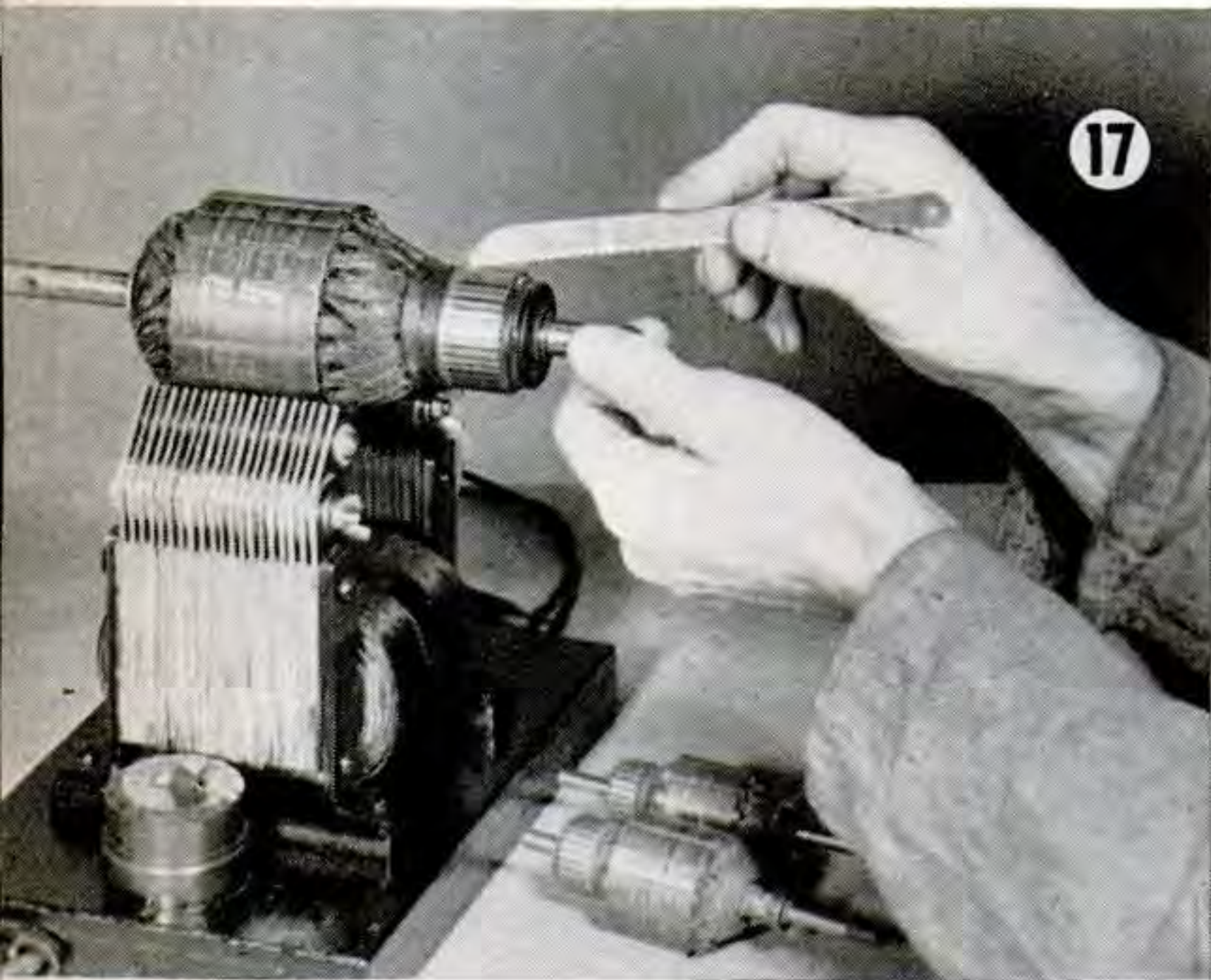


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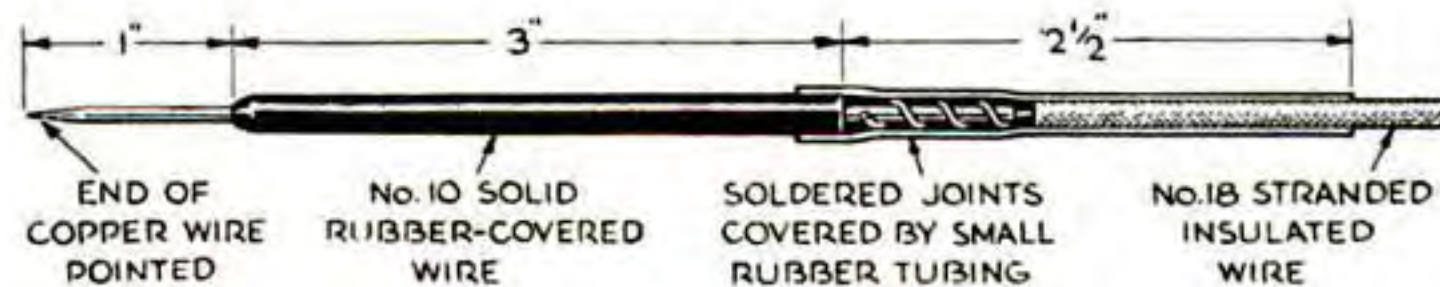
is short-circuited or there is a short between coils.

