

Adjustable GROWLER

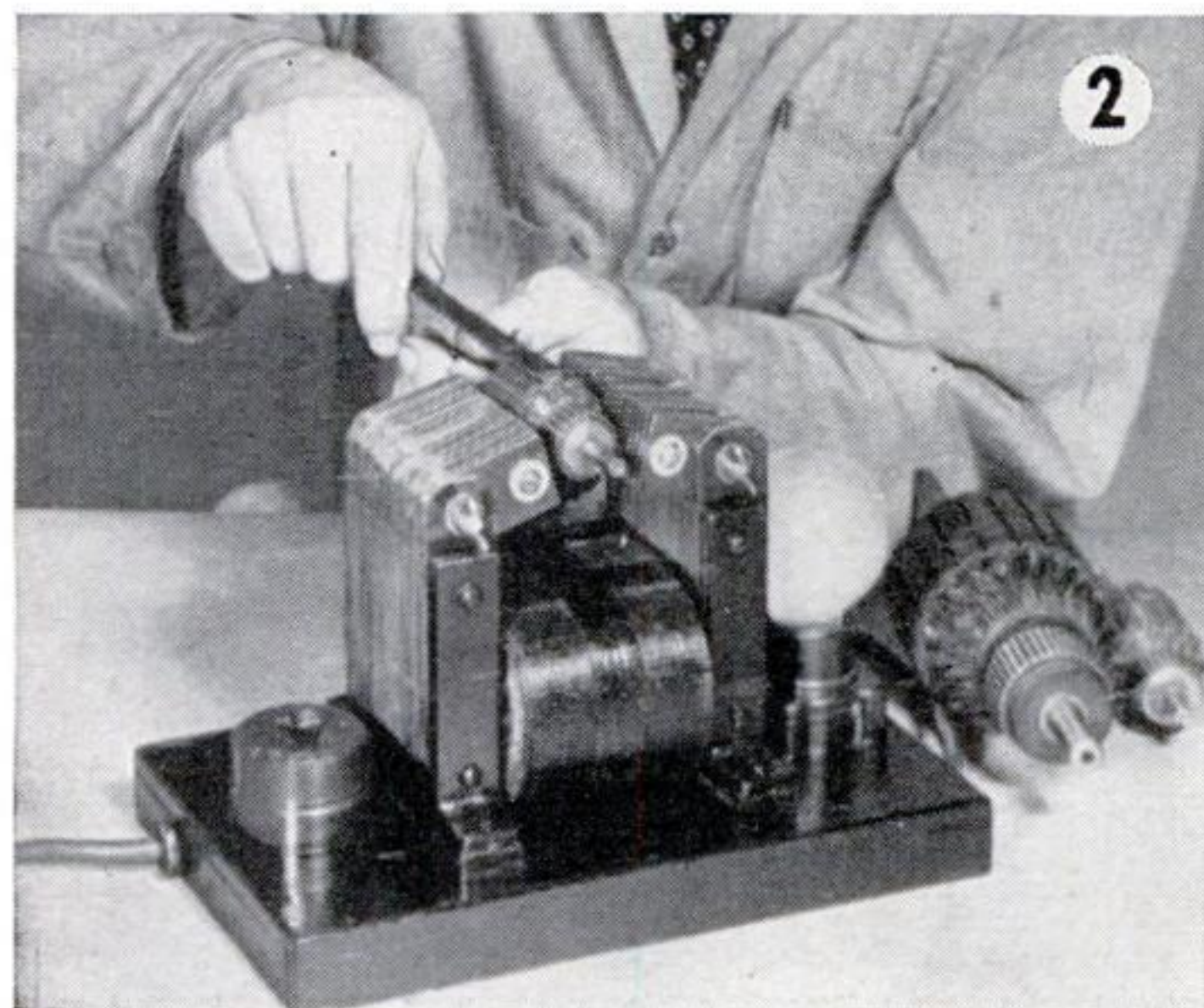
*Tests Large and
Small Armatures*

By HAROLD P. STRAND

FOR testing the armatures of vacuum-cleaner, electric-drill, or other commutator-type motors, "universal" fans and motor-driven kitchen appliances, and automobile starters and generators, what is called a "growler" is generally used. With this device it takes very little time to find a short-circuited coil, a "short" between coils, and other defects that are not visible to the eye but may cause sluggish operation or possibly complete failure of the motor.

