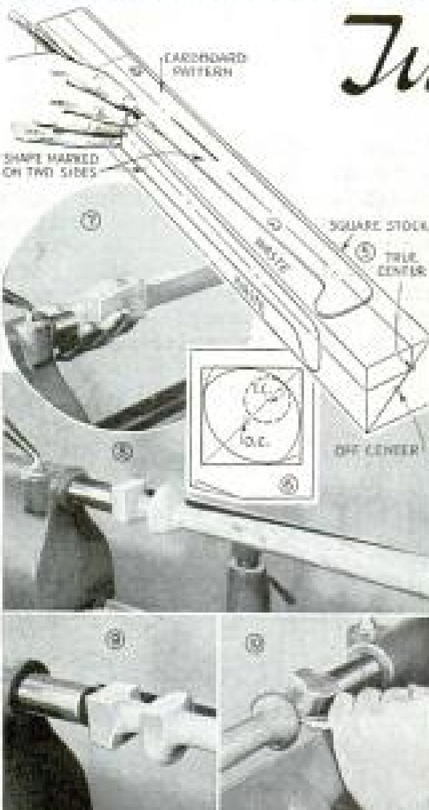
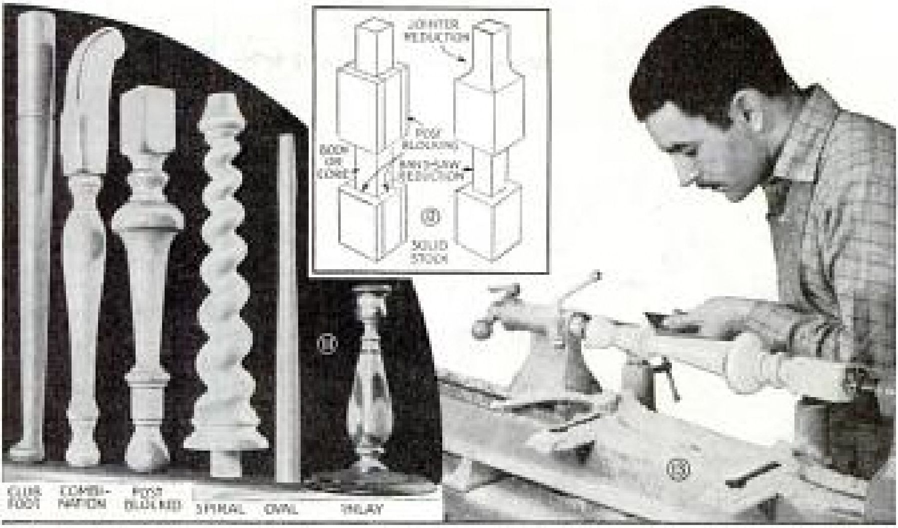
Turn Right!



CABINET work demands the use of many kinds of special spindles, which vary in different respects from regular turnings. A typical example is the turning of an oval spindle, shown in Figs. 1, 2, 3, 4 and 11. Three centers are required. The true center is located in the usual manner, after which the off centers can be located by experiment to obtain the required shape. The work is first turned on the true centers to the contour of the project, after which the ridge line, previously marked on the end of the work, is scribed on opposite sides of the turning. The work is then recentered, using two corresponding off centers, and is turned down until the cut comes exactly to the ridge line. This is done easily by running the lathe at second lowest speed, so that the ridge line can be seen as the work rotates. The same operation is performed with the work mounted between the second pair of off centers.

Club-foot furniture legs are produced by a similar process of off-centering. A paper pattern of the leg is first made, and the shape transferred to two adjoining sides of the turning square, as shown in Fig. 5. The true center is carried out to the

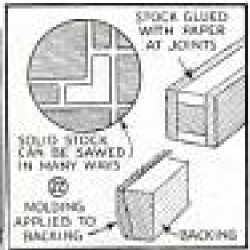


SPECIAL SPINDLES PART 3

end of the work. The off center is found by experimenting with a compass until the desired shape is obtained, as shown in Fig. 6. This end of the work goes to the tailstock; the opposite end, which is the driven end, has a true center only and is not off-centered. It can be seen in Fig. 7 a large part of the waste stock has been sawed away. Turning is then carried out the full length of the leg, including the toe portion, as in Figs. 8 and 9. If the work is now placed on the off center, the back of the toe can be finished, Fig. 10, after which the work is returned to the true center for sanding.

