

SECTION

M

AUTO STARTERS, HAND STARTERS AND MACHINES

SUB-SECTION MA AUTO STARTERS

W	SIZE	PAGE	MA2
X	"	"	MA4
Y	"	"	MA6
Z	"	"	MA8

SUB-SECTION MB MACHINES AND HAND STARTERS

MACHINES	PAGE MB2
HAND STARTERS	PAGE MB6

MA 2
31/7/32

AUTOMATIC STARTER SIZE W

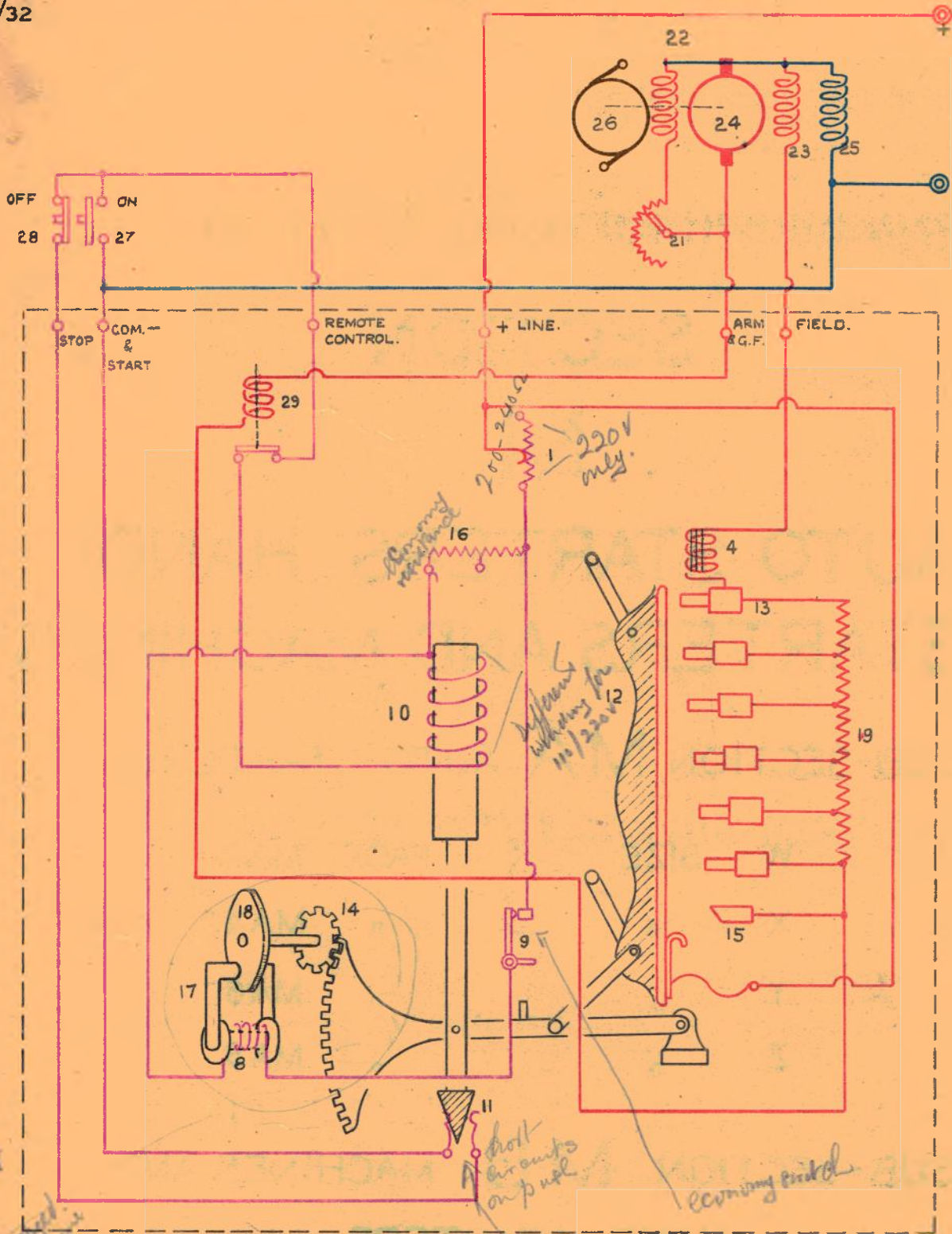


FIG. A.

Self sustaining switch.

*Easy current
to control for speed
at start of the machine*

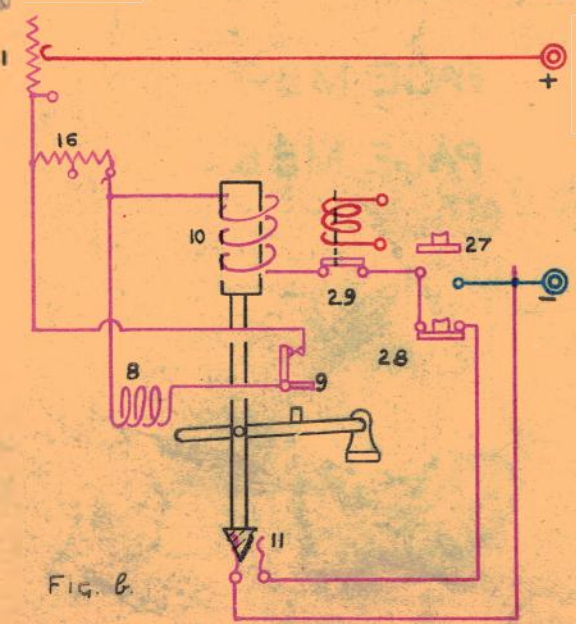


FIG. B.

