

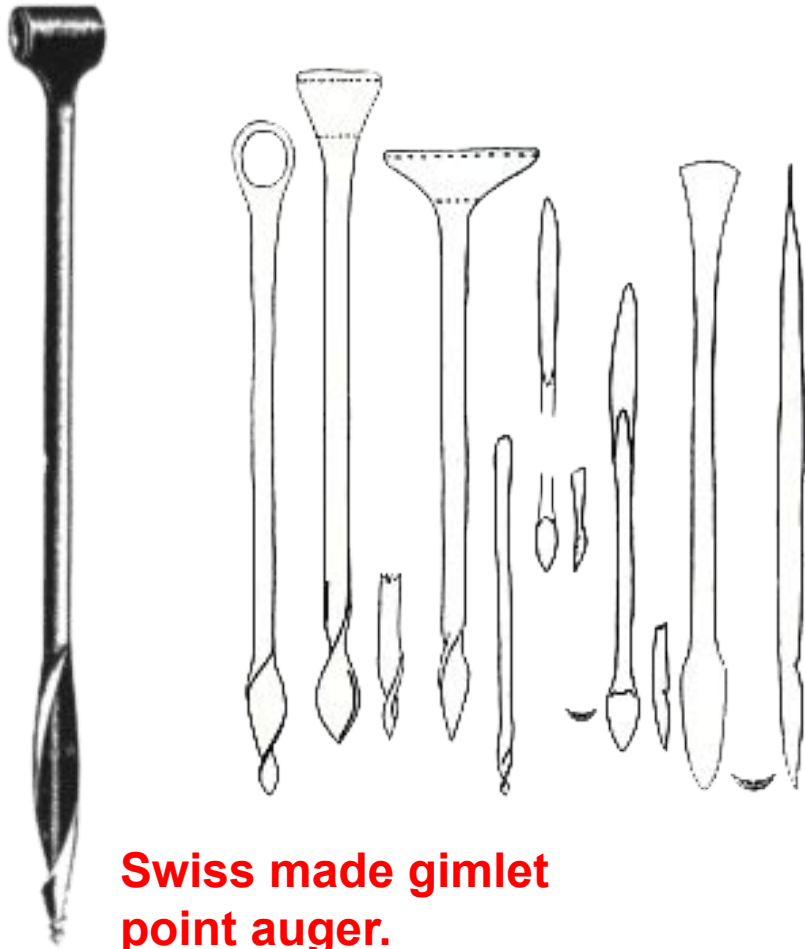
Drilling & Boring

Hand Drills have been around for centuries.

There are clear examples of hand drills in Egyptian hieroglyphics.

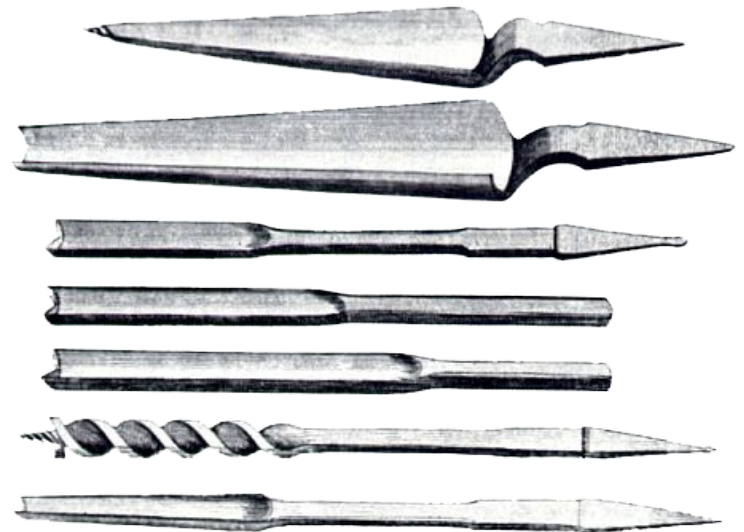


Some early auger bits had a spoon like shape while others had a twist similar to today's drills.



Swiss made gimlet point auger.

These Russian augers date back to at least the 8th century.



A collection of 19th century augers.

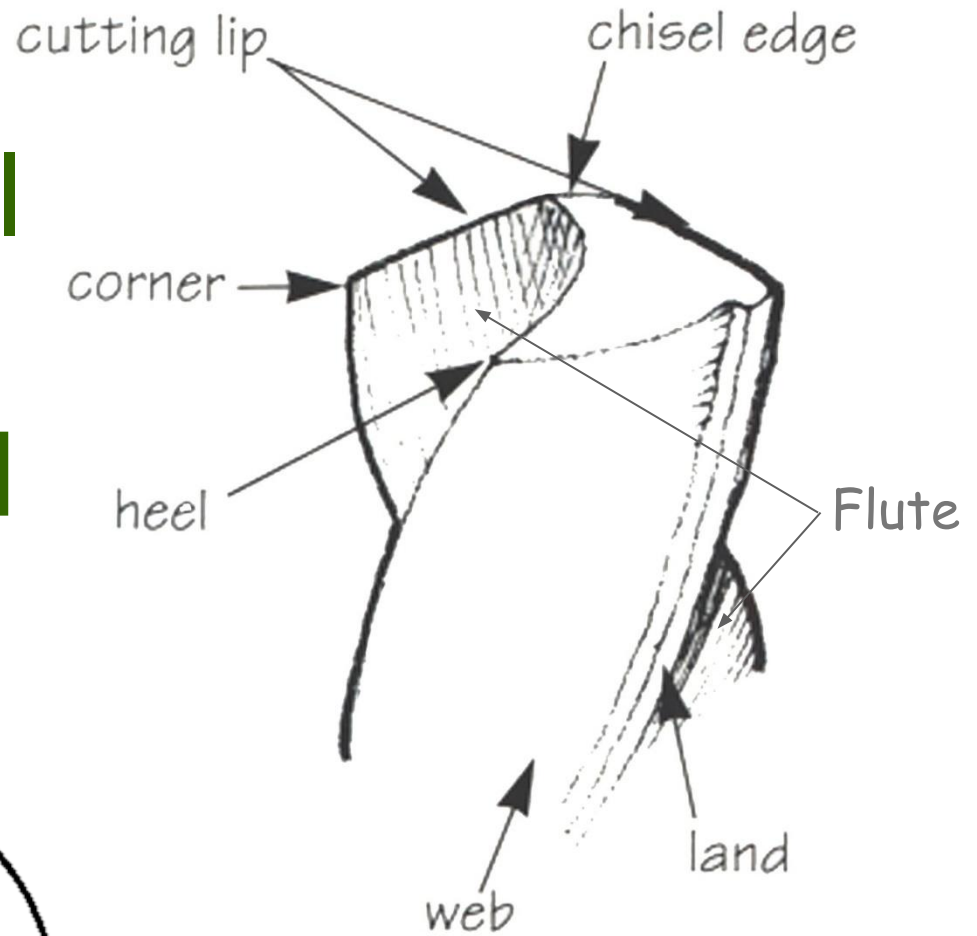
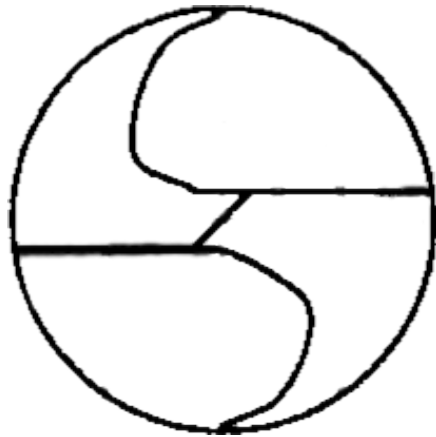
The invention of the auger bit and twist drill revolutionized the way we drill.

**Early Crank
Drill Brace
& Bit**



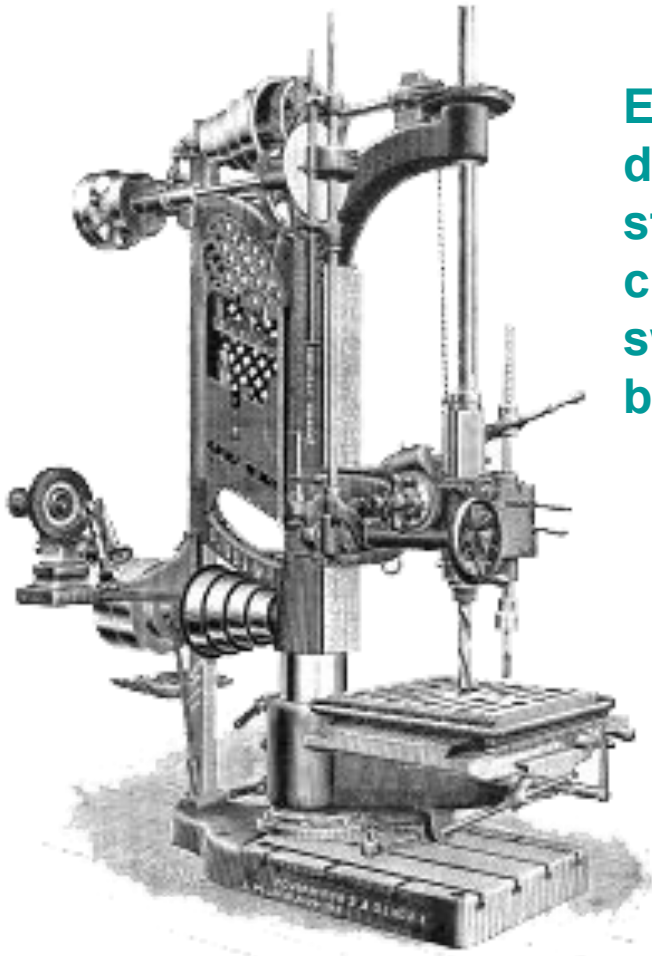
**Use twist drills for
drilling smaller holes.**

The twist drill
flute runs spiral
around the bit
to pull up wood
chips.

