



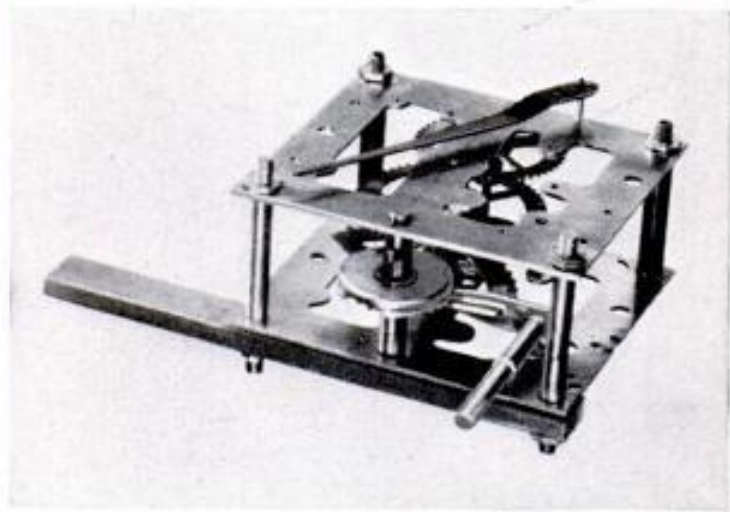
WITH defense needs clamoring for the nation's output of precision instruments, what is the student machinist to do if he needs a dial indicator, so indispensable for centering work in the lathe? One answer is to make his own. The homemade indicator shown at the left checking work held in a steady rest multiplies any eccentricity by 100, so that a movement of .001" on the pin shifts the pointer about $\frac{3}{32}$ ".

Most of the parts can be taken from a cheap alarm clock (Fig. 1). Discard everything except the frame of the mechanism, the studs and nuts that hold it together, the three biggest gears with their shafts and pinions, and the hairspring—the parts shown in Fig. 2.



1 An old alarm clock will furnish almost all the parts for that dial indicator you've been wanting! The first step is to take the timepiece apart

4 The pick-up rod bears against an extension arm soldered to the largest gear. Though shown, the pointer is not permanently attached until later



Sensitive Dial Indicator

BUILT FROM
ALARM-CLOCK PARTS

By
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To make the pointer pivot on the center line, it may be necessary to drill new bearing holes for the smallest gear as indicated in Fig. 9. Be sure they are smooth and accurately aligned. Drive a small brass block on the shaft and clinch the inner end of the hairspring in a $1/32$ " hole drilled into it. The outer end of the hairspring is secured by means of a wedge in a slotted block soldered to the frame as shown in Fig. 3 and in the drawings. To the gear itself solder a bit of thin rod or tubing bent at a right angle to project above the frame and carry the pointer.

The case studs on both sides of the largest gear are replaced with new ones long enough to secure the clamping bar to the frame. A transverse bushing for the pick-up pin, made of $1/8$ " inside-diameter brass tubing, is soldered to a spacer of the same material that is slipped over one of the studs.

About three fifths of the largest gear is cut away. The brass pick-up lever is soldered

to the remaining segment as may be seen in Fig. 4. This lever is long enough to bear against the stud.

Assemble the mechanism with the clamp bar in place. Pull the hairspring taut enough to hold the pick-up lever against the stud, and wedge the free end of the spring in the slot to hold it so. Cut the pick-up pin from $1/8$ " steel rod, round off both ends, and polish them smooth with fine emery cloth.

