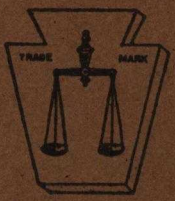
DISSTON

HANDBOOK ON SAWS



HAND SAW
AND
TOOL
SECTION

June 1912

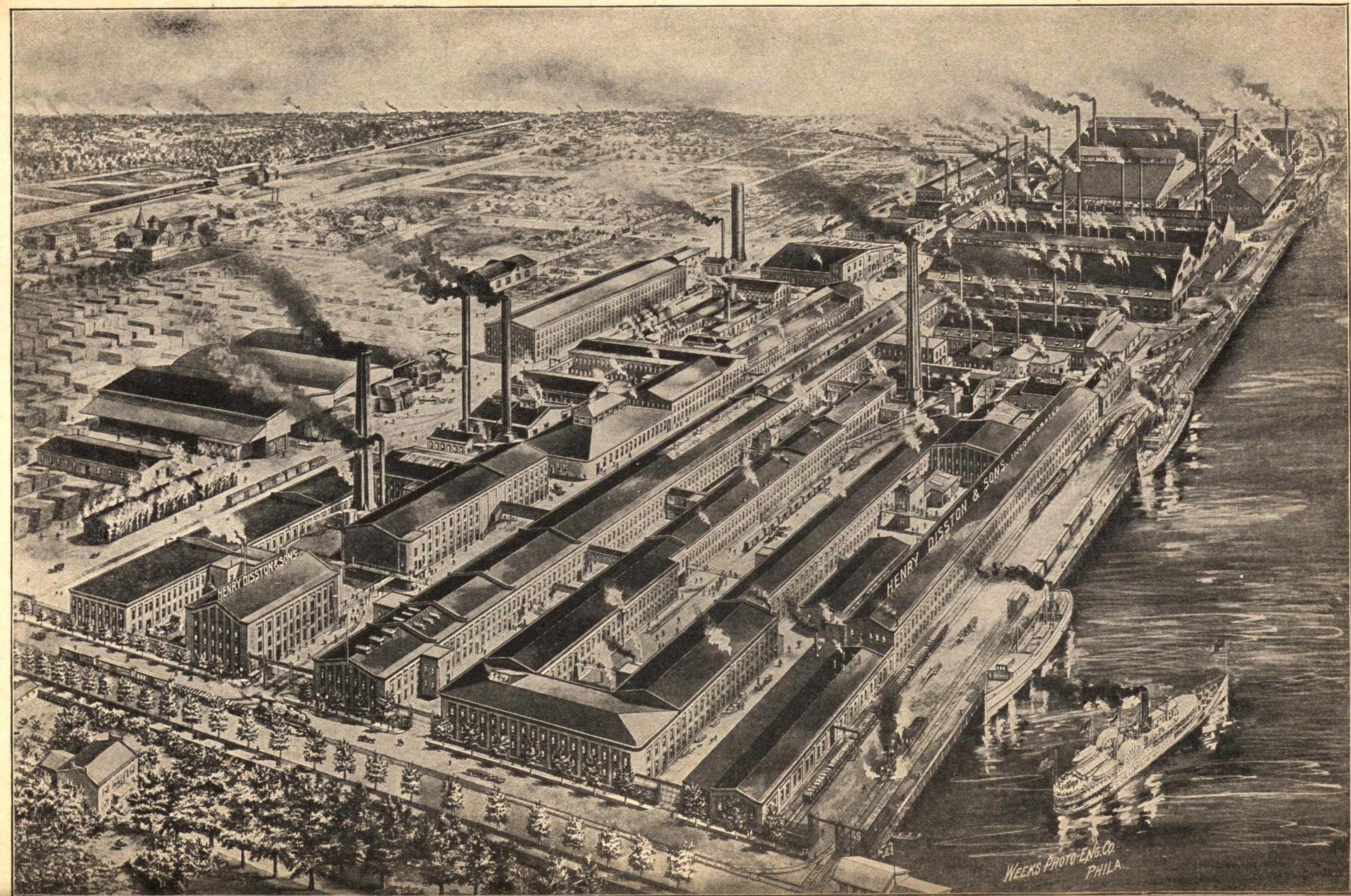
OUR AIM IS TO MANUFACTURE

"Disston Goods" of a Superior Quality

AND AT A COST TO MAKE THEM

PURCHASABLE BY ALL MECHANICS

D. LINC SOUDER.


HENRY DISSTON & SONS
HENRY DISSTON & SONS
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Disston Handbook

CONTAINING A TREATISE
ON THE CONSTRUCTION OF

SAWS

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

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

JUNE 1912

The
SAW
with "DISSTON" on it
is Guaranteed
SUPERIOR in QUALITY and FINISH
to any saw
without "DISSTON" on it.

1840

"If you want a Saw, 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."

Henry Disston

Reduced fac-simile of label used for "DISSTON" Saws.

NOTE:

The numerous requests for information, particularly concerning Handsaws, various Tools and Files, etc., from those not interested in the larger Saws, Band and Circular, and Tools for the Saw Mill, led us to publish this portion of our regular Handbook.

The articles describing the making of the goods are essentially short, for to cite each individual operation would require many pages. Only the most important processes, therefore, are referred to; though, of course, the numerous intermediate steps also have an important bearing on the workmanship and efficiency of the finished tool.

Having a thorough knowledge of the requirements of Saws and Tools, with Disston Crucible Steel as the foundation in manufacturing, it is the extreme care given each operation that results in the high efficiency which has justly earned a world-wide reputation for Disston Brand Goods.

All interior views of the factory shown are from photographs of sections only of Departments, and while serving to give some idea of the facilities, 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.

All goods branded "DISSTON" are fully guaranteed in Material and Workmanship

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

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 1836 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 30,000 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 temper 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., Crosscut 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 flat upon itself if necessary. No chain is stronger than its weakest link, no saw better than its weakest tooth.

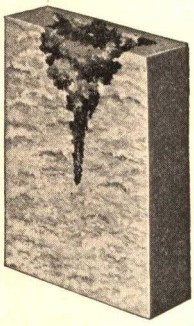
STEEL, therefore, is required absolutely free from blow-holes, pipes, seams, splits and other physical defects, it must be uniform in hardness—in a word, perfectly homogeneous.

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.

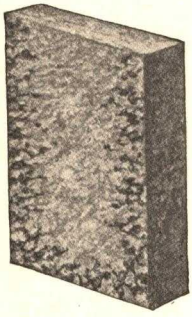
After repeated and unsuccessful efforts to procure steel of desired quality, Henry Disston in 1855 erected a Crucible Steel plant expressly adapted to the manufacture of SAW STEEL, and since, by constant effort and unlimited expenditure of time and money in research and improvement of process and machinery, the plant has been

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

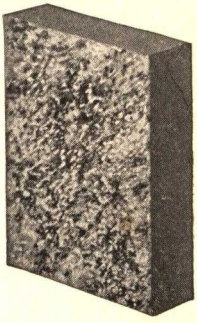
Illustrations Nos. 1, 2 and 3 show defects as they originate in the ingot under usual methods.



No. 1
Pipe Defect.



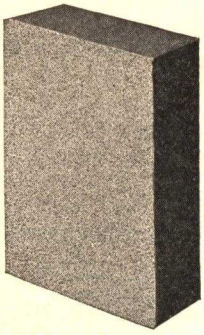
No. 2
Honey-combing Defect.



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

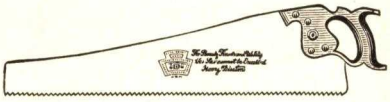
Tensile strength . . . . . 220,000 lbs.
Elastic limit . . . . . 168,000 "

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.

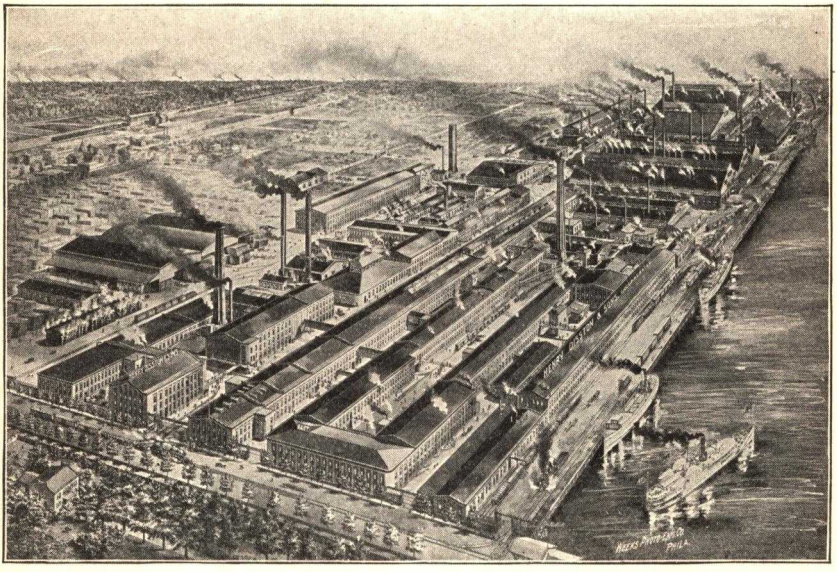
THE MAKING *of the*

DISSTON HAND SAW.



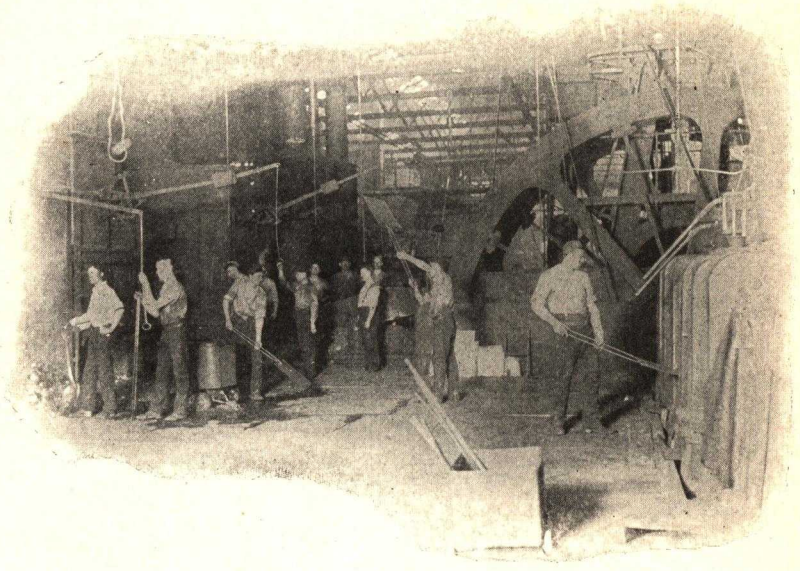
The operations required in the making of the DISSTON HAND SAW are both numerous and varied, to describe each would require considerable space, therefore the principal processes only will be taken up in their regular order.

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 fifty-eight buildings ; ground enclosed fifty acres, and there are 3,500 employees—the Disston Saw Works, without exception, being the largest in the world and its production —Quality and Quantity considered—the FINEST and GREATEST.

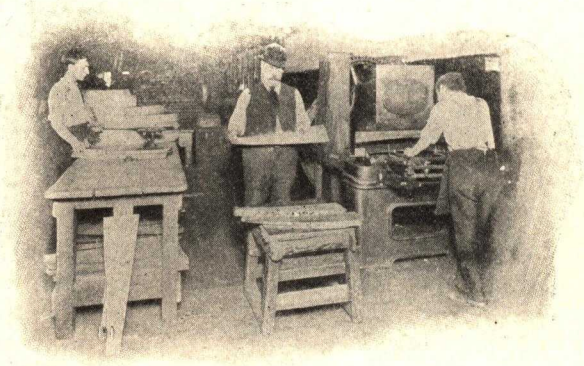


Rolling Hand Saw Plates.

