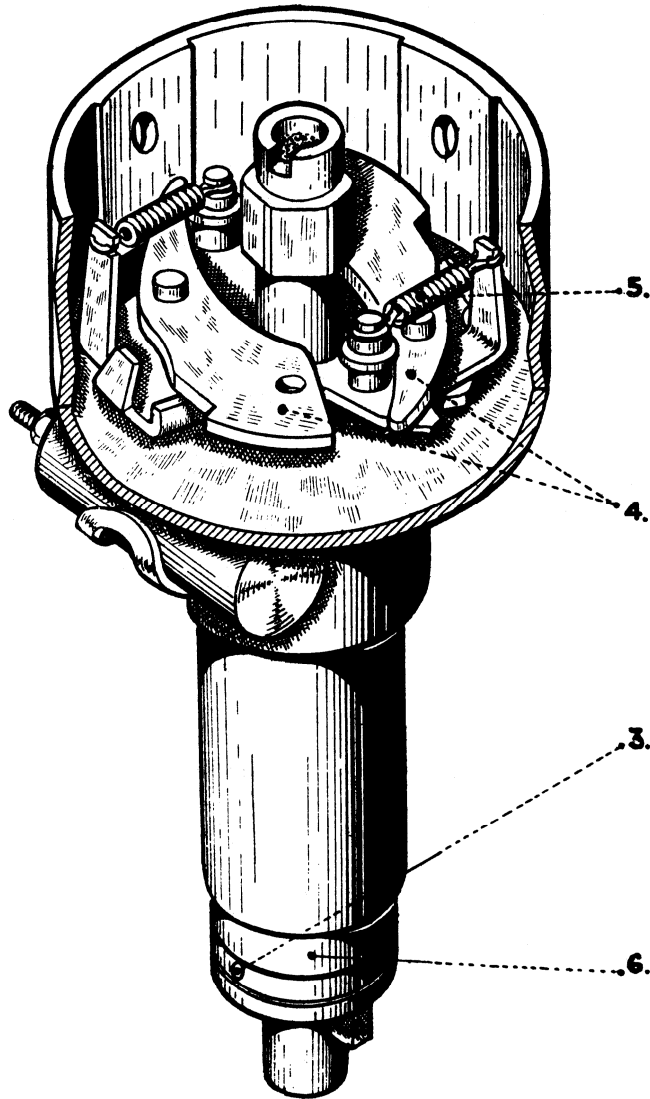
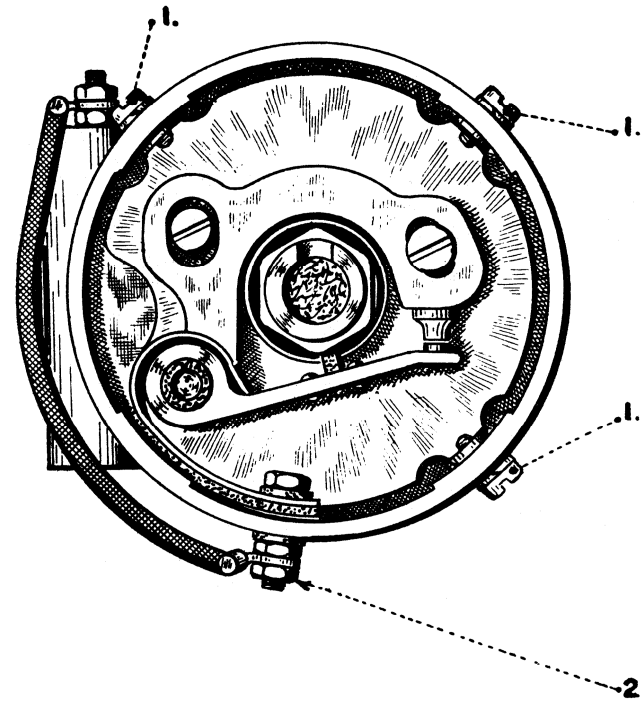