Some very attractive turnings have square sections which are smaller than the diameter of the largest round section. The

Decorative spindles that have the appearance of inlaid work are made by gluing up the blank stock from woods of contrasting colors

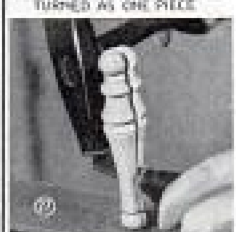


post-blocked leg in Fig. 11 is an example. Two methods of making these turnings are shown in Fig. 12. Solid stock can be used, the necessary square sections being reduced with a jointer or band saw. The second method is known as "post blocking," so called because the central square or post is blocked up to the required thickness. After the pieces have been glued on and the work allowed to dry, the edges are cut off on the band saw, Fig. 14. The work is then mounted in the lathe and turned to shape in the usual manner, as shown in Figs. 13, 15 and 16. The essential point in post blocking is good glue joints. The narrow pair of blocks are glued in place first, as shown in Fig. 17. After the glue has dried, the work is sanded or jointed flush and to net size, Fig. 18, and the second set of blocks is applied. Figs. 19, 20 and 21 show how an "inlaid" candlestick is prepared. Maple and walnut are used for contrast.

Not all turned spindles are left in the round. Many are split, quartered, and otherwise cut into lengthwise strips to form a wide variety of split turnings and ornamental moldings as in Fig. 24. Work of this kind can be done by two different methods. In the first method, the work is turned from solid stock, after which the required molded sections are cut off, as shown in Figs. 22 and 23. The upper right sketch in Fig. 22 shows the second method, the molded sections being glued to a wood core with paper between the joints, and then split off after turning. The latter method is useful when working thin stock, and is preferable when two half-round turnings are required. The complete operation is shown in Figs. 25, 26 and 27.