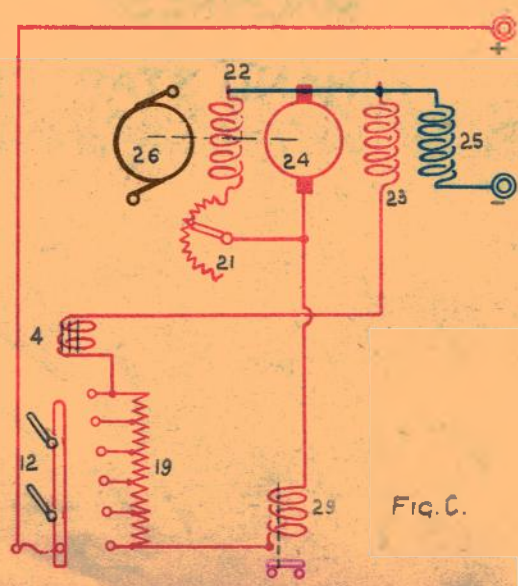


FIG. C.

AUTOMATIC STARTER SIZE W

MA3

Date of design:- 1930.
 Power rating.- 1 to 3 kW.
 Reference:- Admiralty Handbook of W/T (1931) paragraph 247.

The W size automatic starter is somewhat similar to the Z size (see page MA9); it is somewhat simpler however and will in future be adopted for machines of 3 KW and less wherever possible (i.e., wherever the machines are started with no load). A complete sketch of the starter is shown in figure a.

The starting solenoid coil (10) is of different winding for 100/110 volt and 220 volt starters respectively, and also when in 220 volt starters is provided with a reducing resistance (1). An economy resistance (16) is provided in both cases. In ~~the~~ ^{100/110} ~~volt starters~~ ^{volt starters} ~~no~~ ^{no} reducing resistance ~~is provided.~~ ^{is provided.} ~~is of a 1,000 ohm unit which is adjusted by the manufacturer to a suitable value (in early~~ ^{of 200-400 ohms.} ~~supplies usually of the order of 895 ohms); in 100/110 volt starters no reducing resistance is provided.~~ The resistances used are as follows:-

Voltage.	Economy Resistance.	Reducing Resistance.
220	500 (earlier types)	1000 (earlier types adjusted to 895)
220	200 ^{later types} 500 ²⁰⁰	1000 (later types adjusted as necessary).
100/110	500 None.	500 None

A simplified sketch of the operating circuits is shown in figure b., and of the motor starting circuits in figure c.

When the "ON" push (27) is pressed the circuit is completed from positive through the reducing resistance (1) (if in use) the economy switch (9) the eddy current brake coil (8) the starting solenoid coil (10) the contacts of the overload switch (29) and the "ON" push (27) to negative. When the operation of starting is completed, the economy switch (9) is open circuited by means of a stud on the connecting bar between the solenoid rod and the contact bar (12) and the eddy current brake coil (8) thereby cut out of circuit. The solenoid coil (10) is then kept energised, however, through the economy resistance (16), which is of a much higher order than the resistance of the eddy current brake coil (8).

The self sustaining switch (11) in this starter is a V shaped insulated plug fixed to the lower end of the starting solenoid arm which opens two contacts of a jack when the starter is in the "OFF" position and allows the contacts to close when the arm has moved a short distance of its travel upward.

The overload switch (29) will break the circuit of the starting solenoid (10) if the current to the motor armature (24) is excessive. The overload switch (29) can be made to operate between 30 and 60 amps for 100/110 volt starters and 20 and 40 amps for 220 volt starters by an adjusting screw (34) which varies the travel between the overload switch armature and the overload coil.

The magnetic blow out (4) functions at the last connecting stop (13) of the starting resistance and has an asbestos plate as a protection from arcing.

A separate copper stop (15) connects directly with the contact arm (12) when the starter is full on to short circuit the stops of the starting resistance (19) in case of bad contact between the contact arm (12) and the intermediate stops.

The starting resistance (19) reducing resistance (1) and economy resistance (16) are mounted on the back of the starter panel, as shown in figure e, and the starter is therefore self contained.

