How a DISSTON Hand Saw is made

"Blocking" Hand Saws

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The vast saw and tool manufacturing business of Henry Disston & Sons, Inc. was built on the modest foundation of the Hand Saw. In 1840 Henry Disston, without even a helper, undertook the manufacture of hand saws. To-day about thirty-six hundred hands are employed, producing a most varied line of tools and saws of every description, from the most delicate surgical saws to the great circular and band saws of the lumber mills. The majority of hand saws used in this country are made in the Disston Works.

In view of its relation to the development of this great business, a description of the making of the Disston Hand Saw will prove interesting.

To the uninitiated, a hand saw represents simply a notched piece of sheet steel, with a wooden handle on one end. As a matter of fact, there are more than 82 progressive operations in making a Disston Hand Saw, and only the enormous scale of production permits its sale at a figure even approximating the modest charge of the hardware dealer.

All parts of the Disston Hand Saws are produced in the Disston plant by skilled mechanics, under the supervision of a large corps of foremen and inspectors. Regular inspections and tests prevent any but perfect saws leaving the plant. The user of a Disston-brand Saw has positive assurance that he has the finest tool of its kind that can be made.

The steel, the most vital part of the saw, has been made by Disston since 1855. The wood for the handles arrives regularly in carload lots, in the log, and is sawn into boards of required thickness in the Disston saw mill. A large department is devoted exclusively to producing the brass screws for attaching the handle to the blade.

As the first step in making a hand saw is the production of the steel, we will consider it first,

The steel is the foundation upon which rests all subsequent work, and the high quality of Disston saws is due largely to the special formulas and the care exercised in making the steel. Henry Disston was the first saw manufacturer to make his own steel, and this department of the Disston Works has every facility of modern equipment and methods. To insure a uniformly high quality of steel, and for research work, with a view to possible improvement, a laboratory is maintained in connection with the steel plant. Chemical and physical tests are conducted with the aid of delicate instruments and apparatus. From the beginning of the industry saw-makers had experienced the greatest difficulty in securing steel of uniform quality, free from flaws and seams. Years of careful study and costly experiment eventually developed in the Disston plant a method of casting steel ingots, which not only eliminated the splitting, spalling and crumbling of teeth, but produced a hard, tough, elastic steel of the highest quality. This, combined with perfected and patented processes in manufacturing, resulted in saws of the highest excellence as to toughness, edge-holding quality and uniformity of temper.

Each separate brand of Disston saws is made from a lot of steel possessing its own distinctive quality, and this steel retains its identity throughout the entire manufacturing process, until finally it develops into the finished saw bearing the brand ordered out.

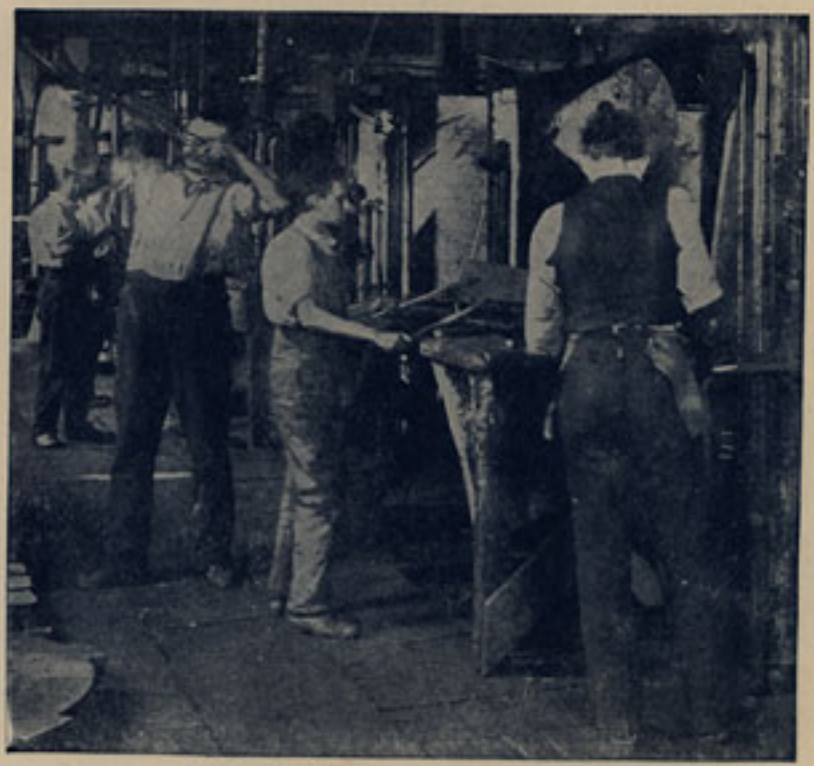
The next step after casting of the steel into the ingot is the rolling of the plates, preparatory to sending them to the saw department. The thick, heavy ingot, red-hot from the heating furnace, is passed back and forth under heavy pressure through rolls until it is widened and lengthened into a sheet of the required size and thickness. These sheets are then trimmed. A narrow-gauge car is loaded to capacity with these oblong plates or "hand saw sheets," and delivered to the hand saw department, where the transformation actually commences. Massive power shears cut the sheet to form and size. While these machines are fed by hand, the speed and precision of the operators seem almost automatic.