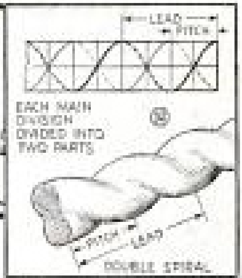
STOCK GLUED WITH PAPER JOINT

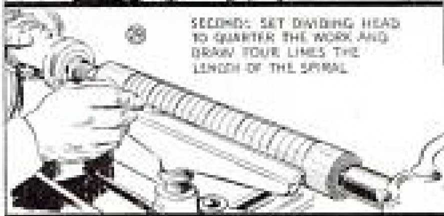
TURNED AS ONE PIECE

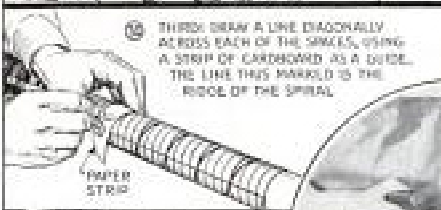


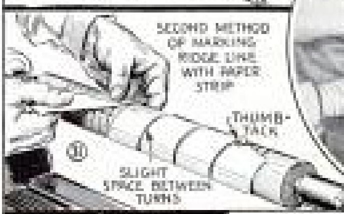
SPLIT APART WITH KNIFE

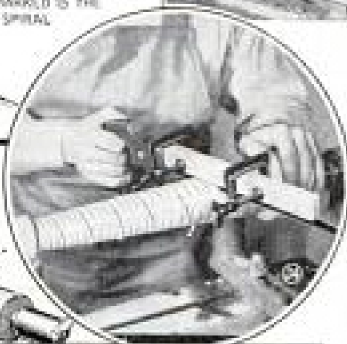
Spiral turnings involve the most work of all special lathe spindles. The most common type is the single spiral, where one thread or twist spirals its way along the length of the turning. In working a turning of this kind, the stock is first turned to cylindrical shape, and the limits of the spiral portion are laid off. The full length of the spiral is now divided into an equal number of spaces, each space being about the same width or a little less than the diameter of the turning. Each main division is again subdivided into four equal parts, as shown in Fig. 28. Next, the dividing head is set to quarter the stock, and four horizontal lines are drawn along the work, as in Fig. 29. The ridge of the spiral can then be penciled in by crossing each of the small spaces, as shown in Fig. 30. Other spiral lines can be added, preferably in colored pencil to avoid confusion, to show the bottom of the groove, and the limits of the true groove portion. Some workers prefer to











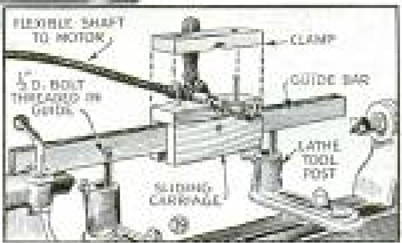
lay out the spiral with a long strip of paper, as shown in Fig. 31, wrapping this evenly along the turning so that a pencil can be inserted between the strips to mark the ridge of the spiral.

The actual work of cutting starts with the operation in Fig. 34, in which a saw cut to the required depth is made on the line which shows the bottom of the groove. The cut does not follow the line at the extreme ends of the spiral, but, starting at the center of the final main division, the cut follows more truly in a circle about the turning. The saw can again be used to rough out the cut to a full vee-shape, after which the true groove portion of the spiral is roughed to shape with a file, as shown in Fig. 35. After the groove has been worked out, a flat file is used to dress the round of the spiral, as in Fig. 36, following which the work can be turned at slow speed and chased up with sandpaper to complete the spiral, Fig. 33. The photo illustrations are of a single spiral on a ta-

pered shaft. This is similar to the straight single spiral except that the main divisions are graduated in width. A good rule to follow is to measure the taper at its largest diameter, then lay out this same distance to establish the second ring. Measure the diameter at the second ring and lay out this same distance to establish the third ring, and so on the full length of the spiral.

A second form of common spiral is the double spiral, in which two threads or twists wind along the turning. In this layout, each main division is divided into two parts, as shown in Fig. 32. The ridges of the spiral are the same distance apart as before, but the distance each ridge travels in one complete revolution is twice as great as the pitch. The two spirals should start on opposite sides of the turning. As there are two spirals, it is necessary to make two saw cuts—in short, do double all the operations described for the single twist. Figs. 37 and 38 show how turned spindles can be fluted or reeded on the lathe. The setup makes use of a flexible shaft, which drives standard 5/16-in. hole shaper cutters. The manner of supporting and guiding the cutter along the work should be apparent from Fig. 39. The spacing of the various cuts is done with the standard lathe indexing head, while the depth of the cut is set by a suitable collar.

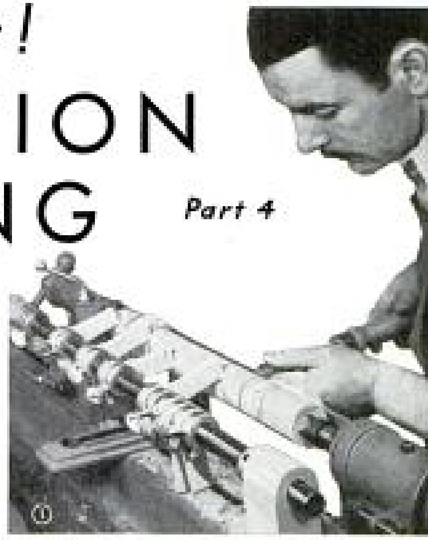
One other style of special spindle is worthy of mention. This is the combination leg, where one portion is turned to shape while the opposite end is bandsawed. Figs. 40 and 41 show how the combination leg is mounted in the lathe for turning, the upper portion being left partly unfinished in order to furnish wood for the lathe center. In some work it is necessary or more economical to cut the shaped portion first. In this case, a suitable jig is made up to fit the curved portion of the leg, and the leg is fastened to this block with some form of clamp, as in Fig. 42.



