IN THE WORKSHOP

by "Duplex"

No. 73.—*A Small Power-driven Hacksaw Machine

NOW that the driving gear has been completed, the construction of the parts forming the saw guiding mechanism will be described.

The components which make up this mechanism are illustrated in Figs. 24 and 29, and their relationship should be made clear if the two photographs are examined together. The main member of the mechanism is a beam, pivoted on a vertical pivot arm and carrying the saw frame slide or carriage. A vertical guide arm secured to the baseplate serves to give additional support to the projecting portion of the beam towards its centre.

Besides these, a catch is fitted to the beam to support it when the saw is lifted from the work; also, a weight for loading the saw blade is carried on a weight-shaft attached by brackets to the top of the beam.

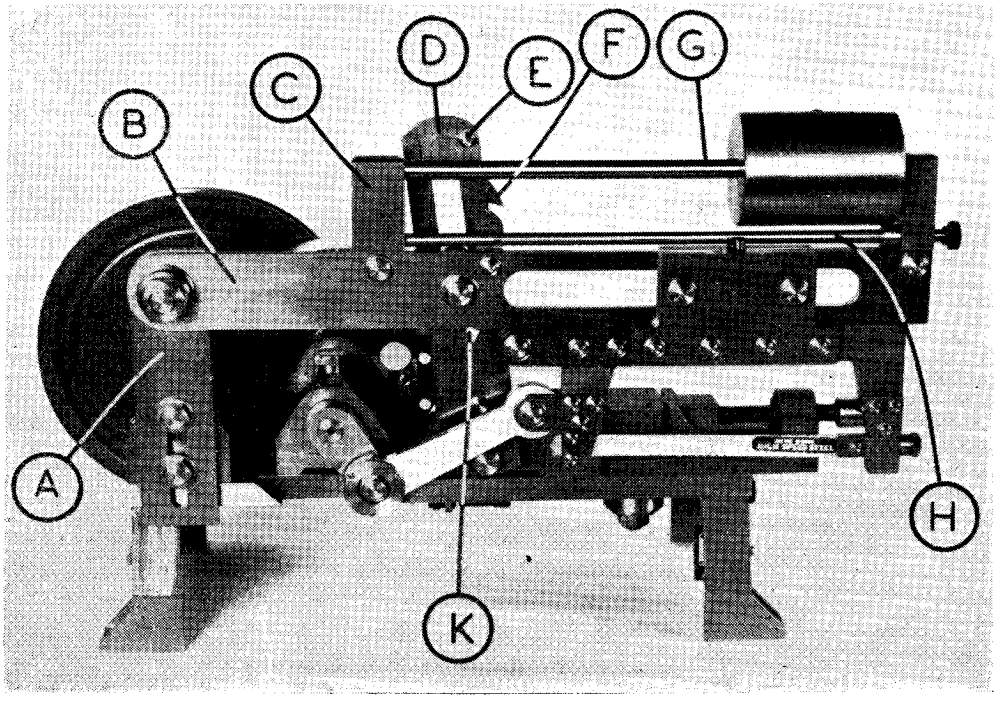


Fig. 24. *A—Beam pivot arm; B—Beam; C—Weight shaft bracket; D—Beam guide arm; E—Latch pin; F—Beam catch; G—Weight shaft; H—Catch control-rod; K—Stop-bolt*

The Beam

This is made from a length of flat mild steel, 1½ in. wide and ¼ in. thick. As this part forms a slide for the saw carriage, it must be both straight and flat, and, if any irregularity is found on testing on a surface plate, the material should be filed and scraped true and to a good surface finish.

Next, the work is marked-out in accordance with the drawing, Fig. 25, and the pivot bearing hole is drilled and reamed. The long slot can be formed either by an end-milling operation in the lathe or by drilling and filing; the surplus metal may be removed with the hacksaw by passing the blade through a drilled hole.

The sides of the slot should be finished parallel, and its width should just allow the ball bearings fitted to the carriage to slide freely.

The Beam Pivot Arm

As will be seen in the photographs, this part is attached to one end of the countershaft bracket

*Continued from page 460, "M.E.," September 21, 1950.