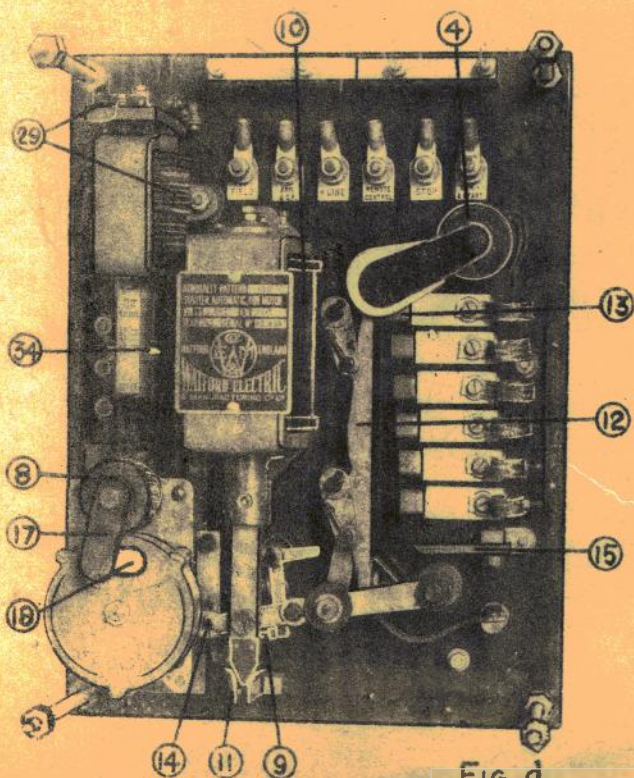


FIG. a

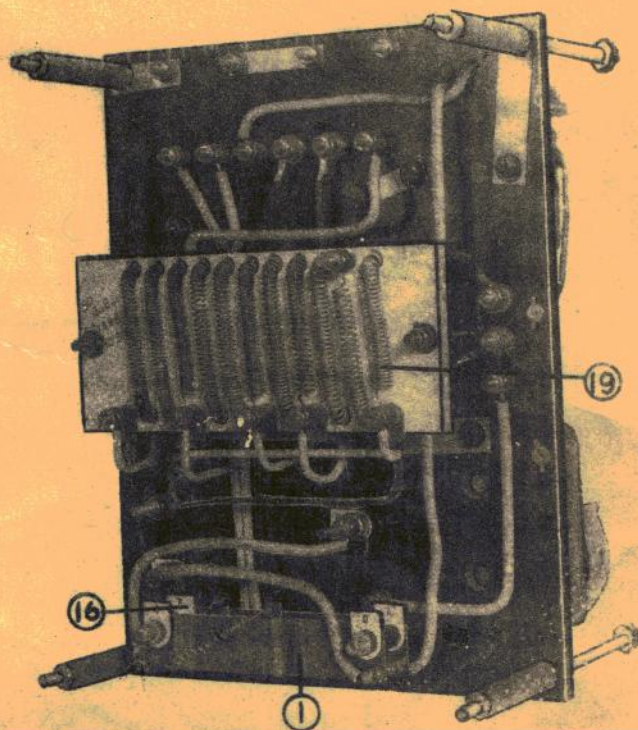
