purposes, is there any cause to wonder why the Disston products became so famous and renowned throughout the entire world."

SINCE ITS INCEPTION THE DISSTON SAW WORKS HAS EVER BEEN IN THE LEAD.

WE WERE THE FIRST

To make Crucible Sheet Steel in the United States,

And are the only Saw Manufacturers making their 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, which machines we originated.

To build and install automatic machines for toothing graduated rip saws, which machines we originated.

To introduce improved process of filing saws.

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

To temper saws under hot dies, which insures uniformity of temper—owning the first patent in the United States, it being of French origin.

To use automatic hammers in smithing saws, which we originated.

To use automatic machines for grinding saws, which we originated.

To "stiffen" saws, thus restoring the natural spring after being worked upon, which process we originated.

To introduce in the United States bandsawing machinery for the cutting of wood in making saw handles, having purchased sample machines at Paris before 1866.

To make Machine hacksaw Blades.

Saw manufacturers in the United States to make their own Files.

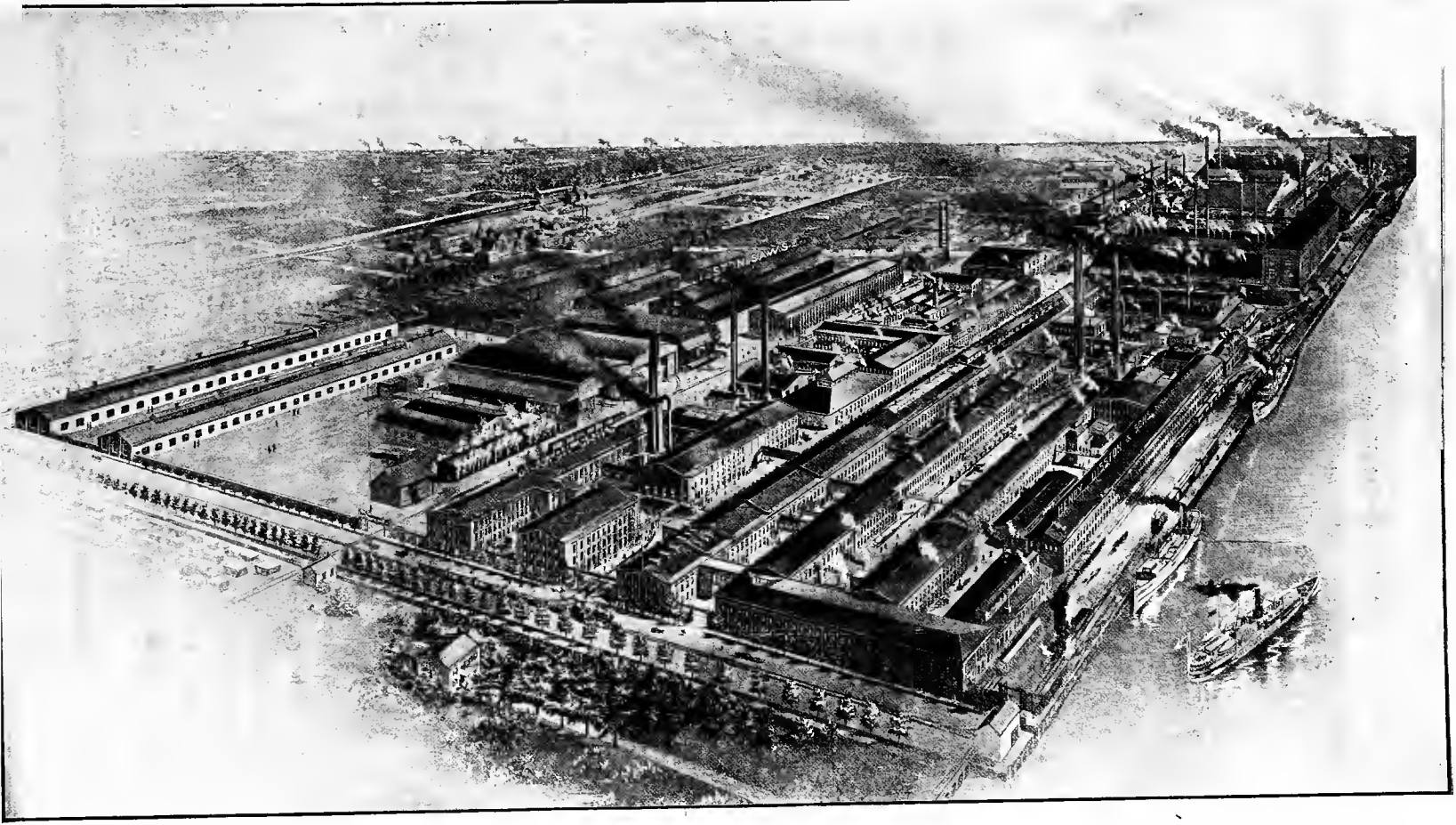
In the United States to make Inserted Tooth circular saws for sawing metal.

We 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.

FUTURE

If earnestness of purpose, coupled with skill, experience and modern facilities COUNT—

Then the DISSTON BRAND *of* SAWS will continue as the STANDARD by which the merits of all other saws are judged.



DISSTON STEEL

Necessarily the strongest material is required for the making of Saws, and that is STEEL of Highest Quality.

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 easily and familiarly to every use, may lead us in error to assume that Steel of High Quality is readily produced. Not so, however, for it is necessary to combine in "Saw Steel," by the exercise of great care, extreme accuracy and experience, certain and expensive elements or alloys to produce a steel capable of resisting the greatest strain, for each tooth of a good saw must be sufficiently hard to withstand the wear and retain its sharp edge the longest possible time, yet tough enough to swage readily and perfectly without flaw, hard 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 blow-holes, pipes, seams, splits and other physical defects, it must be uniform in hardness—in a word, perfectly homogeneous.

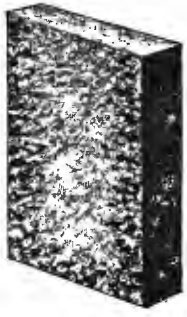
Steel of 60000 pounds tensile strength, considered perfectly safe for the construction of a boiler, a bridge or building, is not one-third strong enough for the making of a satisfactory saw.

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

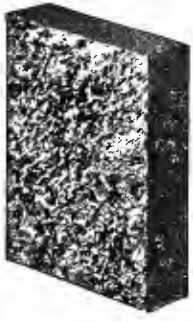
extended and enlarged until now it is undoubtedly the largest and best of its kind in the World.

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

No. 1
Pipe Defect.



No. 2
Honey-combing Defect



No. 3
Sponginess.

There is also another serious defect which cannot be discovered in the fracture of the steel, and that is "Segregation," which is caused especially in large masses of cast steel by a separation of some of the elements from certain portions of the mass segregating or collecting in other portions, thus producing steel that is not homogeneous or uniform, being harder in some parts than in others and weaker in various other parts.

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,

No. 4
Sound and Uniform.

enables the production of steel perfectly sound, free from blow-holes, sponginess, pipe and all other physical defects, and ABSOLUTELY UNIFORM IN QUALITY. See illustration No. 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

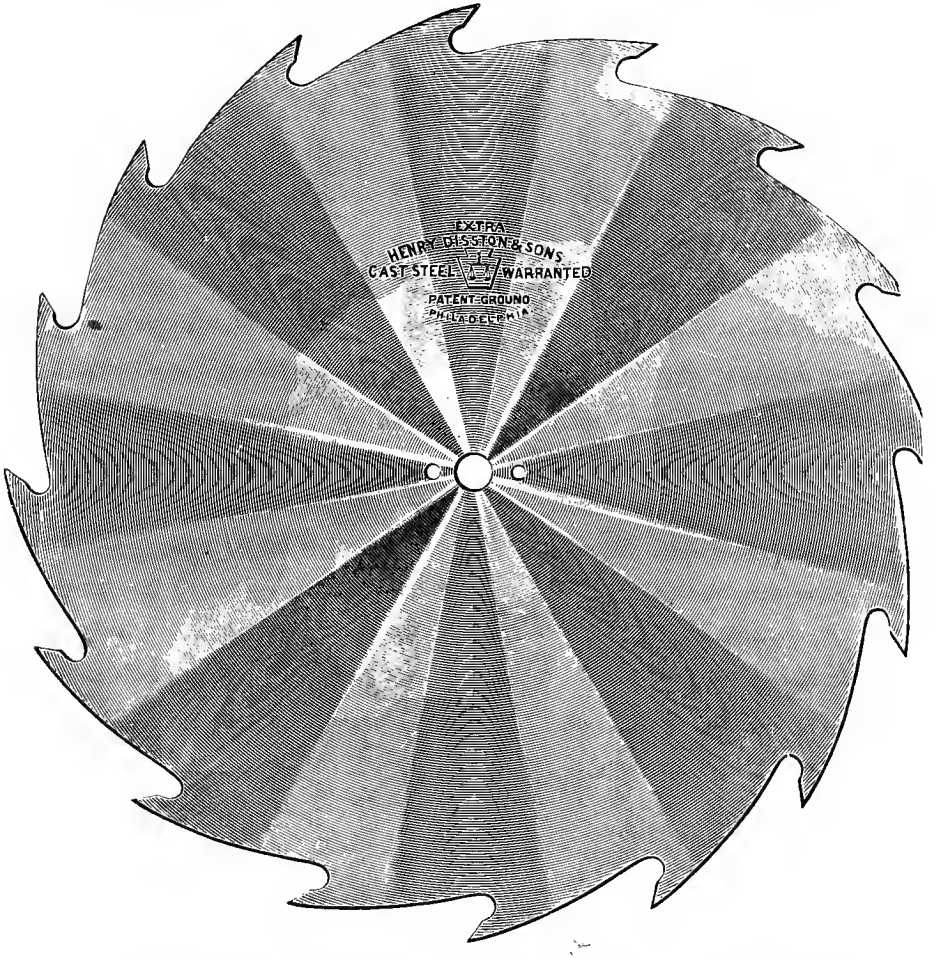
Tensile strength	220,000 lbs.
Elastic limit	168,000 "

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, removed by chipping, the ingot is then very carefully heated and hammered to a "saw slab" of dimensions as required. After again being very carefully inspected it is sent to the mill for rolling into 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, avoiding 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. If passed, it is then sent to the Saw Shop for the operations of making into a saw.

DISSTON

PATENT GULLET-TOOTH CIRCULAR SAW.



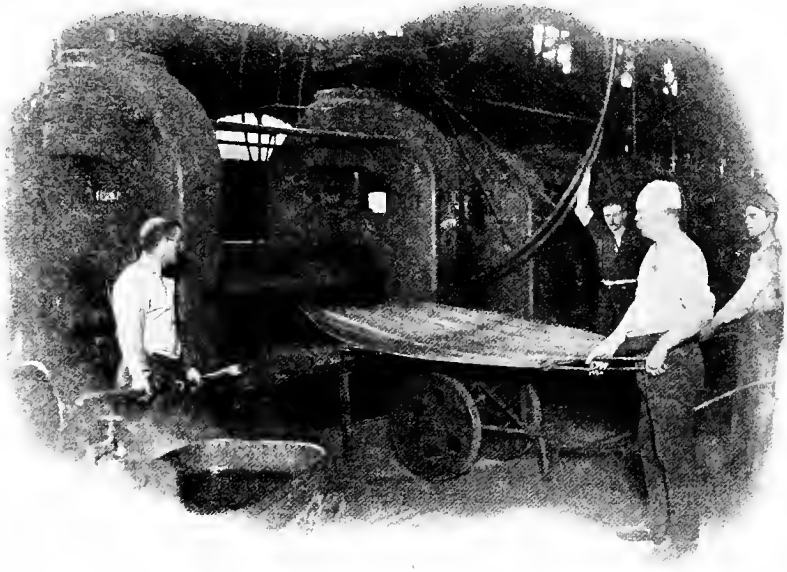
With over seventy-eight years' experience in saw-making, by constant watchfulness and application, we have acquired a thorough knowledge of the requirements of all kinds of saws and achieved a state of perfection in material, machinery, methods and workmanship justifying the claim that Disston Saws are superior to all others.

It is our determination to maintain the high standard of our goods established for so many years.

EVERY SAW BEARING THE BRAND OF HENRY DISSTON & SONS IS FULLY WARRANTED.

THE MAKING *of*

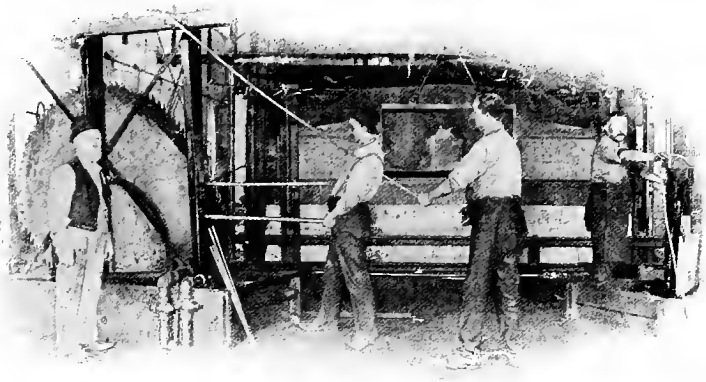
Disston Solid Tooth Circular Saws.



Rolling Circular Plate.

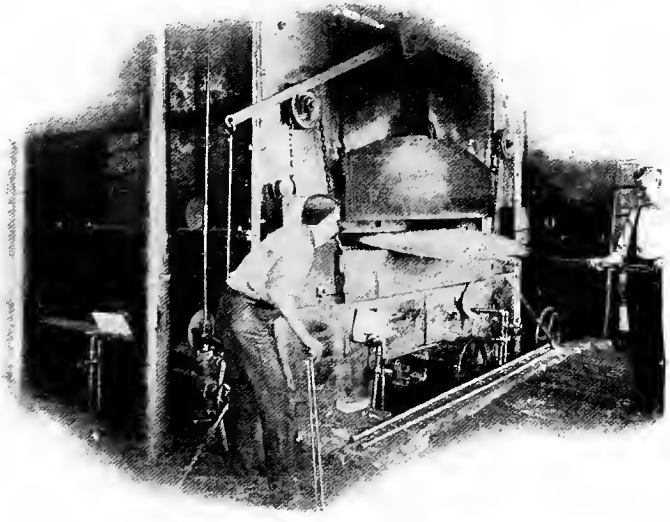
Holing, Toothing *and* Filing Circular Saws or "Getting-out" Department.

The "Plates," trimmed round, are sent by the Steel Mill to the Saw Department, and the first operation is cutting in the center-hole, which is done on a drill-press. The plate is then "Toothed" on a special press, there being different presses, each of which is adapted for certain sizes and thicknesses of plates. The teeth are now



Hardening Circular Saws.

"Dressed" by hand or emery-wheel, then follows the "Hardening" which is done on similar lines to other Disston saws, excepting the furnaces and baths for this work are necessarily a great deal larger. This applies also to the "Tempering" so far as heating is concerned, for, since the photograph, as shown, was made, a special apparatus has

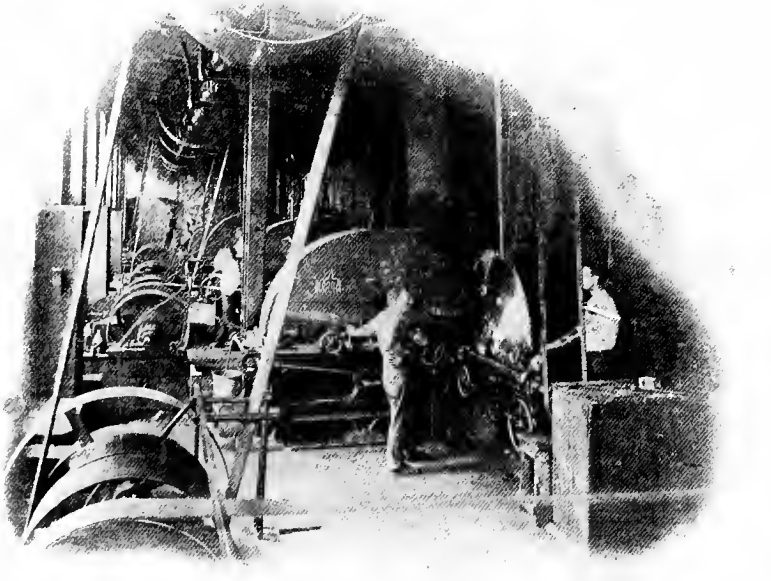


Tempering Circular Saws.

been invented by which more uniform and better results are obtained than from the former method.

The blade is now ready for "Smithing," under which process it is straightened, leveled and trued up by hand, making it perfectly flat and even. Then comes the "Grinding" which is done on machines designed specially for the purpose, some of which have single and others double stones. Taking the double-stone machine, the blade is

Smithing, Hammering *and* Blocking Circular Saws.



Grinding Circular Saws.

placed on a spindle, and while revolving, is run back and forth between the stones and both sides ground at the same time, the machine being of such a character that it will grind to a true and perfect taper, that is from thin on tooth-edge to thick towards the centre or collar-line, or vice versa, or it may be arranged to grind an

even thickness throughout as required. In the use of these machines perfect grinding and true balance of the saws are insured.

These machines, originated, invented and installed in the Disston Works, marked a revolution in circular saw grinding and enabled the production of saws of uniform thickness throughout.

The blade is now "Examined" and if fully up to the Disston Standard is passed for the "finish Grinding," after which it is "Polished;" being adjusted on a face-plate which is revolved at a suitable speed and by a series of rubbing and dusting with emery the high polish is obtained.

In the "Blocking," which follows, the blade is again examined and given the proper tension for the speed at which the saw is to run. This is done by hammering, for, in a circular saw, "tension" means having the centre sufficiently "open" to offset centrifugal force when the saw is revolved up to high speed, thus keeping the edge strained on a true line, otherwise the saw would not run smoothly or cut straight. The teeth are now "dressed" on an automatic saw-sharpener, thus insuring uniformity of teeth and roundness of blade.

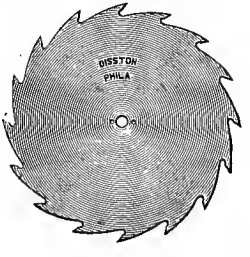
The "Swaging" or "Setting of Teeth" is now in order. Some circular saws have the teeth "put in order" by swaging, or "spreadset," others by spring-setting. In swaging, a Conqueror Swage is placed in proper position on the tooth and by the application of light blows of a hammer the cutting-edge of tooth is upset or shaped according to the work required, swaging being the spreading of the points of the teeth so they extend beyond each side of the blade for clearance of the body of the saw while cutting and to prevent friction. With the swaged tooth, each corner of the tooth cuts, hence will do twice the work in comparison with a spring-set tooth which cuts only half the kerf, the swaged tooth, consequently, will stand more "feed." Swaging is also accomplished by the use of an Eccentric Swage in which pressure is brought to bear on the tooth by means of a lever. In "Spring-setting" the points of the teeth are bent, one to the right, the next to the left, and so on alternately throughout the entire saw, which serves for the purpose of obtaining clearance.

SWAGED TEETH.

SPRING SET.

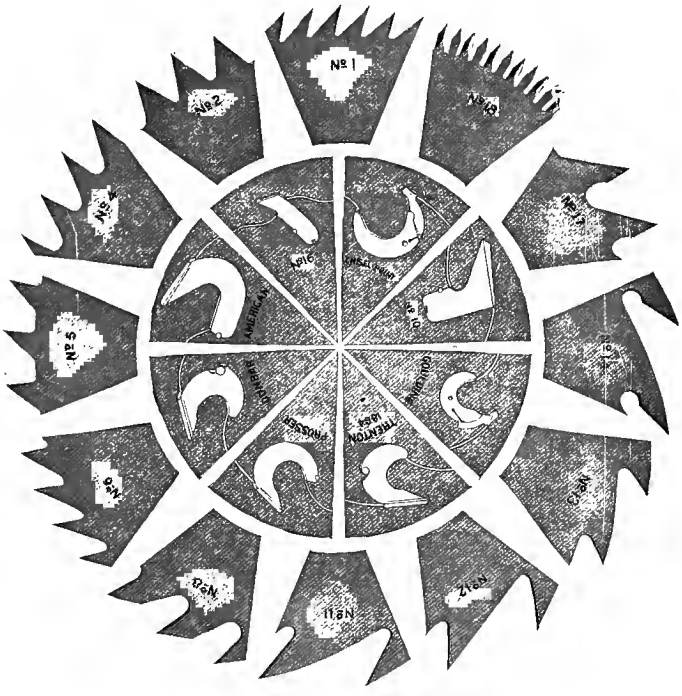
The process of "Sharpening" follows. This is done on automatic machines and by hand-filing, careful attention being given to bringing up each tooth keen and sharp.

The Saw is now given a final inspection, then "Etched" with the Disston Brand, and is complete.



STYLES OF TEETH.

The illustration below represents the general Styles of Teeth for Circular Saws, from which selection may be made of the kind desired. These cuts show shape only, the teeth being made in various sizes.



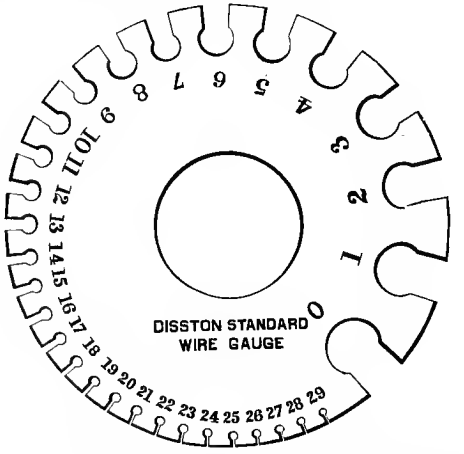
Solid Tooth Saws. Teeth Nos. 2, 4, 5 and 17 are for Cross-cutting; Nos. 11, 12, 13 and 14 for Ripping; Nos. 1, 6 and 8 for Cross-cutting or Ripping; No. 18 for Mitreing or Cross-cutting. The "Slotted Rim" is adapted to to any pattern of Solid Tooth saw. The slots allow for expansion and contraction in rim of blade, thus lessening the risk of breakage particularly in operating circular cut-off saws.

SLOTTED RIM.

Special patterns of Solid Tooth saws made to order.

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.

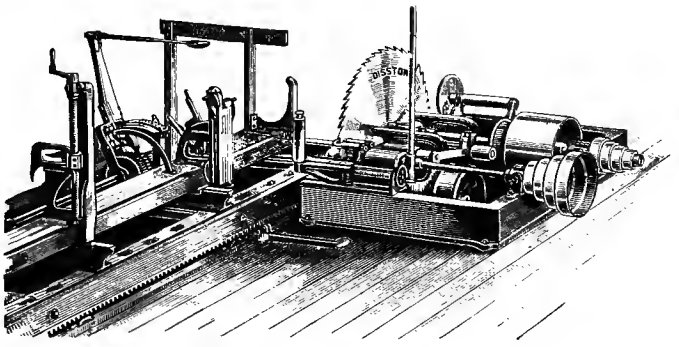


The Disston Gauge corresponds exactly with the Stubbs and Birmingham Gauges.

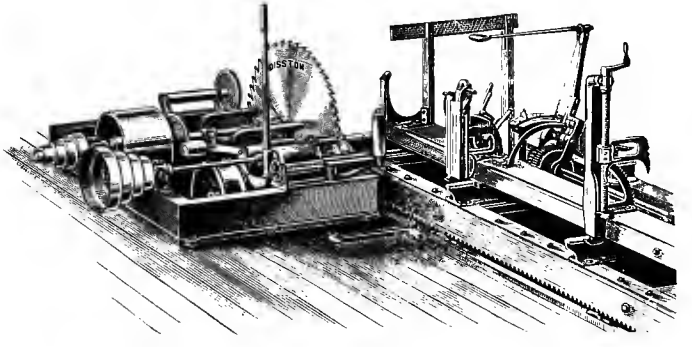
LIST OF EQUIVALENTS OF GAUGES.

GAUGE.	APPROXIMATE FRACTIONAL PART OF INCH.	MILLIMETERS.	STUBBS, BIRMINGHAM or DISSTON	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

LEFT-HAND SAW.



RIGHT-HAND SAW.



When Ordering Circular Saws, the Following Directions Should be Explicitly Given:

Diameter, in inches; thickness or gauge at centre; thickness or gauge at rim; right-hand or left-hand (see engraving above); number of teeth; style of tooth, as illustrated on page 24; 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 and daily output of mill. When ordering saws, be particular to state whether the saws are for ripping or cross-cutting.

N. B.—All our stock saws, forty inches in diameter and larger, have 2-inch mandrel-hole and 5/8" tug pin-holes, three inches from centre to centre. If wanted different. send full pattern of holes.

Hints to Sawyers *and* Saw Mill Men.

A GOOD SAW.

Our 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 capacity of the mill and the class of timber they have to cut.

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.

SOME OF THE CAUSES WHICH GIVE RISE TO 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 and imperfect collars.
Collars not large enough in diameter.
Ill-fitting mandrel and pin holes.
Uneven setting and filing.
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 aligned 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 it is subjected to 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, and 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 would quickly change position unless *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 least amount that is used, which is one-eighth of an inch in twenty feet.

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 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 mandrel either forward or backward until it is exactly at right angles to the new position of line, and the saw parallel with same.

All end play must be taken out of the mandrel and carriage trucks when lining a saw to the carriage, and 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 three-quarters of an inch on the outer rim, the other part clear, as they hold tighter than a solid flat collar. Examine the collars carefully to see if they are true, if not, have them made so; also be sure that stem of mandrel fits the hole nicely and offers no obstruction to the saw slipping easily up to and against the fast collar. 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, tighten up the collars with a wrench, test again with a straight edge and see if the position of the blade has been altered; observing whether it shows true, if not, the fault is sure to lay in the collars and will be likely to ruin 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 freely to fast collar 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, although if we knew exactly to what degree it heats we could make a saw that would admit of that much expansion, but a heating mandrel will *always* 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 94.)

Take up all end play or lateral motion in 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.

SPEED OF SAWS

This is a very important point for consideration, as a hundred revolutions, more or less, will always make a great difference in the running of the saw. We can adjust the tension of saws to overcome a slight variation in speed provided full instructions are given when ordering, though we would advise a regular speed at all times. Our

experience has been that saws work better when run at a regular speed even if it is necessary to reduce the number of revolutions one hundred below that given in 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 the throttle plan, even if the speed does fall below that given in the table; the regularity is the most desirable point to look after. 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	" "

Portable mills, of limited capacity, are usually run at a speed about one-third less that given above.

RULES FOR CALCULATING SPEED, ETC.

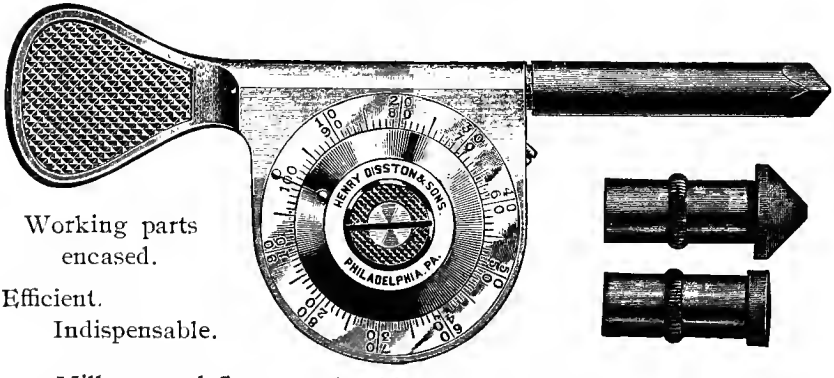
PROBLEM 1. The diameter of driving and driven pulleys and the speed of driver being given, find the speed of driven.

RULE. Multiply the diameter of 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 driven.

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

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

SPEED INDICATOR



Working parts encased.

Efficient.

Indispensable.

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, for 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 would 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, $\frac{3}{32}$ of an inch equally divided ($\frac{3}{64}$ on each side of saw) is about the least clearance that should be used, except in hard wood and frozen timber, then less may be used. 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 successfully run a thin saw. We do not wish to convey the idea that we do not make thin saws, but simply desire our customers who contemplate putting them in to appreciate the differences in working between thick and thin saws. The difference in thickness between 8 gauge and 10 gauge is $\frac{1}{32}$ of an inch; the set for clearance of each being the same, $\frac{1}{32}$ is all it is possible to save in kerf, and between an 8 gauge and 11 gauge the difference is $\frac{1}{32}$ 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, for, being so much lighter, it will deviate from its line much easier, and any deviation, ever so slight in the length of the cut, will consume by friction all the power saved in difference of 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 ones to do the same class of sawing, as this equalizes the strain on the rim as well as 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 best possible condition, though the contrary is too often the case for the most general cause of trouble is a dull or improperly fitted saw.

SPRING SET BRIAR DRESS.

SWAGED TEETH.

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

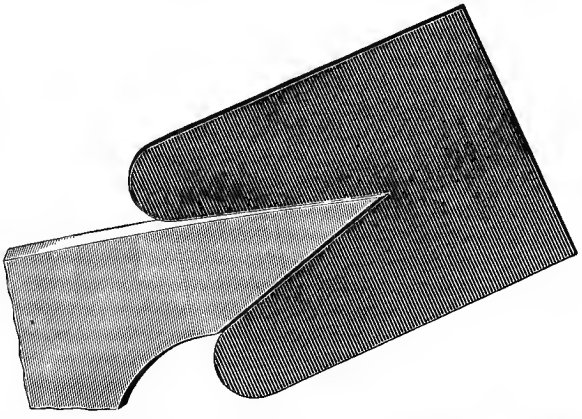
The swage-set is best adapted to and recommended for mills of moderately large feed and capacity, while the spring-set and briar dress is best adapted to mills of light power and capacity, the reason for which is found in the fact that one tooth of the swage-set and square dress style practically equals 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.

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

If the saw is not round it should be made so by "jointing" it 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 teeth whilst 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 to just file out the marks of the stone, thus leaving all the teeth of the

same length, and as near as possible the same shape, for 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 as per illustration is furnished gratuitously upon application and one is included with every swage.



Gauge by which to File *and* Regulate *the* Shape *of* Saw-Teeth *of* Large Saws.

The next operation is "swaging" the teeth for clearance, which under ordinary conditions, should be one-sixteenth inch on each side of the teeth. Taking for granted 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 diameter of saw.

DISSTON
CONQUEROR SWAGE, JUMPER OR UPSET.

Swaging consists, first, of holding the convex side of the Conqueror 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; after which the straight or flat side of swage is used on the teeth; one or two blows being sufficient to flatten or square up the tooth.

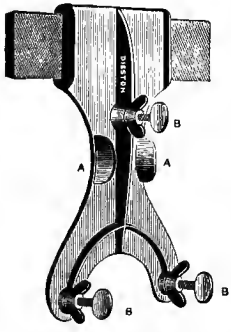
In Swaging, care must be taken to hold the swage at such an angle that the lines or contour of backs of teeth are not changed as the swaging marks should show principally on the fronts of teeth where practically all the filing will be done. The operator must also be careful not to hold the swage at materially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

Following swaging, the saw must again be jointed 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, for 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, and as a slight variation in the widths of 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 teeth be made exactly the same width, which is readily accomplished by the use of our Side File.

DISSTON IMPROVED SIDE FILE.

MADE IN THREE SIZES.



This file must be so adjusted by means of the set screws as 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 by means of the clips "A," against the saw-blade, the points of the set-screws "B" 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, but 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.

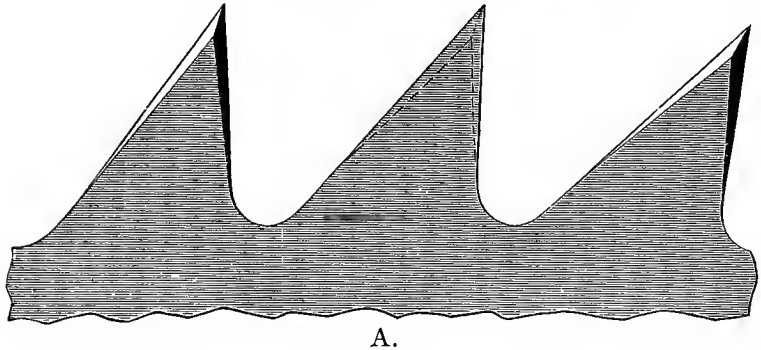
DISSTON SAMSON SAW-SET

THE MOST USEFUL, POWERFUL AND DESIRABLE MADE.

The operation of fitting a "Spring-set," or briar-dress Rip saw is the same as the foregoing in all respects except 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 teeth are filed straight through or square to side of saw on the fronts, but each alternate tooth is slightly beveled on the backs similar to sketch—

CUT-OFF SAWS.

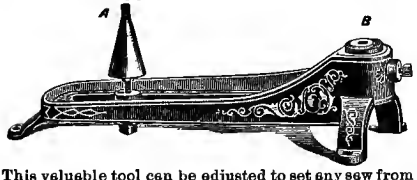


A.

Circular Cut-off saws are fitted the same as briar-dress rip saws, except the teeth are given more bevel both front and back as shown in illustration "A."

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.

DISSTON
IMPROVED ADJUSTABLE SETTING-STAKE
FOR CIRCULAR SAWS.



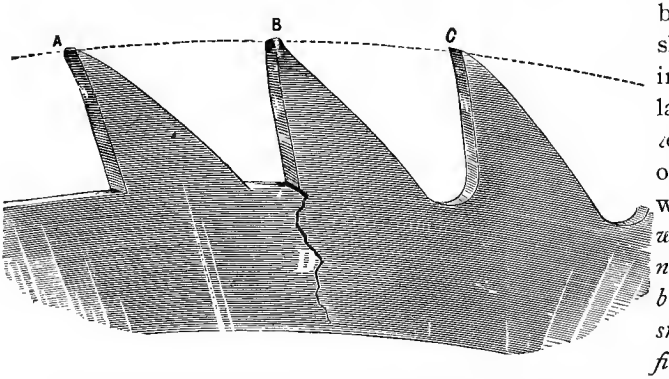
This valuable tool can be adjusted to set any saw from six to thirty inches in diameter. The cone "A" is moved in or out to suit the diameter of the saw, and raised or lowered, as may be required. The movable anvil "B" is made of hardened steel, and some portions of the face being beveled more than others,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

Probably half the saws sent back to the factory for repairs have been injured or ruined just through neglect on the part of the owners or operators, who really know how to properly fit saws, but put off the re-setting and sharpening of their saws just 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 have to send the saw to the factory for repairs or purchase a new one, when due regard to a few simple rules would have saved the saw, a quantity of lumber and a great deal of lost time.

The saw is like a razor or any other cutting tool, it will not work

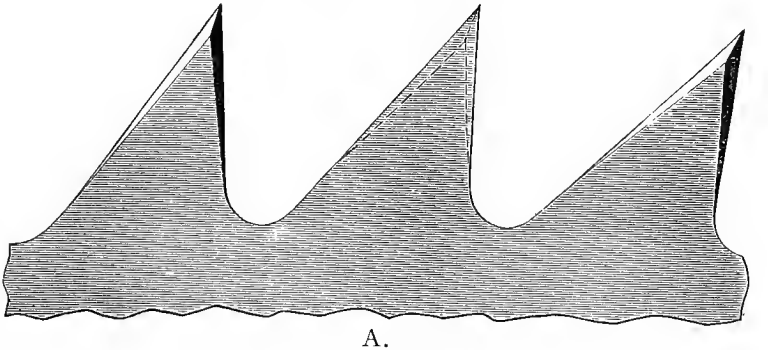
unless it is kept in order and an attempt to *force* it when not in order means a broken saw or a repair bill.

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

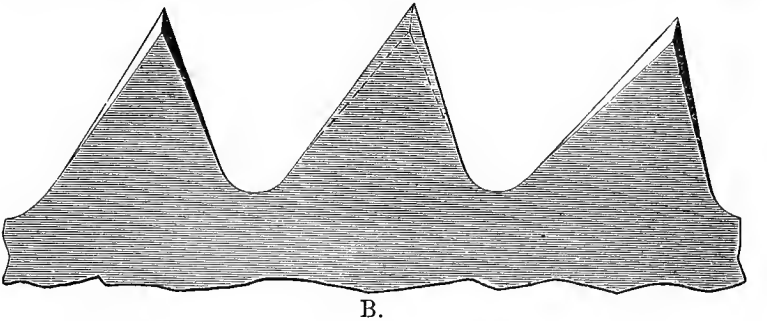


It will be observed in the illustration that in addition to having sharp corners in the gullets, teeth "A" and "B" are very dull; tooth "C" shows how the points and gullets should be dressed. The gullets should be kept rounded out, either with a gummer or a file.

CUT-OFF SAWS.



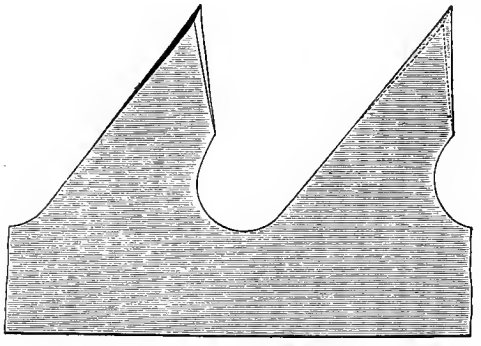
A.



B.

Cut "A" shows proper shape of tooth for cross-cutting soft wood. Cut "B" shows 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 cut "G"). If the teeth are kept in this form, less time will be required in filing, and the bad results from running a dull saw would be prevented; use as little set as possible; file as soon as saw becomes dull, thus saving time and power, reducing the strain and liability of breakage of the saw.

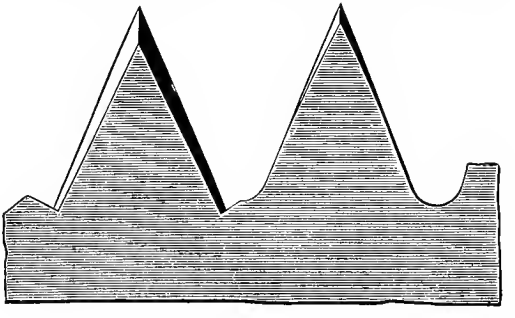


G.

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 in the breaking 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, for there is not the same care given to a cut-off as there is to the larger saws for ripping lumber.

Nearly every case of broken cut-off saws that has come under 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, as filing long bevels on the teeth forms square notches in the gullets, which will cause cracks to start, besides preventing free circulation of saw dust. See Cut "C".



C. 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 cut "D". In heavy cutting the front of the tooth should be filed with very little or no bevel. This will prevent much of the lateral strain and chattering caused by the teeth being forced out of line into the sides of the cut. Saws are frequently broken from this cause, particularly if they are dull.

HINTS FOR COLD WEATHER.

As many saws are broken in winter, owing to the great risk in sawing frozen timber, 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, particularly 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.

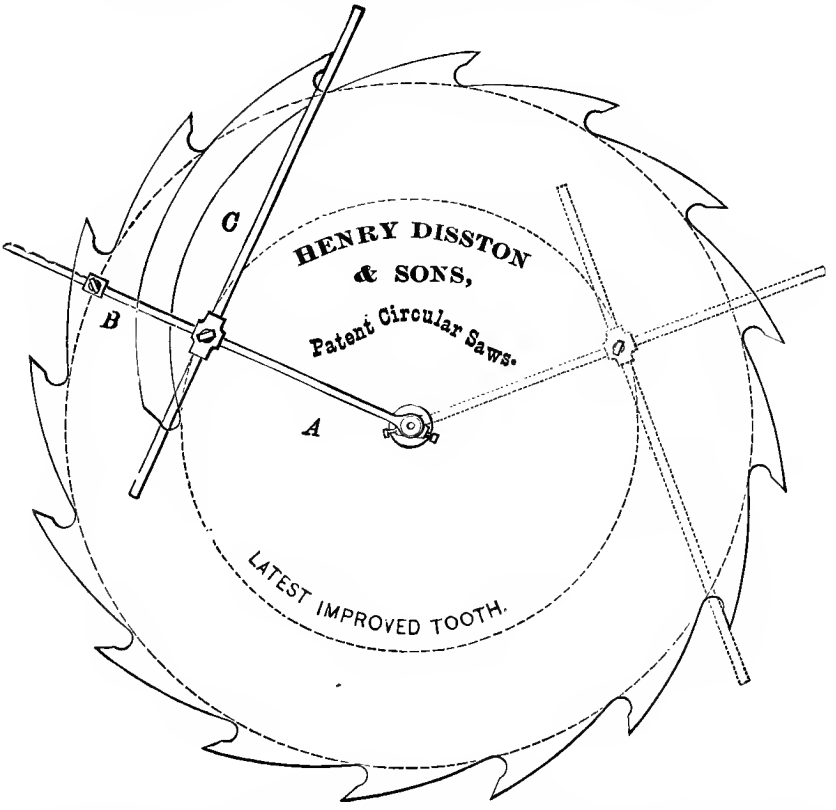
In sharpening or gumming saws with emery wheels always use a good, free-cutting wheel, and never put so much pressure on it or crowd it so fast that the teeth are heated to such an extent they become blue, for when teeth are blued, glazed, or case-hardened by the emery wheel, they are apt to break or crumble when 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, for 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 by the use of the file or burr-gummer, as it 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 whom they are from,** write us full instructions as to the work to be done, and we will guarantee to put as good and durable tension in them as they had originally.

We carry a stock of emery wheels, for the requirements of millmen, at regular market prices.

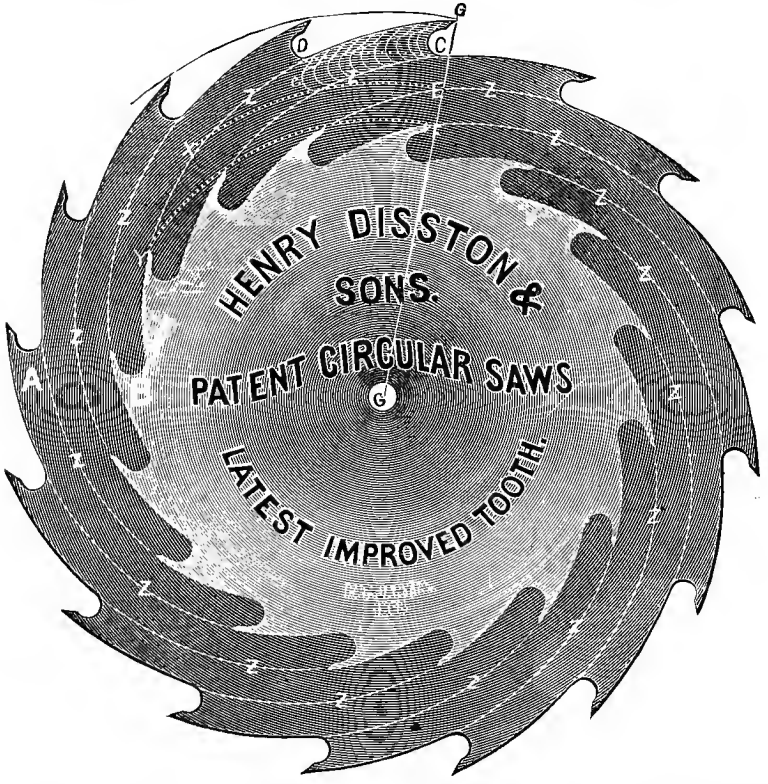
TRAMMEL FOR CIRCULAR SAW TEETH.



The above cut represents a device for laying out and keeping in order the teeth of circular saws. By its use the teeth can be kept in proper shape, regular in depth, and an equal amount of pitch 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 edge 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.

PATENT GULLET-TOOTH CIRCULAR SAW.



By reference to the above engraving, 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 mainly done by the reduction of the gullet or throat only. This is readily accomplished by the use of our patent gummers. (See pages 44 to 48.)

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 tooth of *C*. The engraving represents a two-inch tooth or gullet. The saw *B* is the saw *A* worn down. When the saw has been reduced on centre line from *G* to *F*, it has been worn away but six inches, yet has presented a cutting surface on spiral line *Z* from *G* to *Y*, a distance of twenty-four inches. But 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; and 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 was 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 only one thirty-second of an inch, but it consumes nearly as much saw-plate, time and files to bring up one tooth as the other; it is, however, easy to overdo this; there is reason in this as well as in everything else. On tooth, Fig. 4, *AA* are original lines of tooth, dotted line *B* shows where the point first wears; dotted line *CCC* shows how it should be filed back on the periphery line; but, 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*.

