

# IN THE WORKSHOP

by "Duplex"

## No. 71.—\*A Small Power-driven Hacksaw Machine

THE complete machine together with its driving motor is shown in the photographs mounted on an oak baseboard, but, if the hacksaw is to be driven from a lineshaft, this base can be dispensed with, and the machine is then secured directly to the bench top by means of the bracket feet attached to either end of the steel baseplate. The baseboard used is 1 in. thick, 7 in. wide, and 24 in. long. The width is correct for the standard 1/6 h.p. capacitor-start Hoover motor

### The V-Belt Drive

This provides a reduction ratio of 4 to 1 and comprises: a driving pulley of  $1\frac{1}{4}$  in. pitch diameter, a Fenner  $\frac{3}{8}$  in. M-section V-belt, No. 2300, and a standard Fenner 7 in. pitch diameter steel pulley, an arrangement which gives a distance between the shaft centres of approximately  $7\frac{1}{2}$  in.

The driving pulley illustrated in Fig. 4 was turned from an iron casting, and is secured to the motor shaft by a single  $\frac{1}{4}$  in. B.S.F. Allen

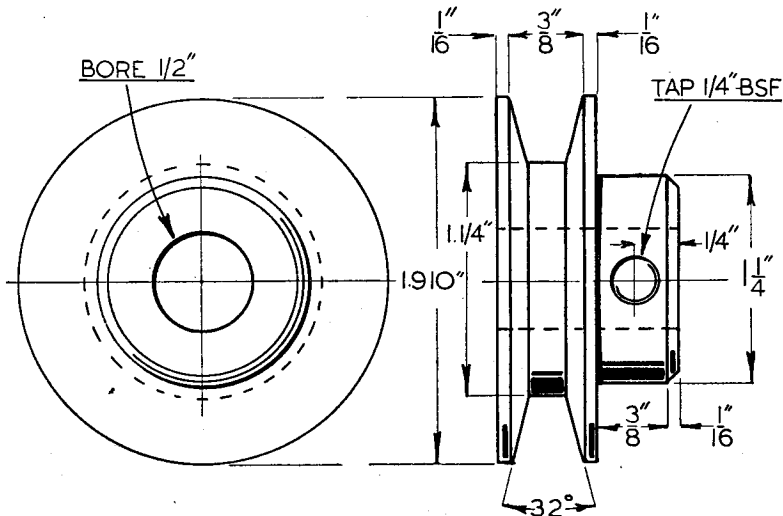


Fig. 4. The motor driving pulley

fitted, and allows the belt line to fall  $\frac{3}{8}$  in. beyond the edge of the board, but if a larger motor is used the width of the board will have to be correspondingly increased. The footplate of the motor is clamped to the board by means of four  $1\frac{1}{2}$  in.  $\times$   $\frac{1}{4}$  in. B.S.F. bolts passing right through the wood. The edge of the footplate should be about  $\frac{1}{2}$  in. from the end of the board when the bolts are in the middle of the footplate slots, in order to allow for adjustment of the belt tension. The base stands on four rubber door stops 1 in. in height; this provides a resilient mounting and allows space for the electrical fittings attached to the under side of the baseboard. One pair of stops should be fitted directly under the motor, and the other pair some 5 in. from the right-hand end of the board in order to distribute the load evenly.

set-screw. Cast-iron is undoubtedly the most satisfactory material for making small V-pulleys, and is far superior to any kind of soft alloy in resisting wear.

The large V-pulley revolves on a short, fixed countershaft carried in a casting mounted on the baseplate.

The general arrangement of this drive, together with the geared drive to the crankshaft, is illustrated in Fig. 5, where it will be seen that the small gear pinion is attached to the V-pulley and both are mounted at one end of the base bracket casting; the other end of this casting serves to carry the vertical arm to which the saw beam is pivoted.

The dimensions of the cast-iron bushing on which the pulley and the pinion are mounted are given in Fig. 6. The pulley is secured by a  $\frac{1}{4}$ -in. B.S.F. Allen set-screw, and the pinion is attached to the shoulder on the bushing by means of a pressure plate and four 6-B.A. screws.

\*Continued from page 272, "M.E.," August 24, 1950.