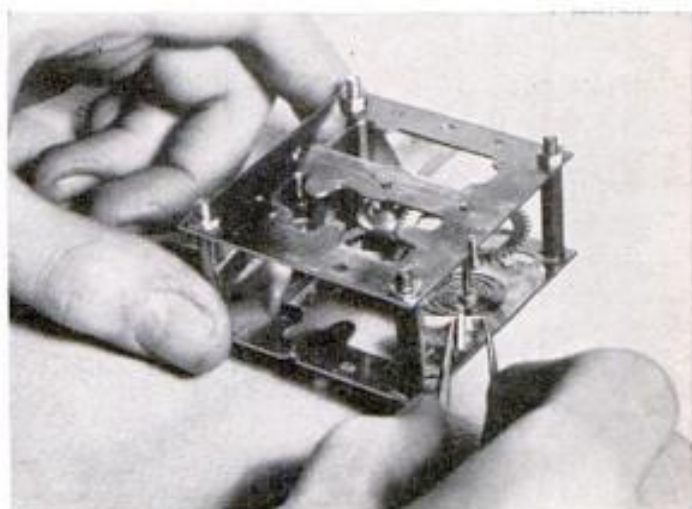
If it is considered necessary to keep the pin from falling out of the bushing, the latter may be slotted and a bit of wire driven into a hole in the pin after it is in place, but the slot must be very cleanly cut to prevent friction. The indicator will, however, work perfectly with the pin left removable, as shown.

Cut the parts of the cover from thin sheet metal and solder it up from the inside. A paper pattern helps in locating the holes for the studs and the position of the curved slot. Four additional brass nuts threaded on the studs hold the cover in place. Figure 5



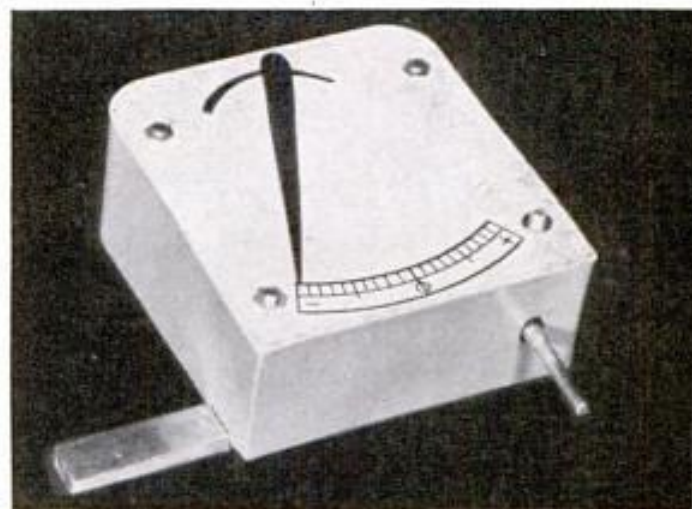
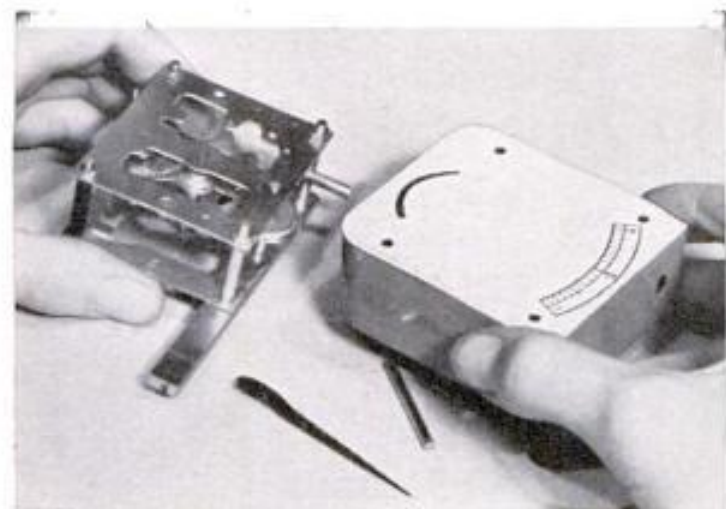
2 You will need the frame, the three largest gears, and the hairspring. Play between the teeth does no harm; the spring will take it up

5 The case is made of sheet metal, with holes to fit the studs and a slot for the pointer bracket. A separate cover plate is used beneath



3 After the parts are assembled as described in the text, the hairspring is drawn taut and its outer end fastened by means of a small metal wedge

