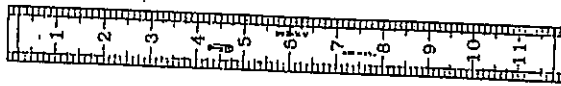


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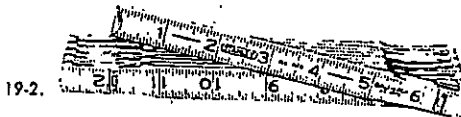
Layout, Measuring, And Checking Devices

DISCUSS

TOOL	DESCRIPTION	USES
Bench Rule Fig. 19-1.	A 12-inch or one foot rule. One side is divided into eighths, the other into sixteenths.	<ol style="list-style-type: none"> 1. To make simple measurements. 2. To adjust dividers. <p><i>Caution.</i> Never use as a straightedge.</p>
Zig-Zag Rule Fig. 19-2.	A folding rule of six- or eight-foot length.	<ol style="list-style-type: none"> 1. To measure distances greater than 2', place the rule flat on the stock. 2. To measure less than 2', it is better to use the rule on edge. (This instrument is good for inside measurement; since the reading on the brass extension can be added to the length of the rule itself.)



19-1.



19-2.

*** Flexible Tape Rules
Fig. 19-3.

A flexible tape that slides into a metal case. Comes in lengths of 6', 8', 10', 12', 50', and 100'. The steel tape has a hook on the end that adjusts to true zero.

1. To measure irregular as well as regular shapes.
2. To make accurate inside measurements. (Measurement is read by adding 2" to the reading on the blade.)

*** Try Square
Fig. 19-4.

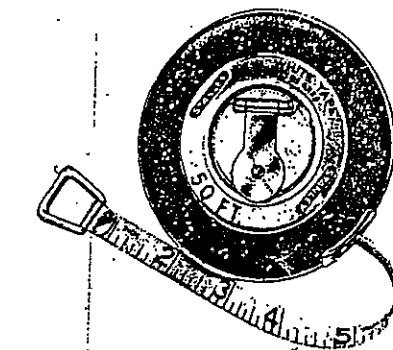
A squaring, measuring, and testing tool with a metal blade and a wood or metal handle.

1. To test a surface for levelness.
2. To check adjacent surfaces for squareness.
3. To make lines across the face or edge of stock.

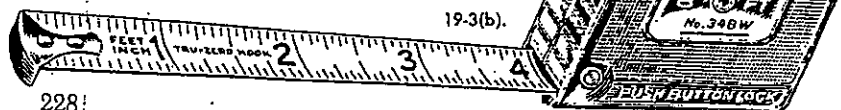
*** Combination Square
Fig. 19-5.

Consists of a blade and handle. The blade slides along in the handle or head. There is a level and a scriber in the handle.

1. To test a level or plumb surface.
2. To check squareness—either inside or outside.
3. To mark and test a 45-degree miter.
4. To gauge-mark a line with a pencil.



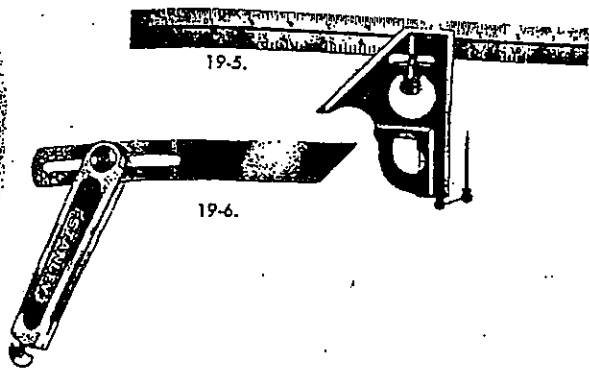
19-3(a).



19-3(b).

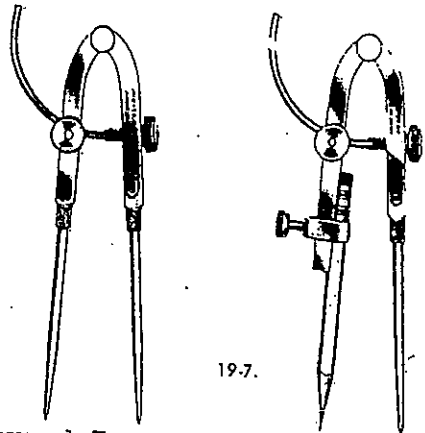


19-4.