— ELECTRICAL EQUIPMENT —
— SECTION OF DISTRIBUTOR —

— Fig. 1. — SECTIONAL VIEW

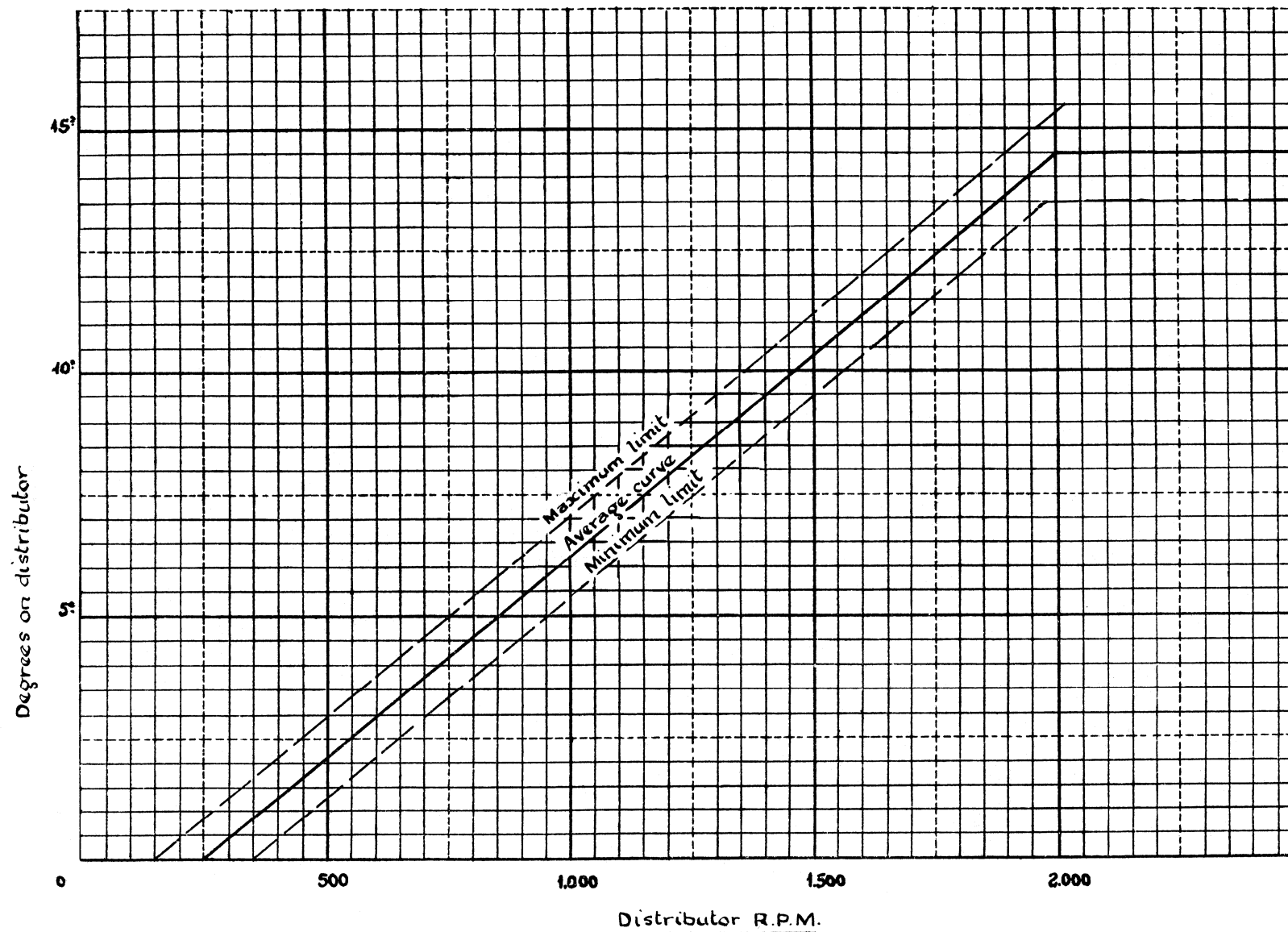


— Fig. 2. — PLAN VIEW

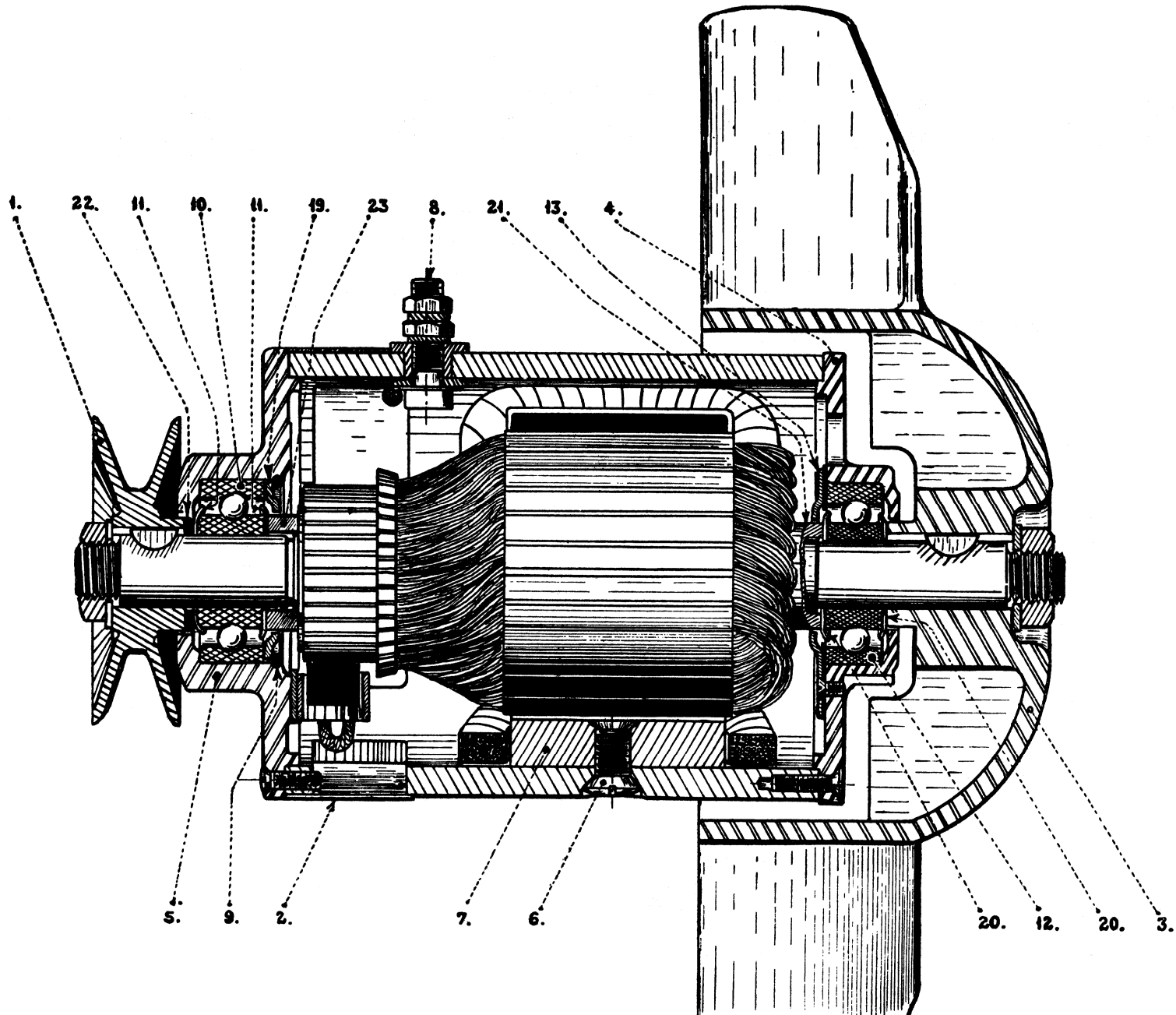


Firing Order
1-4-2-6-3-5

— ELECTRICAL EQUIPMENT —
— DISTRIBUTOR AUTOMATIC ADVANCE CURVE —

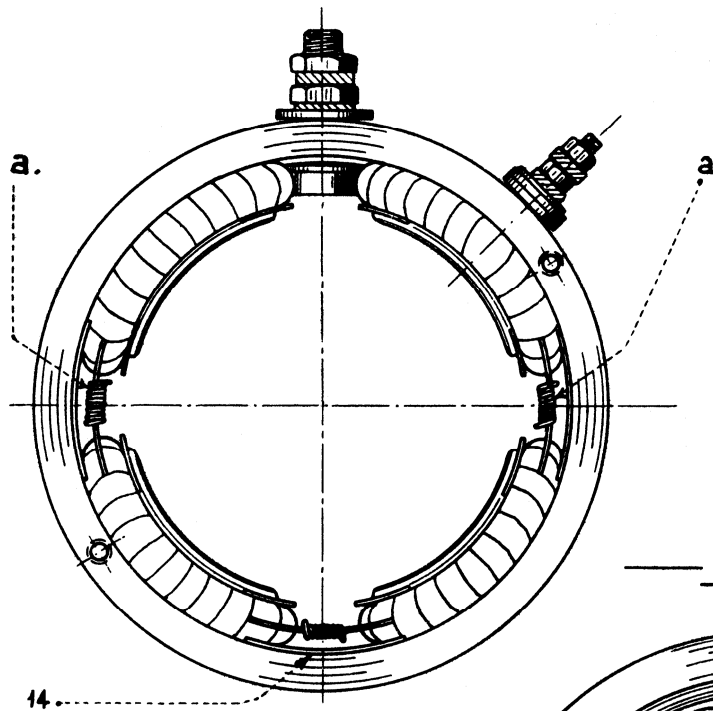


— ELECTRICAL EQUIPMENT —
— SECTION THROUGH DYNAMO —

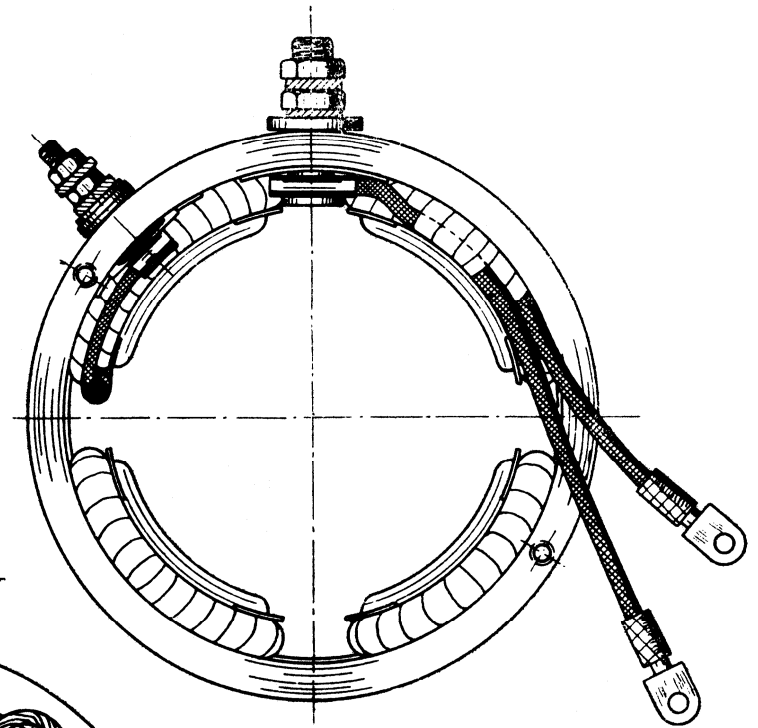


— ELECTRICAL EQUIPMENT —
— CROSS-SECTIONAL VIEWS OF DYNAMO —

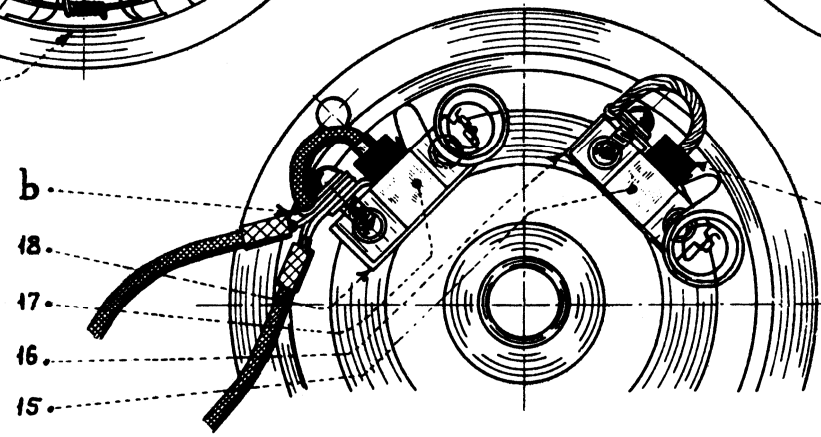
— Fig. 1. —



