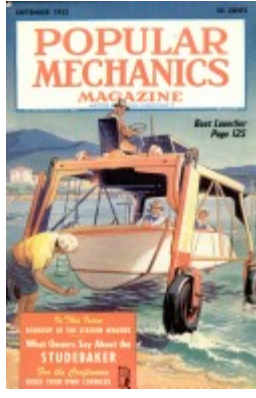
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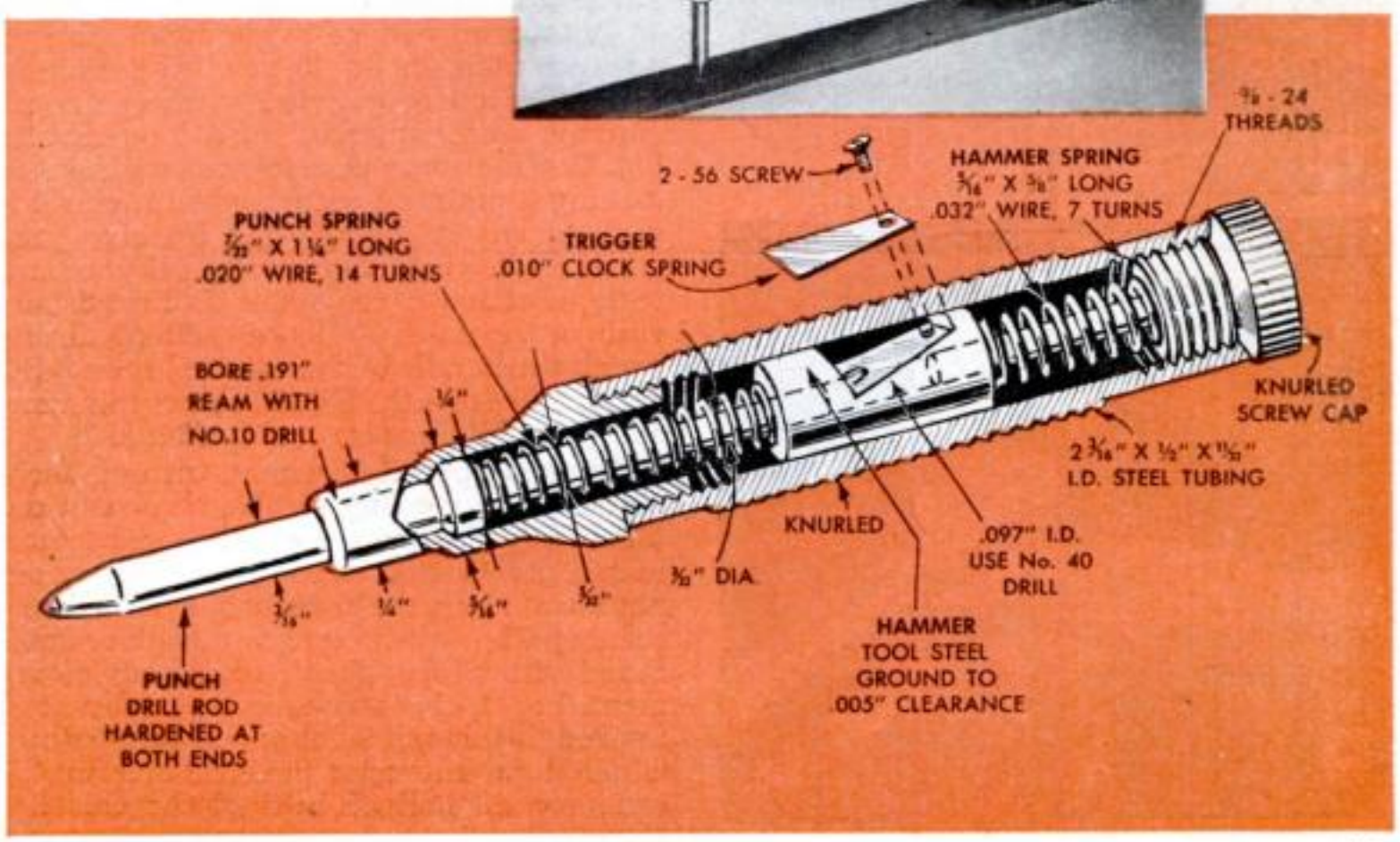
What Owners Say About the
STUDEBAKER

See letter in back of book

MAKE YOUR OWN AUTOMATIC PUNCH

REPETITIOUS SPOTTING of holes in light sheet metal is made much more convenient when the work is done with an automatic center punch, since a hammer is not required as with a regular center punch. The cutaway drawing below shows how it works. After placing the punch on the work, it is operated by simply pressing down on the handle. This causes a short, spring-loaded rod to enter a built-in hammer and, in turn, release a clock-spring trigger bearing against the end of the hardened punch stem. This action releases the hammer which is propelled downward against a shoulder on the punch stem and thus exerts a sudden, sharp blow sufficient to dent the work. Obviously, the hammer spring is stronger than the punch spring and provides the driving force. The punch spring serves to return the hammer and reset the trigger. It is important, of course, to wind the springs of the size wire specified. In assembling the parts, you'll note that the hammer spring is held under tension by the knurled screw cap which threads into the end of the punch. The body of the punch is machined from a length of ½-in.-o.d. steel or brass tube. The hammer should have a .005 clearance inside the tube.



