To Remove the Motor From the Machine

Take out screw (F, Fig. 12) and remove the three-pin terminal (E) from the terminal bracket.

Disconnect motor leads from the three-pin terminal. Remove balance wheel as instructed on page 21.

Take out the two screws (A) and remove, from the machine, motor frame with motor attached.

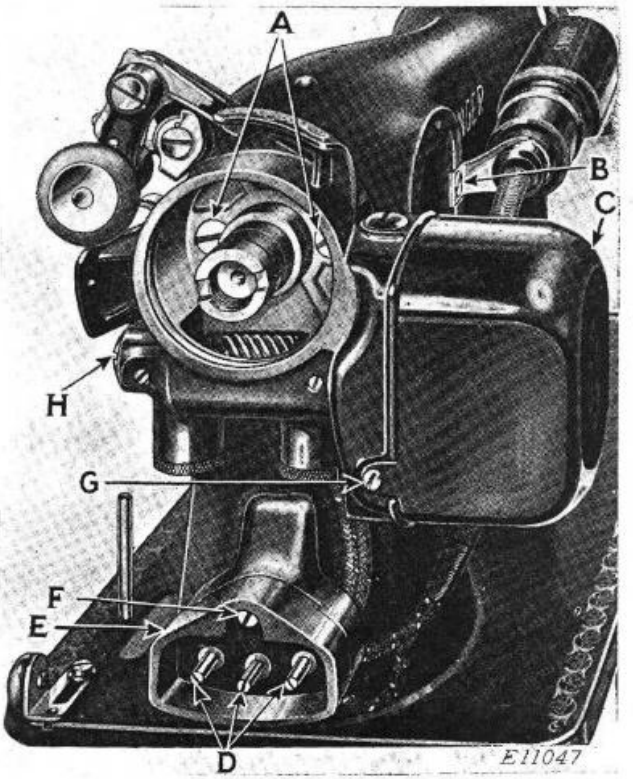

FIG. 12. MACHINE AND MOTOR (BALANCE WHEEL REMOVED)

To Disassemble the Motor

Remove Motor Cover. Loosen the two screws, one of which is shown at (G, Fig. 12) and remove motor cover (C, Fig. 12) by pulling, and at the same time, rocking it up and down slightly, being careful to prevent inside of cover damaging the field coils.

Remove Brushes. Take out screw caps (M, Fig. 14). When screw caps are removed, the brush springs may protrude from the screw holes, and brushes can then easily be withdrawn. However, should difficulty be experienced in removing the brushes, this can be done conveniently after removal of the armature in accordance with "Remove Armature" following. It is advisable to mark the brushes at (P1 and P2, Fig. 14) to make sure that they will be replaced in the same relative position as before removal.

Remove Armature. Remove the brushes in accordance with preceding paragraph. Loosen the two set screws (E, Fig. 13) in

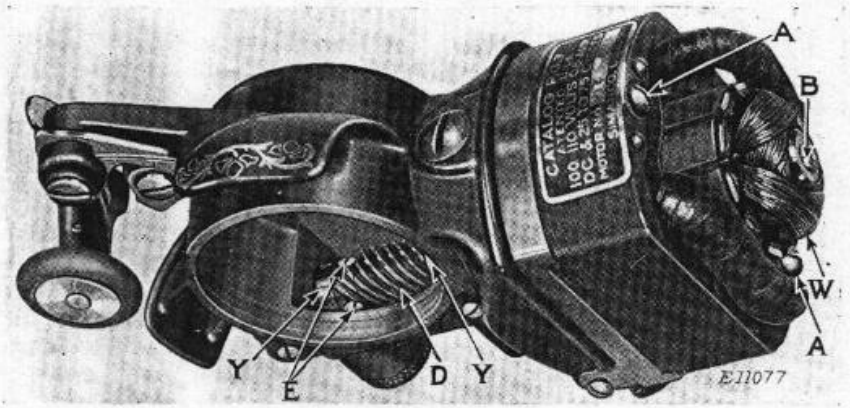

FIG. 13. MOTOR WITH COVER REMOVED

the spiral gear (D, Fig. 13) so that the armature shaft can be withdrawn from its bearings. Remove the armature (W, Fig. 13).

Inspect and Clean the Armature. Inspect the armature winding, making sure that the enamel insulation on the winding is not damaged. Damage to the enamel insulation will prevent proper operation of the motor. If any wires are broken, bare or burned, return the complete motor to the factory for repairs.