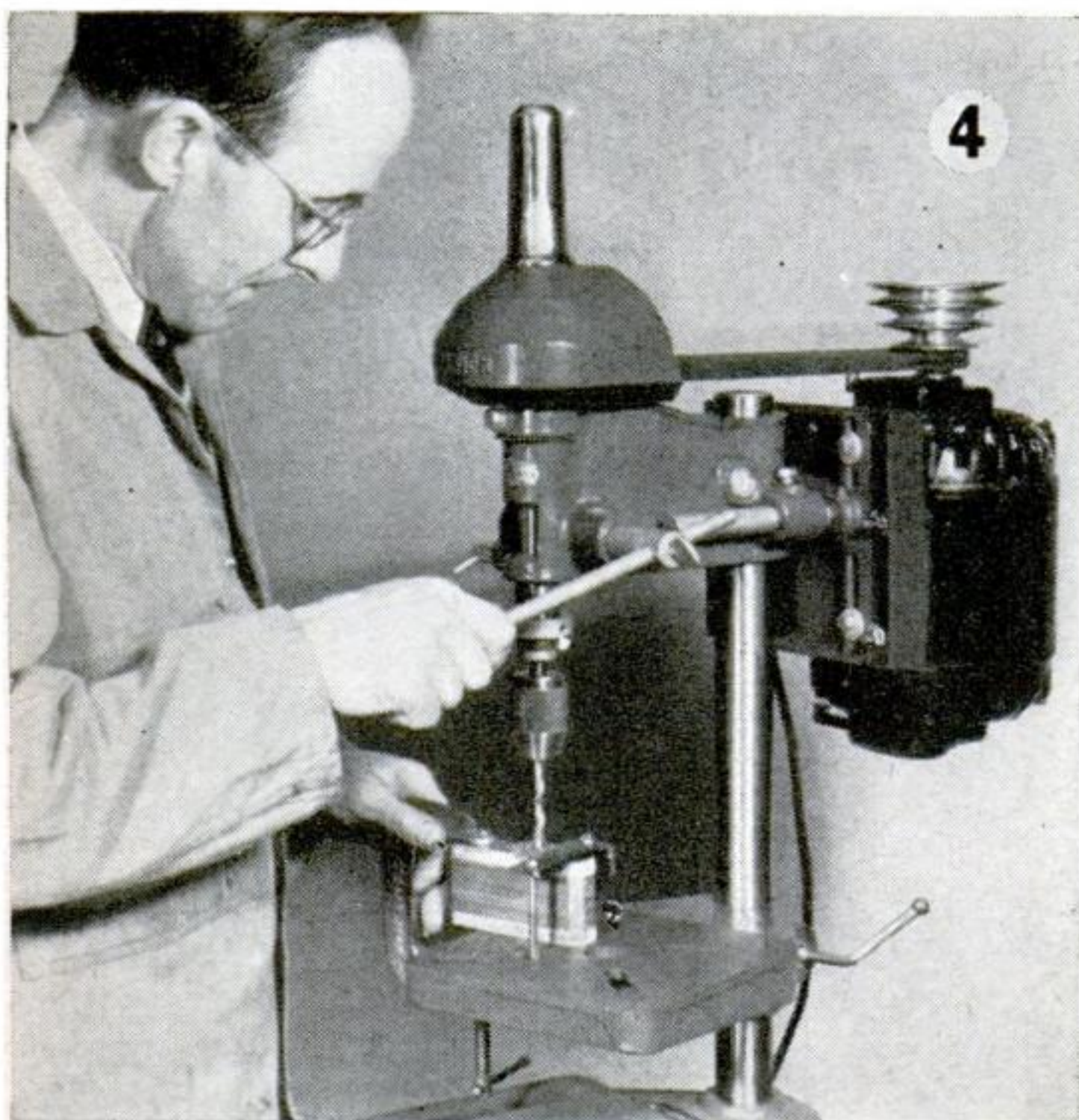
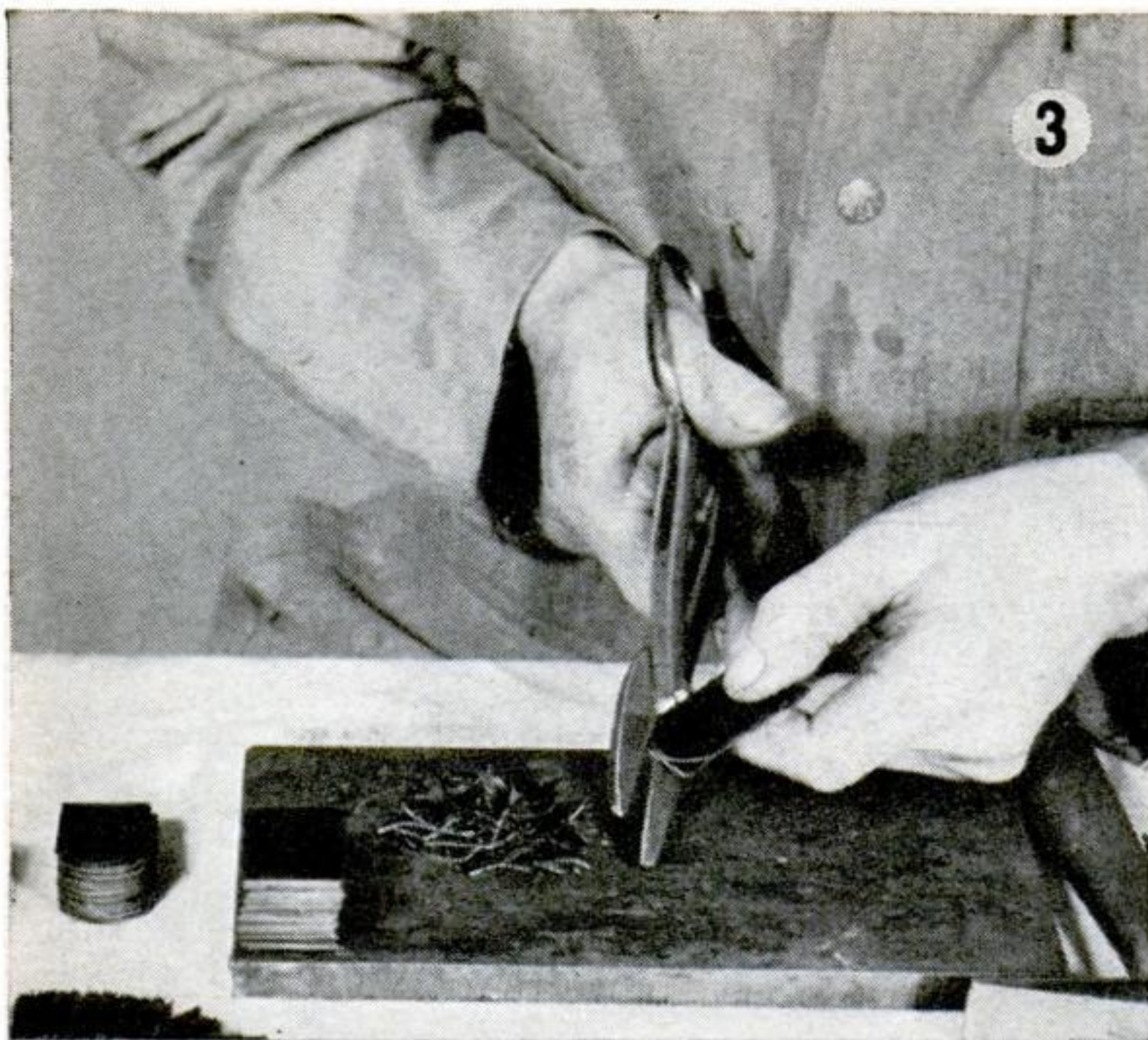
Any armature having commutator bars or segments separated by insulating strips, whether from a direct- or alternating-current motor, can be tested on a growler. It is necessary, of course, to remove the armature and place it on the growler, which, in principle, works much like an ordinary transformer.