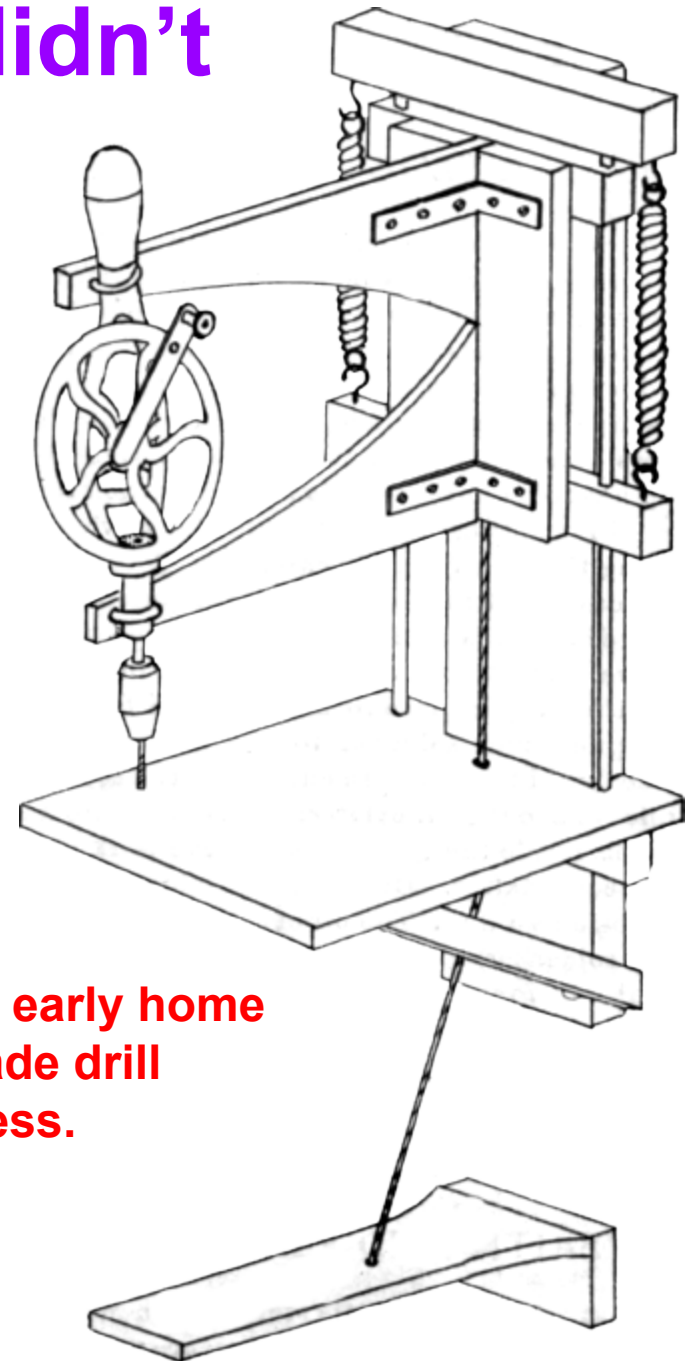


From the operators perspective, the direction of the cutting bevel turns clockwise which is counter clockwise when looking from this end.

Many early machines didn't pay much attention to operator safety.

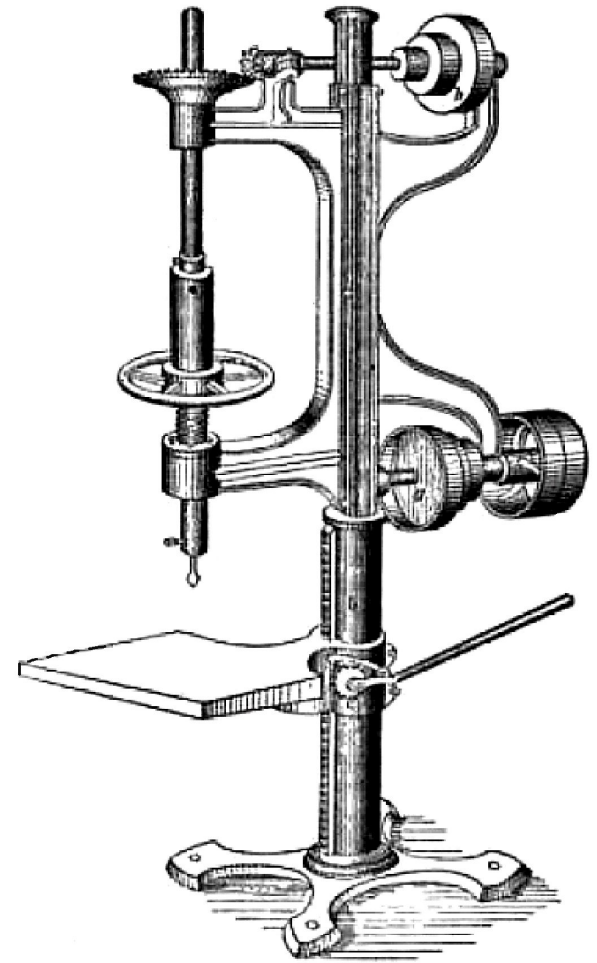


Early drills didn't have standardized chucks making switching drill bits difficult.



An early home made drill press.

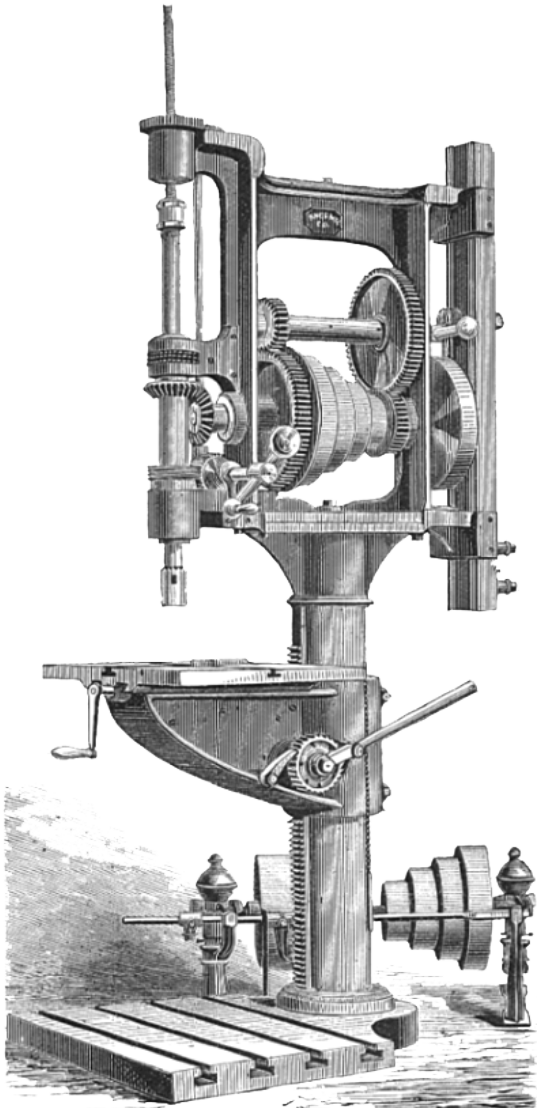
Although the unguarded pulley's don't have belts on them in this illustration, it's clear the Knight's Vertical Drilling Machine also incorporates gears. It's somewhat unclear how well the unique wheel press system may have worked, but since it doesn't show up on MANY future drill presses, my guess is it probably didn't work very well.



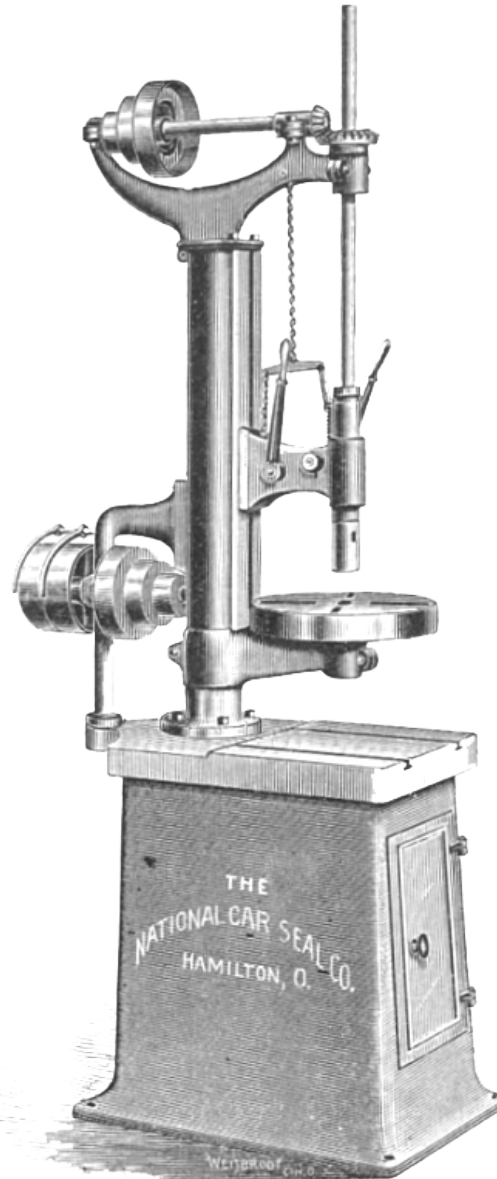
Vertical Drill.

Safety never seemed to be a big issue on early machines.

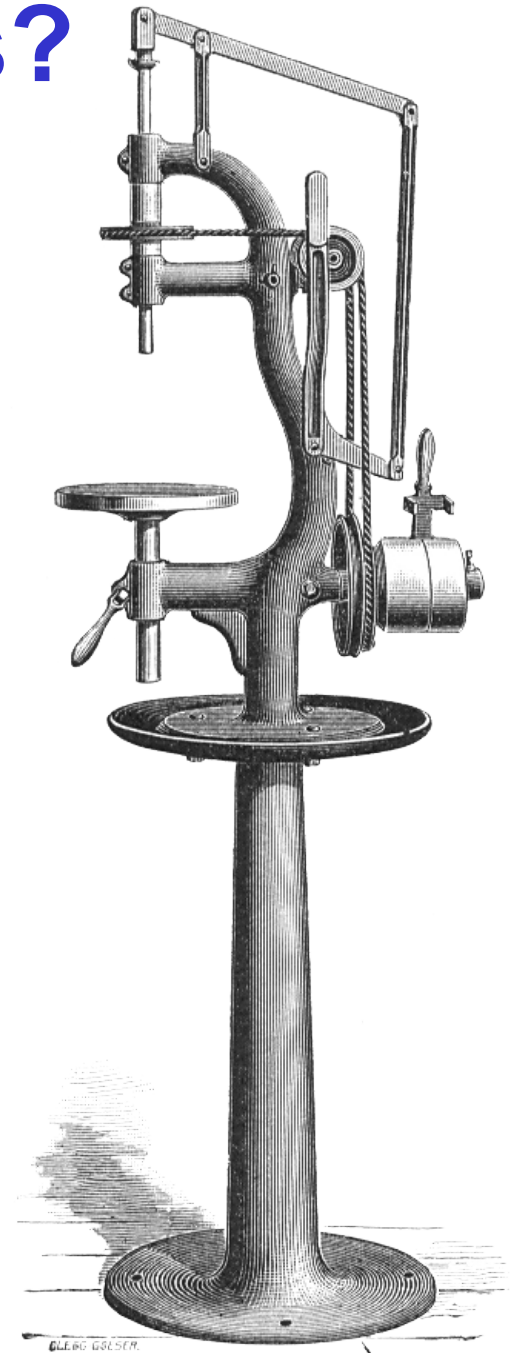
Civil War era drill presses?



