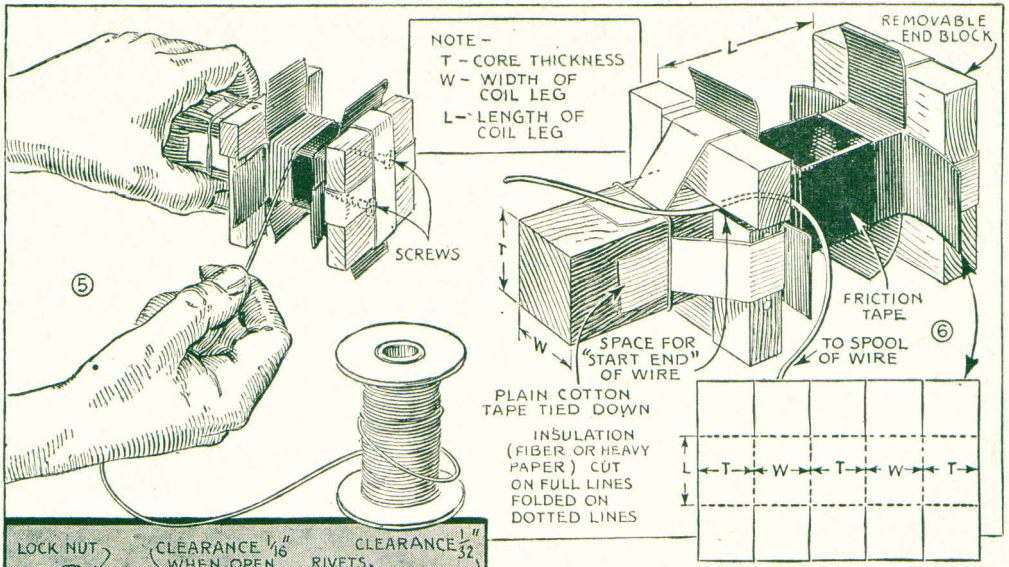
Electric VIBRATING "PENCIL" tools soft metals

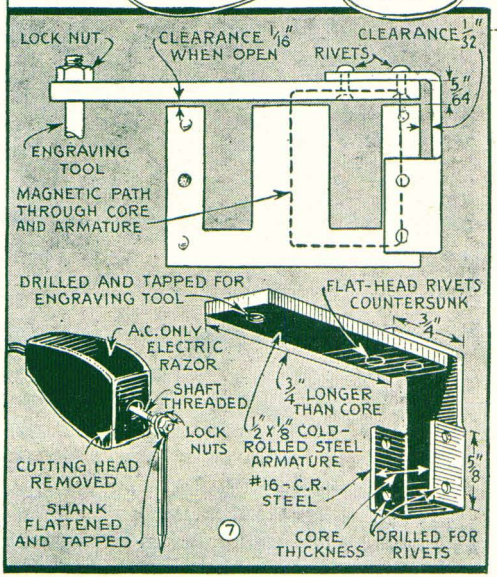
By C. A. Crowley

THIS handy engraving "pencil" engraves name plates, initials tools, lays out metal templates, and is useful for tooling craftwork of all kinds. It operates on 110-volt 60-cycle alternating current, and will not work on direct current.

An electromagnet is the heart of the tool. Its core consists of E-stampings from an old audio-frequency radio transformer, dimensions of which are shown in Fig. 3, although these are not extremely critical. The number of turns required for the coil is equal to 493 divided by the cross-sectional area of the core. The cross-sectional area of the core is the width of the center leg on which the coil is to be wound, multiplied by the thickness. In the case of the core shown, the center leg is .25 sq. in. The number of turns required is, therefore 493 divided by .25, or 1972.

The wire size is calculated from the length of the magnetic path, as shown in the upper detail of Fig. 7. The wire size in circular mils is found by multiplying the length by 50,000, and then dividing by the number of turns. For a magnetic path of 3¼ in., the wire size required is 3.25 times 50,000, divided by 1972, or 82.5 circular mils. The required gauge number is then found from any magnet wire table, which will show that No. 31 has an area of 80 circular mils, and No. 30 has an area of 101 circular mils. In such a case, the larger





size (lower gauge number) should be chosen. The coil will, therefore, be wound with 1972 turns of No. 30 enameled wire. As most audio-frequency transformers are close to the dimensions given, No. 30 wire is satisfactory, but where a heavy-duty outfit is to be built from larger E-stampings, larger wire will be necessary.

The coil is wound on a wooden form as shown in Figs. 5 and 6. The form should be slightly larger than the leg on which the coil fits, and should also have a slight taper toward the end, so that the finished coil can be slipped off readily after removing the two screws that hold the end plate. Strips of plain cotton tape (not friction tape) are laid endwise on the four sides of the form, and then fiber insulation or heavy brown paper, cut to the pattern shown in Fig. 6, is laid over the form and held in place with a single band of friction tape. Wind the coil tightly and evenly, avoiding all kinks. When the coil is finished, tie the cotton tapes tightly over the coil and remove the coil from the form. Wrap a single band of friction tape around each side of the coil. The leads from the coil should be soldered to a suitable length of lampcord, and the soldered joints taped. Then the coil can be slipped on the core and held in place with a small wood wedge.