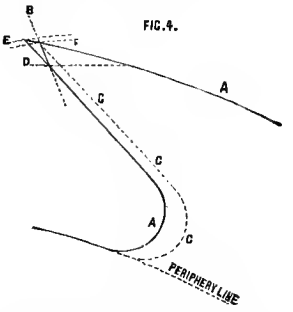


FIG. 4.

Filing back on the Periphery Line.

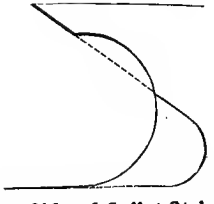


FIG. 5.

Showing Old and Gullet Style Tooth.

This shows that by filing on top five times as much of the saw has been wasted as by proper filing. This difficulty is overcome by the use of the Gullet tooth, as represented by cut Fig. 5.

Fig. 5 shows the outlines of both 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.

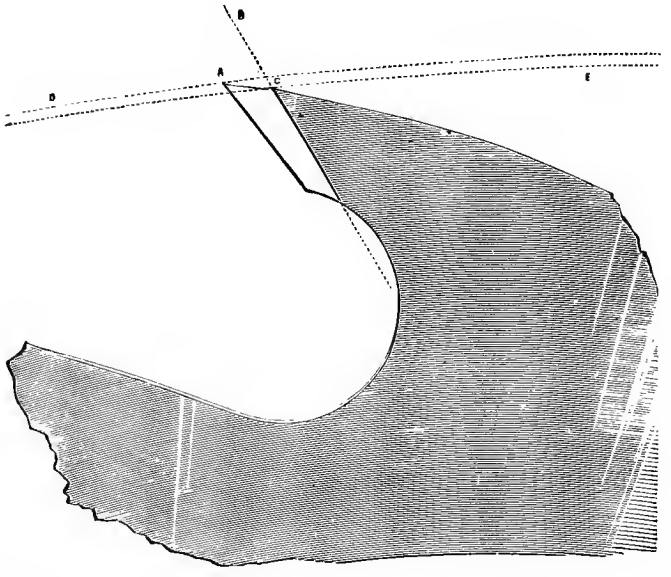
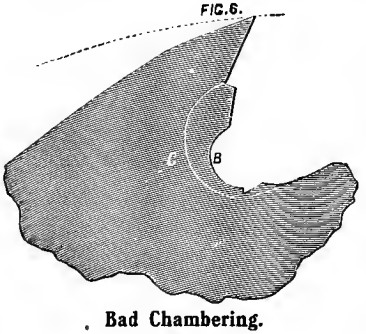


Illustration of Tooth after cutting 300,000 feet of Lumber.

The above cut represents a section of our gullet-tooth saw (kept in order by 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, only reducing the length of teeth three-sixty-fourths of an inch, as can be plainly seen between dotted lines *D* and *E*. According to this, a fifty-inch saw will cut 6,000,000 feet and only reduce the diameter of saw to forty-eight inches, showing the great advantage derived by using our Patent Tooth and Gummer.

FIG. 6.

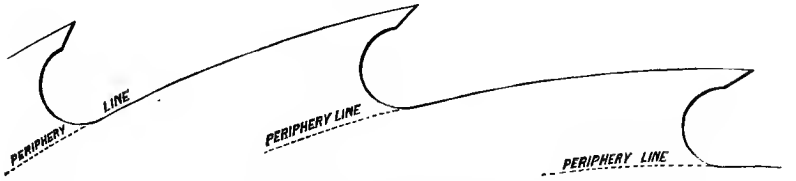


Bad Chambering.
REDUCED TO ONE-HALF NATURAL SIZE.

The accompanying cut is a facsimile of 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 parties were compelled to send it 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 upon it.

Figs. 7 and 8 show, by periphery lines, the difference in the wear of the saw. We will here remark that it is of the greatest importance to file back on these periphery lines. It will be seen by this tooth the point on the face 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 kept back from point to bottom of gullet; and when there is so little point to keep

FIG. 7.



Teeth for Soft Wood.

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

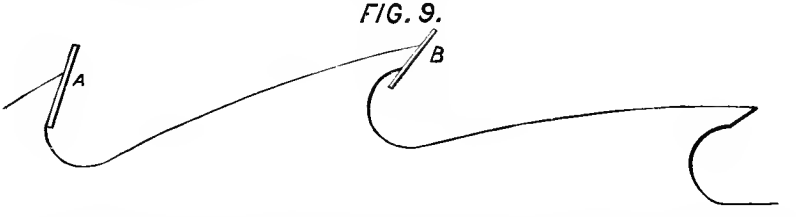
When we know the kind of lumber to be sawn, the speed, feed and capacity of mill, we will make the teeth best suited for the work, save waste of saw and extra time it would require to keep unsuitable

FIG. 8.

Teeth for Hard Wood.

teeth in order. For instance, for one-inch feed, we would not recommend over twenty-four teeth and should 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 teeth, and depth to correspond; for a three-inch feed, we would give thirty-two teeth.

FIG. 9.



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. 9, tooth *A*. Tooth *B* shows full gullet.

THE VICTOR PATENT SELF-FEEDING SAW GUMMER.

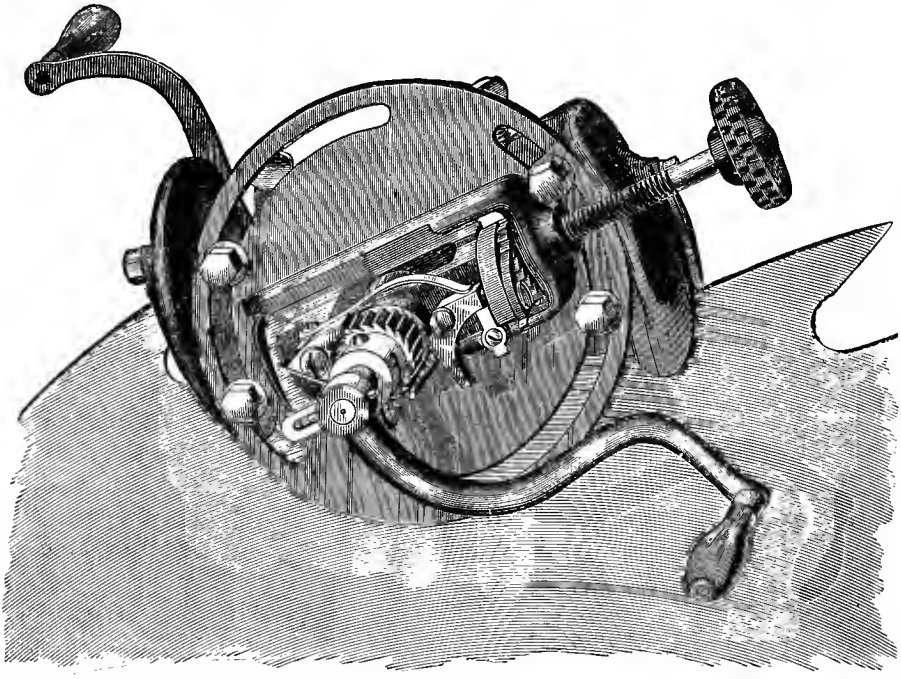


FIG. 1. ADJUSTED TO GUM CIRCULAR SAWS.

We call special attention to this machine, as being superior to any other gummer on the market; a fact which will prove itself upon trial. The victor is made of the very best material; the lighter parts being of malleable iron and the shaft of steel, making it lighter and at the same time stronger than other gummers. Its simplicity of construction makes it unnecessary to give any instruction for use, as an examination of the cuts will enable anybody to operate it. The Victor will gum all saws, from a small circular saw, with a ⅜ inch gullet, to the largest made, with 1½ inch gullet; also all mill, mulay and cross-cut saws. Fig. No. 1 shows the Victor gummer in position for work on a sixty-inch circular saw, and No. 2 on a mill or mulay saw. The self-feeding mechanism can be regulated to fast or slow speed without any change of parts, and the machine can be changed from hand to self feed in an instant. The adjustable stop throws out the feed pawl at any required depth of tooth. This gummer is fitted

THE VICTOR PATENT SELF-FEEDING SAW GUMMER.

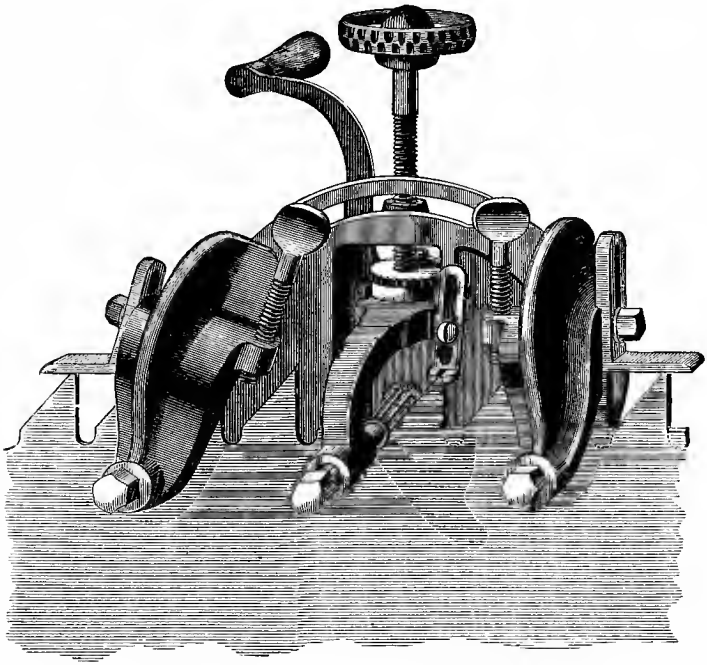
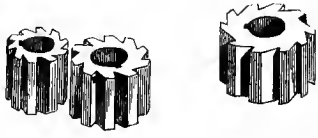


FIG. 2. ADJUSTED TO GUM MILL OR MULAY SAWS.

with three sizes of arbor. In ordering be sure to state which size is wanted. The large size is suitable for the following cutters: 1 inch, 1⅛ inch, 1¼ inch, 1⅜ inch, and 1½ inch. The medium size is suitable for ½ inch, ⅝ inch, ¾ inch, and ⅞ inch cutters. The small size is suitable for ⅜ inch cutters. Each gummer sent complete with one arbor of either size, three cutters, cutter grinder and wrench. Additional arbors furnished extra price. For range of work this machine has no superior.

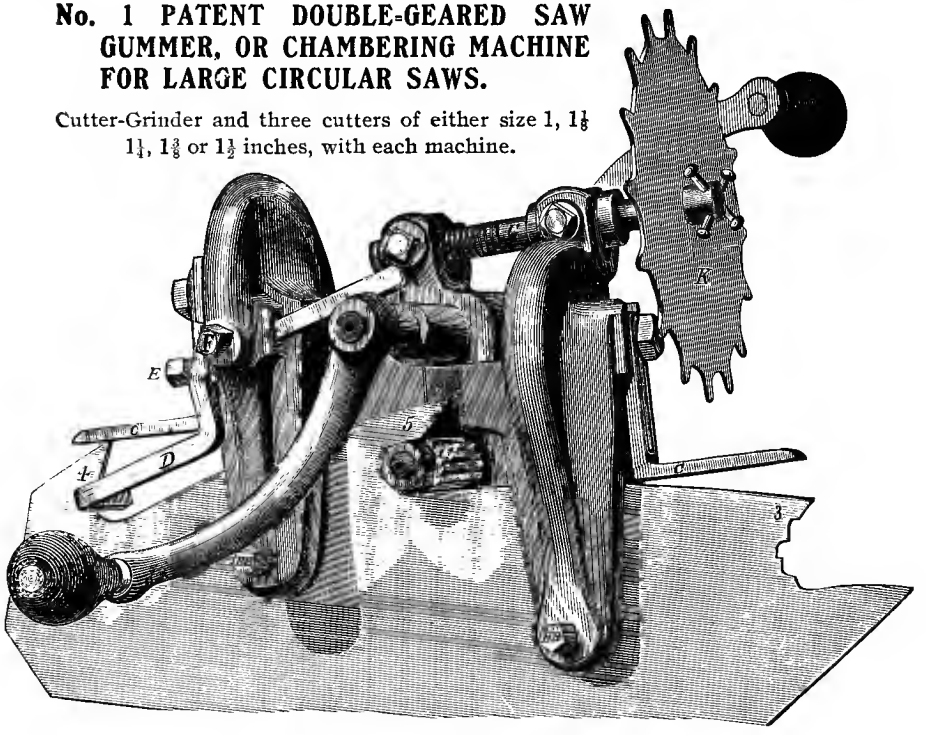
GUMMER CUTTERS.



When ordering state size of cutter and arbor hole.

No. 1 PATENT DOUBLE-GEARED SAW GUMMER, OR CHAMBERING MACHINE FOR LARGE CIRCULAR SAWS.

Cutter-Grinder and three cutters of either size 1, 1⅛ 1¼, 1⅜ or 1½ inches, with each machine.



DIRECTIONS FOR USING.

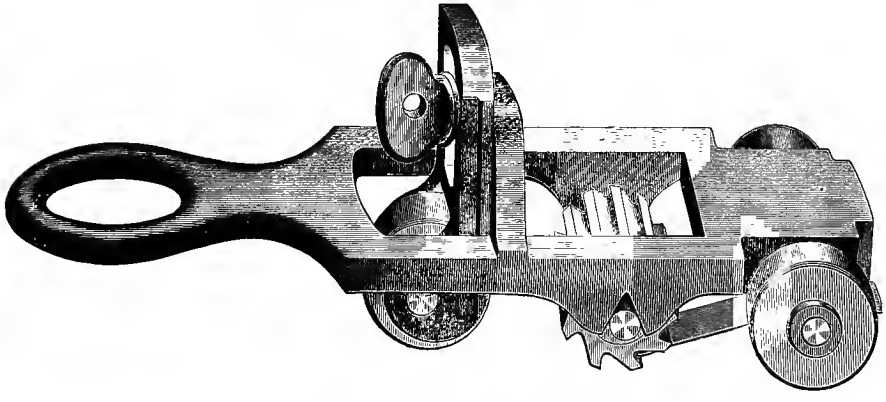
Before using the gummer see that the oil holes are clear. A few drops of oil will be sufficient for from three to five hours' use. After using the gummer remove the chips or turnings that accumulate back of the cutter. If allowed to remain they will cause trouble by getting into the working parts of 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 to the saw by means of the screw *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 steadily fed in until arrested by set screw *E*. Remove the machine 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 so arranged as to slide on its axis, and when one portion becomes dull, by removing a washer from back to front, a new sharp cutting surface will be presented, so continuing 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, to keep the shaft from turning while unscrewing the nut, which has a left-hand thread. The hand wheel on end of feed screw, outside of the star, is to allow the operator to feed easily and gently with the hand when starting in to cut rough gullets, until the cutter gets a bearing, when by tightening the jam-nut on opposite side of star, the machine is made self-feeding. The rachet by which the cutter is moved, effectually prevents any back motion, which has hitherto been a serious objection.

This gummer is a most invaluable machine, and should be in the hands of every mill-man. It saves power, files and time, and is so simple in its mode of operation that any one of ordinary intelligence can be taught to use it. We pronounce this the best gummer ever manufactured.

CUTTER GRINDER FOR HOLDING THE CUTTER OF CHAMBERING MACHINE IN POSITION DURING PROCESS OF SHARPENING.

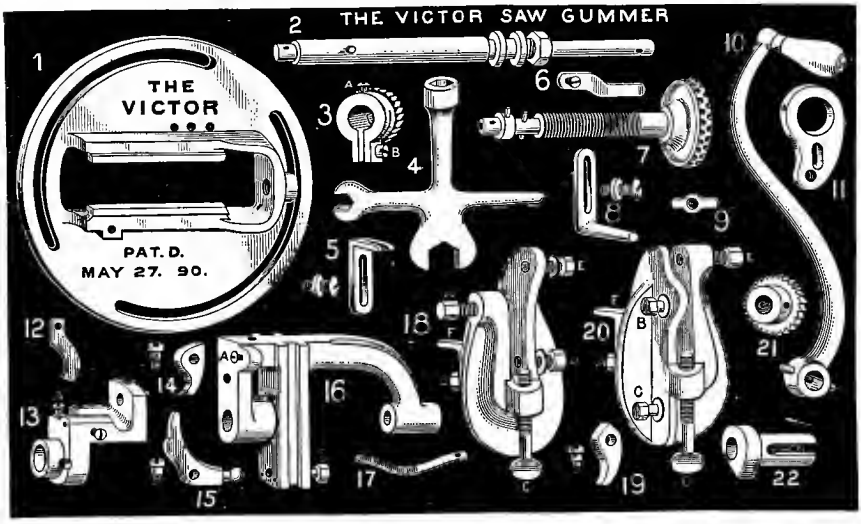


TO GRIND THE CUTTERS

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

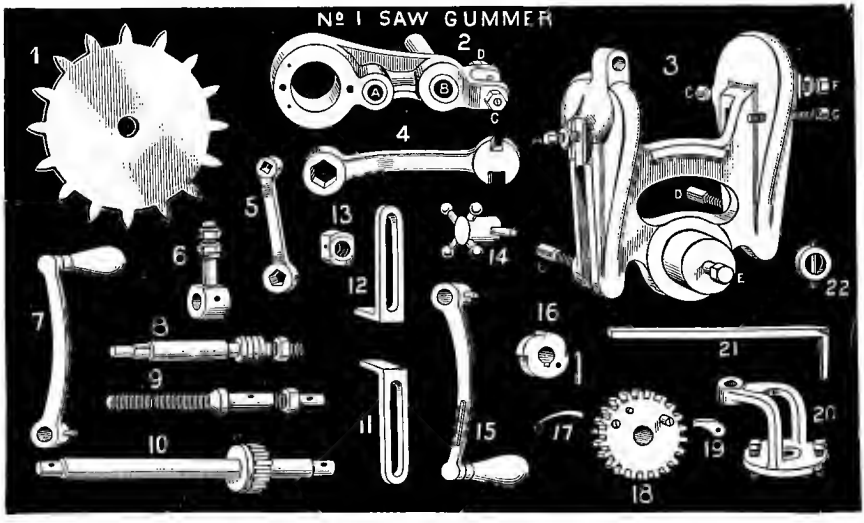
Furnished with either No. 1, 2 or 3 (Pin) shaft.

LIST OF PARTS OF VICTOR SAW GUMMER.



1, Plate; 2, Shaft; 3, No. 1 Rachet; 4, Wrench; 5, Brass Gauge; 6, No. 2 Ratchet Spring; 7, Feed Screw; 8, Stop Gauge; 9, Stop; 10, Crank; 11, Throw; 12, No. 1 Ratchet Spring; 13, Stand; 14, No. 1 Pawl; 15, Ball Lever; 16, Carriage; 17, Ball Lever Spring; 18, Long Clamp; 19, No. 2 Pawl; 20, Short Clamp; 21, No. 2 Feed Ratchet; 22, Cam.

LIST OF PARTS OF No. 1 SAW GUMMER.

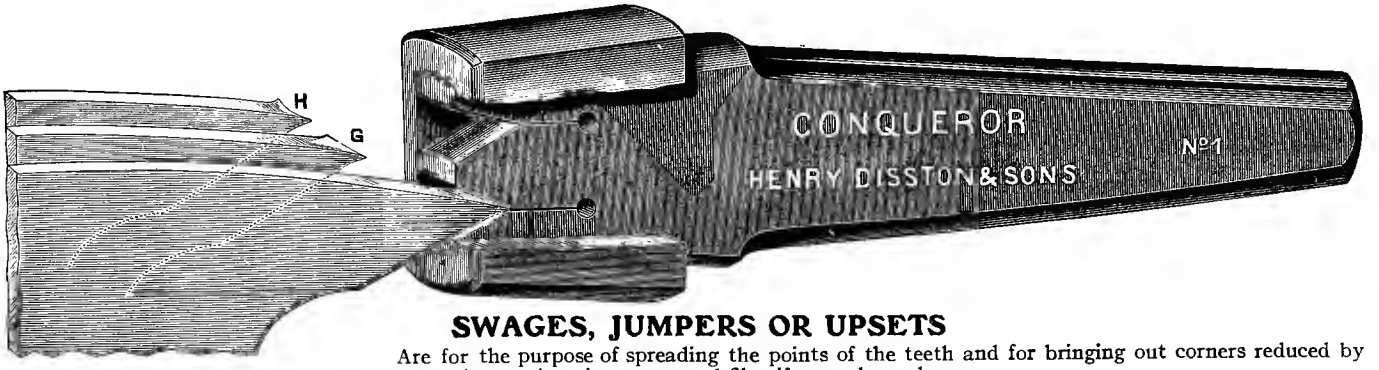


1. Star; 2, Arm; 3, Frame; 4, Large Wrench; 5, Small Wrench; 6, Swivel Bearing; 7, Left Hand Crank; 8, Cutter Shaft; 9, Feed Screw; 10, Crank Shaft; 11, Gauge; 12, Gauge; 13, Swivel Nut; 14, Cross Handle; 15, Right Hand Crank, 16, Ratchet; 17, Ratchet Spring; 18, Large Gear Wheel; 19, Pawl; 20, Out Bearing; 21, Wrought Iron Gauge; 22, Collar for Feed Screw.

When ordering, specify the No. of part wanted, whether for Victor or No. 1 Gummer.

THE CONQUEROR SWAGE, JUMPER OR UPSET.

No. 1. For large Circular Saws.



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 require to be swaged to a sharp, keen edge. The bottom of the openings in the Conqueror are slotted, and 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 properly hardening them at the bottom of the openings, which portion of the swage does all the work, and requires to 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 is most required.

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 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.

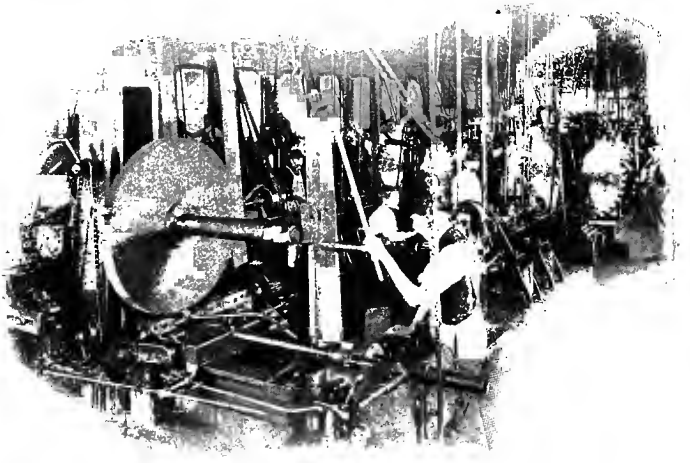
MADE IN SIX DIFFERENT SIZES TO SUIT ALL THICKNESSES OF SAWS.

THE MAKING *of* a

Disston Inserted Tooth Circular Saw.

All "Plates" for Inserted Tooth Circular Saws are made under the same processes as those for Solid Tooth Saws, with the following additional operations:

The plate, in which the sockets have been cut, is sent to the Inserted Tooth Department, where it is thoroughly inspected. If true and round, it is ready for the first operation—that of milling the V



Milling Solid Tooth Metal Saws *and* Cutting Sockets in plates for Inserted Tooth Saws.

projection on the edge of socket. This is done on special machines designed and built in the Disston Works, which insure uniformity and exactness throughout.

The "Holder" or "Shank" is cut out of steel, of suitable thickness, in the form required. This steel blank, is now forged and flattened to gauge, then placed in a milling machine and grooved on lines to fit the V projection of the socket; after which it is stamped with the number designating the particular style or pattern. Testing for diameter of circle takes place; then follows the milling of the head and the grooving of top, in which rests the bottom of "Point." It is now inspected for "ball" as well as size and shape, and, if correct, is "Hardened" and "Tempered" under special processes to a spring temper, its function being, as its name implies, to hold the point or bit in place. The Holder is now critically tested and gauged.

The "Tooth," usually termed "Point" or "Bit," is drop-forged to shape and at the same time an impression is made thereon of numbers designating the style and gauge of the tooth. This forging is annealed for trimming; thoroughly inspected and if properly filled up

Forging Teeth for Inserted Tooth Circular Saws.

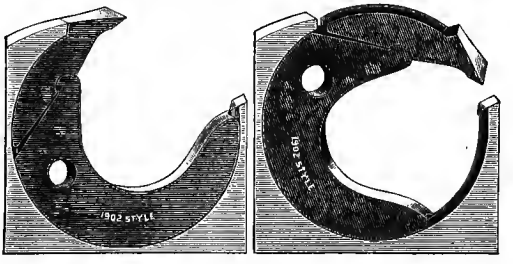
to shape is ready for the next operation. Any improperly forged, that is not filled up at the heel or other parts, are thrown out as scrap. The forging is "trimmed," "formed," then "ground" to remove the surplus stock, and "side-dressed," after which it is "hardened" and "tempered" under the Disston process. It is now passed through the final "grinding and sharpening" operation.

Each "Tooth" is accurately tested for uniformity of width of cutting-edge, thickness and shape, and only those strictly correct in each detail are passed. So rigid are the rules in this respect that the gauges themselves, used for testing, are inspected every week.

All the regular Disston Points and Holders are made to standard gauges, each inserted tooth circular saw is given a number, of which a record is kept at the factory, for the purpose of supplying duplicate points and holders when required.

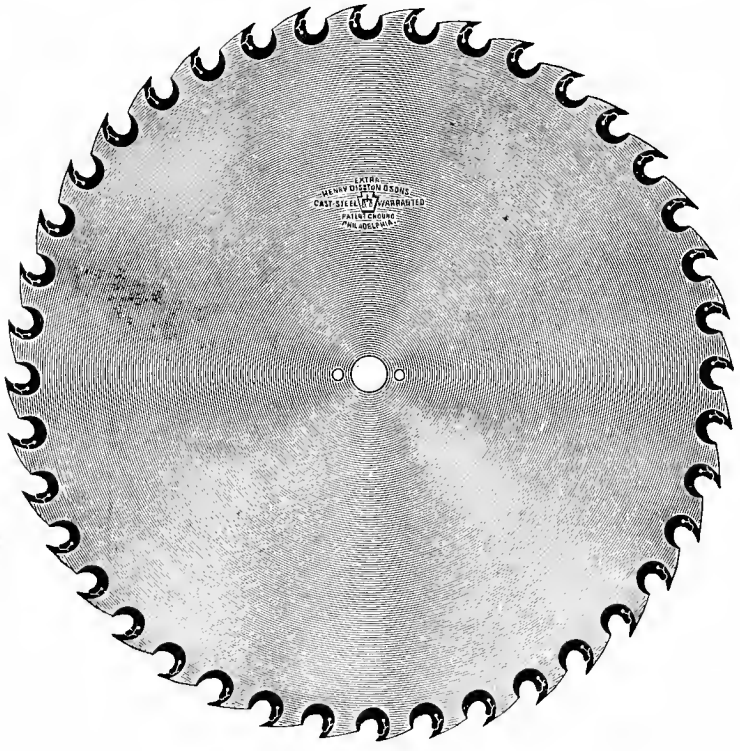
DISSTON

PATENT CHISEL-TOOTH CIRCULAR SAW.



(REDUCED SIZE)

Inserted Tooth, Chisel-Point Circular Saws



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

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 shown in cut, 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 1902 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 gang edging saws, lath bolter saws, lath saws, clapboard saws, boxboard saws, bench saws and rift saws.

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 24, 26.

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 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.

THE 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, 3, 4, 4½ and 6. No. 1 being the largest, is designed principally for the heavy timbers 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. 44 pattern is suitable for board saws, edger and bench saws.

The No. 2 pattern is 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. 3 provides. This is a good all around tooth and has proven 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 $\frac{1}{64}$″ and the other $\frac{1}{32}$″ larger in the circle than regular.

Unless 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.

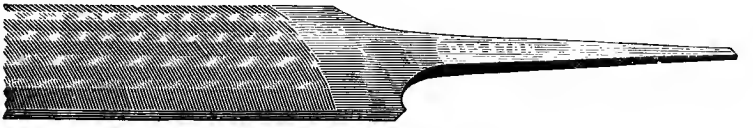
Oil the grooves carefully. Place the new point or bit squarely on the head of the shank. If the point should not turn into position readily, lift the wrench enough to permit the ball or head of the holder to assume its proper place in the point; then start again and the point will be found to move steadily 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.

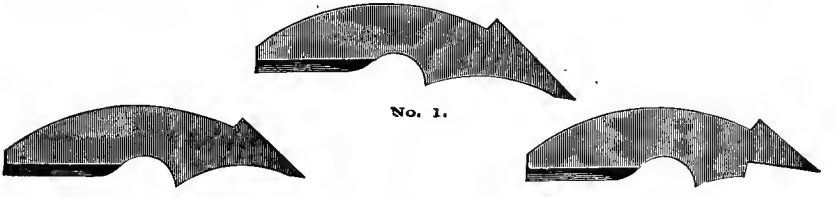
The points or bits should be sharpened or filed without taking them out of the saw, thereby preventing unnecessary wear. The temper of these points is such that they may be sharpened by the use of a good file. The following illustration shows the File specially designed for this purpose.

CHISEL-POINT FILE.

Made 8, 9 and 10 inches in length.



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.



No. 1.

No. 2.

No. 3.

No. 1 shows the point when new. No. 2 shows the point when it has been properly filed until worn out. No. 3 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 a light hammer, drawing out the corners just enough to square the points; then the set should be dressed by 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.

A section of saw containing one tooth, for use in a vise when swaging points, will be supplied at a small cost.

DRESSING POINTS.

Particular attention is called to the necessity for keeping the cutting edges of the points widest. 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, No. 6, No. 7, and No. 8, were taken from bits removed from saws, concerning which complaint was made. The reason is at once apparent. Diagrams

No. 4 and No. 5 show two styles of side dressing, either of which is good, depending on the class of work in hand. The spread or swage should be distributed evenly on both sides of the saw.

No. 4. No. 5. No. 6. No. 7. No. 8.

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.

FROZEN TIMBER.

Before starting to cut frozen timber, equip the saw with a new set of swaged holders, laying the old ones aside 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. 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, have 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 very particularly, before the saw is allowed to run out of the cut and become strained or buckled.

No. 33 CHISEL TOOTH

(FULL SIZE)

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

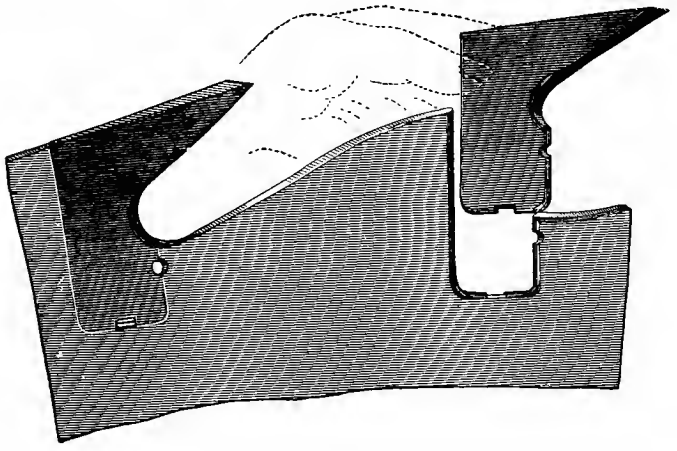
To fill an order properly, we require to know the size of the tooth, the gauge and the width at cutting edge. Teeth of standard width of cutting-edge are always sent unless otherwise specified.

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 Holder in addition to Number and Gauge of 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.

No. 10 TOOTH.



This tooth is sometimes termed the Spaulding Tooth, and is used principally in heavy mills on the Pacific Coast.

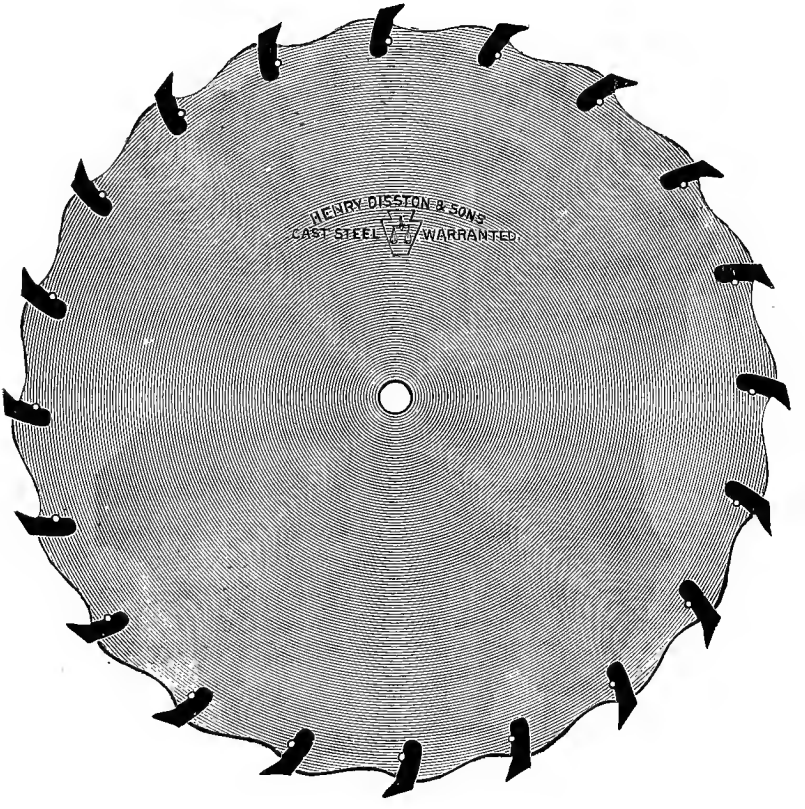
The No. 10 Tooth is made in three sizes suitable for small, medium and large timber.

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 and to supply this want, we are now making re-saws with the improved re-saw inserted tooth, of which the following cut 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 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, and in sawing short stuff where flanged saws are used, the flange or collar, by its close proximity to cutting edge of saw, splits a portion of piece from the bolt instead of sawing it, giving 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, and to do this, inserted tooth saws must be used, or the solid tooth must frequently be replaced.

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 trifling expense.

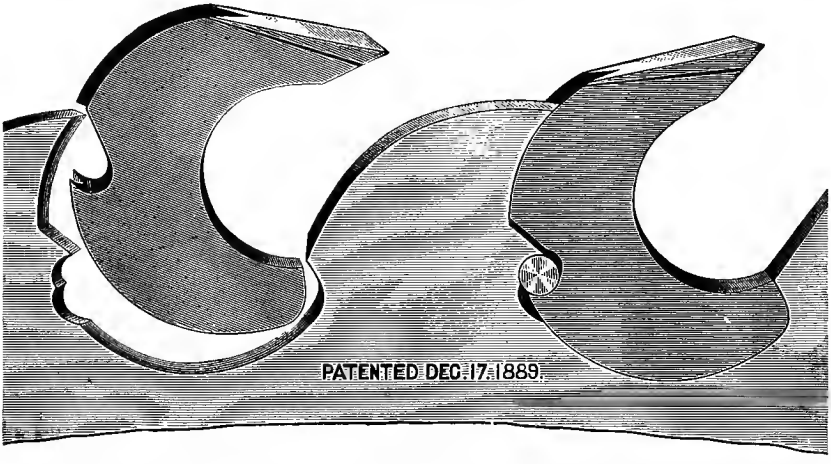
These saws are no experiment, they have been used for years with satisfactory and economical results, and we give the same warranty with them that we give on all goods bearing our brand.

INSERTED TOOTH 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 for same, formerly made by the American Saw Company, of Trenton.

"TRENTON 1894."



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.

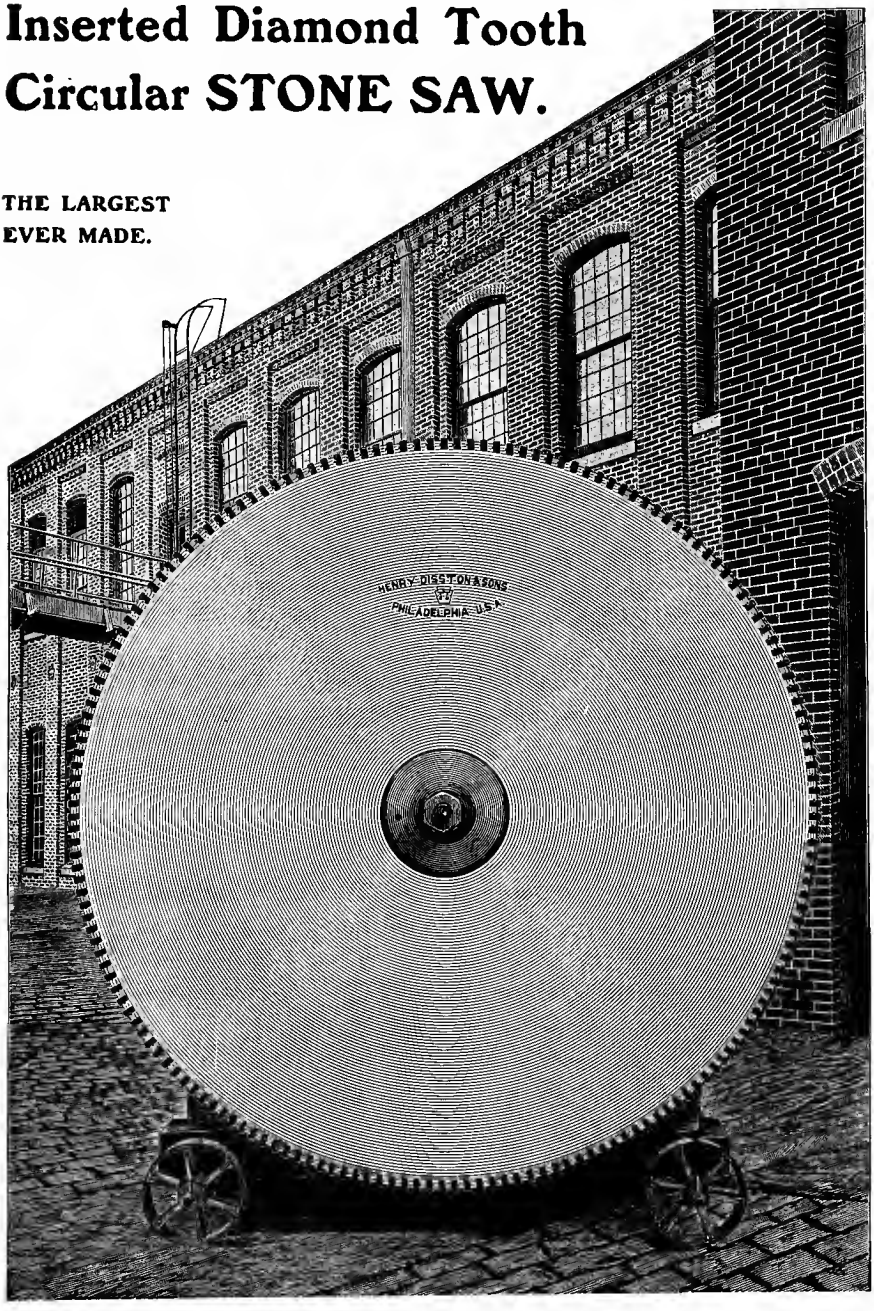
When sharpening, the same cutting angles should be preserved, and the gullets kept round, either with a round file or by the use of a proper gummer.

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 properly done the tension of the 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).

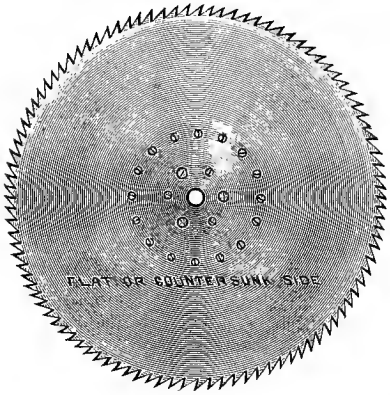
Inserted Diamond Tooth Circular STONE SAW.

THE LARGEST EVER MADE.



100 inches diameter. ½ inch thick. 800 lbs. weight.
180 teeth, in each of which is embedded a diamond.

SHINGLE AND HEADING SAWS.



Left-hand

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, speed of saw. If we are to furnish the flange, state size of machine and maker's name, 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. See cut above.

SCREWS FOR SHINGLE SAWS.

Fig. 1.

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 saw, and which require the flange to be countersunk (as shown in Fig. 1), thereby reducing the length of thread in flange, making it impossible to bind the saw firmly to the flange.

Fig. 2 shows the correct size the screw heads should be, thus getting a good bearing for the screw heads on countersink in saw and the full thickness of flange is retained for thread.

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

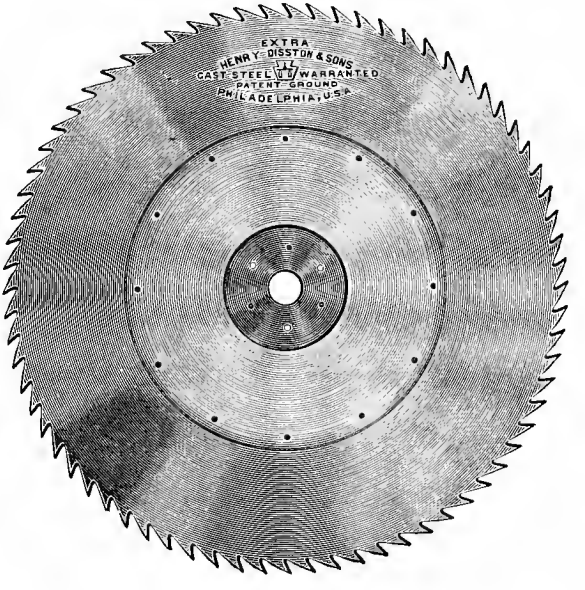
Fig. 2.

FLANGES OR COLLARS
FOR
SHINGLE AND HEADING SAWS.

The Flanges to which shingles 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 frame of 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 which 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.



SET GAUGE

FOR SHINGLE, VENEER AND HEADING SAWS.

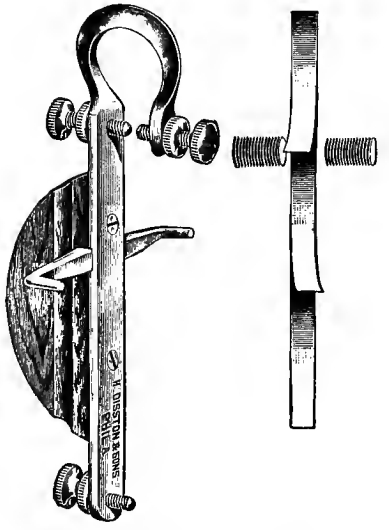


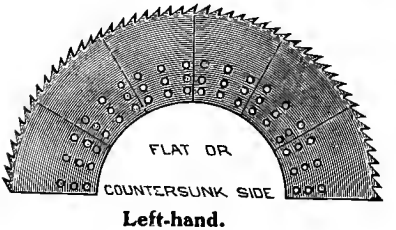
ILLUSTRATION ONE-HALF ACTUAL SIZE.

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

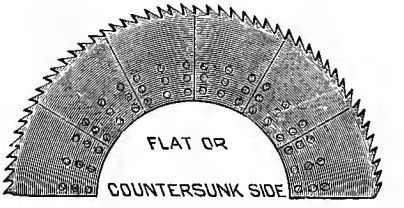
As shown, the gauge is a simple contrivance, having three set screws and two projecting arms, and is operated from flat side of saw.

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

VENEERING SAWS IN SEGMENTS.



Left-hand.



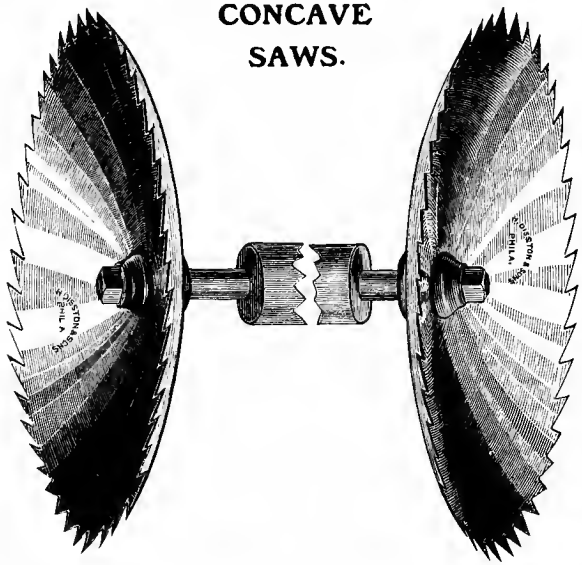
Right-hand.