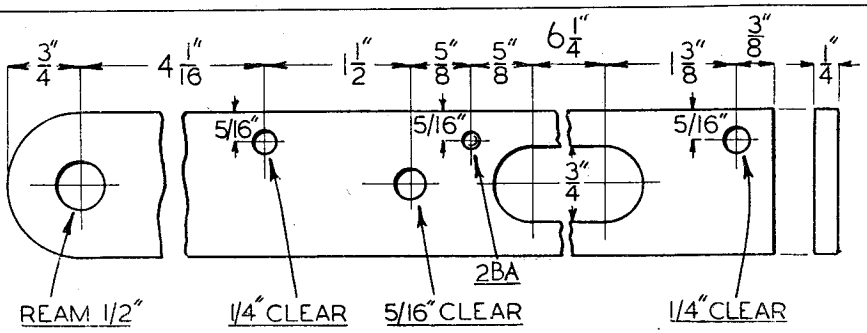


Fig. 25. The beam

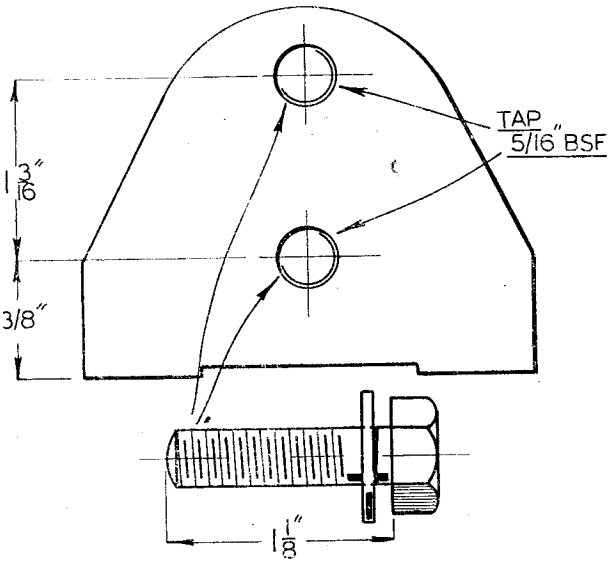
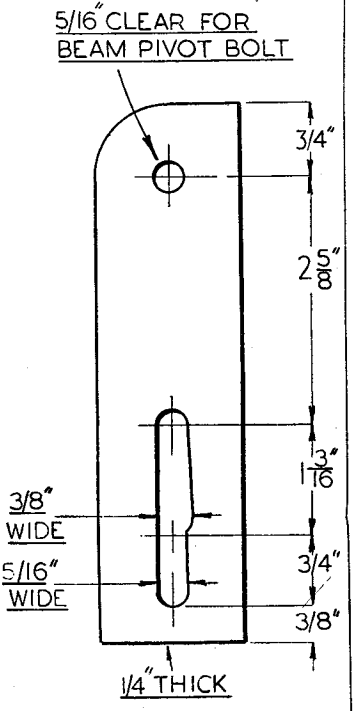
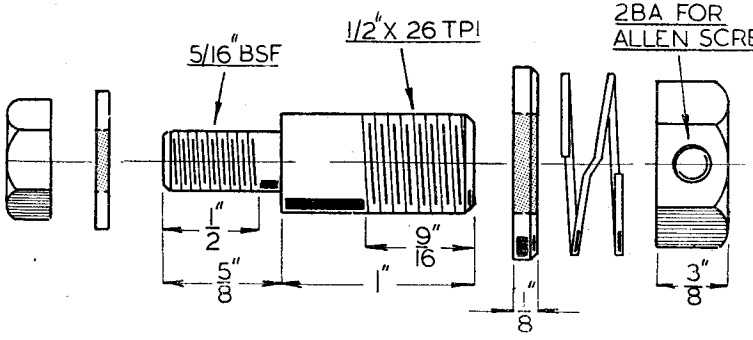