Turn Right!

PRODUCTION TURNING

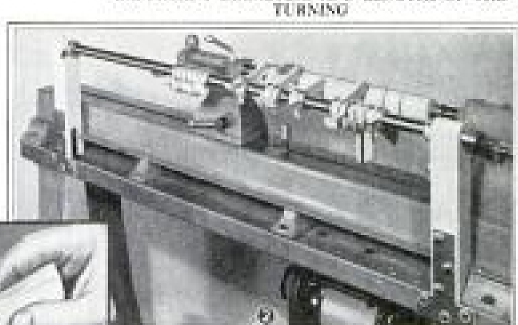
Part 4

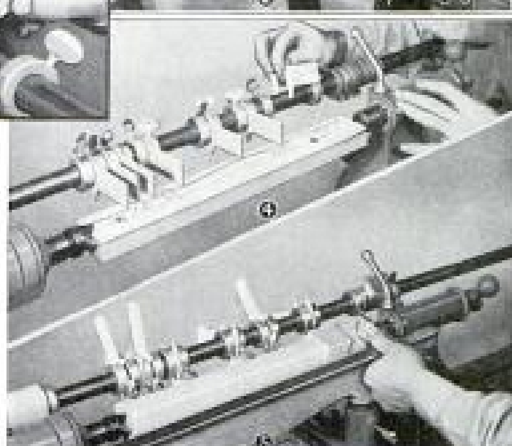


THE "SEMAPHORE" JIG IS USED TO SET OFF ALL IMPORTANT DIAMETERS AND LENGTHS OF THE TURNING

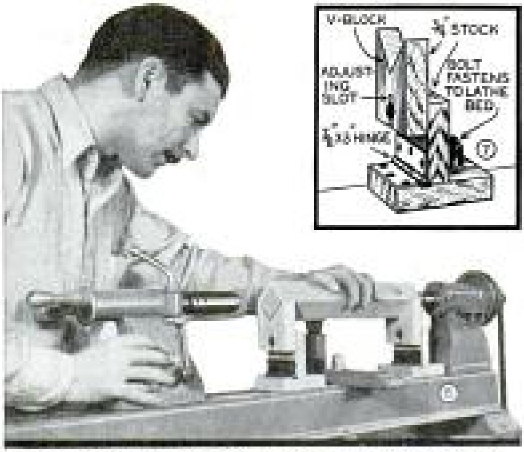
WHEN turning ten or more spindles of the same shape, various jigs to speed the work and to effect greater accuracy should be used. The most satisfactory type of jig is one which is more or less universal in scope, being convertible from one job to another without undue loss of time.

One of the simplest types is the semaphore jig shown in Fig. 1. This is a setting-out device, used to automatically mark all important lengths and diameters of the turning. It can be used to advantage by the home craftsman as well as the professional turner. Fig. 2 shows the general arrangement. Two uprights are fastened to the lathe, and these in turn support a suitable length of 7/8-in. shafting, the center of the shaft being level with the lathe centers. The shaft carries from 20 to 40 metal collars, which are used to set the semaphore arms at the required positions. A complete set of arms should be made up to all common diameters used in wood turning, and each arm should be stamped or marked with the diameter which it measures. The arms should be a press fit, Fig. 3, on the shaft so that they will not fall off.