The laminated core of the device is open



at the top, forming two poles. A 110-volt A.C. source is connected to the growler winding, and the armature to be checked is placed between the poles so that its iron core closes the magnetic circuit. Now the armature coils act as a secondary winding. A current is induced in them, but cannot flow unless a short circuit exists. If this is the case, an old hack-saw blade or other thin piece of steel will be attracted to the armature core where the defect occurs. If the armature is electrically in good condition, the blade will not be attracted. Fuller directions for the use of the growler will be given later on.

Besides being of the most efficient design, the shopmade growler illustrated has the great advantage of being adjustable. It will accommodate armatures from about $1\frac{1}{4}$ " to 5" in diameter (see Fig. 1 and Fig. 2). This is possible because the ends of the laminated poles are hinged in such a way that they can be moved to vary the gap between them. Because of its wide range, the growler should be found very useful in the electrical repair shop. Even the home mechanic who does not intend to rewind armatures himself will find it convenient for diagnosing motor troubles quickly. Its usefulness in the com-

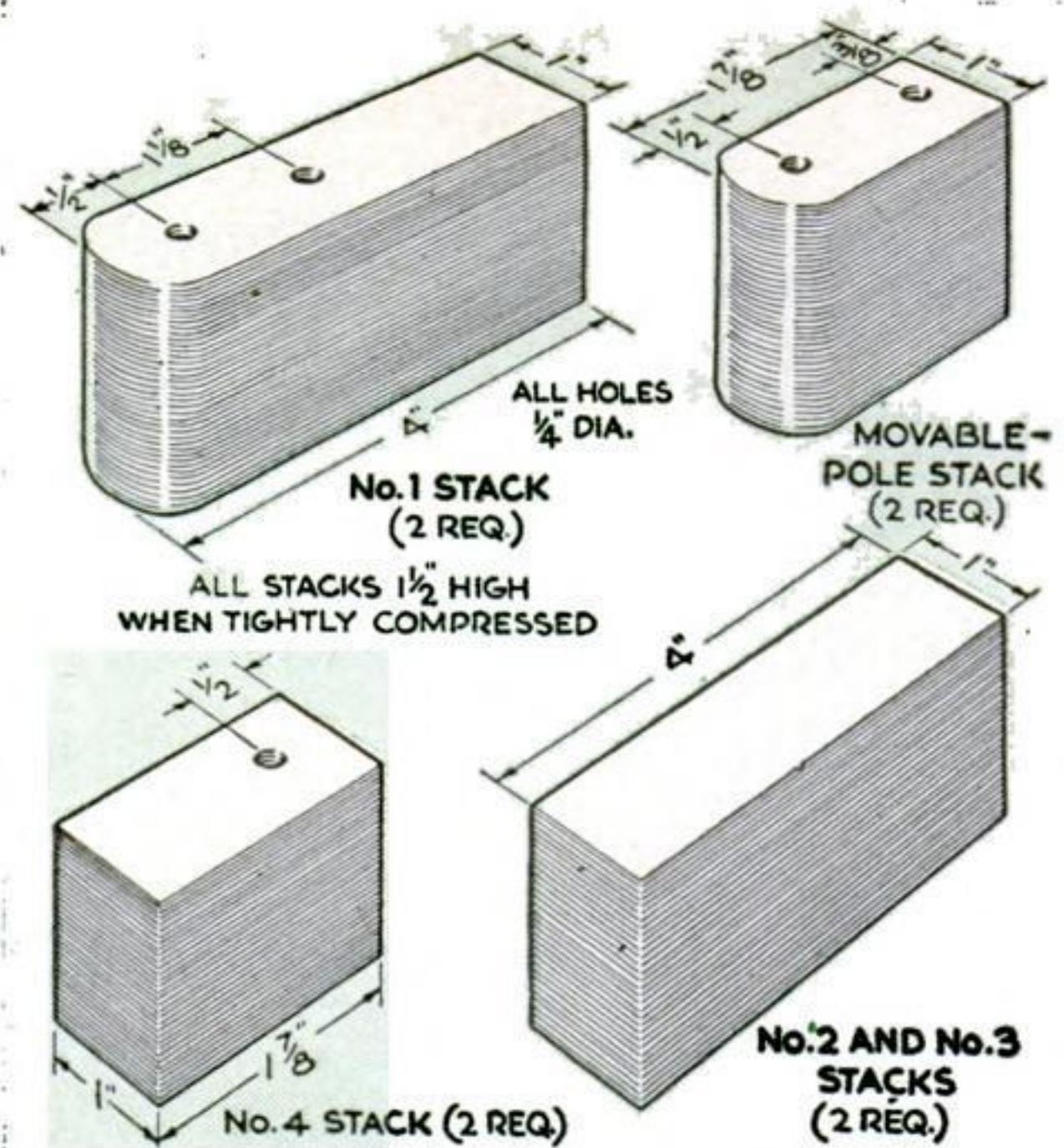


mercial garage is, of course, quite obvious.

To make the core, have a tinsmith cut some 28-gauge black stovepipe iron into strips 1" wide with his foot-power shears. Machine cutting is necessary to insure straight and square edges. About 11 lb. of metal will be required. The strips should then be cut by machine into pieces of the size shown in the drawings. Four stacks of 4" pieces and four stacks of 1 $\frac{7}{8}$ " pieces are required, each stack being 1 $\frac{1}{2}$ " high when compressed tightly.

