

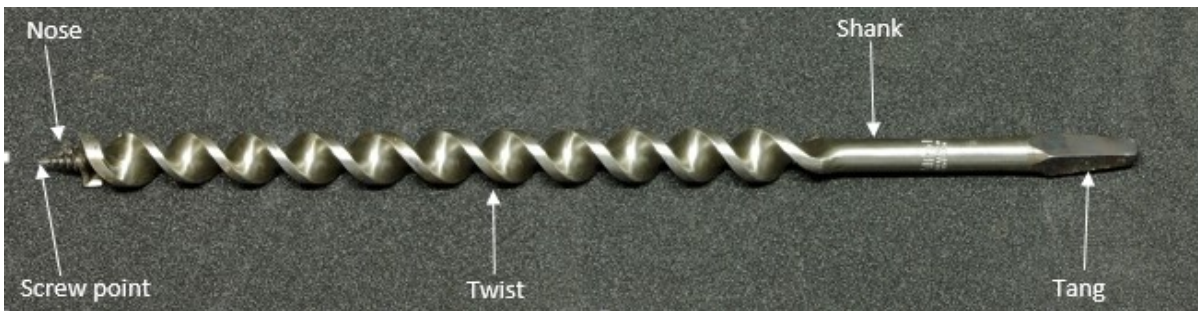


**Hawley  
Collection**  
@ Kelham Island Museum

# HOW IT WAS MADE

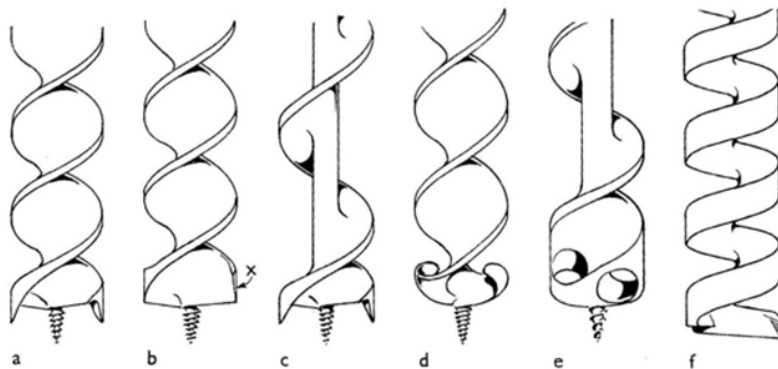
## Augers

Augers and gimlets are used for making holes in wood. The **gimlet** is used to start or make a small, pilot hole in the wood or make a starter hole for a screw and an **auger** to enlarge and shape the hole to the desired size. Most augers give a rough rather than fine, smooth finish to a hole.



*Labelled diagram of an auger bit (this is a fencing bit which has a longer twist than the usual auger bit)*

Downward pressure is put on a fixed or loose handle at the same time as the auger is turned clockwise. On a twist auger, the screw nose pulls the auger into the wood, the spurs (if any) scribe the hole and the cutters remove the wood which is then taken up the twist out of the hole. An **auger bit**, is a type of auger made for use in a ratchet hand brace, electric drill or machine drill.



a) Jennings or Russell Jennings pattern; b) Scotch pattern; c) Solid Centre or Irwin pattern; d) Gedge pattern; e) Solid Nose of Bullnose pattern, f) Single Twist or L'Hommedieu pattern

*Diagram of auger and auger bit patterns (Fig.49, p.44, 'Dictionary of Tools', R. A. Salaman, George Allen & Unwin Ltd., 1975)*

Several types of auger were made by a number of manufacturers in Sheffield, **twist, solid centre and single twist** – see diagram above.