Trimming and Weighing

The plates are then sorted by weight for the various sizes of teeth, the heavier plates for the coarser, and the lighter ones for the finer "points." Each blade is then stamped with a figure indicating the number of points to the inch this particular blade is to have. An automatic toothing machine (one of the many Disston inventions) tooths the saw blade with the required number of teeth.

The blade is in a soft state and unfit for sawing purposes. It is now sent to the hardening shop, where, in special oil-burning furnaces it is heated to the desired temperature, which is controlled and ascertained by the use of scientific instruments. It is taken from the furnace and plunged edge first into a special hardening bath. This makes the saw blade extremely hard and brittle, and great care must be used in handling until after the blade is tempered. On the success of the tempering, a delicate operation, which follows, depends to a considerable extent the durability and cutting qualities of the saw. This tempering consists of drawing or reducing, in a sense, the extreme hardness imparted during the hardening operation, thus relaxing the molecular rigidity, imparting life and elasticity to the saw blade.

Toothing

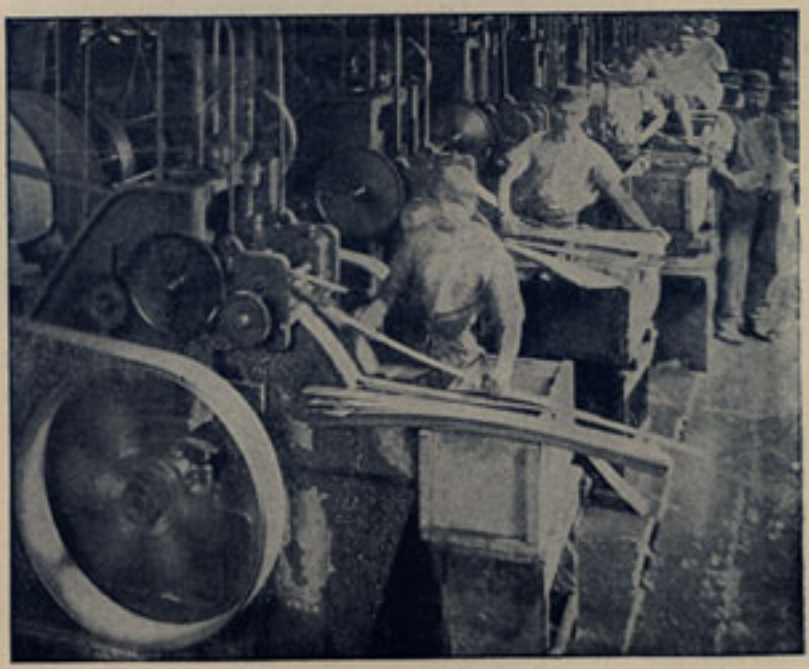


Hardening and Tempering

The Disston special process of tempering is the outgrowth of long practical experience. Henry Disston, the founder, spent many years in its study, and his successors, following along the same lines, have achieved unequaled results, as attested by the enviable reputation of Disston Saws for durability and edge and set-holding qualities.

"Smithing-in-the-black" — the skillful hammering of the saw blade to straighten and flatten it— is the next operation before sending the blade to the grinding machines. All operations of "smithing" require the highest development of the sawmaker's skill. Only by long experience and practice is a man fitted to smith the Disston brand of saws. It is an interesting sight to stand at one end of the room, 430 feet long, in which the smithing is done and watch the line of men that fades away in the distance, while the rhythmical tapping of their hammers sounds like the regular vibrations of some gigantic machine. A man will lift the blade he is working on and sight along it toward the light to learn from the shadows on the blade just where the hammer should fall. The matter of light, too, is an important factor. The wavering nature of artificial light makes daylight essential for this kind of work. Across the room from the "smithers" are the grinding machines, extending in an uninterrupted line the entire length of the building— significant of the enormous quantity of saws turned out each day. Here the blade is ground to the proper gauge or thickness, and taper-ground towards the back. The hand saw blade is ground so that it tapers in thickness from the tooth edge to the back and from the handle to the point. The tooth edge is of even thickness from end to end. A saw not ground to proper taper cannot be ranked as a high-class tool.

Tensioning is the next step. It is a process of hammering, requiring great skill and experience, for in this operation the blade is given the proper amount of tension, spring or character, so that it is not too "fast" or too "loose." In a "fast" blade the metal is too long on the edge, and needs expanding from the center. In a "loose" blade the metal must be stretched on the edge.