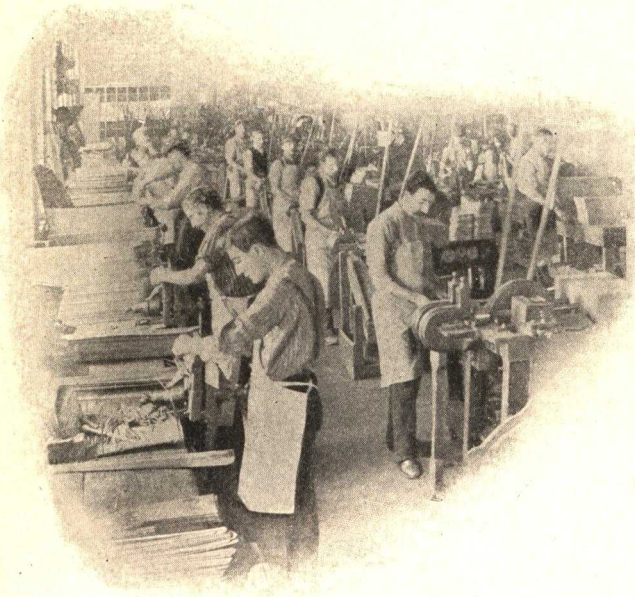
In the Saw Department the sheets of Crucible Steel, rolled to gauge, are trimmed under shears and cut into blanks for either straight or hollow-back saws as required. The blanks are now presumably of the same size and thickness, but to determine this, each blank is weighed, the heavier ones being used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

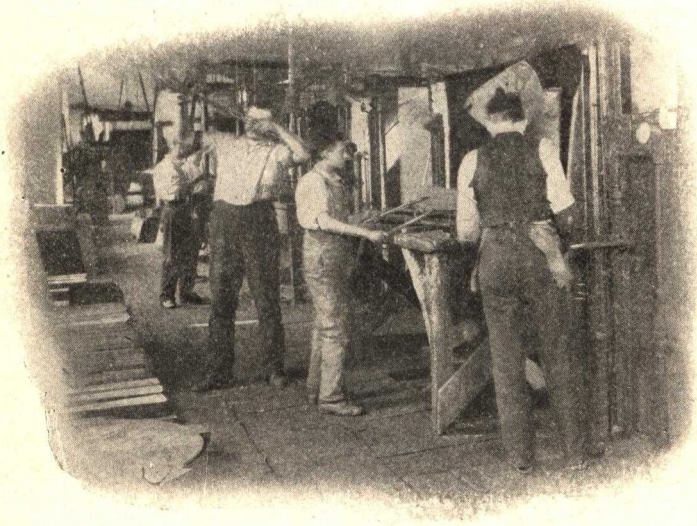


Trimming and Weighing.

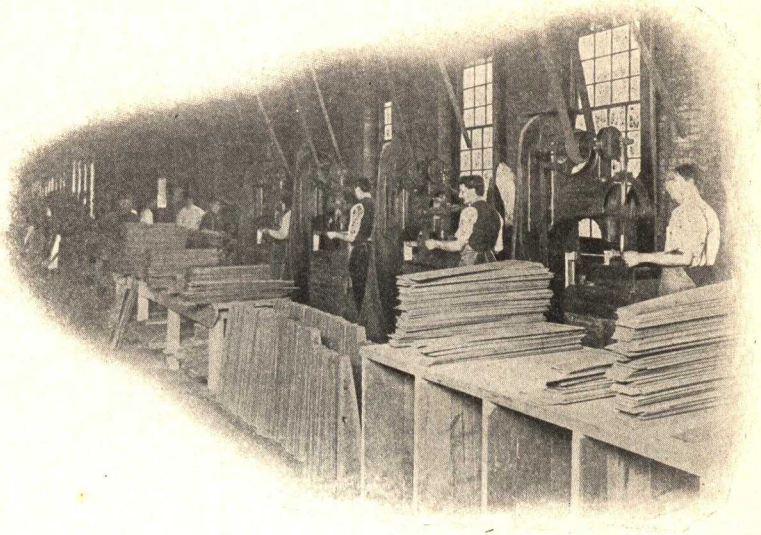


Toothing.

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

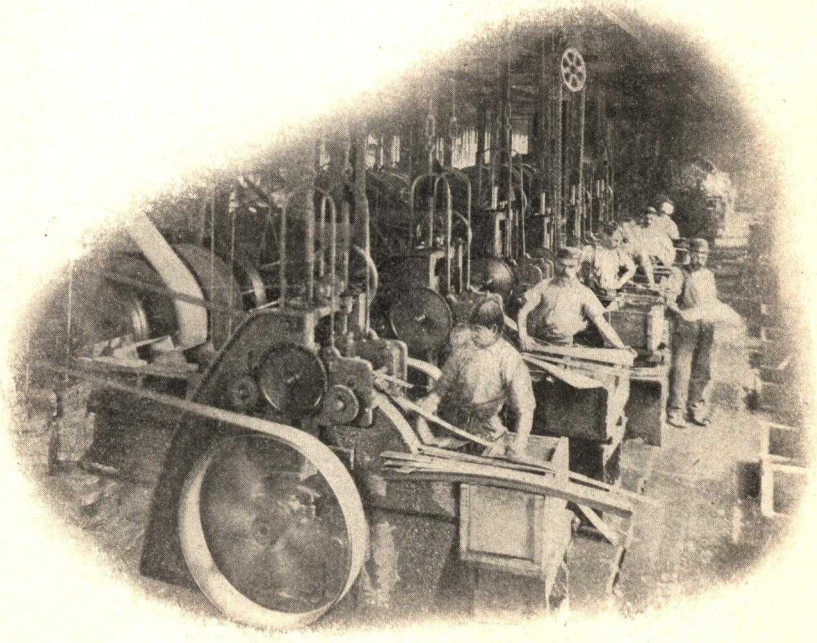


Hardening *and* Tempering.



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



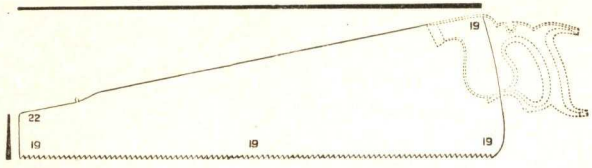
Grinding.

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.



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

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.

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."

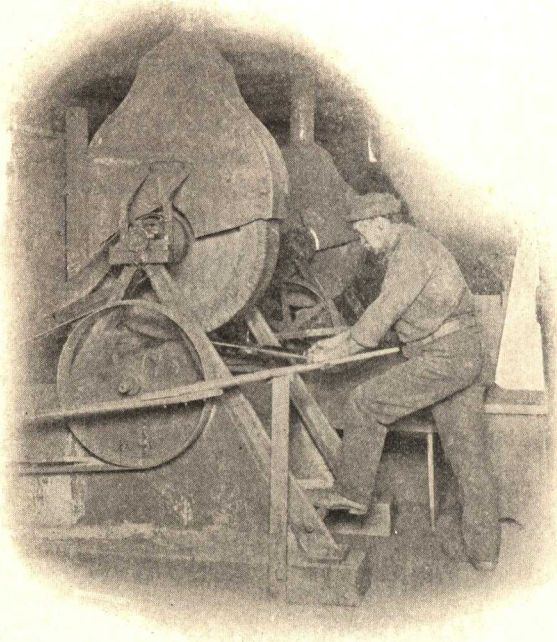
The Largest Grindstone here shown measures 72 inches diameter, 13 inches face.

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.

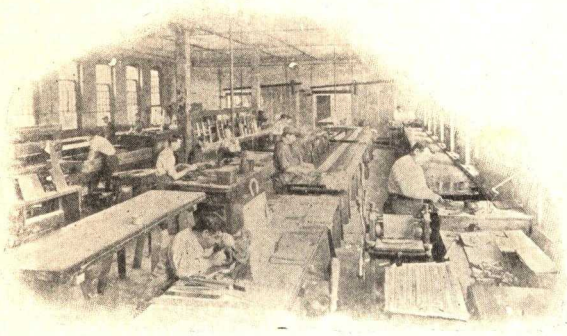
irregularities that may have been developed by the previous processes.

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.

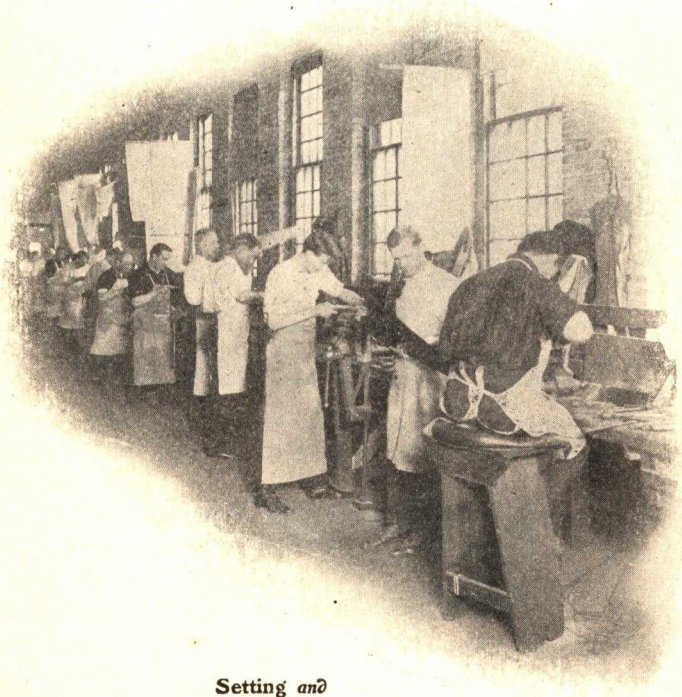
The blades now pass to the



Etching.

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

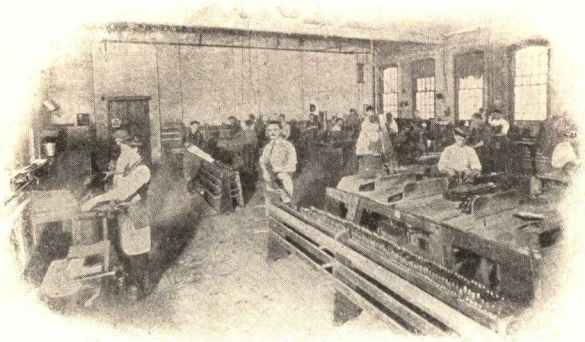
The next stage is "Setting the Teeth." Each tooth is set by one or more strokes of a hammer; the experienced workman performing this work with wonderful accuracy and rapidity. Setting the teeth of a saw consists of bending them so that the point of one tooth is inclined to the right, the next to the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

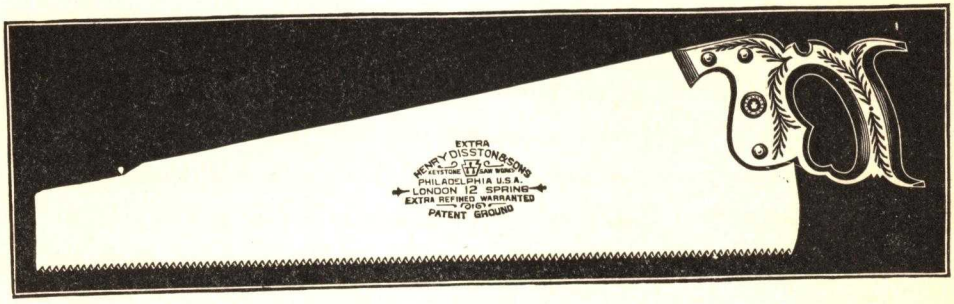
"The growth and development of the saw business in the United States has been phenomenal, as now and for some years past there have been practically no saws of any foreign manufacture imported into the United States, whilst on the other hand the American-made goods are exported very largely to all parts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

"THE WORLD IS OUR MARKET."

Construction

of

Saws



and

How to Keep Them in Order.

Quality Sells

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.

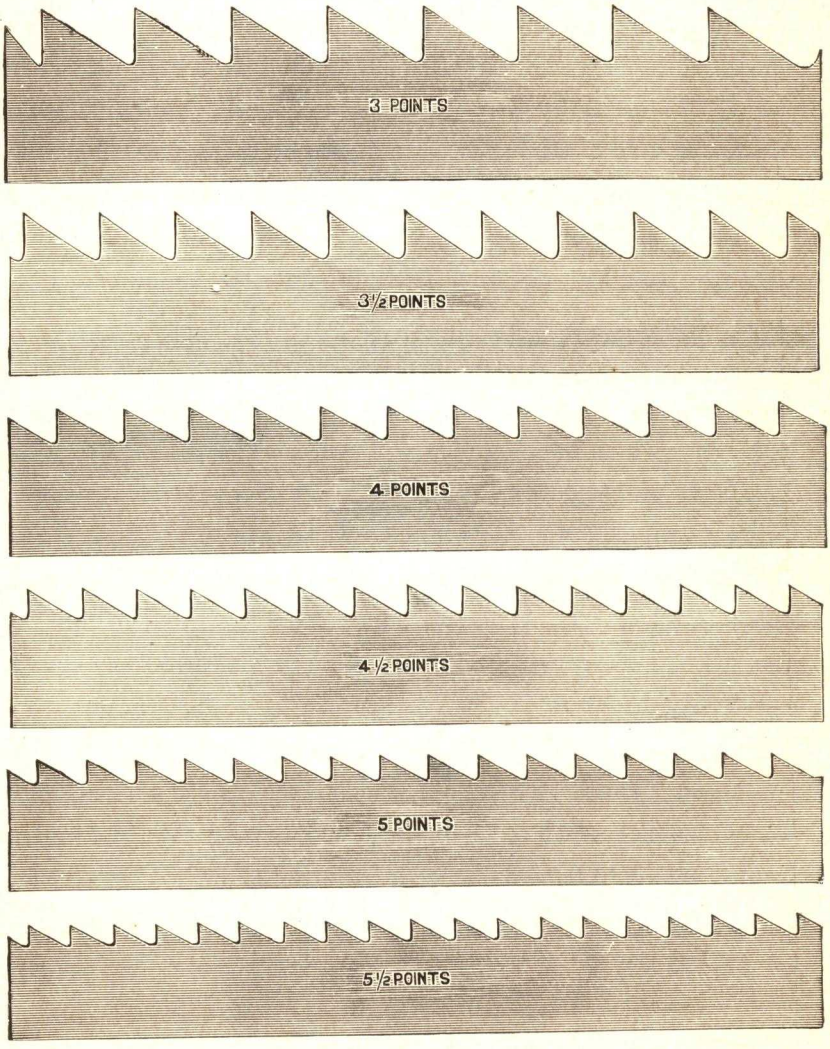
We take occasion to thank our patrons for their appreciation of our products. The High Standard, which is the basis of our constantly increasing business, shall be maintained, and we trust thereby to retain their good will and increase our trade in future.