### **Stages in the manufacturing process**

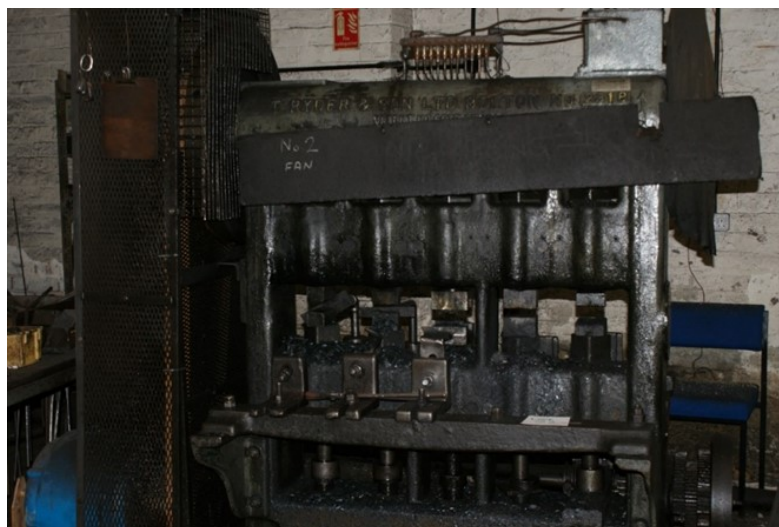
**Blanks** of the desired length were cut from round (or flat) steel bar containing 0.50%/0.55% carbon (EN9-50/55 carbon) according to the size and type of auger to be made.

Before the advent of machinery the steel bar would have been heated to forging temperature - 'bright red' - the bar placed over an anvil and the required length cut off.

### **Preparing the Mood (Mooding)**

This initial forging or shaping of the steel blank would have originally been carried out by hand using a small hearth to heat the steel, and a forging hammer, anvil and dies (or shaped moulds) to flatten the bar of steel and achieve the correct shape. One end of the mood would then be flattened for the boring device - twist - and the other end shaped into the shank and tang. By the 1600s water-powered, belt-driven hammers, and into the 1700s steam-powered spring hammers, would have been used in larger companies for this process.

In the late 1800s and 1900s larger manufacturers used a machine known as a Ryder hammer. This is a mechanical hammer which has six different blocks or dies set into it with hammers above each one. The blank was heated in a furnace to 'cherry red' and was placed on the different dies, under the moving hammers.



*Ryder Hammer at Morrisons & Sons, Sheffield – 2015*

If the auger was to have a scotch-eye or hollow tang, this was forged separately and attached to the shank later.

### Twisting

In early times the auger shank would have been twisted by the forger with a hammer using an array of anvils he had made himself and ordinary blacksmith's tools. The accuracy of the finished twist would have relied on the skill of the forger.



*Forging anvils and dies in Peter Goss's workshop at Kelham Island Museum*

In recent times, the whole of the auger mood was heated in a furnace to forging temperature, the ends fixed between two points and turned a given number of times to achieve the particular number of twists needed on the shank. One end of the shaft rotated and twisted the auger from the nose end – see below.



*Twisting, Morrisons & Sons, 2015*

While it is still red hot, it is immediately placed between two dies and moved backwards and forwards to ensure the twists (flutes) are uniform - the same

diameter all the way along – and finally between two hollow dies in a hydraulic press to make sure the auger is straight. It is then reheated and the end of the twist is shaped ready for the nose.