19-5.

19-6.



19-7.

* Sliding T Bevel
Fig. 19-6.

* Dividers
Fig. 19-7.

* Framing or Rafter Square
Fig. 19-8.

Carpenter's Level
Fig. 19-9.

Marking Gage
Fig. 19-10.

* Scratch Awl
Fig. 19-11.

Trammel Points
Fig. 19-12.

Plumb Bob and Line
Fig. 19-13.

A blade that can be set at any angle to the handle. Set with a framing square or protractor.

A tool with two metal legs. One metal leg can be removed and replaced with a pencil. To set the dividers, hold both points on the measuring lines of the rule.

A large steel square consisting of a blade, or body, and a tongue.

A rectangular metal or wood frame with several level glasses.

A wood or metal tool consisting of a beam, head, and point.

A pointed metal tool with handle.

Two metal pointers that can be fastened to a long bar of wood or metal.

A metal weight with a pointed end. The opposite end has a hole for attaching the cord.

1. To measure or transfer an angle between 0 and 180 degrees.
2. To check or test a miter cut.

1. To lay out an arc or circle.
2. To step off measurements.
3. To divide distances along a straight line.

1. To check for squareness.
2. To mark a line across a board.
3. To lay out rafters and stairs.

To check whether a surface is level or plumb.

To mark a line parallel to the grain of wood.

1. To locate a point of measurement.

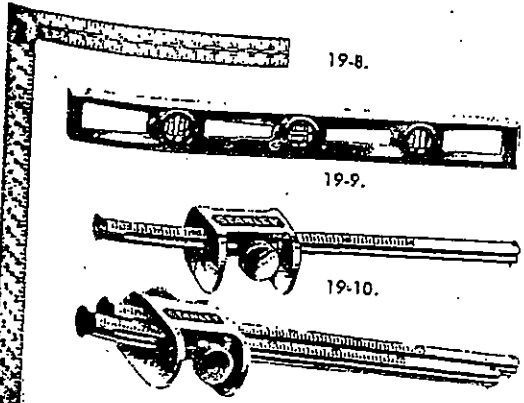
2. To scribe a line accurately.

1. To lay out distances between two points.

2. To scribe arcs and circles, larger than those made with dividers.

1. To determine the corners of buildings.

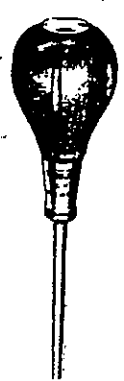
2. To establish a vertical line.



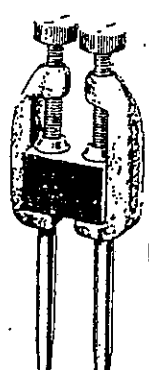
19-8.

19-9.

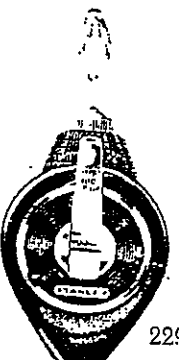
19-10.



19-11.





19-12.

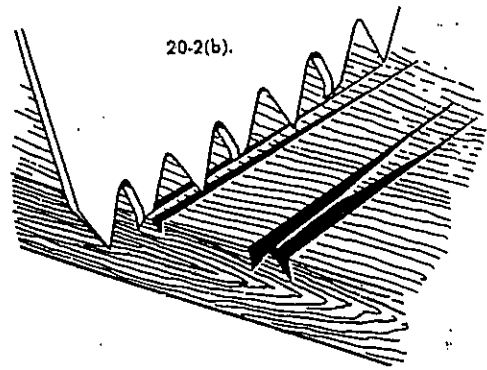
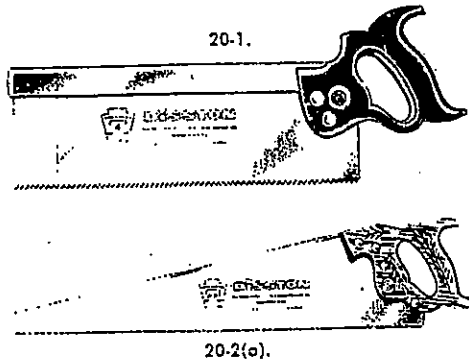





19-13.