Using hand shears, round one end of each piece in two of the short and two of the long piles. One carefully shaped piece may be employed as a template for cutting the others (Fig. 3).

The holes must be accurately located and carefully drilled, as any inaccuracy here will cause difficulty in assembling the core.



Each stack may be clamped between two pieces of $\frac{3}{8}$ " thick hardwood, cut to the same size as the laminations. Tap the metal pieces to align their edges and secure them to the drill-press table. One of the side irons, two of the 4" stove bolts, and a C-clamp may be used for this, as shown in Fig. 4.

Check the stack carefully to see that it is precisely square with the table. Use a new drill, preferably one made of high-speed steel, at the lowest speed possible. Avoid forcing it, which may tear the sheet iron.

LIST OF MATERIALS

- About 11 lb. of 28-gauge black stovepipe iron
- 3 $\frac{1}{2}$ lb. of No. 15 S. C. E. (single cotton, enamel) magnet wire
- 4 pc. 4 $\frac{3}{4}$ " by $\frac{7}{8}$ " by $\frac{3}{16}$ " soft steel or iron
- 6-4" by $\frac{3}{16}$ " roundhead stove bolts
- 2 pc. 3 $\frac{1}{2}$ by $\frac{3}{16}$ " brass rod
- About 90 iron washers, $\frac{3}{16}$ "
- 4-1" by $\frac{3}{16}$ " roundhead stove bolts
- 1 surface lamp receptacle
- 1 surface-type toggle switch
- 2 composition bushings, $\frac{3}{8}$ "
- 8' No. 18 two-wire rubber-type SJ (constant service) cord
- 6' No. 18 flexible insulated wire
- 10" No. 10 rubber-covered solid copper wire
- Miscellaneous: small pieces of $\frac{1}{2}$ " or $\frac{3}{8}$ " oak, maple, or plywood; attachment plug cap; varnished cloth; wing nuts and hexagon nuts; screws; paint; rubber tubing.