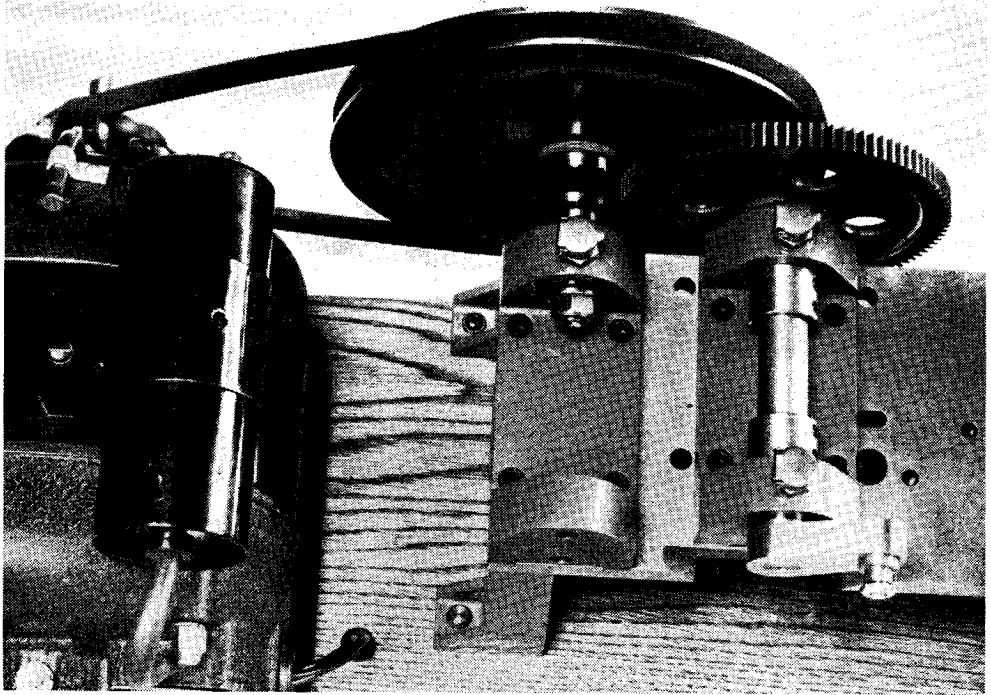


Fig. 5. The two-stage drive to the crankshaft

The bushing is chamfered, as represented in the drawing, to form an oil-well for maintaining the lubrication of the bearing. After the bore has been machined, it is finally lapped to size to remove all tool marks and to ensure that it is true and parallel. As it is essential that both

wheel mountings should be concentric with the bore, it is advisable to finish the wheel seats to size with the bushing mounted on a true-running mandrel.

It will be seen both in the photograph in Fig. 7 and in the working drawing in Fig. 8 that the