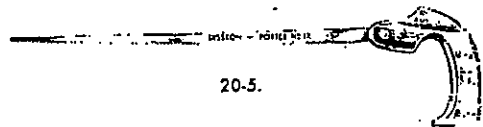
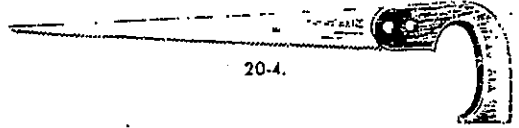
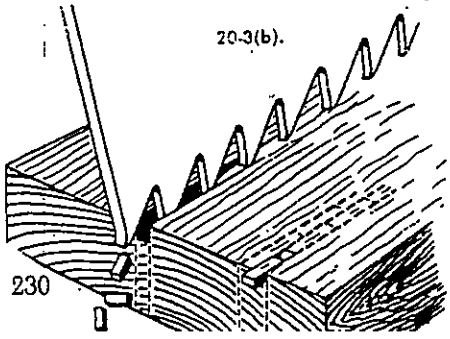
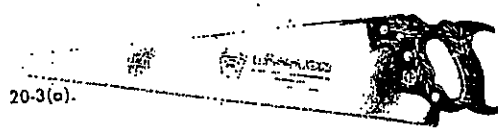
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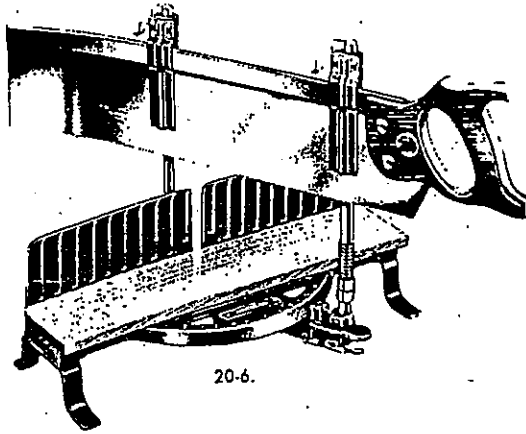
Sawing Tools

TOOL	DESCRIPTION	USES
 Back Saw Fig. 20-1.	A fine-tooth, crosscut saw with a heavy metal band across the back to strengthen the thin blade.	1. To make fine cuts for joinery. 2. To use in a miter box.
 Crosscut Saw Fig. 20-2.	A hand saw in lengths from 20" to 26" with from 4 to 12 points per inch. A 22", 10 point saw is a good one for general purpose work.	1. To cut across grain. 2. Can be used to cut with the grain. <i>Caution:</i> Never cut into nails or screws. Never twist off strips of waste stock.




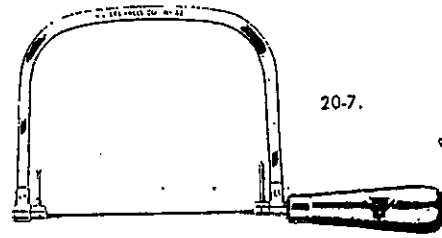
 Rip Saw Fig. 20-3.	A hand saw in lengths from 20" to 28". A 26", 5½-point saw is good for general use.	To cut with the grain. <i>Caution:</i> Support the waste stock. Never allow end of saw to strike the floor.
 Compass Saw Fig. 20-4.	A 12" or 14" taper blade saw.	1. To cut gentle curves. 2. To cut inside curves.
 Keyhole Saw Fig. 20-5.	A 10" or 12" narrow taper saw with fine teeth.	To cut small openings and fine work.






20-6.

 Miter Box Saw
Fig. 20-6.

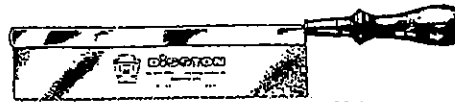


20-7.


 Coping Saw
Fig. 20-7.