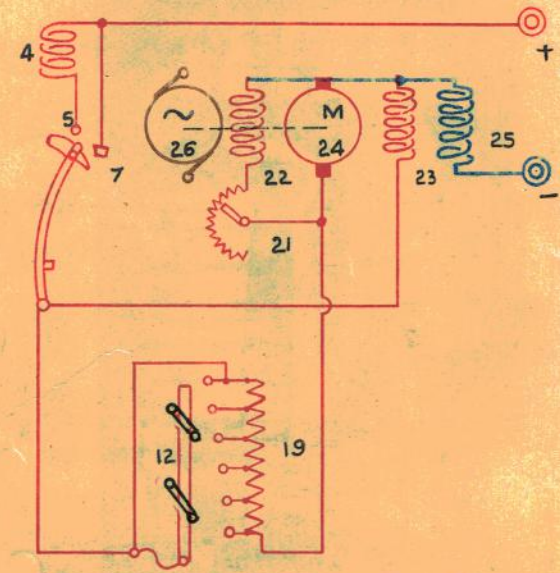
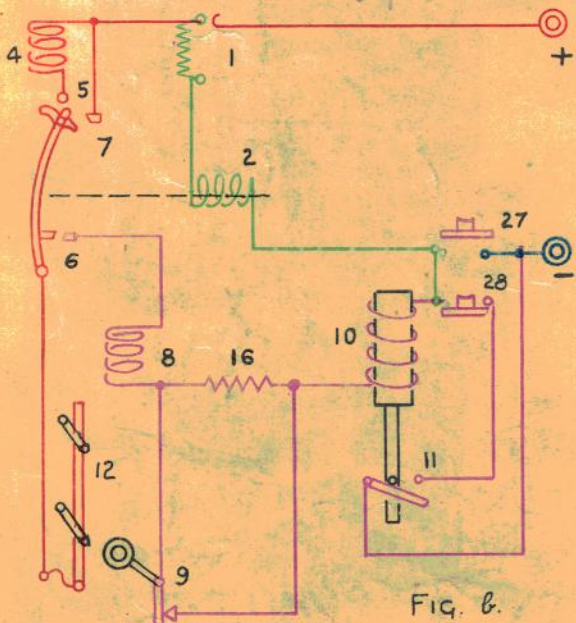
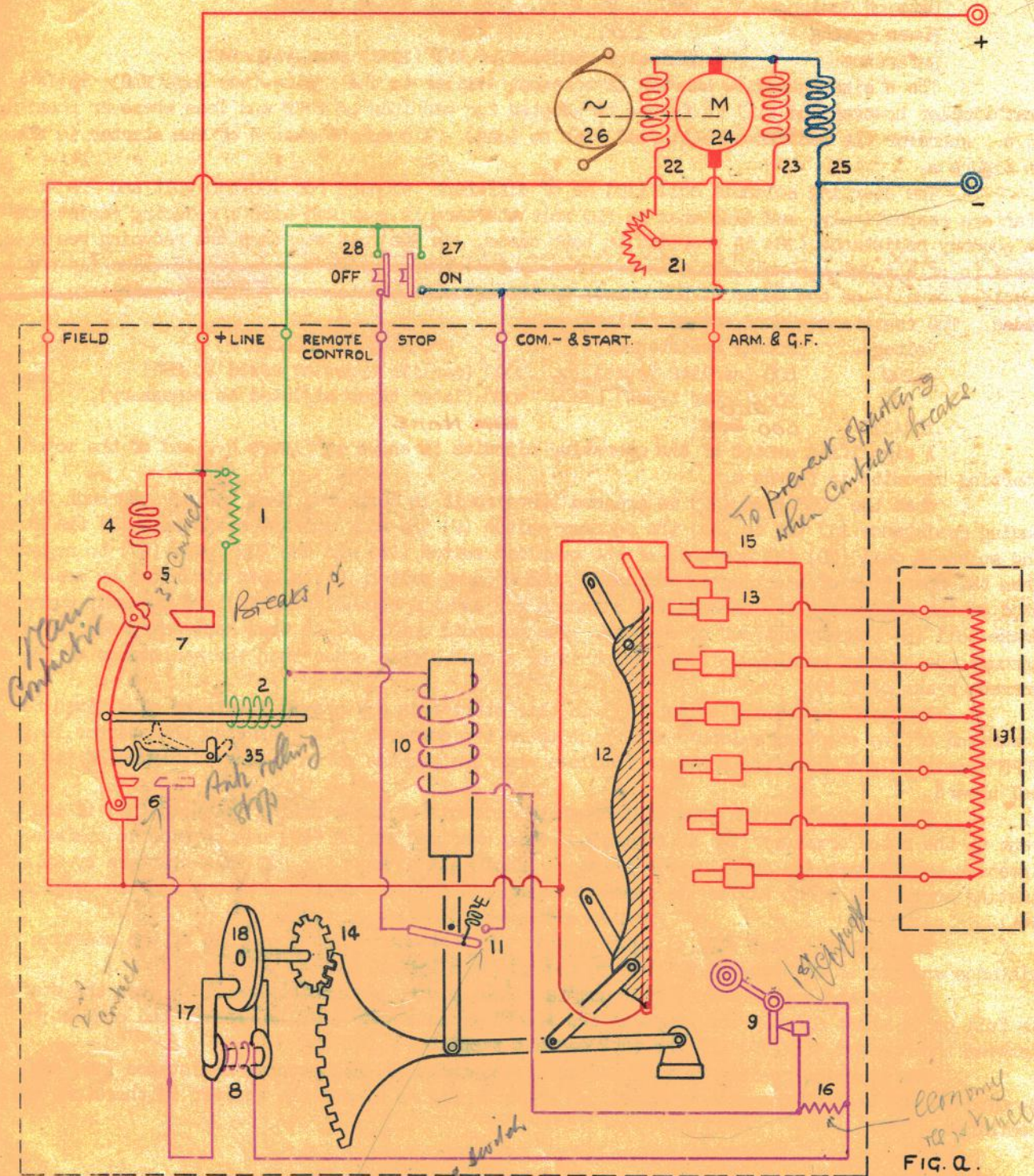


