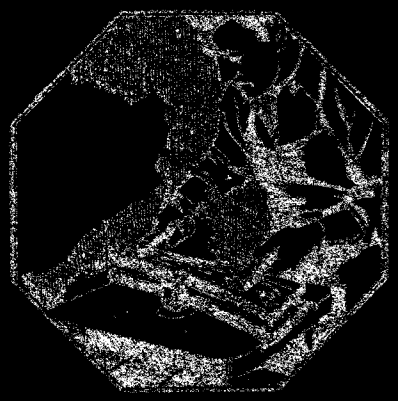
Book No. 4535

GETTING THE MOST OUT OF YOUR SHAPER

- A COMPLETE SHOP MANUAL ON MODERN SHAPER PRACTICE



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GETTING THE MOST OUT OF YOUR SHAPER

A DELTA-CRAFT PUBLICATION

Edited by
SAM BROWN

A Complete Handbook Covering all Branches of Shaper Operation in the Home Workshop with Over Two Hundred Photographic Illustrations and Line Drawings.

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MAIN CONTENTS

• GETTING THE MOST OUT OF YOUR SHAPER

The Shaper... Top Ranking Production Tool for the Small Shop and Capable of a Score of Different Operations, Some of Which are Impossible in Any Other Manner. Photo Above Illustrates Cabinet Model with ¾ Inch Spindle. The Machine Should be Located in an Unobstructed Working Space.