METAL TURNING *Freehand*

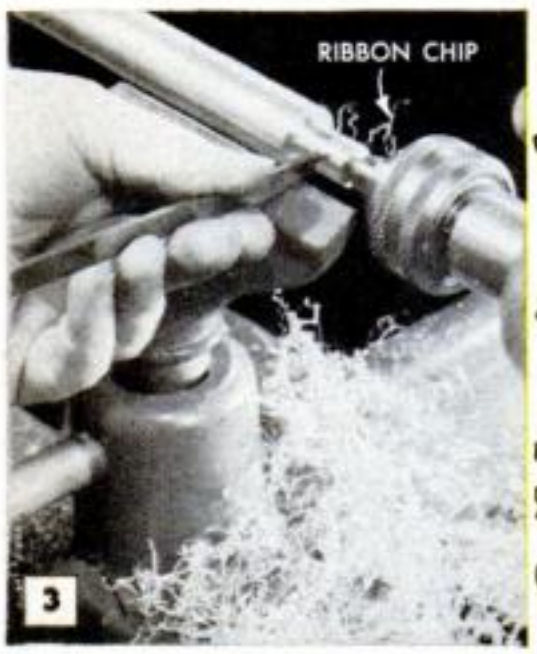
By Sam Brown

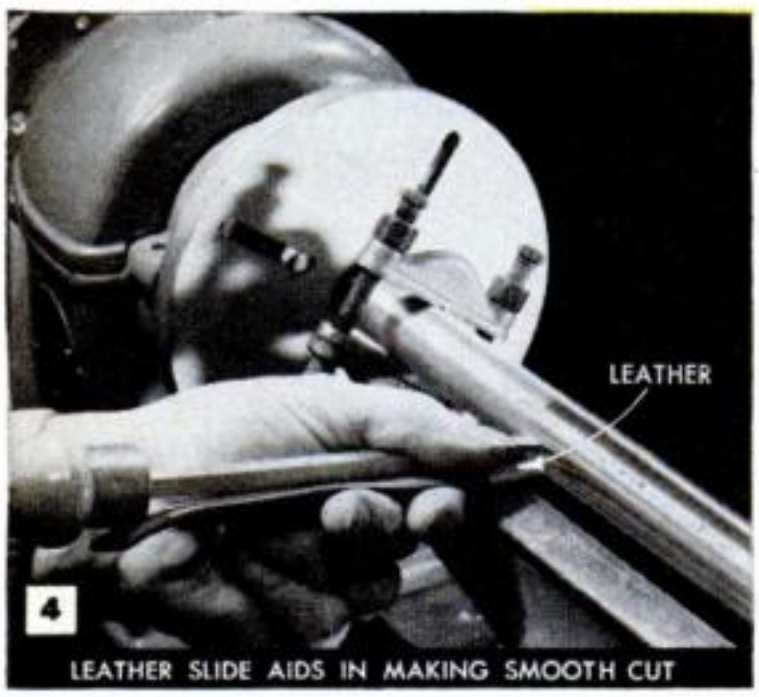
SOFTER METALS, such as brass and aluminum alloys, can be turned on a wood lathe, using ordinary wood-turning chisels. The secret is in driving the work at high speeds, 3000 to 3500 r.p.m. Rough-turning metal takes more time than rough-turning wood, and extreme care must be used not to overheat the chisel blades and draw the temper. After roughing, soft metals such as aluminum, can be turned to pattern with nearly the ease and speed of ordinary hardwood. Even mild steel can be roughed and turned, but more difficulty will be encountered in making certain deep cuts. For this reason carbide-tipped chisels are recommended for freehand turning of the harder metals. Carbide-tipped tools also can be substituted for wood-turning chisels in any of the metal-turning operations pictured.

Cutting technique: The various cuts, with chisel positions, are shown in Fig. 5, details A to P inclusive. Generally, roughing cuts in all metals should be done with negative rake, that is, lift the chisel handle, as shown in Figs. 1 and 2. Finishing cuts in brass also are negative rake, but finishing cuts on aluminum can be made with a heavy positive rake, up to 45 deg. This gives a true shearing action; the work is smooth and the chip comes off in a long ribbon, Fig. 3. One exception to positive rake in turning aluminum occurs when a chisel is used to cut its own form. Positive rake on this cut will cause chatter. If you turn with negative rake, detail J, Fig. 5, and with a press-and-release action during which the handle of the chisel is raised, the cut will be smooth. Fig. 20 shows this same operation. Refer also to Figs. 6 and 7.