— Fig. 2. —



— FIG. 3. —

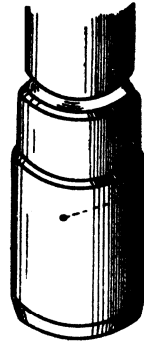


Brushes held in raised position by springs to allow fitting of armature.

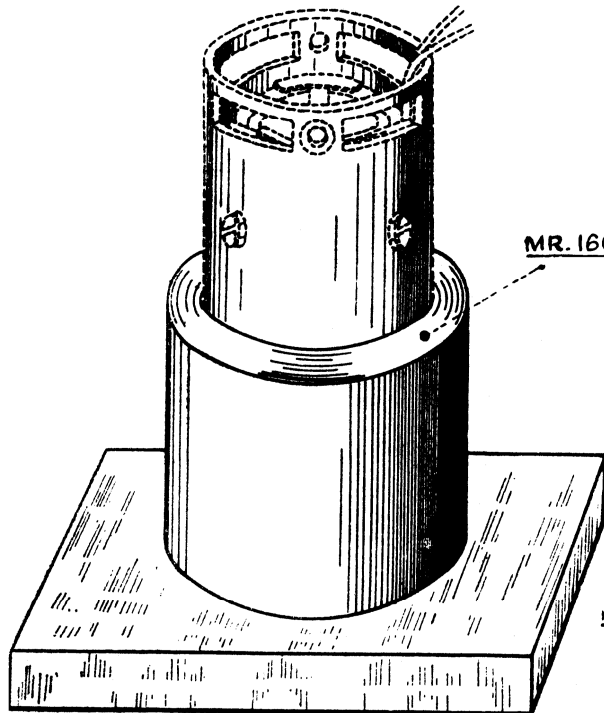
— ELECTRICAL EQUIPMENT —
 — DISMANTLING AND REFITTING DYNAMO AND STARTER MOTOR POLE PIECES —

USE OF MANDREL

Fig. 1.

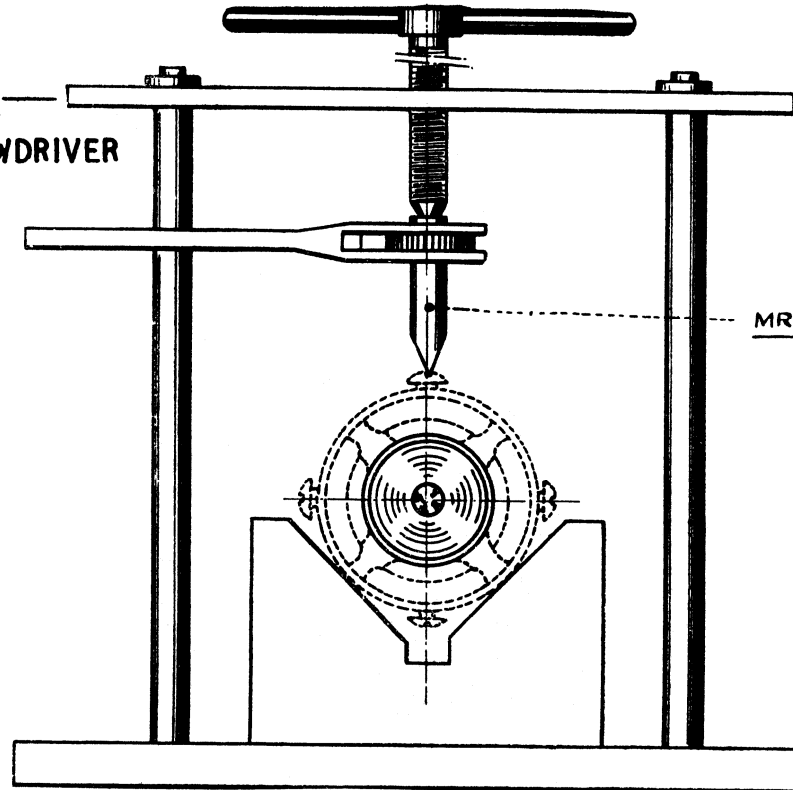


MR. 1601-1
For starter motor
MR. 1601-2
For dynamo



MR. 1601-3

Fig. 2.
USE OF SCREWDRIVER



MR. 1601-4

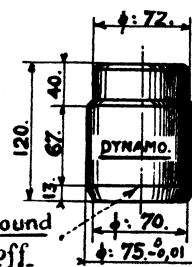
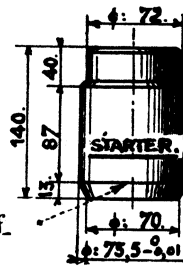
MANDRELS