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.

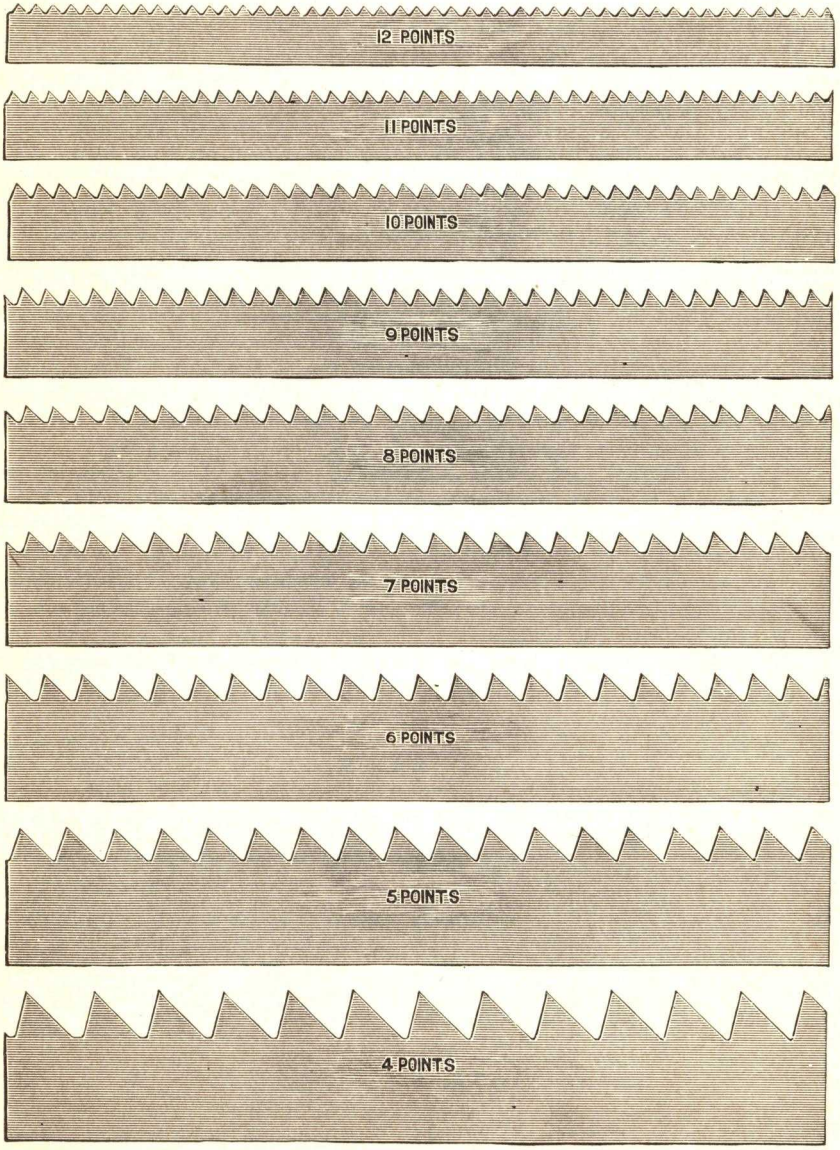
Rip saw teeth are graduated from butt to point of blade, the narrow end being one point to the inch finer than at butt; the "POINTS" being measured at butt of blade.

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.

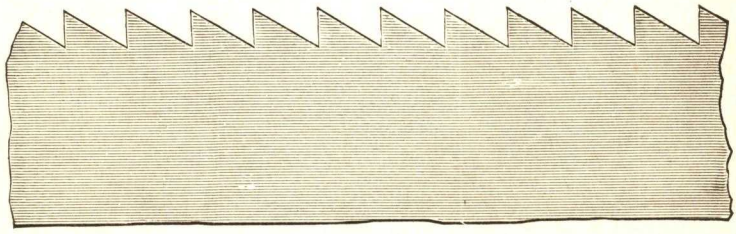


FIG. 1.

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

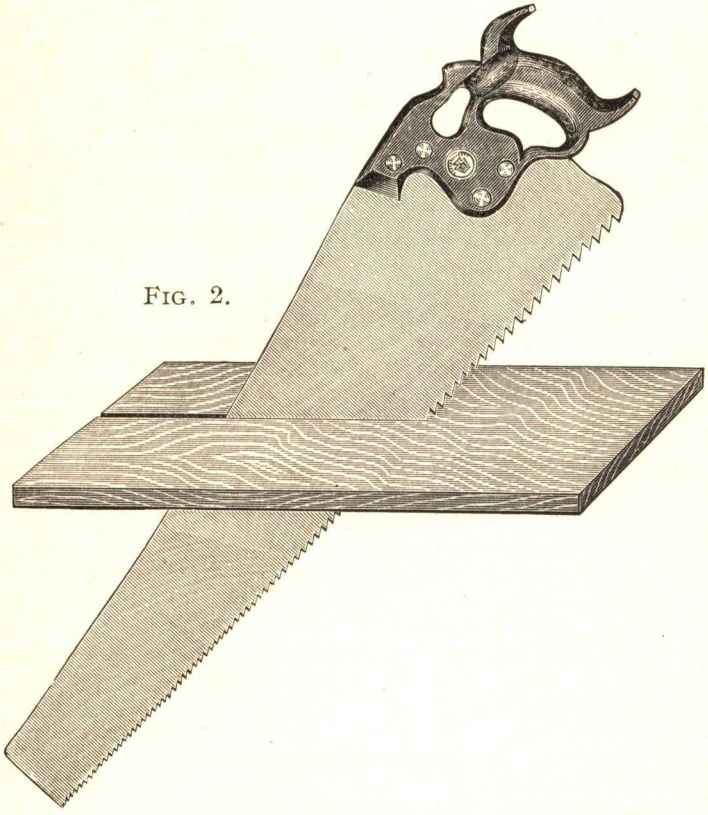


FIG. 2.

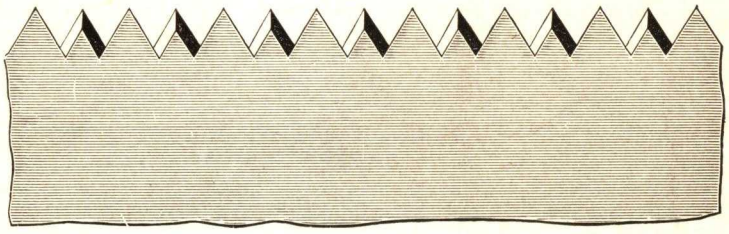
partakes a little of the nature of cross-cutting. In all cases where ripping is done, the thrust of the saw should be on an angle of about 45° to the material being cut, as shown in Fig. 2, this makes a shearing cut, an advantage that can be quickly demonstrated with an ordinary pocket knife cutting 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.

FIG. 4. FIG. 5. FIG. 6. FIG. 7.

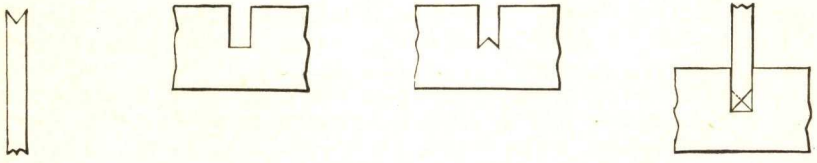
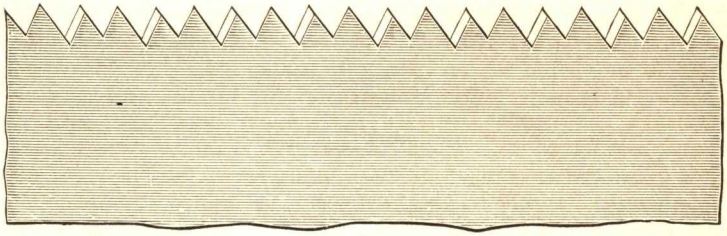


Fig. 4 shows how the groove should appear on looking down the edge of the saw; the action should be such that the bottom of kerf will present the appearance as shown in Fig. 5, and not like Fig. 6; the cutting action is as shown in Fig. 7, the cutting being done with the outside of tooth, the fibre of the wood is severed in the two places and the wood is crumbled out from point to point by the thrust of the saw.

The proper amount of bevel to give the teeth is very important, as is demonstrated by the above figures, 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

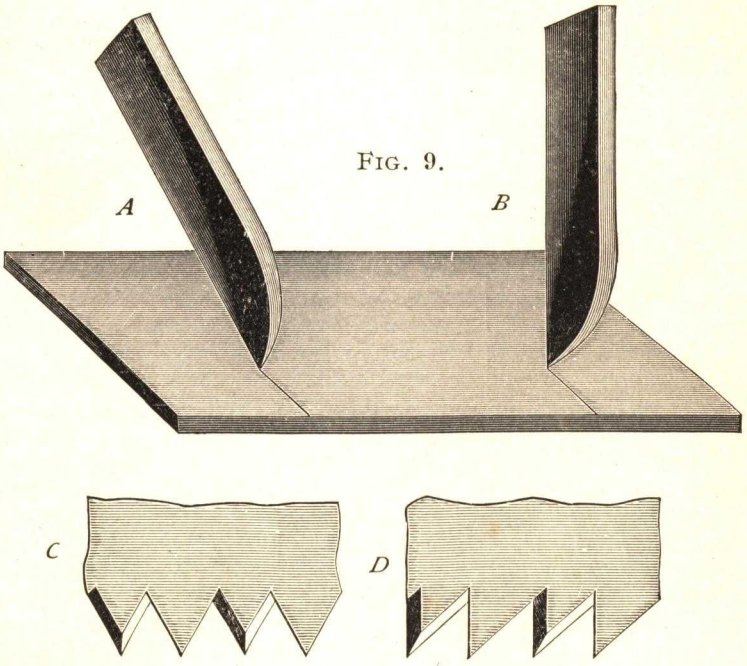
FIG. 8.



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. In Figs. 10, 11 and 12, the filer, as in all cases, files from the heel to the point, which is the only correct way. The file is supposed to be

FIG. 10.

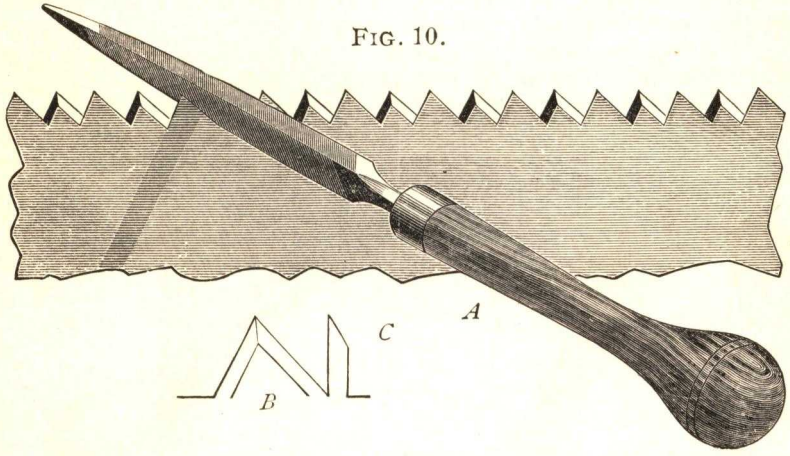
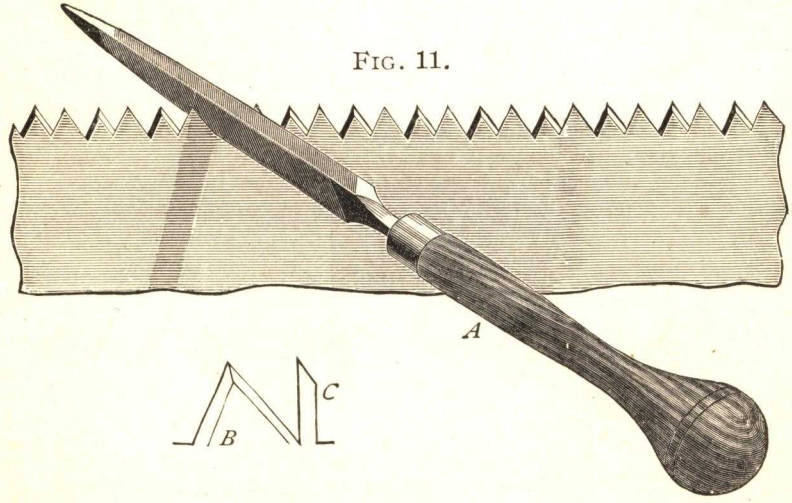


FIG. 11.