A longer back saw (24" to 28").

Used in a homemade or commercial miter box for cutting miters or square ends.



20-8.

 Dovetail Saw
Fig. 20-8.

A U-shaped saw frame permitting 4 5/8" or 6 1/2" deep cuts. Uses standard 6 1/2" pin-end blades.


1. To cut curves.
2. To shape the ends of molding for joints.
3. For scroll work.

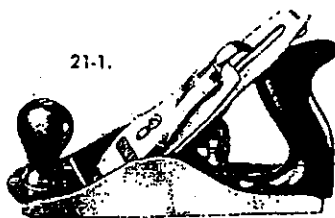
An extremely thin blade with very fine teeth.

For smoothest possible joint cuts.

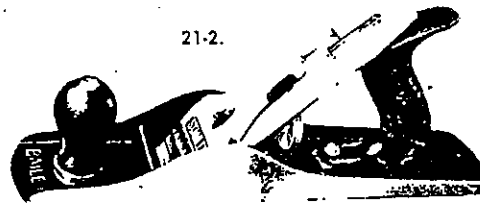
21

Edge-Cutting Tools

TOOL	DESCRIPTION	USES
Smooth Plane Fig. 21-1.	A 9 1/4" to 9 3/4".	1. For general use. 2. For smaller work
 Jack Plane Fig. 21-2.	A 14" or 15" plane.	1. Ideal for rough surfaces where chip should be coarse. 2. Also used to obtain a smooth, flat surface.
Fore Plane Fig. 21-3.	An 18" plane.	For fine flat finish on longer surfaces and edges.
Jointer Plane Fig. 21-4.	A 22" or 24" plane.	1. To smooth and flatten edges for making a close-fitting joint. 2. For planing long boards such as the edges of doors.



21-1.



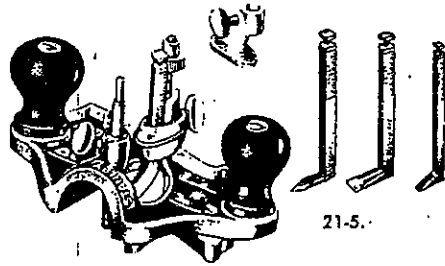
21-2.



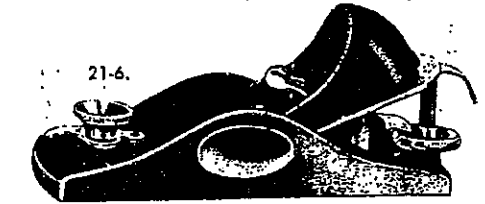
21-3.



21-6.



21-5.



21-7.

Router Plane
Fig. 21-5.

A cutting tool with several cutters.

To surface the bottom of grooves and dadoes.

Block Plane
Fig. 21-6.

A small plane with a single, low-angle cutter with the bevel up.

1. To plane end grain.
2. For small pieces.
3. For planing the ends of molding, trim, and siding.



Chisels
Fig. 21-7.

A set usually includes blade widths from 1/8" to 2".

To trim and shape wood.

Draw Knife
Fig. 21-8.

An open-bevelled blade with handles on both ends.

To remove much material in a short time.



Surform Tool
Fig. 21-9.

Available in plane file type. Also round, or block-plane types. A blade with 45-degree cutting teeth.

For all types of cutting and trimming.



Gouges
Fig. 21-10.

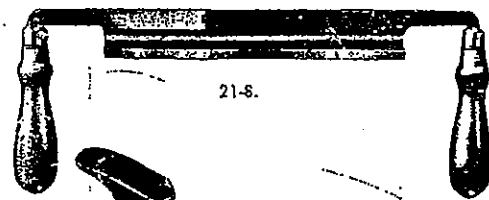
A chisel with a curved blade. Sharpened on the inside or, more commonly, on the outside.

To cut grooves or to shape irregular openings.

Hatchet
Fig. 21-11.

A cutting tool with a curved edge on one side and a hammer head on the other. Has hammer-length handle.