COMBINED DRILL AND SLOTTING.

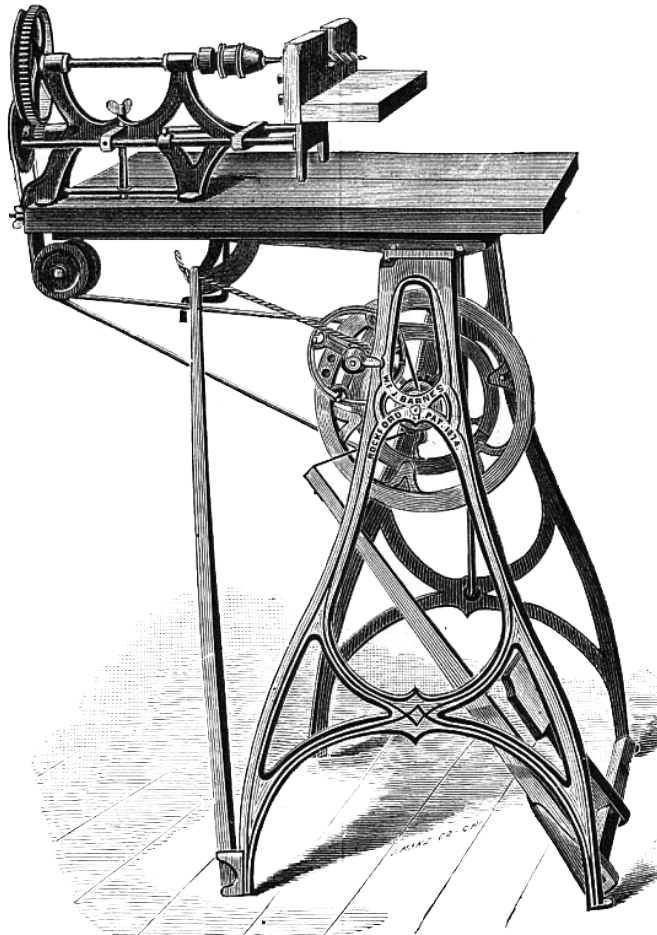


A New Light Drill Press.

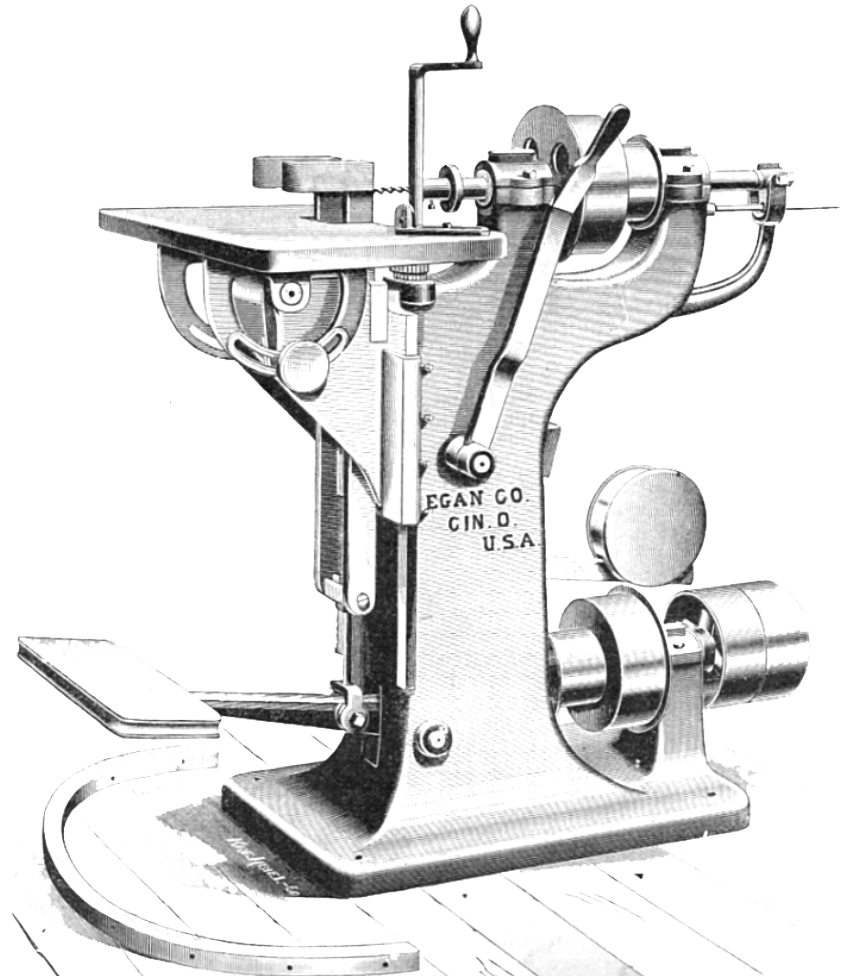


W. G. GILSON.

Early horizontal boring machines.



BORING ATTACHMENT ON COMBINED MACHINE.



FELLOE BORING MACHINE.

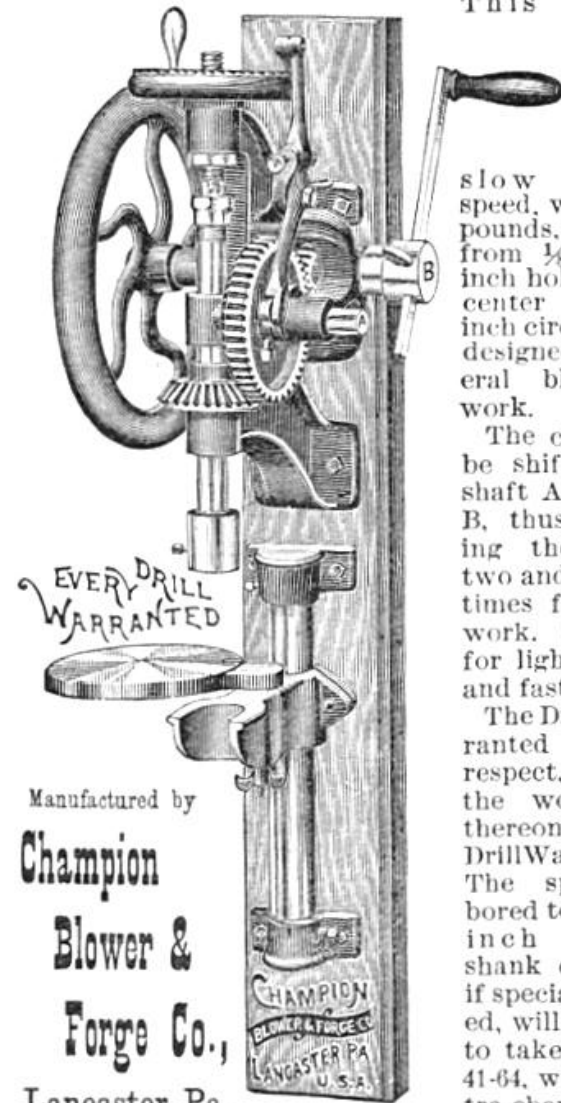
1891

Ten dollars was a lot of money in 1891. This post mounted drill press will self feed as you crank it,

THE WORLD'S CHAMPION

NEW UPRIGHT SELF-FEED

1891 Pattern \$10.00 Post Drill.



This Drill is Double Back Geared, can be changed from slow to fast speed, weighs 120 pounds, drills from $\frac{1}{8}$ to $\frac{1}{4}$ -inch hole, and to center of $14\frac{1}{2}$ inch circle, and is designed for general blacksmith work.

The crank can be shifted from shaft A to shaft B, thus increasing the power two and one-half times for heavy work. Shaft A is for lighter work and faster speed.

The Drill is warranted in every respect, having the words cast thereon, "Every Drill Warranted." The spindle is bored to take $\frac{1}{2}$ -inch straight shank drills, but if specially ordered, will be bored to take in $\frac{5}{8}$ or 41-64, without extra charge.

Manufactured by

**Champion
Blower &
Forge Co.,**

Lancaster, Pa.

These are museum pieces that are interesting to see.

But this fully restored working drill press is something any shop would be proud to own.