SOCKET MR. 1601-3

SCREWDRIVER MR. 1601-4

MR. 1601-1

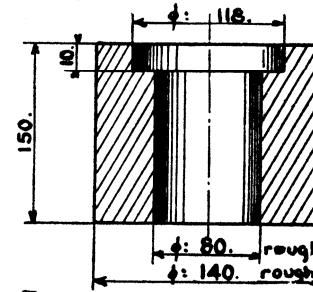
MR. 1601-2



round off.

round off.

semi-hard steel, quenched and ground.



Cast iron.

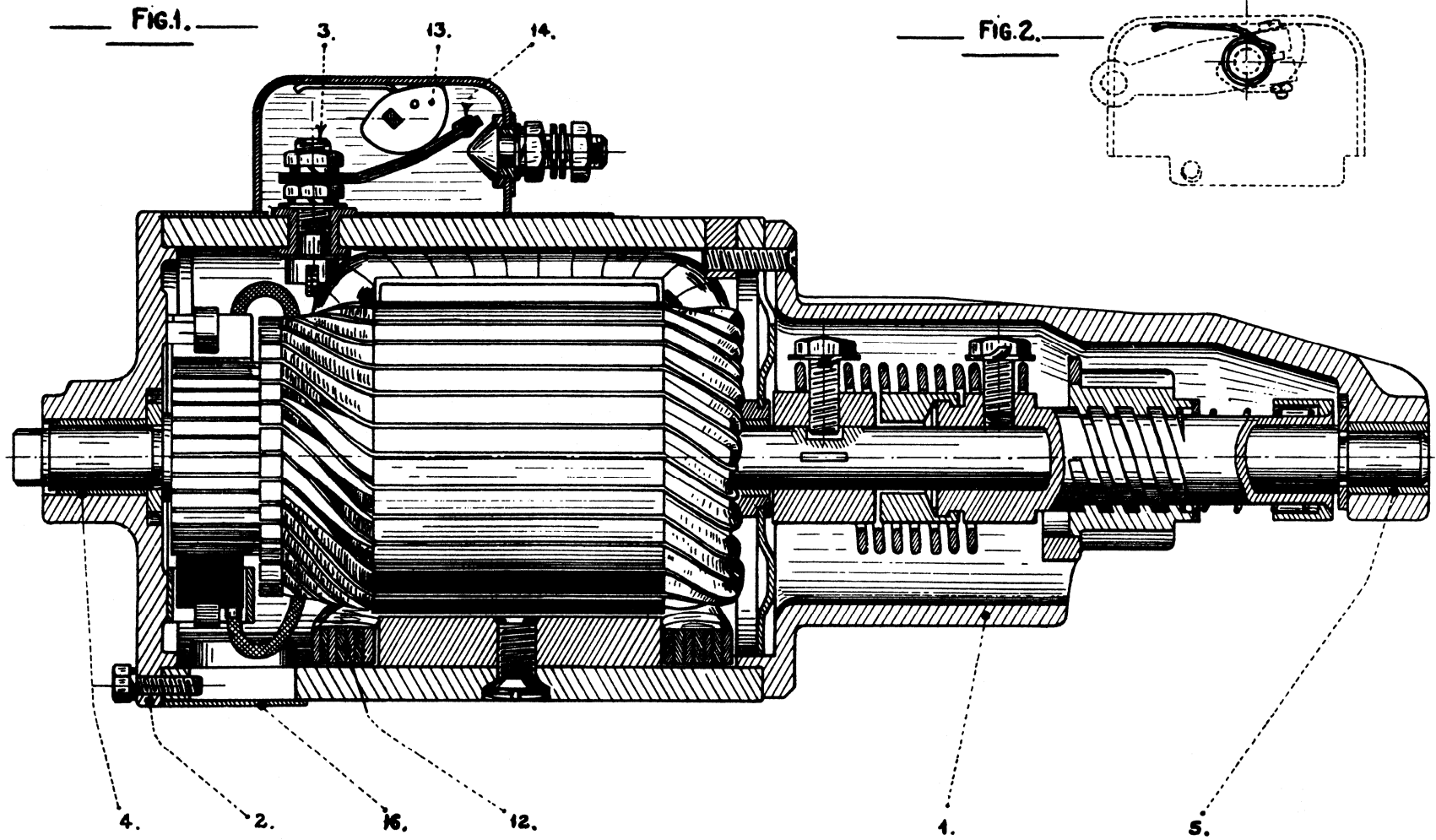
Hexagon to fit ratchet



Hardened tip.

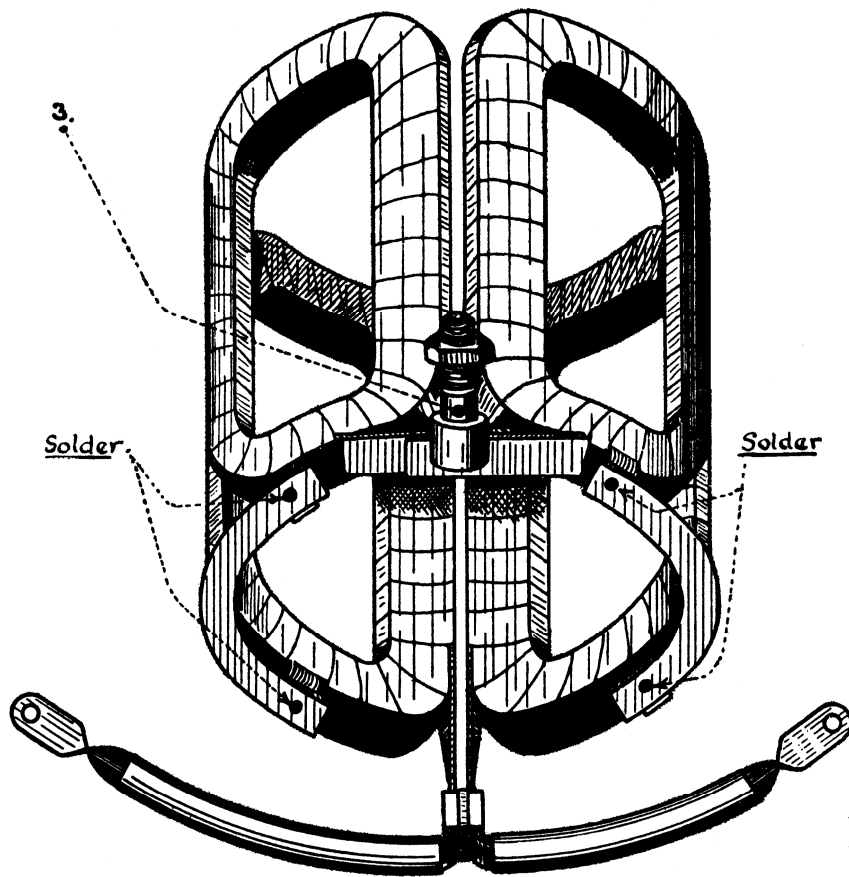
Fig. 3.