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.

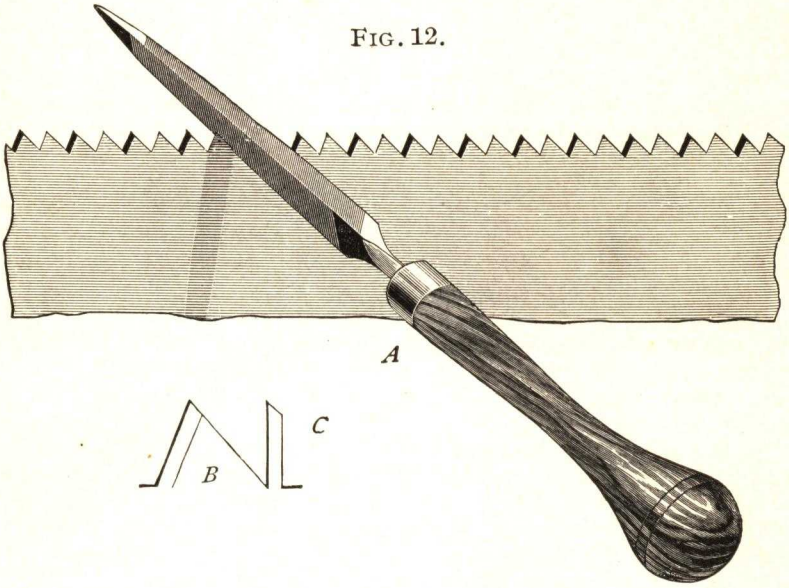


Fig. 12 is a still finer saw, having ten points to the inch. This saw has no fleam on back, the result being very noticeable at *C* and *B*. This style of point is for hard wood.

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.

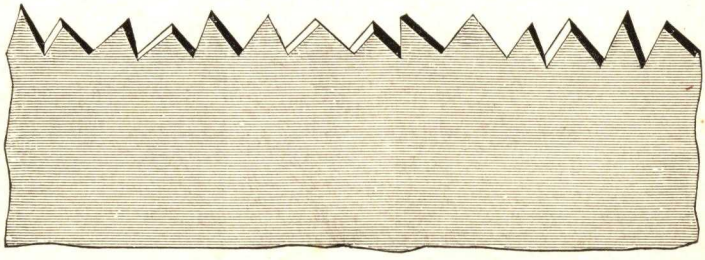


Fig. 13 is a representation of some of the saws we have seen ; there

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.

As we said in the preceding pages, and as will be seen by Figs. 10, 11 and 12, the filing should be done from the heel of saw toward the point. Many practical saw filers contend this is wrong, that the filing should be done from point of saw toward the handle, but the only support they have for their theory is that they do away with the feather edge that the filing from the heel of saw puts on the cutting face of tooth. The feather edge is no objection, as the main part of it is removed when the teeth are side-dressed after filing, as we direct in our summary of saw filing on page 48 Against the correctness of filing from point to handle may be cited the following objections:

Where a different angle of back is required (it being remembered that angle of face should be the same in nearly all cross-cut hand saws, and that angle of back governs angle of point), it will be found very difficult to obtain it without changing angle of face of tooth, and as the cutting duty is on the long side of face, any change is of course of great influence.

Again, (though we think the above argument sufficient) to file from point of saw, it is necessary to file with the teeth bent toward the operator; this will cause the saw to vibrate or chatter, which not only renders good, clean, even filing impossible, but breaks the teeth off the file.

In the preceding illustrations, we have only given 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.

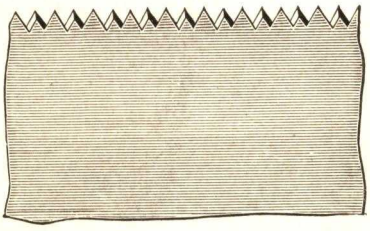
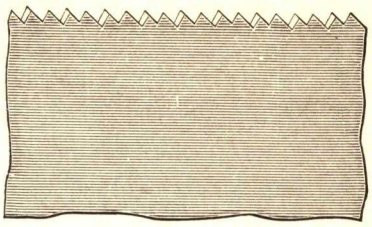


Fig. 14 is a section of an eleven-point saw suitable for the finer kinds of work on dry, soft woods. such as cutting mitres, dove-tailing, pattern work, etc.

Fig. 15 shows a section of saw with same number of points as Fig.

FIG. 15



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.

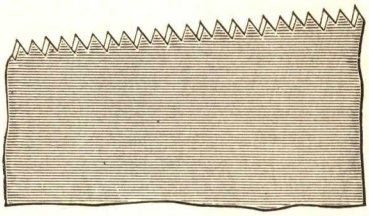
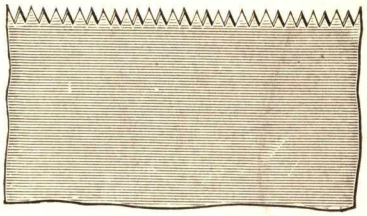


Fig. 16 is a still finer saw for fine work on the very hardest woods having same dress as Fig. 14.

FIG. 17.



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.

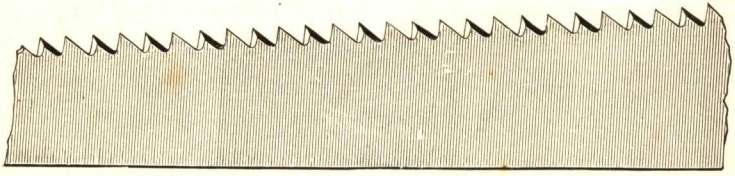
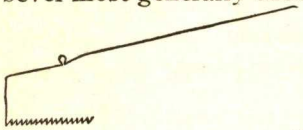


Fig. 18 is a section of a pruning saw which differs from a cross-cut hand saw in being thicker, having a little more pitch to the teeth and

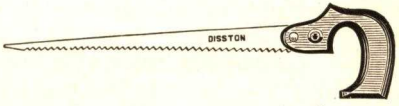
being ground thinner on the back in proportion to its width. These, of course, are made for cross-cutting only, as there is not as great a variety in the work, nor as much difference in the woods to be sawed as to degrees of hardness, being used only as a pruning saw on fruit and shade trees, which are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

The illustration on page 38 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.

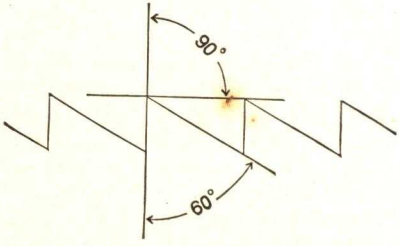
PANEL SAW is a term commonly applied to any Hand Saw with cross-cutting teeth, shorter than 26 inches in length. It was formerly used in designating cross-cutting Hand Saws with fine teeth, of any length, but is now obsolete in that particular.

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

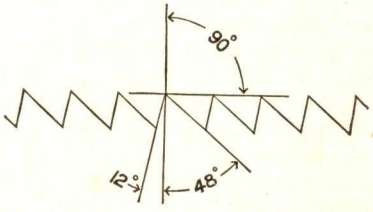
BACK SAW, sometimes termed Tenon Saw, is used for fine bench work, pattern-makers, joiners, etc., and is also made in special lengths and widths for use in mitre-boxes for cutting moulding, etc. The MITRE-BOX SAW has a peculiar shaped butt or heel, making the toothed edge two inches shorter than the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



CROSS-CUT TEETH ¼" PITCH.

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 70 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.

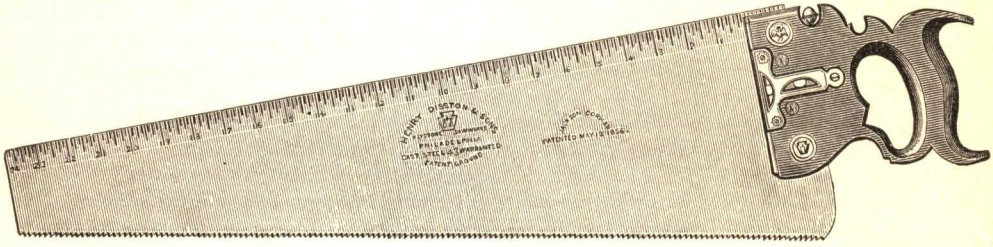
It is for these very reasons that various patterns of saws are made, and specially toothed for the different kinds of work. Experience in this line is the best teacher. Take a saw fitted up for sawing wood, try it on a piece of metal. No matter what kind of a saw it may be, or whose make, it positively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

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.

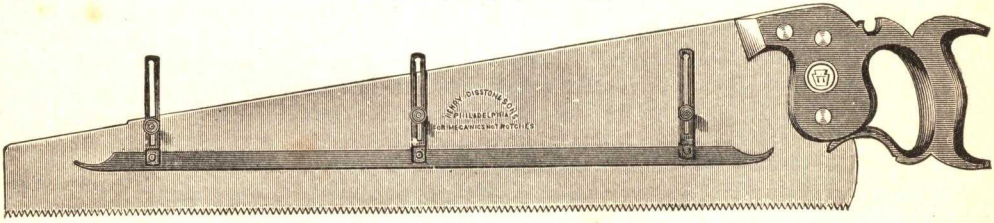
DISSTON
PATENT IMPROVED COMBINATION SAWS.

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.

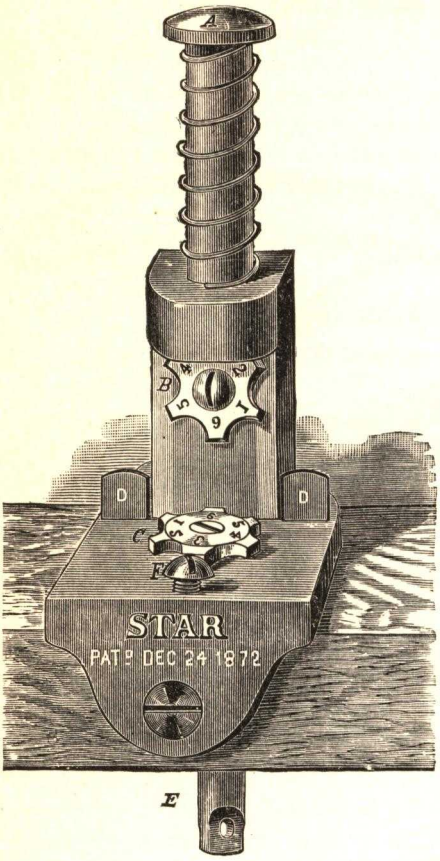


No. 43. Combination Saw, with 24-inch Square and Rule, Straight-edge and Scratch Awl; Apple Handle, with Plumb and Level attachment. Blade same quality as DISSTON'S No. 7 Hand Saw. Made in 26 inch length only.

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.



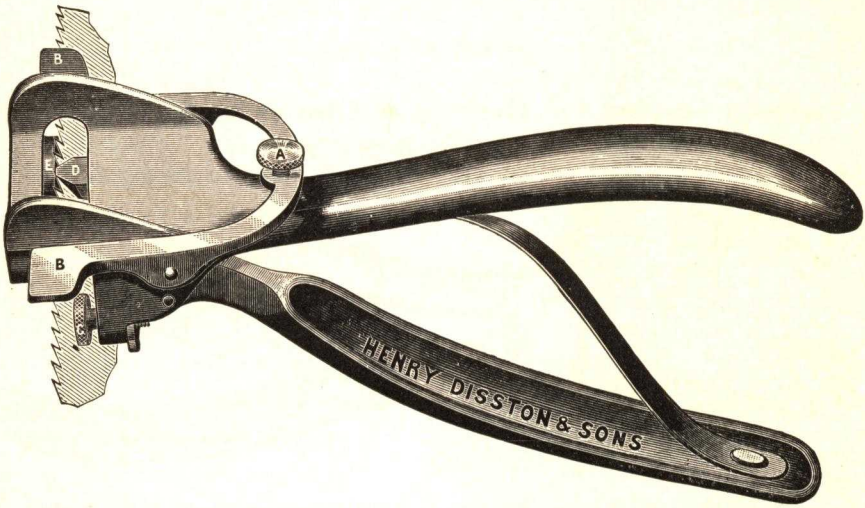
THE STAR SAW-SET.

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.