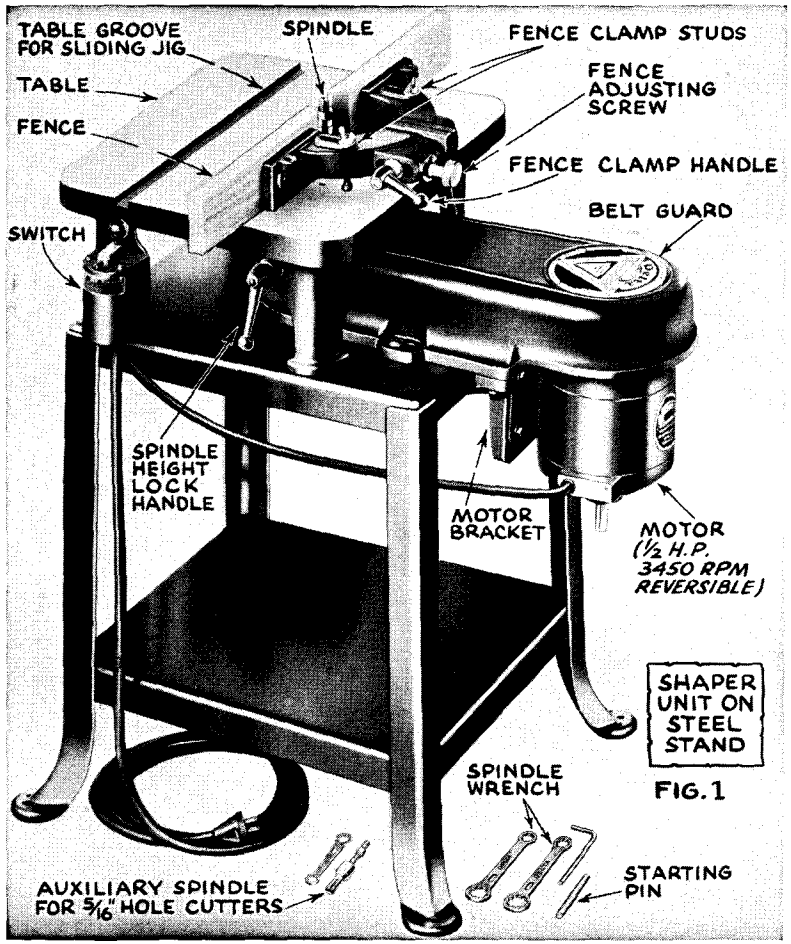


FIG. 1

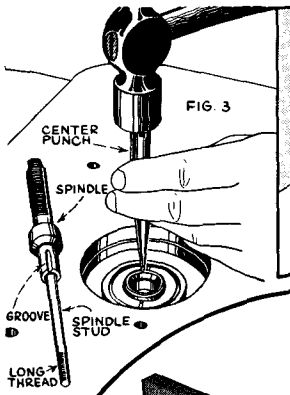


FIG. 3

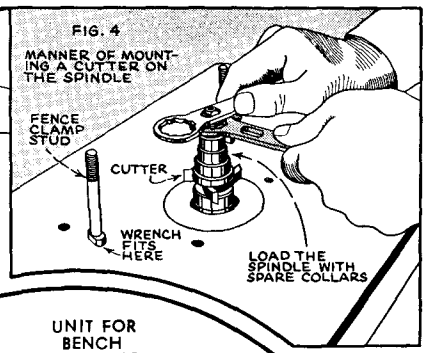


FIG. 4
MANNER OF MOUNTING A CUTTER ON THE SPINDLE

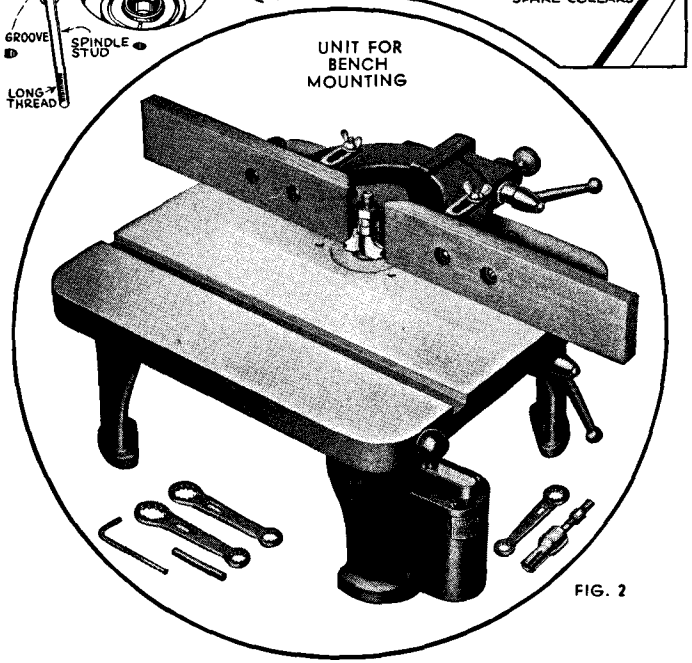
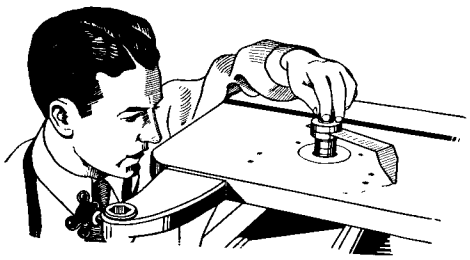


FIG. 2



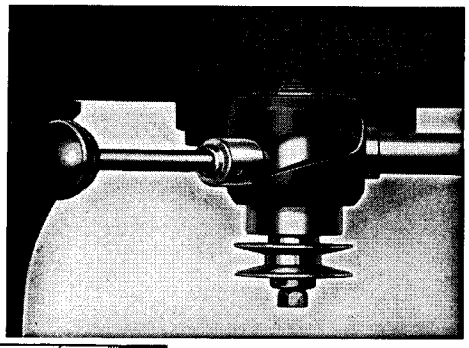
CHAPTER ONE

THE SHAPER and its ADJUSTMENTS

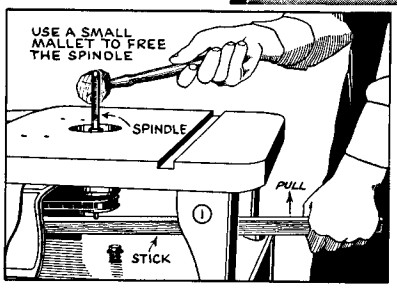
The Shaper.—The shaper is a vertical spindle, differing from the drill press in that it is built primarily to withstand side thrust. The spindle is generally hollow so that auxiliary spindles can be fitted to it, much the same as drills are fitted in a drill chuck. An adjustment is provided so that the spindle can be raised or lowered, and a second adjustment locks the spindle at any desired height above the table.