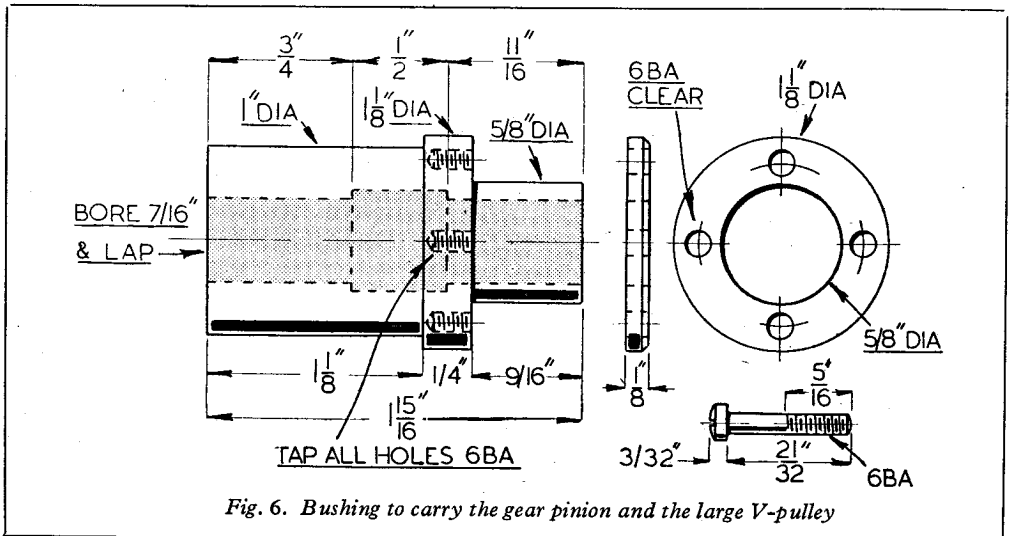


Fig. 6. Bushing to carry the gear pinion and the large V-pulley

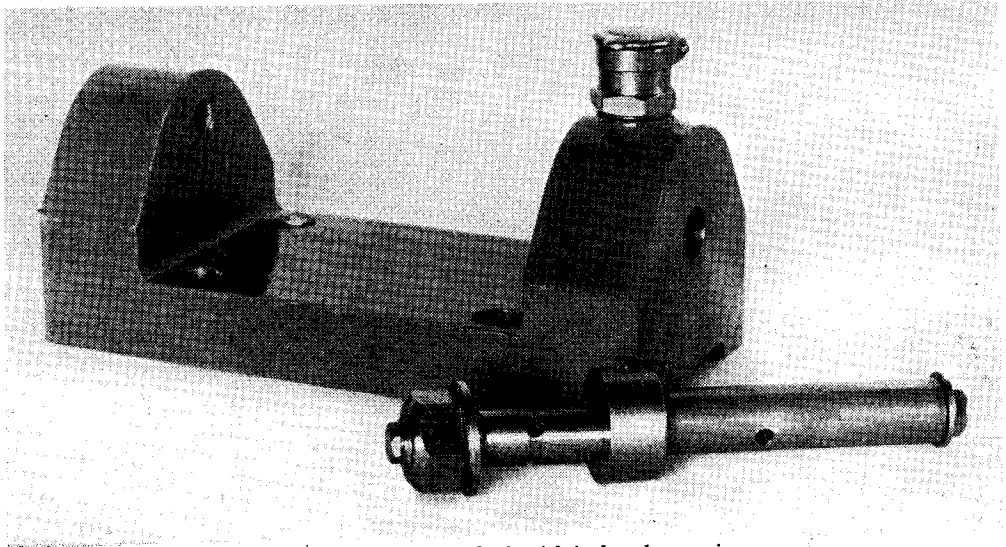


Fig. 7. The countershaft with its bracket casting

bearing portion of the pulley-shaft, or countershaft, is machined eccentric to the part which is secured in the casting; this allows the depth of meshing of the gear wheel teeth to be accurately adjusted by rotating the shaft with a small tommy bar. The eccentric machining is carried out by interposing a packing strip between the work and one jaw of the self-centring chuck, or the four-jaw chuck can be set to give the required eccentricity, which is then measured with the test indicator. The oil-ways from the spring-lid lubricator fitted to the casting and leading to the oil-well formed in the bushing are drilled as shown in the drawing, but a leather washer should be fitted to the shaft under the securing nut in order to form an oil seal at this end of the shaft. The end of the oil-way is closed with a 4-B.A. screw.

After it has been turned some half a thousandth of an inch oversize, the shaft is finally lapped to a close running fit in the cast-iron bushing.

**The Countershaft Bracket Casting. Fig. 9**

The base of the casting is first filed or machined flat to form a datum surface, from which the centre of the bore to receive the pivot shaft is marked-out and then deeply centre drilled. The casting is then mounted on an angle-plate attached to the lathe faceplate to enable the end face to be machined and the shaft bore to be drilled and finally bored to size. Following this, the side faces of the casting are machined truly at right-angles to the machined end face, and the other end is also faced in like manner.

These facing operations can, of course, be carried out conveniently in a shaping machine, or even filing may have to be resorted to should there be difficulty in mounting the work.

In actual practice, however, it was found that the casting could readily be mounted in a Keat's V angle-plate attached to the lathe faceplate, as illustrated in Fig. 10. The base of the casting can now be marked-out, drilled, and counter-