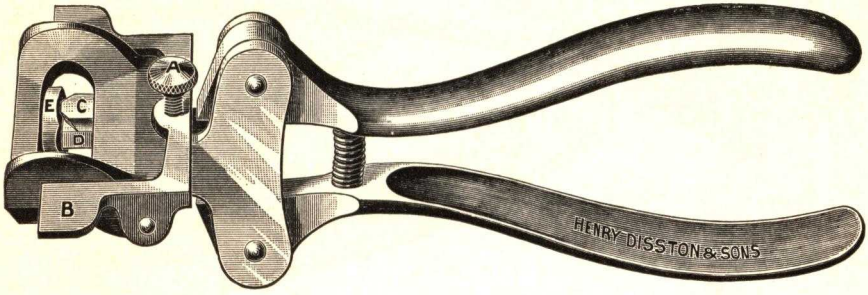
We wish to call special attention to the particular merits of the **MONARCH SAW** set. Many Hand Saw sets are imperfect for the reason that the power is applied by the upper handle of the tool, making it necessary to change the position of the hand every time the pressure is given to the tooth. To perfectly 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 guage "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 manufactured in three sizes; the smaller size being suitable for Saws three-quarter inch and wider, Hand Saws, Back Saws, etc., and the larger sizes for Circular, Cross-cut Saws, etc. Each size is finished either Japanned or Polished.

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,

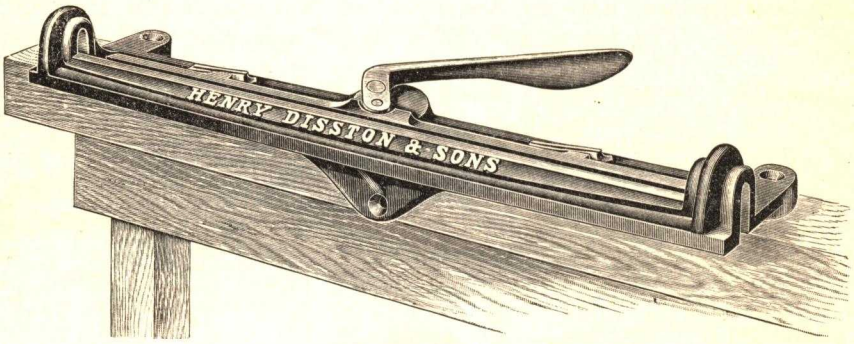
IN OPERATING first adjust the anvil "E" so that the bevel most suitable for the size tooth to be set is brought into position; hang the Saw-Set on the saw so that the gauge "B" rests on the teeth; adjust this gauge for the depth of set to be given, by the use of set-screw "A." Use care not to go too 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 being suitable for Hand Saws, Back Saws, Web Saws, narrow Band Saws, etc.; the medium size for small Circular Saws, etc., and the large size for Cross-cut Saws, Circular Saws, etc.

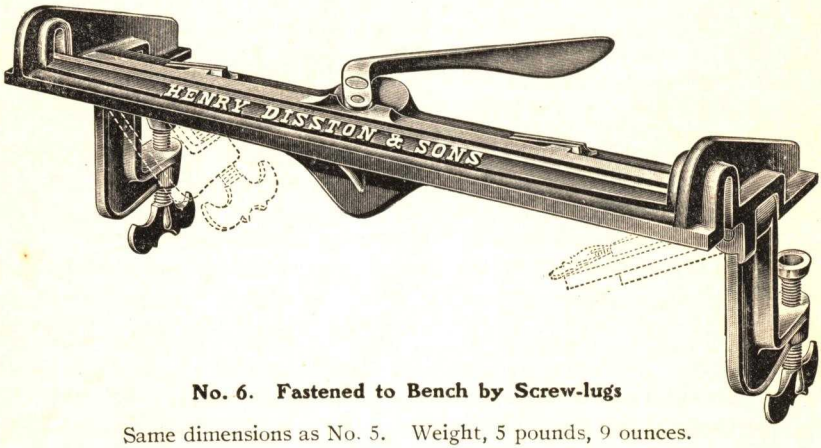
Made only in POLISHED FINISH.

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

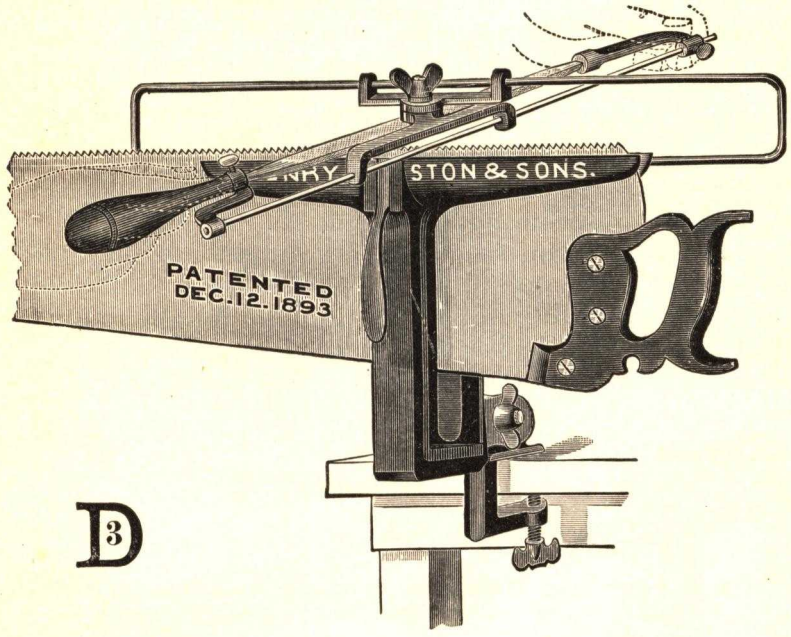
Same dimensions as No. 5. Weight, 5 pounds, 9 ounces.

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 of 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.

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 until all the teeth 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 down and then filing straight through. 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. To make them deep they must be filed on an angle, to do this to advantage the clamp (see engraving) should be used and thus a deep gullet tooth can be filed as readily as a square bottom tooth.

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.

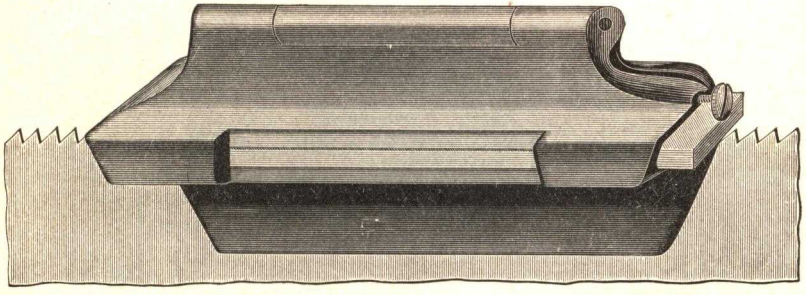
SECTION

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.

DISSTON HAND SAW JOINTER.

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

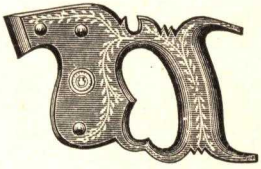


When the teeth of a saw become irregular in size it is absolutely necessary to dress them down until all are of an equal height, and this should always be done before attempting to reset or sharpen the saw.

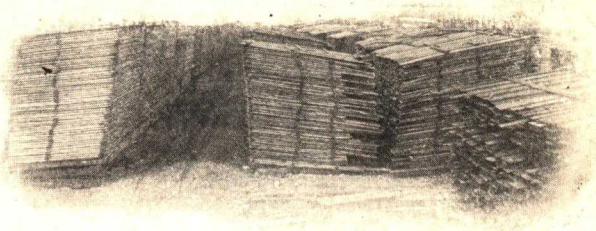
To facilitate this work and insure evenness we fully recommend the above Jointer, which is simple in construction and readily adjusted.

THE MAKING *of*

DISSTON SAW HANDLES.

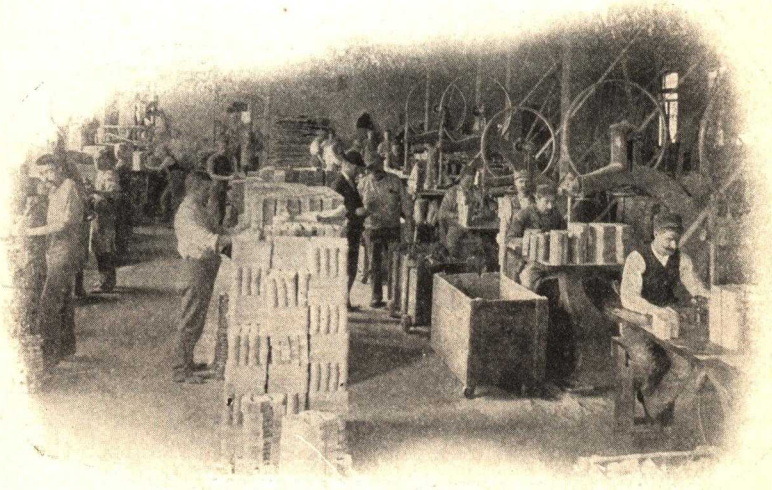


All DISSTON Handles are made of carefully selected lumber, thoroughly seasoned. This lumber is stored in large piles in the yard,

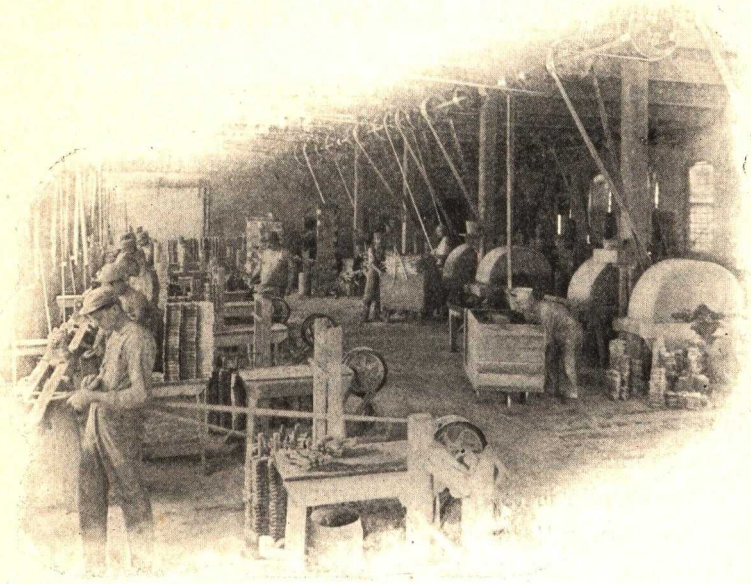


Section of Lumber Yard.

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

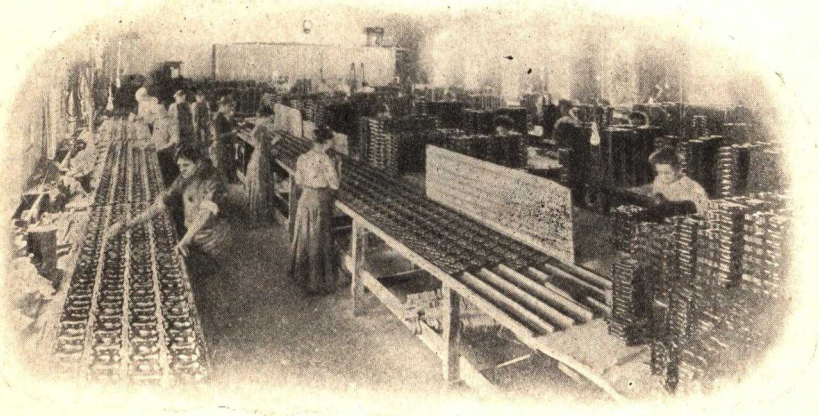


Sawing-Out Handles.



"Beiting" 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.

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 have milled teeth, the blade is hollow-ground to run without set, and tempered so they may be re-filed.

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.

The "Chromol" Hack Saw Blades are made of a special high-grade material which is peculiarly suited for metal-cutting blades ; the teeth are milled in, making them clean and sharp. These blades are hardened throughout under special process.

The regular stock sizes are ½ inch wide, 23 gauge for 8, 9 and 10 inch and $\frac{9}{16}$ inch wide, 23 gauge, for 12, 14 and 16 inch blades. For cutting Brass, Aluminum, etc., we recommend the fine tooth blade, 24 points to inch, ½ inch wide, and for bicycle tubing, the ½ inch wide blade, 32 points, 23 gauge.

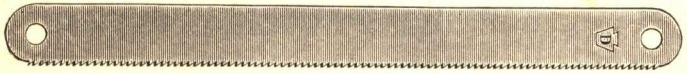
SOFT-BACK.

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.

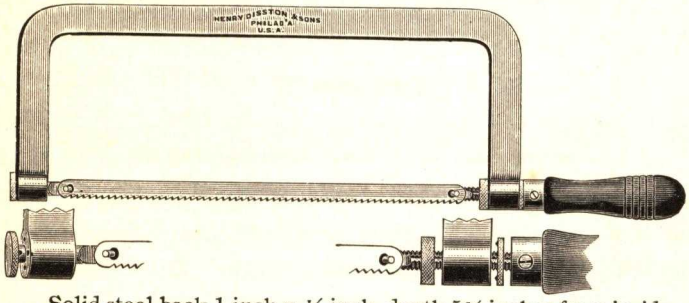
For Lockmakers, we make a blade ¼ inch wide, 23 or 25 gauge, 16 or 22 points, and the same width blade, 28 gauge, 30 points, for Jewelers.