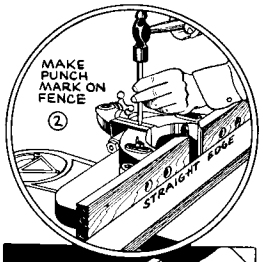
Power and Speed.—The medium-size shaper using ½ inch hole cutters works nicely with a ½ h.p. motor. Where large knives mounted between slotted collars are used, ¾ to 1-h.p. will give best results. The motor must be a 3450 r.p.m. type in order to give the shaper spindle the required speed. Pulleys are generally about a 3 to 1 ratio, so that the actual spindle speed runs slightly over or under 10,000 r.p.m. The motor should be reversible since an opposite direction of rotation may often be required. In some units the motor is reversed by means of a lever fitted directly to the motor; other units employ a reversing switch fitted to the side of the shaper stand and wired to the motor.

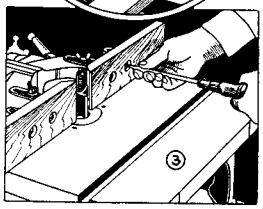
Auxiliary Spindles.—There are four auxiliary spindles—the stub spindle for cope cutters, the 5/16 inch diameter spindle for cutters having this size hole, the ½ inch diameter spindle for ½ inch hole cutters and the ¾ inch spindle for ¾ inch hole cutters. The latter can be used only on the heavy-duty cabinet model shaper. Each spindle is fitted with a tie-rod, threaded at both ends. One end of the rod is fitted to the spindle while the opposite end is capped with a tapered nut after passing through the hollow main spindle. The shank of each spindle is fitted with a keyway. This engages a ball or key inside the main spindle to prevent it from turning. A light punch mark on the rim of the main spindle, as shown in Fig. 3 on the opposite page, is an aid to locating the auxiliary spindle. Once in place, the spindle can be fitted with the necessary collars and cutters, as shown in Fig. 4 on opposite page. Because of accurate fitting, it may be necessary to use the method shown in Fig. 1 on this page to remove the auxiliary spindle.



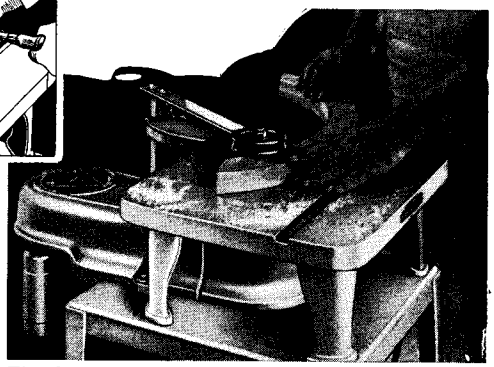
Above, spiral spindle-raising mechanism of light-duty shaper.



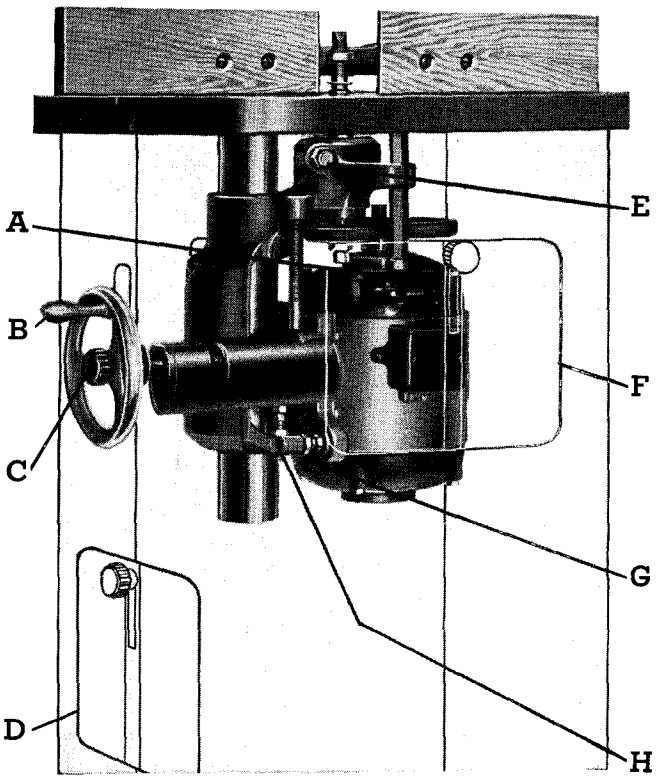




The Adjustable Fence.—The fence is fitted to the shaper table by means of two studs and wingnuts. Adjustment of either half of the fence can be made when required. For most work, the two halves of the fence should be in line. A punch mark across the two parts, as shown in Fig. 2, is a useful index in re-setting.