Fig. 26. Beam pivot arm bracket



Above—Fig. 27. Beam pivot arm



Left—Fig. 28 Beam pivot-bolt

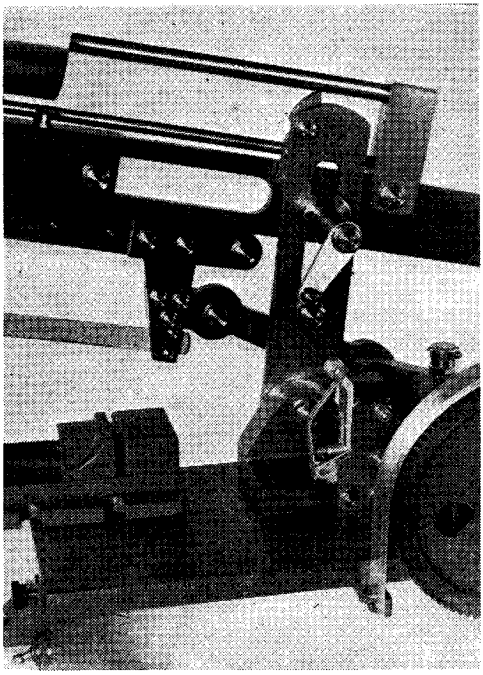


Fig. 29. Beam guide arm assembly

required. In addition, this slot is widened towards the middle of its length to enable the arm to be swung for adjusting the position of the saw carriage; this may be found necessary to keep the carriage clear of the ends of the beam slot when the beam is fully raised. As will be seen in several of the illustrations, the shouldered pivot for the beam is bolted to the beam itself, and a double-coil spring washer and nut provide the clamping pressure. If a circular disc of thin sheet fibre or plastic material is fitted between the two contact surfaces, this will provide some measure of frictional control of the pivot joint, which will then act in the same manner as a car shock absorber in damping out any sudden movement of the beam as the saw blade travels over the work.

The Guide Arm

This arm is attached to a bracket casting bolted to the baseplate of the machine as illustrated in Fig. 29.

After the casting has been machined on all flat surfaces, it is drilled and tapped in accordance with the working drawing in Fig. 30. This casting also serves as a mounting for the automatic cut-out switch, and at this stage the holes for the switch fixing screws can be drilled and tapped. As will be seen in the drawing, the holes for the bolts securing the guide arm lie at an angle to the vertical; in this way, the guide arm is set at an oblique angle of some 7 deg. to enable its slot to conform more nearly to the radial travel of the guide shaft fitted to the beam. Should this description be found difficult to

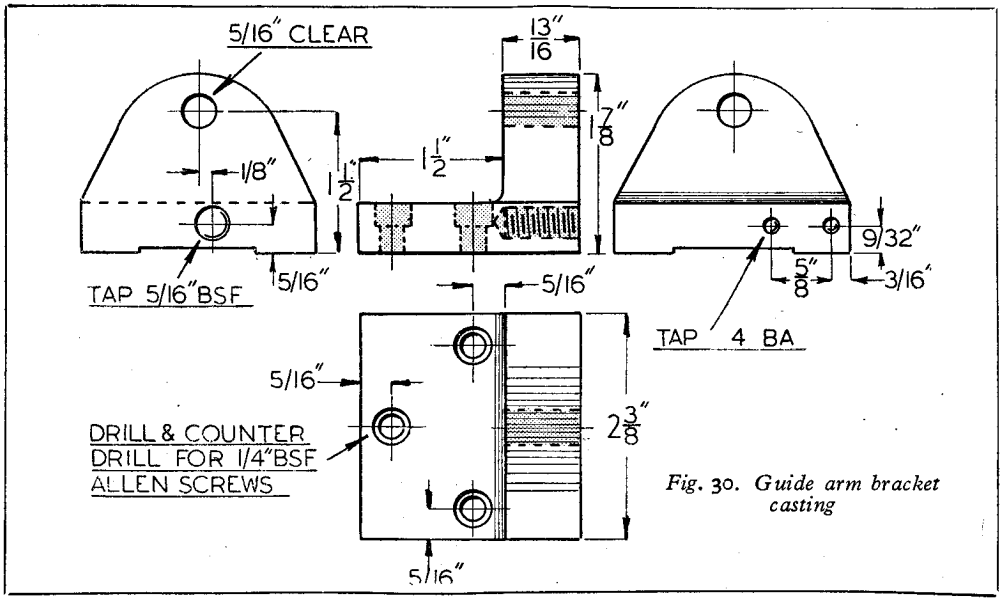


Fig. 30. Guide arm bracket casting

by means of two hexagon-headed screws, located as in the drawing, Fig. 26.

The arm is slotted, in accordance with Fig. 27, to allow the beam to be raised when parallel sawing at some distance above the vice base is

follow, it may, perhaps, be clarified by reference to Fig. 29. The guide arm is slotted to allow the guide shaft to rise as the beam is raised; the bolting hole at the foot of the arm is also slotted so that the arm can be swung to conform

with the setting of the beam pivot arm as already explained.

The Guide Shaft

This part, again, can be clearly seen in Figs. 2 and 29. The shaft is securely bolted to the beam and is provided with two flats to prevent contact with the sides of the slot in the guide arm in which it moves. The further end of the shaft is machined to carry a short arm, Fig. 29, for actuating the automatic switch, but this mechanism will be described at a later stage when the electrical control gear is dealt with.