MACHINE.



We were the pioneers in the manufacture of Machine Hack Saw Blades for use in the Power Cutting-off Machines. These blades are necessarily somewhat thicker and wider than the regular Chromol and Soft-back and are fitted with suitable size teeth for the work intended. Machine blades are tempered the same as the Chromol quality. We are prepared to furnish them in sizes suitable for any make of machine.

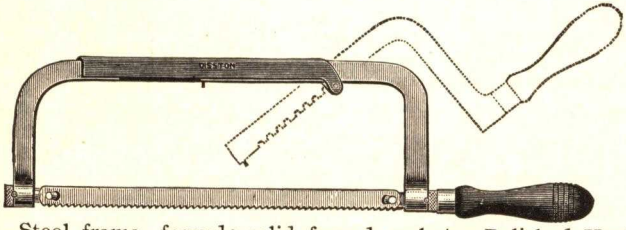
HACK SAW FRAME, No. 25.



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, solid forged, the sockets are solid forged on frames, not riveted, and the stretcher is simple in construction but effective.

IMPROVED ADJUSTABLE HACK SAW FRAME, No. 31.



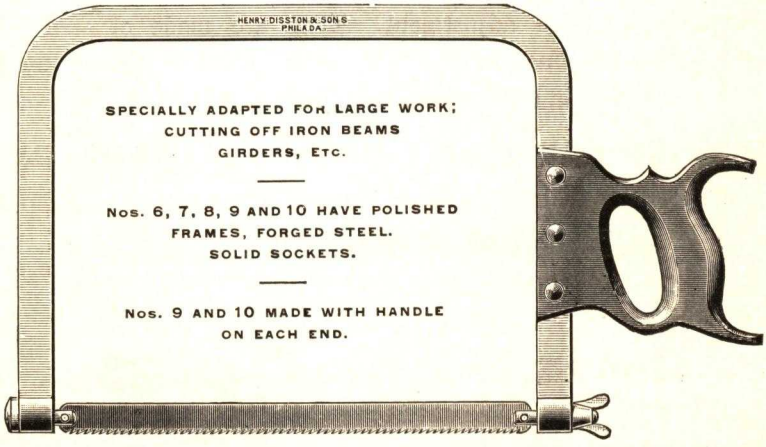
Steel frame, forged; solid forged sockets; Polished Hardwood Handle. Blade readily inserted; parts will not fall out while re-adjusting. Adjustable to half inches. Strong, rigid and durable. Easily and quickly adjusted. Depth, 3⅜ inches from inside edge of frame to tooth-edge of blade. Adapted for blades 8 to 12 inches.

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, ground thin towards the back 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.

THE MAKING *of the*

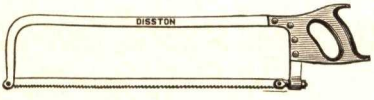
DISSTON BUTCHER SAW.

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.

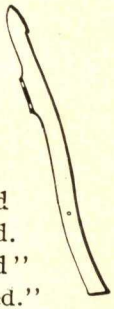
Next the "Back" is straightened, that is made even and true, then "ground." Now follows "glazing" the character of finish being in accordance with the quality of the saw; the higher grades, of course, being given a finer degree of work. The pin-hole in point of frame is now "drilled," this end being 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."

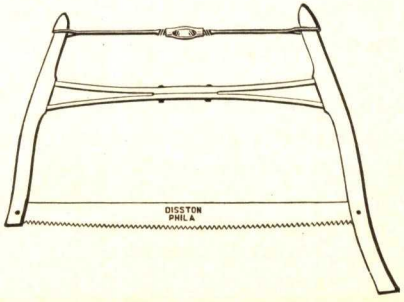


These pieces are "planed" to proper thickness, "jimped," that is, formed to shape and the edges rounded; after which they are "mortised" for the insertion of the ends of "stretcher" or brace. In the next operation the arms are "bored" and "slit" for the blade, and the tops "looped" for rod. They are 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."

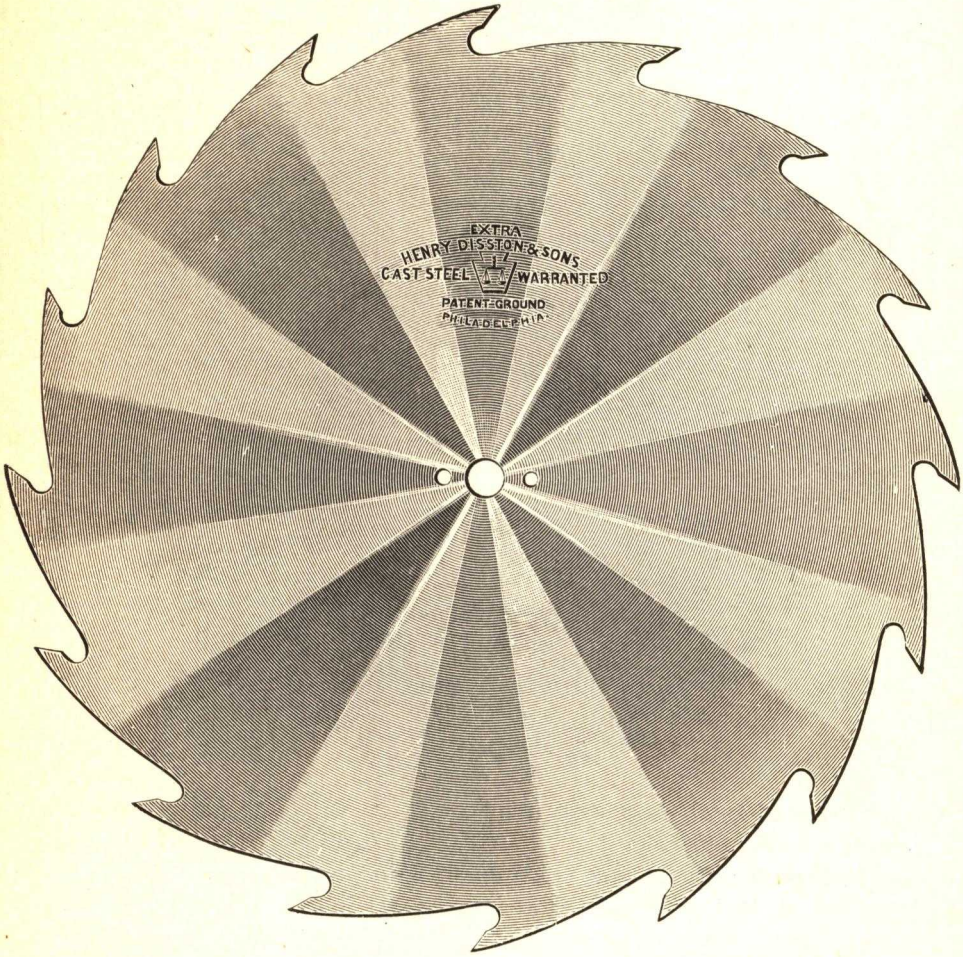
Now the "long arm" is labelled, and the parts are ready for "assembling" or framing up. The two arms are laid on a bench, about the proper distance apart; blade inserted, pins placed in holes, the stretcher inserted, and rod or "tightener" placed on ends at top and adjusted

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



DISSTON

PATENT GULLET-TOOTH CIRCULAR SAW.

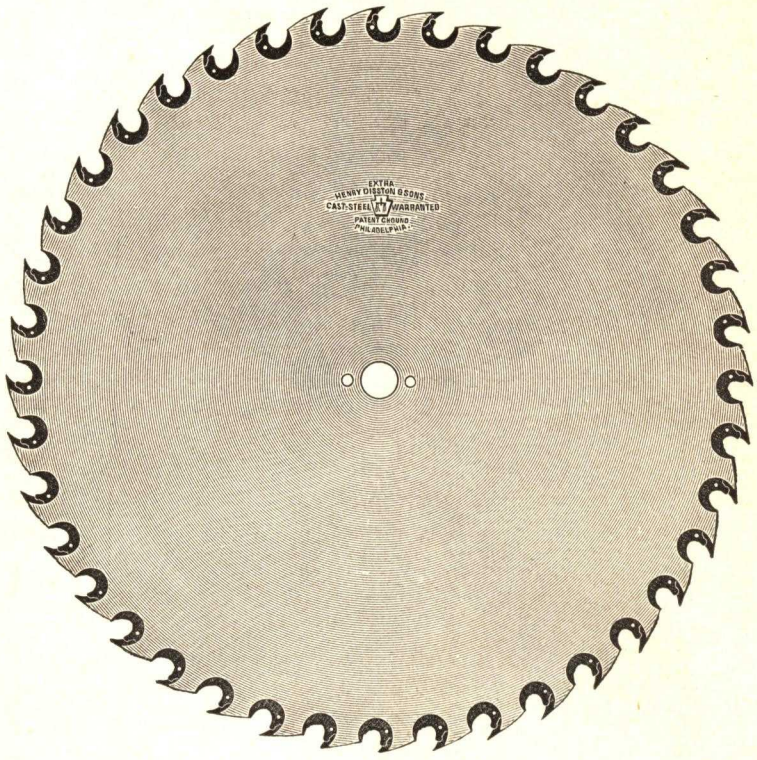


With over seventy-two years' experience in saw-making, by constant watchfulness and application, we have acquired a thorough knowledge of the requirements of all kinds of saws and achieved a state of perfection in material, machinery, methods and workmanship justifying the claim that Disston Saws are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

Inserted Tooth, Chisel-Point Circular Saws

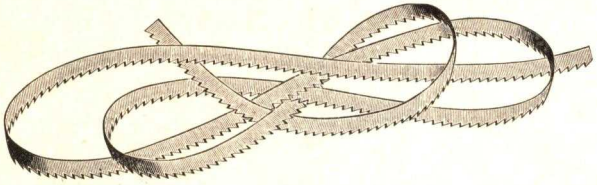


Inserted tooth saws were first introduced with the object of preserving the diameter.

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 Mill 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.

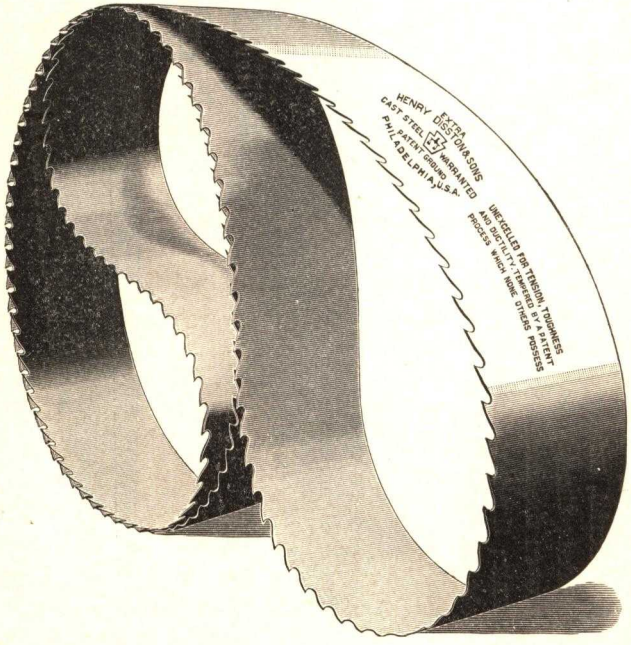
NARROW BAND SAWS.



These are made from $\frac{1}{4}$ inch to $1\frac{3}{4}$ inches wide, of various lengths, and are principally used in wood-working establishments.

LOG BAND SAWS.

For quite some years past Log Band Saws have displaced, to a considerable extent, the Circular Saw. They are made of different widths and lengths up to 20 inches wide, 60 feet and over in length, single and double edge, *i. e.* toothed on both edges to cut going and coming, though the single edge saw predominates.

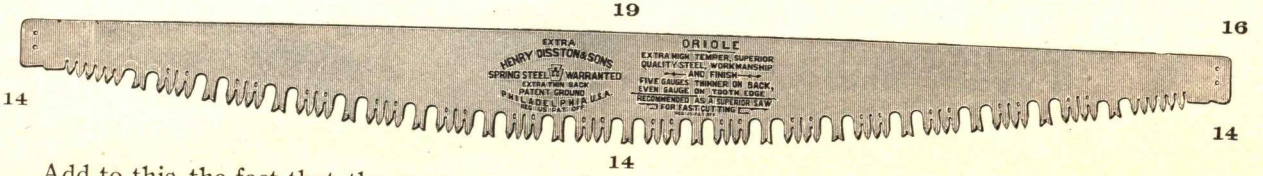


DISSTON HIGH GRADE SAWS.