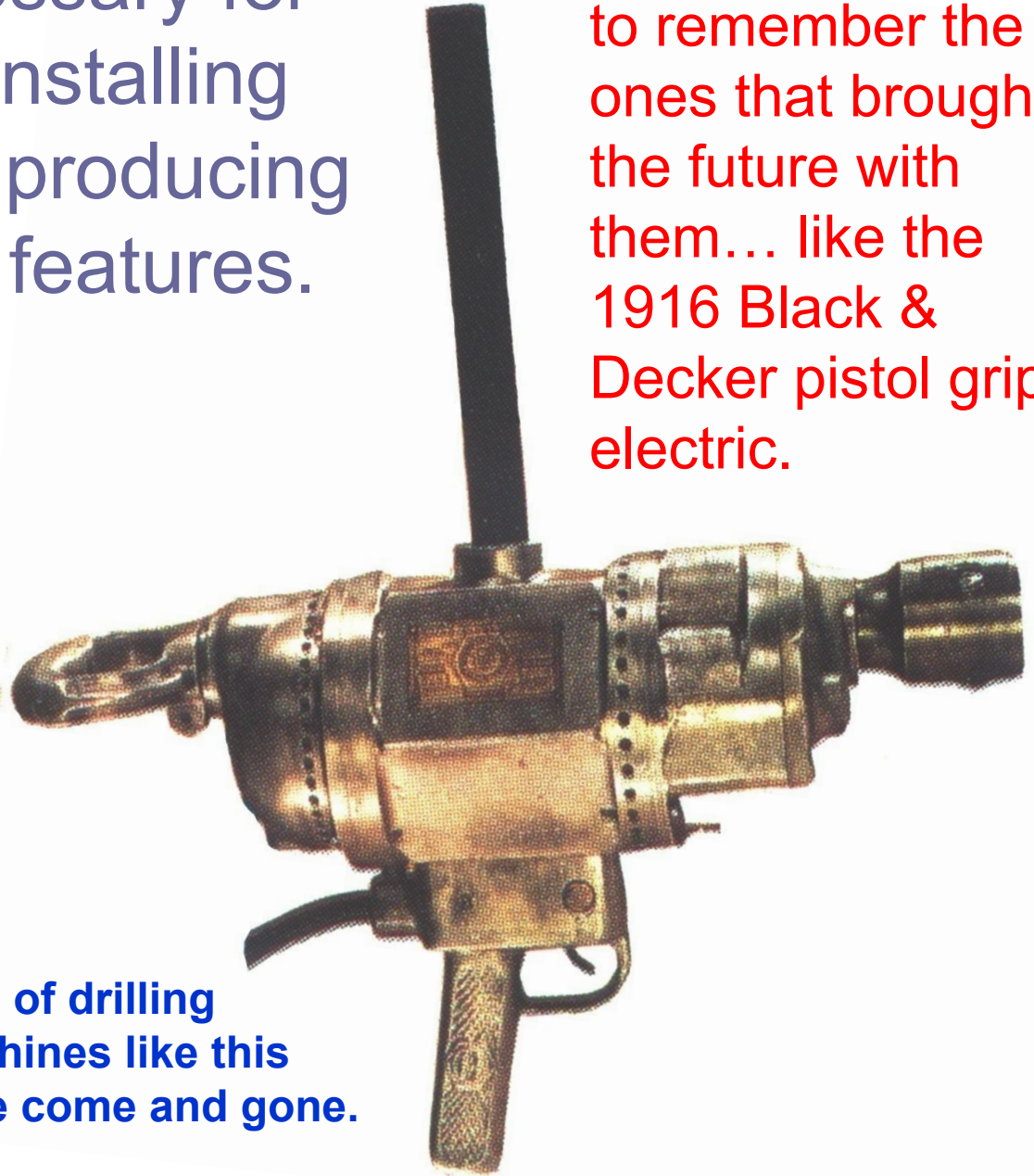
**Fein's first
electric drill
1895**

Drilling
Drilling and
boring are
hole making
processes
as basic to
woodworking
as pounding
in a nail with
a hammer.

Holes are necessary for making joints, installing hardware, and producing various design features.



Lots of drilling machines like this have come and gone.



But people tend to remember the ones that brought the future with them... like the 1916 Black & Decker pistol grip electric.

Even as late
as 1931, this
Delta drill
press still
didn't have
guards over
the belts.



During the war years, this
1941 factory employed
women
to do all
the drilling
jobs.

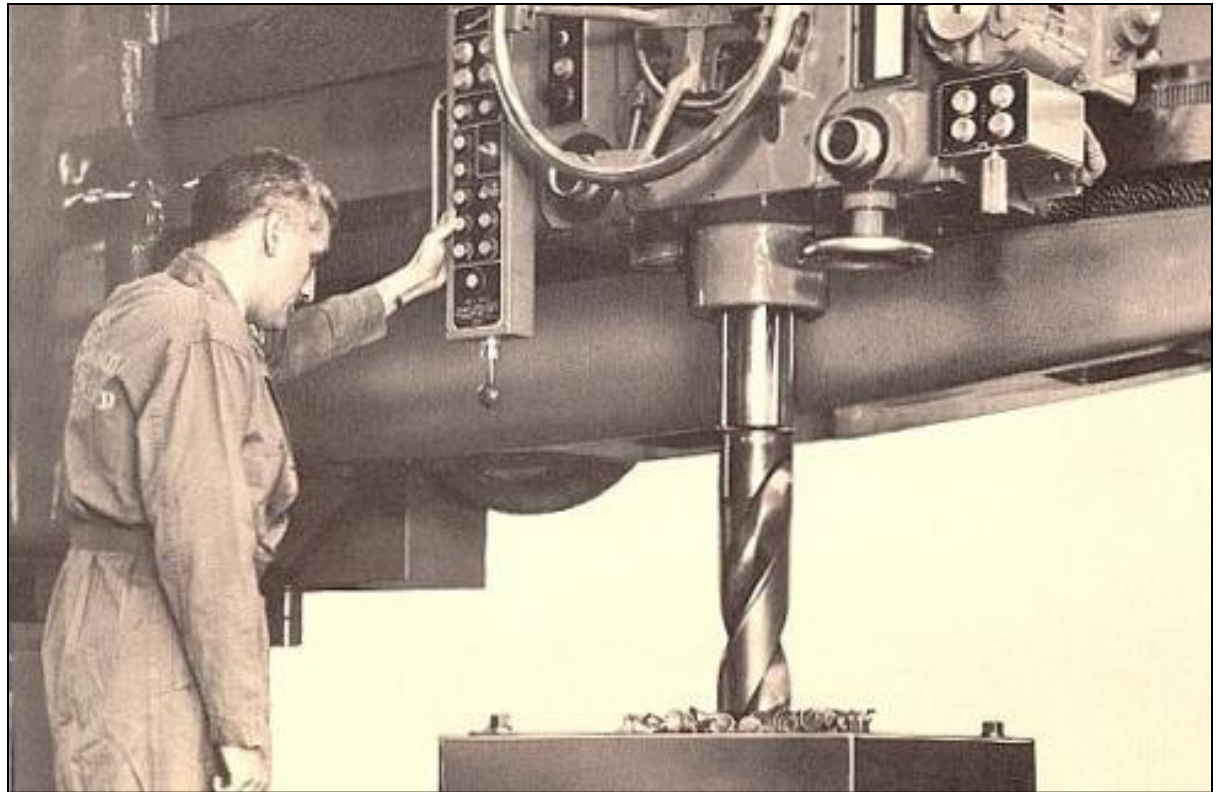


**For many women,
this would be their
first taste of the
working world.**



This is the largest drill press I have ever seen.

I would imagine it would take a crane to help install these drill bits. Made in Kaukauna Wisconsin, this mammoth machine is drilling a six inch diameter hole into steel.

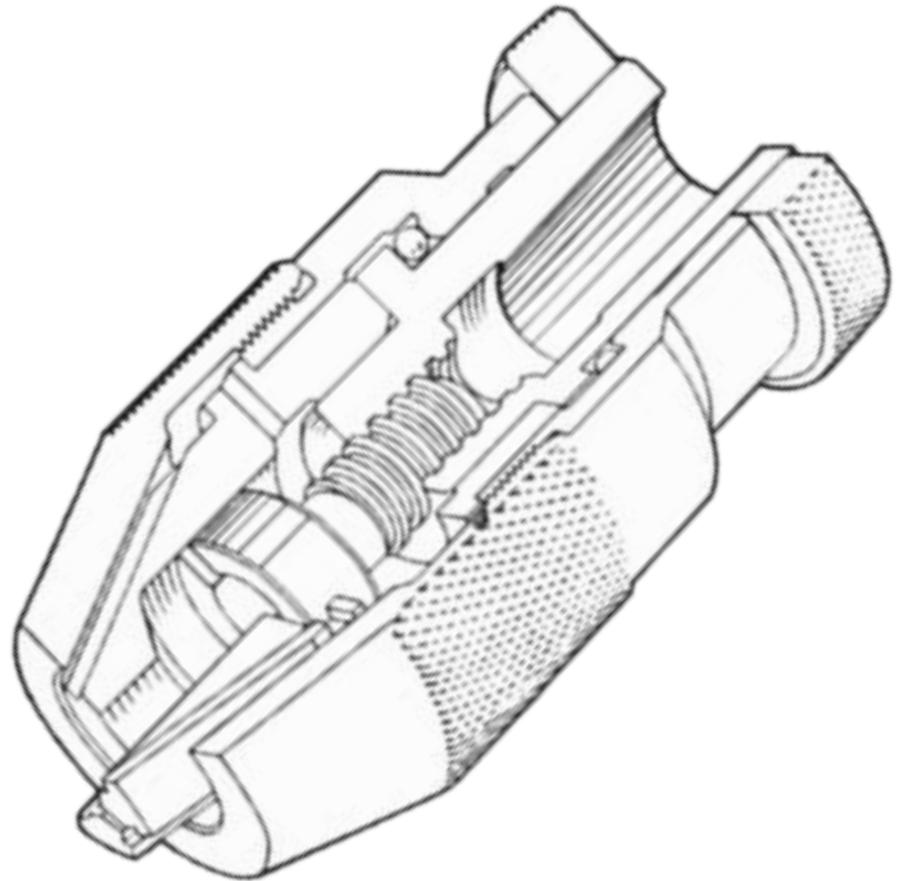


By the 1960's, the Delta drill press still has exposed belts and pulley's.



You may have noticed the chuck changes too. Standardized chucks simplified bit changes into a simple twist.

This Albrecht keyless brace chuck uses a screw mechanism. A twist of the outside sleeve would loosen and tighten to fit the odd shaped tang end of an auger bit.



To firmly hold straight cylindrical shaped drills bits, this Jacobs Chuck works with a chuck key.



This Jacobs chuck incorporates a screw mechanism and key to tighten the jaws.

The Jacobs chuck is also available in keyless.



Keyless Chucks

Today's drill presses cover up belts and pulleys.



A broad range of bits, cutters, and drills are used in woodworking.



Nails make cheap and effective drill bits.

Cut the heads off finish nails and use them to pre-drill holes.



Some cutters are designed for use in hand held tools.