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 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 being only one-eighth inch or less in thickness readily springs away from the thick part of flange, leaving it practically free from friction and heat which, while less detrimental to the operating of segment saws is always objectionable.

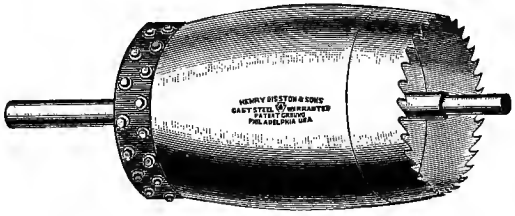
CONCAVE SAWS.



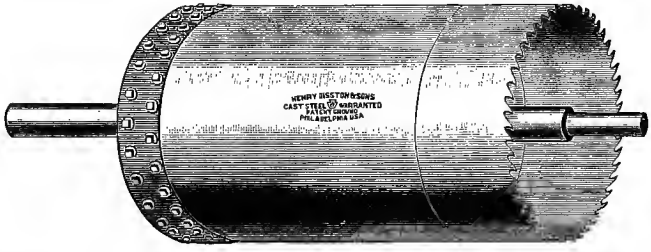
Left-Hand. **Right-Hand.**

The attention of the manufacturers of chair or wheelwright lumber, barrels, etc., is respectfully called to concave saws, of which we are manufacturing large numbers. They are dished and tempered by an entirely new and patented process, and guaranteed to be of superior 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 SAW.



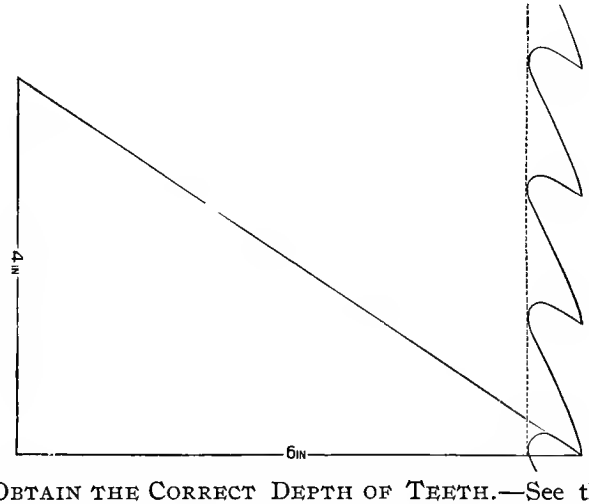
CYLINDER SAW.



We are prepared to furnish these saws of a superior quality, ground and tempered by our special process. They are made of the best crucible steel and will give satisfaction. Old Cylinder or Barrel Saws resteeled and repaired.

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 $\frac{9}{16}$" is given as base for depth of teeth, this is subject to variation to suit the different conditions.



To Obtain the Correct Depth of Teeth.—See that all the points of 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 $\frac{9}{16}$″ from end of razed points, per dotted line on sketch.

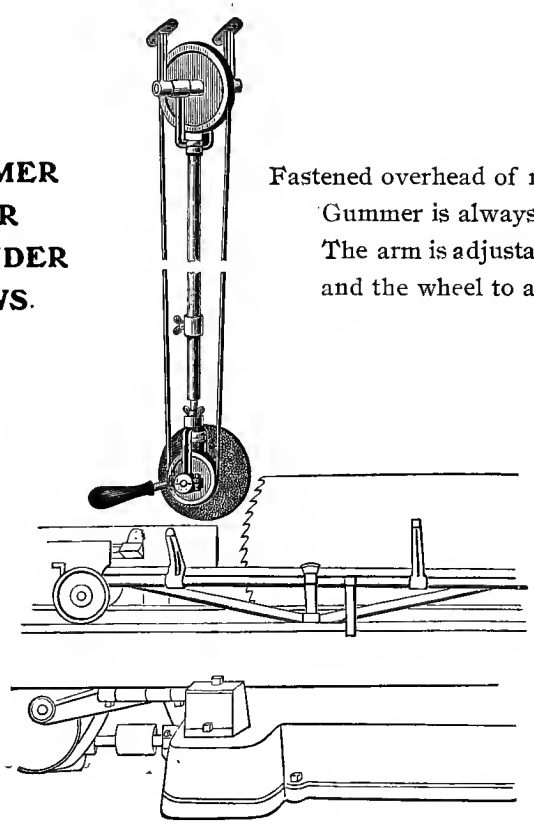
PROPER PITCH FOR FRONT OF TEETH: Draw a line 6″ lengthwise with axis of saw; from the end of this step off 4″ parallel with edge of saw, then draw a line from this point to point of tooth and this will give the angle or pitch.

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

TO SHAPE THE TEETH AND GULLETS a ⅜″ Round File is generally used, the balance of the tooth being finished with an ordinary Mill File, shaping the front and back of tooth as shown on sketch. Particular attention should be given to file the gullets round at bottom, for sharp, square corners will cause breakage.

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

GUMMER FOR CYLINDER SAWS.

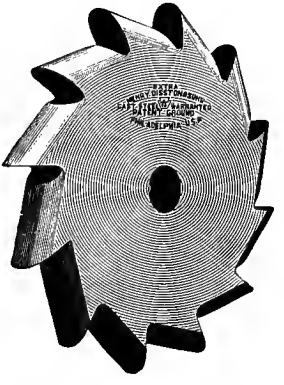


Fastened overhead of machine, the Gummer is always in position. The arm is adjustable in height and the wheel to any angle.

GROOVING SAWS.

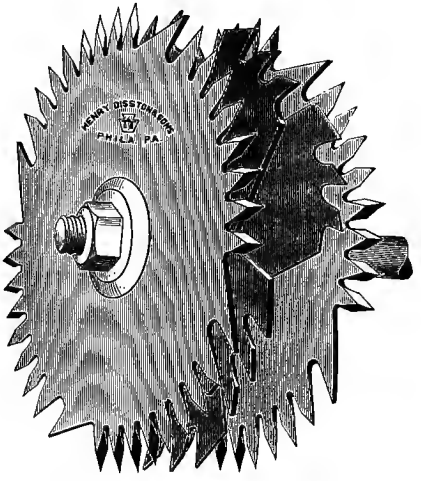
These useful little tools are too well known to require special mention. They are ground thinner at centre than at rim, so that little or no set is required or just sufficient to keep the extreme points of teeth perceptibly wider than body of tooth. We make them any gauge at edge or centre as may be wanted. In ordering grooving saws, state whether wanted straight or hollow ground, if the latter, give size of collar.

SPECIAL GROOVING SAWS.



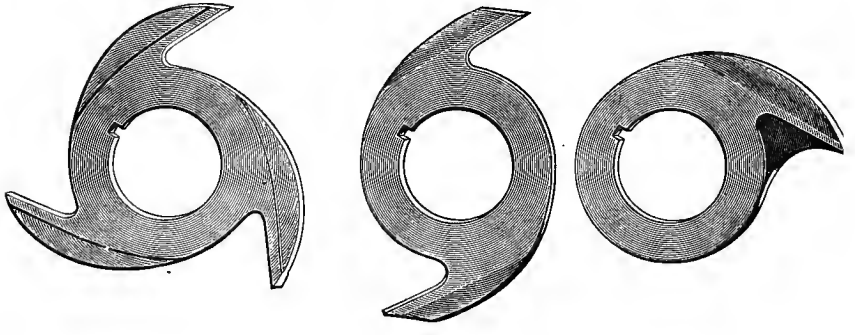
We manufacture Grooving Saws with various patterns or shapes of teeth, to cut grooves of any width, depth, or special shape on bottom or side.

DISSTON KEYSTONE GROOVER.



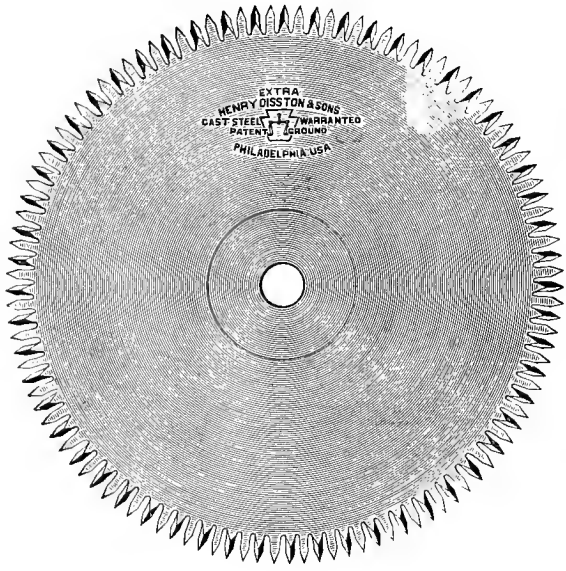
Cuts grooves from ⅛ inch to any width desired. Gives a clean, smooth finish either with or across the grain. Each head consists of two outside and three inside cutters, to cut grooves from ⅛ inch to ⅝ inch in any width, and cuts may be varied $\frac{1}{16}$ or ⅛ inch as required.

LOCK-CORNER CUTTERS.



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.

Circular Mitre Saws.

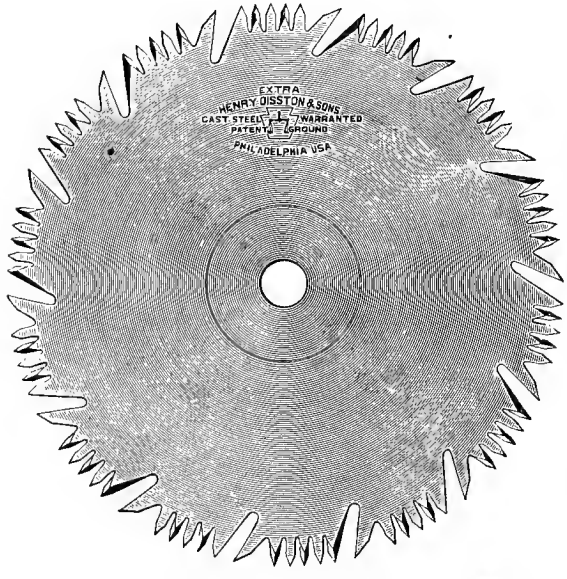


These saws are ground to run without set; especially adapted for smooth cutting, such as Cabinet and Cigar box work.

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

Sectional view, showing taper grinding for clearance.

CIRCULAR MITRE SAW with CLEANER TOOTH.



This style of saw can be made for either ripping or cross cutting. When made for ripping a greater number of cleaner teeth are put in than for cross cutting. It will cut equally as smooth in either ripping or cross cutting.

DISSTON SPECIAL STEEL for METAL-CUTTING SAWS.

DISSTON HIGH SPEED STEEL.

This steel is the development of careful metallurgical research and extensive experiments, a combination of rare and valuable alloys with the finest quality tool steel, producing a metal capable of resisting the severest impact and preserving a good cutting-edge under severe tests.

Lathe, planer and milling tools made of this steel will do more work and keep sharp longer than those of any other known material.

Circular Metal Saws, of small diameter, made of this steel have run as long as six days continuously, cutting metal, without resharpening.

The Teeth for the "PREMIER" Inserted Tooth metal cutting saws are made of this steel, one of which saws, under test by a large Steel and Iron Co., was worked continuously day and night, for ten days, cutting steel forgings and this was done without re-sharpening. After being re-sharpened it was again placed in work and run for two additional weeks without further sharpening. The same excellent results are being had from the various Premier Saws now in use. If the material to be cut is properly annealed we guarantee the saw will perform its duty.

DISSTON MANGTUNG STEEL.

In this steel is combined sufficient of the High Speed Steel elements to give it the facility of retaining a good cutting edge under severe conditions without the sacrificing of strength. It is principally used in the making of Solid Tooth Milling Saws of the larger diameters.

DISSTON CHROMOL STEEL.

The material in the CHROMOL hack saw blade possesses the peculiar qualities of High Speed Steel, making it specially adapted for saw blades to be used for cutting metal; it so takes the special hardening and tempering that the teeth of the CHROMOL blade will not crumble off as in the case with some other makes of saws, but is so *tough and strong* that it *readily maintains its cutting-edge* and will *wear longer* than any other saw.

GENERAL DESCRIPTION OF

Saws For Cutting Metal.

The demand for Hack Saws or Saws for cutting metal has been constantly increasing from year to year owing to the great variety of purposes to which iron and steel and other metals are being adapted.

Some years back, the working of metal to size was done in what may now be considered a very crude, laborious and expensive method. It was usually done in a blacksmith shop, the smaller work being forged to shape, the larger sheared off and dressed up with a file, while in such cases where joints or mitres were desired on beams, etc., the work was sheared to length, the required angle then cut on a shaper or planer. This method afterwards gave way to the adoption of shears, but this did not make an accurate angle and necessitated dressing off. All of these methods consumed considerable time.

The use of the circular metal and hand hack saws has rendered possible to a greater extent the employment of metals in the trades, as modern appliances for shaping and cutting with this class of tool has reduced to a nominal figure the hitherto prohibitive cost, the work now being done with comparative ease.

Hack Saw Blades, ordinarily, are narrow in width and from six to sixteen inches in length; some are hardened throughout (our Chromol) and others on tooth-edge only, leaving the back soft (our Soft-back).

Our Hack Saw Blades are made of the best crucible steel, hardened and tempered under a special process. For durability and fast cutting they are unequaled.

The Teeth have the correct pitch and shape for cutting metal. For toothing, straightening and shaping these blades, intricate and expensive machinery has been built by us, by which the work is done with greater accuracy and at much less cost than would be possible if done by hand. The blades have come into general use by workmen of all trades, and are so inexpensive that when worn dull are replaced with new ones.

HOLLOW-GROUND.

For particular work, where accuracy is desired, the Disston Hollow-ground Hack Saw Blades are recommended. These are made of special crucible steel, have milled teeth, the blade is hollow-ground to run without set, and tempered so they may be re-filed. The length is measured over all.

The amount of work that can be done with one of these little tools is marvelous, though, of course, considerable depends upon the manner in which it is used. To cut steel that has not been properly annealed is hard work for a saw, and too heavy a pressure or a sudden thrust into the work is detrimental to the life of the blade. The first few strokes with a new blade should be made with light pressure.

"CHROMOL."

Made of "Chromol Steel," a high grade material peculiarly suited for metal cutting blades.

The teeth are milled, giving the greatest possible strength and making them sharp and clean ; set in such a manner that every third tooth is straight—acting as a cleaner—while the two intervening teeth are set alternately right and left. This arrangement allows each tooth to do its full share of the work and the action of the cleaner teeth, to a great extent, relieves the set teeth of part of the wear, which considerably prolongs the life of the blade.

They are hardened throughout by the Disston Process which renders them hard and tough without being brittle.

For cutting the various classes of material we recommend blades, for hand frame use, of the following number of "Points" to the inch :

Soft steel, Cast iron, etc., and all general work	16	points, or	15	teeth
Tool steel, light angle iron, and hard metals	18	"	17	"
Brass, Copper, Drill Rods, Iron Pipe, and Sheet Metal . . .	24	"	23	"
Tubing and Metal thinner than 22 gauge	32	"	31	"

The stock sizes are ½ inch wide, 23 gauge for 8, 9 and 10 inch, and 9/16 inch wide, 23 gauge for 12, 14 and 16 inch blades.

Length measured from centre to centre of holes.

SOFT-BACK.

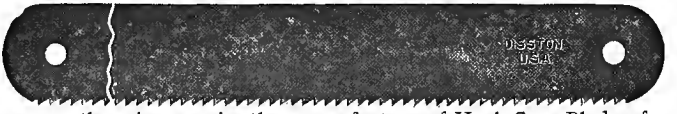
The regular Soft-Back Hack Saw Blades are made ½ inch wide, 23 gauge, 16 points to the inch, this tooth being best adapted for general purposes. For cutting sheet metal and other classes of small work we furnish blades with finer teeth, either 22 or 26 points to the inch, as desired. For cutting Tubing, Brass, Aluminum, etc., we recommend the fine tooth blade, 26 points to the inch.

The Soft Back Blade is also furnished in coils of sufficient length for use on Band Sawing Machines.

For Lockmakers, we make a blade ¼ inch wide, 23 or 25 gauge, 16 or 22 points, and the same width blade, 28 gauge, 30 points, for Jewelers.

Length measured from centre to centre of holes.

"CHROMOL"
FOR
MACHINE OR POWER USE.



We were the pioneers in the manufacture of Hack Saw Blades for use in Power Cutting-off Machines.

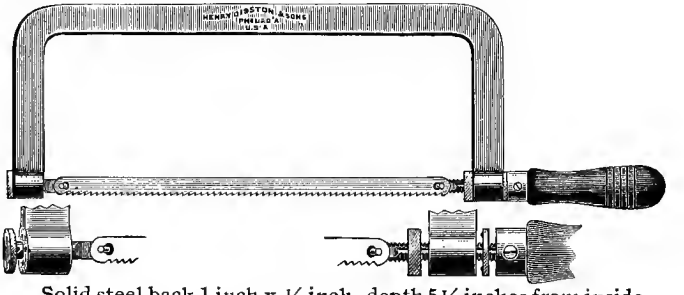
These are necessarily somewhat thicker and wider than the "Chromol" blades for use in hand frames, but are made of the same steel and in the same manner, excepting they are fitted with suitable sizes of teeth for the work intended.

We recommend the following "Points" to the inch for the respective classes of work:

Light Power	15 points	or	14 teeth
Brass, Copper, Iron Pipe, etc	18 "	"	17 "
Heavy Power Work	11 "	"	10 "

We are prepared to furnish them in sizes suitable for any make of machine.

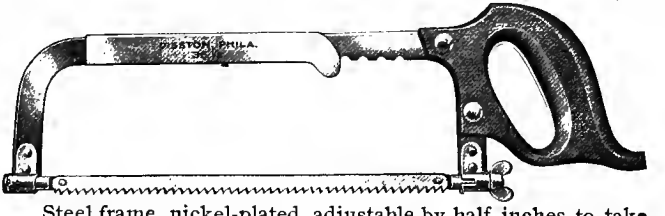
HACK SAW FRAME, No. 25.



Solid steel back 1 inch x ¼ inch, depth 5¼ inches from inside edge of frame to tooth edge of blade, Polished Hardwood Handle. This is the strongest frame made. No riveted parts. Reversible stretcher, special adjustment, sockets of solid steel forged. Made for 12 inch blades only.

While there is quite a variety of Hack Saw Frames on the market, the Disston line has been specially designed for durability, strength, rigidity and ease of adjustment. They are made of steel, some patterns having the eyes or sockets solid forged on frame, others with with riveted sockets. All stretchers are simple in construction but effective.

IMPROVED ADJUSTABLE HACK SAW FRAME, No. 36½.



Steel frame, nickel-plated, adjustable by half inches to take in blades 8 to 12 inches. Riveted sockets. Reversible stretchers, will not fall out while adjusting blade.

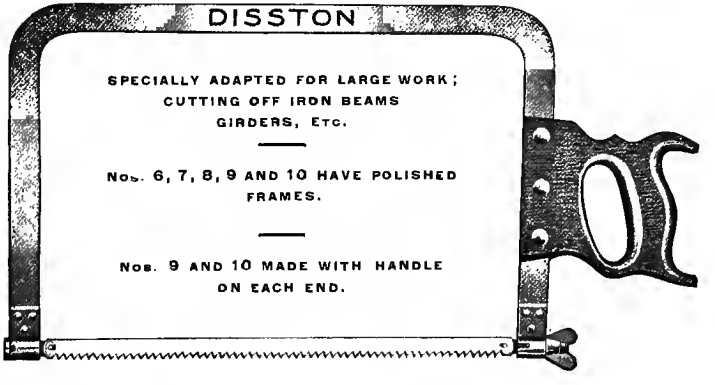
This is the most improved form of extension frame ever put on the market, and is well made and finished throughout.

Metal saws are made in the form of the regular carpenter's hand-saw, also in the shape of Back or Tenon saws. These are of a special steel and temper, hollow ground for clearance and may be resharpened with a good file. Tenon saws of this class are principally used in mitre boxes in the manufacture of show cases, etc., while the hand metal saws are for purposes where a framed hack saw cannot conveniently be used.

Large saws, in the form of hand saws, are also made for cutting metal and may be operated by two men in the same manner as a cross-cut saw, the handle for small end of saw, being adjustable, can be attached or detached at will. These are principally used in foundries for sawing off "gates," etc., from large castings.

Portable hand machines are now made for the working of a small circular milling saw, and are employed in railroad construction and repairs; the rail being clamped in the machine and the saw adjusted to cut either straight or diagonal. This is a great improvement over the hammer and chisel formerly used for this work. While these machines are adapted for hand, they are also arranged to work by power. There are also portable machines made, in which the straight blades are used.

RAIL HACK SAWS.



Length of blades measured from centre to centre of holes.

CIRCULAR MILLING SAWS.

HOT SAWS AND FRICTION DISCS.

For fast cutting of cold steel or iron, friction Discs are used.

For hot steel and iron, Saws having teeth varying from ⅜ inches to ⅞ inches in space are used, the angle of teeth being equally divided by a line drawn from points of teeth to centre of saw. These saws are run at a lower speed than friction discs. The Discs and Saws are made of a special steel which we manufacture expressly for the purpose.

To give the best results, these discs and saws should be run at a high and uniform rate of speed. Hot saws should run about twenty thousand feet per minute, rim motion. Discs for cutting cold iron or steel should run about twenty-four thousand feet per minute, rim motion.

INSERTED TOOTH MILLING SAWS.

Milling saws with inserted teeth have come into very general use for large work, such as cutting structural iron, large castings, steel and iron forgings, etc. Whilst there are many patterns of inserted tooth saws on the market of more or less practical value, we are in position to offer the users of saws the most practical and economical inserted tooth milling saws ever made. After lengthy and expensive experiments and trials we have perfected the styles and patterns illustrated herein.

These saws are run at a speed governed to a great extent by the hardness and size of the stock to be cut, varying from 40 to 60 feet per minute, rim motion, with a feed of ¼ inch to 1¾ inch per minute.

GENERAL HINTS.

It is highly important that the mandrels and collars should be amply heavy, large and true and so secured in boxes to the framework or housing as to avoid all vibration. The arbor should neatly fit the centre-hole of saw. This is essential for good work.

In cases where the motion of these saws is reduced from any cause, the feed should be reduced proportionately, or work should be suspended altogether until proper speed can be regained. In no case should the work be forced suddenly or crowded on the saw.

The ordinary solid tooth or slow motion milling saws, when cutting steel rails, beams, etc.. should run about 45 feet rim motion per

minute, with a feed of ½ to ¾ inch per minute. While the rim speed of saw, i. e., 45 feet per minute, should be maintained for any diameter, the feed must be reduced to correspond to a less number of teeth. For instance, a saw 28″ diameter, to run at this speed, should have 200 teeth with about ½ inch pitch or space.

For cutting rails and beams, $\frac{7}{16}$ inch space of teeth in solid tooth saws 24 to 30 in. diameter is considered right. On large saws, for special purposes, with inserted teeth, the space varies from 1 inch to 3¾ inches.

To cut wrought iron the speed may be increased to 60 feet, rim motion, and feed to 1 inch per minute.

For brass or soft metals. the speed may be increased to about five times that for cutting iron.

When cutting metal tubing, fine teeth must be used, and the speed and feed in accordance with metals, as given above.

In cutting small sections, a closer space or pitch of teeth is required than when cutting larger sections. There should always be two or more teeth in the cut at the same time.

Saws for cutting iron should be kept well sharpened, otherwise they will jam in the work and are liable to break.

The Flanging which takes place upon the rims of discs should be frequently removed particularly before it becomes ragged, or cracks in the plate will result.

For deep cuts the speed should be slowed down to prevent jamming of chips in the gullet. It is best to have a wire brush rigged over the saw for the purpose of knocking the chips from between the teeth so they will not be carried around again in the cut. This brush need not have any motion, except such as it gets from coming in contact with the saw.

If the work be fed to the saw below the centre line, the saw should run from the operator. If the work is fed above the centre line, the saw should run toward the operator. This will prevent the work from being pulled in on the saw from any lost motion that may occur and prevent the teeth or saw from being broken.

Proper lubrication is of great importance. Failure to obtain good results can often be traced to its absence.

When ordering any of these saws, state the kind of metal they are intended to cut, also the speed and feed at which they are to be operated.

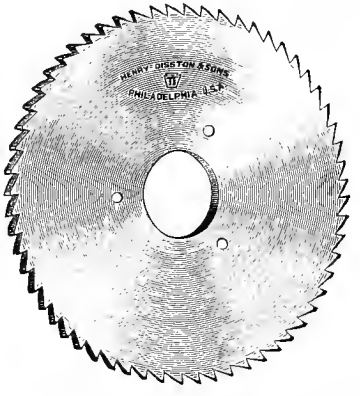
SCREW SLOTTING CUTTER.

As the name implies, these saws are used for cutting the slots in screw-heads.

METAL SLITTING SAWS.

The teeth are of such shape as to render them strong and effective cutters. Accurately ground for clearance.

MILLING SAWS.



SHAPES of TEETH FOR MILLING SAWS.

TEETH "BACKED OFF" FOR CLEARANCE. BRYANT PATTERN TOOTH.

REGULAR PATTERN TOOTH.

We make Milling Saws and saws for cutting metal at either high or low rates of speed, of any diameter up to sixty inches, and of any thickness required.

The above saws are made of a quality of steel exactly suiting the purpose, and hardened under our new improved process. See page 71.

DISSTON

PREMIER

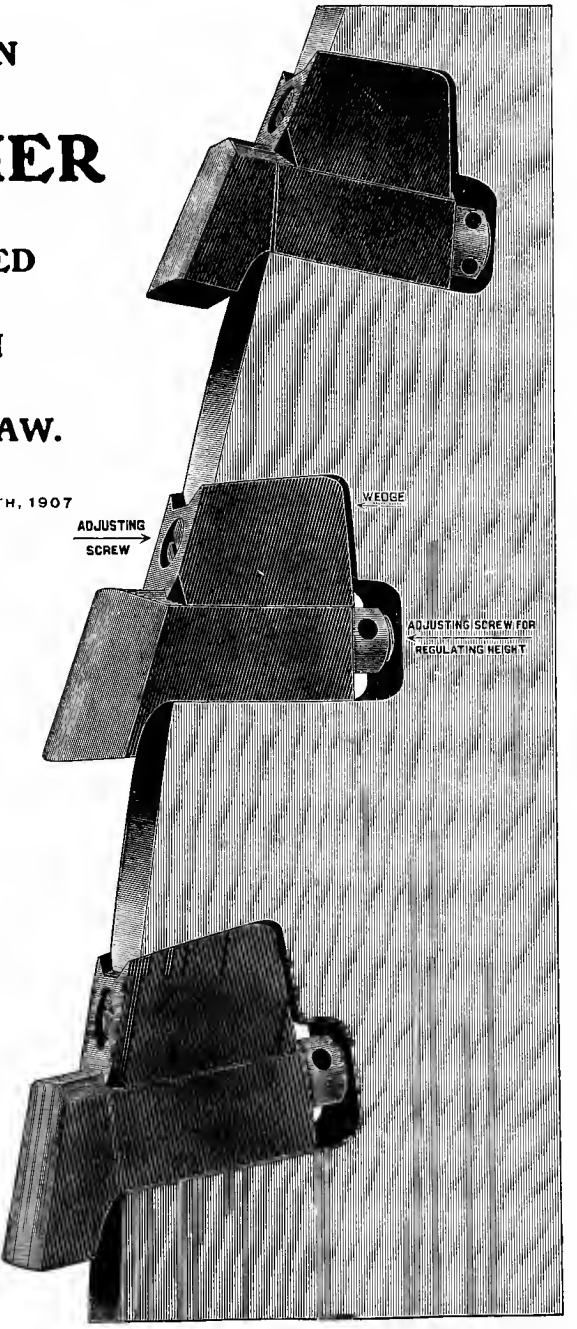
INSERTED TOOTH METAL SAW.

PATENTED MARCH 5TH, 1907

ALTERNATING
ROUND
AND
OVAL-TOP
TEETH.

INVERTED
WEDGE.

DIAMETERS
FROM
18 INCHES.
TO
60 INCHES.



THE FASTEST CUTTER *and* MOST DURABLE SAW *of the* KIND EVER MADE.

The "PREMIER" Inserted Tooth Saw for Cutting Metal.

In the "PREMIER" Saw we present the highest development of the art of saw making. The designs of the teeth and wedge are absolutely unique, differing from anything of the kind now in use.

Many severe tests, which were made with the object of arriving at the limit of the capabilities of the "PREMIER" Saw, resulted in reaching the limits of the machines. In no instance has the saw given down, even under the heaviest feed. These tests have fully demonstrated the superiority of the "PREMIER" over all other metal cutting saws.

The Plates are of high carbon steel of our own manufacture throughout, ground to a uniform gauge, and stiffened. They are peculiarly adapted to withstand the strain to which they are subjected while at work.

In design the tooth is simple and practical. A glance at the illustration will demonstrate to the mechanic its effectiveness.

The Wedge which secures the tooth being inverted operates in an opposite direction from any heretofore used. It is held in position by a screw and when tightened does not disturb the rim of the blade. This screw is inserted in such a manner that it cannot jar loose and drop out. The wedge backs up and strengthens the tooth at the heel, directly back of the cutting edge, where strength is most needed. It not only secures the tooth perfectly, but provides a protection for the plate should a tooth break. The destruction of a wedge is of little moment; it can be replaced quickly at a small cost, while an injury to the plate is a serious proposition, as it frequently destroys the efficiency of the saw.

"PREMIER" Teeth are made of Disston High Speed Steel, which is produced in our own steel works. This steel is the result of many costly experiments and has proven better adapted to the purpose than any other steel we have been able to produce heretofore or purchase. For the purpose of Inserted Tooth Metal Saws it cannot be surpassed —while it can be made extremely hard, it is tough and durable. See page 71.

The shape of the cutting edges of the teeth is such that the chips are rolled and drawn toward the centre of the cut, thus preventing these chips from jamming on the sides. The teeth alternate round and oval top; the round teeth being narrower than the oval teeth. The round tooth breaks down the way and the oval tooth cuts out the

full width of the kerf, thus providing sufficient clearance for the blade. The teeth have considerable hook ; the direction or hook of the fronts, combined with the size and shape of the cutting edges, provides a saw which does the work rapidly, in the best possible manner, and with the least expenditure of power.

Practical results of sixty-seven years' experience in making saws are applied in the "PREMIER" Saw. It contains all the improvements that time has suggested.

The "PREMIER" Saw is useful for steel foundries, steel forges, railroad work, structural work, locomotive shops, and all heavy metal cutting.

We invite the attention of those interested in this style of saw to the records of tests which can be supplied upon application. These tests have been made under practical conditions in the shops of those eminently qualified to pass upon the efficiency of tools of this character.

A special booklet describing the "PREMIER" Saw will be mailed on application.

SUGGESTIONS For Operating DISSTON "PREMIER" Inserted Tooth Milling Saws:

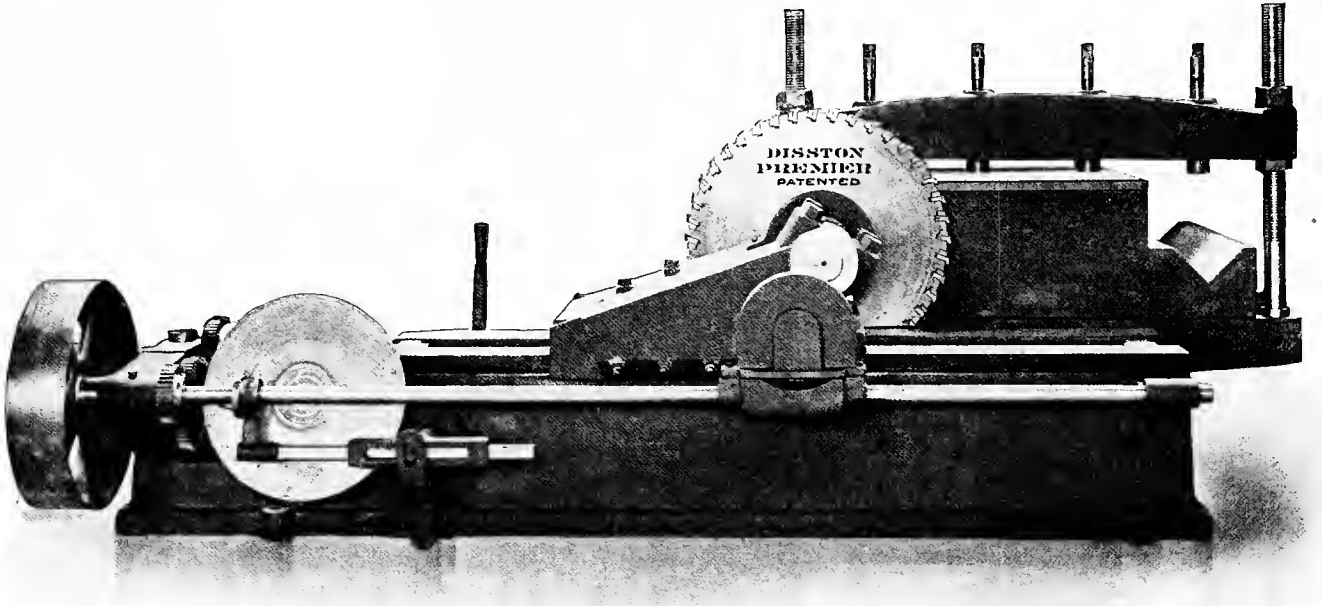
See that teeth are firmly bedded on adjusting screw, also that round and oval teeth are set the proper height from periphery of blade—the round teeth being set slightly higher than the oval teeth—this may readily be accomplished by use of the gauge specially designed for this purpose, and which we furnish with the saw.

In tightening up the wedges, we find that after making them as secure as possible by use of the screw driver, if a drift or punch is inserted under the wedge and given one or two light blows, a half to a full turn may be taken on the wedge screw. This makes the teeth and wedges absolutely tight and saw is ready for work.

After the saw has been operated for one to two hours, stop the machine and carefully examine teeth in saw to see that each tooth is doing its full share of work—or, in other words, that all the teeth are making the same depth of cut, respectively for the round and oval teeth. If any variation is found, correct same immediately by adjusting screws and tightening wedges. This relieves saw from any unnecessary strain and lengthens life of the teeth by preventing breakage.

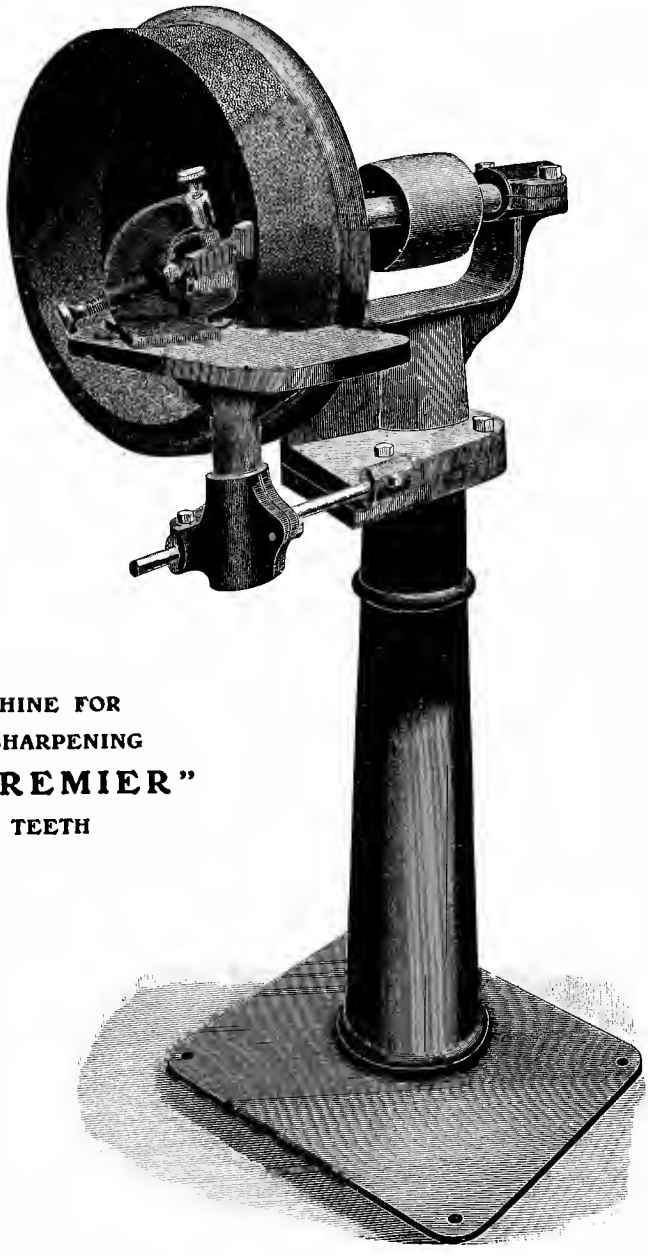
This examination should be made at least once a day, as a precautionary measure, although experience has demonstrated that as the saw is used the teeth naturally find their proper bed and very little adjusting is necessary after the first examination and re-adjustment.

COMBINATION COLD SAW CUTTING OFF MACHINE
Fitted with "PREMIER" SAW.



The above illustration shows the "PREMIER" Inserted Tooth Metal Cutting Saw in position for work, and the powerful machine required by reason of the nature of the material to be cut and the amount of feed this saw is capable of standing. This machine is Newton Machine Tool Works pattern.

The cutting of metal has been reduced to such a science that it is as readily performed as the sawing of wood.



MACHINE FOR
RE-SHARPENING
"PREMIER"
SAW TEETH

The tooth is fastened in holder and the arrangements are such that the proper grinding of "Round" and "Flat" top teeth is easily and quickly accomplished.

HAMMERING *and* ADJUSTING CIRCULAR SAWS.

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, which if carefully followed can not be otherwise than a benefit to beginners and others seeking information in this line. All saws of whatsoever kind, if properly made, are what we will call "loose," through or towards the centre to suit the 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, and even after the most careful instructions we could give, would require practical experience and close observation on the part of those having these saws in charge, before they can successfully hammer them.

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 being to treat here on the hammering necessary to keep the saw true and in proper tension, which means that it must be open sufficiently and properly from the edge towards the centre to suit the motion of saw and feed of the mill.

What is required in the way of tools is an 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.

In studying the matter of how to hammer circular saws, it would be as well for those who have to take charge of them, to examine the saws as to the tension when first received, taking for granted that they are

FIG. 1.

right as to the hammering when they leave the maker ; for all the saws

FIG. 2.

made by us will be as true as it is possible to make them, and will appear for tension as shown by figure 1 to a greater or less extent, according to the speed and feed to be used. A saw that has lost its tension will show as at figure 2 and needs hammering with a round-face

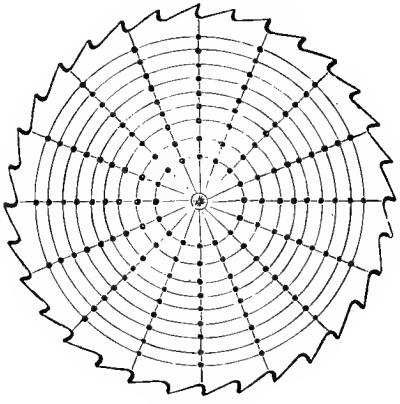


FIG. 3.

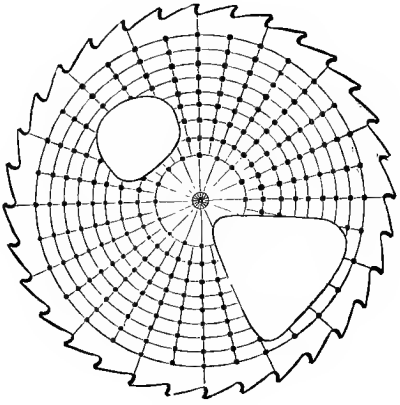


FIG. 4.

hammer, as shown by figure 3, but before commencing to hammer to restore the tension, examine or test the saw all around as in figure 5, and if any part of the saw between edge and centre falls away from the straight-edge, mark around this spot as shown by figure 4, and do not

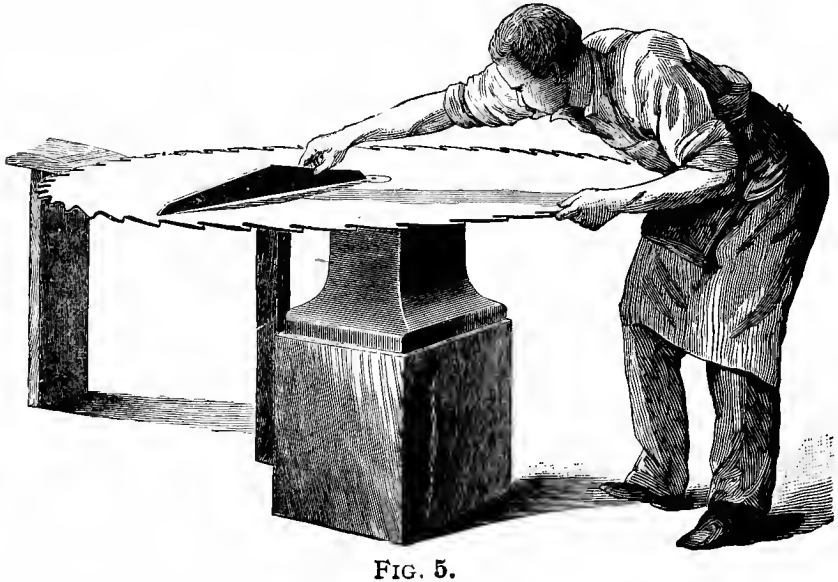


FIG. 5.

hammer as much, if any, at that place. In testing for the tension, be sure to have the straight-edge at right angles with that part of the saw resting on the board and the opposite edge which is being raised with the left hand, while the straight-edge is held and gently pressed down

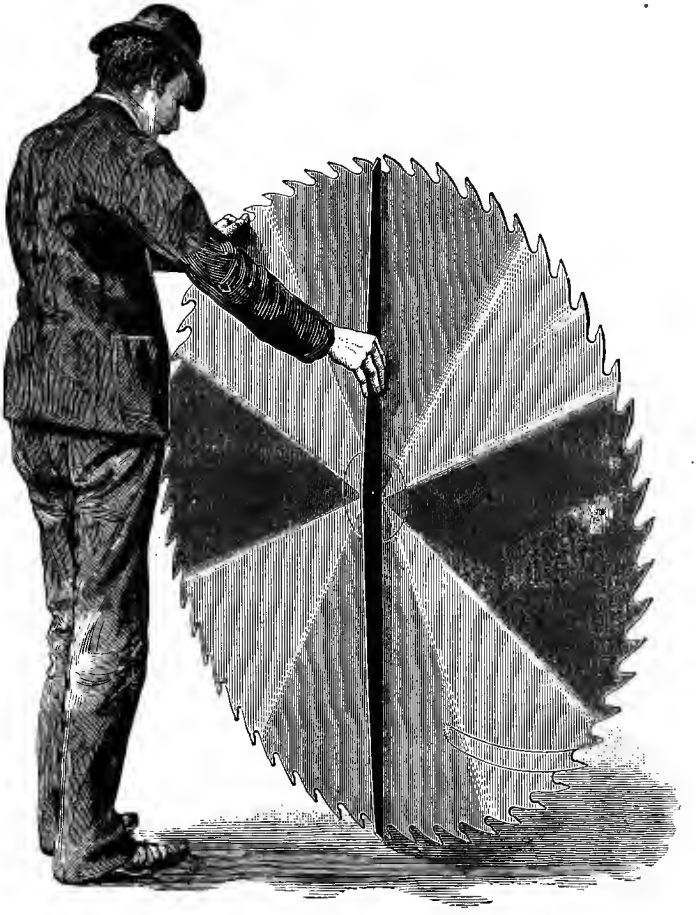


FIG 6.

with the right hand. Do not lean the straight-edge to one side but hold it up straight, 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 in hammering to regulate the tension, and when this straight-edge is applied as above, the saw

should fall away from a straight line as shown by figure 5; this will show that the centre of the saw is stiff, as it must always be to run properly and do good work, and if a short straight-edge about 6 inches long was pressed directly over the centre, it would show the saw to be nearly flat or of equal tension at that part. We will here say that it is very seldom necessary to hammer a saw at the part covered by the collars.