— ELECTRICAL EQUIPMENT —
— SECTION THROUGH STARTER MOTOR —

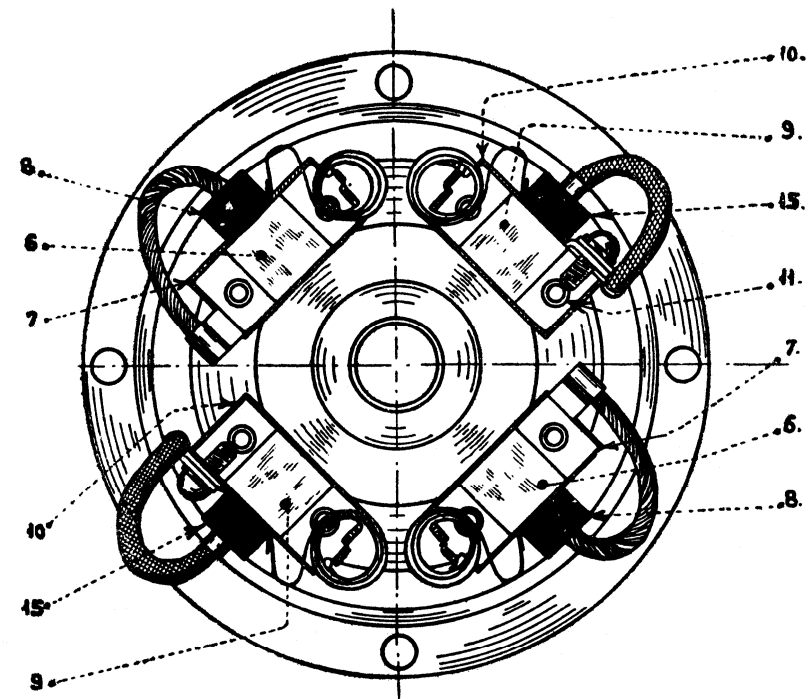


— ELECTRICAL EQUIPMENT —
— END VIEWS OF STARTER MOTOR —

— Fig.1. — FIELD COILS

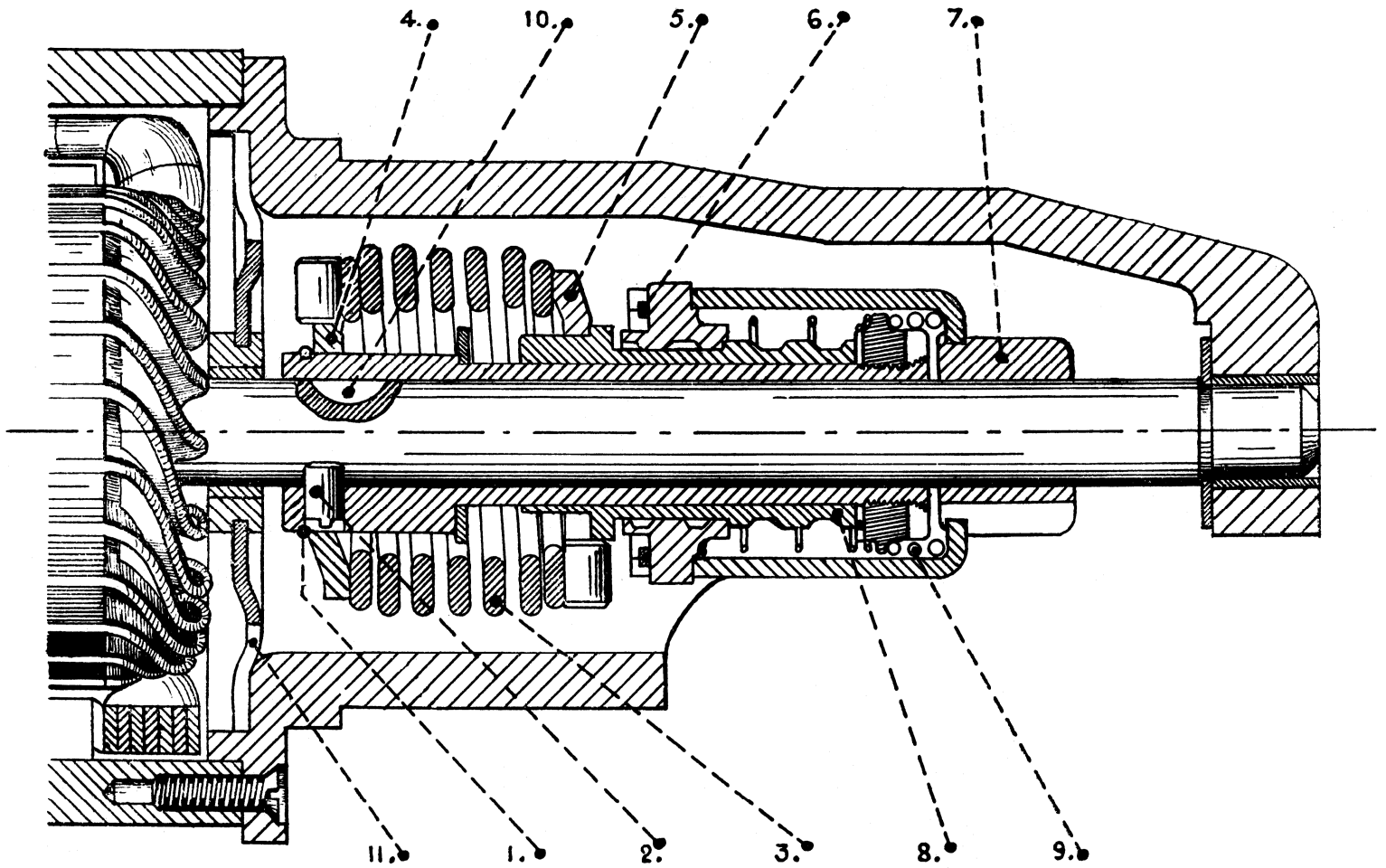


— Fig.2. — FITTING OF BRUSH GEAR



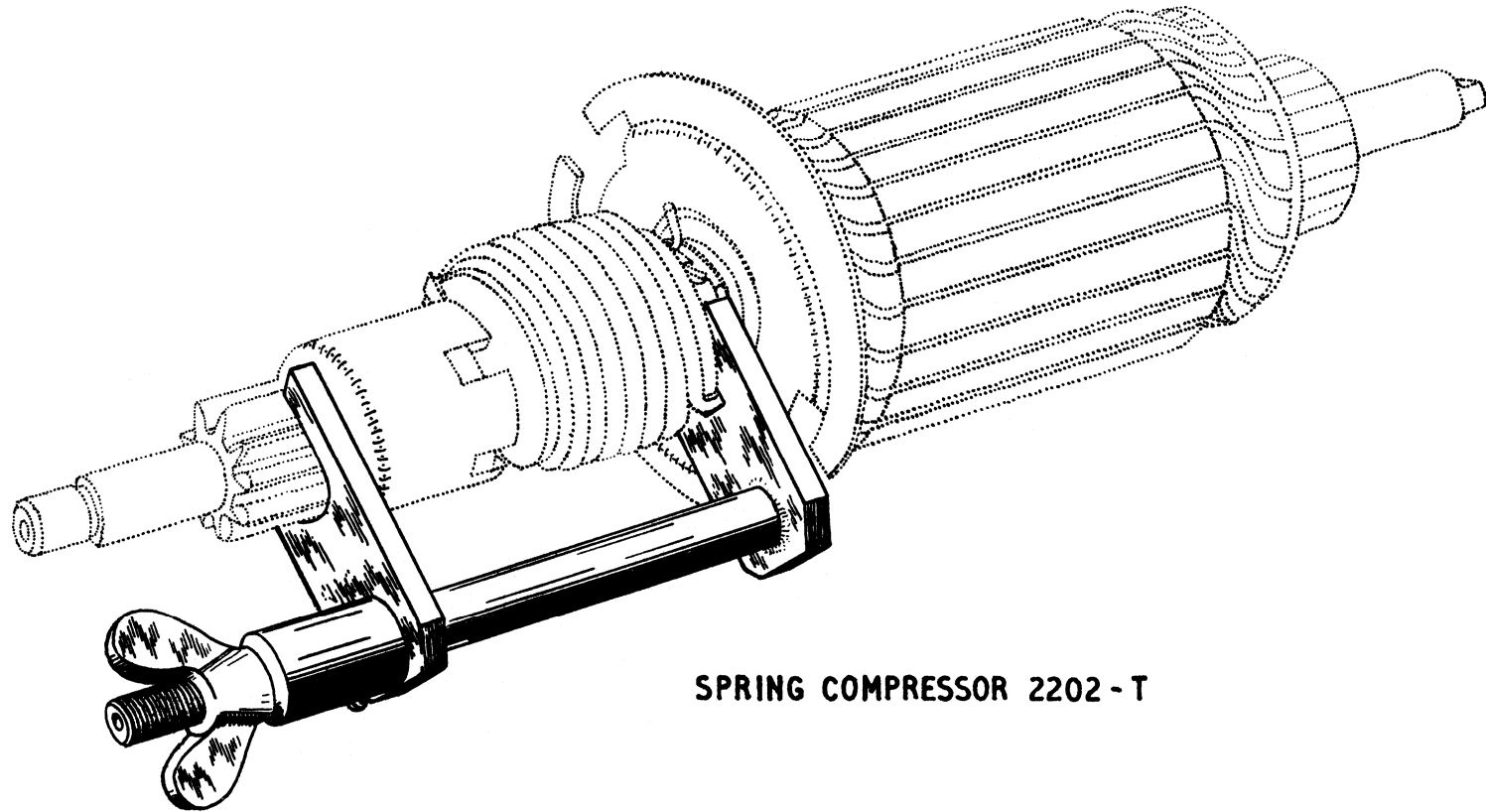
Brushes are held in raised position by springs to allow passage of commutator when fitting armature.

ELECTRICAL EQUIPMENT SECTION THROUGH BENDIX GEAR



— ELECTRICAL EQUIPMENT —
— STARTER MOTOR —

— Fig.1 — USE OF COMPRESSOR FOR BENDIX SPRING



SPRING COMPRESSOR 2202 - T

	REMOVING DISTRIBUTOR	
1	Disconnect ignition coil and spark plug leads.	Box spanner 8
2	Slacken clamp screw and take out distributor.	Flat and box spanners 10
	DISMANTLING DISTRIBUTOR (see Drawing 93).	
3	Dismantle the distributor head, by removing screws (1) and terminal (2). Remove the condenser.	Flat spanner 9
4	Knock out pin (3) fixing driving dog. Disengage the shaft and centrifugal advance weights (4) by unhooking springs (5).	Pin punch 3
5	Disconnect wires from distributor cap.	
6	Clean the parts.	
	ASSEMBLING DISTRIBUTOR (see Drawing 93).	
7	Fit the centrifugal advance weights (4) and hook on springs (5). Offer up the shaft in distributor body and make sure there is no play in the bushes. If there is play replace the distributor body.	