The armature assembly shown in Figs. 4 and 7 is constructed of cold-rolled steel. The armature is fastened to its bracket with two flat-head rivets, countersunk in the armature. Clearances and dimensions specified should be followed carefully.

Engraving tools can be made of ⅛-in. or larger drill rod. The tips can be ground to various shapes, as shown in Fig. 2. After rough-grinding to shape, the ends should be hardened by heating to a straw yellow color and plunging the cutting end only into cold water. After hardening they are finish ground. The shank of the tool can be threaded and screwed into the end of the armature; a lock nut and lock washer are used to hold them firmly. If only a sin-

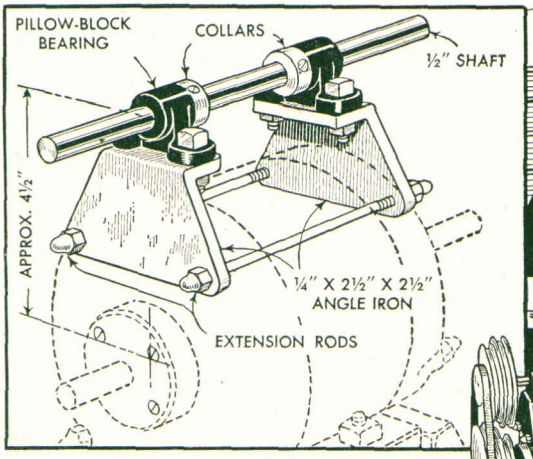
gle engraving bit is to be used, it can be held permanently in place by peening.

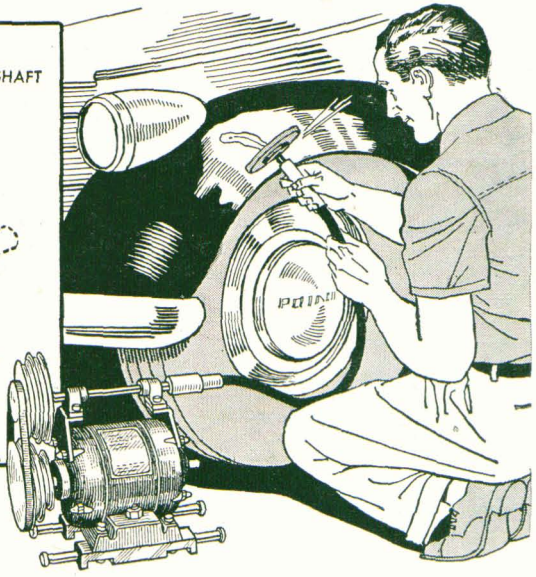
The completed tool can be mounted on a semi-circular wooden block, and placed inside a fiber tube. See Figs. 1 and 4.

Another way to make a simple engraving tool is to take an inexpensive vibrator-type (labeled a.c. only) electric razor, of the kind which contains an electromagnet instead of a motor. See the left detail of Fig. 7. Remove the cutter head from the shaver and, if necessary, saw off the end of the Bakelite case. An engraving tool can be attached to the vibrating shaft of the shaver.

One way to do this is to swage the shank of the tool flat, and drill it to fit the shaft. It can be held in place by peening, or the shaft can be threaded and the tool tapped and held with a lock nut.

Jackshaft on Motor Makes Variable-Speed Unit





You will find many uses for this compact motor-and-countershaft unit, which consists of a jackshaft mounted on an electric motor. The unit can be fastened in a fixed position for driving power tools, such as metal-turning lathes, drill presses, etc., where various speeds are required, or it can be carried about for operating a flexible shaft as shown. By using two 5-in. cone pulleys and a motor of 1,750 r.p.m. on the original unit a speed range of 700 to 4,375 r.p.m. was obtained.

Pillow blocks serve as bearings for the shaft, and they are bolted to angle-iron supports, which are attached to the motor by placing them under the nuts of the tie rods that hold the motor housing together. In some cases, it may be necessary to substitute longer tie rods for the original ones.

—Kent H. Alverson, Niagara Falls, N. Y.

Small Paper Cups Have Many Uses in the Home Workshop

An inexpensive convenience in your home workshop is a supply of small paper cups. They are particularly handy when doing small jobs of finishing, or in mixing paints and stains. When tin cans are used for this purpose they always must be cleaned for the next job, and frequently bits of skins or traces of the old color remain. But paper cups are merely thrown away when a job is finished. Labels and measures can be marked on them easily with a pencil, and liquid levels show clearly through the translucent sides.

¶To remove rust from the flutes of an auger bit use a small rope which is coated with glue or shellac and sprinkled with fine emery.