When ready to hammer, as at figure 3, see that the face of hammer is ground so that the blow will be round and do not strike too heavy, for it is better to go over the saw a number of times than to

FIG. 7.

hammer too much at one operation, and 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 as directly over them as can be done. Now, stand the saw on the floor; hold it up straight and test it with the long straight-edge as shown by figure 6; 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 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 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,

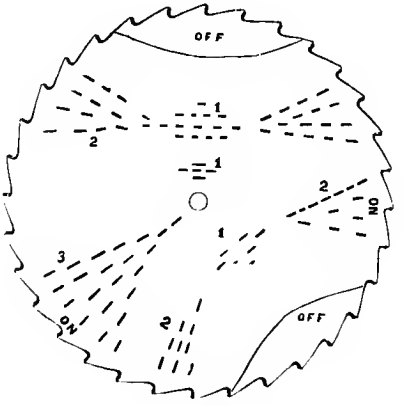


FIG. 8.

which can be determined by changing the position of the saw on the 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 7, while turning the saw slowly around, and where the saw runs off, lumps will be found most likely as at 1, 1, 1, or what is termed twist lumps as at 2, 2, 2 of figure 8, 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 may also be thrown out of true by lumps running toward the centre as No. 3, figure 8; 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, and by 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

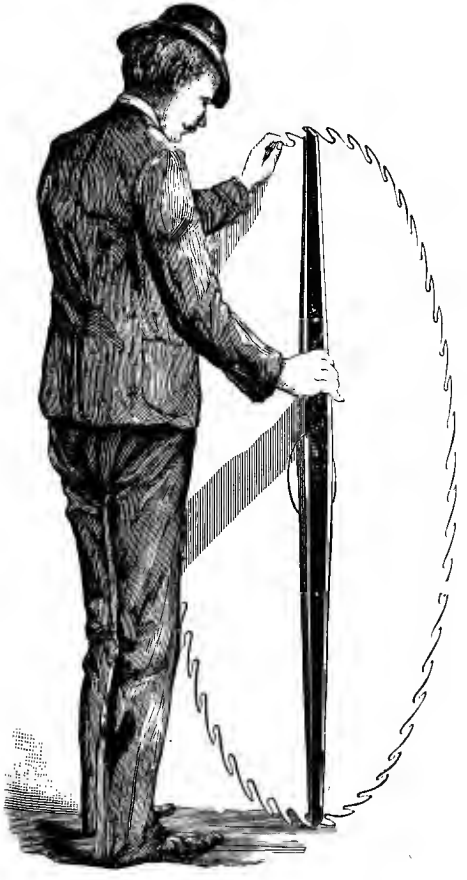


FIG. 9.

manner and get same results. Now put 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 and do its work, but if it acts as heretofore stated (runs snakey and rattles in the guides,) it needs to be made more open toward the centre. An experienced man, however, will stand the saw on the floor, taking hold at the top edge and give it a sudden shake and 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 9, and consequently 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 10, and the distance to hammer in from the edge depends upon where the loose parts are on the saw; if the centre is loose on line 1, hammer to that line; if to line 2 or 3, hammer to those

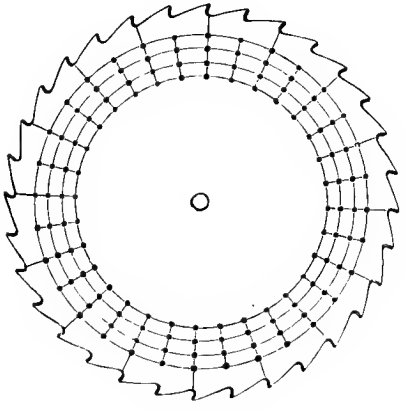


FIG 10.

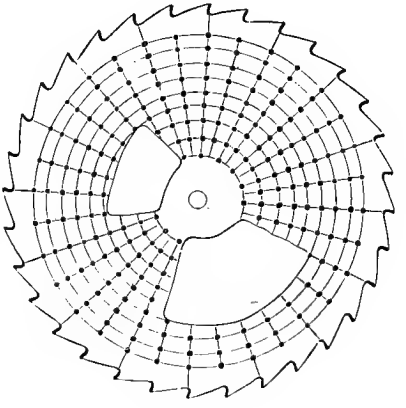


FIG. 11.

lines, or the looseness may be irregular, as shown by figure 11, and needs to be hammered as showu 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 6, 7 and 8 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 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 cross-face hammer. It is very important to have the blows distributed properly over the surface to be hammered. Hammering too much at one place would

cause a loose spot or lump that would be difficult to take out, or 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 lines between those that have already been operated on. The dressing of the faces of the hammers is important; the round face should be nicely rounded so that if a light blow was struck on the oiled surface of the saw, it should show about half inch in diameter; the cross-face so that it would show a blow three-quarter by three-eighth inch, for a sharp cutting blow is not effective in either knocking down a lump or stretching the metal.

In concluding to these instructions, we make the following suggestions to beginners:

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

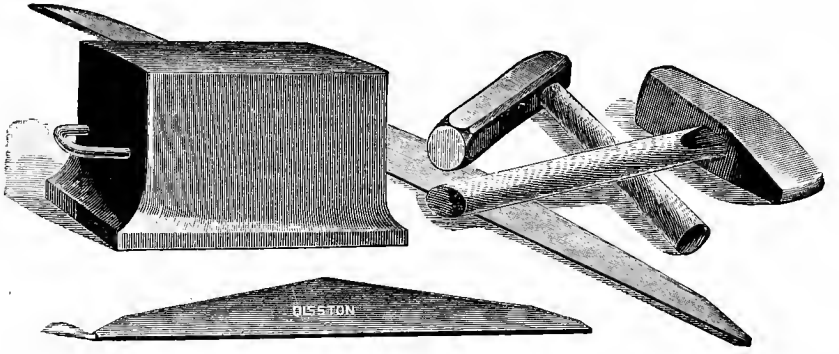
Carefully study the amount of opening the saw requires towards the centre for tension to suit the motion and feed used, and for regulating this, always use the round-face hammer.

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

Beginners in the art of hammering should take a small circular cross-cut saw (for this class of saws, as a rule, are given very little attention in the mills), one that can be easily handled; 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, eventually cracking or breaking 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 the same as though the tension was not properly adjusted.

ANVIL, HAMMERS *and* STRAIGHT EDGES for REPAIRING SAWS



The above cut represents the tools necessary for altering or adjusting the tension of circular saws. (See page 84).

HAMMER *and* SWAGE BAR.

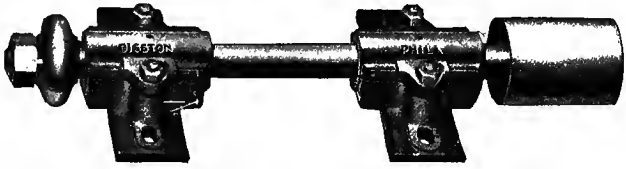
The above cut represents our swage bar and hammer for use on circular and gang saws. We make the hammers in two sizes ; the bars of any shape, size or weight desired.

DISSTON CIRCULAR SAW MANDRELS.

OF THE LATEST AND MOST APPROVED STYLE.

No. 000 PULLEY ON END.

SELF-OILING BOXES.



Our stock mandrels with pulley on end or in centre range in sizes suitable for saws 10 to 38 inches in diameter. Special sizes 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. In service they will last longer and giver better satisfaction than any other make on the market.

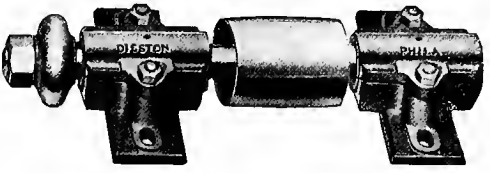
The Shafts of Steel, accurately turned, possesses in the various sizes a good safe margin of strength to prevent springing or undue vibration under the heaviest feed or pressure that may be put on the saw they are designed to carry. All Collars or Flanges are of sufficient diameter to give proper support to the saw, accurately machined and recessed, giving a perfect bearing on the blade. The Pulleys are turned up after being placed on 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 diameter of mandrel: longer would be no detriment. 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 proper lubrication. The cutting of channels from the front side of bottom half of boxes running down and under shaft to point of hardest bearing will be a great benefit in all cases where self-oiling boxes are not used; then 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 economy, to increase the diameter of the receiving pulley on 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 slack on the top; then 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, with the balanced tightener, 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.

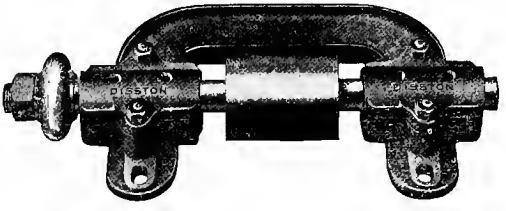
DISSTON CIRCULAR SAW MANDRELS.

WITH SELF-OILING BOXES.

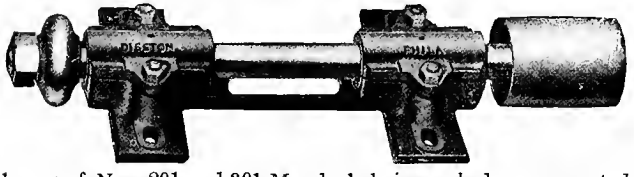
No. 00 PULLEY IN CENTER.



No. 201 YOKE.



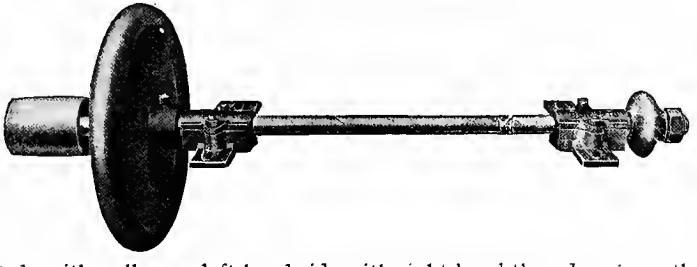
No. 301 CONNECTED BOX.



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.

Above Mandrels are made with pulley on right-hand side with left-hand thread unless otherwise ordered.

No. 400 CORDWOOD.



Made with pulley on left-hand side 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 filling of oil reservoir, the oil being carried to bearings by a ring revolving on shaft.

THE MAKING *of* a

DISSTON BAND SAW.

In the making of a Band Saw it may be of interest to state that a Band 68 feet long, 18 inches wide, 12 gauge, or 7-64ths inch thick, is made from an ingot measuring 16 inches x 5 inches x 30 inches, weighing 624 pounds. This is hammered to 18½ inches x 2½ inches x 55 inches, the weight now being about 530 pounds, then hot-rolled to 19 inches x 3-16 inches x 45 feet, and now cold-rolled and trimmed to 69 feet long, 18 inches wide, 12 gauge tight, weight 483 pounds, approximately.

This work is done with extreme care, for the obtaining of uniform thickness of blade in the beginning insures more perfect results in the hardening, tempering and grinding operations.

After the bands are received in the Saw Department, the first operation in the making of a Band saw is the "Hardening," then follows "Tempering." Owing to the extreme length of the bands, for their hardening and tempering, furnaces and apparatus of particular design are used, which were first invented, built and installed in the Disston Works. By the use of these in connection with the exclusively

Shearing to Width.

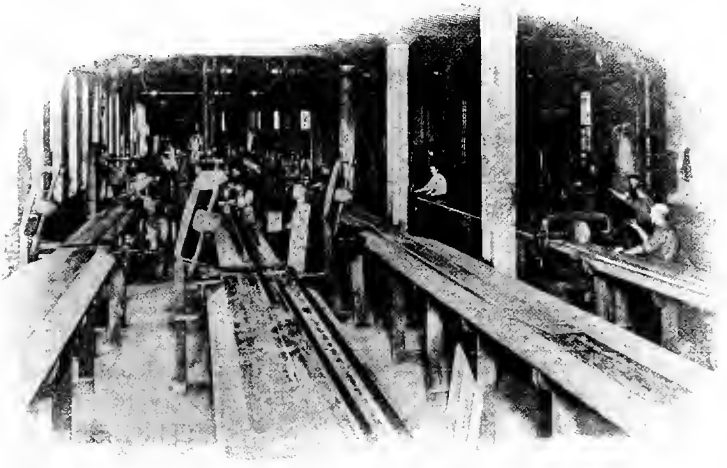
Disston process, a true and uniform temper, otherwise unobtainable, is secured throughout the entire length of the band.

The next step is the "testing for temper" which is done by experts who have tested the bands for the past ten years and none but what are strictly up to the Disston Standard are passed.

The ends are now cut off and the band is "Smithed" in the black to make it level and even for grinding purposes; then "Ground" to the thickness required, after which it is accurately sheared to width under a power press, leaving a true, solid edge for the toothing. It is then placed on a machine specially adapted for the grinding of the edges to obtain a uniform width of blade. The edges are next tested with a file to make sure no part has been case-hardened by the grinding, so particular are the rules and instructions for the making of a Disston Saw.

The process of "Toothing" takes place, which is done by means of a power press in which a suitable die is inserted for the particular pattern of tooth wanted; one tooth being cut at each stroke of the press.

The second "Smithing" is in order; this being a finer degree of work in tensioning, flattening or leveling the surface on both



Smithing.

sides, trueing up the band, and it is here that skilled workmanship particularly counts. The band is now "Re-ground," this being done

on a machine of special design, the purpose being to grind it still closer to gauge and prepare for polishing.

And now the "official gauge" passes judgment as to the thickness of the band; then the band is further "Examined" and given such additional hammering as may be required. It is then ready for "Polishing," after which follows "Blocking." In this latter process the band is again examined as to tension, etc., and placed in perfect condition for the succeeding operation.

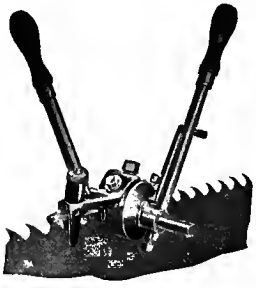
Next the band is cut to the exact length wanted and is ready for brazing. In "Brazing" or joining the ends together for the making of

"Fitting" and Brazing.

an endless band, the ends or laps are beveled on a special milling machine and given a finish dressing by handfiling so that there shall be a uniform and perfect joint. After inspection, the laps are placed together, with a strip of best quality silver-solder between them; adjusted in a clamp so they are held in proper position, heated irons placed under and on the part to be brazed, which are subjected to heavy pressure until the solder is thoroughly melted and the brazed part somewhat cooled off. The part joined is then dressed and tensioned the same as the other portion of the saw. The Disston method of brazing insures a thorough fusion or weld; the part is strong, perfectly joined and is the result of constant efforts to excel.

"Grinding of the Teeth" follows, which is done on an automatic grinding machine; the endless toothed band being placed on this machine which is set for the particular size and shape of tooth to be ground.

DISSTON
ECCENTRIC BAND SAW SWAGE.



Made in two sizes. The No. 1 is adapted to saws from No. 12 to No. 16 gauge in thickness; the No. 2 will swage saws from No. 16 to No. 21 gauge.

After this the teeth are "Swaged" or "Set." The larger band saws, those intended for mills or machinery of large capacity are usually swage-set, that is, the points of the teeth are spread so they will extend beyond each side of the blade for clearance of the body of the saw while cutting, to prevent friction. With the swaged tooth each corner of the tooth cuts, hence it will do twice the work in comparison with the spring-set tooth which cuts only half a kerf. The swaged saw, consequently, will stand more feed.

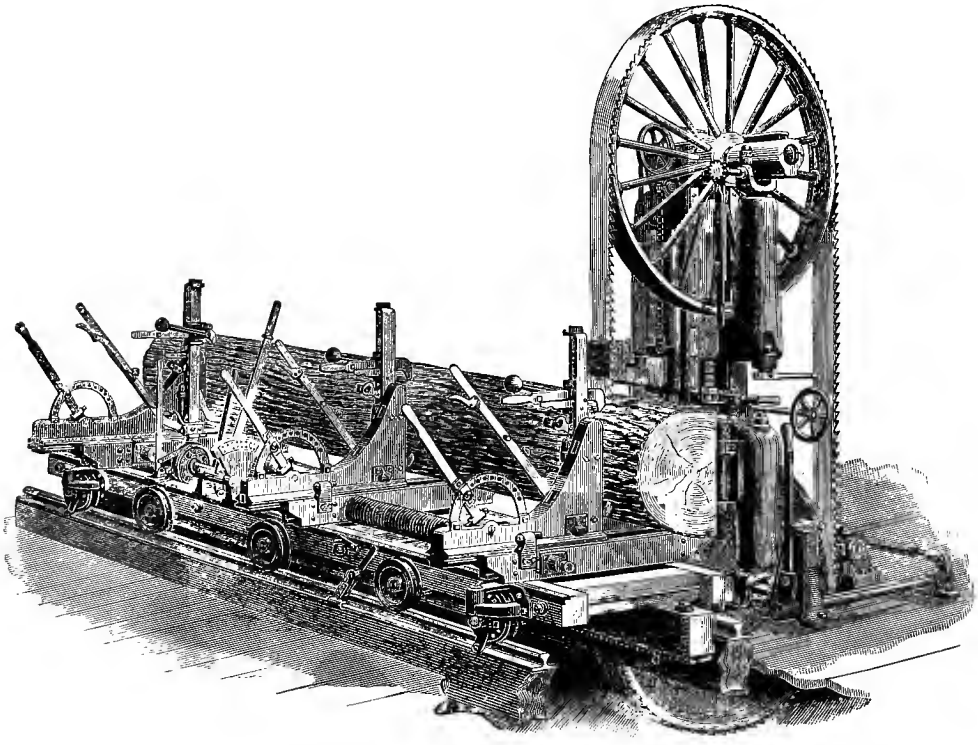
Very Narrow Band Saws are usually "Spring-set" for clearance, that is, the point of one tooth is bent to the right, the next to the left, and so on alternately throughout the saw.

The teeth are now "Sharpened" which is done on automatic machines after the same principle followed for the grinding of the teeth. By this method the teeth throughout are exactly the same, which is an absolute necessity for uniform work in cutting. This applies particularly to the larger saws, for in the case of narrow band saws with fine teeth, these are oftentimes filed by hand.

The band saw is ready for "Etching" or branding; then follows the "Stiffening" or bringing up the elasticity of the saw to its highest efficiency.

All Disston Saws are "put-up" or fitted with full regard as to their use and the conditions under which they are to work, so far as information or instructions to this end can be obtained.

LEFT-HAND
BAND SAW MILL

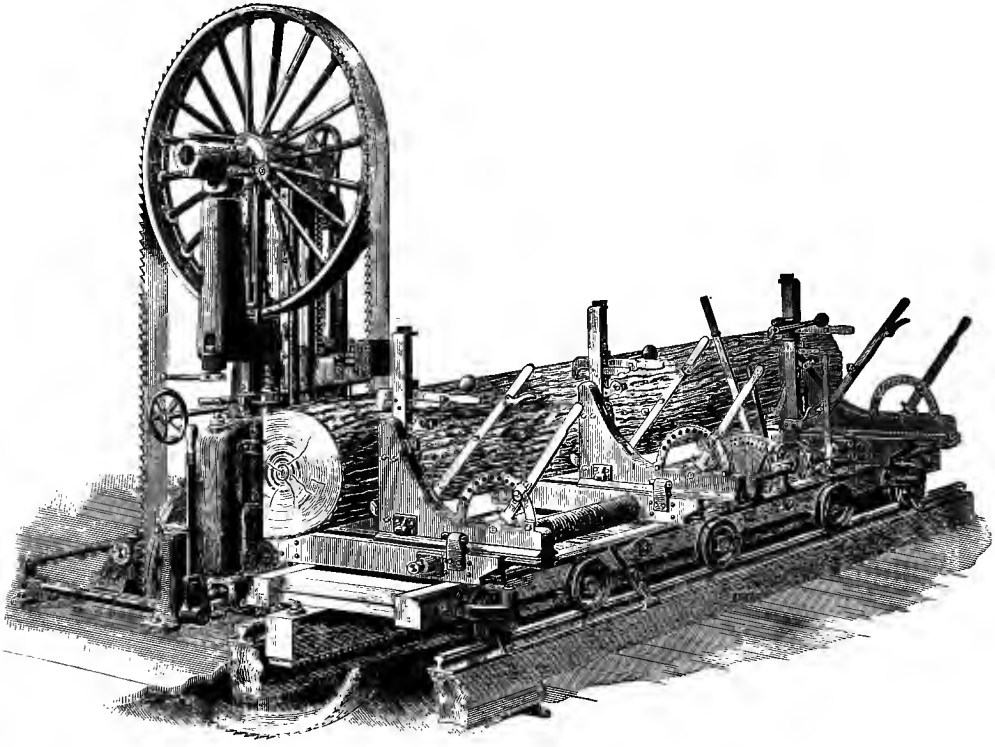


Cut No. 1.

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 back we finish them $\frac{1}{64}''$ crowning to each 5 feet in length, unless otherwise instructed.

We will supply, on application, an order blank giving details to be

RIGHT-HAND
BAND SAW MILL



Cut No. 2.

pecified, and if this is properly filled out it will enable us to make up the saws exactly as required.

The above illustration, together with the one on preceding page, gives views of two mills, by which the "hand" of saw can readily be determined, *i. e.*, cut No. 1 shows design of a Left-Hand Mill, the log being on the left side of saw when standing facing the mill, whilst cut No. 2 shows Right-Hand Mill, the log being on the right-hand side of saw.

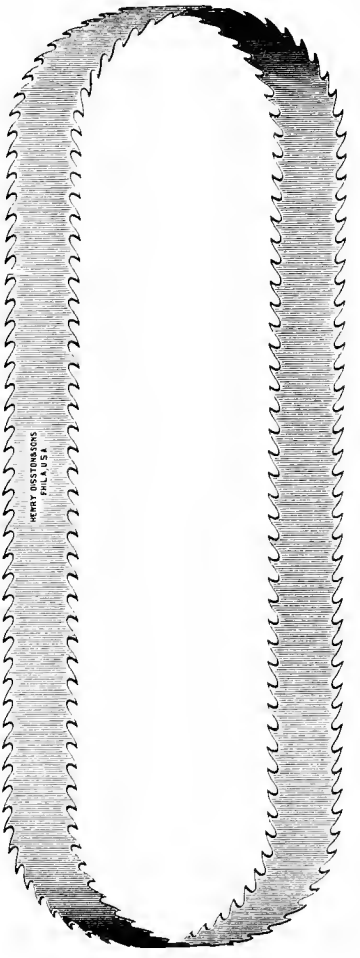
Suggestions and Instructions

AS TO

CARE and MANAGEMENT

OF

BAND



SAWS

SINGLE and DOUBLE EDGE.

THE BAND SAW.

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, and should be gone over with *extra* care the first time it comes off; in fact, if the system of running a saw only half an hour on its first run, then taking it off and touching it up wherever necessary, was more generally followed, 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 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, crowding the saw against 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 capacity and quality of the lumber made and at the same time 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, for 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, hence we repeat, 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 answer correctly any single one without knowing all the conditions under which the saws are run, but we 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, and as some mill builders give one 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 110, of 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 by the hammer, as cracks are apt to start from such marks, particularly when occurring near the edges.

To experiment, cut a piece three feet long from a worn out or broken band saw, lay it on the anvil, taking your position at *H* in figure 1. Commencing at the end of the piece furthest from you place the straight-edge square across the blade and holding the blade with the left hand cause it to bend or curve as shown in figure 2. The places drawn to the straight-edge, as in figure 3, are "Fast" and those places that drop from the straight-edge are "Loose." The first object

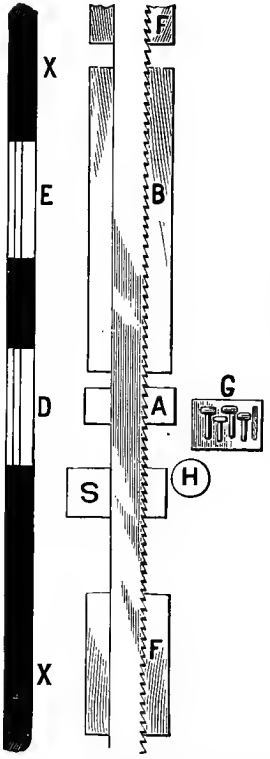


Fig. 1—Showing proper position of table, etc., in front of windows E and D; XX being blank wall. A, anvil; B, leveling table; FF, continuation of bench; G, table holding hammers, etc.; H, position of operator at work; S, position of Roll Stretcher.

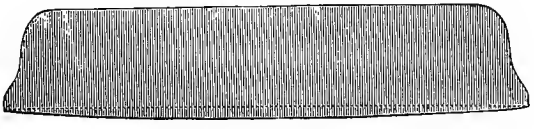
is to make the saw "Flat," or stiff as shown in figure 4, after having knocked down all the lumps. Having located a "fast" place you will notice that it shows on both sides of the blade similar to the manner in which a lump shows when the saw is lying flat. Remove the "fast" by use of the round hammer, working alternately on both sides of the blade, and trying frequently with the short straight-edge. Be careful at all times to keep the edges true. Now take out the "loose" by use of the same hammer until you have the piece stiff or flat throughout. Then proceed to locate and remove the "twists" still working from both sides of the blade and using the cross-faced hammer.

Now proceed to "Open" or tension the saw until it shows the required amount of drop from the straight-edge, figure 5, usually about a sixteenth of an inch in a ten inch saw. The greatest opening should be done in the centre of the blade, decreasing gradually to within about an inch from the tooth edge and about one-half inch from the back edge, varying a little according to the work to be performed. Be careful not to get the saw too open and examine from time to time with the small straight-edge. To insure the saw travelling on the wheels without any lateral motion, and to keep the vibration of slack side of saw down to lowest point, the tension must be perfectly uniform throughout the entire blade.

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 leveling table.

The use of a tension gauge with one edge curved to the amount of tension wanted will be found of great service in adjusting and putting

TENSION GAUGE.



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

tension in saws. Place the saw on anvil as in hammering, hold the tension gauge square across the blade at arms length as in figure 2, and if the tension has been properly adjusted the saw will conform to

FIG. 2.

the curved edge of the tension gauge from tooth edge to back. To reduce the amount of tension or stiffen the blade, hammer gently along the edge of the saw (both sides) taking care not to strike nearer than

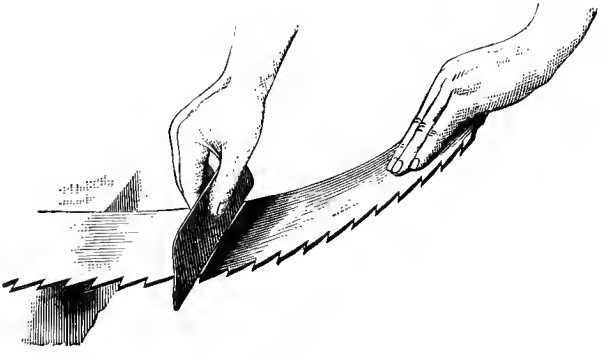


FIG. 3.

a quarter of an inch from the edge or bottom of a tooth, figure 7. To increase the tension (or "open up") hammer the centre or body of blade, testing frequently with the tension gauge, figure 8.

After the saw has been properly tensioned it should be accurately fitted. The swaging and fitting of the teeth is practically the same as in a full swaged circular saw, the swaging being 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 the widest, the full amount

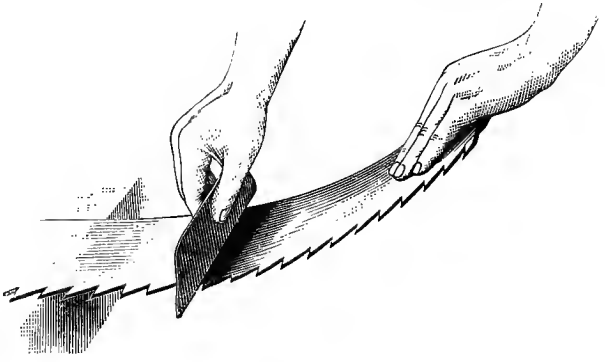


FIG. 4.

of swage when side dressed should never exceed No. 9 gauge in a 14 gauge saw and in hard timber can be run with less clearance; it is advisable to run with as little swage as practicable for it decreases tensile strain on the saw as well as saving lumber in the kerf and requiring less power. It is also necessary to frequently re-sharpen

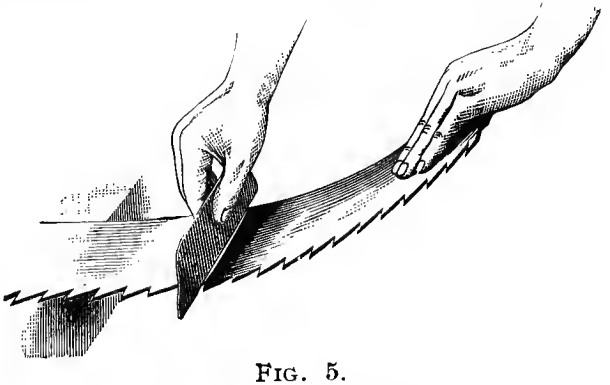


FIG. 5.

bandsaws. Many saws are ruined by being 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.

The amount of "hook" ranges from four inches to six and one-half inches in a ten inch saw, being governed by the timber to be sawn and the amount of feed carried; when a properly hammered and fitted saw runs perfectly true on the wheels out of the cut, but "chases" back on

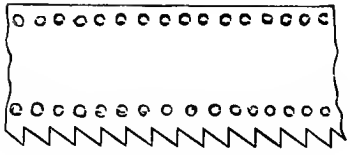


FIG. 7.

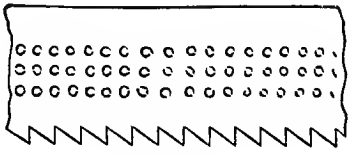


FIG. 8.

the wheels as soon as it enters the log, increase the amount of hook until saw retains practically the same position on wheels both in and out of the cut.

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.

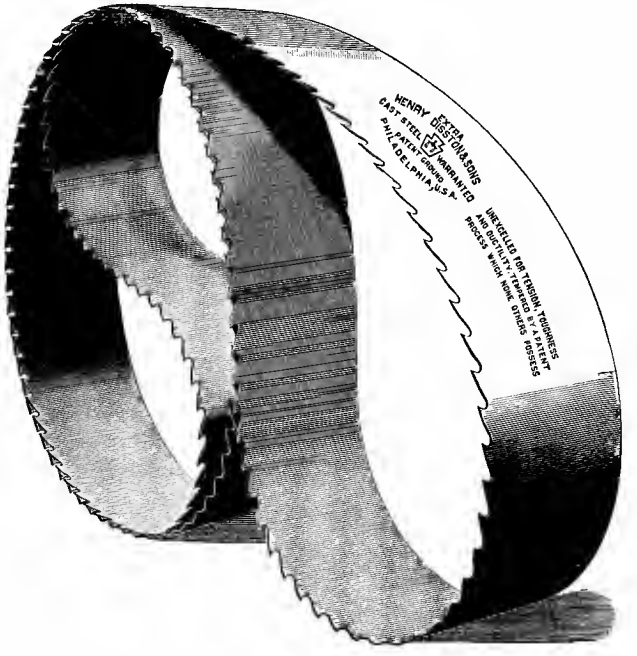
Do not have sharp gullets to the teeth; this concentrates the bend of the saw too much at one point as it runs over the wheels. Use a long round gullet, as large as practicable, with no sharp corners or abrupt angles.

Never let the back edge of saw come in contact with 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 back edge while 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 it has only to make one revolution with the back edge against the guard to do the case-hardening, and is done so quickly that it often happens without the knowledge of the operator.

It is essential to have toothed edge of saw tighter than any other part and to accomplish this without materially affecting the uniformity of tension, roll the saw a little longer on the back edge. Let the increased length begin at the point in saw where greatest tension shows and let the back edge show about $\frac{1}{32}$ of an inch rounding in every five feet then tilt upper wheel forward enough to make saw have as strong a pressure on wheel at back edge as at front; this will leave that part of saw between wheels with a tight toothed edge without

subjecting it to that undue strain brought about by making tooth edge tightest by an *all tilt* movement. The guides should be lined with either soft Babbit metal or hard end wood and adjusted as closely to the side of saw as possible without heating the blade by friction against the metal or wood. The side of the saw must be in perfect alignment with the *V* track and guides adjusted to saw, under no circumstances should the saw be deflected by guides, but have free, small and equal clearance on both sides. The tensile strain should be only sufficient to prevent slipping of saw on lower wheel, the highest capacity and best operated mills now rarely exceed a strain of 6000 pounds on a 12 inch saw, which is all sufficient if saw and mill are in proper condition, while no amount of strain will make an irregularly tensioned saw or a poorly aligned mill make good lumber, but will instead bring more strain on every part of the mill and cause the saw to crack.

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 be put in by hammer. It is necessary, however, to use the hammer for finishing and regulating, after the use of the stretcher.

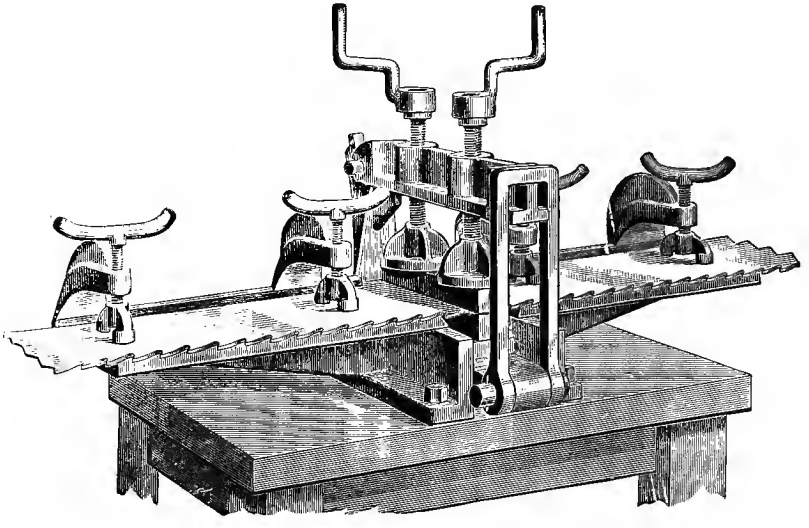


LIST OF MACHINES AND TOOLS TO MAKE COMPLETE OUTFIT FOR BAND SAW FILING ROOM.

1 Automatic Sharpener.
1 Roll Saw Stretcher.
1 Scarfing Machine.
1 Cutting-up Clamp.
1 Set of Pulleys and Stands.
1 Brazing Clamp.
1 Re-toother and Shear.
1 Forge for Heating Brazing Irons.
1 Patch Machine.
1 Anvil.
1 Straight-edge 5 or 6 feet long.
1 Short Straight edge.
1 Tension Gauge.
1 Back Gauge.
2 Hammers—1 Cross Pean, 1 Ball and Pean.
1 Hand Swage.
1 Swage Shaper.
1 Leveling Block.

We are prepared to furnish customers with any of the above tools and will be pleased to supply description and quote price on anything required for the keeping and fitting of saws. Correspondence solicited.

HENRY DISSTON & SONS' METHOD OF BRAZING BAND SAWS.



We illustrate cut of brazing clamp for the purpose of reference, this pattern we have in use at our factory.

The parts to be joined should be beveled to a feather edge on opposite sides to a width of 5/8 inches to a very nice fit; the ends of bevels should be perfectly square, and taper of bevel must be uniform throughout. Too much attention cannot be given to this point, for if the bevel is not uniform and surface of same not perfectly even, a good joint cannot be made.

Clean the beveled parts with slacked lime. We recommend

slacked lime instead of muriatic acid, as a great deal of the acid of commerce is very impure. Place the scarfed ends of saw on the brazing table with the back edges against the back of brazing clamp or whatever part serves as a straight edge, to insure having ends of the saw in line with each other. Have the centre of lap directly over the centre of irons when in position. Arrange the main brazing clamps so that the saw when clamped will be in perfect contact with the body of table, so that final pressure can be applied quickly without disarranging the position of saw after the hot irons are in place. Cut a strip of Silver Solder the same size as lap and clean this in the same manner as parts to be joined, taking care to remove all traces of grease and dirt; place this between the laps. Slip the irons, which should have a good true surface, in position, one under and one over the saw, centrally and squarely across the surface of laps. After making sure the adjustment is correct remove irons and heat them to a bright red in a moderate fire, using charcoal or coke.

When the irons are at the proper heat scrape all the scale from the sides to be applied to the saw, replace them as originally adjusted and apply the pressure on the main clamps quickly, after which loosen the side clamps adjoining the braze to allow for expansion and to relieve the strain on body of saw.

As the irons cool, tighten the main clamps from time to time. Allow them to remain on the saw until they become black, then remove them. This will leave sufficient temper in the saw to hold the tension when hammered and prevent that portion of the saw just brazed from becoming too hard. Be sure the irons have always a good true surface. After using a few times they should be dressed off, which is necessary to get an even pressure.

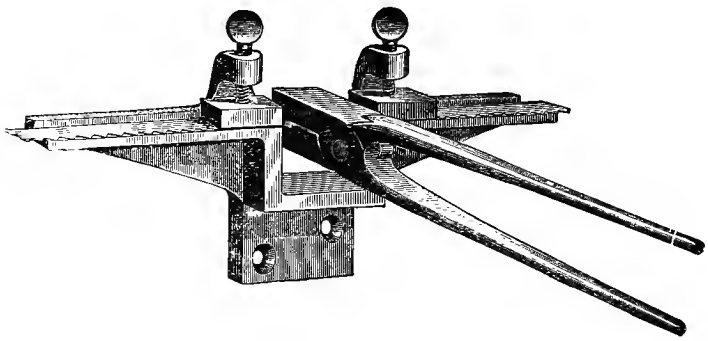
The closer the scarfed ends fit, the less solder will remain in the joint and the better it will hold. In clamping down the irons, see that they are placed square across the saw. Use nothing but Silver Solder of the very best quality as furnished by Henry Disston & Sons, and see that both solder and scarfed edges are perfectly free and clean from grease. This is absolutely necessary to make a good joint. Do not remove the irons too quickly, nor attempt to cool off the blade with water, as this is apt to make it brittle. When the braze is cool enough to handle, the joint can be cleaned, straightened,

dressed to thickness of balance of the blade and hammered and rolled to the same tension.

To those desiring to use a flux, we recommend the following ;— Cover the laps with a thin borax paste to make a good flux. The borax for making the paste should be burned in a pan over a slow fire and frequently stirred to allow all the gases to escape ; after burning, pulverize as fine as possible, mix with water, and apply a thin coat to silver solder and parts to be joined just prior to placing the hot irons.

By carefully following the above directions, you will be able to make a satisfactory braze.

DIRECTIONS FOR JOINING SMALL BAND SAWS.



SMALL BRAZING CLAMP AND TONGS.

The parts to be joined must be beveled to a nice fit. Secure the saw at both ends in clamps, as per cut. See that the edges are parallel, or a short and a long edge will be the result, which will cause the saw to run badly and to break on the short edge when strained. Put on the filed parts a thin coat of borax paste. Cut a piece of very thin sheet silver solder of the same size as joint to be made, which place between the lap. Take a pair of tongs having suitably sized jaws for the joint

and that have been heated to a bright red, sufficiently to melt the solder. Scrape all the scale off between the jaws with an old file; hold the joint with the hot tongs until the solder has thoroughly melted; remove the hot tongs carefully and follow up with another pair heated to show a dull red, which will set the solder and prevent the joint from being chilled too suddenly. The joint can then be dressed to thickness of the saw blade. It would be as well to have a pair of cold tongs to clamp the hot jaws firmly to the joint, as the hot iron must fit nicely over the whole width of the saw. In joining, do not make the lap longer than is absolutely necessary.

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 saw after use, thus preventing the free contraction of saw blade on cooling down after work, the framing of machine column being of too light a section or too high, thus causing excessive vibration, joint in saw not being of the same thickness as the rest of the blade, improper method of receiving the back thrust of saw, consequently case-hardening the back of saw blade and cracking same, using band saws with angular instead of rounded gullets at root of teeth, top pulley over-running saw, working dull saws, feeding up work too quickly to the saw, allowing saw dust to collect on face of 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.

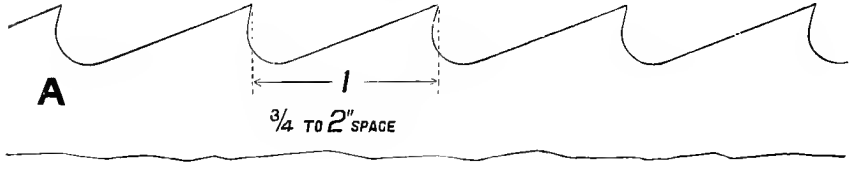
Always endeavor to have a full knowledge of the working and condition of each saw in your charge and examine each blade carefully as it comes off the wheels. Close application in studying the conditions under which the saw works, along with good judgment as to when it is properly fitted for its particular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

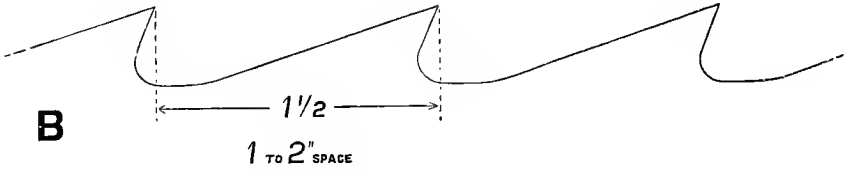
SHAPES AND SPACING OF TEETH IN

DISSTON BAND SAWS.

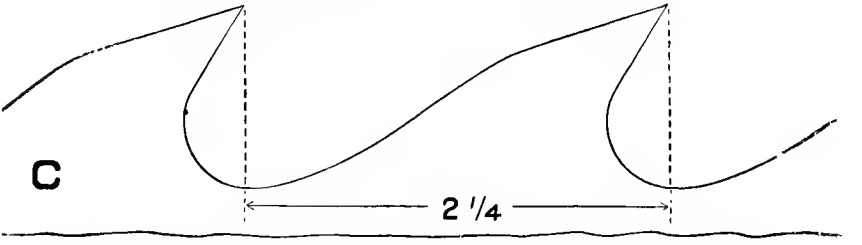
SPECIAL PATTERNS MADE TO ORDER.

BAND RE-SAW TEETH.



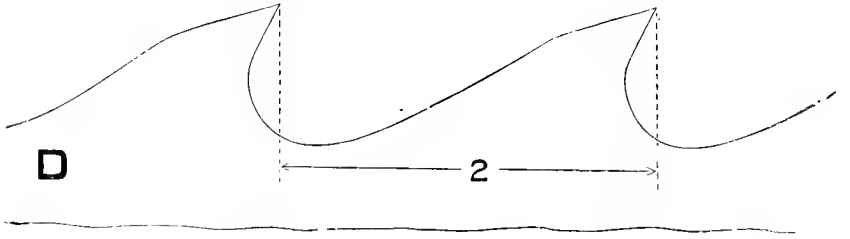


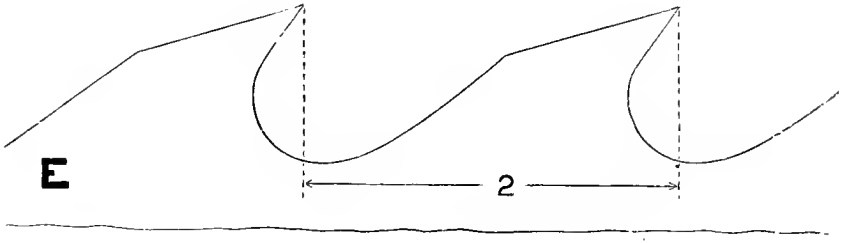
LOG BAND SAW TEETH.