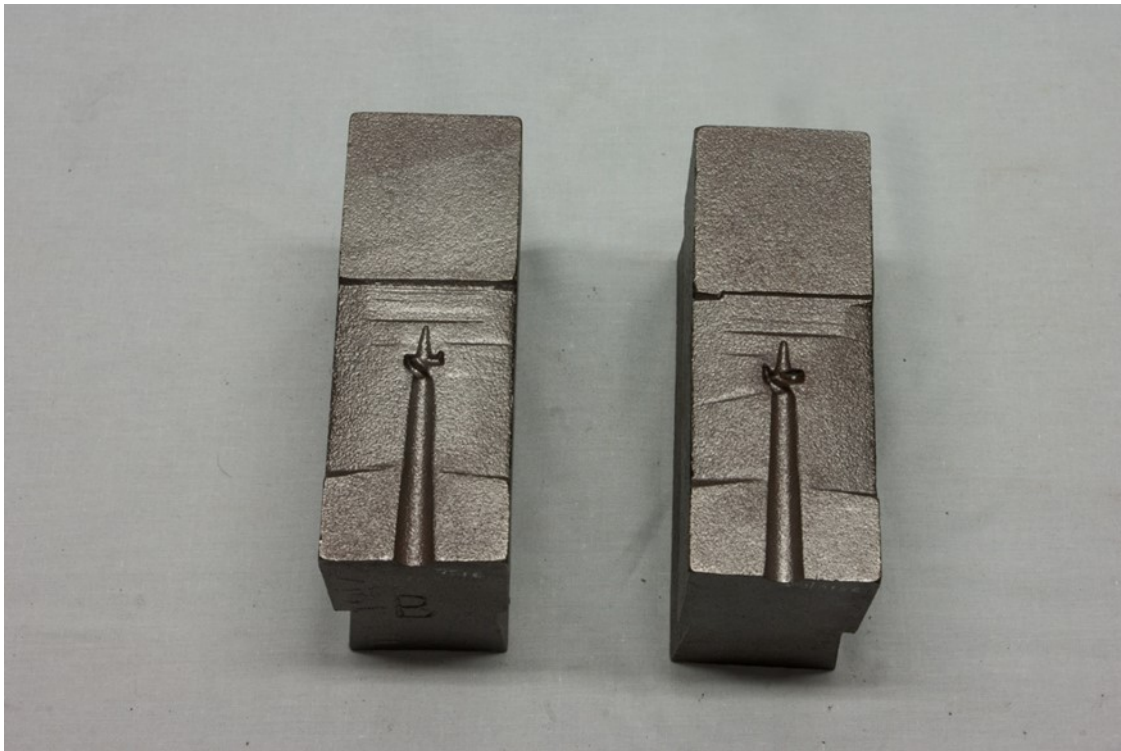
*Straightening after twisting, William Ridgway & Sons Ltd – Ph.Edg.1200A*

### **Forging/Shaping the Nose**

The nose or tip of the auger would have been forged by hand but by the 1900s was shaped by placing the end of the auger between two dies in a drop stamp.

The nose was shaped twice, first roughly – **roughing** – and the scrap (flash) around the edge was then clipped off using a hydraulic press with two dies.

It was then forged a second time between a second set of dies to give a good final shape.



*Pair of finishing nose dies – C94*

After all these machine forging processes the auger is checked for straightness by eye and a hammer used to straighten it as necessary. This task, as with hand forging of augers, relies on the skill of the workman.

### **Cutting the Screw (Screwing) and finishing the Nose**

The nose of an auger or auger bit usually has a screw thread (the same as can be found on a metal screw used to join materials together) along with cutting edges and sometimes spurs or side wings.

This was the most complex part of the manufacturing process and required a large number of separate operations, up to 40 or 50 in the case of some types of auger, e.g. Jennings Pattern – approx. 48 operations, Scotch Pattern – approx. 36 operations, Irwin Pattern – approx. 42 operations.

The cutting edges on the nose had to be cut back - 'facing back' - and the spurs or side wings shaped - 'undercutting' - as well as the screw thread put on the lead point of the nose, etc.

Before machinery was available from around the 1930s these processes would have been done by hand and the screw thread filed into the nose using a hand file. The filer started at the junction to the twist where the cutting edge has to flow into the first screw thread. At the same time, the spurs and side wings would have been shaped and sharpened.

After this time, tools – thread dies - were attached to a machine to give the nose its final shape and add the screw thread or threads.



*Screw die in position in screwer, Morrisons & Son - 2015*

At the end of all these machine processes a hand file was used to make any final adjustments needed to make sure both of the cutting edges and the screw thread were even on both sides of the auger.

## Grinding

All parts of the auger would have been ground on a sandstone wheel or later on an abrasive belt (moving bands made of paper similar to sandpaper) or on a thin abrasive wheel (wheel with abrasive around its circumference) to remove any blemishes: shank, nose, top of twist, inside the twist.