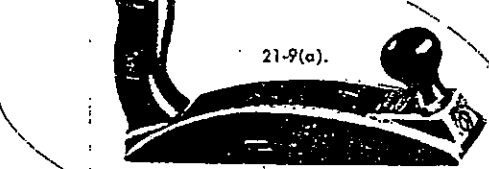
To trim pieces to fit in building construction. For nailing flooring.



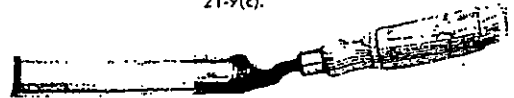
21-8.



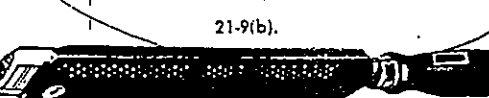
21-9(c).



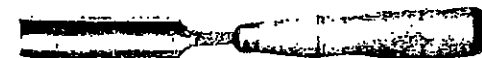
21-9(a).



21-10(a).



21-9(b).



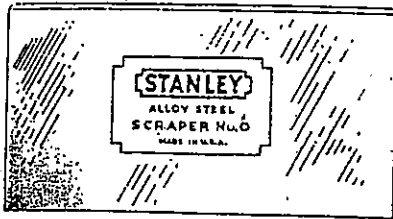
21-10(b).



21-11.



21-12.



21-13.

Spokeshave
Fig. 21-12.

Hand Scraper
Fig. 21-13.

Cabinet Scraper
Fig. 21-14.

Utility Knife
Fig. 21-15.

Edge-trimming Plane
Fig. 21-16.

Rabbit Plane
Fig. 21-17.

Model-makers Plane
Fig. 21-18.

Carving Tools
Fig. 21-19.

A small plane-like tool

A blade-like tool.

A blade in a holder.

An all-purpose knife with retractable blade.

A 6" edge-cutting plane with a cutter that works on a skew.

A small, accurate plane with the sides and bottom ground square to each other.

A small plane with the bottom curved in both directions.

Gouges and chisels of various shapes and sizes. Common types include the skew or flat chisel, parting tool, veneer gouges, and fluters.



21-14.



21-15.



To form irregularly shaped objects.

To scrape the surface of open-grain wood.

To scrape the surface of furniture woods.

1. To cut and trim wood, veneer, hardboard, and particle board.
2. To make accurate layouts.

To trim or square the edges of boards up to 7/8" wide for a square or close fit.

1. For fine cabinetwork or any job that requires extreme accuracy.

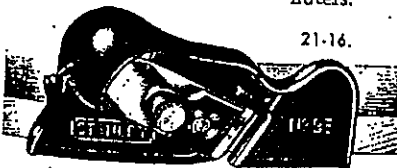
2. Front can be removed to use as chisel to remove glue or uneven places in corners.
3. For trimming a rabbit.

For planing concave, curved surfaces.

1. For making angular and curved cuts.

2. For hand carving designs in furniture.

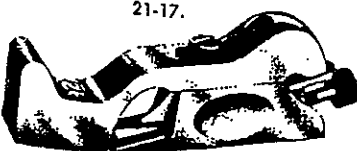
3. For shaping wood patterns.



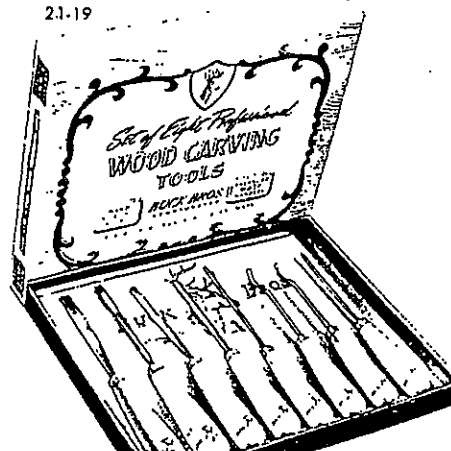
21-16.



21-18.






21-17.