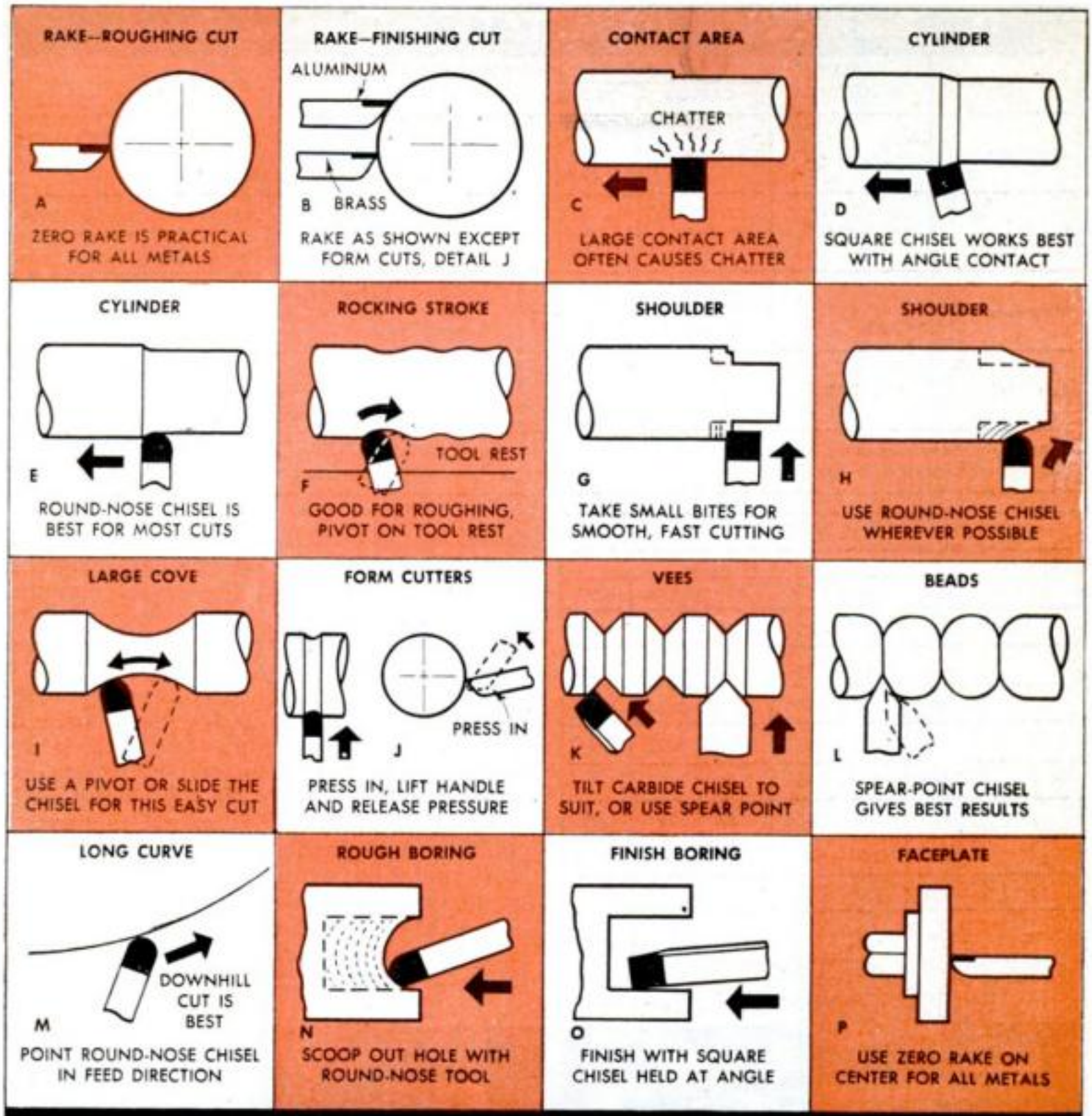
Another special freehand-turning technique is the rocking stroke, shown in detail F, Fig. 5. The chisel takes short bites with a pivoting or rocking action and does not move along the tool rest as in ordinary turning. The rake is zero or negative. Combined with a chest position and body movement, Fig. 1, this stroke is especially good for rough-turning steel and brass, both of which tend to resist penetration. In the ordinary method of cutting, the chisel is

Above, chest position is useful for rough-turning metals. Glove on left hand protects against chip burns. Below, aluminum turned with positive rake cuts smoothly with a continuous ribbon chip





LEATHER SLIDE AIDS IN MAKING SMOOTH CUT



5 Cutting technique features both wood and metal-turning methods. Two special techniques are the rocking stroke, detail F, which is good for roughing, and the press-release system of using form cutters, detail J

held somewhat more level and is moved along the tool rest as in wood turning. Movement is aided by polishing the tool rest or by using a waxed piece of leather under the tool, as shown in Fig. 4. Spring action of the leather also will help to prevent chatter in deep cuts.

Work speed: Generally, the top speed of the lathe — usually 3400-3600 r.p.m. — can be used for aluminum up to 1½-in. diameter. Larger work and harder metals may require lower speeds. As shown in Fig. 6, a speed of about 500 f.p.m. is best for average work in any metal. To support the tailstock end of the work at high speed, it is best to use a ball-bearing center as in Figs. 1 and 8. A dead center also can be used but must be continuously lubricated.

Turning procedure: Simply follow approved methods for wood turning, but watch the rake angle of the turning tool. For clean, fast work, a half pattern tacked to ¼-in. plywood saves time. Work the chisel right over the pattern, Fig. 8, to set off lengths, using negative rake to avoid nicking the work. Then proceed in the usual manner, as shown in Figs. 9, 10 and 11.