The manner of using the semaphore jig is shown in Fig. 4. A full-size, half-pattern of the turning is laid out on thin cardboard, and tacked to a piece of 1/2-in. stock. The pattern is then placed between lathe centers. All important dimensions along the turning are set with correspond-



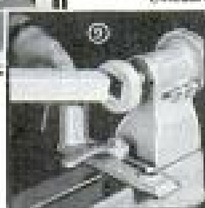
RAPID CENTERING IS MADE POSSIBLE WITH THESE SIMPLE ADJUSTABLE CENTERING BLOCKS. WHEN THE WORK IS HELD BETWEEN CENTERS THE BLOCKS ARE FOLDED DOWN TO PERMIT TURNING

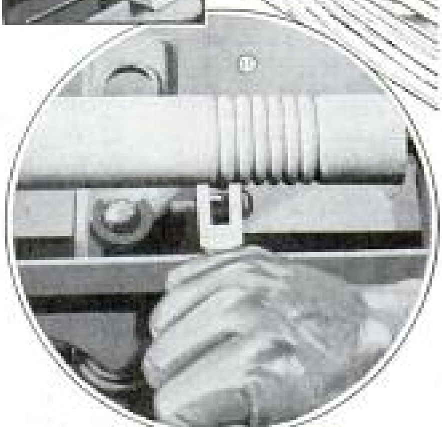
ing semaphore arms. Thus, if a certain portion of the turning is to be 1¾ in. in diameter, a 1¾-in. semaphore arm is placed at that point. Each arm is held between two collars snugly, but not tight enough to prevent a free swing. After completely setting out the turning, the arms are turned back to permit rough shaping to cylindrical form, Fig. 5. The arms are then turned over to rest against the work, and the parting tool is used to make each cut until the arm drops below the turning, indicating that full depth has been reached. With all important points cut in this manner, it is a simple job to finish-turn the spindle to shape.

Any production turning has for a first consideration some quick and accurate method of centering the work. One of the best methods of doing this is shown in Figs. 6 to 8 inclusive. The centering blocks, made as shown in Fig. 7, are first set at the required position. Each succeeding square of work is centered by placing it upon the blocks and forcing the tailstock against the dead end. A spur center should be sharpened well so that a light push will be sufficient to seat the work. After centering, the blocks are moved back to permit turning, as in Fig. 8. If the end thrust is likely to damage the lathe bearings, one centering block can be used in combination with a square-hole chuck, Fig. 9.

Where specially shaped chisels are used in combination with the centering and semaphore jigs, you have a fairly rapid and accurate set-up for varied short-run production jobs. Turning tools can be wood chisels ground to all common bead and cove shapes, or the worker can use standard shaper cutters mounted in special holders, as in Figs. 10 and 11.

A simple method of working that eliminates all need of setting-out devices or special chisels is pattern turning, as shown in Figs.