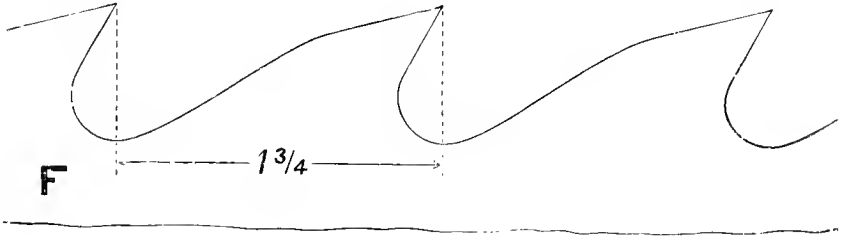


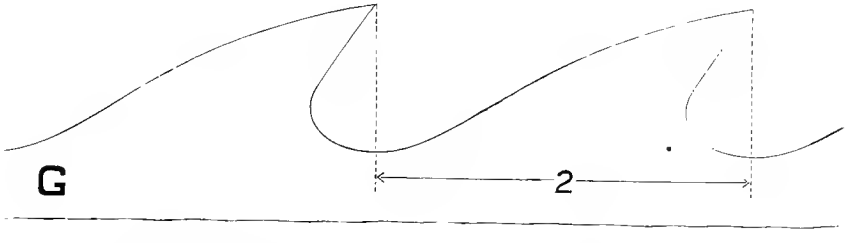
Above illustrations FULL SIZE. Order by Letter on Cut, and state space desired.

LOG BAND SAW TEETH.









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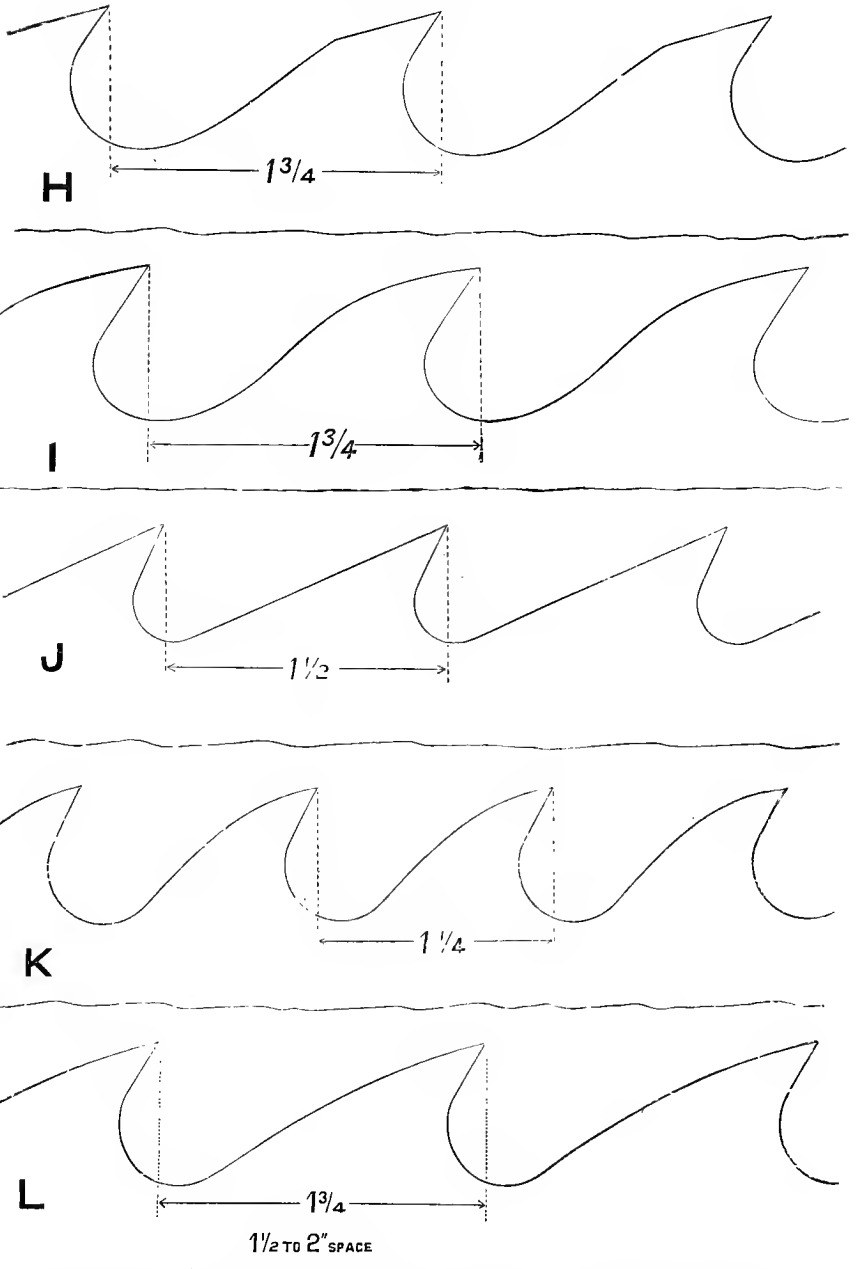
LOG BAND SAW TEETH.



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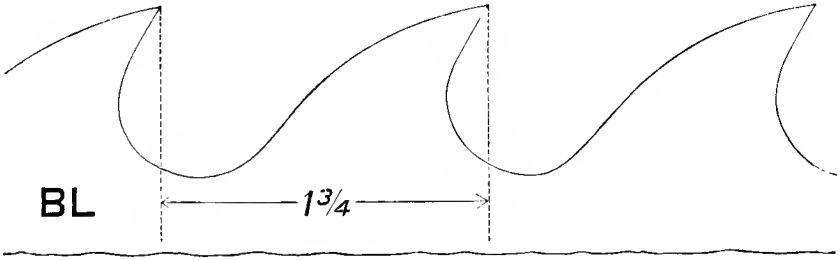
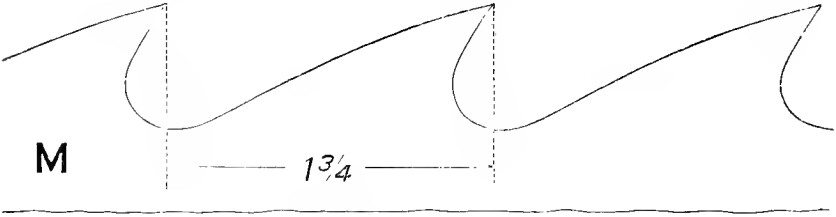
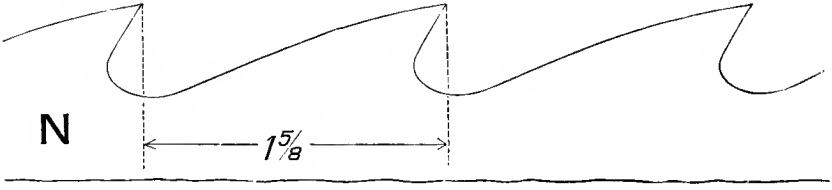
LOG BAND SAW TEETH.

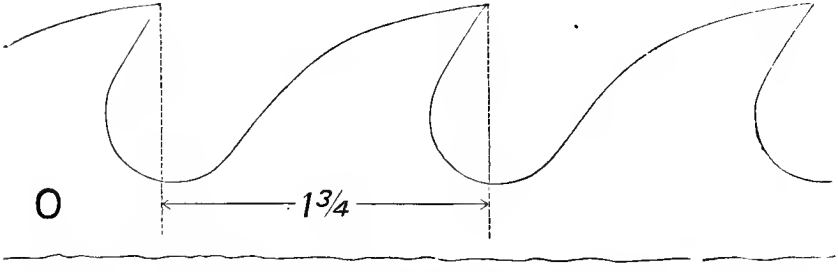


LOG OR BAND RE-SAW TEETH.



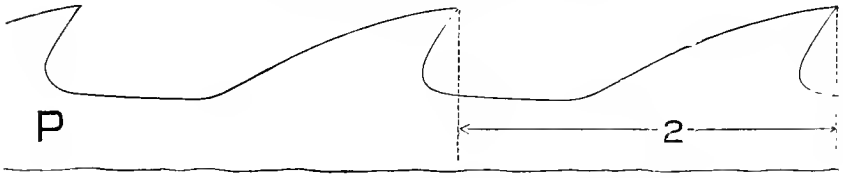


LOG BAND SAW TEETH.

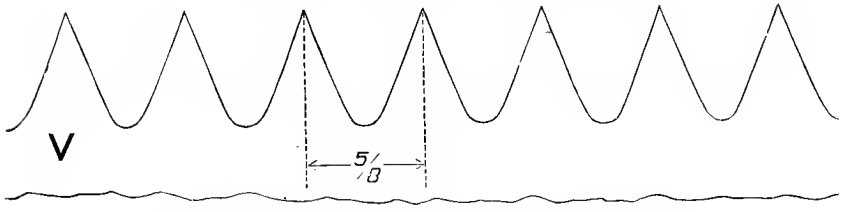


Above illustrations FULL SIZE. Order by Letter on Cut, and state space desired.

BAND RE-SAW TEETH.



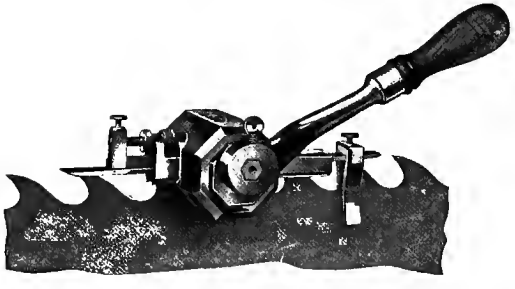
BAND CROSS-CUT TEETH.

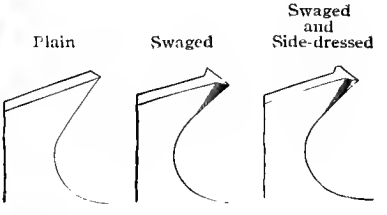


DISSTON SWAGE SHAPER

FOR BAND AND GANG SAWS.

Patented March 27, 1906





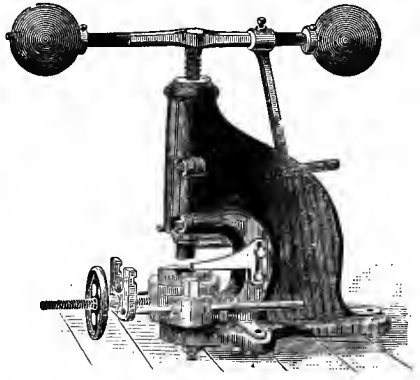
Having each tooth in a band or gang saw of the same width is quite as important as having them of a uniform length.

The Disston Swage Shaper is designed for the purpose of making all the teeth of a uniform width and at the same time give them the "back" and "under cut" necessary for proper clearance and smooth sawing.

This swage shaper can readily be adjusted to rapidly shape teeth on band saws of any thickness.

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

DISSTON HAND SCREW PRESS.



No. 2 Press, Fitted for Gumming Band Saws.

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

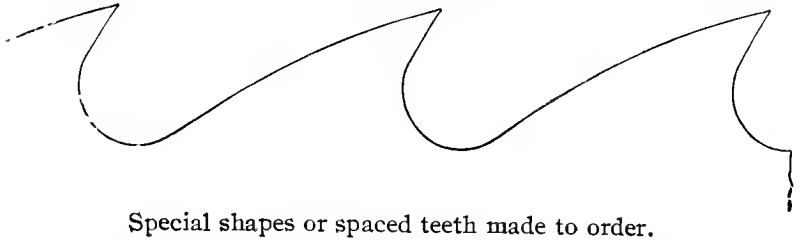
The No. 1 Press weighs 460 pounds, and is adapted for gumming saws or punching steel up to 5 gauge ($\frac{7}{32}$ inch) in thickness.

The No. 2 Press weighs 250 pounds and will gum saws up to 8 gauge ($\frac{5}{32}$ 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.

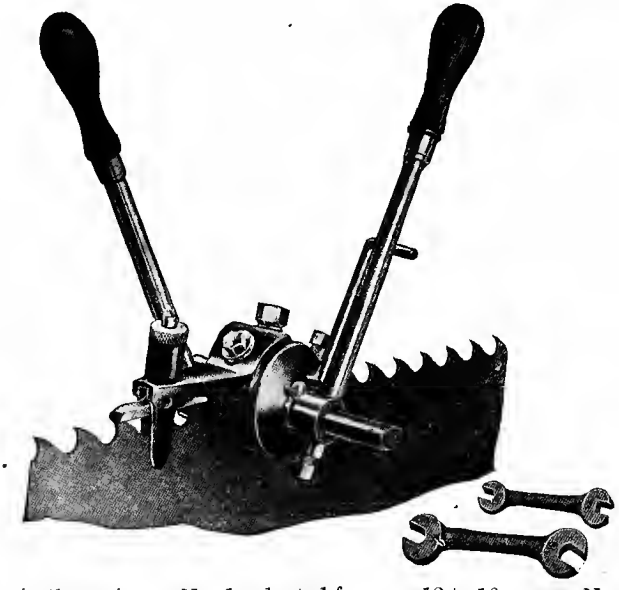
This is a very desirable and powerful machine, and we recommend it as superior to any other pattern for retoothing Band, Gang and other saws, as well as for general purposes.

STANDARD SHAPE OF BAND SAW TOOTH.



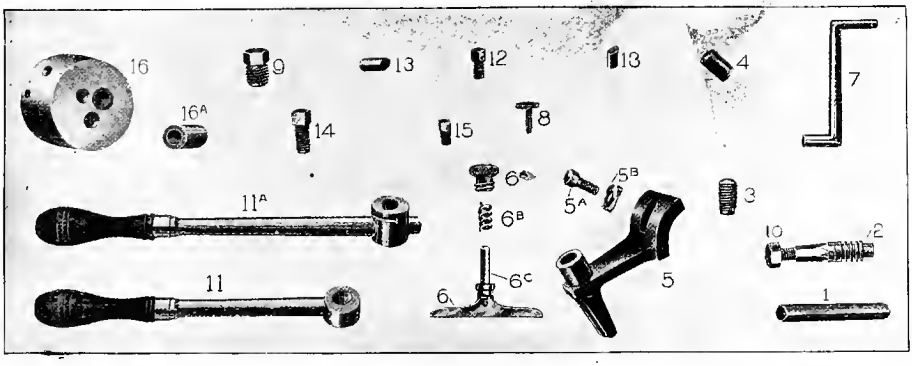
Special shapes or spaced teeth made to order.

DISSTON ECCENTRIC BAND SAW SWAGES.



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 the use of extra brackets this swage can be used on cylinder and circular saws. When ordering, state thickness of saws on which swage is to be used and send sketch of teeth.

LIST OF PARTS.

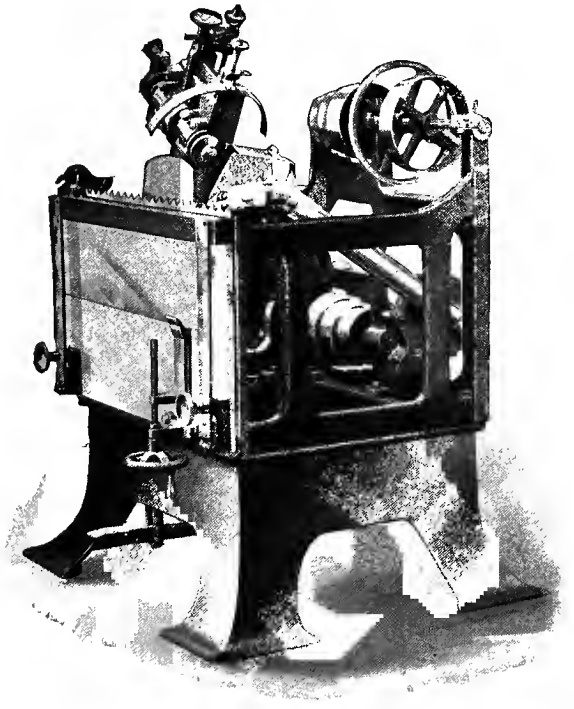


1, Die; 2, Long Clamp Screw; 3, Short Clamp Screw; 4, Anvil; 5, Bracket; 5A, Bracket Screw; 5B, Bracket Washer; 6, Tooth-Rest; 6A, Tension Screw; 6B, Tension Spring; 6C, Tension Stud; 6D, Button-head Screw for Tooth-Rest (for No. 3 only); 7, Lever Rest; 8, Lever Guide Screw; 9, Anvil Top Screw; 10, Clamp Screw Nut; 11, Clamp Screw Lever; 11A, Die Lever; 12, Lever Rest Screw; 13, Packing Piece for Short Clamp Screw; 14, Anvil Set Screw, also Die Lever Set Screw; 15, Short Clamp Screw—Set Screw; 16, Block; 16A, Bushings for Block; 17, Wrench for 5A, 9, 10; 18, Wrench for 12, 14 and 15. 6A, 6B and 6C, not used on No. 3.

When ordering, specify the No. of part and state whether for No. 1, 2, 3 (or No. 0 for Circular Saws) Eccentric Swage.

AUTOMATIC SHARPENER

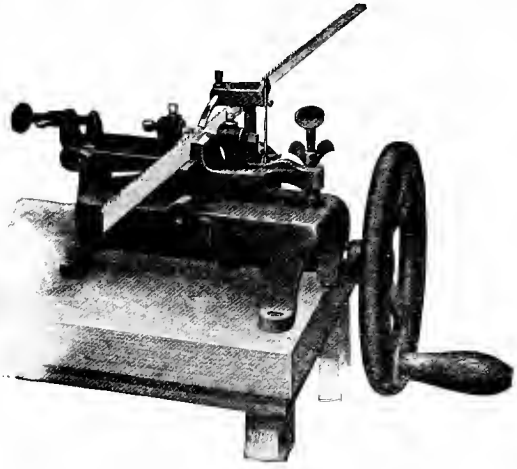
FOR BAND SAWS



The above cut illustrates an Automatic Band Saw Sharpening Machine that will sharpen saws from 8 inches to 20 inches in width.

By the use of Automatic Sharpening Machines the saws are kept uniform in width and the form of the teeth is maintained alike throughout the entire saw which insures the best possible results in sawing.

IMPROVED
NARROW BAND SAW SETTING MACHINE.

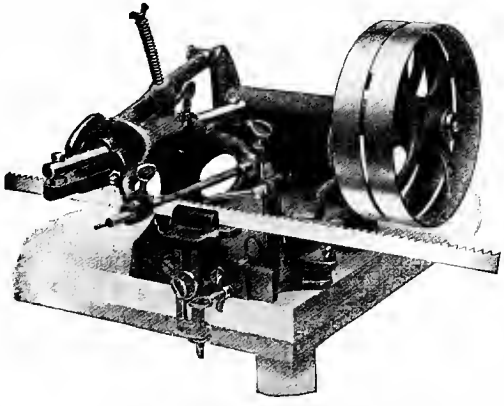


PRACTICAL AND DURABLE.

Will set saws ⅛″ to 1½″ wide, with teeth 1/16″ to ⅝″ space, setting points of teeth uniformly; the vise automatically gripping the blade while tooth is being set, prevents twisting of narrow saws.

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

AUTOMATIC
NARROW BAND SAW FILING MACHINE.



EFFICIENT, ACCURATE.

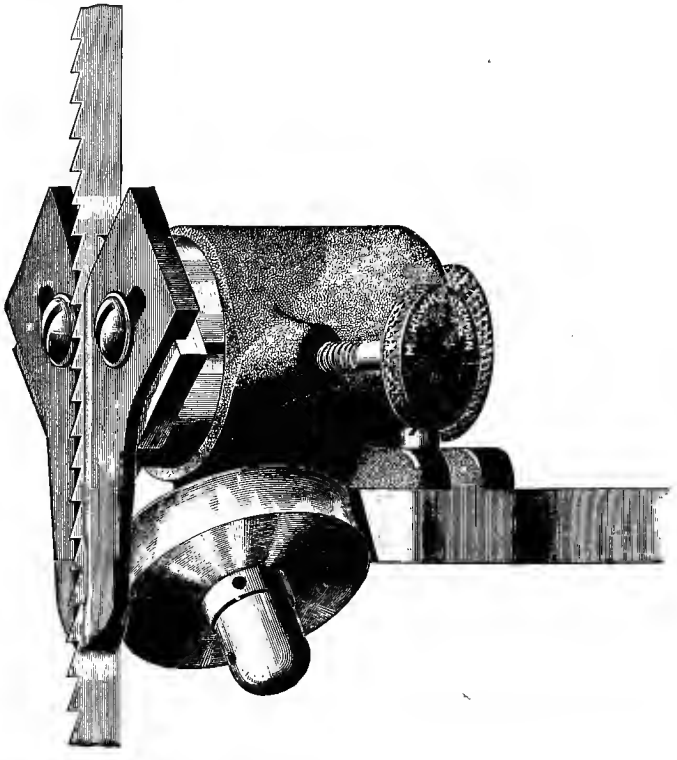
Strongly made, easily adjusted, requiring no attention after being started.

Will take saws ⅛″ to 1½″ wide, with teeth 1/16″ to ⅝″ space, and will file old saws with uneven teeth as perfectly as new ones; all teeth being filed to same height, saws will keep sharp longer, and each tooth doing its proportionate amount of work prevents breakage.

Uses 6″ Taper Saw Files, and should run 50 to 60 revolutions per minute.

BAND SAW GUIDE.

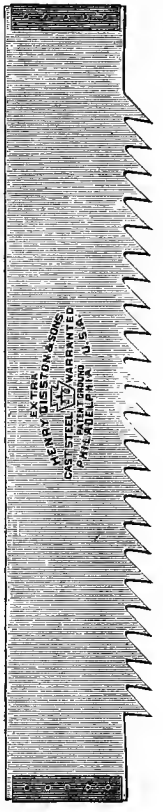
An important and vital feature of a band saw machine is the Saw Guide. To insure even and easy running it is necessary that the blade should move with all possible freedom and the best guide is one that offers the least resistance to the motion of the blade.



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 saw is constantly changed and prevents the saw 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 wheels run on a Ball Bearing; requires very little oil, and is always in proper position. The Shouldered-screw adjusts for saws of different widths. The Thumb-screw at side adjusts for different gauges. Wood and metal side pieces are sent with each guide.

DISSTON

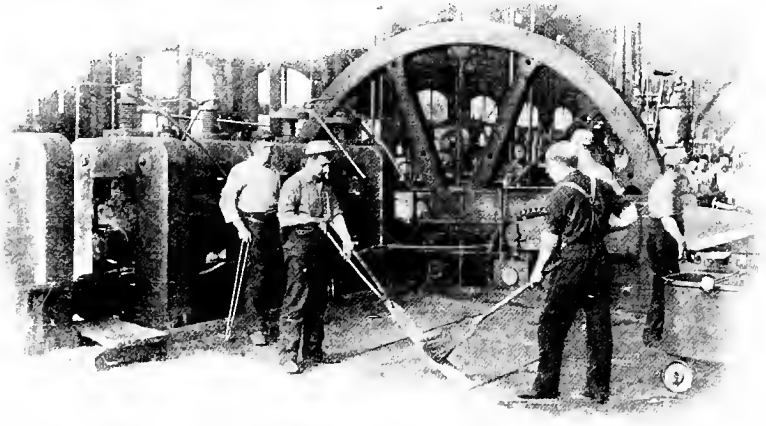
GANG SAWS



Our Gang Saws are made from steel that is peculiarly adapted to the strains to which all gang saws are subjected in use, and for quality of material, temper, elasticity, tension and edge-holding qualities, we guarantee they have no equal.

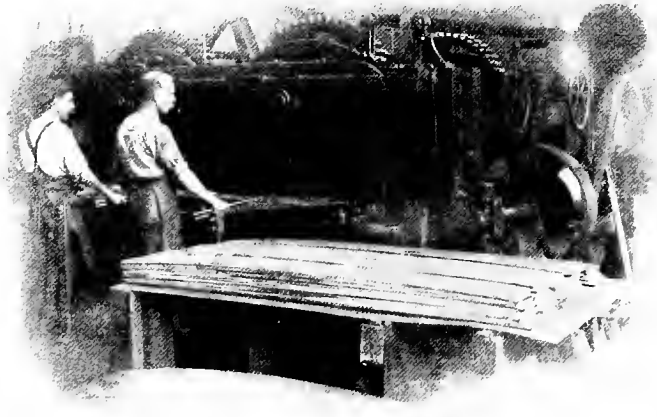
THE MAKING *of the*

DISSTON CROSS-CUT SAW.



Ready for Rolling Long-Saw Plate.

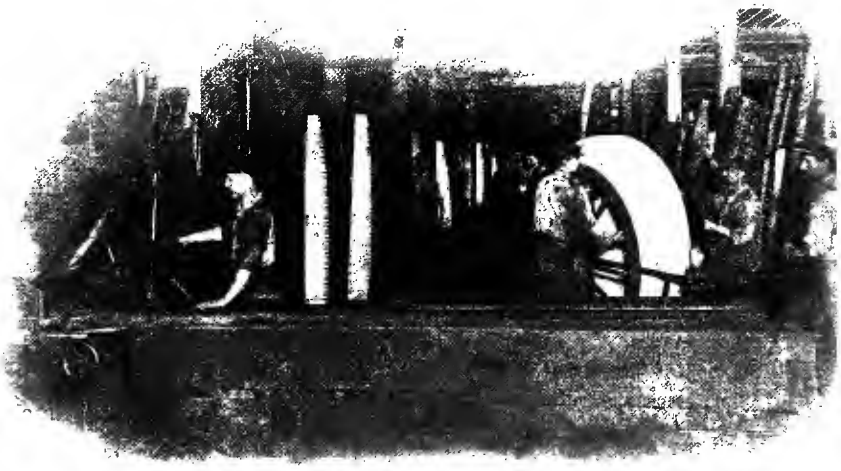
The "Plates" trimmed to the various shapes required, are sent by the Steel Works to the Cross-cut "Getting-out" department. The first operation, "Toothing," is done under powerful presses especially



Cutting to shape.

built for this work; dies being inserted of the particular pattern of tooth desired. The holes in ends, for handles, are then punched and ends shaped.

The blade is now ready for "Hardening" which is done under a method similar to that for Hand Saws; then follows "Tempering," that is the extreme hardness is drawn to such a state as will make the blade suitable for the purpose intended. This is done under the Disston special process which insures uniform and highest set and edge-holding qualities, and also leaves the blade practically flat, thus reducing to a minimum the work required for the next operation; that of "Hammering" for tension, and at the same time the blade is trued for "Grinding" which is done by machinery of Disston design and



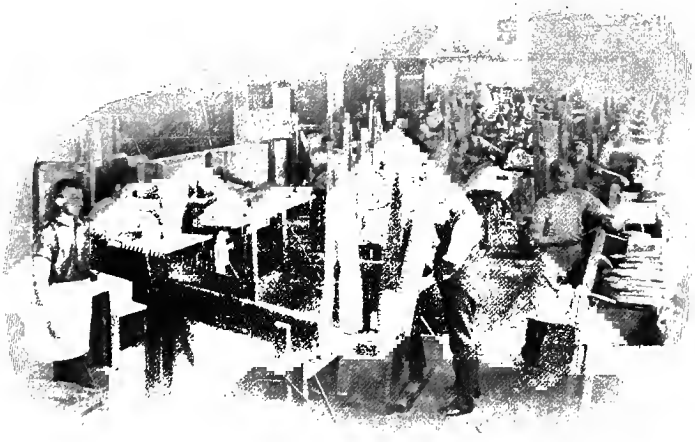
Grinding Long-Saws.

invention, whereby is obtained the maximum amount of clearance without sacrificing elasticity and stiffness, in other words—a perfectly even thickness throughout the entire toothed-edge and thinner towards and on the back from two to five gauges to prevent kerf-binding, as may be required for the particular pattern and to suit the conditions under which the saw is to work.

Now follows "Glazing" by machinery invented for the purpose; then "Blocking", which is next in importance to tempering and grind-

ing, this being a higher degree of work in tensioning and upon the skill employed in this operation depends in a great measure the successful working of the saw.

Next in order is "Polishing" then the blade is examined before passing to the operation of "Stiffening" by which the elasticity of the blade is brought up to its highest efficiency. This is a distinctively Disston operation of great value.



Filing Long Saws.

The blade is again inspected and if up to the Disston Standard, it is "Etched" with the name and brand and is then ready for "Filing and Setting." Contrary to the method pursued on hand saws the filing of Cross-cut Saws is done before the Setting for the reason that much better and more uniform results are obtained owing to the blade being heavier and the teeth much larger. In Setting, the points of the teeth are bent one to the right, the next to the left and so on alternately, for clearance in cutting. A well-sharpened cross-cut saw is one that has the teeth in proper alignment and the alternate teeth on each side filed to an exactness of bevel and pitch, the amount of which is determined by the work the saw is to do.

Cross-cut Saws are made from three feet in length, for timber framing and tie cutting, up to twelve feet and longer as may be required for cutting the giant Redwood trees of the Pacific Coast and the large timber of Tasmania, etc.

DISSTON 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 absolutely adjust the hardening and tempering processes to the degree giving that perfect combination of hardness and toughness that produces the "edge and set-holding qualities" for which the Disston Saws are renowned.

The process of Grinding saws is second only in importance to the material and temper. 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; insuring an even thickness on the cutting-edges, with a relative and uniform thickness throughout the body to a thin or extra thin back.

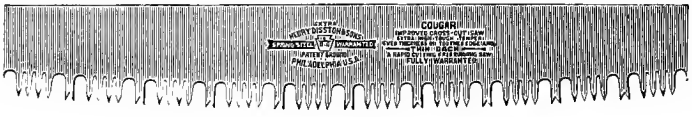
In the Blocking, Polishing, Stiffening and final processes of manufacture, the same high order of skill is exercised as in the Hardening, Tempering and Grinding, the result being saws of the highest quality and efficiency that human ingenuity coupled with skill is capable of producing.

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

CROSS-CUT SAWS

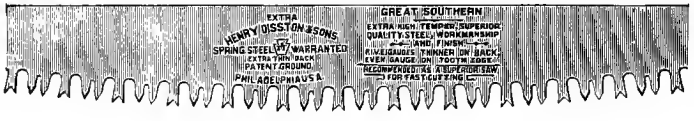
Illustrations of Different Patterns of Teeth.

COUGAR.



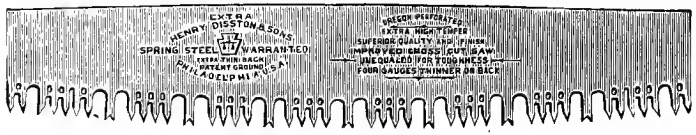
WIZARD.

GREAT SOUTHERN.

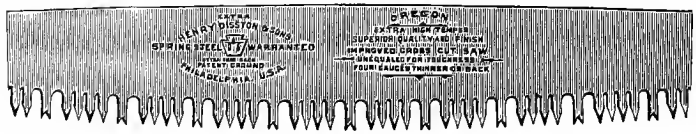


NEVADA.

PERFORATED OREGON.



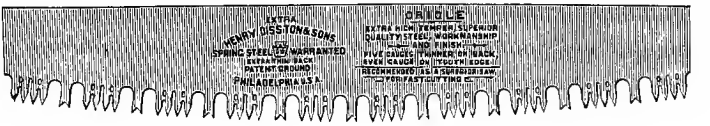
OREGON.



THE ABOVE STYLES MADE ESPECIALLY FOR PACIFIC COAST.

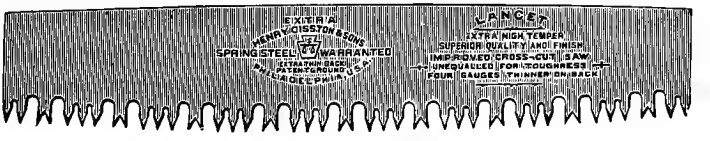
Illustrations of Different Patterns of Cross-Cut Saw Teeth

ORIOLE.



DIAMOND POINT VIM CHAMPION.

LANCET.



No. 1 GREAT AMERICAN.

CHAMPION.

LUMBERMAN.

Illustrations of Different Patterns of Cross-Cut Saw Teeth.

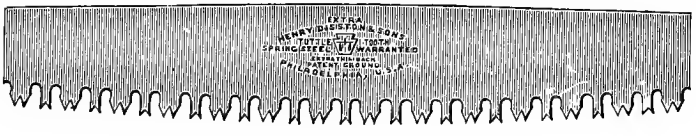
PERFORATED LANCE.

DIAMOND.

PLAIN.

TENON.

TUTTLE.

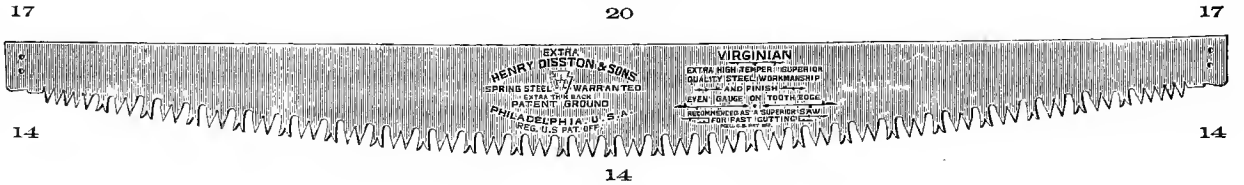


The above patterns represent a general line of cross-cut saw teeth. We make various other styles and shapes, however, as shown in our catalogue.

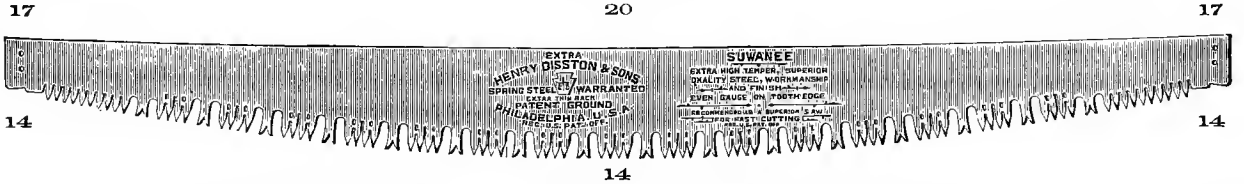
DISSTON HIGH GRADE SAWS

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 experience and careful observation have proven the most advantageous in high duty saws; the temper is as high as due regard to necessary toughness will admit; the shape and spacing of teeth, the size, position and depth of gullets have much to do with the results to be obtained from Cross-cut Saws, and all these points were most exhaustively studied before the saws were placed on the market.

VIRGINIAN



SUWANEE



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 saws, the result is 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 specially 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.

COUGAR FELLING.

NEVADA FELLING.

TRIUMPH TOLEDO

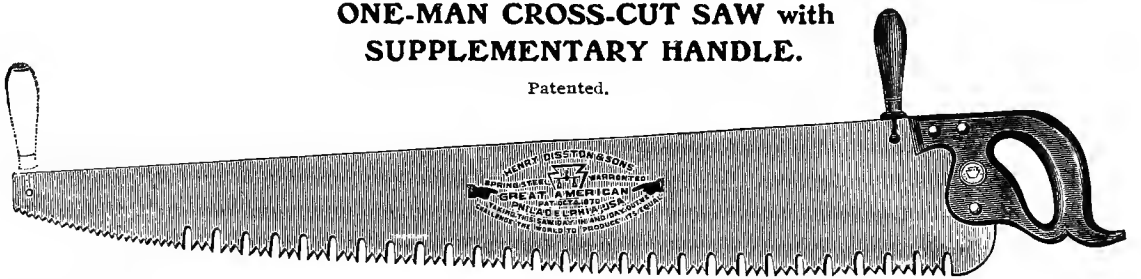
The blades are made as narrow as a fair margin of strength and a proportionate amount of wear permit ; they are ground on special lines which give the greatest possible stiffness and at the same time the proper clearance to prevent kerf-binding.

BEAVER (Hollow Back).

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

ONE-MAN CROSS-CUT SAW with SUPPLEMENTARY HANDLE.

Patented.



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

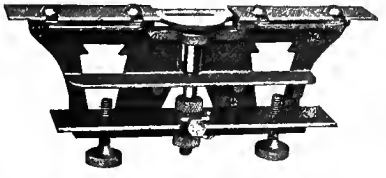
Bridge-builders, mill men, railroad and other contractors—in fact, all large establishments—will find this a very useful tool, and easily worked. For cutting off girders, joists, blocking, or heavy lumber of any kind, it is just what is required. This saw will pay for itself in a few days, as the labor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

Disston Imperial Cross-cut Saw Tools

THIS SET OF TOOLS INCLUDES A JOINTER, RAKER TOOTH GAUGE SETTING BLOCK OR ANVIL, AND SET 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 jointing, in all tools are subject to the greatest wear. In the *Imperial* these parts are made of high-grade steel and *specially hardened*, thus making for greatest durability and overcoming a feature so objectionable in all other Cross-cut Saw Tools on the market.



The Raker Gauge is also made of steel and hardened to such a degree that the best superfine file will not cut it. This gauge is "milled" to an accurate width and thickness, and is fitted in its recess, which is also "milled," so neatly that misalignment is impossible, thus insuring a positively uniform length of Rakers throughout the entire length of any saw that is fitted with the "Imperial."

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

The material entering into the make-up of this *Imperial Cross-cut Saw Tool* is the best that can be procured for the purpose, the workmanship is most thorough, and we unhesitatingly pronounce it superior to any Cross-cut Saw Tool on the market —one that fills a long-felt want.

SETTING AND SHARPENING OR "FITTING" CROSS-CUT SAWS

With Disston Imperial Cross-cut Saw Tools

To properly fit up a Cross-cut Saw, it is necessary:

First—That the teeth be uniform in length. To accomplish this place an 8-inch mill File edgewise in the frame, and secure it by thumb-screws. Pass the tool lightly over the teeth until file touches shortest cutting tooth, see Fig. 1.

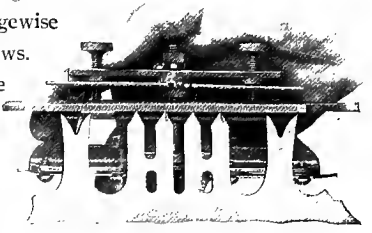


FIG 1. JOINTING

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. 2, reducing the length of rakers

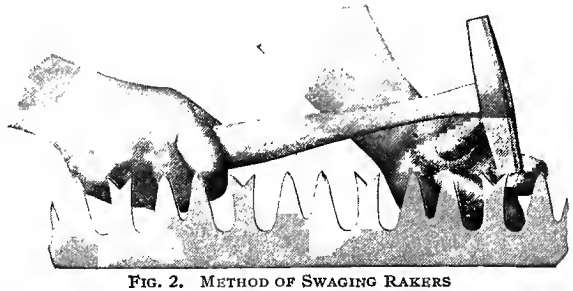
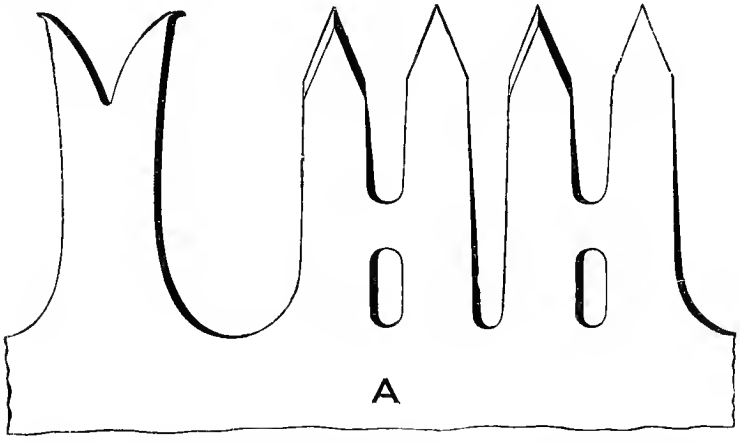


FIG. 2. METHOD OF SWAGING RAKERS

from one one-hundredth to one thirty-second 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 raker-tooth gauge in the *Imperial Cross-cut Saw Tool.*



Third—To "*fit*" the straight or unswaged raker, where preferred—place the gauge over the raker teeth, as shown in Fig. 3, adjust for length of raker required and file them down. 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 one-hundredth of an inch shorter than the cutting-teeth.

FIG. 3. FILING RAKER TOOTH

For hard, green wood the rakers should be one sixty-fourth of an inch shorter than the cutting-teeth, and graduated from one sixty-fourth to one thirty-second of an inch, according to conditions and timber when cutting softer wood.

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

A and B show styles of fitting which we strongly recommend, particularly for very hard or dry stock. These styles of fitting produce 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.

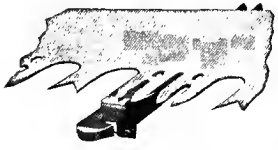


FIG. 4. SETTING BLOCK

Fifth—If a saw requires Setting, lay the block or anvil, Fig. 4, on some convenient, flat, solid surface, and hold the saw so that the *point* of the tooth projects over the beveled edge of 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 point.

It is very important that the "Set" should be perfectly uniform, or exactly the same amount of Set to each tooth. This can be regulated by the use of *Set Gauge*, Fig. 5. 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 Thin Back Saws* when properly filed, do not require more than one-hundredth 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.

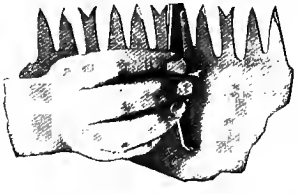
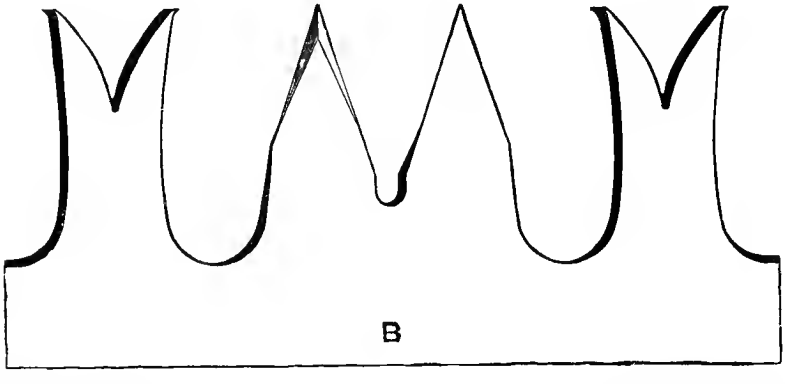


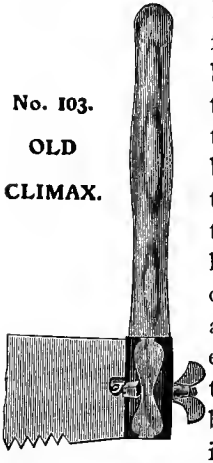
FIG. 5. SET GAUGE.



DISSTON HANDLES for CROSS-CUT SAWS.

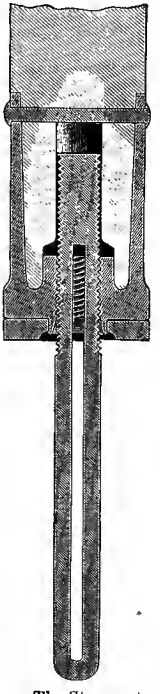
All Disston Handles are made of carefully selected, well-seasoned wood; beech and maple being principally used, and are of such shape as to give a comfortable grip. The fittings used are of best malleable iron, well made and finished, and of designs particularly adapted for the purpose.

Some patterns of handles are made to fit on the saw, the Loop handle for instance, by slipping the loop over the end of blade, and tightened by turning the handle; while others are adjusted to edge of blade; the pin of bolt inserted in hole at end of saw, and tightened by screwing up thumb-nut.



No. 103.
OLD
CLIMAX.

Sectional View of DISSTON No. 109 CROSS-CUT SAW HANDLE



—WOOD HANDLE.

—RIVET
Extends through Casting and Handle. Headed both ends.

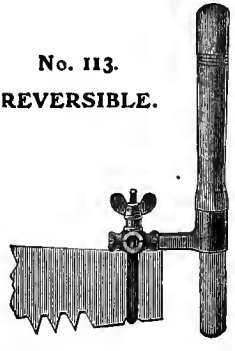
—WASHER
Prevents friction on Saw when tightening up.

—LOOP,
Strong in Body. Well cut Threads.

No. 109.

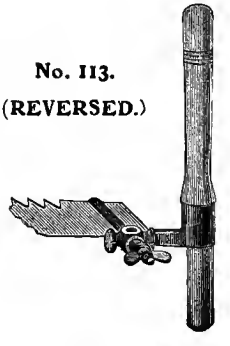
The Strongest and most Efficient Loop Handle for Cross-Cut Saws ever placed on the market.

The most perfect handle is one, 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.



No. 113.
REVERSIBLE.

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



No. 113.
(REVERSED.)