Two guide collars are also mounted on the shaft; these are adjusted to make contact with either face of the guide arm so that they support the beam laterally. The dimensions of these split collars are given in Fig. 32, and they should be made a close fit on the shaft to enable them to be securely clamped in position after adjustment.

The Stop

To limit the downward movement of the beam when the saw breaks through the work, the guide collar next to the beam comes into contact with a stop-bolt fitted to the guide arm.

As the beam at the end of its travel may strike the stop with some force, the stop itself must be positively located and not made to slide for the purpose of adjustment. Accordingly, a stop-bolt of the form shown in Fig. 31 was fitted to the guide arm.

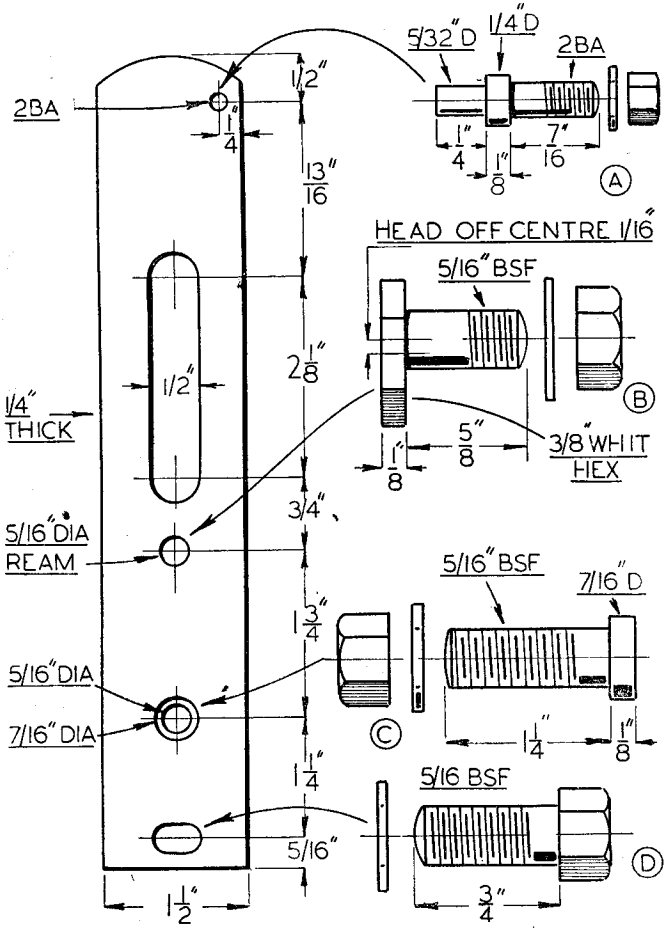


Fig. 31. The beam guide arm, latch pin and stop-bolt

In order to provide a sufficient range of adjustment, the part is made from hexagon material, and the shank is machined $\frac{1}{16}$ in. eccentric to the head. As the stop is rotated, the flats on the head as they come into contact with the guide collar will, therefore, provide four different settings, each varying by 1/32 in. Moreover, as the point of contact is close to the beam, there will be but little tendency for the beam itself to tilt or twist when its downward movement is arrested in this manner.

The Beam Catch

The position of this part, with the beam lowered and also in the raised position, can be seen in the photographs, and its dimensions are given in the working drawings in Fig. 33.

Small parts such as this, which have a somewhat complicated relationship with other moving parts, usually require some hand fitting if they are to work satisfactorily; it is advisable, therefore, to check the fit as the work proceeds in order to make allowance for any slight discrepancies in the machining of the parts. The catch itself, in the raised position of the beam, engages with the latch pin, Fig. 24, fitted to the upper end of the guide arm. In addition, as will be seen in Fig. 29, a pin, actuated by the control-rod, is fitted for the purpose of disengaging the catch when the control button is pressed.