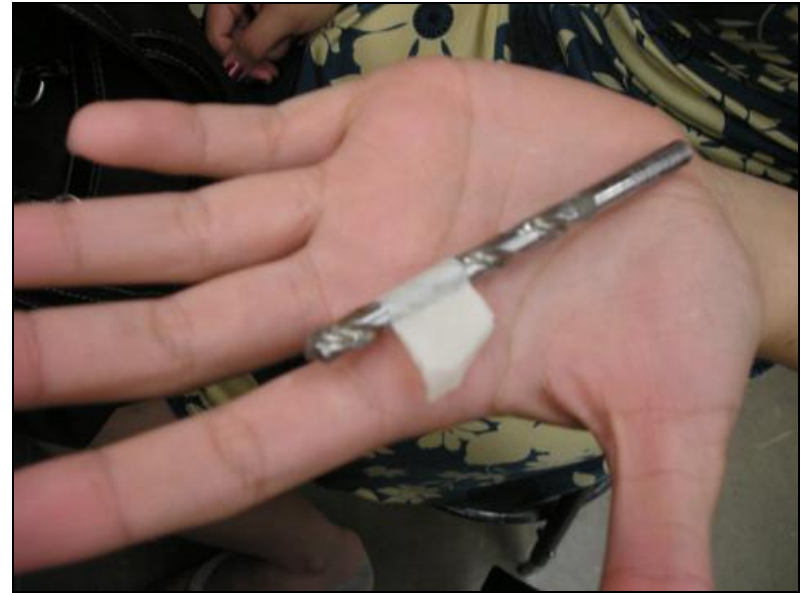
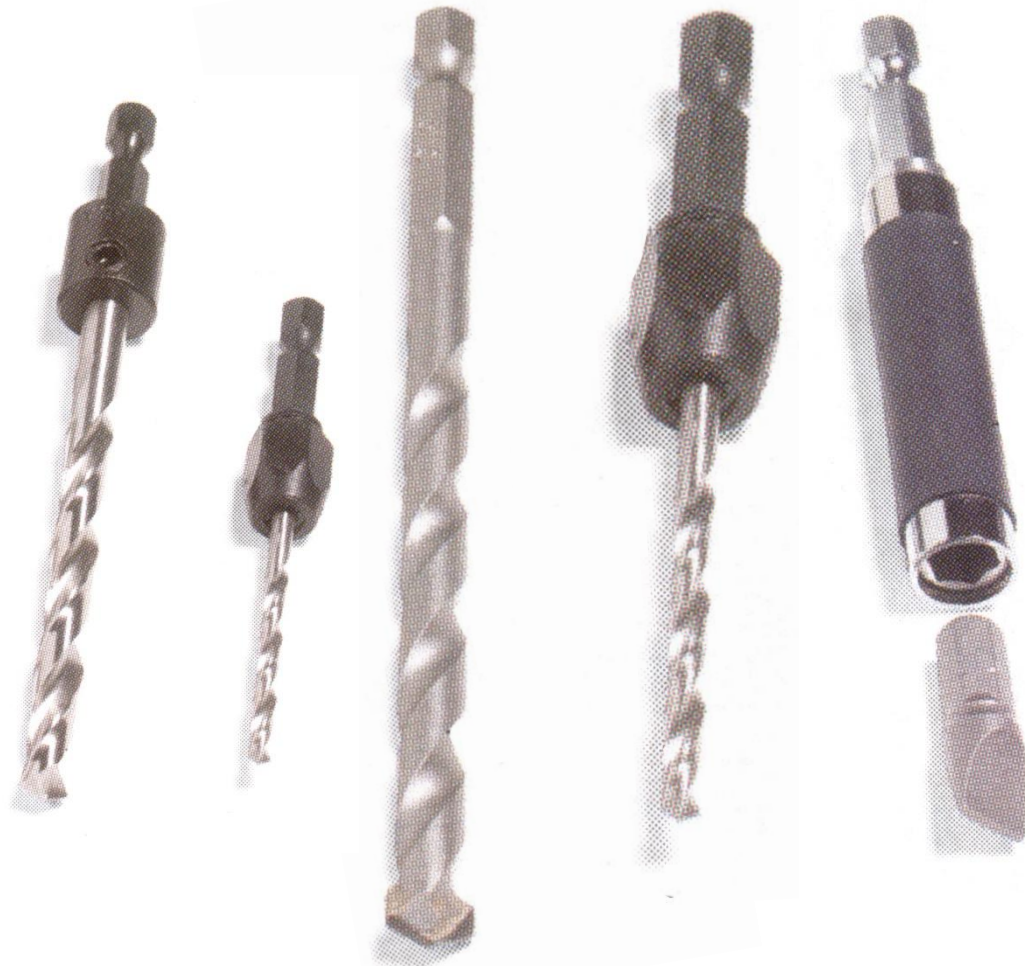


Huge advancements in cordless technology came from NASA.

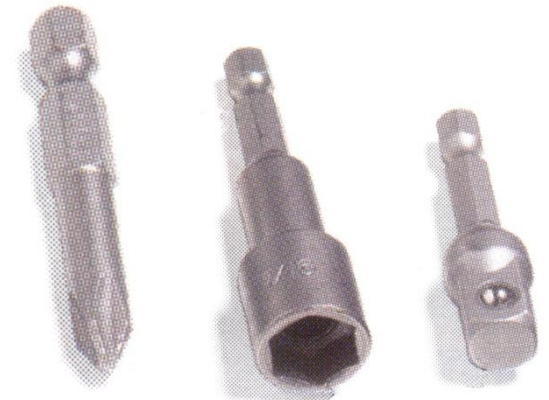


There is a variety of specialty accessories.

Hex shanks
make for
quick release.



Masking tape marks the depth.



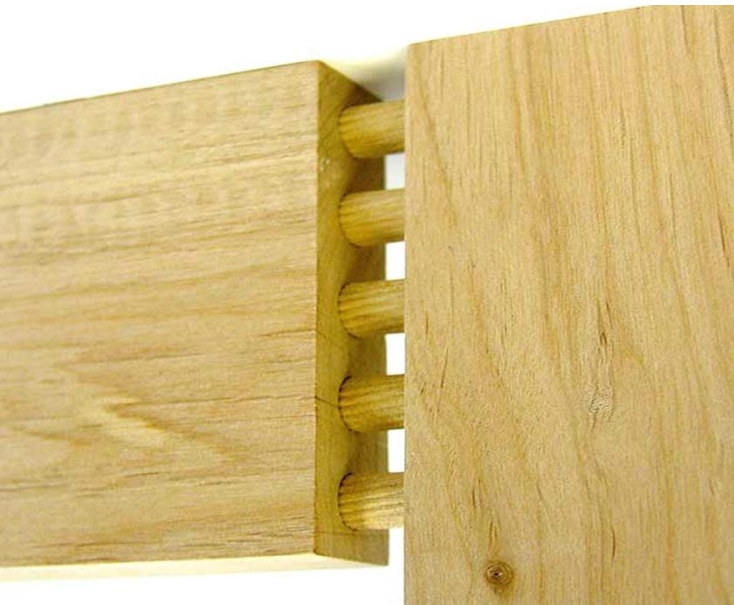
A variety of drilling jigs help hold the drill bit.

This simple jig made from scrap wood holds the drill perfectly upright.



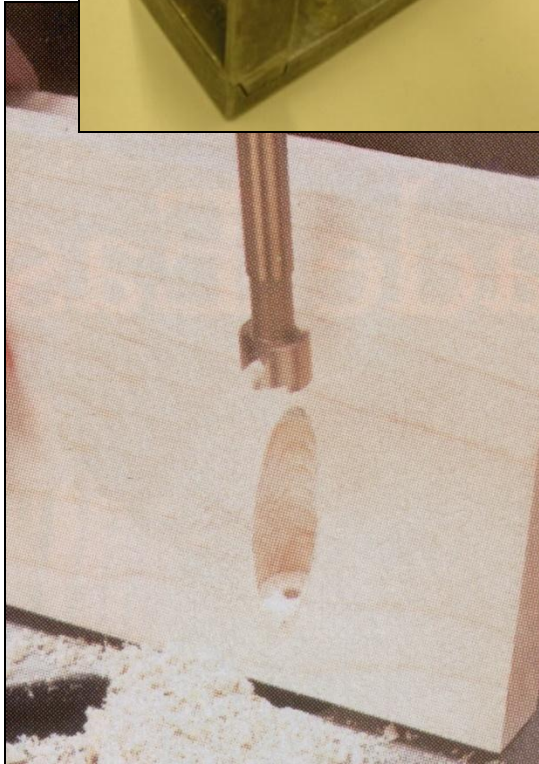
A doweling jig is used to drill straight even holes.

Place masking tape on the drill bit to mark the final depth. Drill the hole an extra 1/8" for a glue relief reservoir.



Dowel centers transfer hole locations.

The pocket
hole jig
works with
a hand drill.

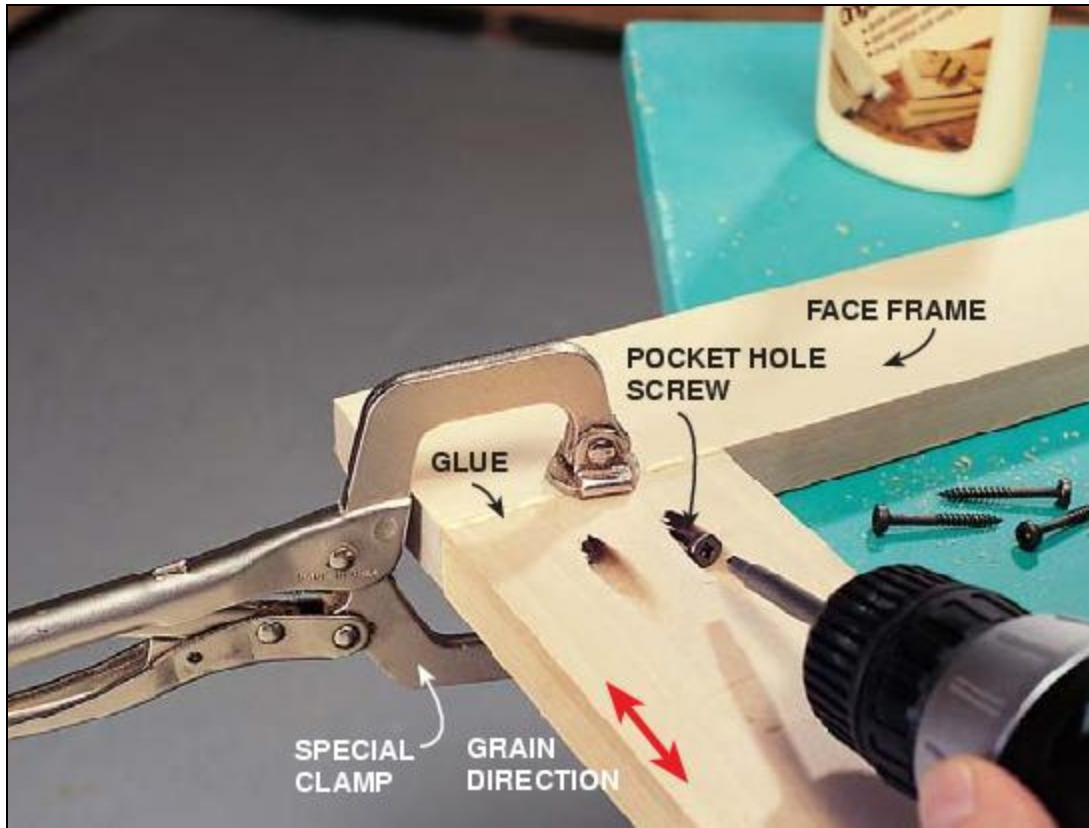


A drill press can
be used for the
same purpose.



The Porter Cable pocket cutter.

Routers inside this
machine, cuts slots
and drills holes
producing pockets
for screws.