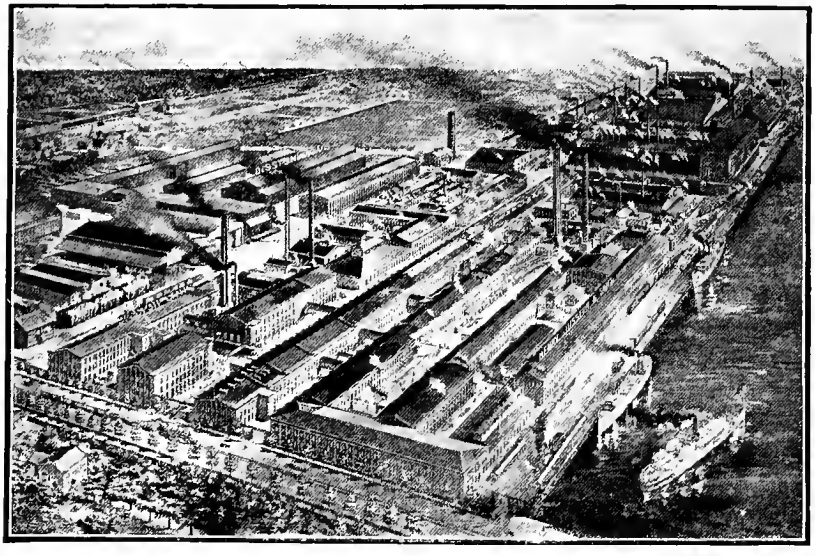
Quality of material and workmanship, design and weight of castings being considered, the Disston Handles for Cross-cut Saws are the cheapest on the market, and should not be compared with those of inferior make.

THE MAKING *of the*

DISSTON HAND SAW.

The operations required in the making of the DISSTON HAND SAW are both numerous and varied, to describe each would require considerable space, therefore the principal processes only will be taken up in their regular order.

All Disston Saws and Tools are *made throughout* in the Disston Works, from the selecting and melting of the material itself to the



finishing process; every operation being under the care of experienced superintendents and subjected to frequent inspection and tests.

The Factory consists of sixty-four buildings; ground enclosed fifty acres, and there are 3,600 employees—the Disston Saw Works, without exception, being the largest in the world and its production —Quality and Quantity considered—the FINEST and GREATEST

The Disston Laboratory Used Exclusively for Making Physical and Chemical Tests of Disston Steel.

The DISSTON STEEL WORKS, which is part of the plant, is fully equipped with the latest appliances, machinery, etc., and has exceptional facilities for the making of CRUCIBLE STEEL peculiarly adapted for saw requirements. This is an important factor in the making and maintaining of HIGH QUALITY SAWS, for the steel is the foundation upon which rests all subsequent work.

This Steam Hammer strikes a blow equal to 2½ tons.

From the time saws were first made saw manufacturers had the greatest difficulty in obtaining steel of uniform quality, free from flaws and seams. This difficulty was overcome in the Disston Steel Works after years of careful study and costly experimenting. The Disston method of casting steel ingots not only does away with splitting, spalling and crumbling of teeth, but makes a hard, tough, elastic steel of the highest quality, which with the improved and patented

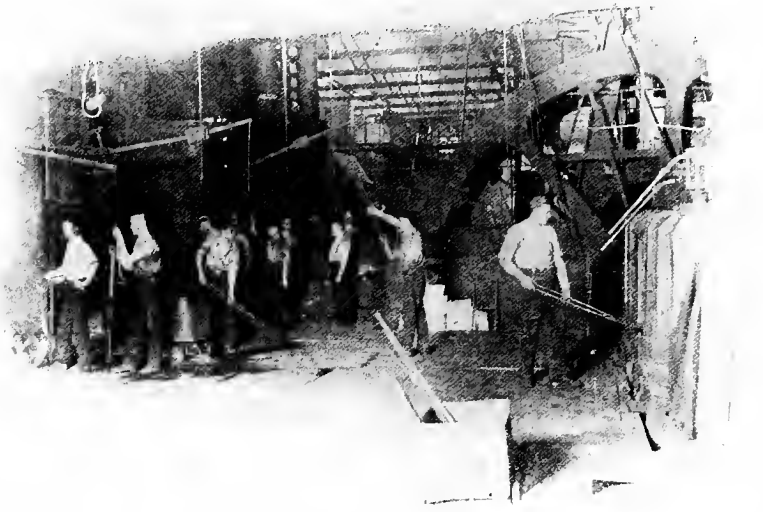
About 32 tons *of* Ingots.

processes of manufacturing and tempering guarantees the production of saws that for toughness, standing-up quality and uniformity of temper have never been equaled.

The Disston Saw Works was the first to manufacture saws from the raw material to the finished article. This, in fact, was the first successful Crucible Steel Melting Plant in America for saw steel, and in line with the making of progress, on April 24th, 1906, an Electric Furnace was installed in the Disston Steel Works and successfully operated for the melting of crucible steel, it also being the first of its kind in the United States. The material to be melted is carefully selected, of best quality, the various operations, from the melting to the rolling, are performed by men of long experience, and all steel is fully inspected before it is sent to the Saw Department, thus insuring the highest perfection.

Ready for Charging Crucibles.

Pouring Steel.

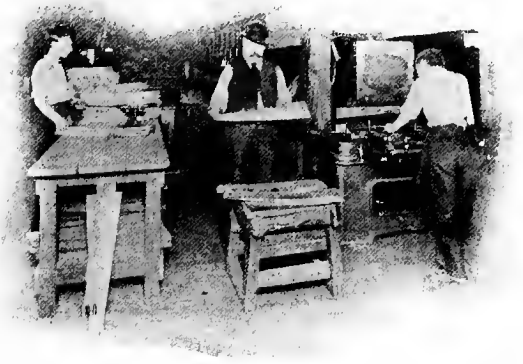


Rolling Hand Saw Plates.

In the Saw Department the sheets of Crucible Steel, rolled to gauge, are trimmed under shears and cut into blanks for either straight or hollow-back saws as required. The blanks are now presumably of the same size and thickness, but to determine this, each blank is weighed, the heavier ones being used for saws with larger size teeth.

The next operation is that of cutting the teeth, which is done on a machine of special design, the blanks being fed in by hand.

To the untrained eye the saw blade now looks as if it were ordinary material. The next step is an important one and is one of a series which helps to give character and value to the tool, *i. e.*, the saw blades at this stage are in the soft state and must be "Hardened." To do this they are placed



Trimming *and* Weighing.

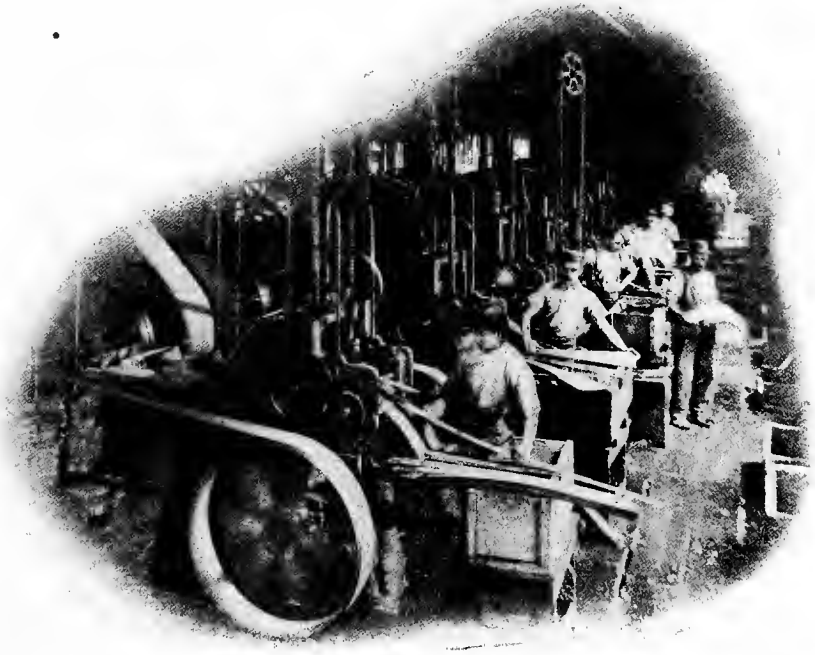
Toothing.

in the hardening furnace, which is heated by the use of fuel oil. The saw blades in this furnace are heated to a certain temperature, then

Hardening *and* Tempering.

Smithing.

taken out and plunged edge first into a special hardening Bath. This makes them extremely hard, in fact as hard as it is possible to make



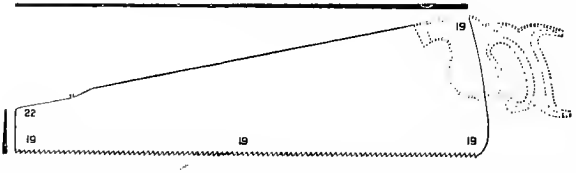
Grinding.

them and they must therefore be handled very carefully until properly tempered.

In order to make the saw blades so they can be used they must now be "Tempered," or a certain amount of this extreme hardness drawn according to the quality of saw desired, which is done by bringing them in contact with less heat than they were subjected to in the hardening furnace. This operation is a very delicate one.

The next step is that of "Smithing." In this the blades are flattened and made perfectly straight, all inequalities being taken out by the skillful hammering of the mechanics.

The blades are next "Ground" to gauge and to a taper so that the back will be thinner than the cutting edge. The back of the hand saw blade is ground to taper from the teeth to the back and from handle to point, the tooth-edge being of even thickness from end to end. A saw not ground to proper taper cannot be ranked as a high-class tool.



Now follows "Tensioning." In this the blades are hammered so that they shall not be too "fast" or too "loose;" but shall possess the proper tension, spring or character. If the blade is what is termed "fast" the metal is too long on the edge and needs expanding through the centre, or, if too "loose" the metal must be stretched on the edge. A saw not properly tensioned will run out of its course, in other words it will not cut straight and true.

After being tensioned they are returned to the smithers for "Looking-over" and preparing for next operation.

The blades are again passed to the grinder for the purpose of "Drawing" which is a finer process of grinding and prepares the surface to take the higher polish to be given by the "Glazing."

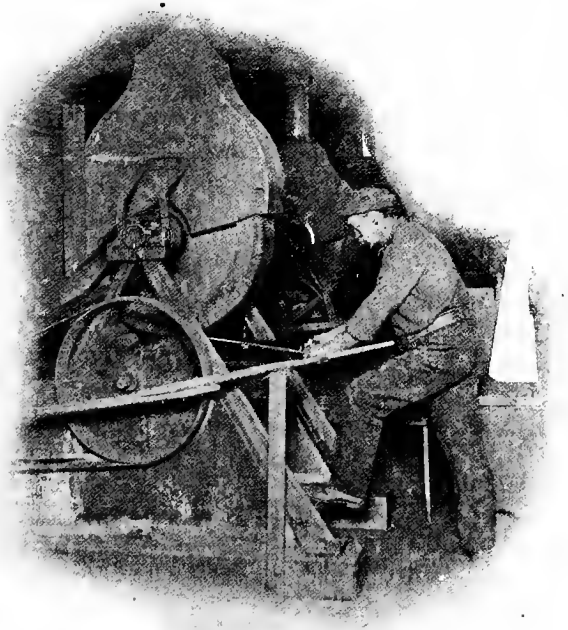
The Largest Grindstone here shown measures 72 inches diameter, 13 inches face.

Now comes the "Blocking," which is an important operation and requires the highest order of skill. Each blocker is provided with an anvil and lignum-vitæ block on which he corrects any slight

Blocking.

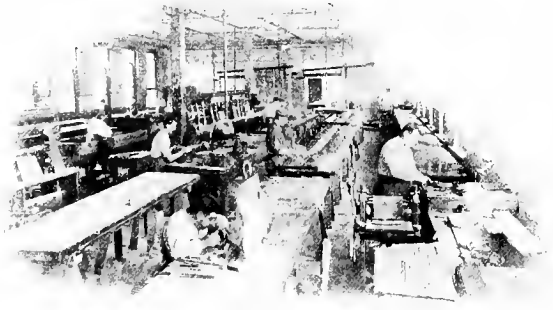
irregularities that may have been developed by the previous processes.

The blades then undergo the "Polishing" process, then through the important operation of "Stiffening." As to this latter, the different processes and hammering under which the blades have passed, has altered the arrangement of the molecules in the metal and in order to restore the desired qualities and spring they are stiffened in a special bath, which was originated and is known only to "Disston."



Polishing.

The blades now pass to the



Etching.

"Etching" room where the name, brand, trademark, etc., are put on.

The next stage is "Setting the Teeth." Each tooth is set by one or more strokes of a hammer; the experienced workman performing this work with wonderful accuracy and rapidity. Setting the teeth of a saw consists of bending them so that the point of one tooth is inclined to the right, the next to the left, and so on throughout the entire length of the blade, thus they slightly

Setting *and* Filing.

protrude beyond the side of the saw blade, which is necessary to obtain sufficient clearance for the body of the blade so it will not bind in the cut, the amount of set required being somewhat lessened by the special grinding which leaves the blade tapering from toothed edge to thin-back, though extra thin-back saws are made so they will run without any set, but these are particularly adapted for hard, dry, seasoned lumber.

They are now ready for "Sharpening," which, as will be noticed, is done after setting so as to avoid injury to the teeth. Each saw is well sharpened and filed so true that on holding it up to the eye and looking along its edge it will show a central groove down which a fine needle will freely slide the entire length. In filing and sharpening, the teeth are given a certain amount of bevel, according to the class of work for which they are intended; saws for hard wood requiring less bevel as well as pitch than saws for cutting soft wood.

"Handling-Up"

The next operation is "Handling-Up." Each handle for the Disston Hand Saws is separately slit, bored and fitted to its blade to insure the correct "hang" or pitch to the saw when entering the work. The completed handle is placed on the blade, holes marked with a punch, the handle is then removed, holes punched in blade, the handle replaced and bolted on.

The saw is now complete; subjected to examination for correctness in hang of handle, then fully inspected, cleaned, and is ready for packing.

The making of the Disston High Grade Hand Saws from start to finish calls for the most careful workmanship and constant attention. At each stage of the work the saws are inspected and the system for accomplishing this is so thorough that it is almost impossible for an inferior article to pass out of the works as a high grade and perfect tool. The brand "Disston" is reserved exclusively for the high grade goods which are never sent out under any other brand.

Wareroom.

"The growth and development of the saw business in the United States has been phenomenal, as now and for some years past there have been practically no saws of any foreign manufacture imported into the United States, whilst on the other hand the American-made goods are exported very largely to all parts of the civilized globe."

"THE WORLD IS OUR MARKET."

Construction

of

Saws

and

How to Keep Them in Order.

Quality Tells

The demand for an article of instruction on saw filing having been demonstrated to us not only by personal inquiry and letter, but also by the return of fine quality saws, pronounced defective through a lack of knowledge of how to keep them in order, or by the use of extensively advertised so-called saw sets and other tools,—which pull the saw blade apart or so distort it as to render it unfit for use—has led us to compile this book for gratuitous distribution for the enlightenment of the amateur and the improvement of the expert mechanic.

We will endeavor to give, in the following pages, such practical information as to the proper methods of keeping saws in order and of the tools with which to do so, that will overcome the above mentioned pit-falls to the proper working of the saw. We offer our wide experience and the reputation of our goods for the efficiency of this treatise, which has been gleaned from the most scientific saw makers and most practical saw filers in the world. While we admit there are other methods of putting saws in order, we claim our modes to be the easiest and equally or more effective.

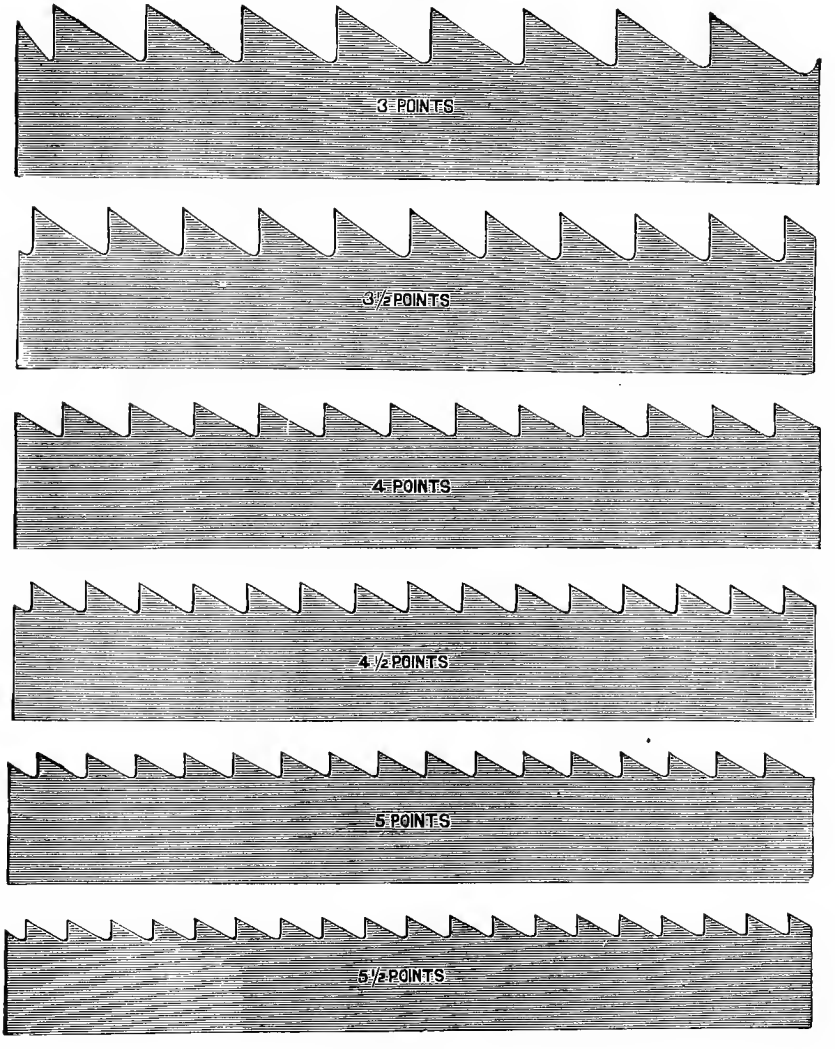
We take occasion to thank our patrons for their appreciation of our products. The High Standard, which is the basis of our constantly increasing business, shall be maintained, and we trust thereby to retain their good will and increase our trade in future.

HENRY DISSTON & SONS, Incorporated.

The following cuts are full size of the respective number of teeth and points per inch which they represent. It will be noticed that in one inch space there is one **tooth** less than there are **points**. Order all saws by the number of "POINTS" to the inch measuring from point to point of teeth.

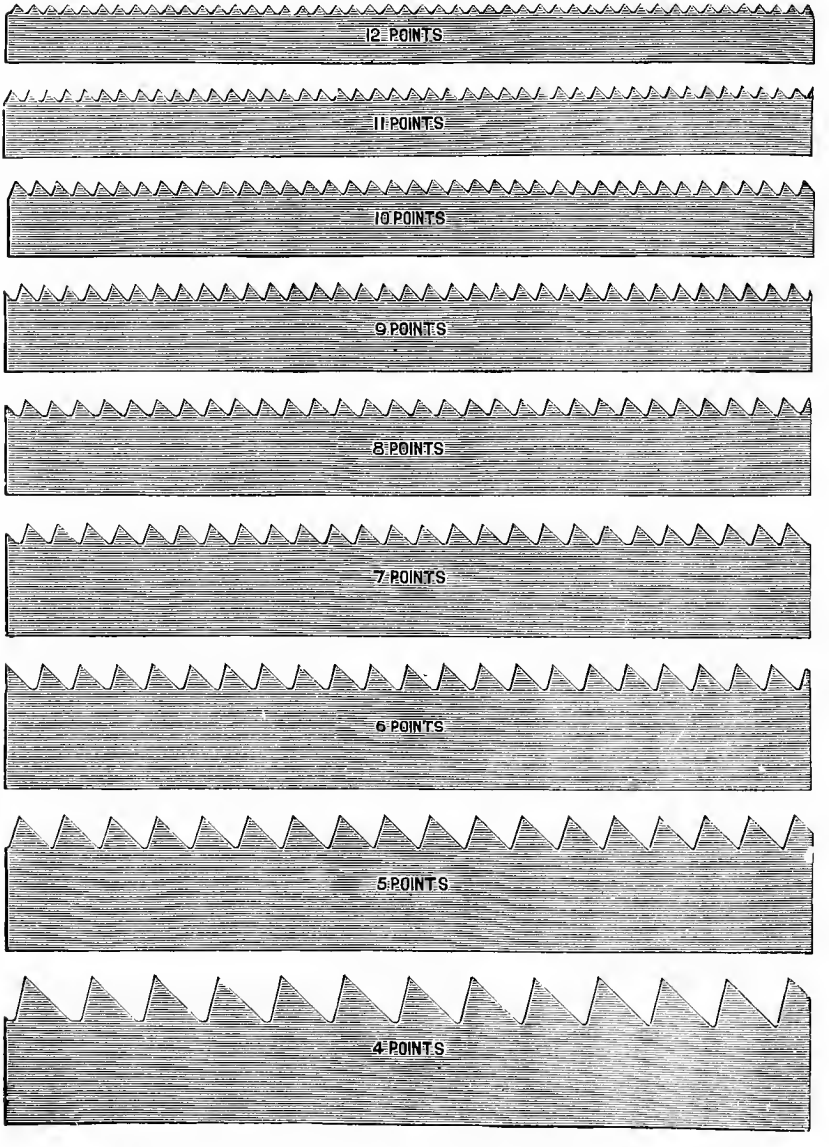
Rip saw teeth are graduated from butt to point of blade, the narrow end being one point to the inch finer than at butt; the "POINTS" being measured at butt of blade.

RIP SAWS.



The following cuts are full size of the respective number of teeth and points per inch which they represent. It will be noticed that in one inch space, there is one **tooth** less than there are **points**. Order all saws by the number of "POINTS" to the inch, measuring from point to point of teeth.

CROSS-CUT SAWS:



PRINCIPLE OF CONSTRUCTION.

The saw is either reciprocating or continuous in action, the first being a flat blade and practically straight edge, making a plane cut, as in hand, mill, jig and sash saws; the latter, either a circular or rotating disc, cutting in a plane at a right angle to its axis, a cylindrical or barrel shape with a convex edge cutting parallel to its axis, or a continuous ribbon or band running on two pulleys making a plain or curved cut with a straight edge parallel to their axis of rotation. Practically speaking, the teeth are a series of knives set on a circular or straight line, each tooth cutting out its proportion of wood and prevented from cutting more by the teeth on either side of it. Each tooth should cut the same amount and carry out the chip or dust, dropping it below the material being sawed. Different kinds of wood require teeth varying in number, angle or pitch and style of filing.

The perfection of a saw is one that cuts the fastest and smoothest with the least expenditure of power; to do this, it is evident that each tooth should be constructed and dressed as to do an equal proportion of the work, for if any of the teeth are out of line or shape, they are not only useless themselves, but a disadvantage to the others. We find many good mechanics who frankly acknowledge that they never could file a saw satisfactorily; the probable reason is that they never studied the principle of the action or working of the tool. There is no reason why any man of ordinary mechanical ability should not be able to file, and keep his saw in order, but like all trades, it requires practice and study of the subject.

The following illustrations and explanations will greatly assist in the selection of a saw and show the best method of keeping it in proper working order. These should be carefully studied.

A saw tooth has two functions—paring and scraping. A slitting or ripping saw for wood should have its cutting edge at about right angles to the fibre of the wood, severing it in *one* place, the throat of tooth wedging out the piece.

In a cross-cut wood saw, the cutting edge also strikes the fibre at right angles to its length, but severs it on *each side* from the main body before dislodging it.

RIP SAWS.

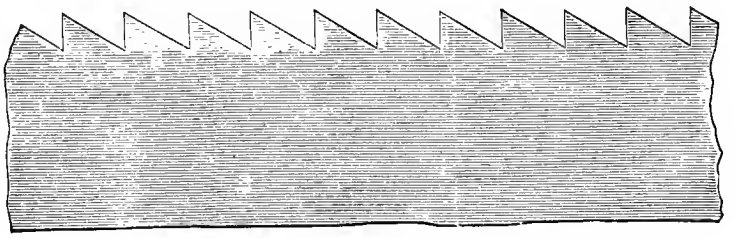


FIG. 1.

Fig. 1 is a four-point rip or slitting saw with the rake all in front, where the cutting duty is. This saw should be filed square across,

filing one-half the teeth from each side after setting, which will give a slight bevel to the cutting edge of tooth, as it should be for soft wood; for medium hard woods a finer toothed saw with five points to the inch should be used and dressed in the same manner; for the very hardest and toughest cross-grained woods a still finer toothed saw is required, with the teeth filed slightly beveling, as ripping cross-grained stuff

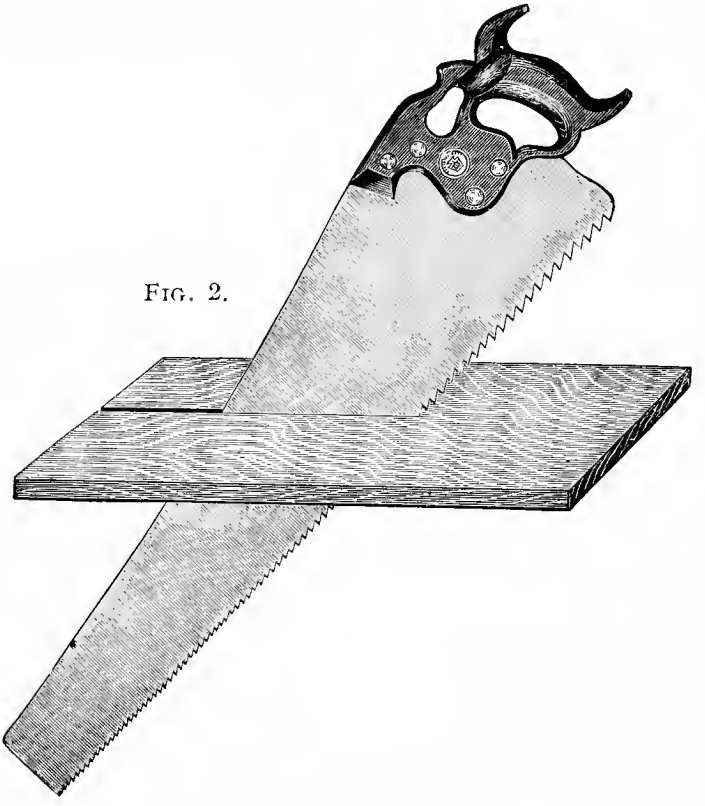


FIG. 2.

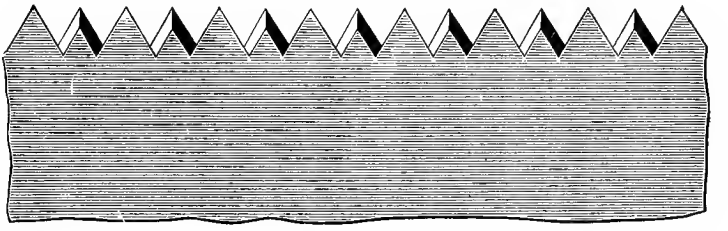
partakes a little of the nature of cross-cutting. In all cases where ripping is done, the thrust of the saw should be on an angle of about 45° to the material being cut, as shown in Fig. 2, this makes a shearing cut, an advantage that can be quickly demonstrated with an ordinary pocket knife cutting any piece of wood. For ripping thoroughly dry lumber, it will be found advantageous to use an extra thin back saw which will run without set.

CROSS-CUT HAND SAWS.

In cross-cutting the fibre of the wood is severed *twice*—on each side of the saw—the thrust dislodging and carrying the dust out.

Fig. 3 is a five-point peg tooth cross-cut saw with the rake on the side. For the same reason that the rip saw has the rake on front of tooth, the cross-cut has it on the side, as that is where the cutting duty is. The bevel or fleam to teeth in Fig. 3 is about 45°, while there is

FIG. 3.



no pitch at all; the angle on each side being the same, forms the "*peg tooth*," which is best adapted to cutting soft, wet and fibrous woods. This style of tooth is principally used in Buck-saws.

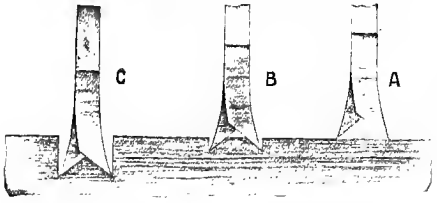
In all cases, the size and length of teeth depend largely upon the duty required; a long tooth has the demerit of being weak and liable to spring, but the merit of giving a greater clearance to the saw-dust. The throat space in front of each tooth must be large enough to contain the dust of that tooth from one stroke; the greater the feed, the deeper the dust chamber required, or, more teeth.

The first point to be observed in the selection of a saw is to see that it "hangs" right. Grasp it by the handle and hold it in position for working, to see if the handle fits the hand properly. These are points of great importance for comfort and utility. A handle should be symmetrical, and the lines as perfect as any drawing. Many handles are made of green wood; they soon shrink and become loose, the screws standing above the wood. We season our handle-wood three years before using. An unseasoned handle is liable to warp and throw the saw out of shape. The next thing in order is to try the blade by springing it, seeing that it bends regularly and evenly from point to butt in proportion as the width and gauge of the saw varies. If the blade is too heavy in comparison to the teeth, the saw will never give satisfaction, because it will require more labor to use it; the thinner you can get a stiff saw the better; it makes less kerf and takes less muscle to drive it. This principle applies to the well-ground saw. There is less friction on a narrow true saw than on a wide one; you will get a smaller portion of blade, but you will save much unnecessary labor at a very little loss of the width.

See that it is well set and sharpened and has a good crowning breast; place it at a distance from you and get a proper light on it, by which you can see if there is any imperfection in grinding or hammering. We should invariably make a cut before purchasing a saw. even if we had to carry a board to the hardware store. We set our saws on a

stake or small anvil with a hammer; a highly tempered saw takes several blows, as it is apt to break by attempting to set it with but one blow. This is a severe test, and no tooth ought to break afterwards in setting, nor will it, if the mechanic adopts the proper method, The saw that is easily filed and set is easily made dull. We have frequent complaints about hard saws, though they are not as hard as we would make them if we dared; but we shall never be able to introduce a harder saw until the mechanic is educated to a more correct method of setting it. As a rule, saws are given more set than is necessary, and if more attention was paid to keeping points of teeth well sharpened, any well-made saw would run with very little set, and there would be fewer broken ones. The principal trouble is that too many try to get part of the set out of the body of the plate, whereas the whole of the set should be on the teeth. Setting below the root of the tooth distorts and strains the saw-plate, which may cause a full-tempered cast-steel blade to crack and eventually break at this spot; and it is always an injury to the saw, even if it does not crack or break.

The teeth of a hand saw should be filed so true, that on holding it up to the eye and looking along its edge, it will show a central groove down which a fine needle will slide freely the entire length; this groove must be angular in shape and equal on each side, or the saw is not filed properly and will not run true.



A—Scoring.
B—Entering deeper and deeper until
C—the full bite is taken.

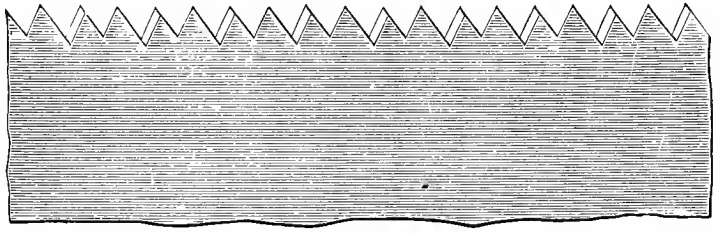
It is a common supposition that the entire tooth cuts, though, as a matter of fact, the actual cutting is done only by the points which can enter the wood no deeper than the central channel, that is, where the inside angle of the tooth on the right lines with that of the tooth on the left.

The cutting section of each tooth, owing to their being set alternately to the right and left, individually severs but half the width of the kerf, the beveled front edge of each tooth crumbling up and dislodging the upper portion of the ridge of wood left between the cutters, the pieces being pocketed and carried out of the kerf by the throat or gullets at each thrust of the saw.

The proper amount of bevel to give the teeth is very important, for if too much bevel is given the points will score so deeply that the fibres severed from the main body will not crumble out as severed, but be removed by continued rasping, particularly in hard woods, as they require less bevel, as well as pitch, than soft wood.

Fig. 8 on next page, shows a six-point cross-cut saw filed with a medium amount of bevel on front or face of tooth, and none on the back. This tooth is used in buck-saws, on hard wood, and for general sawing of woods of varying degrees of tenacity. This style of dressing is the best, but a number of saws each having teeth suited to its

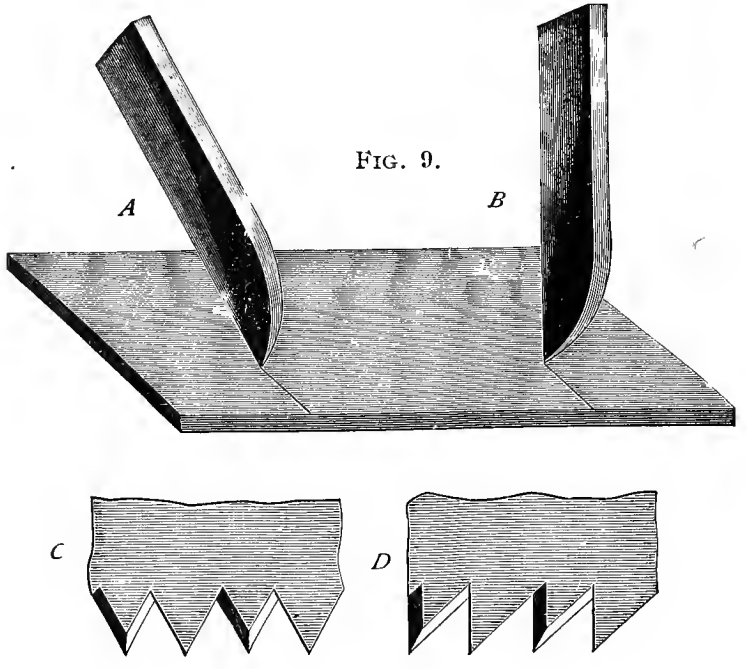
FIG. 8.



particular work, will be found more advantageous than trying to make one saw serve for all kinds of hand saw work.

We will now consider the cross-cut saw tooth, in regard to rake or pitch; this being one of the most important features, too much care cannot be taken to have the correct amount of pitch for the duty required. To illustrate this, Fig. 9 represents a board, across which we wish to make a deep mark or score with the point of a knife; suppose

FIG. 9.



we hold the knife nearly perpendicular as at *B*, it is evident it will push harder and will not cut as smoothly as if it was inclined forward as at *A*; it follows then that the cutting edge of a cross-cut saw should incline forward as at *C*, rather than stand perpendicular as at *D*.

Too much hook or pitch, and too heavy a set are very common faults, not only detrimental to good work but ruinous to the saw; the

first by having a large amount of pitch, the saw takes hold so keenly that frequently it "*hangs up*" suddenly in the thrust—the result, a kinked or broken blade; the second, by having too much set, the strain caused by the additional and unnecessary amount of set is out of proportion to the strength of the blade, and is broken in the same manner. The most general amount of pitch used is 60°, though this may be varied a little more or less to advantage, as occasion may demand.

The next point to be considered is the bevel, or fleam, of the point. To obtain this, as shown in Figs. 10, 11 and 12, the file is supposed to be

FIG. 10.

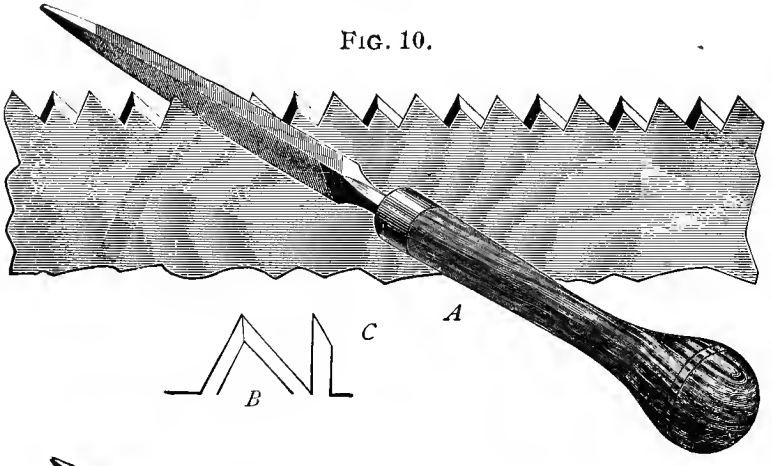
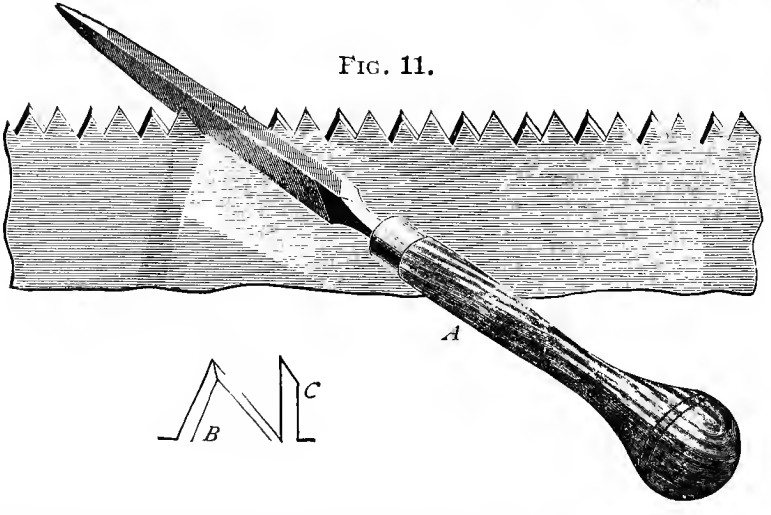


FIG. 11.



horizontal to the perpendicular of the side of saw, and on an angle of about 45° longitudinally with the length, measuring from file line toward heel.

Fig. 10 is a five-and-a-half-point cross-cut saw showing the same amount of fleam front and back, this saw is best suited for work in soft wood, and where rapid, rather than fine work is required. *A* shows the position of the file, *B* an exaggerated view of shape of point, and *C* the shape of point.

Fig. 11 is a seven-point saw for medium hard woods, illustrated in same manner as Fig. 10. This tooth has less fleam on the back, which gives a shorter bevel to point, as at *C*.

FIG. 12.

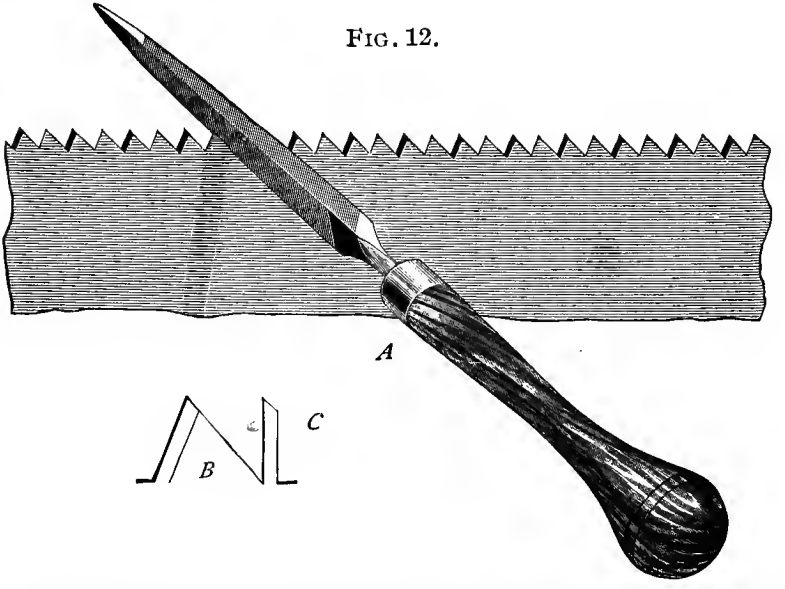


Fig. 12 is a still finer saw, having eight points to the inch. This saw has no fleam on back, the result being very noticeable at *C* and *B*. This style of point is for hard wood.

It will be seen that the bevel on the front of teeth in Figs. 10, 11 and 12 is the same, but the bevel of the point looking the length of saw is quite different, consequent upon the difference in the angles of the backs.

FIG. 13.

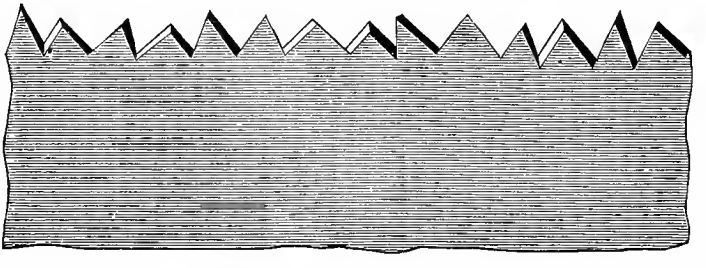


Fig 13 is a representation of some of the saws we have seen ; there

are entirely too many such now in use, and we have no doubt their owners are shortening their lives in the use of them as well as those of the saws. To owners of such saws we say, take them to the factory and have them retoothed, or buy a new saw and take a fresh start, and steer clear of this style of filing.

Care should be taken in filing a saw to keep the teeth of uniform size—not one large and one small, one up and one down. Unless the teeth are regular, the set can never be regular. When the teeth of a saw become irregular in size it is useless to attempt to regulate them without filing them down (called jointing) until all are of equal height. Then proceed to regulate the size by filing straight through. We know from experience that not one man in a thousand, be he ever so practical and proficient, can regulate the teeth of a saw without first filing them down and then filing straight through.

When this is done if some of the teeth still show slight "tops," these should be given another cut with the file on front and back. The teeth, now shaped and of even height, are ready to be set, as referred to on pages 155 and 162.

In sharpening, you can start from either point or butt of saw. When the saws are manufactured the sharpening is usually done by filing every other tooth from point to butt or handle end. The filer, standing at the point of saw holding the point of the file inclined toward the handle, works in that direction and against the front or cutting-edge of the tooth set toward him. After filing every alternate tooth, maintaining a uniform angle and bevel, the saw is reversed in the clamp, the filer changing his position accordingly and proceeding to file the alternate teeth on this side, also beginning with the first tooth set toward him.

By this method the operator is in better position to see if the fronts of the teeth are being brought up keen. It also does away with the "feather-edge" thrown up on the cutting-edge of tooth which is done by holding point of file toward point of saw, or in other words filing against the set of the back of the tooth. It is essential that the filer place the edge of the file well into the gullet, letting the sides find their own bearing against fronts and backs of teeth, the angle of the file being the same as that of the tooth. By doing this, the original shape of the tooth is maintained.

If the blade is securely fastened in the clamp, with just sufficient of tooth-edge extending so the file will clear the jaw, with a good file, firmly grasped and sufficient pressure applied, the sharpening should be easily done without the file chattering or screeching.

After the saw is properly set and sharpened, lay it flat on a true board, rub over the points of the teeth on the side with a smooth or partly worn flat file, which will regulate the set and insure smooth cutting, making the filing last longer.

After this operation, should the saw not run true, take another cut with the file over the side toward which it leads. A fast cutting cross-cut saw should have deep teeth.

In the preceeding illustrations, we have given only the coarser saws that are in most general use, but the same principle of filing should be applied to the finer toothed saws regarding angles and pitch suitable for woods of different degrees of hardness, the only actual difference

being that one saw has finer points, and they being finer, require a little more care and delicate touch in setting and filing.

FIG. 14.

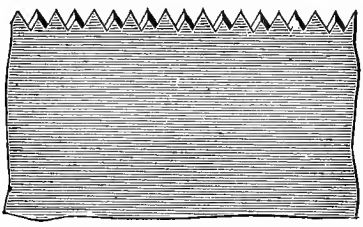


FIG. 15.

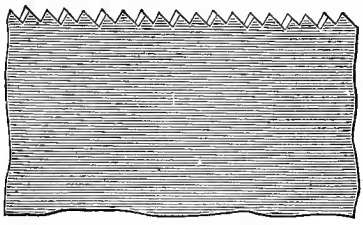


Fig. 14 is a section of an eleven-point saw suitable for the finer kinds of work on dry, soft woods, such as cutting mitres, dove-tailing, pattern work, etc.

Fig. 15 shows a section of saw with same number of points as Fig. 14, but filed same as Fig. 12. This saw is for finer work, same as Fig. 14 only on the medium hard woods.

FIG. 16.