The graver: The graver, or diamond-point tool, is an old-time favorite for free-hand metal turning. It usually is made from carbon steel. You can make your own from a square file, ⅜ in., or larger, grinding the bevel as shown in the inset, Fig. 13. For small V-cuts, the tool is used with the

6 Quick GUIDE TO METALS for Freehand Turning

METAL	EASE OF CUTTING*	**SPEED (Feet per minute) CARBON	HI-SPEED	CARBIDE	REMARKS
Aluminum	50%	300 **400** 800	300 **600** 2000	300 **600** Up to 8000	The ideal turning metal. Works well at any speed. Use positive rake for most cuts. Alloy 11S (Alcoa) is best for turning.
Brass	25%	150 **300** 350	300 **400** 700	300 **500** 1000	Harder to turn than aluminum. Use negative rake. Free-cutting yellow brass and other leaded brasses turn the best.
Magnesium	50%	150 **300** 400	300 **500** 700	300 **500** 700	Similar to aluminum. Speed should be kept under 1000 f.p.m. when cutting dry to avoid fine, hot chips which may ignite.
Soft Steel	8%	60 to 140 f.p.m. Too slow for hand turning		300 **400** 1500	Requires firm pressure. Use only carbide chisels for freehand turning at high speed. Screw stock is best for turning.

* Approximate machinability based on hardwood at 100%

** High and low limits are given with recommended speed in heavy type. Use table below to convert to revolutions per minute

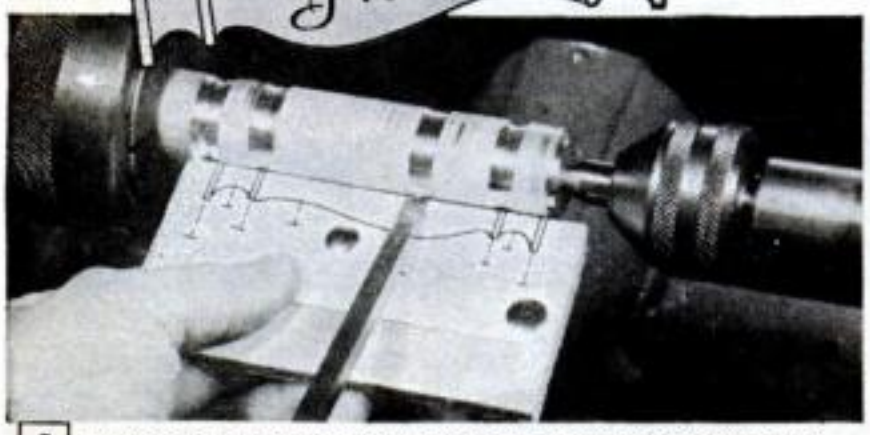
7 F.P.M. to R.P.M.

DIA. OF WORK	FEET PER MINUTE 300	400	500	600	800	1000
½"	2290	3056	3820	4580	6112	7640
¾"	1530	2032	2540	3060	4064	5080
1"	1150	1528	1910	2300	3056	3820
1½"	754	1016	1272	1508	2032	2544
2"	574	768	956	1148	1536	1912
3"	382	502	636	764	1004	1272
4"	286	384	476	572	768	952
6"	192	256	320	384	512	640

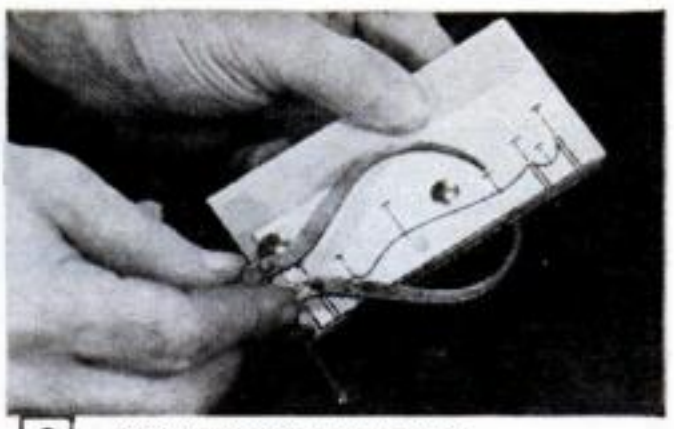
bevel up, Fig. 13. For other cuts, the tool is worked with the bevel down, Fig. 12. Note in Fig. 14 that the chisel contacts high on the work. It is common practice to rock the stroke, covering a small area and then moving to a new position.

Assemblies: When the work varies widely in diameter, such as the candlestick in Fig. 15, you can save time and material by making separate parts and then press-fitting together, Fig. 16. Be sure the work is cool before making the final cut on a tenon, as hot metal shrinks and you may end up with undersize work. A threaded assembly is generally best since it gives a positive fit and also permits easy disassembly when necessary. On the aluminum hammer, Figs. 17 to 20 inclusive, the thread is cut with a