8	FIT THE SHAFT (a) Oil the shaft and engage it in distributor body. (b) Fit a spacing washer on the lower end of the shaft and then the driving dog (6). THE DRIVING DOG TONGUE IS OFFSET. THE PART MUST BE FITTED SO THAT THE TONGUE IS OFFSET TOWARDS THE SIDE OPPOSITE THE CAM SLOT. With the driving dog fitted make sure that the shaft turns freely without end play. Should there be end play in the shaft take this up by using a thicker spacing washer. Peen over both ends of Pin (3).	
9	Fit the contact carrier plate and the toggles. Adjust the contact gap to 0.4 mm., plus or minus 0.05 mm. Fit the condenser.	Flat spanner 9
10	Fit the spark plug and ignition coil leads to the distributor cap. Fit cap to distributor.	
11	BENCH TEST DISTRIBUTOR (a) Set up on the test bench an ignition coil of the same type as the distributor to be tested.	

Connect the negative terminal of the coil to the distributor primary terminal.

(b) Check the insulation of the secondary circuit. Set the test bench contacts gap to 1.5 mm. Connect ignition coil secondary terminal to the central terminal of the distributor cap. Connect the spark plug leads to the test bench contacts. Rotate the distributor for fifteen minutes, at 1000 R.P.M.

(c) Check the firing points. The angular differences of the firing points read on the degree scale must not exceed $1^{\circ}5'$ at all speeds. (Maximum speed of distributor is 2000 R.P.M.)

(d) Check the adjustment of the automatic advance curve. The curve is as follows:-
 0° at 250 R.P.M. (distributor speed) and 14.5° at 2000 R.P.M. (see Drawing 94 for tolerance).
To obtain this curve it is possible to modify the tension of the centrifugal weights by bending the spring carrier plates.