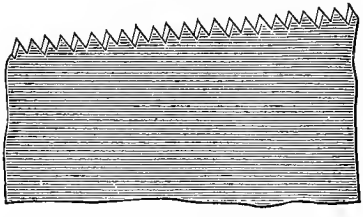


FIG. 17.

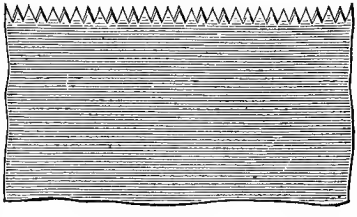


Fig. 16 is a still finer saw for fine work on the very hardest woods having same dress as Fig. 14.

Fig. 17 is the finest toothed saw of its kind that is made for wood. All the above mentioned saws in Figs. 14, 15, 16 and 17, are made especially hard and will not admit of setting, but being made thinner at the back, when properly filed, will cut clean and sweet. Teeth such as shown in Fig. 17 are used principally on Back Saws and smooth cutting hand saws. To maintain the original shape of these teeth use our cant safe back file.

FIG. 18.

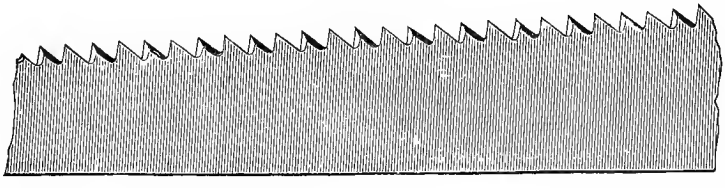
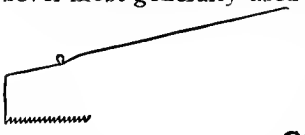


Fig. 18 is a section of a pruning saw which differs from a cross-cut hand saw, in being thicker, having a little more pitch to the teeth and

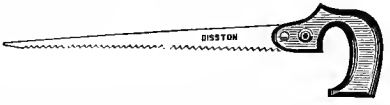
being ground thinner on the back in proportion to its width. These, of course, are made for cross-cutting only, as there is not as great a variety in the work, nor as much difference in the woods to be sawed as to degrees of hardness, being used only as a pruning saw on fruit and shade trees, which are always practically green and comparatively soft.

The illustration on page 161 shows number of points, pitch and bevel most generally used and best adapted to such work.



The "Nib" near the end of a hand saw has no practical use whatever, it merely serves to break the straight line of the back of blade and is an ornamentation only.

COMPASS SAWS



These saws are for miscellaneous sawing. The best form of tooth for this purpose is the same as Fig. 18, excepting that it has a trifle less bevel. As the nature of the work partakes about as much of cross-cutting as of ripping, and as a cross-cut saw will rip better than a rip will cross-cut, it is apparent the shape of tooth should be between the two. These saws are all ground thinner at back but set same as any hand saw.

Scroll and Web saws are ground, filed and set in the same manner, and should have pitch according to the work to be done. If more ripping than cross-cutting is done, as in large felloes, more pitch is given than in compass saws and *vice versa*, though these saws are almost universally run with a rip-saw tooth and have very little variation in the pitch.

BUTCHER SAWS.

These saws are for cutting bones. The pitch and number of points are about the same as a fine tooth hand saw for medium hard wood, but filed straight through without fleam or bevel to tooth, with light, even set, same as in fine hand saws.

HACK SAWS.

These saws are for cutting metal, such as brass, iron, or untempered steel, and should have a little finer tooth than the average butcher saw. They are so hard that none but the best metal-saw File will sharpen them. Like the butcher saws, the filing must be straight through and no bevel.

SETTING THE TEETH OF SAWS.

This is an important part of the work of keeping a saw in order and should always be done *after* the teeth are *jointed* and before filing. In all cases the set should be perfectly uniform, as the good working of the saw depends as much on this as on the filing. Whether the saw is fine or coarse, the depth of set should not go, at the most, lower than half the length of the tooth, as it is certain to spring the body of saw if not break the tooth out. Soft, wet woods require more set as well as coarser teeth than dry, hard woods. For fine work on dry woods, either hard or soft, it is best to have a saw that is ground so thin on the back that it requires no set; such saws are made hard and will not stand setting, and an attempt to do so would surely break the teeth out

WHAT CONSTITUTES HAND *and* RIP SAWS?

As a matter of interest it may be stated whilst there is a general understanding in the Hardware Trade that Hand saws are 26 inches long and Rip saws 28 inches long, this is not carried out by facts. There are a great many Rip saws made of shorter lengths, such as 22 and 24 inch, for the term "Rip" applies to shape and style of tooth only and not to the length of the saw. Likewise the Cross-cut or Cutting-off saws may be made in any length desired.

As to the graduation of teeth in Rip Saws, the purpose of this is to enable the user to start the saw in the work more easily by commencing the cut with the end or point of blade where the teeth are somewhat finer than those at the butt.

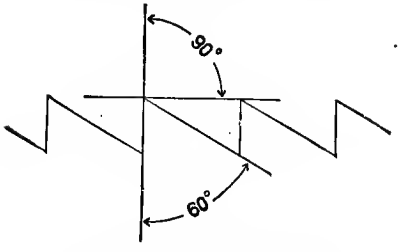
PANEL SAW is a term commonly applied to any Hand Saw with cross-cutting teeth, shorter than 26 inches in length. It was formerly used in designating cross-cutting Hand Saws with fine teeth, of any length, but is now obsolete in that particular.

TENON SAW. Some mechanics apply this term to Páuel Saws, though it more properly applies to a Back Saw.

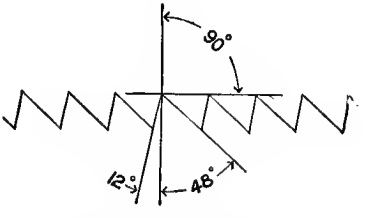
BACK SAW, sometimes termed Tenon Saw, is used for fine bench work, pattern-makers, joiners, etc., and is also made in special lengths and widths for use in mitre-boxes for cutting moulding, etc. The MITRE-BOX SAW has a peculiar shaped butt or heel, making the toothed edge two inches shorter than the full length of blade. The purpose of this is to prevent the "heel" from catching in the work.

LAYING-OUT TEETH.

The following cuts show the method of laying-out Rip saw teeth and Cross-cut saw teeth, the angles for the teeth remaining the same as in these sketches for all sizes of teeth. It will be noted that the Rip saw tooth is made with a straight front, whilst the front of the Cross cut tooth is given a slight pitch or rake.



RIP TEETH ½" SPACE



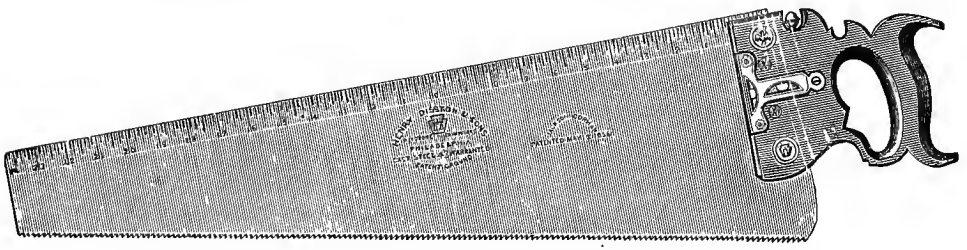
CROSS-CUT TEETH ¼" SPACE

COMBINATION SAWS.

We receive letters from time to time in which the writers offer for sale patents, or what they term improvements in Hand saws, which in character, are similar to the ideas embodied in our Combination Hand Saws. These saws we have made for many years and from the etching on the blade it will be noted a patent was granted as long ago as 1856 The Gauge Saw we have also been making for quite a long time.

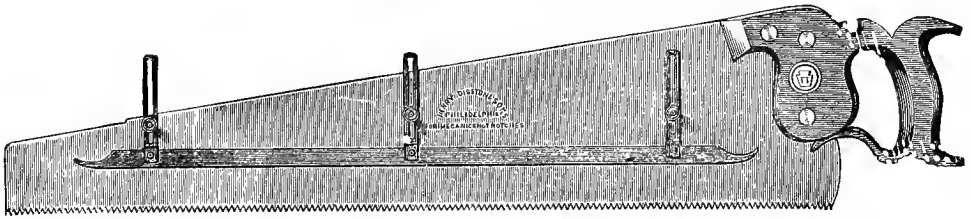
DISSTON
PATENT IMPROVED COMBINATION SAWS.

One of the most complete and useful saws ever offered to the trade. A full combination saw, comprising the additional advantages of a Square, 24-inch Rule, Level, Plumb, Straight-edge and Scratch Awl.



No. 43. Combination Saw, with 24-inch Square and Rule, Straight-edge and Scratch Awl; Apple Handle, with Plumb and Level attachment. Blade same quality as DISSTON'S No. 7 Hand Saw. Made in 26 inch length only.

GAUGE SAWS.



Adapted to tenoning, shouldering, dovetailing, curving, cog-cutting, or any purpose where a definite depth of cut is required. Same quality as DISSTON'S No. 7.

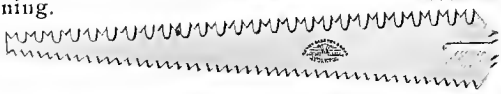
DISSTON HANDY SAW KIT, No. 101.

The combination of Blades in this set provides a Handy Kit for the practical mechanic, householder, farmer, etc.

12-inch Keyhole.

14-inch Compass.

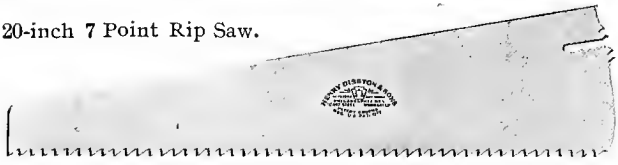
16-inch Pruning.



18-inch Plumbers'

20-inch 10 Point Cross-cut.

20-inch 7 Point Rip Saw.



Patented Nov. 2, 1909

Adjustable Handle

Canvas Case

Hardwood Handle, Carved and Polished, with a special lever device which is arranged to hold the blades comprising the Set rigid and the special formation of the butt of the blades prevents wobbling.

The Special shaped Lever Bolt, permits by a quarter or half turn of same, the keeping of the Lever in position so it will not interfere with the working of the saw.

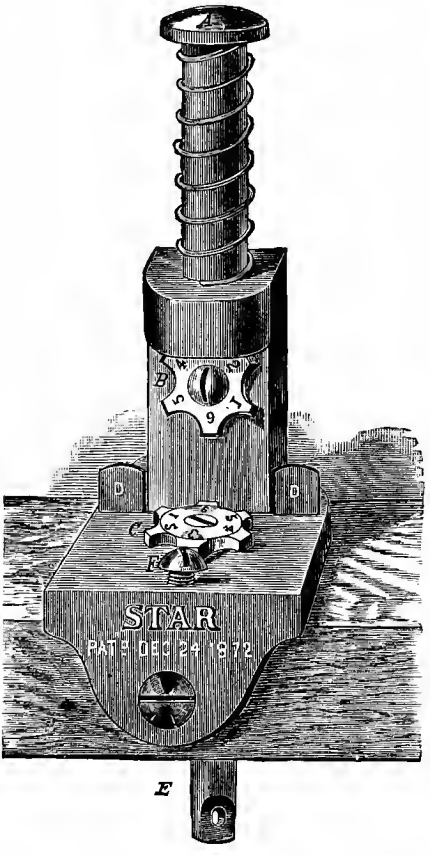
The Plumbers' Saw Blade is specially tempered for cutting nails, spikes, bolts, gas pipe, soil pipe, etc.

The blades are made of DISSTON CRUCIBLE STEEL, ground and polished.

HAND-SAW JOINTER.

Specially Adapted for Hand Saws, Narrow Band Saws, Etc.

When the teeth of a saw become irregular in size it is absolutely necessary to dress them down until all are of an equal height, and this should always be done before attempting to reset or sharpen the saw. To facilitate this work and insure evenness we fully recommend the above Jointer, which is simple in construction and readily adjusted.



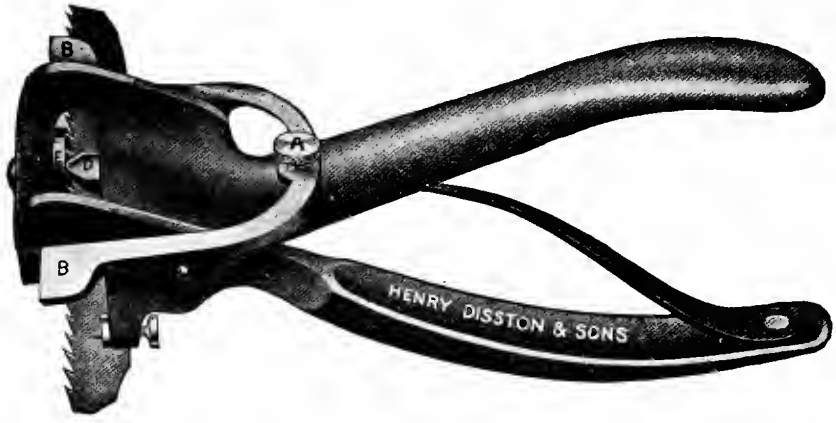
THE STAR SAW-SET.

There are many saw-sets that ruin the saw; the best form is one that involves the principle of the hammer and anvil; with such a set the teeth would all be bent evenly, and cannot be otherwise, though repeated blows be given. In the Star saw-set, represented in the following engraving this principle is involved, and we guarantee this tool to do the work satisfactorily.

Prominent among the advantages claimed for this set is that it can be operated by the foot by means of a treadle, thus leaving the hands free to guide the saw; or it can be used by striking on the top with a light mallet.

A is the plunger, operated by a treadle attached to *E*, under the machine, a slight tap with the foot setting the tooth; *B*, the hammer or striking part; *C*, the anvil; *D*, the movable gauge; *F*, the screw to regulate the amount of set. The striking part, and the anvil, or portion which receives the blow, are star-shaped, and similar in construction. The points are all of different sizes, numbered from one to six, and are designed to set different sized teeth. It will strike a blow as sharp and effective as though by a hammer, and is the most useful and complete saw-set that has ever been offered. If the saw is hard, several blows should be given in setting it, raising the back of the saw from the guide-screw *F* when the first blow is given, and gradually lowering it with each blow until the process is complete; thus many a good saw will be saved from utter ruin. A trial will suffice. Be sure to clean the saw teeth before setting.

MONARCH SAW-SET.



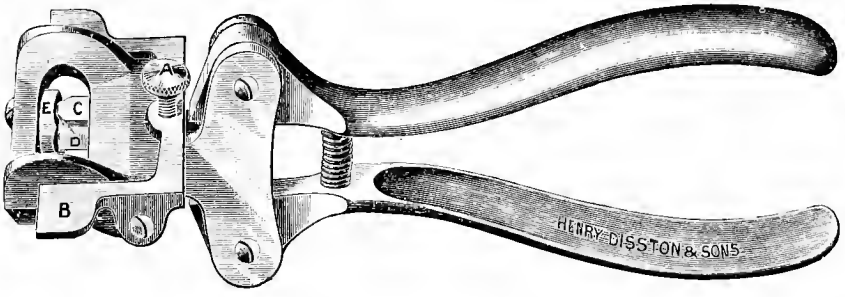
We wish to call special attention to the particular merits of the **MONARCH SAW** set. Many Hand Saw sets are imperfect for the reason that the power is applied by the upper handle of the tool, making it necessary to change the position of the hand every time the pressure is given to the tooth. To perfectly set a saw it is necessary that the Saw-Set should be held in the same relative position on every tooth. In the Monarch, the power is applied by the lower lever, making it very easy to hold the saw-set in the proper position and obtain the necessary pressure by simply closing the fingers. The head of the set is made open and the work in plain view at all times, enabling the operator to quickly adjust the Saw-Set to the tooth. The gauge "B" for regulating the depth of set has a wider bearing than in most Saw-Sets, thus doing away with the tendency to incline the tool to one side or the other, which would give an uneven set to the teeth. The anvil "E" is fitted with four beveled surfaces suitable for different sizes of teeth. The amount of set on each tooth is regulated by set screw "C" which is held firmly in place after adjustment by the small lock-nut or lever in the rear. This is of considerable importance, as the screw "C" cannot work loose during the operation of setting, which is the case with many other saw-sets, and insures an even amount of set throughout the entire length of blade. **IN OPERATING,** first adjust the anvil so that the bevel most suitable for the size tooth to be set is brought into position; hang the Saw-Set on the saw so that guide "B" rests on the teeth; adjust this guide for the depth of set to be given by use of set screw "A." Use care not to go too deeply into the tooth as all of the set should be in the tooth itself. Taking too deep a hold is liable to distort the body of the blade, or break out the teeth. The top of plunger "D" should be in line with the top of the tooth to be set. Next adjust set screw "C" for amount of set required taking care not to put on any more set than is absolutely necessary.

The Monarch Saw-Set is adapted for setting saws three quarter inch and wider. Made in three sizes; the small size No. 2 being suitable for Hand Saws, Back Saws, etc., the medium No. 12 and large No. 20 size for Circular, Cross-Cut Saws, etc. Each size is Barff finished.

TRIUMPH SAW-SET.

Patented Oct. 31, 1899.

Specially adapted for Hand Saws, Cross-Cut Saws. Circular Saws and all Small Saws.



The idea embodied in this Saw-Set is one that will commend itself to every user of a saw-setting tool. The principal feature is the use of two plungers operated by the two levers or handles; pressure on the lower lever forcing plunger "D" against the body of the saw, thus holding it rigidly in position and preventing slipping, whilst a continuation of the pressure on the upper lever operates plunger "C" in setting the tooth.

In action it is easy and powerful, and while it will perfectly set wide and heavy saws, it is also particularly adapted for narrow blades, such as web saws, narrow band saws, etc. If the gauge "B" is properly adjusted, the result will be a uniformity of set that cannot be obtained by any other hand set.

Another important point is the head of the Set is made open, enabling the operator to quickly adjust the Saw-Set to the tooth, the work being in plain view at all times. The gauge "B," for regulating depth of set, has a wider bearing than in most saw-sets, thus doing away with the tendency to incline the tool to one side or the other, which would give an uneven set to the teeth. The anvil is fitted with four beveled surfaces, suitable for different sizes of teeth.

IN OPERATING first adjust the anvil "E" so that the bevel most suitable for the size tooth to be set is brought into position; hang the Saw-Set on the saw so that the gauge "B" rests on the teeth; adjust this gauge for the depth of set to be given, by the use of set-screw "A." Use care not to go too deeply into the tooth, as all of the set should be in the tooth itself. Taking too deep a hold is liable to distort the body of the blade or break out the teeth. The top of plunger "C" should be in line with the top of tooth to be set.

We claim this to be the best Hand Set ever put on the market, and a trial will convince anyone of its superior merits. If the instructions as to adjustment are carried out the results will be entirely satisfactory to the operator.

The **Triumph Saw-Set** is manufactured in three sizes, the smaller size, No. 28 being suitable for Hand Saws, Back Saws, Web Saws, narrow Band Saws, etc.; the medium size, No. 18 for small Circular Saws, etc., and the large size, No. 8 for Cross-Cut Saws, Circular Saws, etc.

The No. 280 Triumph Saw-Set is similar in size and style to the No. 28, but is fitted with a SMALLER SIZE SETTING PLUNGER, thus making it especially adapted for saws 10 to 16 points to the inch.

Finished, each size made with bright polished head, Barff finished handles.

SAWS MUST BE SPECIALLY TOOTHED AND FILED FOR DIFFERENT KINDS OF WORK.

The majority of users do not know or give little thought to the fact that to obtain the best results in any particular class of work the saw must be specially toothed and filed for the sawing to be done.

A man called at our works some time ago carrying a Disston handsaw. He seemed very much aggrieved and complained bitterly about our sending out such a saw as the one he had.

"Why," he said, "it will not cut wood; in fact, it will not cut anything."

This struck us as being rather curious, for in 78 years of sawmaking some millions of saws have been made and sold by us. Upon examining the saw, however, the cause of the difficulty was readily apparent. Our superintendent casually asked the visitor if he thought the saw would cut iron. "No, of course it won't," said the visitor emphatically.

Asked if he could wait a few minutes, he said he would. Our superintendent took the saw out in the shop, had it *specially filed to cut iron* (notice the specially filed part), brought the same saw back, took the visitor in the machine shop, got a piece of iron bar about 2 inches in diameter, placed it in a vise, tightened it up, put the saw to work, and in short order neatly sawed the bar in two without any trouble whatever, and the teeth were still in fair condition.

The visitor was utterly amazed. "Well," he said, "I wouldn't have believed it."

After an explanation of the trouble—simply a matter of the condition of the teeth in the saw—he asked: "Can you put it in proper condition for sawing wood?"

"Certainly."

"Well, do it, and I will never complain about a Disston Saw again."

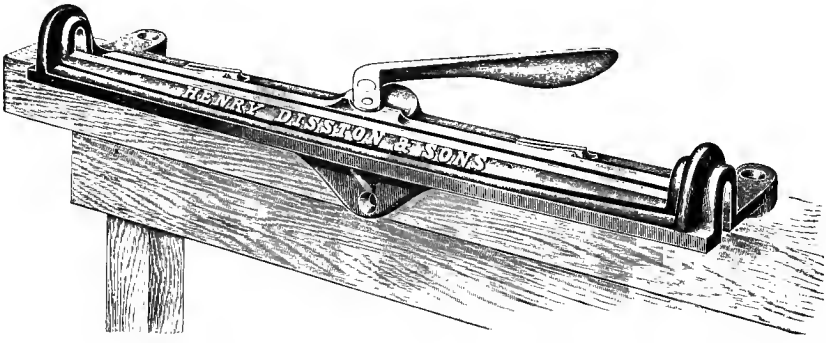
Years of experimenting have determined just what shape or space, angle and bevel should be given to the teeth, as well as the amount of set best suited for this or that class of sawing; that the tooth best adapted for sawing soft woods is not at all suitable for cutting hard woods. Of course, the work could be done after a fashion, but the result would not be as good as that obtained by the use of a saw properly toothed for its particular purpose. You can take a rip saw and cross-cut with it, but note the difficulty.

In line with this, it may be noted that even a saw blade made for cutting soft metals is not at all adapted for sawing the harder metals nor will a saw made for sawing wood stand the work of cutting a combination of wood and metal without injury to the points of the teeth, thereby spoiling it for further use in making a clean, sweet cut in wood.

A saw that is "fitted-up" for sawing wood has the teeth filed with a bevel back and front, given a proper set, enabling it to do fast cutting. A hand saw for sawing metal has no set on the teeth, but is ground for clearance and filed straight across the front of the tooth, and while to a limited extent it would cut wood, it would not do so in the manner a mechanic desires. In other words, it is not adapted for wood cutting, and its temper also is different from that of a wood cutting saw.

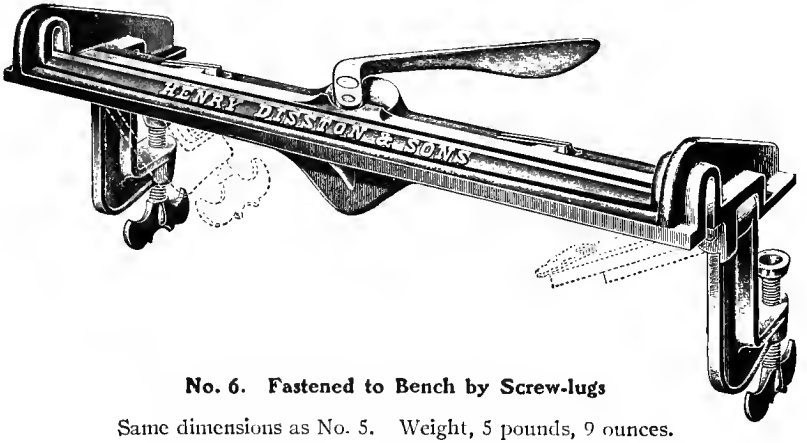
It is for these very reasons that various patterns of saws are made, and specially toothed for the different kinds of work. Experience in this line is the best teacher. Take a saw fitted up for sawing wood, try it on a piece of metal. No matter what kind of a saw it may be, or whose make, it positively will not do as good work afterward in sawing wood without being refitted.

HANDY SAW CLAMPS.



No. 5. Fastened to Bench by Screws

Length over all, 14¾ inches. Filing length of jaw, 13 inches. Weight, 3¾ pounds.



No. 6. Fastened to Bench by Screw-lugs

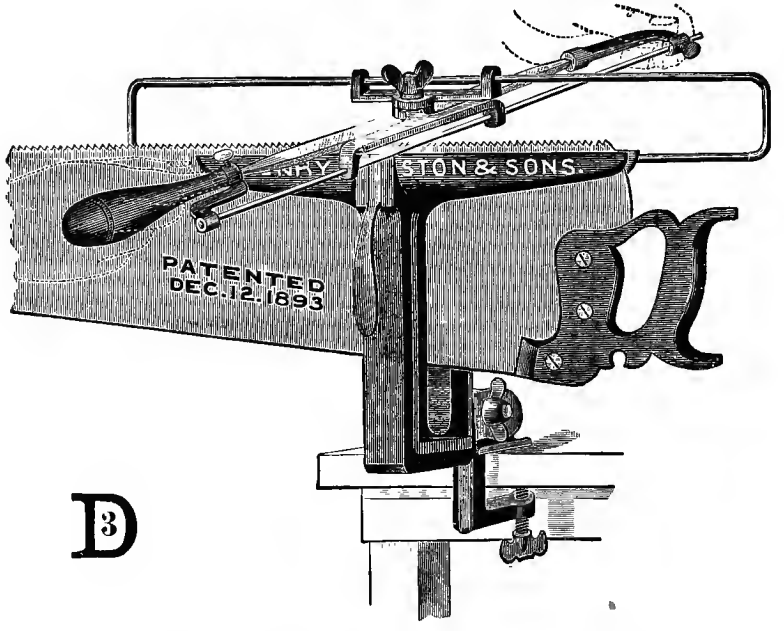
Same dimensions as No. 5. Weight, 5 pounds, 9 ounces.

The Handy Saw Clamp was designed with the particular view of making it light in weight and at the same time strong and durable; to take up the least possible space, and easily carried in a tool chest.

The material is grey iron, the arches are re-inforced to give the requisite strength where needed. Tightened by means of the eccentric lever permits of quick and positive action. There being three points of pressure on the jaw, proper contact with the blade is obtained along the entire length of the jaws, which insures the holding of the saw blade firmly and rigidly in position.

DISSTON'S SAW FILING GUIDE.

Especially Designed to Assist Those Not Skilled in the Art of Filing to File a Saw Correctly.



This cut shows a saw and clamp with attachment in proper position for filing the first side. There are three marks on the upper hub of the swivel attachment, and one mark on the other. One or the three marks show when it is in position for first side and the other designates when it is in position for filing the other side. The third, or centre mark, shows when it is in position for filing Rip Saws. To obtain the correct position loosen the wing nut and move the guide around to the point desired; after tightening wing nut, loosen screw in file handle and adjust the file for the shape tooth wanted.

A good way is to select a tooth of correct shape and let file down into it, tighten set screw in handle, then file a tooth to see if the shape suits. If not, turn the file a little to the right or left and try another tooth until the proper shape is obtained. Then file every other tooth. When one side is filed, reverse saw and attachment and file the other teeth. For Rip Saws, place the file at right angles with the saw, and file every tooth. Always keep the file as nearly horizontal as possible.

This guide is sold only attached to our Nos. 2 or 3 clamps and price includes Clamp, Filing Guide, File and Handle.

No. 120 ACME SAW.

Made to Run Entirely Without Set, in Dry, Seasoned Lumber Only.

In filing the No. 120 Saw for Cross-cutting, the saw should be placed in a clamp that is set at an angle of about 45 degrees. USE A DISSTON SIX INCH CANT SAFE-BACK FILE which is made expressly for filing this style of tooth.

Hold the file horizontally, at an angle of 30 degrees to the side of blade, which will give the proper bevel.

File the front and back of each alternate tooth the entire length of blade, per illustration of section, then turn the saw around and file the remaining teeth in the same way.

SECTION

Showing actual Size and Shape of Cross-Cutting TOOTH Six Points to Inch.

NOTE: The FRONT of the 120 Rip Tooth should be at right angles with the cutting edge of saw. Place the Rip Saw vertically in clamp, hold the file horizontally and at an angle of five degrees to the side of blade, which will give a slight bevel. Care must be taken not to change the front of tooth while filing. If properly sharpened in this manner the saw will clear itself and make a smooth, clean cut.

No. 77 SAW.

Made to Run Entirely Without Set, in Dry, Seasoned Lumber Only.

The No. 77 Saw for Cross-cutting, to be filed, should be placed in a clamp set in a VERTICAL position. Use a Disston 4½ inch Regular Taper File. Hold the file horizontally to the side of blade and at an angle of 45 degrees to side of blade, which will give the proper bevel. File the front and back of each alternate tooth the entire length of blade, per illustration of section, then turn the saw around and file the remaining teeth in the same way.

SECTION

Showing actual Size and Shape of Cross-Cutting TOOTH Six Points to Inch.

The No. 77 Saw for RIPPING is filed in the same manner as the No. 120 Rip Saw mentioned above.

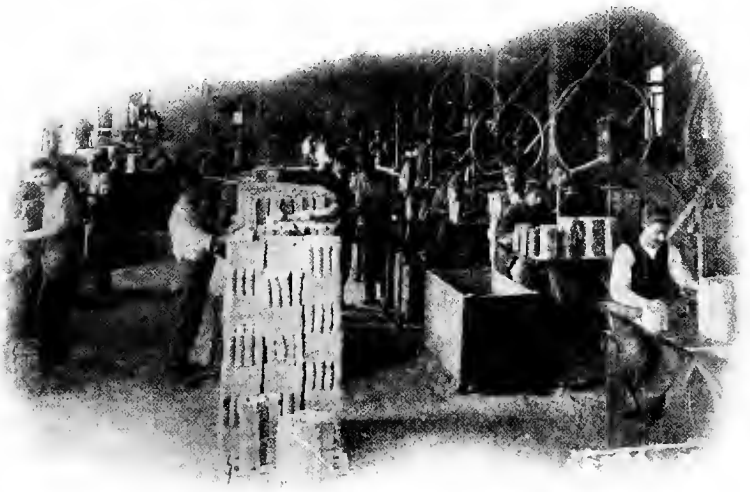
THE MAKING *of*

DISSTON SAW HANDLES.

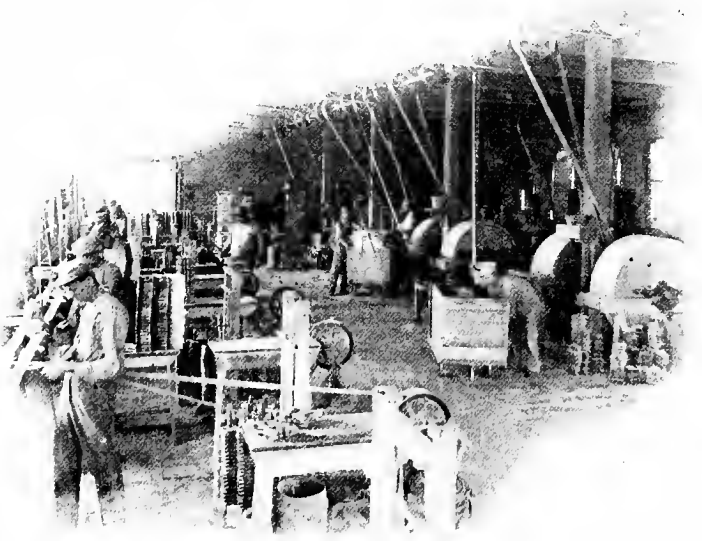
All DISSTON Handles are made of carefully selected lumber, thoroughly seasoned. This lumber is stored in large piles in the yard,

Section of Lumber Yard.

which well compares in size with many large commercial yards. It is air seasoned for at least three years and then receives the complete and

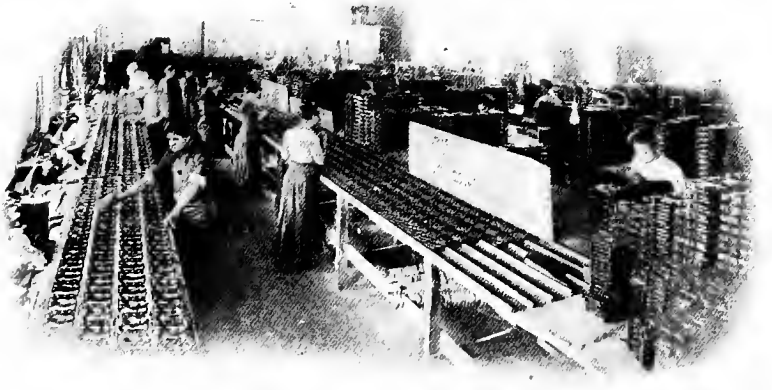


Sawing-Out Handles.



"Belting" or Sand-Papering.

final drying in the drying room, whence it passes to the planing machines, where it is planed down to an even thickness. It is next sawed into small pieces, generally of such size that two handles



Varnishing and Polishing.

may be made from each of them. The markers then trace the shape of the handles with lead pencils around sheet steel patterns. They are then cut out by the band saws, after which a hole is bored in the centre through which the jig saw enters and cuts out the centre piece. They are now sent to the "nosing" machine where the nose is shaped.

"Jimping" is the next operation. In this the roughly cut out handles are brought in contact with swiftly revolving cutters, and the edges are rounded. The handles now pass on to the filers, who work them into the finished shape. This is followed by "sand-papering" on belt machines.

The next step is "varnishing," after which comes "slitting" as it is termed, or the process of sawing the slot in the handle in which the blade rests. In connection with this operation the handles are bored and countersunk for the bolts or screws.

If the handle is to be "carved," that work is now done, then follows "polishing."

The woods used chiefly for making handles are beech, apple, cherry, walnut and other hard woods. Beech is the wood generally used, but apple is the favorite.

THE MAKING *of the*

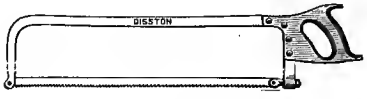
DISSTON BUTCHER SAW.

The steel is rolled in bars of the required thickness and width, oval or flat in shape according to the pattern of saw to be made; then cut in multiples suitable for the length desired.

Taking one of these pieces, which are straight as to length, the ends are bent or forged by machinery to form the sides of the butcher-back or frame; the "eye" or socket at the end near the handle is formed and welded; the inside being either round or square as per design. It will be noticed that the entire back and socket are made of one single piece of solid steel, forged, consequently is stronger than if made with the ends riveted on.

Next the "Back" is straightened, that is made even and true, then "ground." Now follows "glazing" the character of finish being in accordance with the quality of the saw; the higher grades, of course, being given a finer degree of work. The pin-hole in point of frame is now "drilled," this end being also "slitted" to take in the end of blade. The "eye" at butt of frame is then fitted for either a square or round stretcher; the stretcher, as the name implies is for the purpose of tightening the blade, being made of various designs or shapes, though the usual method of stretching is by means of a wing or a hexagon-nut, which requires the threading of the end of stretcher.

The "Back" is now stamped with the name and brand. The handle, properly bored, is fitted on the end of frame in position; the holes marked on "back," handle removed and holes drilled, after which the handle is adjusted and fastened with three or four screws as the case may be. The saw is then inspected and handle tested to see whether it "lines" up with the back.



THE MAKING *of* a

DISSTON WOOD SAW

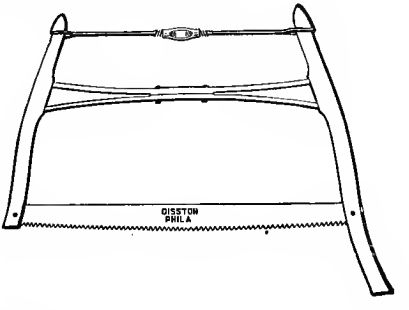
The lumber principally used is Maple; the boards having been well-seasoned for several years, are cross-cut to length, sawed in strips of required width for the "long arm," "short arm" and "brace."

These pieces are "planed" to proper thickness, "jimped," that is, formed to shape and the edges rounded; after which they are "mortised" for the insertion of the ends of "stretcher" or brace. In the next operation the arms are "bored" and "slit" for the blade, and the tops "looped" for rod. They are now "belted" smooth on round edges, "sanded" on flat sides, then "stained," "buffed" and "varnished."

The pieces for "stretcher" or "brace," in other words the centre-piece, are cut to length and width, "planed," and marked out to be "band sawed" to shape. They are now "jimped," "tenoned" on ends to fit the mortise in arms, then "belted" smooth on round edges. After being "bored" two pieces are "riveted" together, then "sanded" smooth on flat sides. "stained," "buffed" and "varnished."

Now the "long arm" is labelled, and the parts are ready for "assembling" or framing up. The two arms are laid on a bench, about the proper distance apart; blade inserted, pins placed in holes, the stretcher inserted, and rod or "tightener" placed on ends at top and adjusted

These frames, when properly tightened up, are strong and rigid, there being no lost motion or give.



THE MAKING *of*

DISSTON PLUMB *and* LEVELS TRY SQUARES *and* BEVELS.

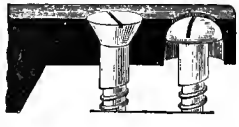
The wood used is principally Beech, Cherry and Mahogany. This is air-seasoned for fully two years in the lumber yard before being cut up.

In the making of a Disston Plumb and Level the first operation is the sawing up of the rough lumber into stocks or pieces of suitable size. These undergo another seasoning of at least four weeks in a dry-room before any further work is done on them.

The stock is now planed, then bored and mortised, ready for the insertion of the level vials, after which it is sand-papered, then passed on to the fillers and stainers. It is now in shape for the insertion of the top and side vials, which constitute the vital parts of the level.

All vials used for the Disston high grade plumbs and levels are made of the finest flint glass; the liquid therein is pure alcohol and ether, which will not freeze in the coldest weather, while its action is so sensitive it will show the slightest variation.

This vial, in the Disston adjustable plumb and level, is placed in an iron casting and held in position by plaster-of-paris, which when set, forms a very firm bed. This casting is then fitted in the mortise, the left-end, fastened with a screw, being round underneath permits a slight rocking up or down; the right or adjusting-end is fitted with two screws, a round-head screw fitting up in the recess or countersink under and at the extreme end, thus up-holding the casting, while the flat-head screw at the same end bears down on the casting, which holds it firmly and securely in position. The method of adjusting is extremely simple, consisting merely of removing the protecting shield, loosening the flat-head screw, raising or lowering the round-head screw as may be



required, then tightening up the flat-head screw, the most delicate adjustment being thereby easily obtained and maintained.

The brass plates are now fastened on and serve to protect the vials from breakage. The stock is then varnished, and, when dry, the plumb and level is fully inspected.

Some Plumb and Levels are made of single-piece stock, whilst others have double and triple stocks, that is, made of two or three pieces firmly glued together, such stocks being of course more expensive but are less liable to spring or warp. Again, some are finished with brass ends for the protection of the corners and ends when in use.

No. 16.

No. 16. Plumb and Level, Arch Top Plate, two Side Views, Solid Brass Ends, Polished. Made in assorted sizes, 26 to 30 inches.

TRY SQUARE.

In the making of a Try Square, the Disston No. 1 Square will be taken for example.

All stocks are made of well-seasoned wood, the same as Disston Plumb and Levels; for Rosewood stocks, the lumber being bought in the log, cut into planks, which in turn are sawed into strips, planed, then cut to multiples.

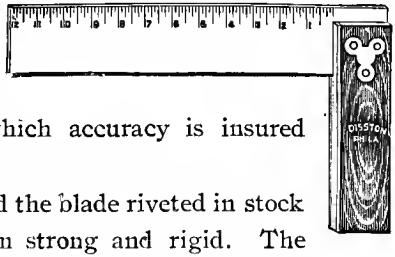
The next operation is preparing the face-plate, it being a piece of heavy brass, sawed to size of inside face of stock, and designed to take up the wear at that point.

In this plate holes are punched, deeply countersunk, then it is fitted in position on the stock and securely fastened by the use of oval-head-countersunk brass screws. The tops of these screws are now ground off, together with a slight portion of face of plate. This insures a perfectly true, even and smooth surface and avoids those objections which arise by reason of ordinary countersinking and depressions.

Now follows the slotting of end of stock to receive the blade. This slot is sawed through both brass and wood, on a special machine arranged to secure accuracy.

The blade, made from sheet steel cut in strips, is hardened and

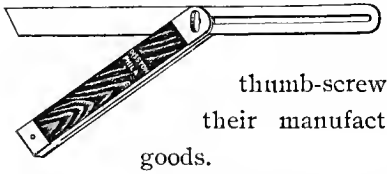
tempered; ground and glazed; then cut to multiples of the length desired; the edges are then breasted and trued, and the blade blued. It is now ready for the marking of the graduations, which is done on special automatic machines by which accuracy is insured throughout.



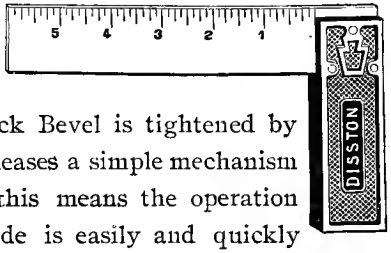
All parts are now assembled and the blade riveted in stock after a method which renders them strong and rigid. The square is then ground-off, tested for accuracy, polished, and branded.

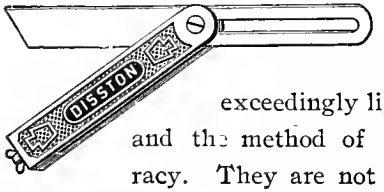
BEVEL.

A BEVEL, made with wood-stock, requires practically the same processes as the wood-stock Try Square, with the exception of the fact that the blade of the Bevel is adjustable and is tightened with a thumb-screw; the same care being exercised in their manufacture as with the previous named goods.



In the making of the Iron Stock Try Square and Bevels, the same processes are followed for the fitting. The blades in these are of steel, while the stock, being of iron, is milled by special machinery which results in a perfectly flat surface and parallel width. The blade of the Disston No. 3 iron-stock Bevel is tightened by thumb-nut at end, which draws or releases a simple mechanism in the body of the stock, and by this means the operation of tightening or releasing the blade is easily and quickly performed.





These iron-stock Squares and Bevels, while made with metal stocks, are of such pattern as to be exceedingly light in weight, but strong and durable, and the method of their manufacture guarantees accuracy. They are not only adapted for carpenters' use but also for the more particular work of the machinist.

THE MAKING *of the*

DISSTON SCREW-DRIVER.

In the making of Screw-Drivers, the wood for handles is of the same well-seasoned quality as that used for other Disston Tools.

The planks sawed into strips, are cut in multiples of desired length. These pieces are, one by one, placed in the automatic turning machine where it is "formed" to shape. The ferrule is now placed in position on the end of handle and by means of heavy pressure is forced on. The handle is then spun in a lathe, finished smooth and is ready for "staining."

The Blade, which is of best crucible steel, is "forged" to shape; then "hardened" and "tempered." It is now thoroughly tested for durability and then passes under the "polishing" operation.

The handle is now "bored," tang of blade inserted and driven in until the driver is of proper length. While the blade is thus made quite secure in the handle, to prevent any possibility of its turning in the socket or coming loose, a boring is made through ferrule, handle and tang, in which a pin is inserted, and this pin headed on both ends.

The blade is then "stamped," handle varnished and, when dry, the screw-driver is carefully inspected.

THE MAKING *of the*

DISSTON TROWELS.

The making of a Brick Trowel, in the various evolutions, is quite curious and interesting, particularly so when it is considered that, with the exception of the wood-handle, the entire trowel with blade measuring 12″ long by 5½ inches wide, or 18 inches long from tip of blade to end of tang, is made from a small diamond shaped piece of steel 5 inches by 3 inches, and ⅝″ thick.

This piece of steel is heated and from one of these points is forged what may be termed a stem, which in due course forms the "tang" of the trowel. This blank, being now of a somewhat triangular shape with extended stem, is again heated and placed under a drop-hammer which forges or spreads, to a certain extent, the flat portion, thus reducing its thickness but increasing the width and length. The blank is re-heated, the stem cut to length; then placed on a die and by one powerful blow of the drop-hammer is transformed into the crude shape of a trowel including the shape and incline of the tang. This being done under a die insures a uniformity of "lift" or hang of handle in the completed trowels.