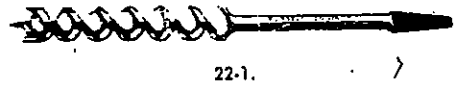


21-19

22

Drilling and Boring Tools

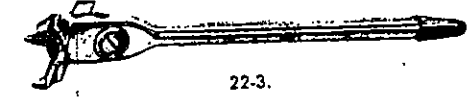
TOOL	DESCRIPTION	USES
 Auger Bit Fig. 22-1.	May be either single-twist or double-twist bit. Comes in sizes from No. 4 ($\frac{1}{4}$ ") to No. 16 (1"). A shorter bit with a sharper twist.	1. To bore holes $\frac{1}{4}$ " or larger. 2. Single twist bit is better for boring deep holes.
Dowel Bit Fig. 22-2. Expansion Bit Fig. 22-3.	A shorter bit with a sharper twist. A bit that holds cutters of different sizes. Sometimes this tool is called an expansive bit.	To bore holes for making dowel joints. 1. To bore a hole larger than 1". 2. One cutter will bore holes in the 1" to 2" range. 3. A second cutter will bore holes in the 2" to 3" range.
 Brace Fig. 22-4.	Two common types—the plain for a full swing, and the ratchet for close corners.	To hold and operate bits.
Foerstner Bit Fig. 22-5.	A bit with a flat cutting surface on the end.	1. To bore a shallow hole with a flat bottom. 2. To bore a hole in thin stock. 3. To bore a hole in end grain. 4. To enlarge an existing hole.
Bit or Depth Gages Fig. 22-6.	Two types—one is a solid clamp, the other a spring type.	To limit the depth of a hole.
 Twist Drill (a) or Bit Stock Drill (b) Fig. 22-7.	A fractional-sized set from $\frac{1}{4}$ " to $\frac{1}{2}$ " is best.	To drill small holes for nails, screws, etc.



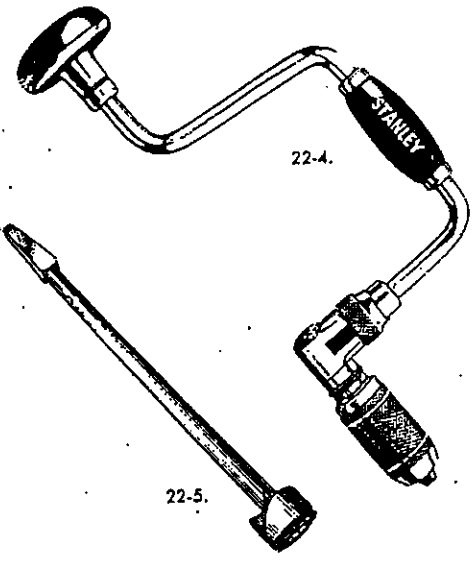
22-1.



22-2.



22-3.




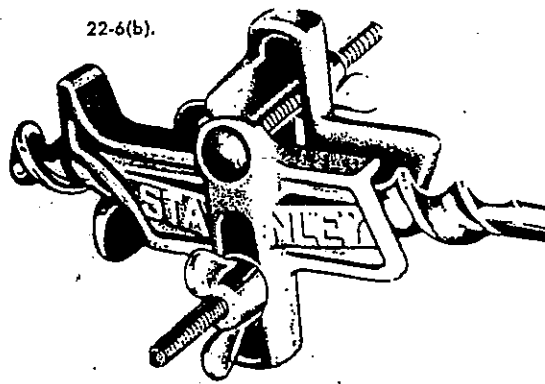
22-4.

22-5.



22-6(e):

 Hand Drill
Fig. 22-8.



22-6(b).



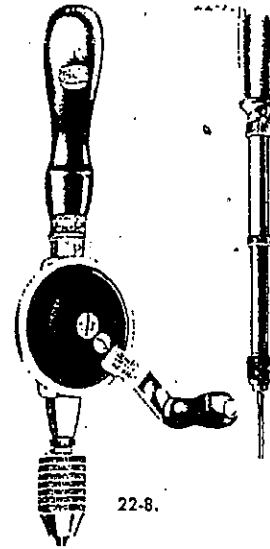
22-7(a).



22-7(b).

A tool with a 3-jaw chuck.