If wiring is not damaged, clean commutator (V, Fig. 14) with a dry, clean cloth before assembling motor. If it is impossible to get the commutator bright by this means, use an ordinary rubber eraser. **Never use anything else on a small motor commutator.**

Remove the Field Core with Coils—Loosen the two screws (A, Fig. 13) and remove the field core (S, Fig. 14) from the commutator end cover which, in this case, is part of the motor frame. The removal of the field core must be done carefully to prevent damage to the field coil insulation, and to prevent strain at the soldered brush tube connections (R, Fig. 14).

Clean Brushes and Brush Tubes. Thoroughly clean the carbon brushes (O, Fig. 14), inner walls of brush tubes and inside of end covers, with a dry, clean cloth.

Inspect Wire Connections to Brush Tubes. Examine both field wire connections (R, Fig. 14) at the brush tubes. If broken, these connections should be securely soldered to the lugs of the brush tubes. Any loose strands of wire should be cut off.

Remove and Replace Brush Tubes. After the brushes and brush tubes have been cleaned, the brushes should slide freely in the brush tubes. If they do not, the brush tubes should be replaced by new ones. The new brush tubes must be replaced in the same manner as the old tubes, viz., firmly positioned in the insulating bushings (Z, Fig. 14), and with the field leads properly soldered to the lugs of the new tubes, as shown by (R, Fig. 14).

Remove and Replace Insulating Bushings. If the threads in the insulating bushings (Z, Fig. 14) and on screw caps (M, Fig. 14) become stripped, these parts should be replaced by new ones. When these bushings require replacement, the brush tubes also should be replaced with new ones. Do not attempt to use the old brush tubes in the new bushings. Loosen the two screws at (Q, Fig. 14) to release the bushings (Z, Fig. 14). When the new bushings are in place, tighten the screws (Q, Fig. 14).

To Reassemble the Motor

Replace Field Core with Coils. After the insulating bushings are replaced; the field coil wires properly soldered to the brush tubes as shown at (R, Fig. 14) and brush tubes in place in insulating bushings (Z, Fig. 14), put field core (S, Fig. 14) in place on commutator end cover, being careful not to damage field coil insulation. When the field core is properly seated on commutator end cover, insert and tighten screws (A, Fig. 13).

Replace Armature. Before replacing the armature, make sure that the wires from the field coils to the brush tubes are safely positioned. Observe the wires through the field coils while the motor cover and armature are removed. If the wires are not properly placed (to avoid contact with armature or commutator) they can be reached through the field coils, with cover and armature removed.

When the armature was removed, as instructed on page 17, the spring-pressured grease wick for each of the two bearings (Y) projected into the shaft bearings. Therefore, before replacing the armature and shaft, remove the two grease wicks in order that armature shaft may be inserted in its bearings without damage to the wicks. To do this, remove cap screws (A, Fig. 15) and, using a small screw driver, carefully remove the grease wick spring retainer, together with grease wick spring and grease wick from each grease cup.

On the outer end of each grease wick retainer is a small tab the purpose of which is to hold the wick spring in place. **Do not**