Turning Procedure

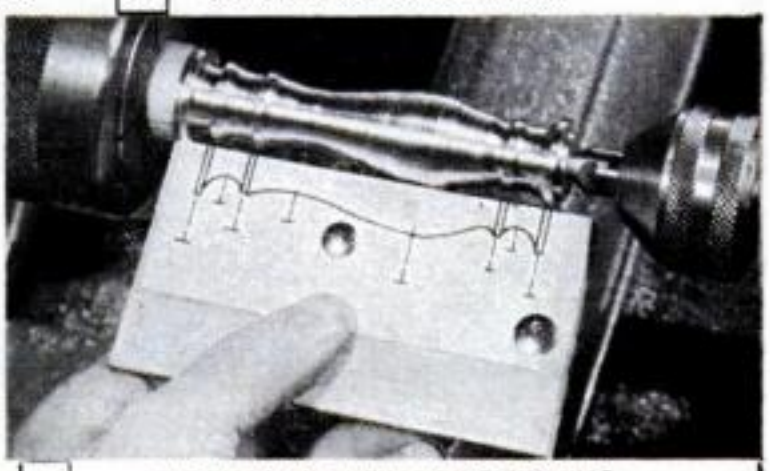


8 LAY OFF LENGTHS FROM PATTERN TACKED TO PLYWOOD

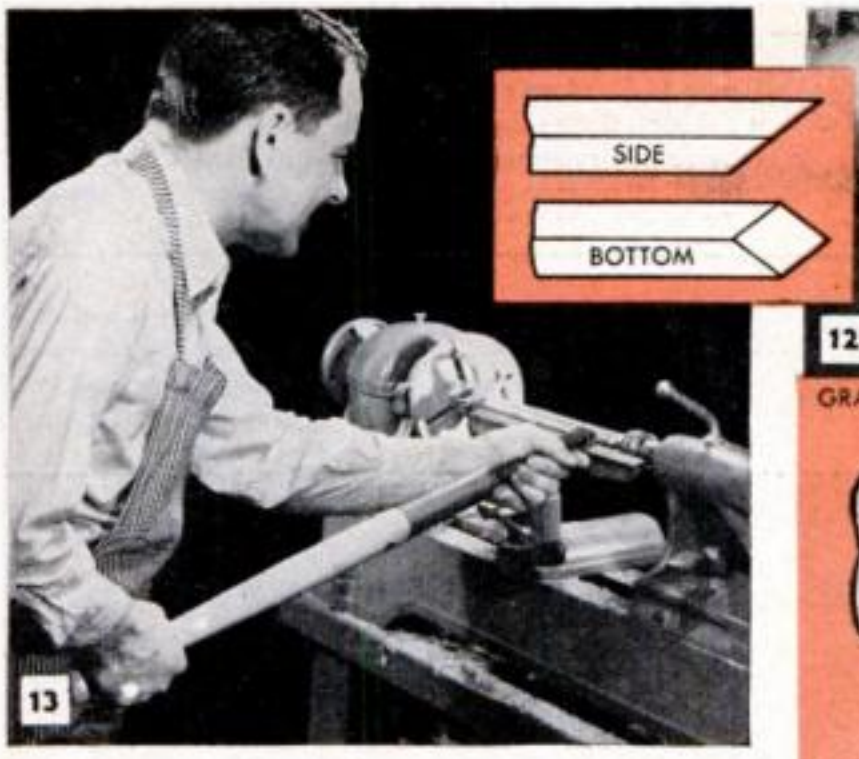


9 SET CALIPERS TO DIAMETERS

10 ROUGH-TURN THE VARIOUS DIAMETERS

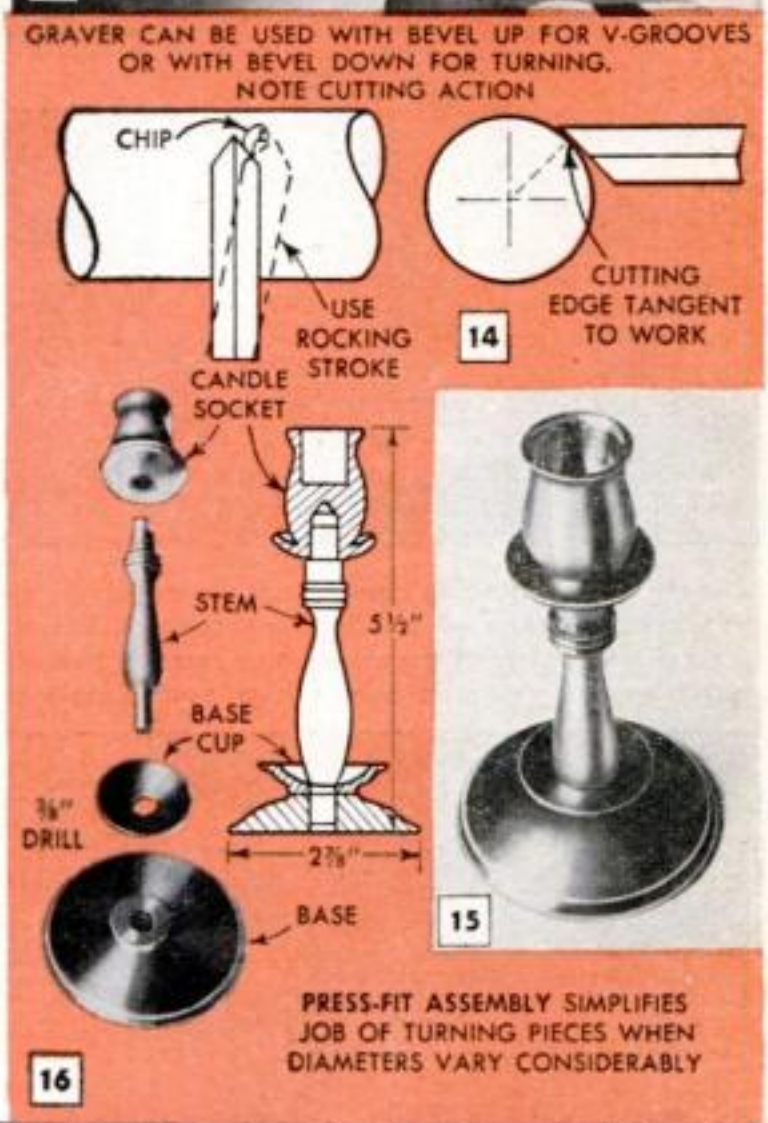


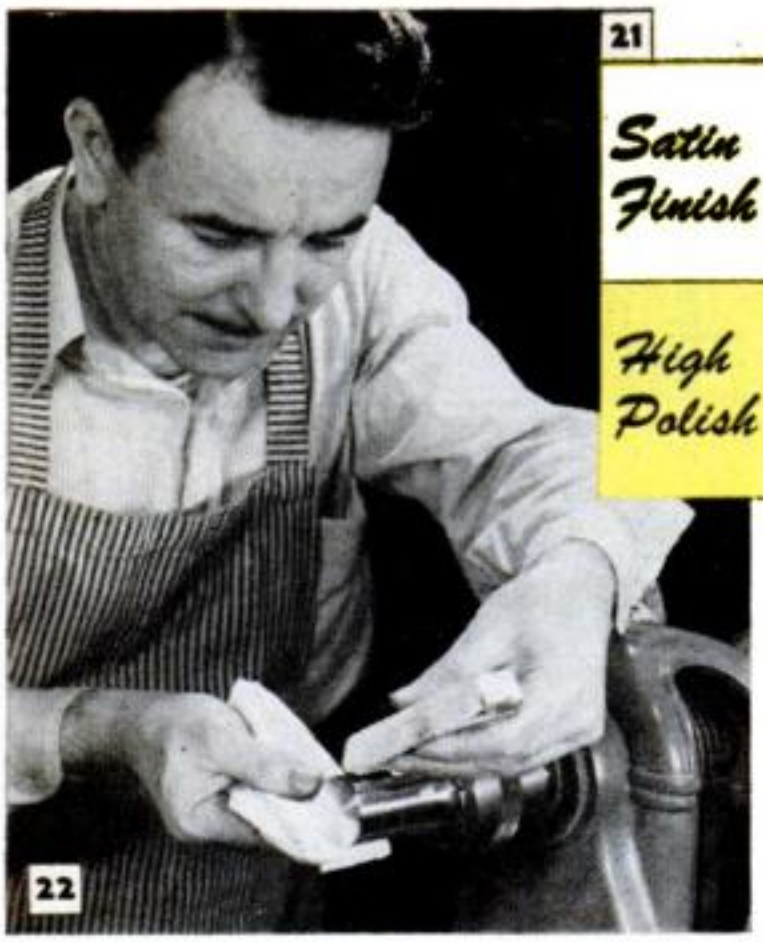
11 CHECK CONSTANTLY WHILE TURNING



½-13 die, as shown in Fig. 18. The hole in the head, Fig. 19, is tapped on the drill press to assure a straight thread.

Polishing: At high speed, the turning tool leaves the metal quite smooth. Abrasive as fine as 2/0 grade will rough up a good turned finish. The abrasive paper or cloth is useful, however, in smoothing contours. Steel-wooling after turning gives an attractive satin finish. A high polish, Fig. 21, usually is obtained with buffing compound, holding the abrasive stick against the rotating work to transfer compound to a cloth pad, as shown in Fig. 22. Of the various compounds, emery is coarse enough to remove the fine tool marks. Tripoli also will cut, but much finer. Red or white rouge burnishes the surface to a high luster.





21

POLISHING SCHEDULES FOR ALL SOFT METALS

Satin Finish — Use a 6/0 aluminum-oxide abrasive or 3/0 steel wool, dry. Softer luster is produced with soapy-water lubricant. Dry pumice on wet cloth gives similar results. Rottenstone applied in same way is suitable