FIG. e

AUTOMATIC STARTER SIZE X



AUTOMATIC STARTER SIZE X

ANB

MA5

Date of design - 1925.
 Power rating - 8 to 20 kW.
 Reference - Admiralty Handbook of W/T (1931) paragraph 247.

The "X" size auto starter is the largest size automatic starter used with service W/T machines.

A complete sketch of the starter is shown in figure a. which is identical with figure 102 of the Admiralty Handbook of W/T (1931) and the action of the starter is clearly explained in paragraph 247.

No overload switch is fitted as the starter and machines are protected by circuit breakers or fuses in the supply to the starter.

The starting resistance (19) forms a separate unit from the starter but the reducing resistance (1) and economy resistance (16) are fitted on the back of the starter panel.

1. Resistance in separate box
 2. Main contactor and anti rolling stop

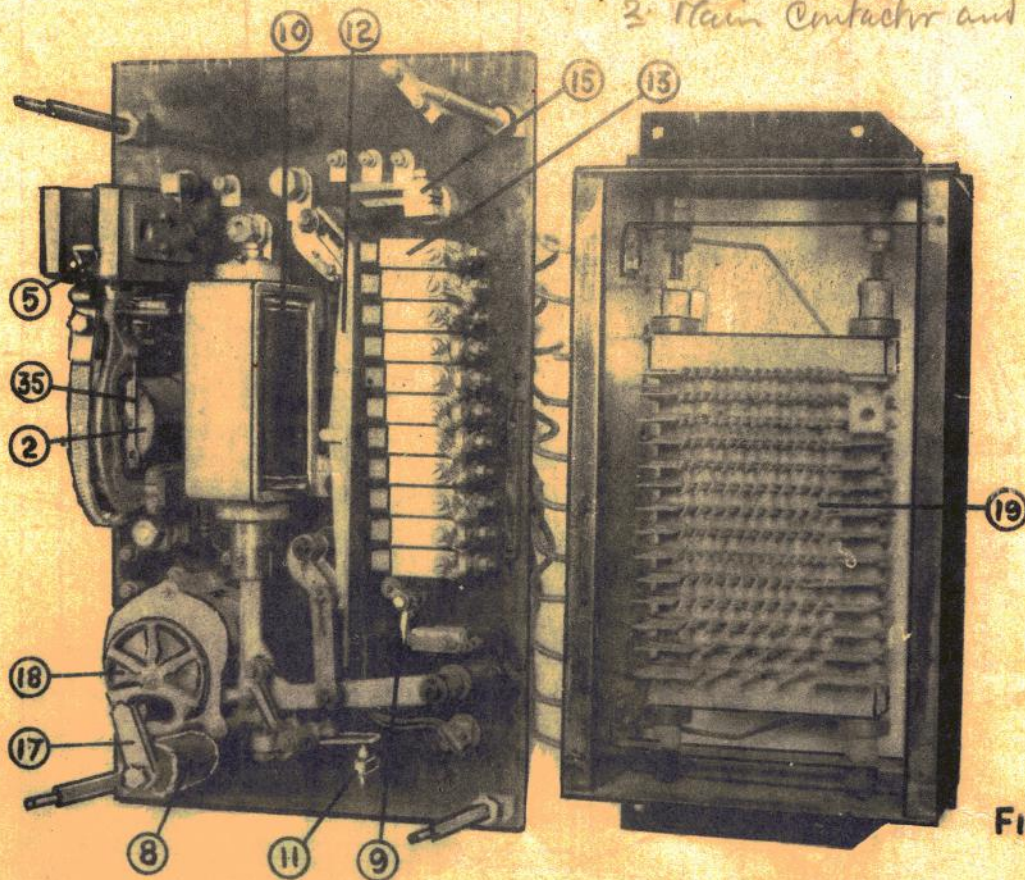


FIG. d

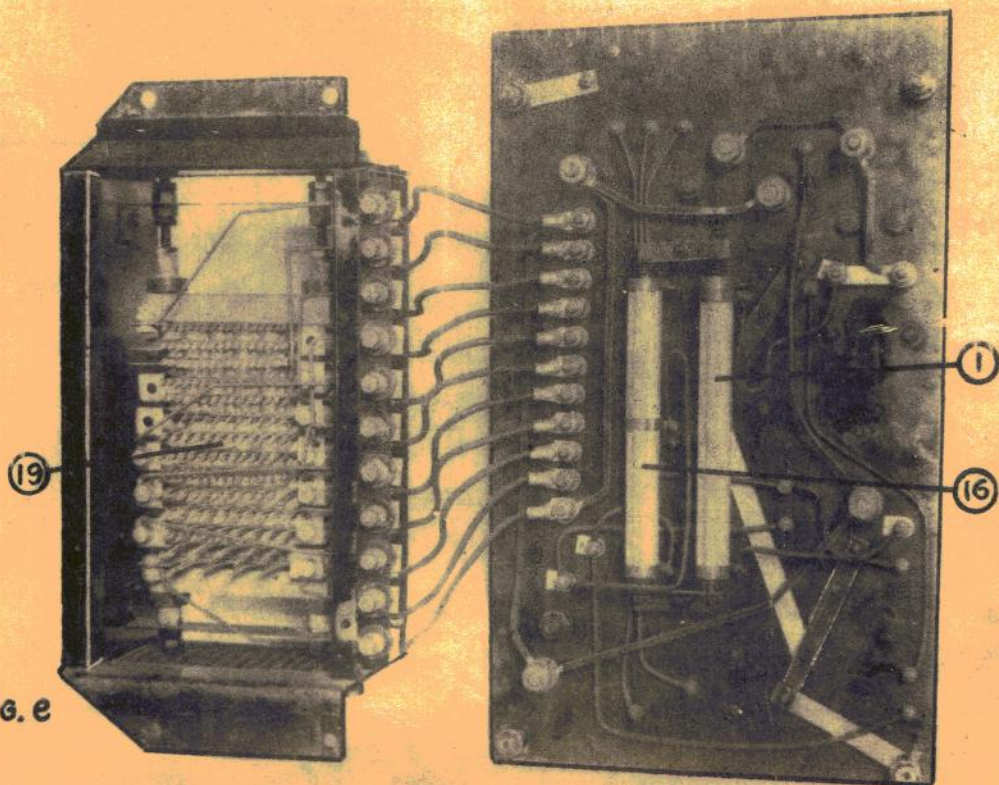


FIG. e

AUTOMATIC STARTER SIZE Y

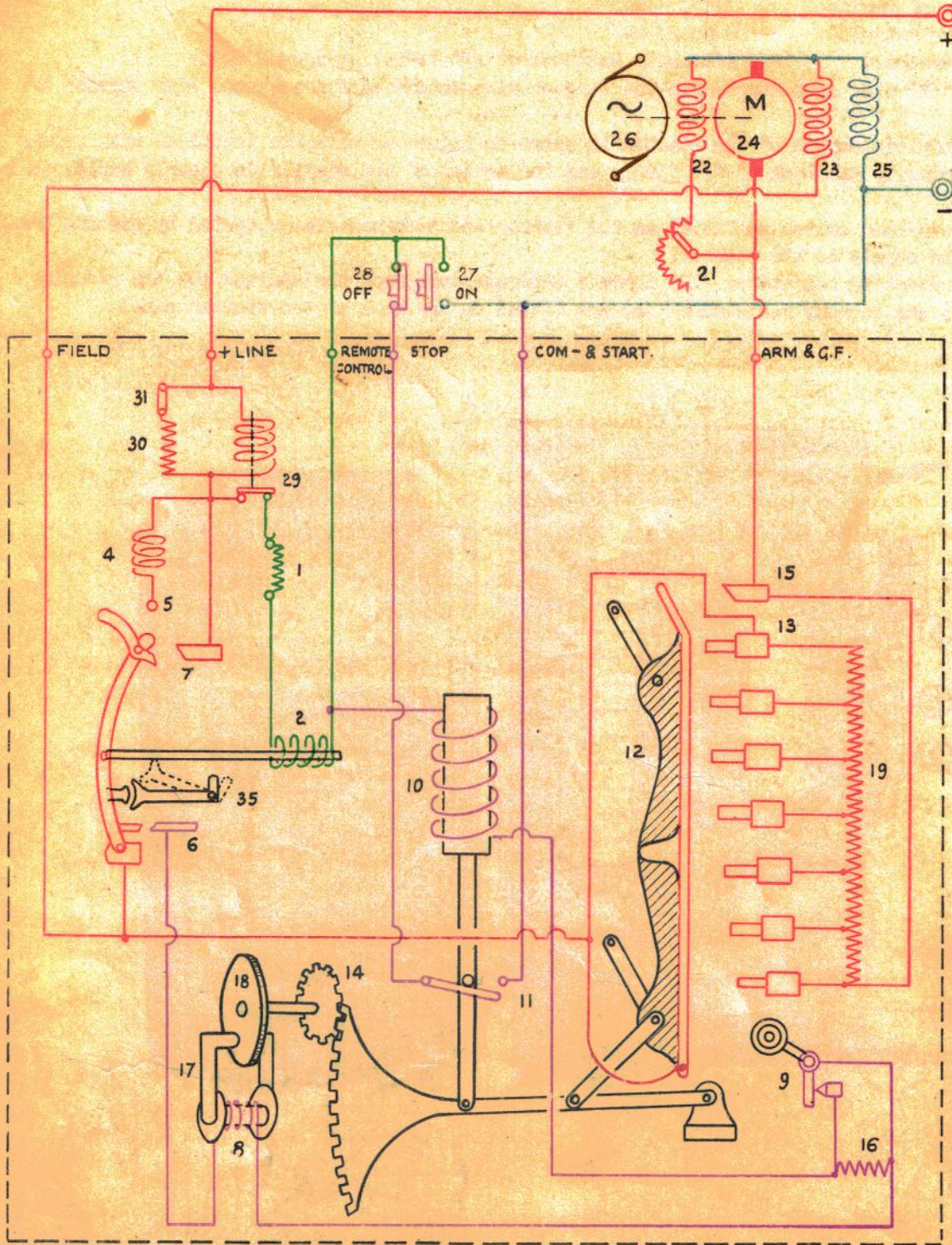


FIG. A.

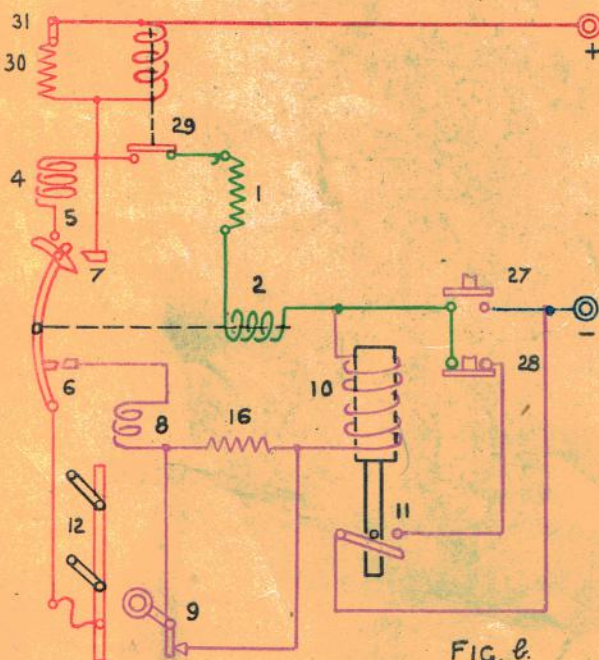


FIG. B.

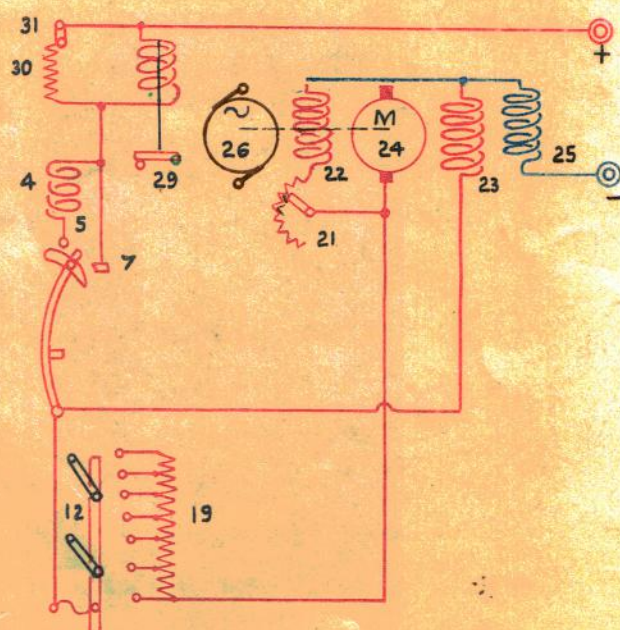


FIG. C.

AUTOMATIC STARTER SIZE Y

MA7

Date of design:- 1926.
 Power rating:- 5 to 8 kW.
 Reference:- Admiralty Handbook of W/T (1931) paragraph 247.

The Y size automatic starter is somewhat similar to the X size, see page MA5, but has an overload switch (29) fitted.