Particular attention is invited to the merits of the **Diamond Point Vim Champion** and tne **Oriole 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.

DIAMOND POINT VIM CHAMPION.

ORIOLE.



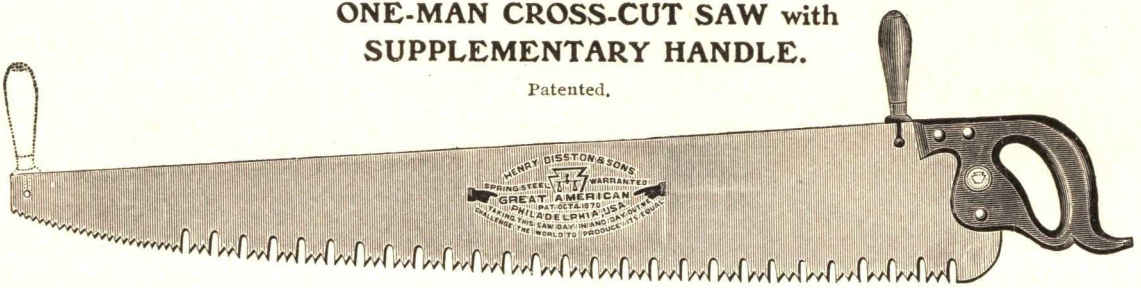
Add to this the fact that the saws are ground to a perfectly uniform thickness throughout the tooth-edge and tapered to an extra thin-back on lines that conform to the breast of the saws, the result is we have saws which for rapid cutting and easy "running" have never been equaled.

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.

THE MAKING *of*

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

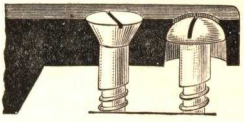
The wood used is principally Beech, Cherry and Mahogany. This is air-seasoned for fully two years in the lumber yard before being cut up.

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

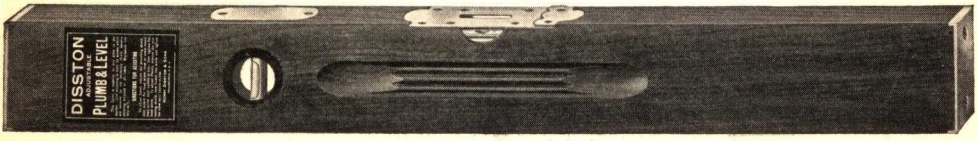


required, then tightening up the flat-head screw, the most delicate adjustment being thereby easily obtained and maintained.

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.

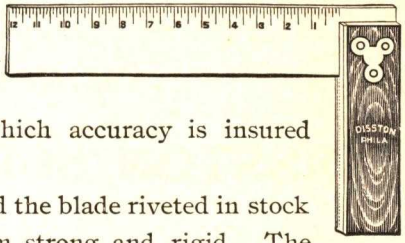
In the making of a Try Square, the Disston No. 1 Square will be taken for example.

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.

Now the stock is bored for the fitting of the face-plate, the latter being a brass casting containing a number of points or pins which enter the wood, being forced in the stock under considerable pressure and fastened by a special method which insures security. The fact that this plate is not fastened by screws enables the finishing of its face perfectly true, even and smooth, thus avoiding such objections as may arise where there are countersinking and depressions. The face-plate is now ground and polished.

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

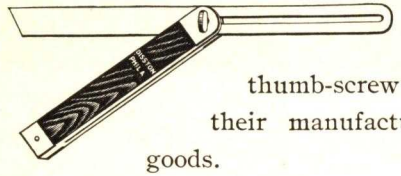
tempered; ground and glazed; then cut to multiples of the length desired; the edges are then breasted and trued, and the blade blued. It is now ready for the marking of the graduations, which is done on special automatic machines by which accuracy is insured throughout.



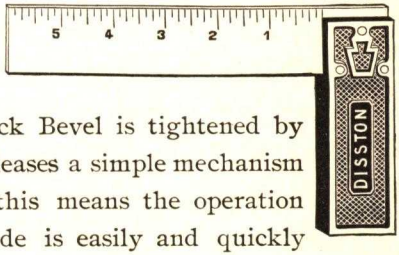
All parts are now assembled and the blade riveted in stock after a method which renders them strong and rigid. The square is then ground-off, tested for accuracy, polished, and branded.

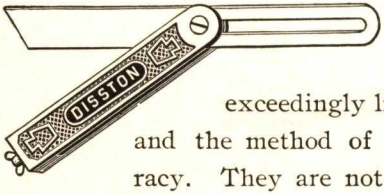
BEVEL.

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.

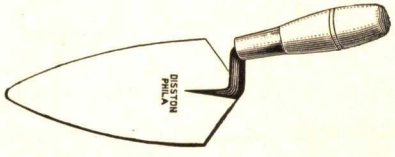
The blank, for it may yet be so termed, is now passed along for the "rolling" operation. For this, the blank is re-heated and passed again and again under heavy rolls until it has been drawn to proper thickness, taper and so shaped as to allow the necessary spring to blade. Then follows the operation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

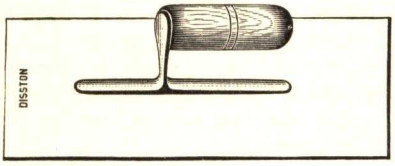
The trowel is now thoroughly inspected and tested for quality and spring, shape of blade and "lift" or hang of handle, etc.



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."

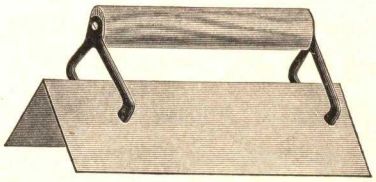
The wood-handle, having been bored and mortised, is driven on the tang, the latter having extended fins or shoulders which entering the wood prevent the turning of handle while in use. This tang extends through the handle, a washer put on and the end riveted.

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.

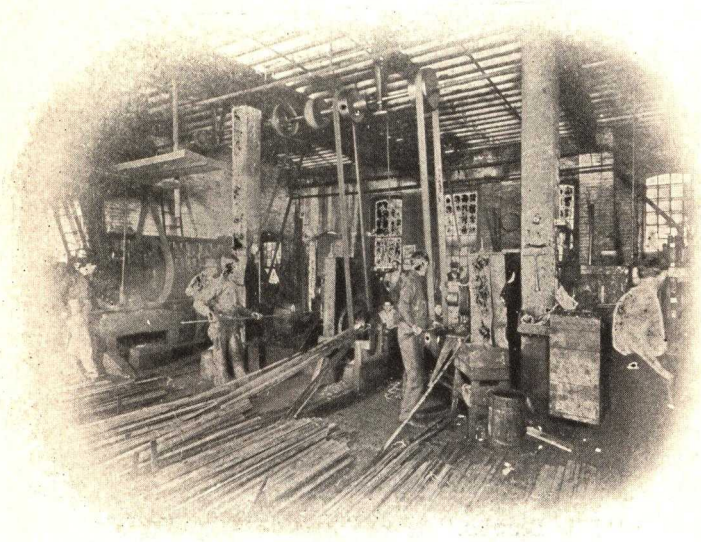


These are made for "inside" or "outside" angles, also rounding for inside and outside circles, and are used by plasterers and cementers for squaring and rounding corners, etc.

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.

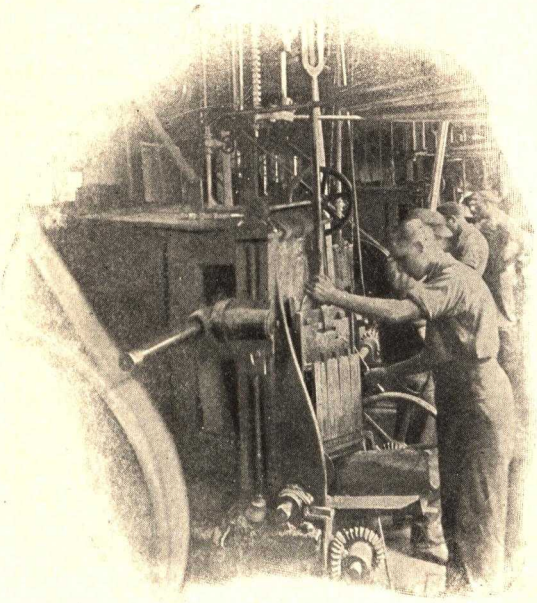
Forging.

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.

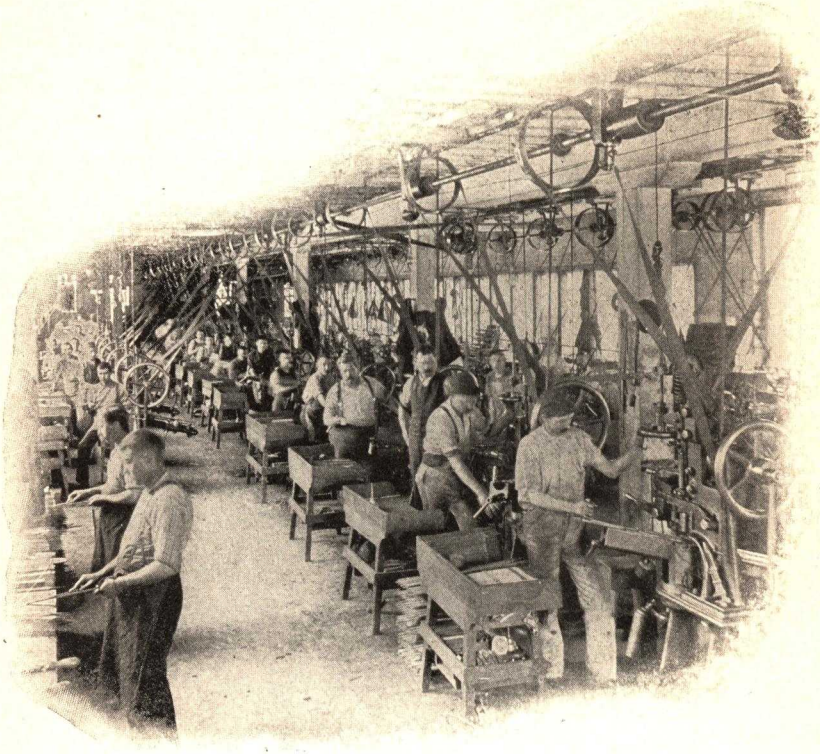
After inspection, the file blanks are then annealed by heating, which softens the steel so that they can be ground and the teeth cut in them. When the blanks are annealed, each one is carefully straightened, then ground to remove the scale and oxidizing and make the surface smoother.

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

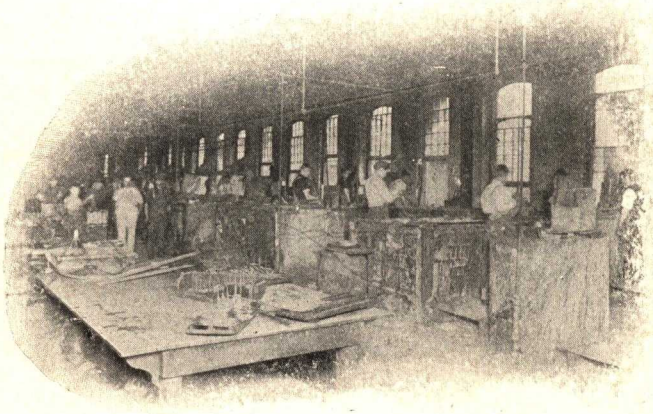


Grinding.

"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 which requires great care. The teeth are coated for protection and allowed to dry, which preserves the teeth in the process of heating the files, they being so fine that unless protected would be burned off before the body of file became heated. As soon as heated to a certain degree, the files are immersed in brine of particular temperature to harden them. We desire to call particular attention to our method of sharpening the teeth of files after hardening. New Saw Files sharpened by this process will not only do more work, but will have a finer and sharper cutting edge and file a harder saw than the ordinary file. They are then brushed clean, put in limewater to neutralize any tendency to rust and when taken from this bath they are dried and oiled.

The files are now subjected to final inspection, tested to prove their hardness and are then packed.