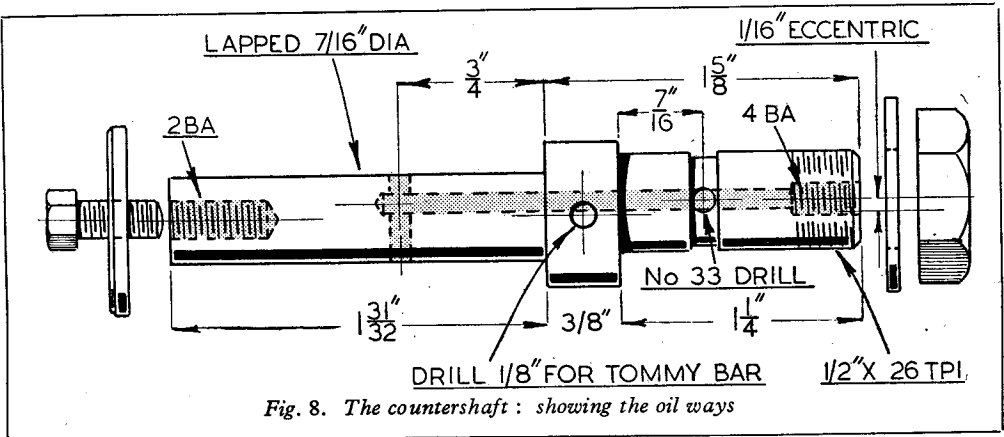


Fig. 8. The countershaft : showing the oil ways

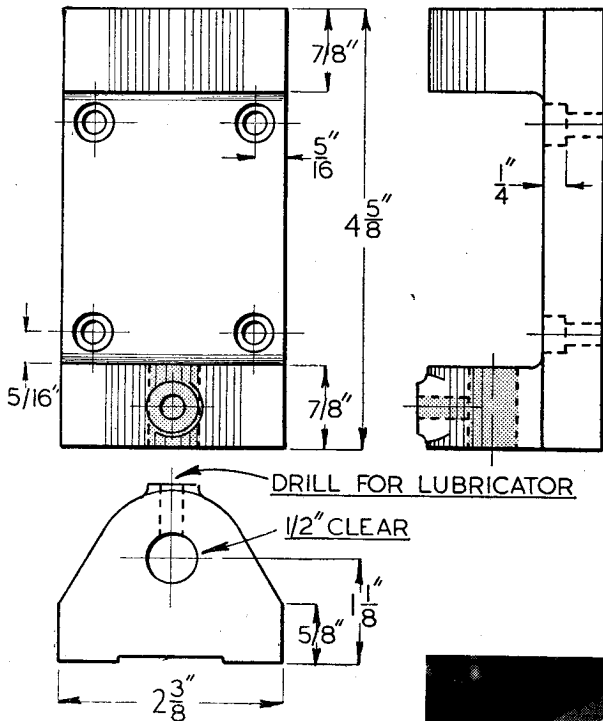


Fig. 9. The countershaft bracket casting

drilled to form the bolt holes for the Allen screws which secure the part to the baseplate. The centre-lines on both ends of the casting should next be marked out conspicuously, as they will be required later both for locating the crankshaft bracket and for drilling the bolt holes for securing the beam pivot-arm. Finally, the inner face of the casting is machined or filed in order to provide a flat bolting face for the nut securing the pivot shaft.

**The Baseplate**

This consists of a length of flat mild-steel 12 1/2 in. long, 5 in. wide and 1/2 in. thick. The upper surface must first be filed flat to provide a true seating for the three castings which are here mounted. At the same time, the front edge of the material is filed straight and square, as it will be used later as a datum surface for locating the three castings.

The countershaft bracket casting can now be mounted on the baseplate with its left-hand edge level with the end of the plate and its front face overhanging the plate by 1/32 in.

The casting is correctly aligned at right-angles to the front edge of the baseplate with the aid of a try-square applied to the machined side face

of the casting. After the casting has been firmly secured in this position with a pair of toolmakers' clamps, a drill fitting the bolting holes is entered for a short distance, and this is followed by the No. 3 tapping size drill.

If the baseplate is then tapped while the casting remains in position, it will be found that the clearance holes previously drilled will serve to maintain the tap upright. The holes for the screws used to attach the leg castings to the baseplate are now drilled and tapped as represented in Fig. 11.

Next, the aluminium castings, Fig. 12, which form the legs supporting the baseplate are drilled for the attachment screws, and, in addition, the feet are drilled with a No. 16 drill to take the No. 8 wood-screws used to secure the castings to the baseboard. It should be noted, however, that, instead of a wood-screw, a 2-B.A. bolt is fitted at the front of the left-hand leg casting to form an