A complete sketch of the starter is shown in figure a. a simplified sketch of the operating circuits in figure b., and of the motor starting circuits in figure c.

The bobbin of the overload switch (29) is connected in parallel with a shunt resistance (30) by means of a link (31). The link (31) is removed when the starter is used with machines smaller than 5 kW. so that the whole motor current passes through the bobbin to operate the overload switch (29).

With the exception of the overload switch (29) shunt resistance (30) and link (31) figure a, is similar to figure 102 of the Admiralty Handbook of W/T (1931) and the action of the starter is clearly explained in paragraph 247.

In type Y size starters the reducing resistance (1) economy resistance (18) and starting resistance (19) are fitted together and form a separate unit from the starter.

No self sustaining switch (11) is fitted in the earlier types and the starter is switched on by a single switch, in place of the "ON" push (27), which remains closed after making and is not broken until switched off by the operator. Should the overload switch (29) operate under these conditions the circuit through the solenoid coil (10) is broken and the starter falls off. The overload switch (29) will then return to its normal position, completing the circuit through the solenoid coil (10), and the starter is again switched on. If the current through the overload (29) is still excessive the overload switch (29) will again operate and the solenoid circuit again be broken. The overload will therefore continue to break and make the solenoid bobbin circuit, switching the starter off and on, as long as the motor is taking an excessive current, causing the starter to "chatter".

To avoid this a retaining catch (32) is fitted to the overload switch (29) in the earlier type of Y size starters which retains the overload switch (29) in the off position until reset by hand. Figures d. and e. show the later type.

NOTE :- The W and Z size starters have no retaining catch (32) and will therefore "chatter" when an overload occurs if the control is wired through a single switch as stated above.