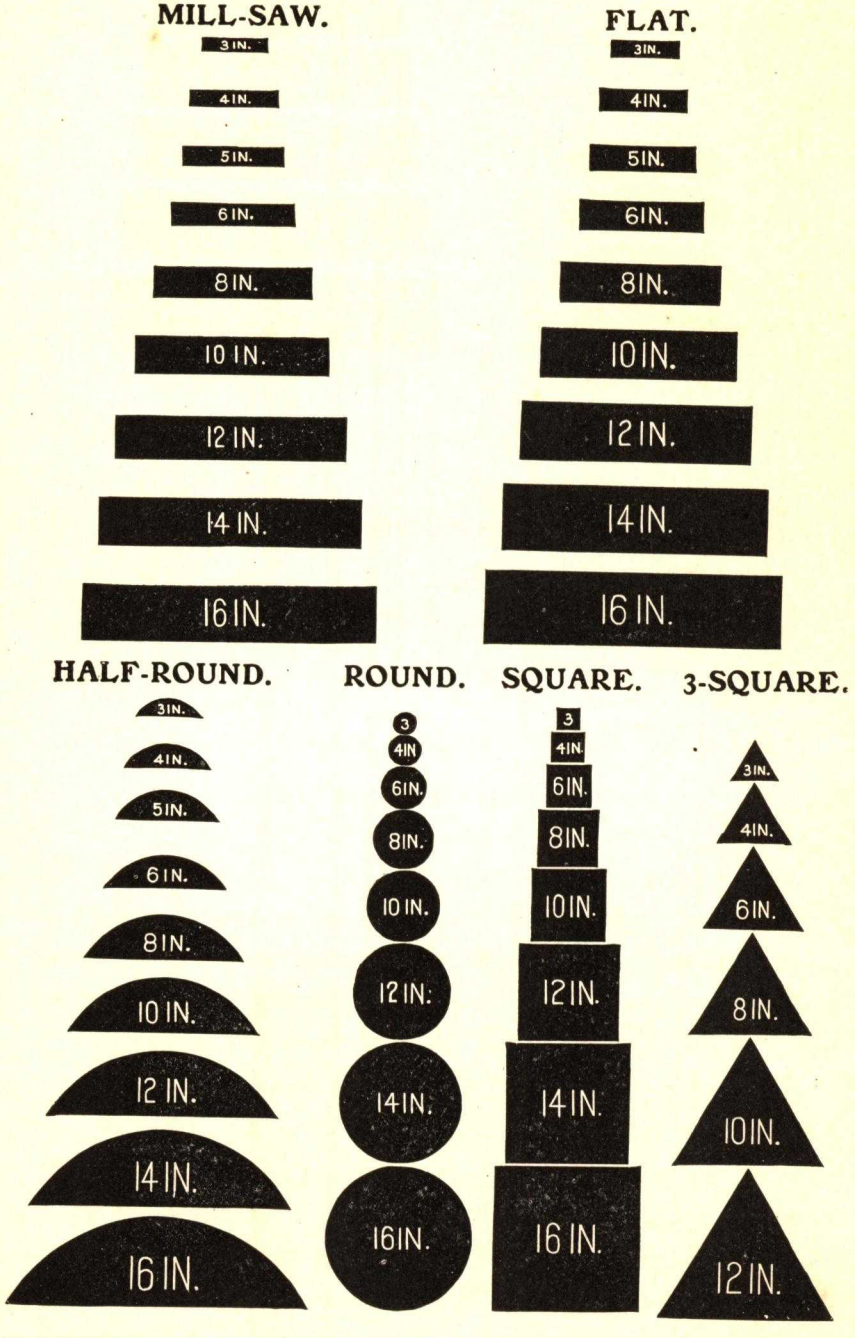
GENERAL DESCRIPTION.

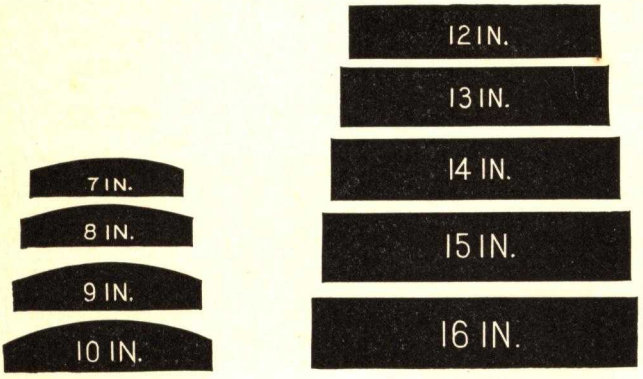
Of all tools known there are none used for so many purposes and of so many styles and kinds as files. There are several hundred kinds of regular files and several thousands of regular and special combined, all of which are designated by a name according to the length, shape and grade of the cut; besides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

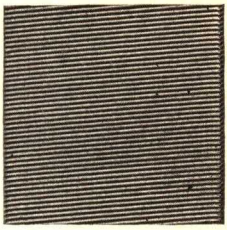
Some years ago there was much doubt, argument and speculation as to the relative quality of machine made and hand made files which now, however, has passed away in favor of the machine made files for we can and do make finer files with machinery than can possibly be made by hand; we make a file for special 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.

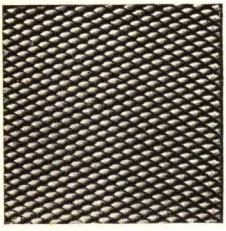
BASTARD.

SECOND CUT.



SMOOTH.

DOUBLE CUT.

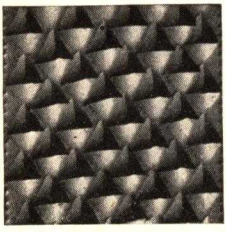


BASTARD.

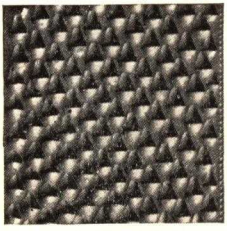
SECOND CUT.

SMOOTH.

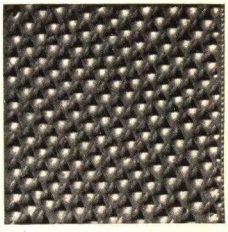
RASP CUT.



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 **30,000 dozen** Disston Files annually in our works.

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.

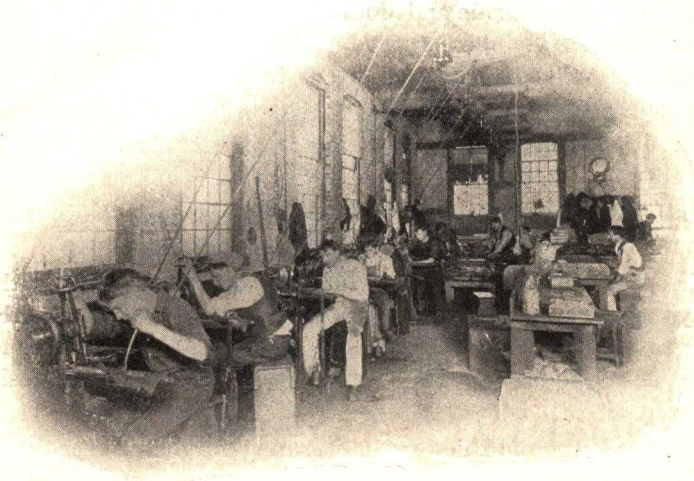
Cabinet Rasps and Files are half-round; forged thinner than other half-round rasps and files. The rasp is punched on round and flat sides and some have their edges single-cut. The File is double-cut on round and flat sides. These Rasps and Files are used by cabinet, saddle-tree, pattern and last-makers,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

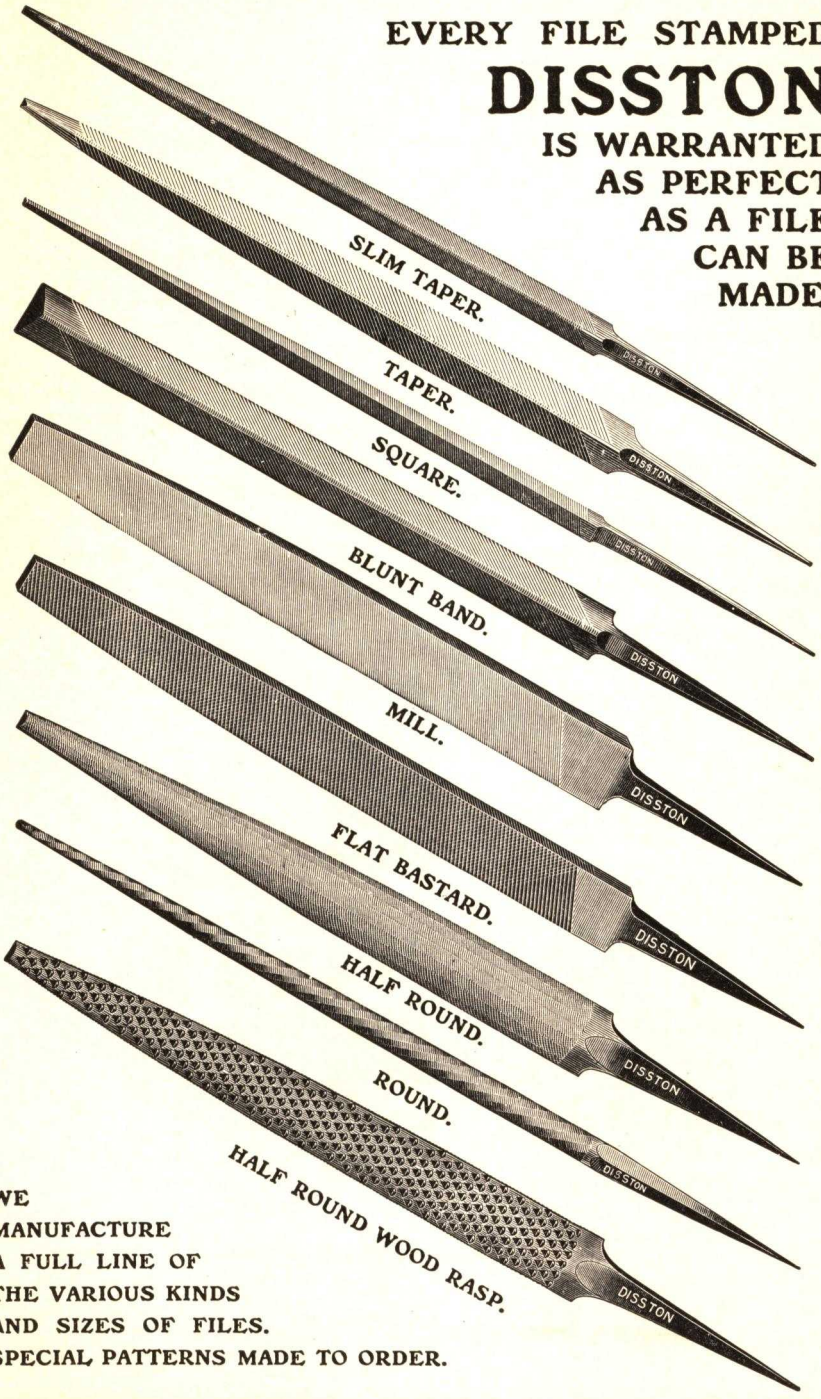


Section of Superfine File Department.

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.

DISSTON

THE BRAND THAT STANDS THE TEST OF TIME

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

IT CARRIES A FULL WARRANTY

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
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 Handsaws
Compass Saws
Concave Saws—Circular
Conqueror Swages
Corn Grater
Corn Knives
Crosscut Saws and Tools
Crout Cutters
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
Sets—Saw
Shafting Level
Shaper—Swage
Shear for Trimming
Shingle Saws
Ship-Carpenters' Saws
Side Files
Siding Saws
Slate Saws—Circular
Slaw and Crout Cutters
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, German 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

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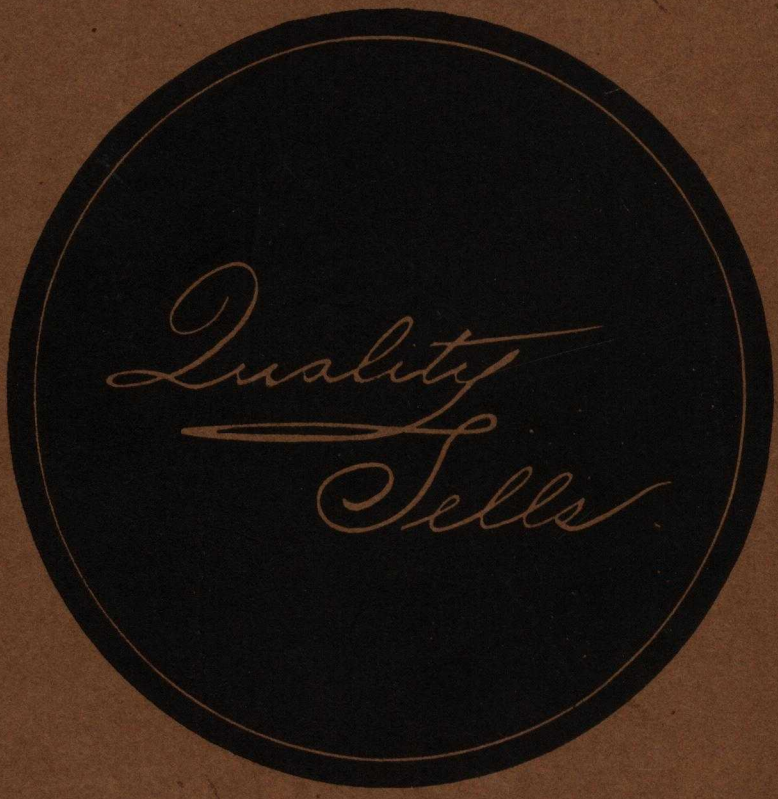
Quality
Sells