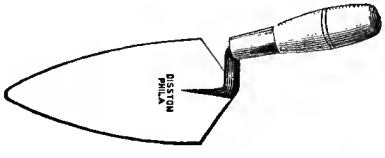
The blank, for it may yet be so termed, is now passed along for the "rolling" operation. For this, the blank is re-heated and passed again and again under heavy rolls until it has been drawn to proper thickness, taper and so shaped as to allow the necessary spring to blade. Then follows the operation of "cutting-out" for shape, which is done under punch and die.

"Hardening" and "Tempering" now takes place, which is done under the Disston special process. The next course is "smithing" or straightening; after which the blade is "ground" to the requisite thickness and taper. The blade is now "glazed" and then "stiffened" by which latter process the elasticity is brought up to its highest efficiency.

It is to be noted, as stated before, that the entire trowel, with the exception of the wood-handle of course, is made entirely from one small piece of solid steel.

After a careful inspection, the blade is "handled-up" in the most approved manner; some patterns having the tang extending clear through the handle and riveted.

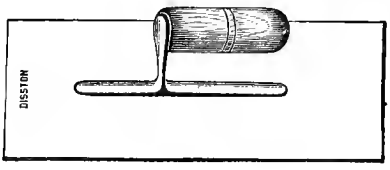
The trowel is now thoroughly inspected and tested for quality and spring, shape of blade and "lift" or hang of handle, etc.



POINTING TROWEL.

A "**Pointing Trowel,**" as its name indicates, is used for pointing the bond or mortar between the bricks. It is smaller in size than the regular brick trowel, but made on similar lines and under the same processes.

PLASTERING TROWEL.



The sheets of steel are sent by the Steel Works to the Cutting-room where they are cut in strips of a length making three blades, and in width according to the length and pattern of trowel to be made. The holes are now punched in the centre for the fastening of the mounting, after which the plate is passed through rolls to take off any fash left by the cutters on the edges or by the punches in the holes, then follows countersinking of the holes for the rivet-heads. The next course is "Hardening" and "Tempering" which is done under the Disston special process. The plate is now "smithed" or straightened, then "ground," the top being left flat while the bottom or working side is made somewhat beveled towards the edges to insure the trowel going over the work smoothly and without catching, after which the plate is "glazed."

This plate is now cut apart making three trowel blades. The blade is "re-glazed" and then undergoes a special process which

is necessitated by reason of the after operation of grinding of rivet-heads, and this process insures an even and true blade. The name and brand is now "etched" on the blade, and it is ready for the mounting.

The shank or "mounting," made of malleable iron, is "straightened," "ground" flat on base or part fitting on blade, then "glazed."

In the assembling, the mounting is riveted on blade under a power-hammer which has two motions; perpendicular and at the same time the hammer-head has a rotary motion which insures a thorough distribution of the blows on the rivet-head. The blade is now inspected, then the rivet-heads ground flush with the blade, and this part receives a course of "glazing." Another inspection is made; the blade "blocked," and is then ready for "handling-up."

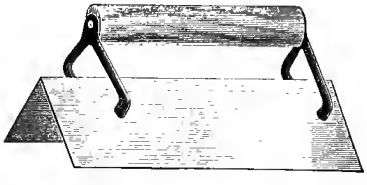
The wood-handle, having been bored and mortised, is driven on the tang, the latter having extended fins or shoulders which entering the wood prevent the turning of handle while in use. This tang extends through the handle, a washer put on and the end riveted.

From four to ten rivets are used in fastening the mounting of a plastering trowel, according to the design, pattern or quality.

The trowel is now given the final inspection for "lift," riveting, etc.

Cementers' Trowels are made under processes similar to a Plasterers' Trowel, with the exception that the blade is heavier, some have one edge rounded or curved, and the mounting stronger, the latter usually being of double-post owing to the extra heavy pressure used.

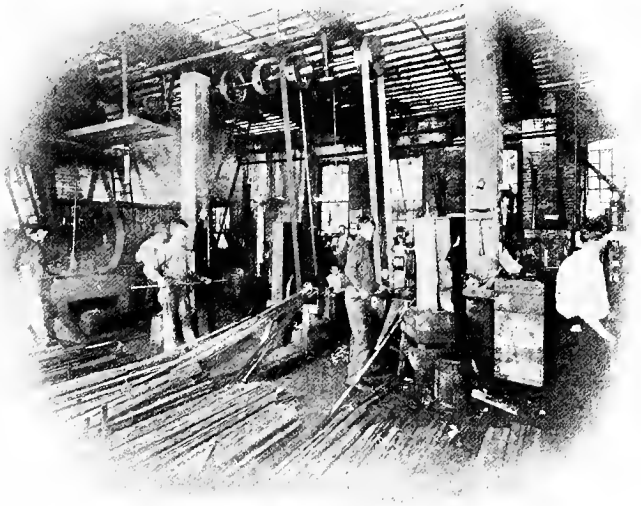
CORNER TROWELS.



These are made for "inside" or "outside" angles, also rounding for inside and outside circles, and are used by plasterers and cementers for squaring and rounding corners, etc.

THE MAKING *of the*
DISSTON FILES AND RASPS

The manufacturing of Files and Rasps is a long and tedious process requiring the exercise of great care throughout. In describing the principal processes in the making of files and rasps the term "Files" only will be used.



Steel Room, Cutting to Multiples.

Files as generally known are made of crucible steel, and the experience of the American File-maker is that steel made in this Country is far superior to foreign steel which was used exclusively in this art some years ago.

The principal and necessary conditions of a good file are tough steel of high grade, sharp and well formed teeth, thorough hardening and careful inspection at every stage of the work.

All the steel used in the manufacture of the Disston Brand of Files is of the finest quality Crucible Steel and is made in the Disston

Steel Works under careful supervision. It is rolled to different shapes such as ROUND, HALF-ROUND, FLAT, etc., of various thicknesses and widths suitable for the numerous kinds of files and then sent to the File Shop where it is cut into sections of the length required.

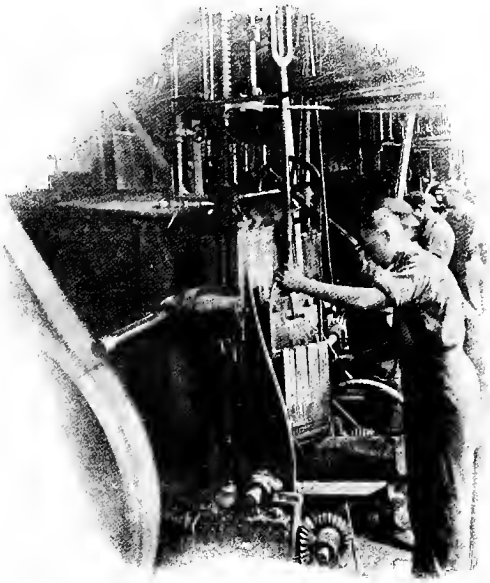
Forging.

These sections of steel are forged into shape for the files and are then called "File Blanks."

The "Tang" means that portion which is shaped for the handle, and is not included when measuring the length of the file.

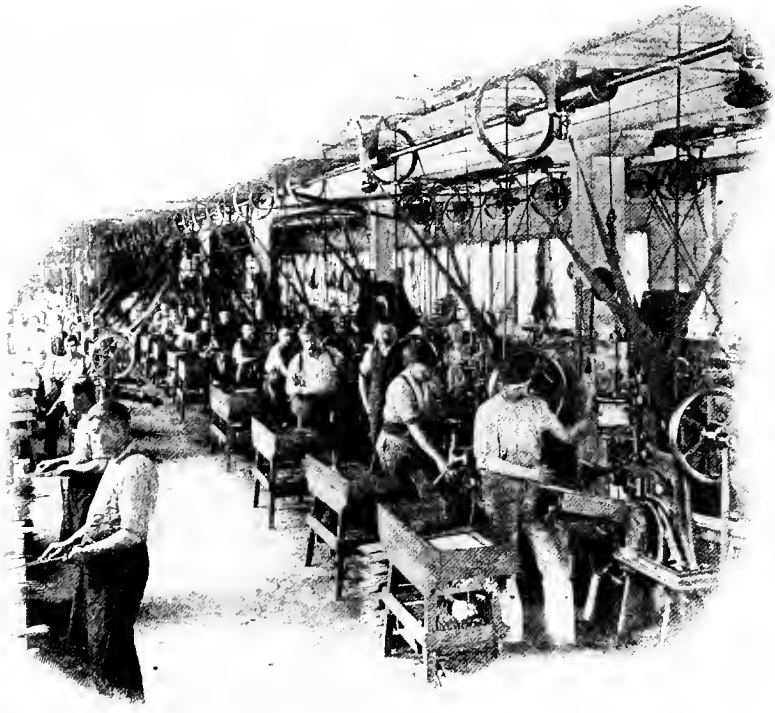
After inspection, the file blanks are then annealed by heating, which softens the steel so that they can be ground and the teeth cut in them. When the blanks are annealed, each one is carefully straightened, then ground to remove the scale and oxidizing and make the surface smoother.

The ground blanks are again inspected, then "Stripped," that is

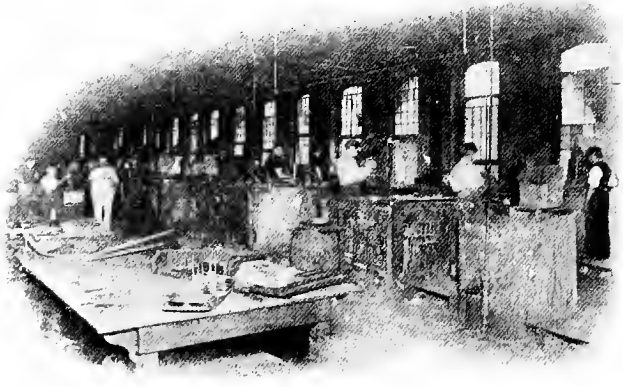


Grinding.

"Stripping" *and* "Cutting" Small Files.



"Cutting" Large Files.



Hardening.

a hardened file is used on them in such a way as to make the surface even, flat, smoother and firmer for the tooth cutting process.

The "Teeth" were formerly cut in the blanks entirely by hand, with a hardened steel chisel. but they are now almost exclusively and more perfectly cut by machinery, particularly in this country.

After the teeth are cut, the files are inspected, and branded, then "Hardened," a process requiring great care. In preparation for this they are coated with a special paste which protects the teeth while the file is being heated to the degree necessary, for the points are so fine they would otherwise be burned off before the body of the file became sufficiently heated.

The coated file is heated by being immersed in molten lead, then withdrawn and plunged deep in the bath, moved back and forth a few times until somewhat cooled. From a comparatively soft state it has now become so hard that an attempt to bend it will cause breakage. Files are never tempered, but hardened to a particular degree which gives greatest durability.

After being scoured, washed in lime-water to neutralize any tendency to rust, then steam dried, Blueing-the-tang follows, by which its hardness is drawn and the tang toughened so it can be driven into the handle without breaking.

Each file is now oiled, neatly arranged in wooden trays and delivered to the inspectors for final examination and test—for straightness, cutting quality and durableness. Passing successfully they are ready for packing.

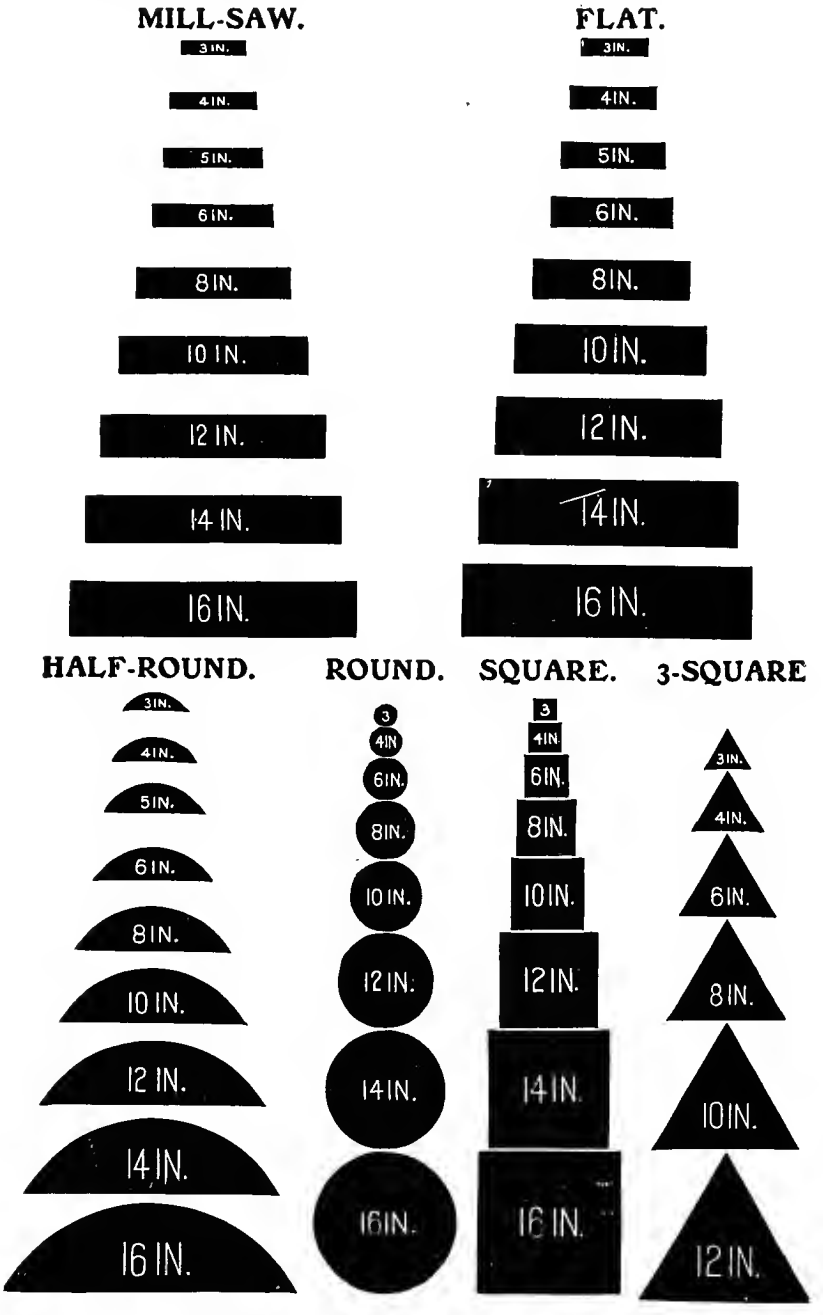
GENERAL DESCRIPTION.

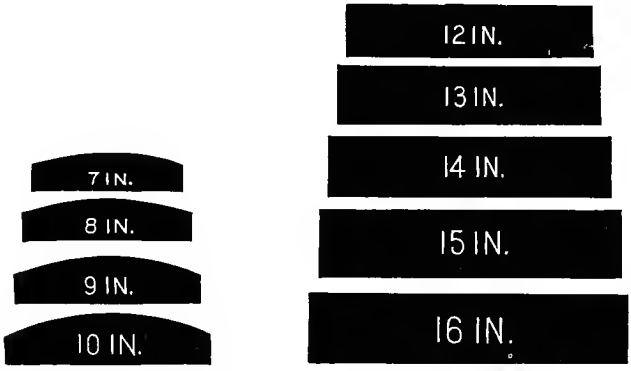
Of all tools known there are none used for so many purposes and of so many styles and kinds as files. There are several hundred kinds of regular files and several thousands of regular and special combined, all of which are designated by a name according to the length, shape and grade of the cut; besides the hundreds of special names for the purposes for which they are made and used.

The kinds in common ordinary use are Flat, Mill, Hand, Square, Round, Half-Round and Three-Square Files, and Flat, Half-Round, Cabinet and Half-Round Rasps, Horse and Shoemakers Rasps.

The name "Flat File" is not used because the file is flat, but it is the name given to a particular kind of file, for Flat, Mill and Hand files are, in appearance, all flat files.

Full sectional sizes and shapes of the file steel of which most of the regular files are made.





SHOE RASPS. **HORSE RASPS.**

Many of the shapes now accepted by the trade as regular stock goods were originated and first made by us, such as Great American Cross-cut Saw Files, Chisel Point Files for Inserted Tooth Circular saws, Acme Files with safe back for filing Hand-saws, etc.

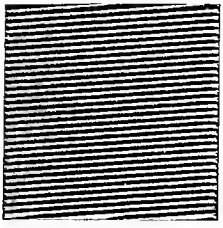
MACHINE MADE VERSUS HAND MADE FILES.

Some years ago there was much doubt, argument and speculation as to the relative quality of machine made and hand made files which now, however, has passed away in favor of the machine made files for we can and do make finer files with machinery than can possibly be made by hand; we make a file for special use in which the teeth can hardly be seen with the naked eye, there being 150 teeth to the inch. There are some files yet cut by hand and people often wonder how a file cutter can space the different grades of teeth so regularly with a hammer and chisel guided only by the eye. The fact is a hand cutter of files is not guided by sight near so much as by the feel with the chisel and the weight of the hammer. A good hand file cutter, blindfolded, can cut one file nearly like another.

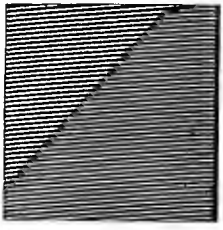
Illustrations showing the different "cuts" in general use. These are engraved from files 12 inches long. If longer than 12 inches the "cuts" will be coarser; if shorter, they will be finer in proportion.

SINGLE CUT.

BASTARD.

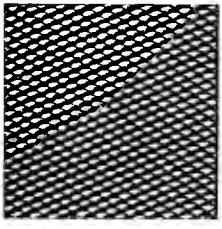


SECOND CUT.

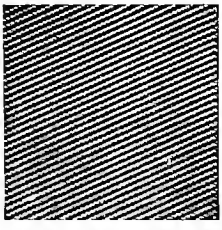


SMOOTH.

DOUBLE CUT.



BASTARD.

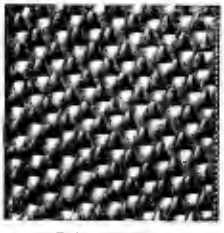


SECOND CUT.

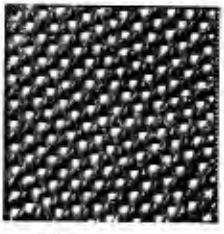
SMOOTH.

RASP CUT.

HORSE.



BASTARD.



SECOND CUT.

Every person using files should have a file brush and card to keep the files free from filings. To obtain good files select the brand of the maker who has the best means of testing the quality of their own make which is strictly the case with the DISSTON brand. We use **35,000 dozen** Disston Files annually in our Saw Works, Handle Factory and Machine Shops.

Rough-cut, Coarse-cut, Bastard-cut, Second-cut, Smooth-cut and Dead-Smooth-cut files mean coarser or finer cut files, that is, files having more or less teeth to the inch.

A "Rough-cut" file has the least number of teeth to the inch, and a "Dead-Smooth" file the greatest.

A "Coarse-cut" file is a degree finer than a Rough-cut, while Bastard-cut, Second-cut, Smooth-cut and Dead-Smooth-cut are each a degree finer. All regular files of the different lengths and shapes are graded into three regular or usual sizes of teeth known as Bastard cut, Second-cut and Smooth-cut. We have often been asked the meaning of the name "Bastard" as applied to the cut of a file. The name "Bastard" as applied to the cut of a file comes from the days when files were entirely made by hand and the name is supposed to have been given to a "cut" between what was termed a "rough-cut" and the finer grades of cutting and the file became a standard, taking the place of rough or coarse cuts and has been known since then as the "Bastard-cut." The same is the case in the names of "Flat" Bastard and "Hand" Bastard files, while both are the same as to cut, they vary a little in shape, and both are often used for the same purpose.

All the files in ordinary use as named above, except the Three-Square, are cut with teeth two or more degrees of coarseness or fineness for different kinds of work. The "Bastard-cut" is the ordinary cut, that is, there are more ordinary files "Bastard-cut" than any other cut.

Three-Square files are never cut coarser than Bastard-cut but generally cut finer.

There is no established rule fixing a certain number of teeth to the inch for Bastard-cut or any cut, consequently there may be a slight variation in the cuts by different makers.

SINGLE-CUT AND DOUBLE-CUT FILES.

A "Single-cut" file has but one course of chisel cuts across the surface, the cuts are parallel to each other, but oblique across the file blank.

A "Double-cut" file has two courses of chisel cuts crossing each other and both oblique across the file blank. The first course is called the "Over-cut," the second course is called the "Up-cut" and its direction being across the first course the chisel cuts through the over-cut, consequently the teeth of double-cut files are "points" and the teeth of single-cut files are "chisels."

KINDS, SHAPES and USES of FILES.

"Flat Files" are forged tapering from near the centre to point, are narrower and slimmer at point, are double-cut on side and the edges single-cut. These are generally used by machinists and mechanics on coarse and rough work.

"Hand Files" are forged thinner from near centre to point; are parallel in width and double-cut on sides, one edge is single-cut, but the other edge is not cut in order that the file may be used in a corner without filing both sides of the angle. They are generally finer than bastard-cut and are used by machinists and engineers for finishing flat surfaces, etc.

"Square Files" are forged tapering, some are made the same size from heel to point, generally double-cut on the four sides though a few are made single-cut. These are used where other files cannot be employed on account of their width, *i. e.* filing apertures, dressing out square corners, etc.

"Half-round Files" are forged tapering from near centre to point; double-cut on the round and flat sides, are used for general machine shop work.

"Mill Files" are forged tapering from near centre to point; are thinner and narrower at point; some are made with one and others with two round edges, single cut on the sides and edges. These are generally used for filing Mill Saws, sharpening Planer Knives, Mowing and Reaping Machine Cutters, and for certain kinds of work by mechanics, such as lathe work, draw-filing, etc. Having chisel teeth, they leave a comparatively smooth surface, which double-cut point teeth do not, though the double-cut point teeth cut faster. A few Mill Files are double-cut.

"Round Files" are generally forged tapering, though some are made of uniform size from heel to point, and are single-cut. These are used principally for gulletting, enlarging holes. etc.

"Three-Square Files" are made from three-cornered steel, generally forged tapering, have teeth on three sides only, double-cut to the point, leaving the edges very sharp. They are sometimes made single-cut, also blunt or parallel. Used principally for cleaning out sharp angles, filing cutters, taps, etc.

"Taper Saw Files" are also made of three-cornered steel, usually forged tapering, but differ from the Three-Square in that they are smaller, generally single-cut, have teeth on edges as well as sides, and are not cut quite to the point. They are also made double-cut as well as blunt or parallel. "Tapers" are used for filing band saws and

all small saws. The double-cut Tapers having point teeth file faster than the single-cut but the latter, having chisel teeth, file smoother.

Some Tapers are forged tapering at both ends, without tang for handle, are single cut at both ends, making two files in one piece. These are termed "Double End" or "Reversible Tapers."

Again, some Tapers are made longer than others from the same size steel and are called "Slim Tapers." There is a greater length of stroke in filing with these.

KNIFE Files are forged tapering and similar in shape to the blade of a pocket knife; are double-cut and used for filing the inner angles of the sear, mainsprings of gunlocks and work of similar shape.

RASPS.

Rasps differ from single or double-cut files from the fact that the teeth are detached and not shaped like single or double-cut point teeth—each rasp tooth being made with a pointed tool called a "punch." The essential features are that the teeth thus formed are so placed that in use they produce uniform work and cut fast.

The ordinary Horse-shoeing Rasp is forged the same at both ends, has punched teeth on one side and double-cut teeth on the other. Some Horse Rasps are forged with a tang at one end for handle, punched teeth on one side and double-cut teeth on the other. In the ordinary Horse Rasp the punched teeth on one side and double-cut teeth on the other are formed to cut from each end to the centre. Horse Rasps are single cut on the edges.

Flat Wood Rasps are forged similar to Flat Files, are single-cut on the edges and punched teeth on the sides.

Half-Round Wood Rasps are formed similar to Half-Round Files, have punched teeth on both round and flat sides.

Half-Round Shoe Rasps are forged parallel to width, with sides slightly tapered from the middle. The ends are round and single-cut; the edges are not cut; the sides are usually made half file and half rasp reversed and are fast taking the place of the old fashioned Shoe Rasp.

Cabinet Rasps and Files are half-round; forged thinner than other half-round rasps and files. The rasp is punched on round and flat sides and some have their edges single-cut. The File is double-cut on round and flat sides. These Rasps and Files are used by cabinet, saddle-tree, pattern and last-makers, gunstock makers and fine woodworkers generally.

There are many other files which are more or less used, such as—

Arch Files,	Equaling Files,	Riffler Files,
Auger Bit Files,	Gin Saw Files,	Pillar Files,
Bone Files,	Feather-edge Files,	Pit Saw Files,
Band Saw Files,	Gulleting Files,	Stave Saw Files,
Cant Files,	Lock Files,	Slotting Files,
Cotter Files,	Mowing Machine Files	Topping Files,
Doctor Files,	Needle Files,	Tumbler Files,
Entering Files,		Etc., Etc.

To describe these, their shapes and uses would extend this article unduly, for in connection with them the whole class of Superfine Files has been omitted.

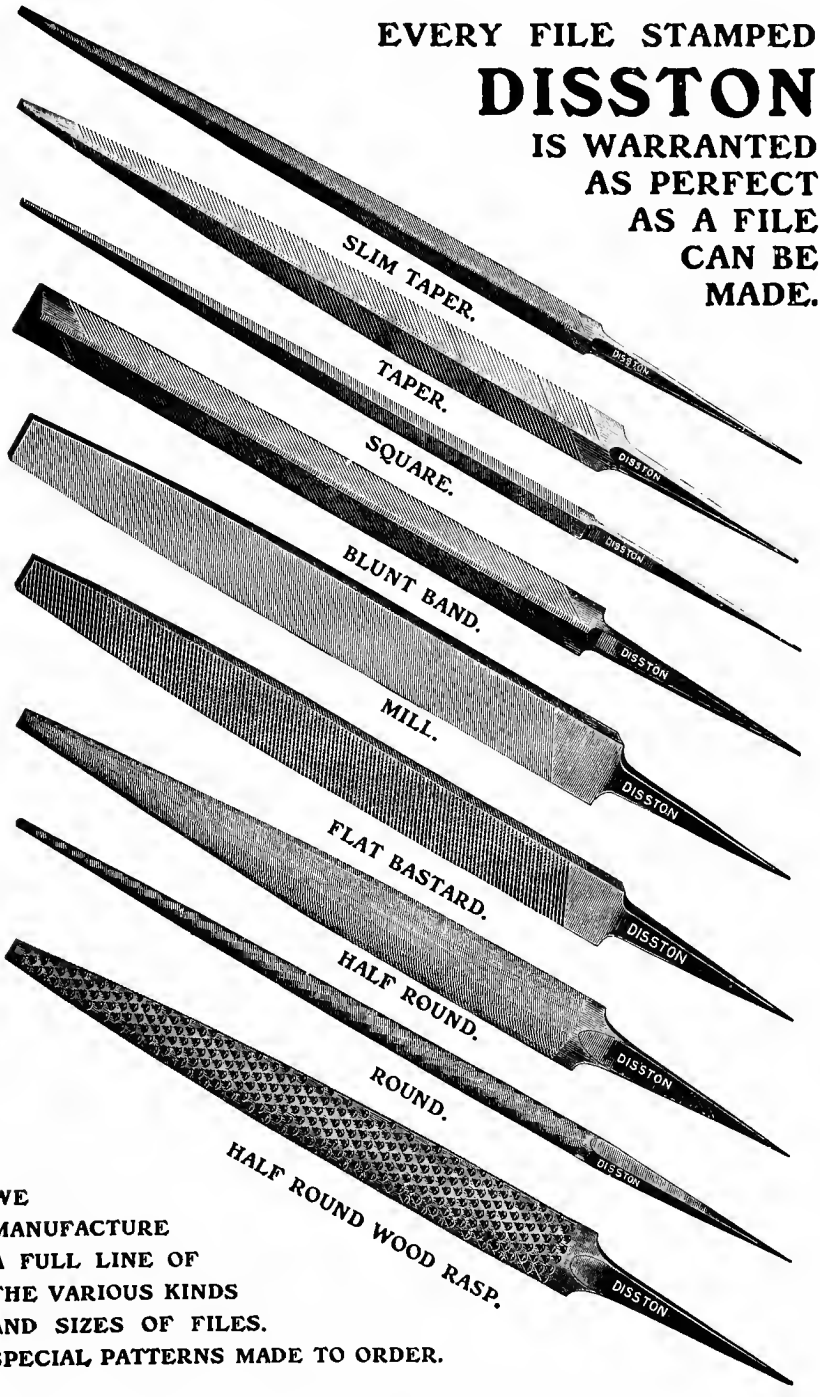
These latter are made in various shapes and sizes, with extremely fine teeth, graded from No. 00 (the coarsest) to No. 8 (the finest). They are used principally for fine tool making and work on fine machinery, where close, smooth filing is necessary.

Section of Superfine File Department.

EVERY FILE STAMPED

DISSTON

IS WARRANTED
AS PERFECT
AS A FILE
CAN BE
MADE.



WE
MANUFACTURE
A FULL LINE OF
THE VARIOUS KINDS
AND SIZES OF FILES.
SPECIAL PATTERNS MADE TO ORDER.

MACHINE KNIVES.

To produce good knives there are three important requisites;—Good steel, good temper, and good workmanship. The "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 steel face to back in the "Disston" Knives insures the strongest union possible, see illustration; the

temper cannot be excelled for uniformity and toughness, and our workmanship is the best that skilled labor can produce.

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 sample knife face down on a piece of paper and mark around to show 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 sample piece of moulding or an outline drawing of shape of moulding desired, or ordered by pattern number as shown in National Moulding Book, list adopted April 15th, 1896, by Sash, Door and Blind Manufacturers' Association; also give width of cylinder head and size of bolt used.

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

DISSTON MACHINE KNIVES.

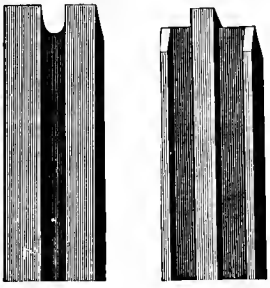
PLANER KNIVES.

BACK KNIVES.
BARKER KNIVES.
BEADING KNIVES.

We desire to call your particular attention to the Disston Machine Knives, of which we manufacture a full and complete line.

CHIPPER KNIVES.
CONCAVED KNIVES.
CONVEXED KNIVES.

SOLID MILLED MATCHER BITS.

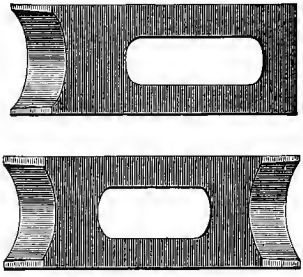


BEVELED EDGE STEEL.

PLANER KNIFE STEEL.

PAPER KNIVES.

CHAIR ROUNDING KNIVES.

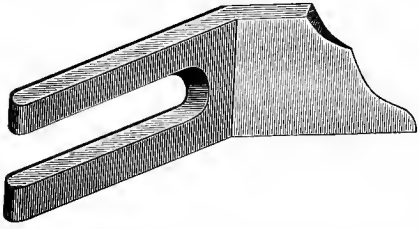


EXCELSIOR KNIVES.
GAINING CUTTERS.
HOG KNIVES.
HOOP KNIVES.
JOINTER BITS.

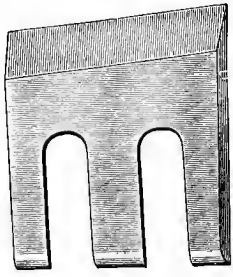
Having made Knives for years and in our own factory use quantities of Planer Knives, Moulding Knives, Shear Blades, etc., we therefore have a practical knowledge of what they should do, and make them so they will do it.

JOINTER KNIVES.
LISTING KNIVES.
MATCHER BITS.
MOULDING CUTTERS
MOULDING CUTTER BLANKS.

COPE CUTTERS.



SPOKE KNIVES for DEFIANCE LATHES.



SHINGLE JOINTER.
SIDING KNIVES.
STAVE KNIVES,

The Disston Knives are manufactured of a Steel made in our works expressly to suit the purpose intended; our method of welding the face to back insures the strongest union possible; the temper is uniform throughout, and the results obtained warrant us in claiming the

TENON MACHINE CUTTERS.
FLAT or SPIRAL VENEER KNIVES.

DISSTON KNIVES ARE UNEQUALED.

CIRCULAR

CORK, LEATHER, PAPER OR CLOTH KNIVES.

Cork Knife.

Our stock for these knives is made especially for the purpose and is the finest quality of edge-tool steel. This with our new process of tempering and grinding and the highest class of workmanship, enables us to turn out knives that for general superiority stand unequaled.

In ordering knives give diameter, gauge, size of hole, whether to be beveled on both sides or only on one, and how deep bevel is to run. If knife is a large one and screws to plate or flange send flange to us or an accurate tracing of holes, stating whether one or both sides are to be beveled; if only one side, state whether screw holes are to be counter-sunk or flat on beveled side. Circular and straight knives for cutting rubber, cork, etc., made to order.

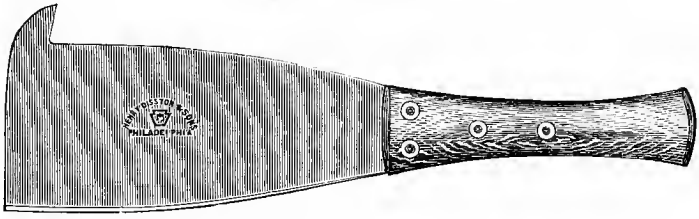
We manufacture all sizes and styles of Springs, Cutting Implements and Tools.

Flat Springs,	**Slitter Blades,**	**Candy Knives,**
Loom Springs,	**Perforator Blades,**	**Shuttle Covers,**

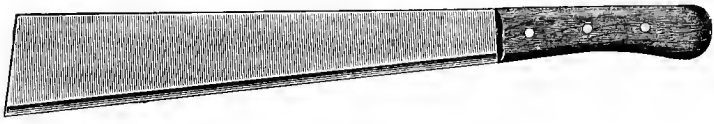
Flat and Curved Plates for Scoring, Cutting and Creasing Presses. Steel Cut to all shapes.

DISSTON KNIVES.

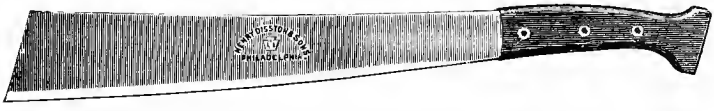
CANE KNIFE.



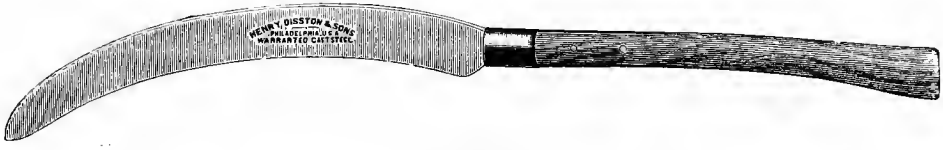
CORN KNIFE.



HEDGE KNIFE.



HEDGE TRIMMER.



MACHETE.

These are Made of Various Patterns.

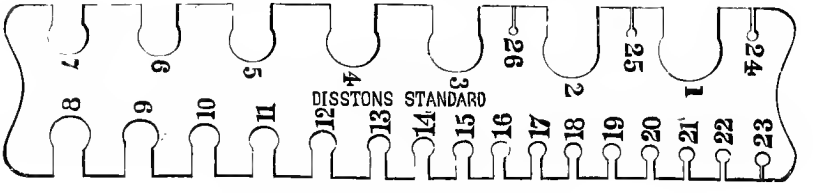
TABLE SHOWING VALUE *of* DISSTON WIRE GAUGE

Corresponds Exactly with Stubb's English Gauge.

In Decimal and fractional parts of an inch, with 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
	1/4	.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 WIRE GAUGE



No. 1. Small Gauge, 1 to 26

USEFUL INFORMATION.

To find circumference of a circle multiply diameter by 3.1416.

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

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

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

To find side of an equal square multiply diameter by .8862.

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

To ascertain heating surface in tubular boilers multiply $\frac{2}{3}$ the circumference of boiler by length of boiler in inches and add to it the area of all the tubes. The actual effective heating surface of a tube, however, is only $1\frac{1}{4}$ times its diameter, multiplied by its length.

One-sixth of tensile strength of plate multiplied by thickness of plate and divided by one-half the diameter of boiler gives 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 piston by the average steam pressure. Multiply this product by the travel of 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 boiler and on piston we advocate figuring the average steam pressure on the piston at one-half the pressure carried on boilers. The result will then be nearer the actual power.

HYDRAULICS.

A cubic foot of water contains $7\frac{1}{2}$ gallons, or 1,728 cubic inches, and weighs $62\frac{1}{2}$ pounds.

A gallon of water contains 231 cubic inches, and weighs $8\frac{1}{2}$ 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; thus doubling the diameter of a pipe increases the 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 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 number of gallons in 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 contents of a gallon in inches), and quotient is 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 SECURE 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 lead 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 same pressure as the safety valve when that is blowing off. If not, then one is wrong, and the gauge should be tested by one 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 water gauge, learn the cause and correct it.

4. GAUGE COCKS AND WATER GAUGES must be kept clean. Water gauge should be blown out frequently, and the glasses and pass-

ages to gauges kept clean. The Manchester, Eng. 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 fire as soon as it can be done without increasing the heat. Neither turn on the feed, start or stop engine, or lift safety valve until 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.

Fusible 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 SECURE 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 $\frac{1}{16}$ inch scale or soot to collect on surfaces between cleanings. Hand-holes should be frequently removed and surfaces examined, particularly in case of new boiler, until proper intervals have been established by experience. Scale $\frac{1}{16}$ of an inch causes a loss of about 13% in fuel, and $\frac{1}{4}$ 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 condition of water. Empty the boiler every week or two, and fill up afresh. When surface blow-cocks are used, they should be often opened 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 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 frequently parts in contact with copper or brass where water is present, for signs of corrosion. If 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 $\frac{3}{16}$ of an inch and a safe working load is assumed to be 45 lbs. per inch in width, which, 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, and 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 $\frac{3}{16}$ 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 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 quotient by $3\frac{1}{7}$, then add the product of twice the distance between centre of 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 that 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 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 1.000 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 small end, square the remainder, multiply the product by the length of log and divide by 16, the result will be the board measure contents of log. Logs over 24 feet in length are usually measured at centre for diameter.

PROGRESSION.

In 1840 Henry Disston made but FEW Saws a day.

1850 Made SOME Dozens each of various kinds of Saws per day.

1860 The DISSTON SAW WORKS turned out HUNDREDS OF DOZENS of Saws per week.

1865 Factory destroyed by fire—immediately rebuilt.

1870 Sales increased to THOUSANDS OF DOZENS per month. Factory again destroyed by fire and rebuilt.

1880 Mounted up to TENS OF THOUSANDS OF DOZENS per month.

1885 Handle Department destroyed by fire—rebuilt at once.

1890 Leaped to HUNDREDS OF THOUSANDS OF DOZENS per year.

1900 MILLIONS of Saws of various patterns were made AND SOLD.

1918 SALES STILL INCREASING AND THE DEMAND FOR DISSTON BRAND OF SAWS AND TOOLS UNPRECEDENTED.

AND WHY?

It is the perfectly natural result of an earnest, well-directed effort to make Saws that would DO the work intended; formed to do it with the greatest ease; of a superior quality of material so tempered as to hold the cutting edge the longest possible time, and finished in a workmanlike manner.

WE MANUFACTURE A COMPLETE LINE OF

Anvils (Sawmakers')
Back Saws
Band Saws
Barrel Stave Saws
Beef Splitter Saws
Bevels
Bilge Saws
Brazing Clamps for Band Saws
Burnisher—Cabinet
Butcher Blades and Saws
Butting Saws
Cabinet Scrapers
Canadian Webs
Cane Knives
Cementers Trowels
Chisel Tooth Circular Saws
  Machine for Sharpening
Circular Knives
Circular Saws for Wood
Circular Saws for Metal
Circular Saws for Slate
Clamps—for Brazing Saws
Clamps—for Filing Saws
Combination Hand Saws
Compass Saws
Concave Saws—Circular
Conqueror Swages
Coping Saw
Corn Knives
Crosscut Saws and Tools
Currier Blades
Cylinder Saws
Deal Saws
Dehorning Saws
Discs for Cutting Cold Metal
Doctor Blades
Dovetail Saws
Drag Saws
Eccentric Bandsaw Swage
Edger Saws
Edging Trowels
Emery Wheel Gummer
Fay Webs
Felloe Webs
Ferrules
Files and Rasps
  Side Files
Filing Guides and Clamps
Flanges for Saws
Flooring Saws
Futtock Saws
Gang Saws
Gauge Saws
Gauges—Carpenters' Marking
  " Mortise
  " Wire
Gin Roller Blades
Grooving Saws
Gummers—Saw
Hack Saw Blades, Frames
Hack Saw—Handsaw pattern
Half-back Bench Saw
Handles for Saws
Hand, Panel and Rip Saws
Hand Hack Saws
Handsaw Jointer
Hand Shear
Heading Saws
Hedge Knife
Hedge Trimmer
Ice Saws
Inserted Tooth Circular Saws
Joiner Saws
Jointer for Handsaws
Keyhole Saws
Kitchen Saws
Knives—Cane, Corn, Hedge
Knives—Circular for Cork,
  Cloth, Leather, Paper
Knives—Machine
Levels—Masons', Pocket,
  Shafting, etc.
Leveling Blocks for Bandsaws
Lock Corner Cutters
Long Saws
Machetes
Machine Knives
Mandrels
Mason's Mitre Rods
Metal Slitting Saws
Midget Saw Punch
Mill Saws
Milling Saws for Metal
Mitre-box Saws
Mitre Rods—Masons'
Mitre Saws—Circular
Mitre Squares
Mulay Saws
Nest of Saws
One-man Crosscut Saws
Pattern Makers' Saws
Pit Saws and Tiller Handles
Plastering Trowels
Plumb and Levels
Plumbers' Saws
Pocket Levels
Pork Packers' Saws
Post-hole Diggers
Pruning Saws
Pruning Hook and Knife
Pruning Saw and Knife
Punch for Saw Blades
Rail Hack Saws
Rasps
Re-Saws
Rift Saws
Saw Clamps & Filing Guides
Saw Knives
Sawsets
Saw Screws
Scrapers—Cabinet
Screw Drivers
Screw Press
Screw Slotting Saws
Screws—Saw
Scroll Saws—Fay's
Segment Saw
Set Gauge
Sets—Saw
Shafting Level
Shaper—Swage
Shear for Trimming
Shingle Saws
Ship-Carpenters' Saws
Side Files
Siding Saws
Slate Saws—Circular
Slicker Blades
Slitting Saws for Metal
Solder for Brazing Bandsaws
Speed Indicator
Springs, Tools, etc.
Squares—Machinists',
  Mitre, Try and Bevel
Square-hole Saws
Stair-builders' Saws
Stave Saws
Straight-Edges
Swages
Swage Bars
Tiller and Box Handles
Tools for Fitting X-cut Saws
Tools for Repairing Saws
Tools and Springs, etc.
Top Saws for Double Mills
Trowels—Brick
  Circle, Coke
  Corner,
  Garden, Gauging,
  Plastering,
  Pointing, etc.
Try Squares
Turkish Saws
Vegetable Cutters
Veneering Saws
Webs—Canadian, Felloe,
  Fay, Turning or Chair
  Cabinet Pattern,
Web Saw Frames
Whip Saws
Wire Gauges
Wood Saws
  Boys' Buck Saws
  Bucks, Frames, Rods
Wrench for Chisel Tooth Saws

STEEL

Disston High Speed Steel
  " Special Tool "
  " Extra Tool "
  " Standard Tool "
Disston Special Steels for all
  purposes—
  Sheets, Bars, Hot Rolled,
  Cold Rolled, Hammered

TERMS

USED IN THE

MAKING, RUNNING *and* REPAIRING SAWS

DISSTON

THE BRAND THAT STANDS THE TEST OF TIME

HAS STOOD FOR ALL THAT IS BEST IN SAWS FOR THE PAST SEVENTY-EIGHT YEARS AND WILL MAINTAIN THAT REPUTATION IN THE YEARS TO COME

IT CARRIES A FULL WARRANTY


Quality
Tells