(e) Check the insulation of the primary circuit. Heat the distributor, WITHOUT CONDENSER to a temperature of 60° C. (140° F.). With the contact breaker open, apply an alternating current of 110 volts, 50 cycles, between positive terminal and earth with a lamp in series. Keep voltage applied for one minute. If lamp lights, the insulation is faulty.

FITTING DISTRIBUTOR

See Operation 701, paragraph 30, and operation 702, paragraph 17.

NOTE. Certain cars are fitted with fans that have the blades equally spaced. On these models, to remove the dynamo, it may be necessary to remove the air intake silencer, the air heater tube, and also to free the radiator on its brackets to move it a little forward.

REMOVING DYNAMO

- | | | |
|---|---|-------------------|
| 1 | Remove the air intake silencer. Disconnect the pipe from the carburettor intake and the silencer brackets from hull. | Flat spanners 12 |
| 2 | Disconnect wires on dynamo. | Box spanners 8-14 |
| 3 | Remove nuts fixing dynamo bracket on clutch housing cover. | Flat spanner 17 |
| 4 | Take out the dynamo from the right of the engine. Turn the fan so that blades that are wider spaced clear the radiator. | |

FITTING DYNAMO

- | | | |
|---|---|-------------------|
| 5 | Fit the dynamo from the right of the engine. Turn the fan so that blades that are wider spaced clear the radiator. | |
| 6 | Fit belt on dynamo pulley and adjust without excessive tension. Tighten the dynamo bracket fixing nuts after fitting one plain washer and one spring washer under each. | Flat spanner 17 |
| 7 | Connect dynamo wires. | Box spanners 8-14 |
| 8 | Fit the air intake silencer with the fixing plates between two rubber washers. Split pin the fixing bolts. | Flat spanner 12 |

DISMANTLING DYNAMO (see Drawing 95)

- | | | |
|---|--|---|
| 1 | Remove the driving pulley (1), dust cover band (2), fan (3), and the end plate (4) (fan end), together with armature. Remove end plate (5) carrying brush gear. | Box spanners 8-21 |
| 2 | Remove the dynamo bracket. | Flat spanner 21 |
| 3 | Remove pole-piece fixing screws (6). (Use special screwdriver MR.1601-4 fitted in a bench press, see Drawing 97) . Remove the pole-pieces (7), take out the terminals (8), and remove the field coils. | Screwdriver
MR.1601-4
Bench press |
| 4 | Remove the end plate (4) from the armature by means of the bench press. | |
| 5 | Dismantle the end plate (5) carrying brush gear. | |
| 6 | Remove the bearing (12) from end plate (4) (fan end), by taking off the closing plate (13). | |
| 7 | Unsolder connections 'a' of field coil leads (see Drawing 96). | |
| 8 | Clean parts. | |

ASSEMBLING DYNAMO

- | | | |
|----|---|-------------------|
| 9 | Check the armature with suitable apparatus. | |
| 10 | True up the commutator. Do not decrease by more than 2 mm. the original diameter of 45 mn. | |
| 11 | After machining the commutator use a scraper or a piece of saw blade, ground to the width of the segment insulators, to clean the insulators and thus prevent 'shorting' of the segments. | |
| 12 | Check the field coils with the aid of a test lamp. | |
| 13 | REPLACE DEFECTIVE FIELD COILS
(a) When soldering field coil connections use only a resin paste flux. NEVER USE ZINC CHLORIDE (spirits of salts).

(b) When fitting the field coils take care not to break or kink the connections. | |
| 14 | FIT THE FIELD COILS AND POLE PIECES (see Drawing 96)
Make sure that the coils and pole pieces are correctly positioned in the dynamo casing (Use | Mandrel MR.1601-2 |

Mandrel MR.1601-2, see Drawing 97). This mandrel will establish a clearance of 0.05 mm. between armature and pole pieces and thus prevent fouling.

- (a) Fit the field coils and the insulating strips (14). Provisionally tighten the pole piece fixing screws (7). (see Drawing 95).
- (b) Completely engage mandrel MR.1601-2 between the pole pieces by means of a press (see Drawing 97).
- (c) Tighten the pole piece fixing screws. (Use screw driver MR.1601-4 fitted in a bench press, see Drawing 97).
- (d) Take out the mandrel from the end opposite to its entry.
- (e) Twist and solder the field coil leads (see Drawing 96), and connect to the terminals.

Screwdriver
MR.1601-4

15 PREPARE END PLATE CARRYING BRUSH GEAR (see Drawings 95 and 96).

- (a) Rivet the negative brush holder (15) with its packing (16) and the positive brush holder (17) with its insulating plate (18). Use insulating on the rivets.
- (b) Fit in the bearing housing of the end plate, oil retaining washer (11), bearing (10), a second oil retaining washer (11), bearing retaining washer (19) and circlip (9).
- (c) Fit the brushes and brush springs. To allow the commutator to be fitted between the brushes hold the brushes in a 'raised position' by the springs (as indicated on Drawing 96, fig. 3).

No greasers are fitted for the bearings. Before assembly coat the bearings with Vaseline. No other lubrication should be necessary during the life of the dynamo. (Lubrication points are not provided in order that neither oil or grease can cause dirty brushes or commutator).

16 PREPARE END PLATE (4), FAN END (see Drawing 95).

- (a) Fit in the bearing housing of end plate, oil retaining washer (20), bearings (12), a second oil retaining washer (20), paper gasket for closing plate and the closing plate (15). Tighten the three screws.
- (b) Fit the thrust bush (21) on the armature, and fit the end plate with the aid of a small press.
- (c) Engage the armature in the dynamo casing and fix the end plate by screws. Lock the screws by punching metal from the end plate into the slots of screw heads.

	(d) Fit the fan (3) and tighten nut using a spring washer under.	Box spanner 21
17	Fit thrust bush (23) on armature and fit the brush gear end plate. Tighten the fixing screws. Connect the field coil wires to the positive brush as at 'b'.	
18	Fit the driving pulley (1) to shaft. Make sure that the shaft turns freely BUT WITHOUT END PLAY. If it is necessary to take up end play fit an adjusting washer (22) between bearing and pulley. Use a spring washer under the pulley nut and tighten the latter. Engage brushes with commutator. Fit the dust cover band (2).	Box spanners 8-21
19	Fit the dynamo bracket to the casing. Use spring washers under nuts and tighten.	Flat spanner 21
20	Check the output on a test bench. The dynamo commences charging at 700 to 800 R.P.M. The output at 2500 R.P.M. should be between 14.5 and 15 amperes the corresponding voltage being 6.2 to 7.2 volts, the dynamo discharging into a battery.	
21	Paint the unit.	

REMOVING STARTER MOTOR

- 1 Disconnect positive cable from battery. (Use extractor 2200-T, see Drawing 1, fig. 1).
- 2 Disconnect starter motor switch control. Disconnect starter motor wires.
- 3 Remove starter motor housing cap, Take out starter motor.