*Grinding Shop at William Ridgway & Sons Ltd., Ph.Edg.1203*

By the 2000s the shank of the auger could have been ground by placing it in a centreless grinder – two grinding wheels, one is stationary and the other moves toward the first.



*Centreless grinding of the shank, Morrisons & Sons, 2015*

## Hardening and Tempering

Once ground, the auger needed to be **hardened** and **tempered**, i.e. first hardened and then the hardness reduced (tempered), so that it was hard enough to withstand use but not too hard to make it brittle and break.

Up to the 1800s the forger would have done this in his hearth heating up the auger and quenching it in a bath of water or oil, doing everything by eye according to the colour – once 'straw' colour was reached the piece was beginning to soften 'the temper was being drawn'.

Later in the 1800s in larger manufacturers, to harden the auger it was heated in a furnace to 850°C and immediately dipped into oil and tempered by being re-heated in a tempering stove with a sealed lid to around 200-240°C and being allowed to cool slowly.

After hardening and tempering the auger would be straightened if necessary, by again tapping with a hammer.

## Polishing, Sharpening and Marking

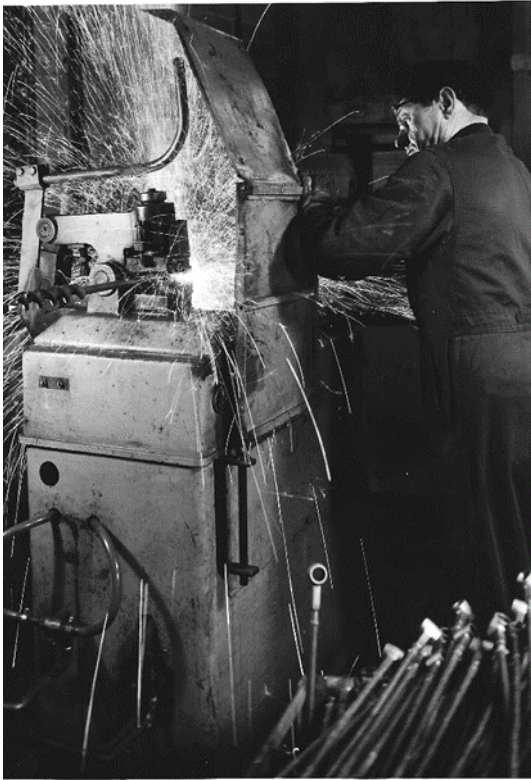
Augers were traditionally supplied either 'black' (unpolished) or 'bright' (polished). 'Black' augers received no further treatment. All the parts of 'brights' were glazed or polished on abrasive belts and rotating wheels to give the 'bright' fine finish; the shank, top of the twist, nose twist, and insides of the twist. The same abrasive belts and wheels were used but a stone (known as 'the boulder' in Sheffield) is first put across the moving belt. This gives the auger a better finish. A thin flexible abrasive band (similar to an elastic band) moving at speed is used for the final polish. It can get right inside the twists to any parts which may have been missed.

The inside of the screw thread was cleaned on a small rotating wheel and a hand file used to sharpen (whet) the cutting edges.

If the auger was to have a scotch-eye tang, it would at this point be cut to length and a pre-forged scotch-eye butt-welded onto the auger – the auger shank joined to the tang with hot steel. A final grinding was needed to smooth the join between the two.

The mark or trademark was put on the shank either by hand (using a mark punch and hammer) or by machine.

The cutting parts of the finished augers were then oiled, and they were wrapped in greaseproof paper and packed in boxes of a dozen.



*Butt welding the scotch-eye on-  
to the auger, William Ridgway &  
Sons Ltd., Ph.Edg.1205*



*Scotch-eyed double twist  
auger, 95E*

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If you would like more information about augers and gimlets and related items in the Hawley Collection, please contact us:

via our website: [www.hawleytoolcollection.com](http://www.hawleytoolcollection.com)

by email: [enquiries@hawleytoolcollection.com](mailto:enquiries@hawleytoolcollection.com)

by telephone: 0114 2010770