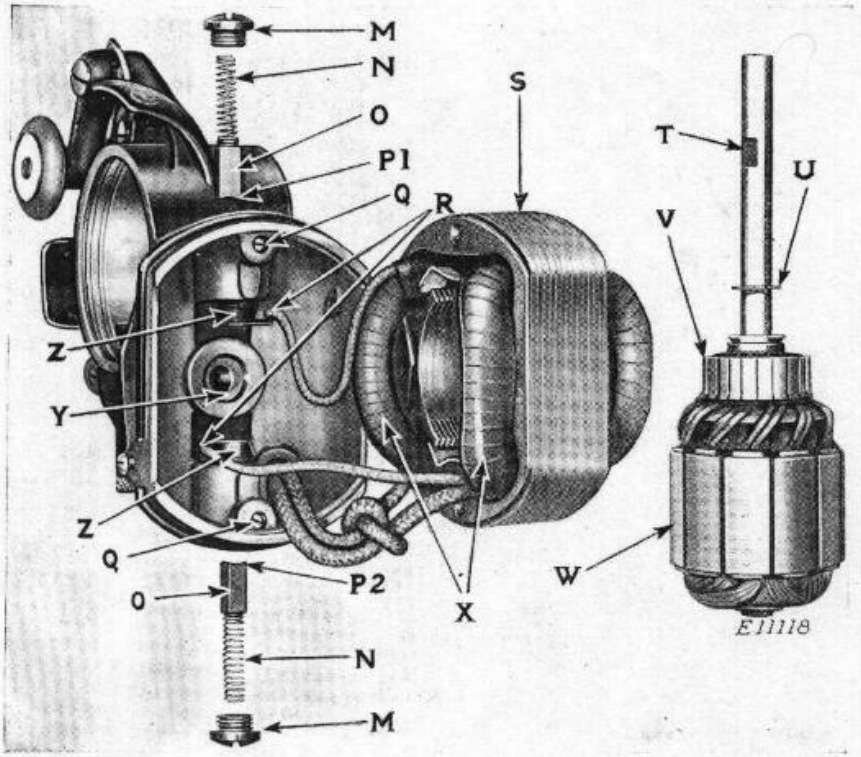

FIG. 14. MOTOR DISASSEMBLED

bend up these tabs to remove the wicks, as the tabs are very likely to break off at any attempt to bend them.

Put the spiral gear in position between the two bronze shaft bearings (Y, Fig. 13), having the two set screws (E, Fig. 13) toward the cap screw (H, Fig. 12) in order that one of the two screws (E) can engage the "flat" (T) on the armature shaft. Insert armature (W) so that the fibre washer (U) is against the first of the two shaft bearings (Y, Fig. 14).

When armature shaft is in place in its bearings and through spiral gear (D, Fig. 13), the "flat" (T), against which one of the two set screws (E, Fig. 13) is to be tightened, is covered. Its position is, however, indicated by the "flat" at (B, Fig. 13) at the cover end of the shaft. Be sure that one of the two screws (E, Fig. 13) engages the "flat" (T), then tighten both screws (E).

Replace the grease wicks, making sure that the inner ends of the wicks are against the armature shaft. Then put the grease

wick spring retainers in place in the grease cups, having the tab, at the outer end of each retainer, over the outer end of the grease wick spring. Fill the grease cups and replace cap screws (A, Fig. 15).

Replace Brushes. When inserting the brushes in the brush tubes, make sure that their concave ends (P1 and P2, Fig. 14) correspond with the convex surface of the commutator, and that they are replaced in the same relative position as before removal. See "Remove Brushes," page 16. Hold end of brush spring and tap the brush against the commutator until contact is clearly heard. Then insert and tighten the two screw caps (M, Fig. 14), being careful not to strip the threads.

Attach Motor, Three-Pin Terminal and Singerlight

Place motor frame, with motor assembled, on its seat on the machine arm, and insert and tighten the two screws (A, Fig. 12). Attach three-pin terminal to its bracket by inserting and tightening screw (F, Fig. 12). Attach Singerlight to machine arm by inserting and tightening screw (B, Fig. 12). Replace arm side cover. Replace the balance wheel as instructed on page 21.

To Lubricate the Motor

Remove the two thumb screws from the two grease cups (A, Fig. 15) and clean out the interiors of the cups. Insert the tip of motor lubricant tube into grease cups, as shown in Fig. 15, and squeeze about a quarter of the tube of lubricant into each cup, then replace and tighten the thumb screws.

Never, under any circumstances, use oil in the grease cups or on any part of the motor. Grease will remain in the bearings, but oil works its way onto the commutator and brushes, causing most of the troubles experienced with small motors—slow speed, failure to start, overheating, smoking, etc. These troubles may be remedied by removing the oil from the commutator, brushes and inner walls of brush tubes.

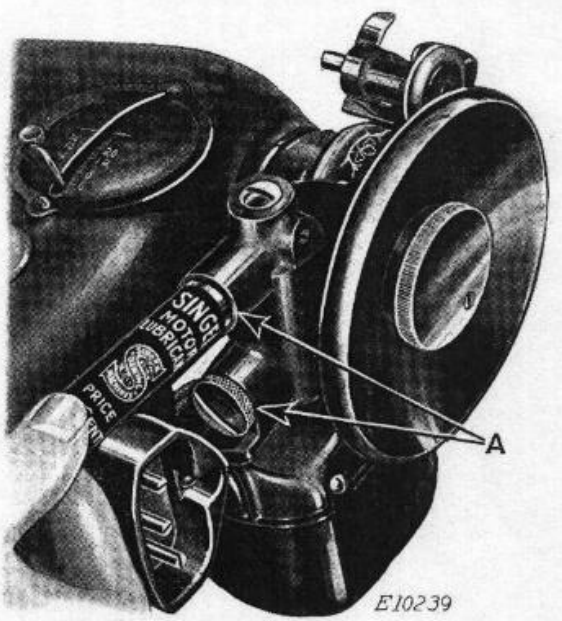

FIG. 15. LUBRICATING MOTOR