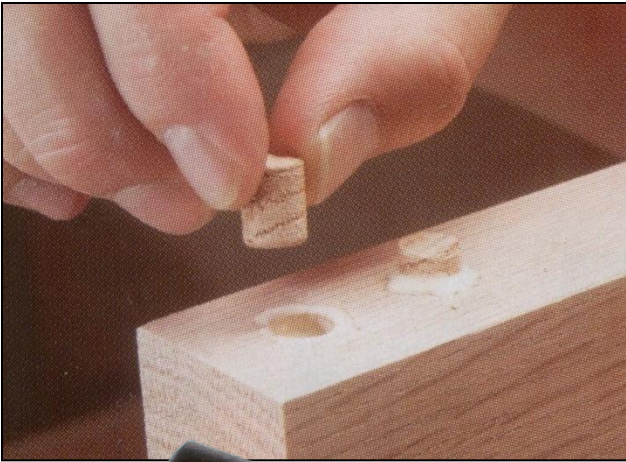


Pan head screws
will pull tight
without splitting
the pocket hole.

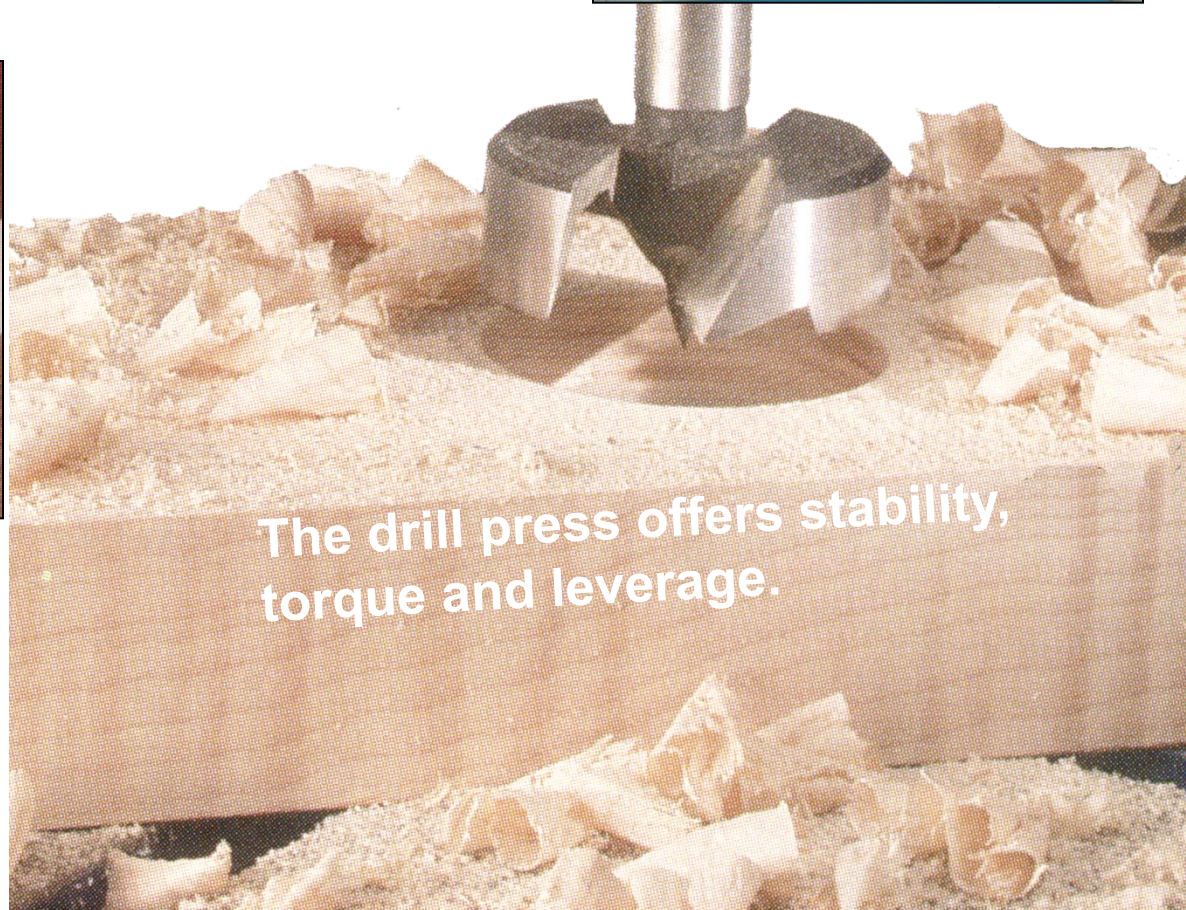


A pocket joint consists of a butt joint reinforced with pan head screws driven at an angle through pocket holes.

Some cutters are limited to power equipment.



Plug cutters require the extra stability and torque.



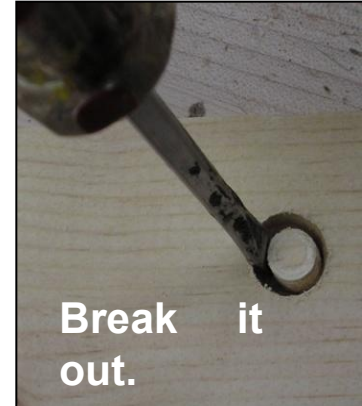
The drill press offers stability, torque and leverage.

A matched bit set makes plugging screws easy.

A Forstner bit matched to the same size plug cutter can do the job nicely.



Cut a plug.



Break it out.



Glue it into place.



Sand it down flat.

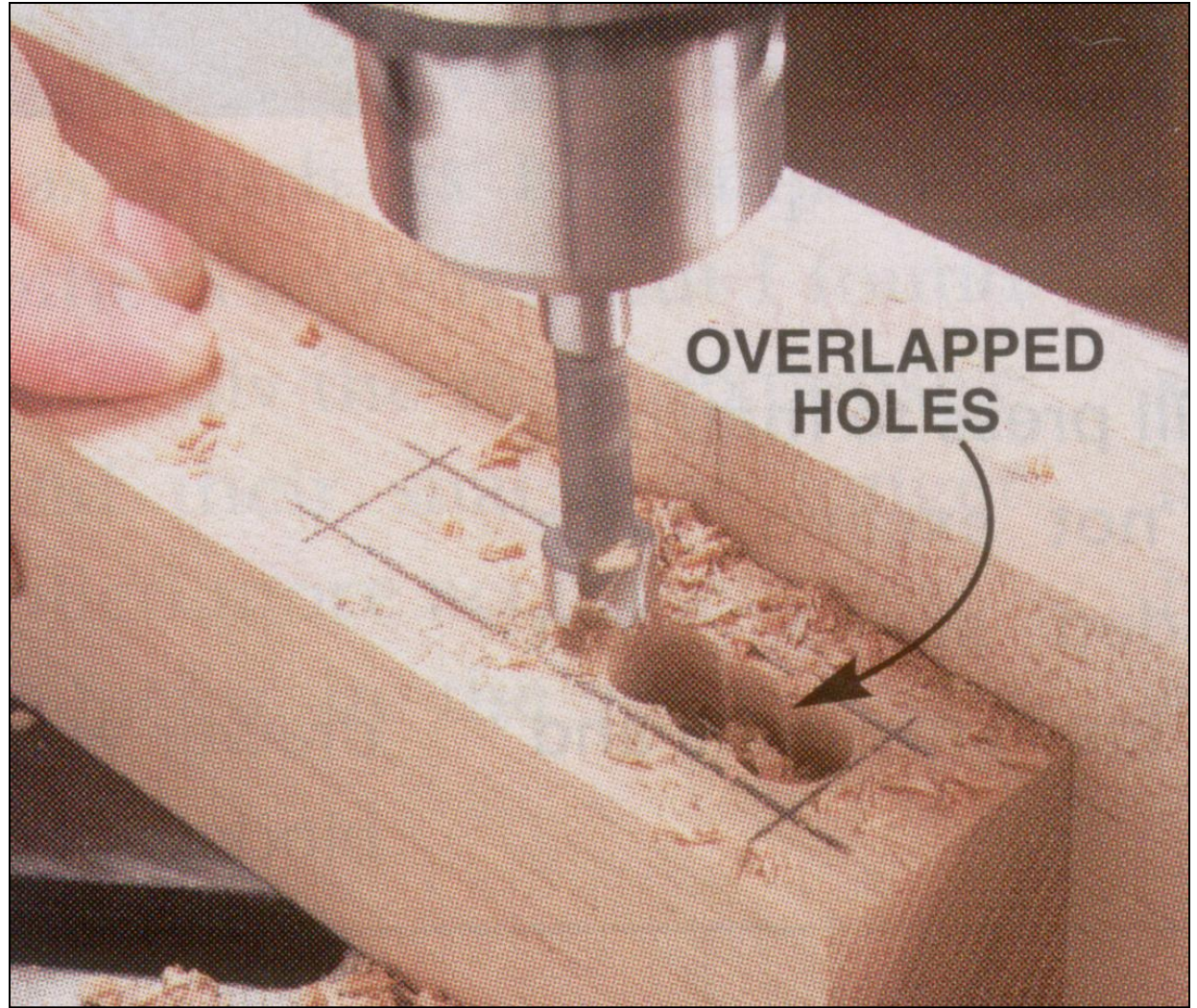
Forstner
bits make
smooth
clean flat
bottomed
holes.

**But this self-feed
bit cuts quicker.**

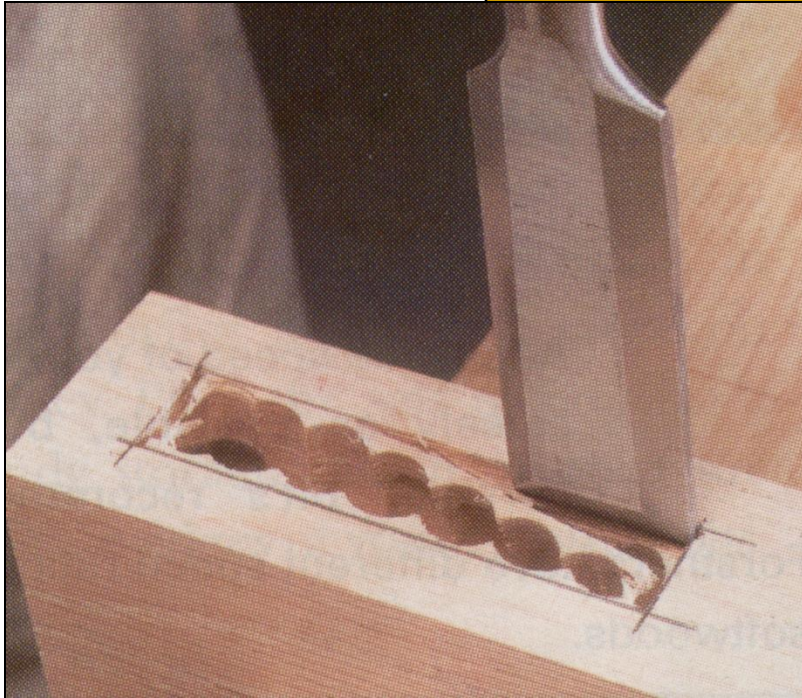


Forstner bits also work well for mortising.