The Circular Guard Should Be Used Whenever Possible When Shaping Directly Against Guide Collars.



MECHANISM OF HEAVY-DUTY SHAPER

A—Spindle Tie-Rod Nut
B—Spindle Height Handwheel
C—Spindle Lock Knob
D—Cleanout Door
E—Bearing Clamp Screw
F—Removable Panel
G—Belt Tension Adjustment
H—Spindle Stop Screw

returning mouldings across the ends of narrow strips.

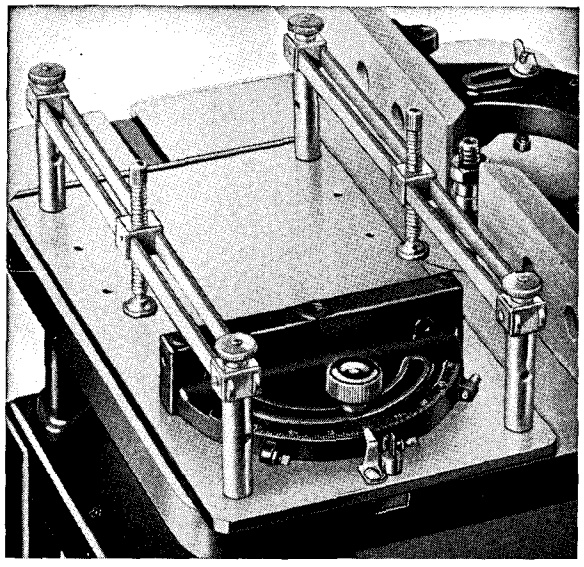
Heavy-Duty Shaper.— A phantom view of a typical heavy-duty cabinet type shaper is shown at left. A machine of this size, swinging a ¾ inch diameter spindle, should be powered with a ¾ to 1½ h.p. motor. The construction of this machine differs from the lighter model previously described, the main points of departure being the spindle raising mechanism and mounting of motor, as shown in photo at left. The standard spindle for this machine is ¾ inches in diameter and has a travel of 3 inches. The spindle is fitted inside the main spindle, as previously described, and this method of mounting permits the use of ½ inch diameter and other auxiliary spindles. The table size is 27 by 28-inches, which can be increased to 27 by 36-inches by the addition of a back wing.

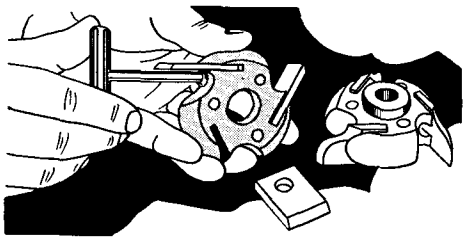
Left, phantom view of heavy-duty shaper. Below, the sliding jig.

The wood face pieces of the fence are adjustable in or out to accommodate various sizes of cutters. The opening should never be any more than is required to clear the cutter. Changes in the setting are made by loosening the bolts, pushing the wood facings to the required position, and retightening, as shown in Fig. 3 on the previous page.

Ring Guard. — The ring guard should always be used when shaping curved work directly against collars. Besides offering protection, the guard provides a hold-down, pressing the work down on the table surface.