Flat spanner 10
Extractor 2200-T

Box spanners 8-14

Universal joint
spanner 21

FITTING STARTER MOTOR

- 4 Fit the starter motor in its housing, making sure that the locating dowel is properly engaged. Fit the housing cap and secure with nuts and spring washers tightened to a tension of 4.5 mkg. (32.5 foot pounds).
- 5 Connect starter motor wiring. Fit the starter motor switch control.
- 6 Connect battery positive cable.

Universal joint
spanner 21

Box spanners 8-14

Flat spanner 10

DISMANTLING STARTER MOTOR (see Drawing 98)

- | | | |
|---|--|--|
| 1 | Remove the switch, dust cover band (16), Bendix housing (1), take out the armature and remove end plate (2) carrying brush gear, | Flat spanners 8-12 |
| 2 | Remove the pole-pieces. (Use screwdriver MR.1601-4 fitted in a small bench press, see Drawing 97) Unsolder field coil and terminal (3) connecting strips and take out field coils (see Drawing 99, Fig. 1). | Screwdriver
MR.1601-4
Soldering iron |
| 3 | DISMANTLE BENDIX GEAR FROM ARMATURE SHAFT (see Drawing 142)
(a) Compress the spring (3). (Use compressor 2202-T. see Drawing 143). Remove circlip (1), extract pin (2) with the aid of a pair of flat nose pliers (the pin comes out easily). Free the Bendix assembly from the shaft. Remove the plate (11) for the intermediate bearing.

(b) Remove compressor 2202-T from the spring. Remove washer (4) for spring (3). Unhook spring (3) from washer (5).

(c) Remove circlip (6), disengage pinion (7) from shaft (8), take out spring (e) from bore of pinion (7). | Compressor 2202-T |
| 4 | Dismantle the brush gear end plate (2). Use a mandrel to knock out bushes (4 and 5) from end plate and Bendix housing respectively. | Punch 3 dia.
Mandrel 15x17x150 |
| 5 | Dismantle the switch. | Flat spanner 14
Box spanner 8 |
| 6 | Clean the parts. | |

ASSEMBLING STARTER MOTOR

- | | | |
|---|--|--|
| 7 | Check the armature shaft between centres. Check the armature windings on suitable test apparatus and the field coils with a test lamp. | |
| 8 | True up the commutator. (NEVER DECREASE THE ORIGINAL DIAMETER OF THE COMMUTATOR, WHICH IS 45 mm. BY MORE THAN 2 mm.) | |
| 9 | After rectification of the commutator clean out the insulators between the segments to ensure against 'shorting'. For this purpose use a scraper or piece of saw blade ground to the width of the insulating plates. | |

10	<p>BUILD UP THE END PLATE CARRYING BRUSH GEAR AND THE BENDIX HOUSING (see Drawing 98 and 99).</p> <p>The bushes for the end plate and Bendix housing are made of porous bronze. Before assembling soak the bushes for approximately twenty four hours in an oil bath (engine or similar oil) to thoroughly impregnate them. No means of lubricating the bushes after assembly is provided and the above method should suffice throughout the life of the machine. (The reason for this method is to prevent oil penetrating to the commutator and brushes).</p> <p>(a) Fit the lubricated bearings (4 and 5) by means of a small bench press.</p> <p>(b) To the end plate carrying brush gear rivet on negative brush holders (6) with packings (7) and the brushes (8). Rivet on positive brush holders (9) with insulating plates (10) using insulating sleeves (11) on rivets, Fit the positive brushes (15) and tighten screws.</p> <p>(c) To allow the commutator to be fitted hold the brushes out as indicated on Drawing 99, fig. 2</p>	
11	<p>FIT FIELD COILS AND POLE PIECES</p> <p>Make sure that the field coils and pole pieces are correctly positioned in the starter motor casing. (Use mandrel MR.1601-1 see Drawing 97). This mandrel will establish a clearance of 0.7 mm. maximum between armature and pole pieces and thus prevent fouling.</p> <p>(a) Fit the field coils, insulating strips (12), screws fixing pole pieces and provisionally tighten.</p> <p>(b) Place the terminal (3) with its insulating washers and solder field coil connecting strips (see Drawing 99, fig. 1)</p> <p>(c) Completely engage mandrel MR.1601-1 between pole pieces by means of a press (see Drawing 97, fig. 1).</p> <p>(a) Tighten the pole piece fixing screws using screwdriver MR.1601-4 fitted, in a small Press (see Drawing 97, fig. 2).</p> <p>(e) Take out the mandrel from the end opposite to its entry.</p>	<p>Mandrel MR.1601-1</p> <p>Flat spanner 12</p> <p>Mandrel MR.1601-1</p> <p>Screwdriver MR.1601-4</p>
12	<p>ASSEMBLE SWITCH (see Drawings 98 and 99)</p> <p>Fit terminal (30) with its insulating washers. Fit the spring, positioned according to drawing, to ensure bearing against the cam (13). Fit the cam, retaining tube, and control lever.</p>	<p>Flat spanners 6-14-16</p>
13	<p>FIT BENDIX GEAR TO ARMATURE SHAFT (see Drawing 142)</p>	

	<p>(a) Fit spring (9) in bore of pinion (7). Fit pinion on sleeve (a) and fit circlip (6).</p> <p>(b) Fit the spring (3) by engaging the bent end in slot in washer (5). Fit washer (4) (with the conical portion of the spring side) by introducing the bent end of spring (3) in washer slot.</p> <p>(c) Compress the spring (3). (Use compressor 2202-T, see Drawing 143). Fit circlip (1) in groove of sleeve (8).</p> <p>(d) Put in position the intermediate bearing (11) and then the key (10) in keyway on shaft.</p> <p>(e) Offer up the Bendix assembly on armature shaft and fit pin (2) in its seating. Turn the circlip (1) in groove on sleeve (8) to lock the pin (2). Remove compressor 2202-T.</p>	Compressor 2202-T
14	<p>Fit the end plate (2) on starter motor casing. Connect the field coil terminal strips to the positive brushes (15). Tighten the screws using spring washers under heads. Engage the armature, fitted with thrust washers at both ends, and fit the Bendix housing (1). Make sure that the armature turns freely without fouling and has an end play of 0.2 mm. to 1.3 mm. If necessary use thrust washers of a different thickness to give the correct end play. Bring brushes into contact with commutator. Fit the dust cover band (16). Fit the contact leaf (14) to the terminal and lock contact by turning back corners against flats of nut. Fit the switch TAKING CARE THAT CONTACT LEAF IS ABOVE THE SWITCH TERMINAL.</p>	Flat spanner 8
15	<p>Bench test motor. Current consumption under load is 180 to 200 amperes and with no load 50 to 75 amperes.</p>	
16	<p>Paint unit.</p>	

HEADLAMP ADJUSTMENT

Use the screen MR.1572 according to instructions on Drawing 106.

Screen MR.1572