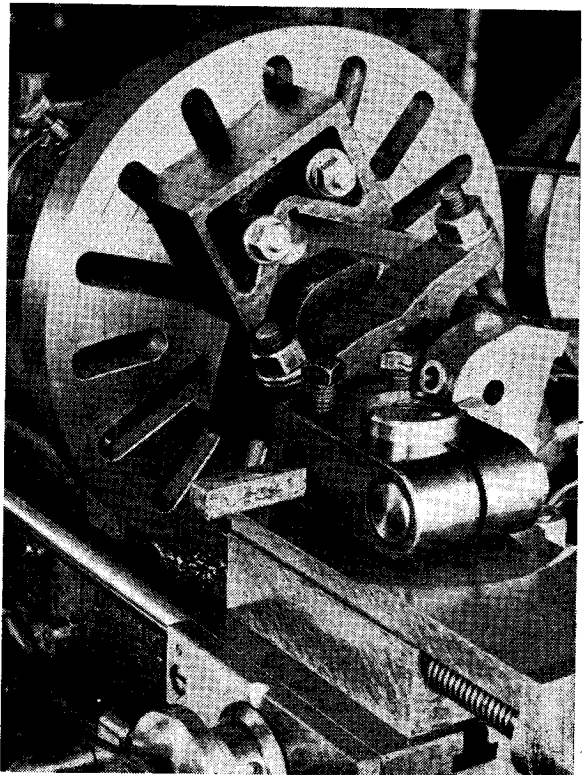


Fig. 10. Machining the bracket casting mounted in a Keats V-angle plate

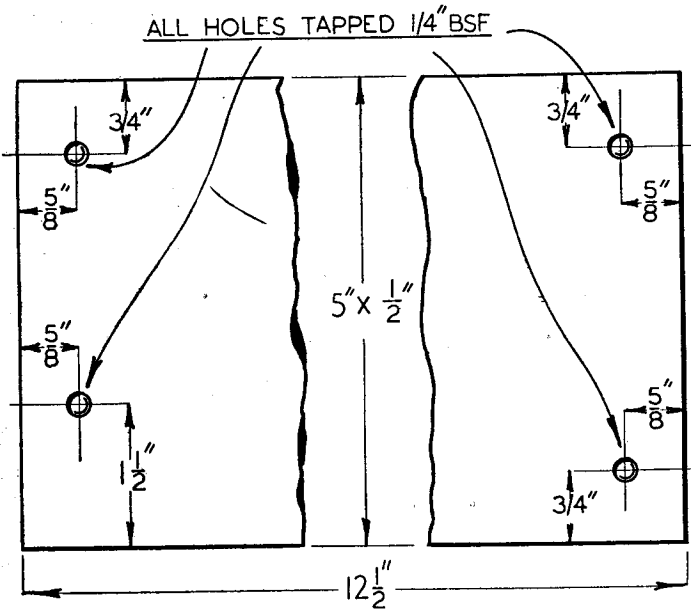


Fig. 11. Location of screw holes for attaching the leg castings

earth connection for the electrical equipment. When the baseplate has been secured to its legs, the assembly can be mounted on the baseboard, and its position determined by setting the two belt pulleys in line with the aid of a straight-edge or a length of cord; at the same time, the centre distance

between the two pulleys is set to 7 1/2 in., with the motor fixed at the mid-point of its adjustment travel. Those who are eager to see some part of the machine working can now fit the belt and start the motor to set the first stage of the drive in motion.

(To be continued)

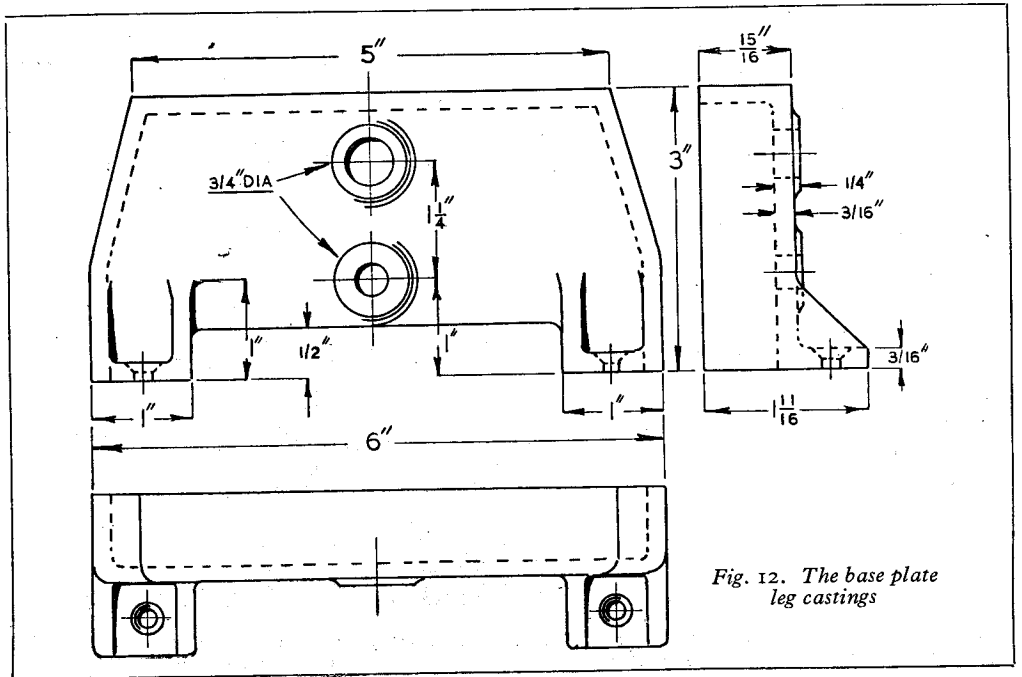


Fig. 12. The base plate leg castings