Sliding Jig. — The sliding jig shown in the lower photo is an essential part of any shaper. Its purpose is to clamp the work securely so that it can be advanced to the cutter. It is used chiefly in

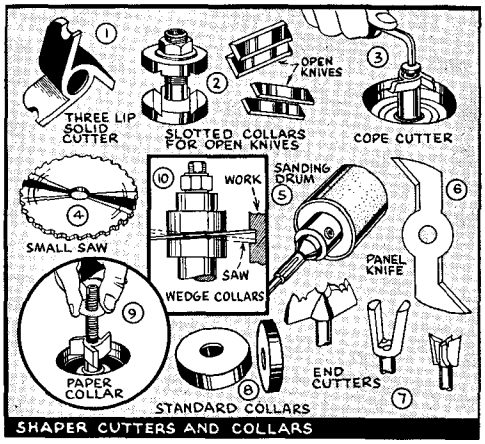


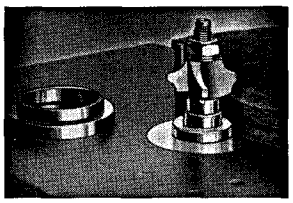


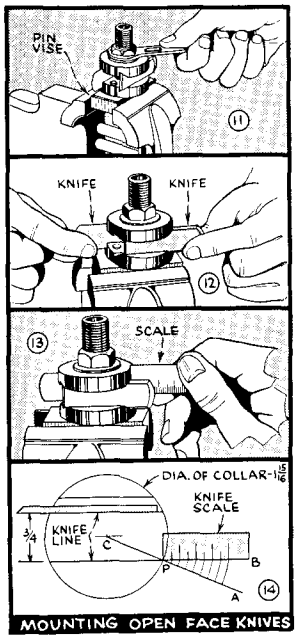
CHAPTER TWO

CUTTERS and COLLARS

Shaper Cutters and Collars.—A wide variety of knives, saws, collars, etc., are used in shaper operation, a typical group being as shown in the drawing at the right. Fig. 1 shows the standard three-lip cutter with ½ in. spindle hole. These are available in a wide variety of shapes and are undoubtedly the safest and most practical type of knife for average work in the small shop. Similar cutters with 5/16 in. hole can also be used by substituting an auxiliary spindle of the proper diameter. A second type of commonly used cutter is the open face knife clamped between two slotted collars, as shown in Fig. 2. The blank knives are easily ground to any required shape. The drawing in heading shows a three-knife cutterhead. A variety of ready-machined knives can be obtained, any set of which can be mounted in this head. The center hole is ¾ inch, but a bushing permits mounting on a ½ inch spindle.





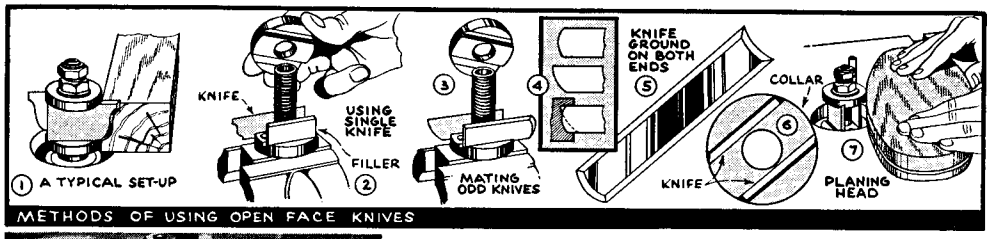


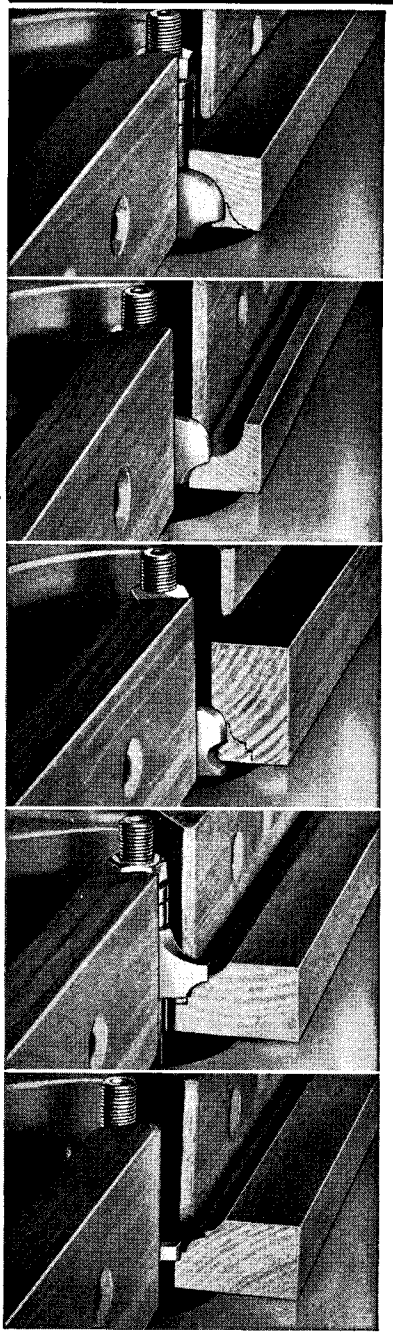
Above, Examples of Shaper Cutters. Left, Stationary Collars and Manner of Mounting Open Knives.