Overlapping holes drill straight and stop at the proper depth because of the machines stability.



After drawing out the area, drill a series of holes in a straight line starting at both ends and taking as much interior wood out as possible.



Go back and chisel out the round corners.

Utilize a bench mortiser

The mortiser is dedicated to making **square holes** for a mortise and tenon joint.



To make a square hole, the mortiser uses hollow chisels with a boring bit running through the chisel.

Without proper clearance between the hollow chisel and boring bit, it will overheat.

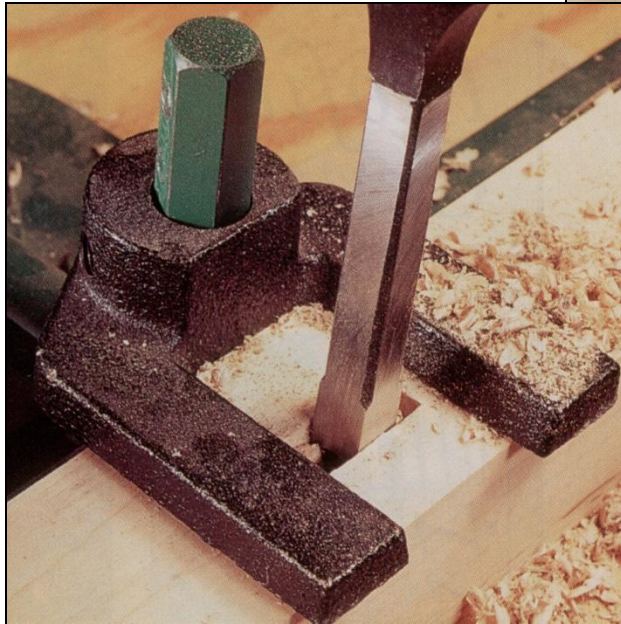
Like drilling on the drill press, start at each end and work inward.



Utilize a bench mortiser

Care must be taken to not hog down on the machine. Don't let the bit overheat.

Have patience and let the boring bit take out the wood. Let the square chisel cut out the corners.



Bit Style	Size Range	Typical Trades	Application Benefits
SPEEDBOR Bit 	1/4" to 1 1/2" diameter 4" to 16" lengths	Carpentry Electrical Plumbing	Fast, clean holes with reduced "break out" when through-hole drilling
I-100 Solid Center Auger 	1/4" to 1 1/2" diameter 7 1/2" length	Carpentry Electrical Plumbing	Self-feeding tip pulls bit into the work for repetitive cutting of fast clean holes with a clean exit hole. Micro-groove cutting edges and spurs for fast, clean cuts. Single spur cutting edge scribes the circumference of the hole for a smoother finish.
Ship Auger 	3/8" to 2" diameter 7 1/2" 29" lengths	Public Utilities Electrical Plumbing Carpentry Log Homes	Hollow center provides better chip removal for deeper holes in utility poles and logs
Installer Bit 	1/4" to 3/4" diameter 12" to 30" lengths	Telecommunications Cable / Internet Security Systems	Wire hole near the end of the bit enables user to pull wire back through after drilling the hole
Self-Feed Bit 	1" to 4 5/8" diameter	Plumbing Electrical General Contracting	Replaceable self-feeding tip pulls bit into the wood; for cutting larger holes with clean edges
Forstner Bit 	1/4" to 2 1/8" diameter	Fine Woodworking Cabinetmaking	Precise cutting of smooth, flat-bottomed (blind) holes with clean, sharp edges
Brad Point Bit 	1/8" to 1/2" diameter	Woodworking Cabinetmaking	Precise cutting of smooth through-holes with clean, sharp edges and reduced "break out"

Some bits work in both hand drills and drill presses.



**Countersunk
holes with a
screwmate can be
done by hand drill
or by drill press.**

When using a hole saw, make sure the cutting teeth contact the material at all points around the cutting circle.



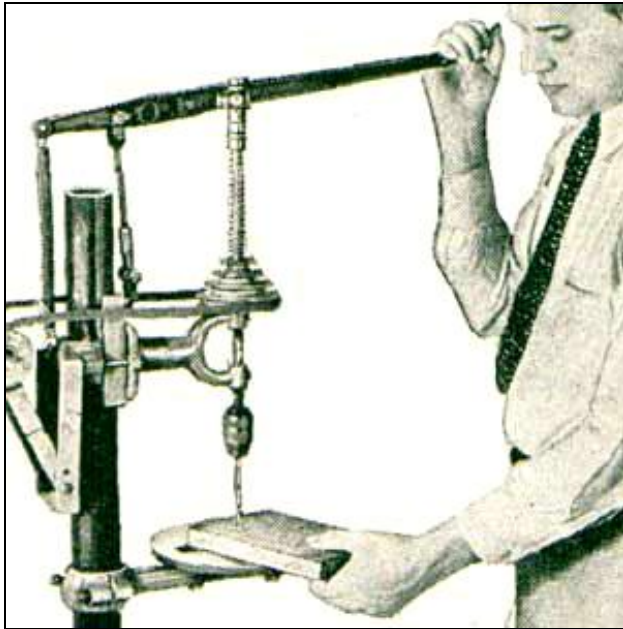
Larger holes can be made with expansion bits and hole saws.

Safety Rules for the Drill Press

1. **Wear safety glasses.**
2. Select the slowest speed for wood cutting.
3. Back up materials especially when they are thin.
4. Clamp work whenever possible.
5. Sleeves rolled up, **long hair tied back.**
6. Operate the feed so the bit cuts evenly (not too fast or too slow.)
7. Ease up when the drill **bit breaks through.**
This is when it can catch in your wood and hang up.
8. Back the bit out of the hole as soon as the cut is complete.
9. If the wood does hang up, **shut off the power as you step back.**
10. When finished, put the speed to its lowest setting before turning off.
11. The **speed control** only works when the machine is in motion.
12. Clean off the machine putting away all bits and clamps used.



The operator should have on safety glasses.
The tie should be tucked in. Long hair should be tied back.

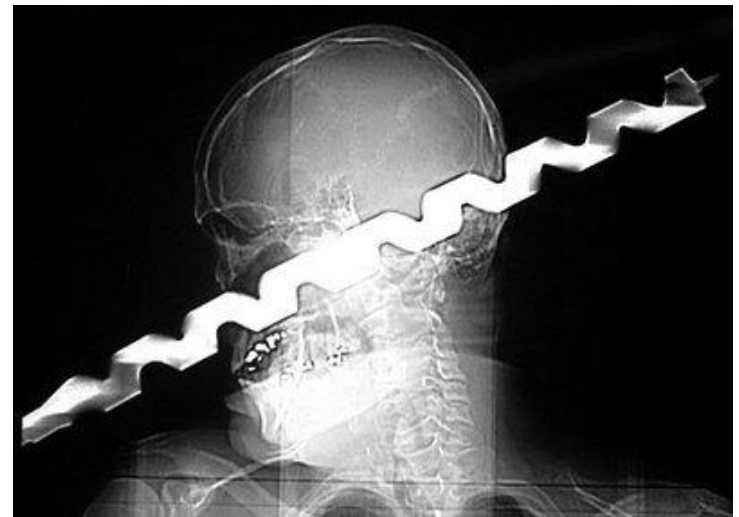


Hey buddy! Tuck in the tie and... Where are your safety glasses?

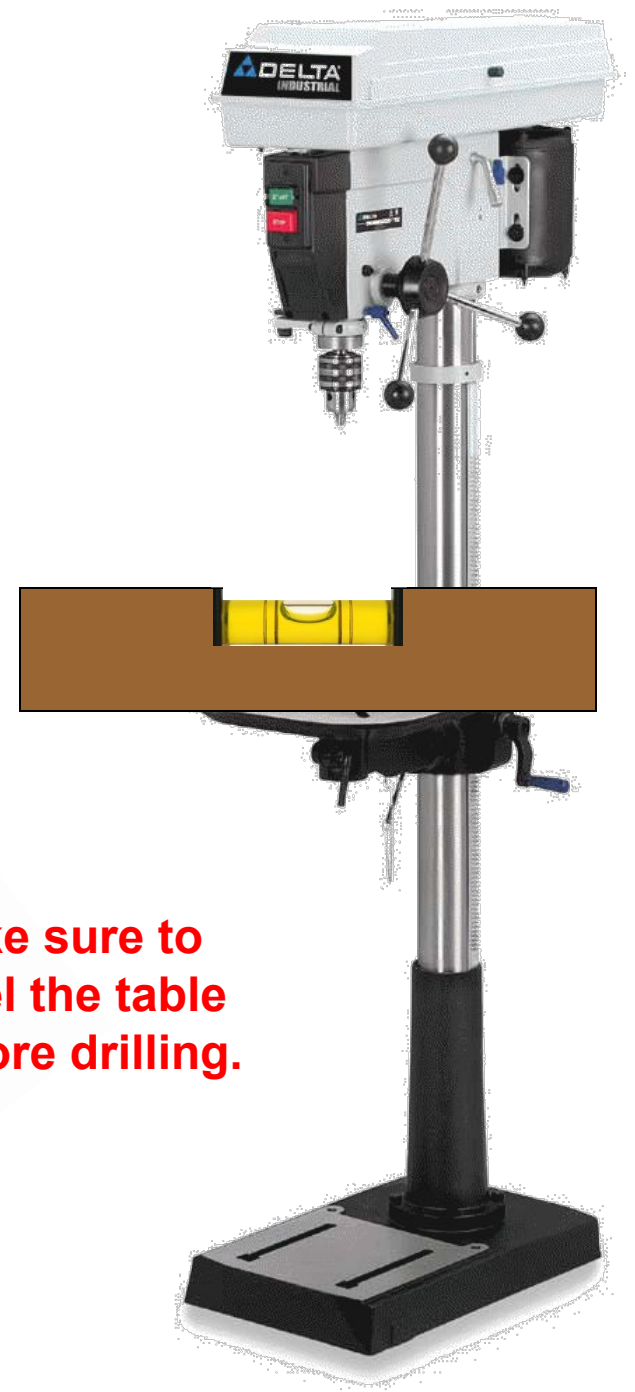


This 1976 photo shows what can happen when a drill gets a hold of hair. It pulled it out by the roots. Ouch!