The Weight Shaft and Catch Control-Rod

As will be seen in the photographs, this shaft is supported in two brackets attached to the beam, and its purpose is to carry the sliding weight which serves to load the saw blade. One end of the shaft is screwed into the left-hand bracket, but the other is made free to slide in order to facilitate the assembly of the parts. These brackets are, however, also utilised to form bearings for the control rod that operates the beam catch. The general arrangement of these

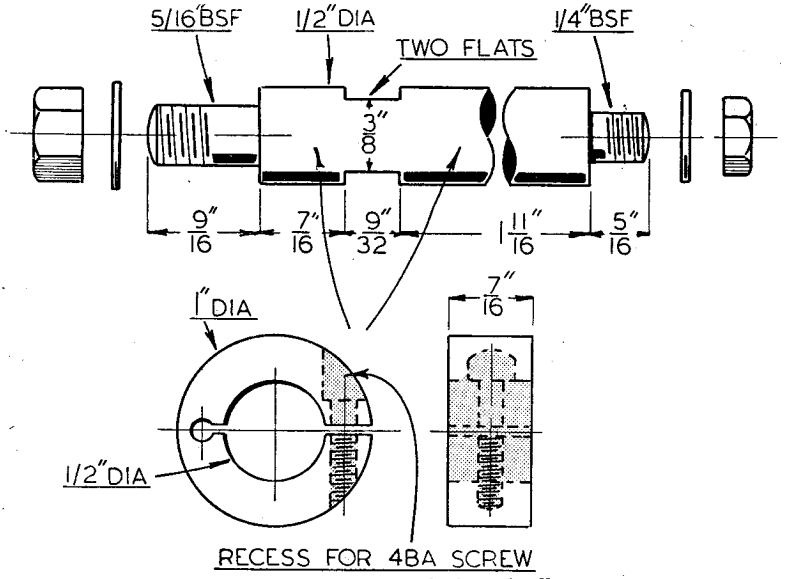


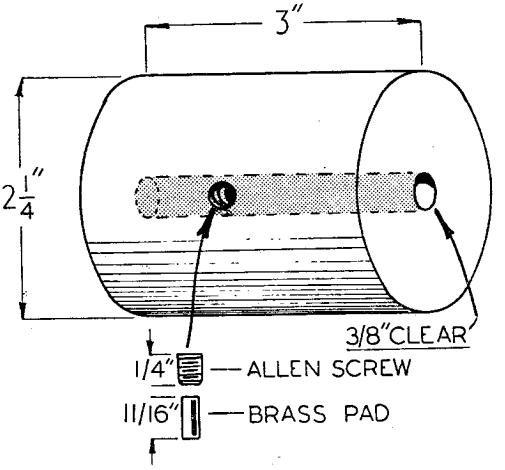
Fig. 32. Guide arm shaft and collars

parts can be seen in the photographs, whilst the drawings indicate the method of fitting the return spring to the catch control rod.

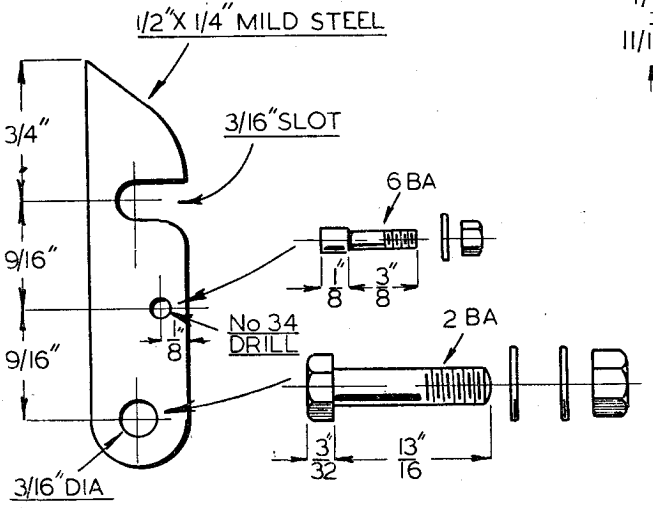
It will be seen, too, that a groove is turned in the control rod to accommodate the actuating pin fitted to the beam catch.

It may be found advisable to delay turning this groove until the exact position of the other parts of the catch mechanism has been checked and any small errors of fitting corrected.

A stop collar is shown fitted in contact with the right-hand weight-shaft bracket; this is set to limit the forward movement of the catch and so enable it to engage with the latch pin when the beam is raised. The weight-shaft bracket at the free end of the beam is attached by means of the shaft bolt shown in Fig. 34; this bolt is furnished with an ebonite knob for the purpose of raising and lowering the beam. As will be seen in the photographs, a small ebonite push button is fitted to the end of the catch control-rod. This arrangement allows the saw to be raised or lowered with the fingers of one hand acting at the extreme end of the beam and well away from the moving parts of the machine; as will be seen later, the electrical control gear is also fitted in this position.