Fig. 3 shows a cope cutter and the special spindle on which it is carried. A small saw, Fig. 4, is a useful accessory for grooving and rough cutting. No. 5 is the familiar sanding drum. Fig. 6 shows a wing cutter, used for making raised panels and similar work. A group of end cutters are pictured in Fig. 7. These, as the name implies, travel vertically and make an end cut.

Standard shaper collars, Fig. 8, are from ⅛ to ½-in. thick and of various diameters to permit control over the depth of cut. Paper collars are often used as shims to build up a standard collar to some required exact size, as shown in Fig. 9. Collars of special size or construction are often made up to suit the work, a common example being the wedge collars shown in Fig. 10. A saw clamped between these collars (they can be made from hardwood) will cut a more or less wider groove than the saw thickness depending on the wedge angle of the collars. Stationary collars, which fit into the table opening, as shown in the photo, and ball-bearing collars (these are simply ball races which fit over the spindle) are often used instead of standard collars to eliminate scoring, especially in production work.

Mounting Open Face Knives.—Open face knives are perfectly safe to use, but only when they are properly mounted. The first step in mounting a set of knives is shown in Fig. 11. The cutter head is placed on the pin vise, and the nut is turned down to lightly clamp both knives. The ends of the two knives are then gripped between the fingers and pulled outwards. Both knives should slide with an equal





Above, Various Methods of Using Open Knives Between Slotted Collars. Left, How Cuts Are Combined to Produce Moulded Shapes.

tension—if one pulls more readily than the other, it is an indication that the knives are not of the same width, and *knives of unequal width should never be used together between slotted collars.* It can readily be seen that if one knife is a trifle narrower than the other, the wider of the two will be clamped firmly while the other will be loose and apt to fly out when the machine is set in motion. However, providing both knives are clamped evenly, the knife projection can then be measured, setting both knives to project exactly equal, as shown in Fig. 13, after which the nut is turned down tight. An ordinary thin steel rule can be used as a gauge, but the dimensions will read about 1/32 in. off. If a knife scale for exact measuring is required, it can be made as shown in Fig. 14. First draw a circle of the same diameter as the collar—$1\frac{1}{16}$ in. On this, lay out the knife lines. Project one of the knife lines to the point B. From the center of the circle, draw a line through point P to point A. On line PA, lay off $\frac{1}{8}$ in. marks from a common rule, starting at P. With C as a center, extend these marks to line PB, these marks being the exact dimensions for the knife scale.

Methods of Using Open Face Knives.—Open face knives can be used in a number of different manners, as shown in the drawing above. Fig. 1 shows a standard set-up, two blank knives ground to the required contour being held between the collars. For light cutting, or where the run is not long, one knife alone is often used, as shown in Fig. 2, a short blank piece of steel being used in the other slot as a filler. It is important, of course, that the filler be the same exact width as the knife. Odd knives of the same width but of different shapes are sometimes mated, as shown in Fig. 3. The moulding which would be cut in the example is shown in Fig. 4. Mating is often useful, but should not be practiced unless both knives are approximately of the same weight. Grinding knives at both ends, Fig. 5, is widely practiced, and is especially good for cuts requiring a male and female joint. Straight knives ground to the same diameter as the cutterhead, as shown in Fig. 6 and Fig. 7, are often used for outline planing.

Combining Cuts.—Knives are sometimes made to cut a required moulding in one pass of the work. More often, however, two or three passes are required, using standard shapes. The photos at the left show typical examples of how cuts are combined to shape moulded edges.