A tool with drill points and handle.
Drill point sizes: #1 = $\frac{1}{16}$ " ; #2 = $\frac{3}{64}$ " ; #3 = $\frac{1}{8}$ " ; #4 = $\frac{3}{32}$ " ; #5 = $\frac{1}{4}$ " ; #6 = $\frac{5}{16}$ " ; #7 = $\frac{3}{8}$ " ; #8 = $\frac{1}{2}$ " .





22-8.

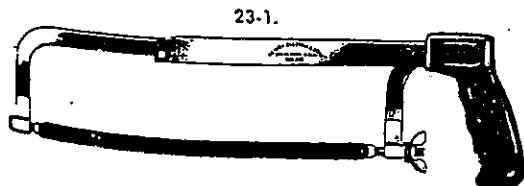
To hold twist-drills for drilling small holes.

To drill many small holes.

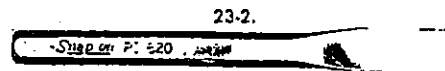
23

Metalworking Tools*

TOOL	DESCRIPTION	USES
 Hacksaw Fig. 23-1.	A U-shaped frame with handle. Uses replaceable metal-cutting blades.	To cut all types of metal fasteners, hardware, and metal parts.
 Cold Chisel Fig. 23-2.	A tool-steel chisel with cutting edge especially hardened and tempered for cutting metal. Angle between bevel surfaces is about 60 degrees.	<ol style="list-style-type: none"> To cut off a rivet or nail. To get a tight or rusted nut started.



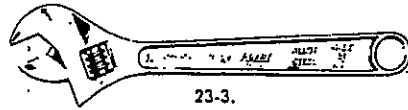
23-1.



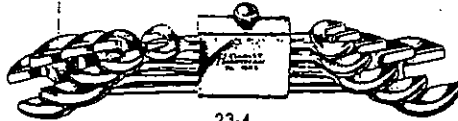
23-2.

*In cabinetmaking, many metalworking tools are needed to set up and adjust machinery and to work with metal hardware and fasteners.

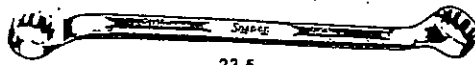
Cabinetmaking and Millwork • Section III



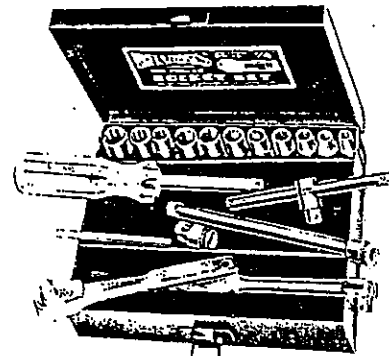
23-3.



23-4.



23-5.



23-6.

Adjustable Wrench
Fig. 23-3.

An extra-strong, lightweight, thin-jawed tool with one adjustable jaw. Wrench develops greatest strength when hand pressure is applied to the side that has the fixed jaw.

1. To make adjustments on machines, when there is plenty of clearance.

Open-end Wrench
Fig. 23-4.

A non-adjustable wrench with accurately machined openings on either end.

2. To install and replace knives and blades.

Sizes of openings are stamped on the tool. For variety of work, a complete set is needed.

1. To make adjustments on machines where there is plenty of clearance.

Box Wrench
Fig. 23-5.

A metal wrench with two enclosed ends. Heads are offset from 15 to 45 degrees.

2. To install and replace knives and blades.

Socket Wrench Set
Fig. 23-6.

A series of sockets using a variety of handles.

To make adjustments where there is limited space for movement.

Visc-grip Wrench
Fig. 23-7.

An all-purpose tool with double-lever action that locks the jaws on the work.

To assemble and disassemble machinery. Fits many sizes of bolts and nuts.

Pipe Wrench
Fig. 23-8.

A tool with hardened, cut teeth on the jaws.

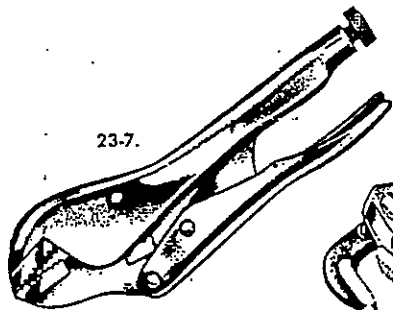
Used as a substitute for a vise, clamp, pipe wrench, fixed wrench, or adjustable wrench.