6 Use cardboard, white celluloid, or metal for the dial face, which also fits over the studs. The scale is drawn on in ink, engraved, or etched

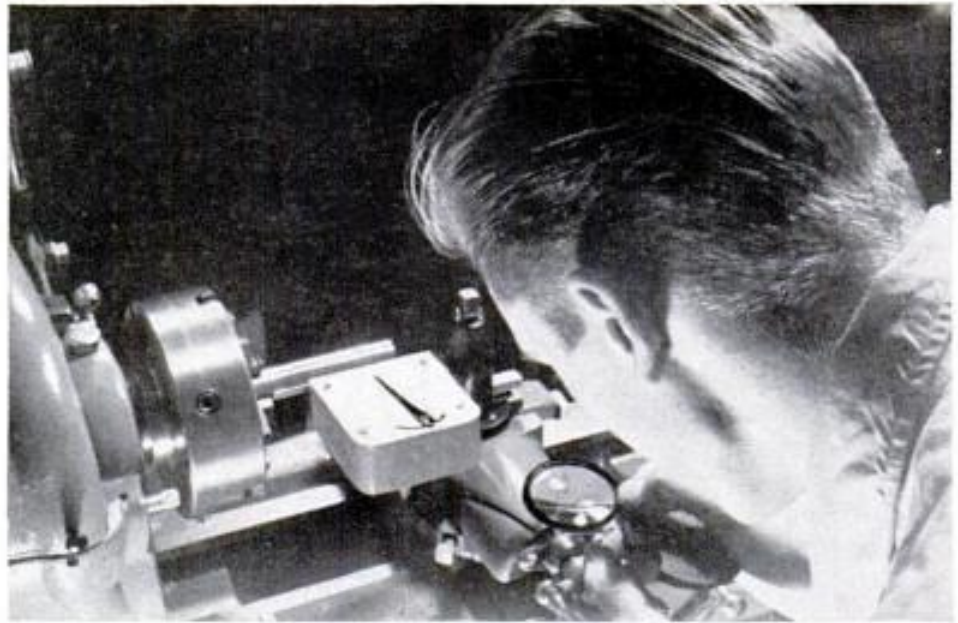


shows the latter all ready to be mounted on the mechanism.