This is an actual x-ray of someone who should be more careful when using a drill on a ladder.



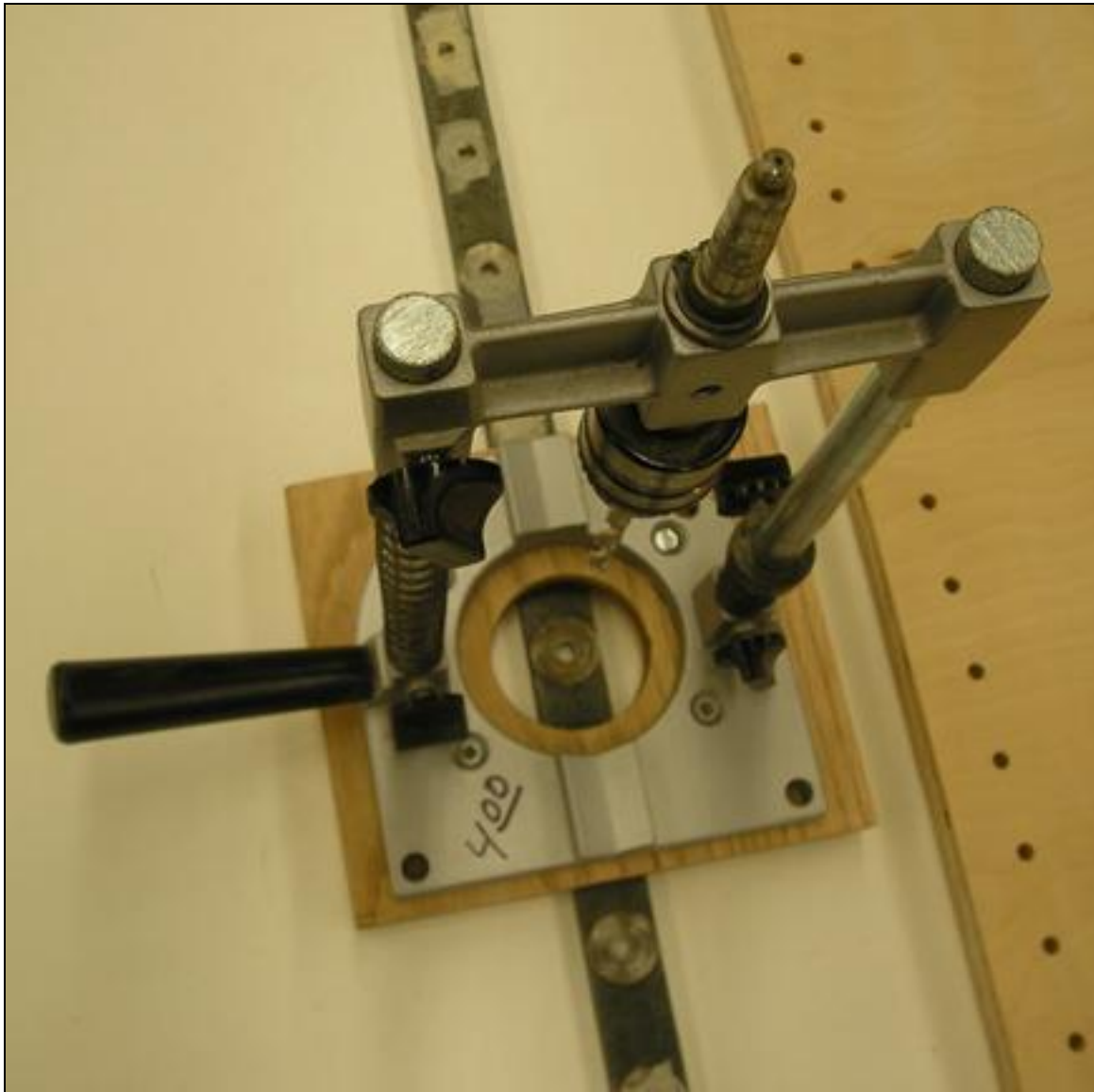
Firmly hold or clamp your work when drilling.



Make sure to level the table before drilling.

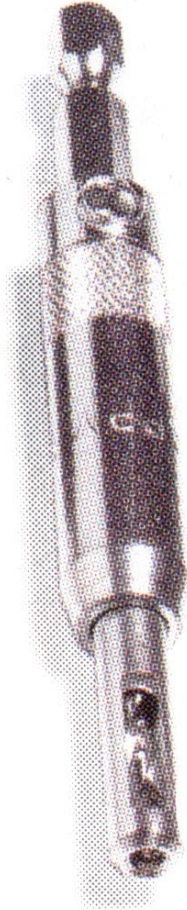
This Delta in-line boring machine has 13 bits that will drill holes in a line for adjustable shelves.



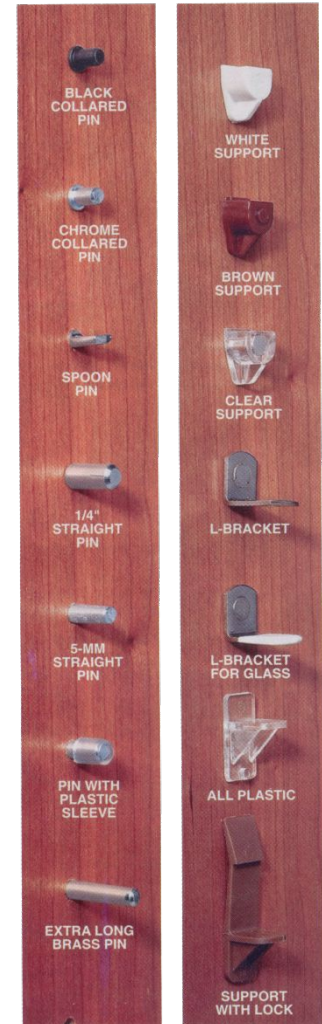


The same job can be done with this shop made jig. The metal strip has evenly spaced holes. The drill is held perpendicular with a 2nd hand drilling jig.

This can also be accomplished using a simple wooden jig and a self-centering bit.



A wide choice of shelf pins are available.

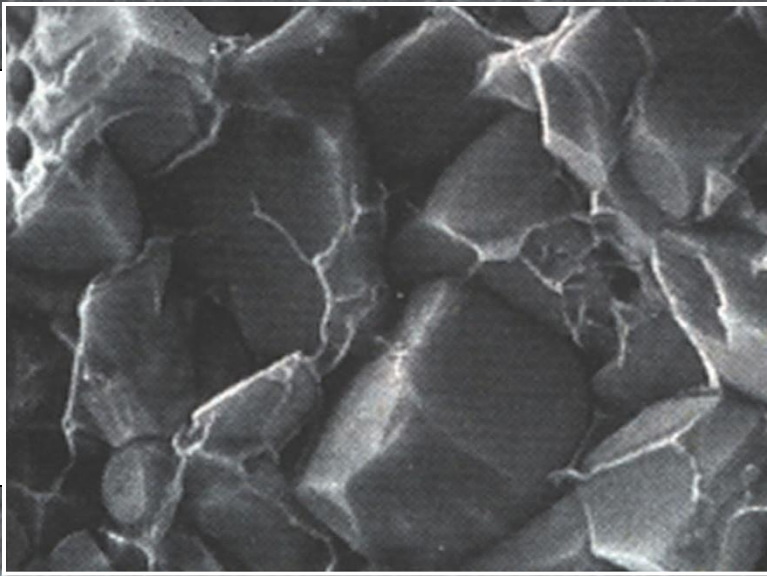


Most drilling and boring bits can be properly maintained and sharpened in the shop.

As with other tools, keeping sharp is safer because it takes less force to use.

During sharpening, the drill bit is arced (swings) as it passes over the grinding wheel keeping the proper proportion and relief angle.

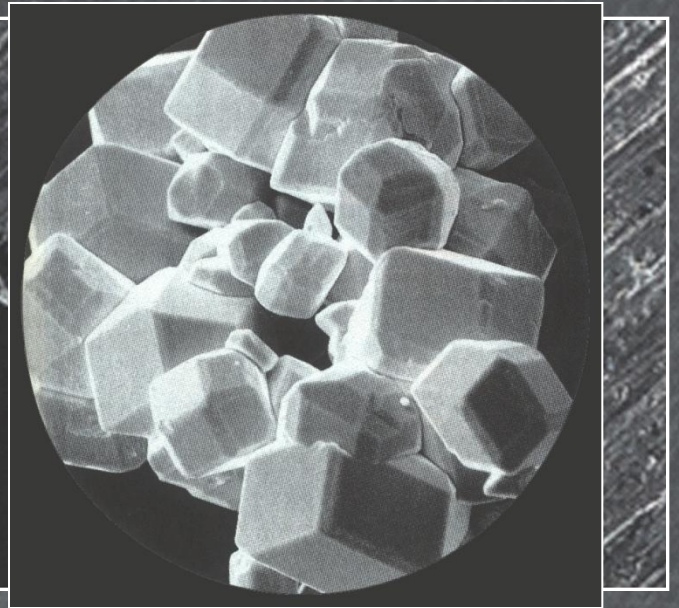




K.

A piece of fractured
the small even gra
binder used to cem

5000 X.



5000 X.

Copy down any new vocabulary words or phrases from this slideshow...

Gimlet- pointed, when the end of a drill bit has a screw point.

Drill- holes cut into wood with little concern to absolute accuracy... it's close enough.

Bore- the accurate cutting of holes into a solid surface... absolutely on the nose accurate.

Chuck- device made to firmly hold a drill bit. Can be keyless.

Carbide- extra hard metal used for wood cutting tools because it stays sharp longer.

Blowout- when wood end grain breaks away, usually because of the direction of cut putting undue pressure on the grain structure as with through holes.

Guard- usually a factory made covering over a cutter or blade.

Twist drill- bit with twist flutes running along the shank.

Auger bit- helix shape with a center shaft, scoring spurs and a feed screw end.

Brace- crank shaped turning device with a chuck to hold the bit's tang end.

Tang- the odd shaped end of an auger bit that fits into the brace.

Hole saw- round saw hole cutter with a drill bit center that fits into a drill.

Screwmate bit- all in one... countersink, shank and pilot... cutting bit for screws.

Counter sink- a V-shape cut into wood so flathead screws will fit flush on a surface.

Expansion bit- an adjustable bit that can be changed to a variety of hole sizes.

Plug cutter- a specialized bit for cutting plug shapes to fill holes & cover countersunk screws.

Pocket hole- angled holes drilled for the purpose of hiding pan head screws.

Doweling jig- a clamping device made to hold a drill bit straight & in-line for the purpose of placing dowel pins.

The End

The Story of Drills