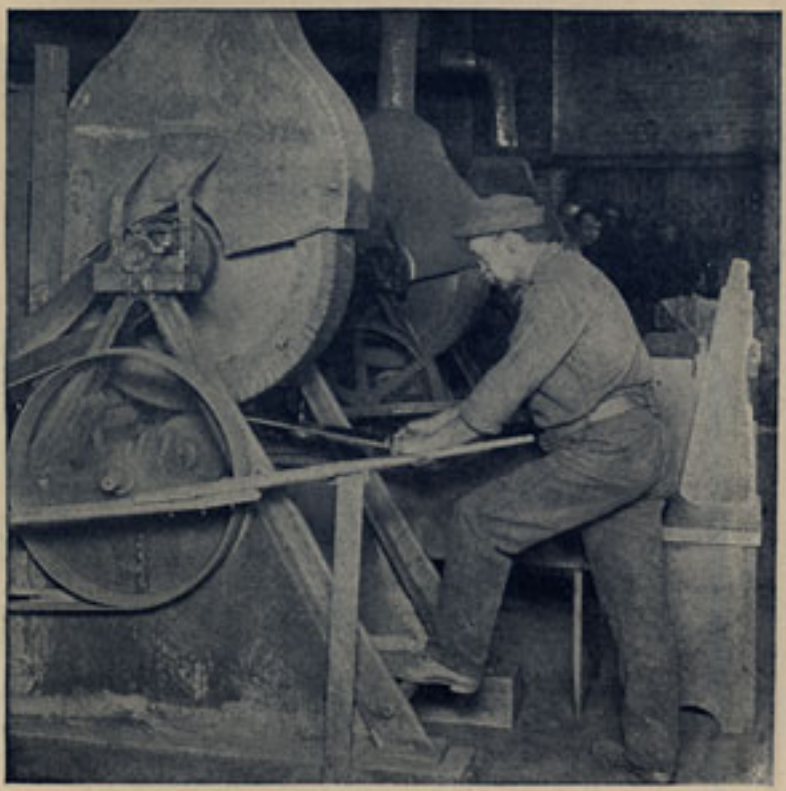
Grinding

A saw not properly tensioned will not cut straight and true, but will run out of its course. Without any tensioning, the blade would buckle in the wood.

The blade is then ground the second time. This is the final, or, as it is called, the "draw-grinding." This prepares the blade for the higher polish which it receives later.

The next process is glazing or buffing the blade while it is covered with very fine emery. This operation is the basis of the polish of the finished blade.

The next operation, "blocking," is one of the most important in saw making. While a form of smithing, this requires the utmost skill. Only men of long experience and proven dexterity handle this work. "Blocking" consists of tensioning and the correcting of any slight irregularities which may have developed during the draw-grinding or glazing. Beside the anvil, these men use also a *lignum vitae* block, whence the name of the operation—blocking. While affording a base sufficiently hard for the work, this wood prevents hammer marks from appearing on the finished blade.



Polishing

After blocking, the blade is polished. This operation is similar to the glazing process. It imparts the fine polish that is characteristic of all Disston tools.

Etching

Setting and Filing

Now follows a process which is exclusively Disston; no other manufacturer possesses the secret of this method. It stiffens, or restores, the spring of the steel, which is more or less affected by the previous operations to which the saw has been subjected.

After stiffening, the blades are passed into the etching room, where the mark of quality is placed on the blade. The first impression of an observer in the etching room is that the supply of saw blades spread out on the long tables, in the various stages of branding, is inexhaustible.

The blade is now ready for the setting of the teeth. The skilled workman lays the blade on the setting block, or stake, and beginning with the first tooth at the butt end, sets each alternating tooth. Then the blade is reversed, and beginning with the first unset tooth at the point, each alternate tooth is set. A hammer with long, tapering head is used. A tap of the hammer sets each tooth half the thickness of the blade, making the cutting edge about twice as thick as the blade. This prevents binding. The setting is done with remarkable speed and accuracy.

"Handling-up"

Sharpening follows setting. With the saw fastened in a special vise, and the file held in both hands, the sharpener moves swiftly from tooth to tooth, giving each the proper bevel and a keen edge. To the amateur, with whom saw filing is a slow and laborious process, the speed attained by these experts is astonishing. The file seems to leap from tooth to tooth, and yet every stroke has the sureness gained from long experience and practice.

After sharpening, the blades are sent to the "handling-up" room. Each handle for the Disston hand saws is slit, bored and separately fitted to its blade to insure correct "hang" or pitch to the saw when in operation. The completed handle is placed on the blade; holes marked with a scriber; the handle removed; holes punched in the blade; the handle replaced and secured with brass screws especially made for the purpose.

After "handling-up," the now completed saw is "looked over" to discover any possible imperfection. It is then carefully oiled and wiped off, placed in a paper bag and packed in a carton containing one-third dozen. The shipping department then finally takes the cases of hand saws in charge and sends them broadcast over the world to maintain and enhance a reputation which Henry Disston established for them 82 years ago.

If You—

found this booklet interesting, we would like you to read *The Disston Saw, Tool, and File Book.*

It is a book of practical information on the selection, use, and care of saws, tools, and files. It is non-technical, easy to understand, and contains over 100 illustrations.

If you want a copy without charge, simply write: "Send me *The Disston Saw, Tool, and File Book.*"

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