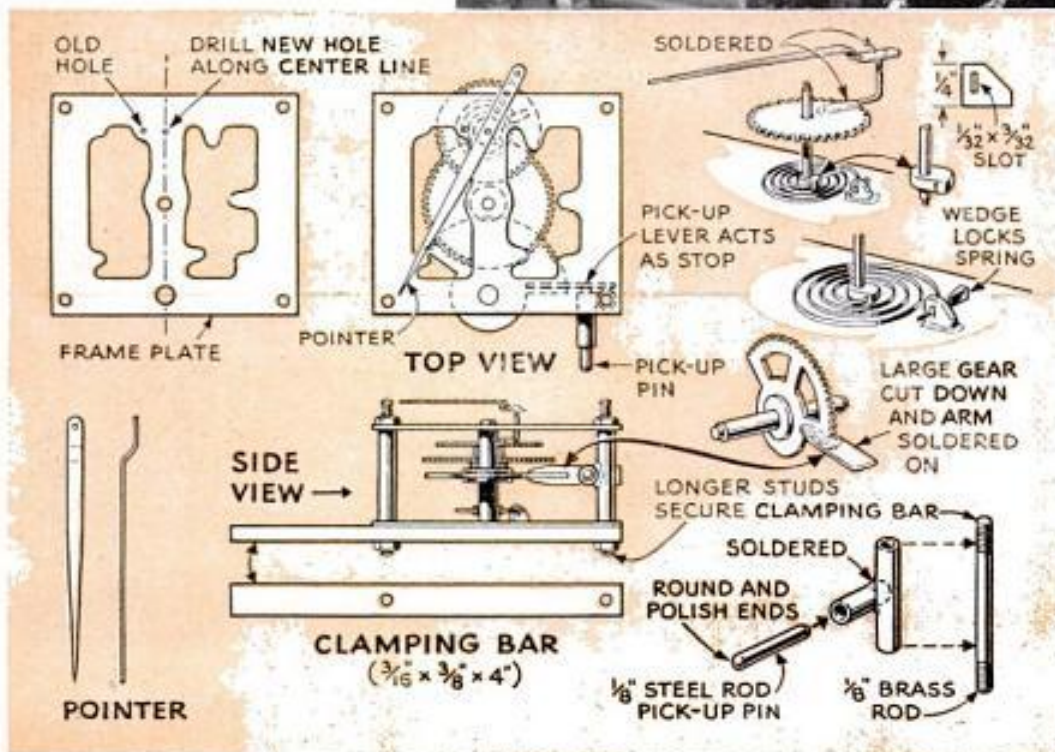
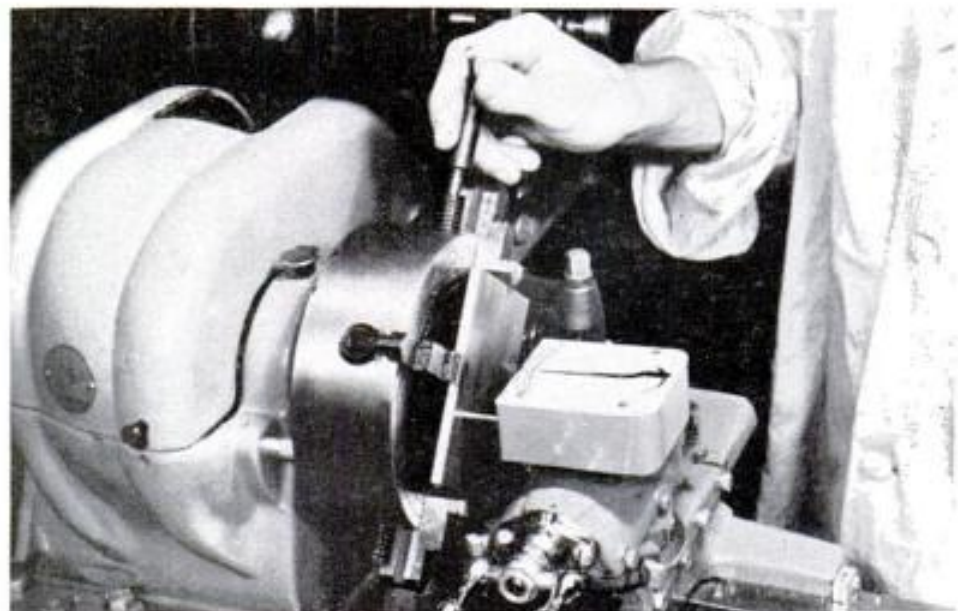
Solder the pointer to the bracket pin so that it rests at one end of the scale; then mount the indicator in the tool post of the lathe to bear against a piece of stock in the chuck with the pointer over the mid-point of the scale. Advance the indicator against the stock .001" at a time by means of the calibrated sleeve on the cross-feed (Fig. 7). Make a temporary mark under the pointer at each setting. Repeat the process on the other side of the scale by withdrawing the indicator from the stock.

This method of calibration should be repeated several times to achieve maximum accuracy. Finally, ink in the scale markings (Fig. 6) and paint the case gray or any desired color.

In using the indicator, set it against the work so that the pointer rests over the mid-point and revolve the stock slowly by hand. The pointer moves to one side or the other to indicate any eccentricity.



7 Our finished indicator is calibrated on the lathe. Repeat the process several times, using a magnifier for greater accuracy



8 Above, the finished indicator being used to check a plate mounted in a four-jaw chuck. For between-center work turn it to position shown at top of page

9 Although details of various clockworks vary, these diagrams show the main changes to be made. Be sure the pick-up pin works freely and is smoothly polished