High Polish — Work up a satin finish first and follow with tripoli buffing compound. Finish with a stainless-steel compound to remove all scratches. A mirror polish is easily obtained with a red or white rouge

22

Above, when polishing apply stick to metal. Abrasive will be picked up by cloth without loss. Below, several examples of freehand turnings in various metals include cigarette holder, pipe and miniatures

23

What to make: Turned projects in metal include candlesticks, Figs. 24 to 37 inclusive, ship's wheels, lamps, cigarette holders, salt shakers, jewelry, stamp dispensers, paperweights, goblets and a variety of other items. Miniatures, such as shown in Fig. 23, are fun to work in either aluminum or brass. The Early American candlestick, Fig. 24, is fully detailed and makes an interesting project. The base or tray is a simple spinning project and can be worked by either spinning the metal disk into a hollow chuck or over an external chuck. The ring handle can be soldered instead of using the screw fastening shown. All of the turning on this job can be done at 3400 r.p.m. although a somewhat lower speed is quite satisfactory. At 3400 r.p.m. and with zero rake, chips from the roughing cut will be quite hot, making it advisable to wear long sleeves plus an old glove on the left hand. Also, in all metal turning by the freehand method wear goggles to protect the eyes from flying chips. Be sure that there is no end play in the lathe spindle and that both centers are tightly seated. ★ ★ ★