Above—Fig. 35. The weight



Left—Fig. 33. The beam catch

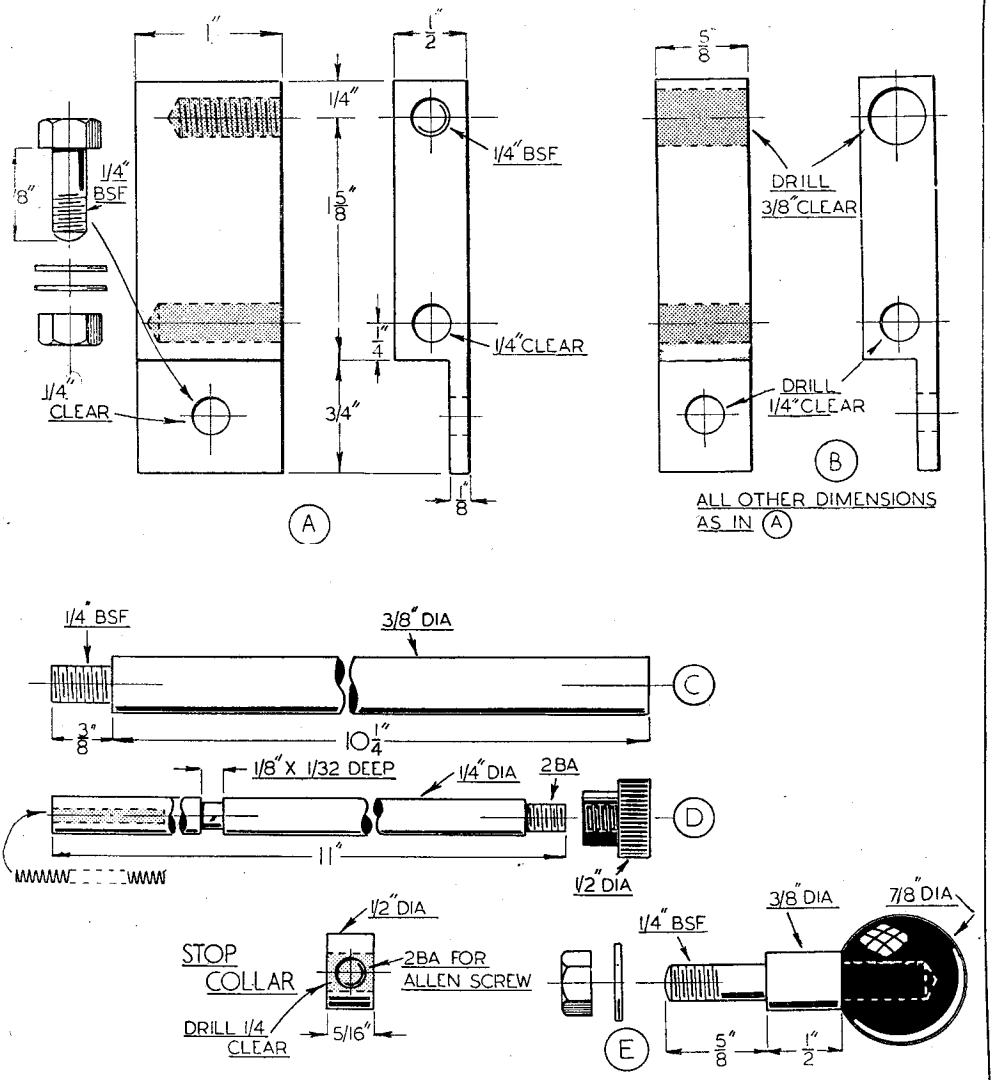


Fig. 34. A—Left-hand weight shaft bracket ; B—Right-hand bracket ; C—The weight shaft ; D—Control-rod and stop-collar ; E—Beam-raising bolt and knob

The Weight

The weight is made from a short length of mild-steel, turned all over and bored with a D-bit to slide freely on the ⅜-in. diameter weight-shaft. To retain the weight in position after adjustment, an Allen set screw is fitted to bear on a brass pressure pad. The finished weight, as shown in the drawing, Fig. 35, weighs approximately 3 lb., and this has been found by experiment to load the high-speed steel saw blade sufficiently to give satisfactory cutting without damaging the saw teeth. When an Eclipse Junior blade is fitted to the machine, the loading should be reduced by sliding the weight towards the beam pivot, for the full weight may cause the rather slender blade to bow, and the saw frame will not then travel on an even path.

(To be continued)