Before deciding upon a rewind job, examine the commutator. The bars may be deformed enough at one or more points, due to long wear, to bridge the mica-insulated gap between them. Particles of copper or of carbon from the brushes may have lodged in these gaps. To remedy either condition, undercut the mica at each gap slightly with an old hack-saw blade as shown in Fig. 17. Grind one end of the blade off, and grind back both sides of the toothed edge to remove all set and reduce the thickness. Use the blade with the rake of the teeth toward you, so that it cuts on the backstroke. This operation should remove all deposits, and the armature should then be tested again.

If the insulation between the bars is already deeply cut, it may be advisable, after the final test, to fill the gaps with a paste made of powdered mica and water glass or shellac. When this has hardened, undercut each division slightly and smooth up the commutator in the lathe with fine sandpaper. Should the armature still fail on test after undercutting, check the coil connections to each commutator segment for shorts between the leads, and see that all are tightly soldered and that no shorts exist between the risers.

To continue testing the armature on the growler, bridge the two adjacent bars at the top of the commutator with a tool or short piece of thick wire and turn the armature until all the bars have been at the top and have been tested in this way. A spark should be obtained on each pair. A low-reading A.C. voltmeter may be used for this test, and should give the same reading across all pairs. No spark or voltmeter reading indicates a short between coils or a short-circuited coil, or else a short between commutator bars. A low reading may indicate the same faults, but a high reading or an unusually heavy spark between two bars means an open circuit. A 75-ohm telephone receiver may be touched across the bars for this test; the same hum should be heard across each pair. If the pitch is lower at one point, a short circuit is indicated; if higher, an open circuit.

Many repair men test for a grounded winding before using the growler, as a ground may invalidate other tests. With the growler current shut off, touch one test prod to the



shaft and the other to the commutator. If the series lamp lights, there is a ground in the armature and it will be necessary to unsolder all the leads from the commutator risers in order to test the winding and the commutator separately, thus determining which is grounded. Figure 18 illustrates this test being made.

Armatures from repulsion-induction A.C. motors also may be tested, but as they are fitted with various short-circuiting devices necessary to their operation, care must be taken that these are not bearing on the commutator during the tests just outlined. Such automatic contacts are usually fitted inside the hollow of the commutator, and should not touch the latter when the armature is at rest. As the motor gains speed, a centrifugal governor pushes them out to short-circuit the commutator at the same

time the brushes are lifted off the latter, so that the motor continues to run as a squirrel-cage induction motor. Check the moving parts for dirt or pitted surfaces that might cause them to stick in operation, and see that the contacts cut in and out as they should.

Because of the relatively large amount of copper and iron in its core, the growler does not draw an excessive amount of current even with no armature in place. It may therefore be used for demagnetizing tools and watches. Simply move the article between the poles, allowing it to touch neither of them, and any permanent magnetism will disappear. The current draw on such an open magnetic circuit is about 4 amperes; with a small armature in place it is about $2\frac{1}{2}$ amperes, and with the large one shown, it is only 2 amperes.



Small Rubber Band Keeps T-Square from Sliding

WHEN used on an inclined drawing board, a T-square is likely to slide down at inconvenient moments, causing delay and annoyance, and perhaps smudging wet ink on a finished drawing. This can be prevented by slipping a rubber band on the blade as shown. The additional friction is enough to keep the T-square from slipping, yet it can be moved up and down the board with a light touch of the fingers.—BRIAN A. LOVERIDGE.

ELECTROPLATING, PART 7

[ELECTRICAL]

Plating will not adhere to work that is not chemically clean; any trace of grease, tarnish, or oxides will result in a spotty deposit or one that will peel during subsequent handling. After washing the work with benzine to remove most of the grease film, it should be scrubbed in a hot solution of soapsuds fortified with a little washing soda.

The work may also be cleaned electrically by suspending it, as if it were the cathode, in an iron container which serves as the anode, with the following solution: 1 gal. water, 3 oz. lye, and 5 oz. laundry soap chips. The brass rod from which the work is suspended must, of course, be insulated where it rests on the edges of the iron container.

No rheostat is required in the circuit, but use a double-pole, double-throw switch connected so as to reverse the current, which is used full strength. First throw the switch to make the work the cathode. A quantity of hydrogen bubbles will then be generated around the work. After three minutes, reverse the switch for *only five seconds* to dispel the hydrogen bubbles.

Do not handle the work with bare hands after it has been cleaned. Rinse with water. If this flows over the entire surface, without dry spots, it indicates that all grease has been removed. If the work appears not to have been entirely cleaned of oxides, it should be pickled before being transferred to the plating bath.

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