Allen Wrenches
Fig. 23-9.

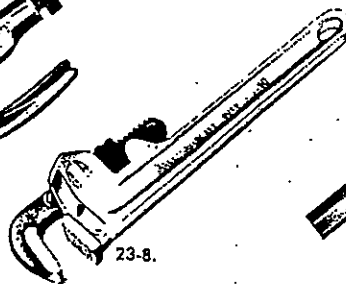
Hexagonal steel bars with bent ends.

Used on pipes and rods, never on nuts or bolts.

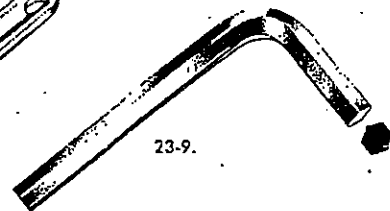
To tighten and loosen set screws that are often used to hold jointer and planer knives in cutterhead.



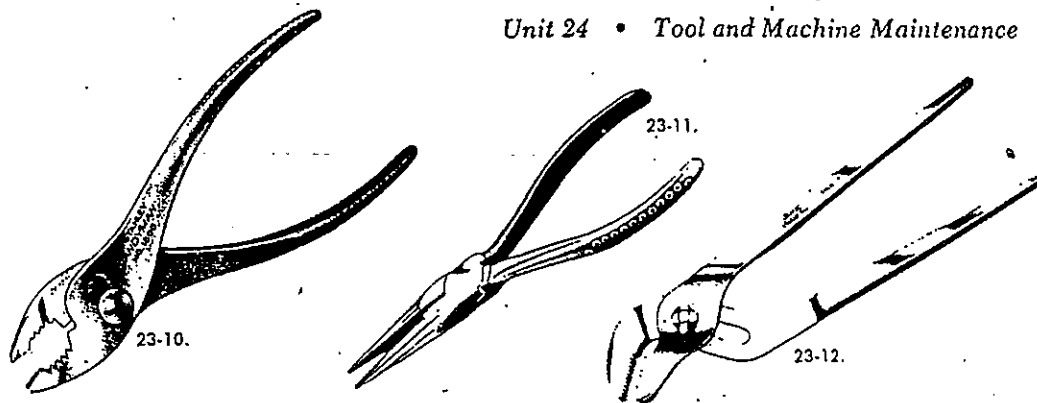
23-7.



23-8.



23-9.



* Combination Pliers
Fig. 23-10.

An all-purpose, slip-joint adjustable pliers.

To hold and turn pieces round. Never used on heads of nuts or bolts.

* Long, Flat-nose Pliers
Fig. 23-11.

Pliers with long, thin, flat nose.

To hold and bend thin wire and metal fittings.

* Box-joint Utility Pliers
Fig. 23-12.

A larger pliers with a slip joint at four positions.

To hold and turn large, round parts.

24

Tool And Machine Maintenance

The experienced craftsman knows the value of sharp tools. Any time taken off for sharpening tools and adjusting machines will be regained many times over in good workmanship and greater speed.

Most tool and knife sharpening can be done by the person who uses the equipment. In the case of certain types of cutting tools, particularly hand saws and the blades of circular saws and band saws, it is better to have sharpening done by a well equipped professional. Though saw filing and setting can be done by hand, generally this is too time-consuming. Also, some school and cabinet shops are not equipped with saw filing machines and sharpeners.

Grinding should be done when a tool needs a new bevel or when its edge has

been nicked. *Honing* alone is enough when the edge is only slightly dull.

EQUIPMENT FOR SHARPENING

Several types of power-driven grinders can be used for sharpening tools. A *standard two-wheel grinder*, Fig. 24-1, should have a motor speed of 1425 or 1725 r.p.m. For general grinding purposes, the motor usually has a speed of 2850 or 3450 r.p.m. However, at the higher speeds care must be taken because tool edges tend to burn very easily.

Silicon-carbide wheels and stones are used primarily for sharpening high carbon tools and for knives. The harder and tougher grains of aluminum-oxide wheels and stones make them ideal for sharpening hard tool steels. Accessories