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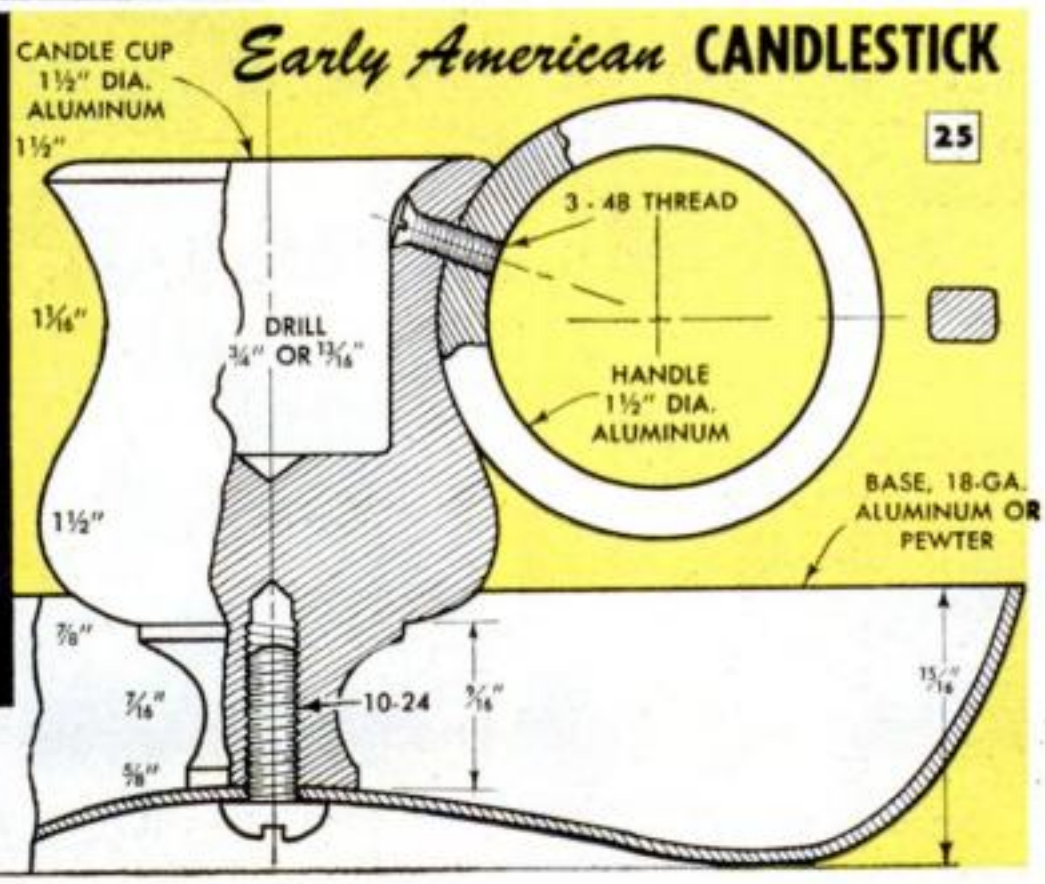
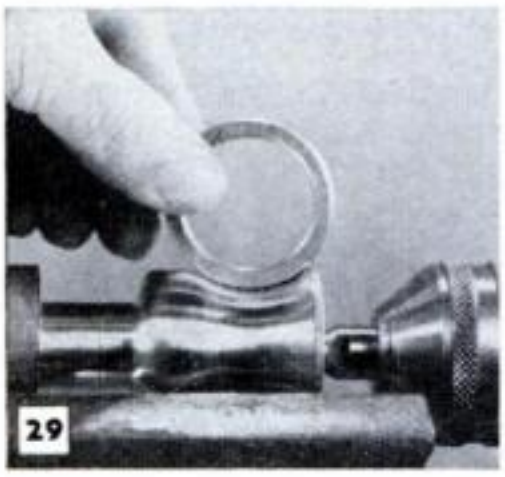


TURNING SCHEDULE *Early American* CANDLESTICK

Chuck round stock in collet or a three-jaw chuck and center-drill the end for ball-bearing center

Make layout marks, then rough in stem with a round-nosed chisel. Note use of glove to protect hand

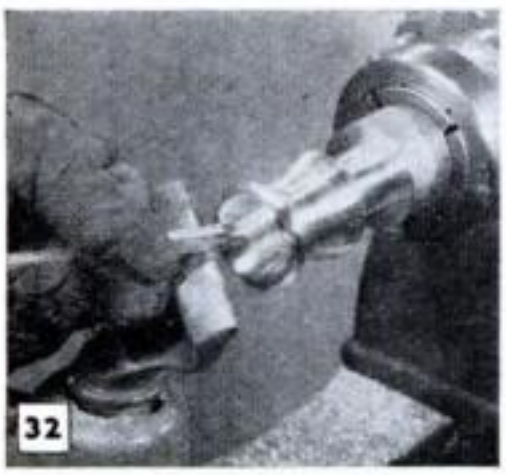
Use a square-nosed chisel to run in shoulder cuts. Be sure to hold chisel firmly on the tool rest



When curve nears the finish dimension, use a 1½-in. ring to check radius of the curved portion

True the curve by using abrasive cloth wrapped around a length of 1½-in. tubing. Use light pressure