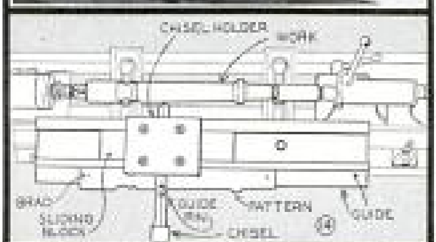


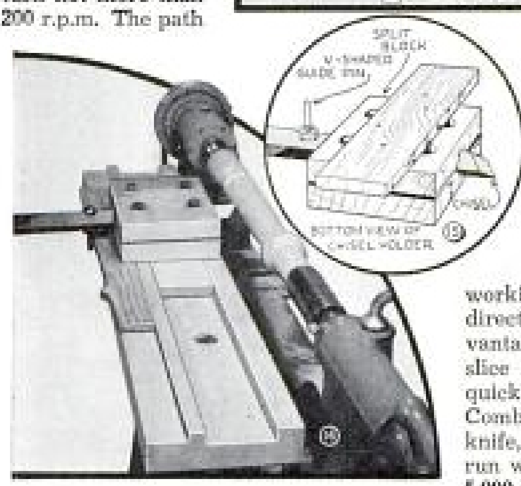


SPECIALLY SHAPED HAND CHISELS OR SHAPER CUTTERS IN HOLDERS SIMPLIFY CUTTING OF INTRICATE SHAPES

12 to 16 inclusive. A wood or metal pattern cut to the profile shape of the turning is used as a guide. The chisel or other cutting tool is fitted with a guide pin, which moves the cutting edge in and out as the cutter is pushed along the pattern. The entire operation can be done with scraping chisels, using the circular chisel, Fig. 10, for roughing cuts, and the diamond-point chisel, Fig. 15, for finishing. Faster work on roughing cuts can be made with a round-nose router bit, using a heavy-duty flexible shaft as a drive. In this setup, the shaft is firmly clamped between two wood or metal blocks. The underside of the block carries the guide pin, which should be square with slightly rounded edges. The thickness of the pin is the same as the diameter of the router bit—preferably ⅝ in. The shaft block slides in and out between guide blocks, and these slide along the turning—a simple form of compound slide rest. The router bit should rotate 5,000 r.p.m. while the lathe should turn not more than 200 r.p.m. The path of cutting is always from headstock to tailstock, and the router bit must be exactly on center. The finishing should be made with a scraping chisel fed slowly along work rotating at high speed.

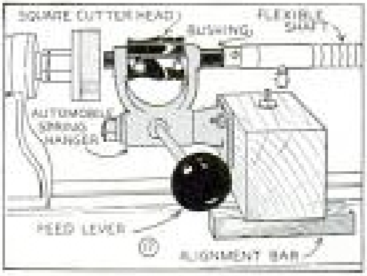
PATTERN TURNING IS PRACTICAL AND ACCURATE. IT IS ESPECIALLY USEFUL FOR SHORT-RUN WORK ON LONG SPINDLES

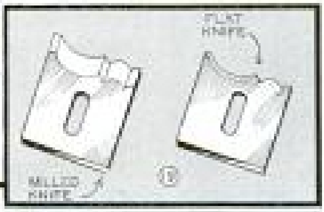




One very essential requirement for successful pattern turning is rigidity. There must be no play in the sliding ways, yet all parts should slide smoothly without binding. Where the spindle length is not too great, various other methods can be used to duplicate quickly any turning. The rotary head, Figs. 17 and 18, gives fairly good results, its main drawback being a slight tearing of the wood common to all woodworking operations where the cut is made directly across the grain. The main advantage of the rotary head is speed—it will slice into any small turning almost as quickly as the handle can be pushed down. Combined with a finishing cut with a flat knife, this method is very good for long-run work. The cutterhead should turn at 5,000 r.p.m., rotating toward the operator;

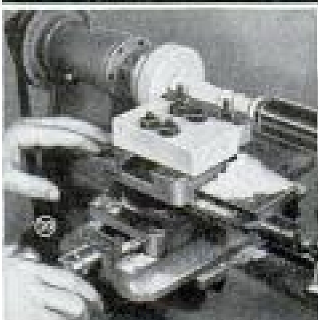
A NUMBER OF DIFFERENT SET-UPS CAN BE MADE FOR PRODUCTION TURNING OF SHORT SPINDLES





the work should turn at 200 r.p.m., rotating away from the operator.

The simplest set-up for short spindles uses a flat knife, ground to the profile shape of the required turning. This is mounted on the lathe slide rest, the cutting edge being on center. Fig. 20 shows the set-up. Knives are made from carbon or high-speed steel, and are from ⅛ to ½ in. thick, depending upon the cut required. Blank knife stock, ¼ in. thick by 3½ in. wide costs about 40 cents per inch in carbon steel. A faster cutting knife is the milled knife, shown in Fig. 19. This has the profile shape of the turning milled on its face. The milled knife has two great advantages over the flat knife—it can be sharpened by simply grinding straight across the cutting edge, and, moving tangent to the work, it forms a positive support at all times. Its main disadvantage is cost as made-to-order knives run from $2.50 to $4.00 per inch.



The method of using milled knives is shown in Figs. 21 and 22. First of all, it should be understood clearly that the profile shape of the turning is milled across the flat side of the knife. This permits grinding the cutting edge to a point or on an angle, so that the strain of entry into the wood is considerably lessened. The knife works below the center of the spindle, as shown at the bottom of Fig. 21, so that as the turning is made it is supported at all times. It will be noted in this diagram that the rotation of the lathe is reversed, the work running opposite to the usual direction. The knife feed can be fairly rapid—6-in. spindles can be finished-turned at the rate of about one a minute.