Hook a spring balance in the hole on the cross-head (into which the pin on the connecting rod normally locates) and withdraw the rack with the balance. The maximum permissible force required is 6 lbf (2.72 kgf).

Badly kinked or flattened tubing must be replaced and any bends of less than 9 in (228 mm) radius must be reformed. Examine the cable rack for signs of damage to the helix.

Checking Wheelboxes

Check the wheelbox spindles for freedom of rotation. Seized units, or those suspected of having damaged gear teeth, must be replaced.

(b) Dismantling the Motor

Withdraw the four gearbox fixing screws and lift off the cover.

Remove the circlip and flat washer securing the connecting rod to the crankpin.

Withdraw the connecting rod, taking care not to lose the second flat washer positioned beneath it on the crankpin.

Remove the circlip and washer securing the shaft and gear.

Before proceeding further, use a smooth file to remove any fraze from the gear shaft. Failure to do this may result in the bearing being scored when the gear is withdrawn.

Remove the gear taking care not to lose the dished washer fitted beneath it.

It is normally unnecessary to detach the crankpin mounting plate — which is an integral part of the gear shaft — from the moulded gearwheel, since these are serviced only as an assembly. However, should the shaft and gearwheel become separated for any reason it is essential, on re-assembly, to observe the correct angular relationship between the crankpin and the slip ring so that correct parking of the blades will be maintained. Fig. 5 shows the two positions (180° apart) in which the crankpin plate can be assembled to the gearwheel to give parking with cable rack fully extended or fully retracted.

Note: Before removing the yoke assembly mark the yoke and gearbox so that it may be re-assembled in its original position. If the yoke is fitted in the alternative position (i.e. 180° displaced), the motor will run in reverse, causing the internal switching arrangement to function incorrectly and possibly damaging the switch contacts.

Unscrew the two fixing bolts from the motor yoke and carefully remove in turn the yoke assembly and armature. While removed, the yoke must be kept well clear of swarf, etc., which may otherwise be attracted to the pole pieces.

Withdraw the three screws securing the insulating plate to which the brushes are attached. The brush assembly is now retained only by the brush cables.

Remove the screws securing the switch plate and cover. The terminal and brush assemblies may now be detached from the unit.

(c) Bench Inspection

After dismantling, examine individual items.

(i) Brush Replacement

Single-speed (2-brush) motors.

Brushes worn to $\frac{3}{16}$ in (4.8 mm) in length must be renewed. Carefully open the rolled tag crimping the cable insulation, release the cable and tear the brazed cable end from the terminal on the switch plate. Remove and discard the worn brush taking care not to lose the brush spring which is loose in the brushbox.

Clean the terminal plate and connect the new brush flexible by soldering.

Two-speed (3-brush) motors.

Observe single-speed instructions for the two main (diametrically-opposed) brushes. The third brush is stepped in section and requires replacing when the narrow section is worn away so that the full width of the brush is in contact with the commutator.

Fig. 3 shows the correct method of fitting the brushes to the brushboxes for both 2 and 3 brush units. It is particularly important to position the third brush correctly.

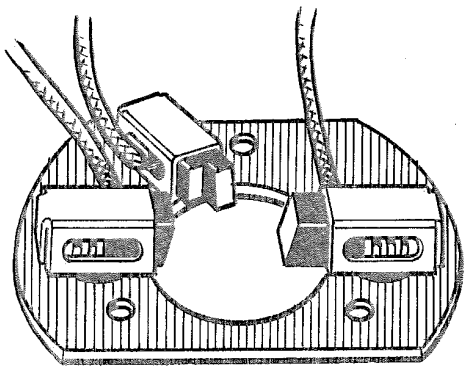

Fig. 3 2-speed motor brush assembly

(ii) Checking Brush Springs

The brush springs can be removed from the boxes once the brushes are held clear.

A good spring will exert a force of 5–7 ozf (140–200 gf) when compressed to 0.158 in (4 mm) in length. Springs which fail to do this should be renewed.

(iii) Testing and Servicing the Armature

Use armature testing equipment to check the armature for open and short circuits.

Test the soundness of the armature insulation by using a mains test lamp (Fig. 4). Lighting of the lamp indicates faulty insulation.

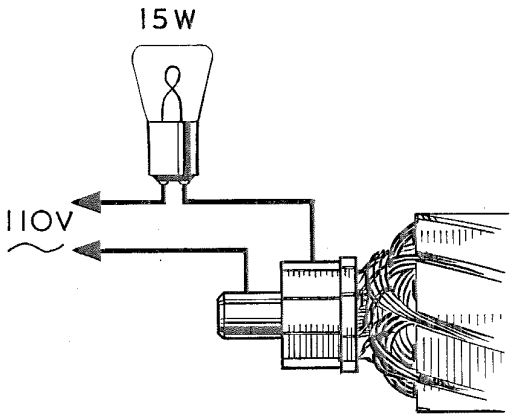

Fig. 4 Armature insulation test

If the commutator is worn, it can be lightly skimmed while the armature is mounted in a lathe.

Afterwards, clear the inter-segment spaces of copper swarf.

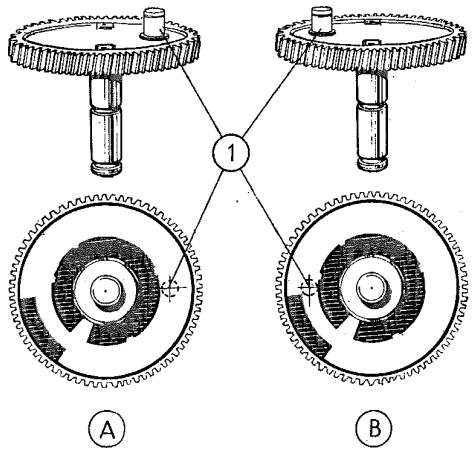

Fig. 5 Alternative positions of crankpin (1) to give

A Parking with cable rack retracted

B Parking with cable rack extended

(iv) Inspection of Moulded Gear

Examine the gearwheel, especially the teeth, for signs of wear or damage. If necessary, a replacement must be fitted.

(d) Re-assembly

This is a reversal of the dismantling procedure described in 4(b).

Take care not to damage the brushes when fitting the armature. Note that the yoke seating rim is slotted to facilitate the passage of the brush flexibles from switch plate to brushboxes.

Lubricate the gear teeth, crosshead and crosshead slide with Ragosine Listate grease. This should also be smeared on the slip-ring on the gearwheel and be liberally applied to the cable rack.

The crankpin should be sparingly lubricated with Shell Turbo 41 oil, as should the wheelbox spindles if they have been removed.

The yoke fixing bolts should be tightened to a torque of 20 lbf in (0.23 kgf m).

Check the armature end-float following the reassembly of the motor. Slacken the end-float adjuster nut (Fig. 6) and carefully screw in the adjuster until resistance is felt. Make this adjustment while holding the yoke vertical with the end-float adjuster uppermost.

Screw the adjuster back for $\frac{1}{4}$ turn and lock it in this position. This corresponds to an end-float of 0.004–0.008 in (0.1–0.21 mm).

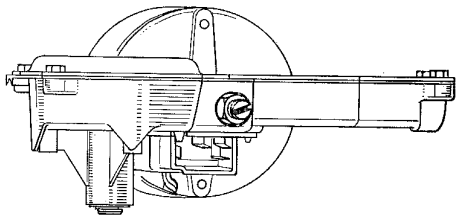

Fig. 6 Armature end-float adjusting screw