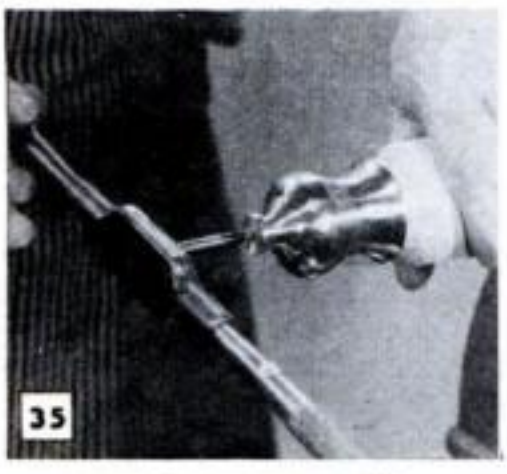
Bore the candle socket with an ordinary drill bit first. Then taper with a square-nosed tool

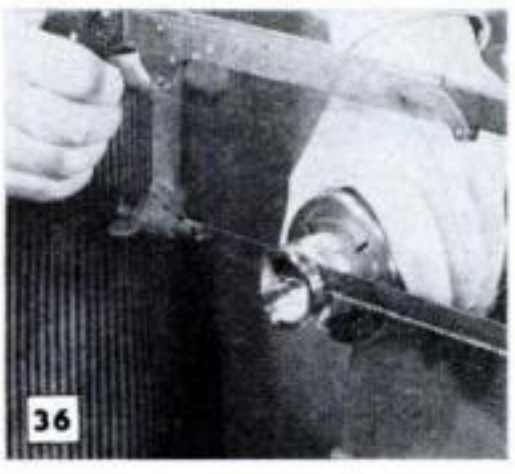


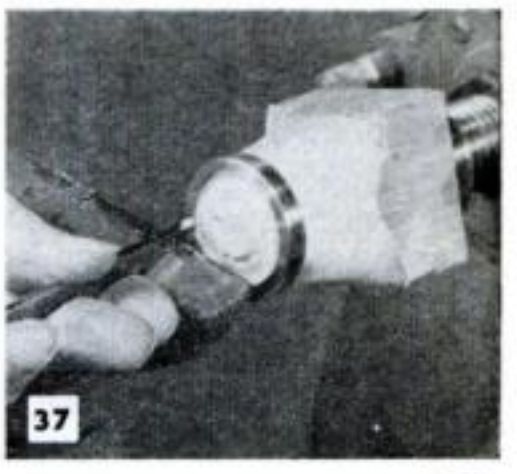
Above, finish top of socket with round-nosed tool. Below, drill stem 5/32 in. and tap 10-24 thread

Above, after polishing cut work free with hacksaw. Below, when finished, handle is cut off as shown

Above, mount socket on wooden form to face off stem. Below, turning of handle on hardwood form



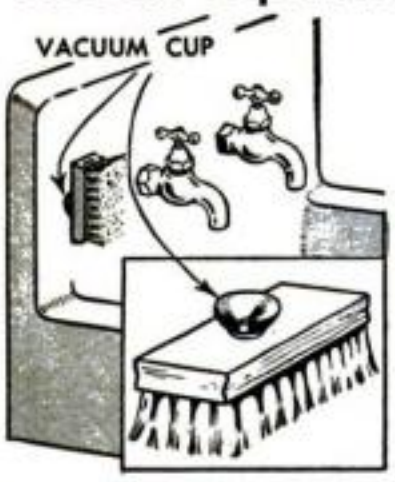




Pinch Bar Has Steel Rollers For Moving Heavy Objects

Fitted with steel rollers, this pinch bar is especially useful for moving heavy equipment in shops where crane facilities are not available. It consists of a length of heavy bar steel shaped as shown in the detail, and fitted with an axle inserted through a hole in the lower end of the bar on which the rollers turn.

Vacuum Cup Holds Brush



The annoyance of having a shop hand brush frequently mislaid or lost will be less likely if a rubber vacuum cup is screwed to the back of the brush. This will encourage the user to stick the brush against the sink backboard when finished. When the brush is replaced, the cup may be removed and used on the new one. Use a vacuum cup having a screw-type base.

Float Arm With Flexible Link Protected in Watering Tank

Livestock cannot break the valve float-ball arm in a watering tank by licking or nudging it if a flexible link is incorporated in the arm. This can be done by cutting the arm near the ball and forming an eye on each severed end. Then a length of small chain is connected to each of the eyes. It may be necessary, however, to bend the arm downward to accommodate a chain long enough to allow the ball enough play.

Harvey Muller, Danboro, Pa.

Floodlights on Wooden Standard Provide Portable Trouble Lamp

Consisting of three floodlights and a bulb with a reflector mounted on an 8-ft. standard, this portable trouble lamp can be used to illuminate large areas of a shop or factory for night work. It also may be used to provide light for picnics and other outdoor activities. The floodlights illuminate a large area surrounding the standard, while the bulb fitted with the reflector illuminates the area directly under the lamp. The floodlights are clamped to a heavy pipe inserted through a hole in the top of the standard, which consists of two 2 x 4s nailed together and braced on four sides to a cross of 2 x 4s that serves as a base. A crosspiece nailed to the standard holds the coiled electrical cord when not in use.

Grover Brinkman, Okawville, Ill.

Signs From Scrap Materials

Attractive, easy-to-read signs similar to the ones shown, help one orchardist sell apples at his roadside stand. The upper sign consists of letters that are cut from fiberboard or tough cardboard and tacked to thin wooden strips mounted on crosspieces. With the exception of the black trim, the entire background of the sign is painted red, while the letters are painted either white or black. The detachable sign below is a varnished board on which red cardboard letters are mounted. This sign also has a black trim around the edges. The signs are supported by screw hooks.