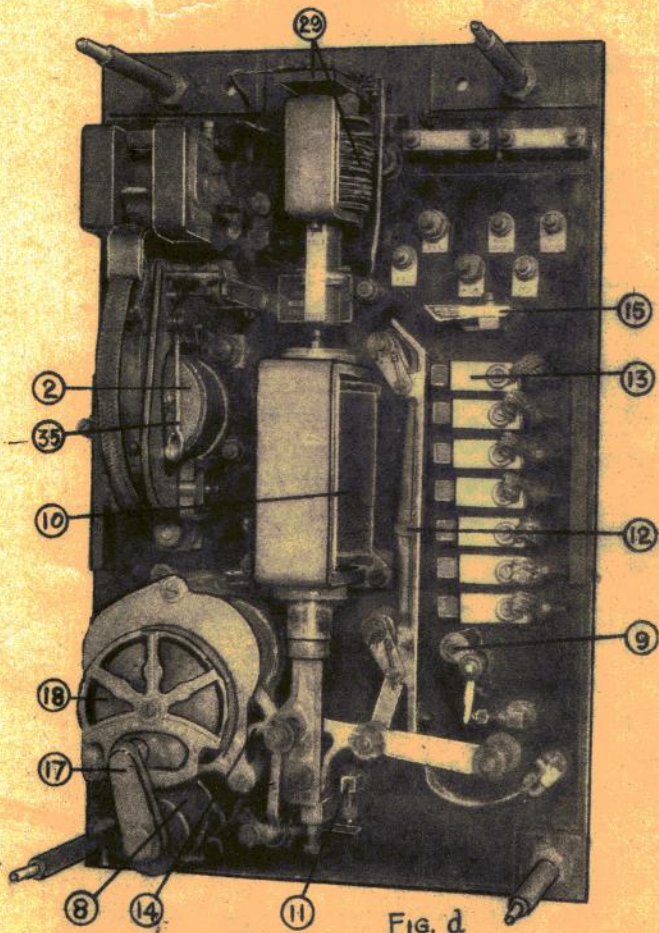


FIG. d

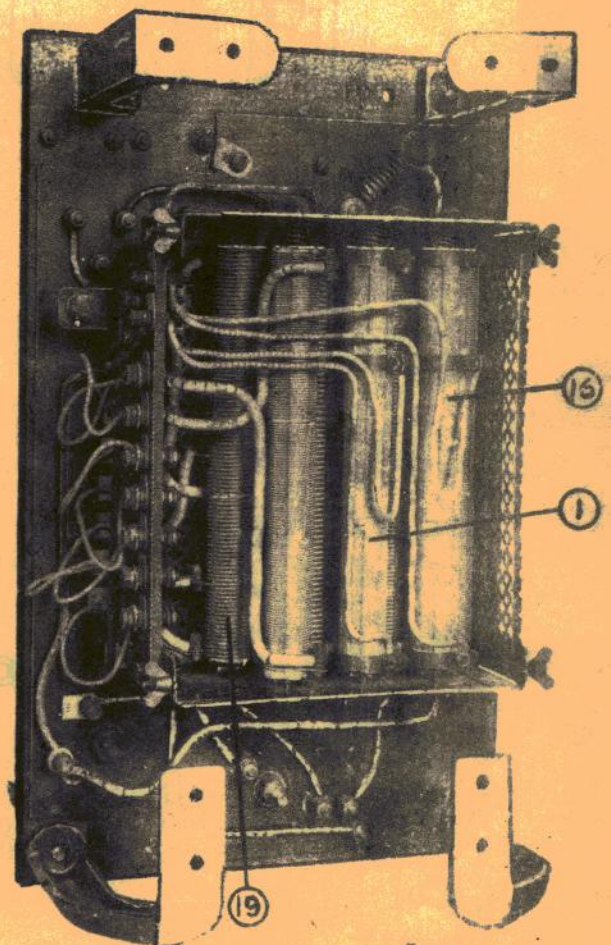


FIG. e

AUTOMATIC STARTER SIZE Z

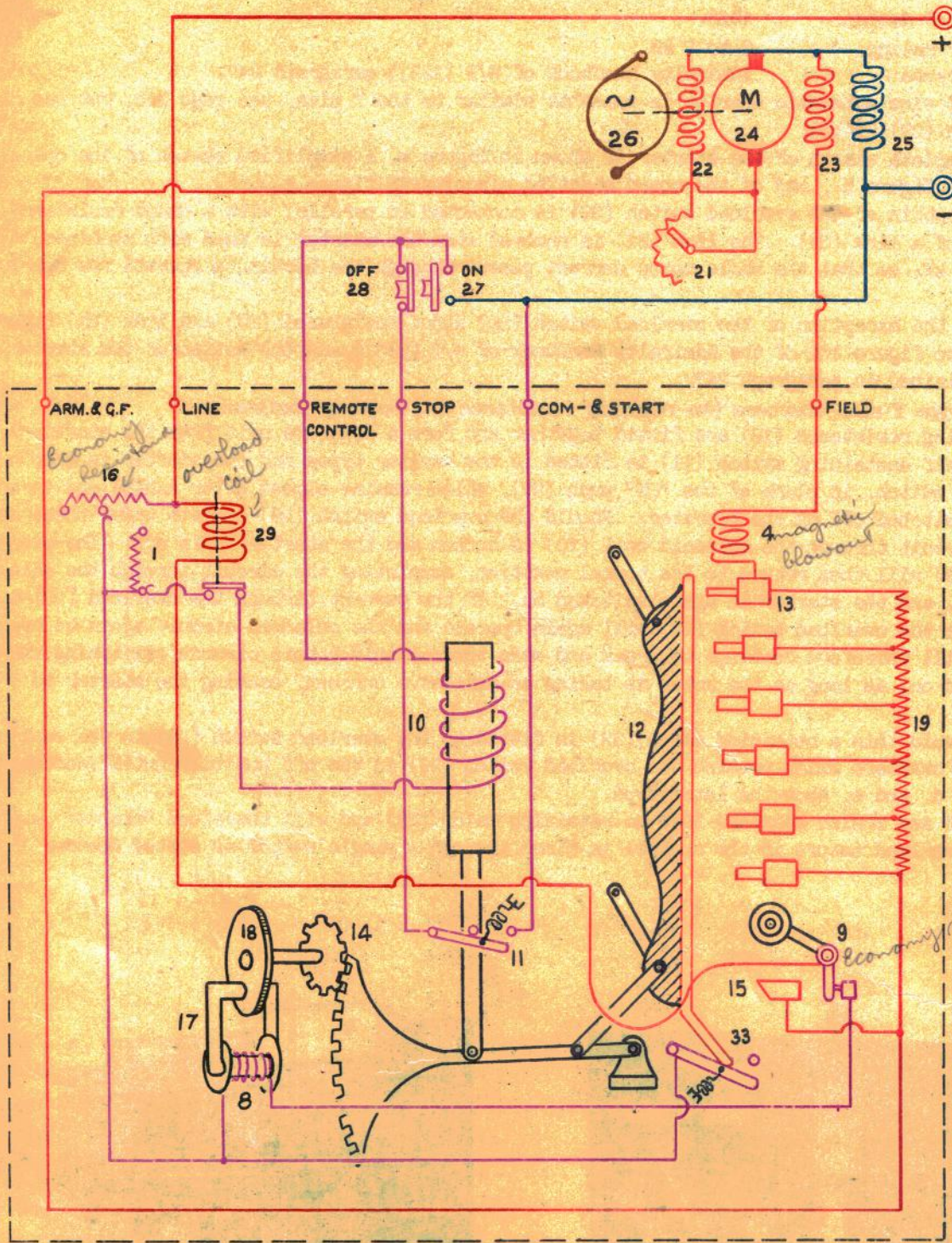


Fig. A.

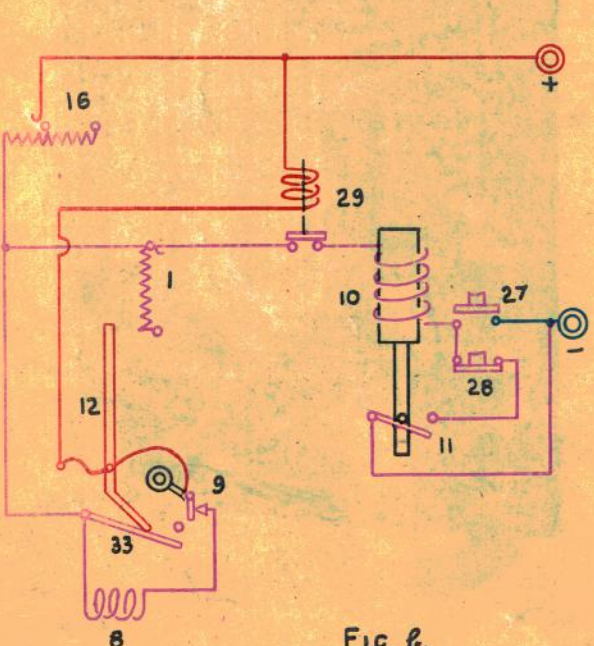


Fig. B.

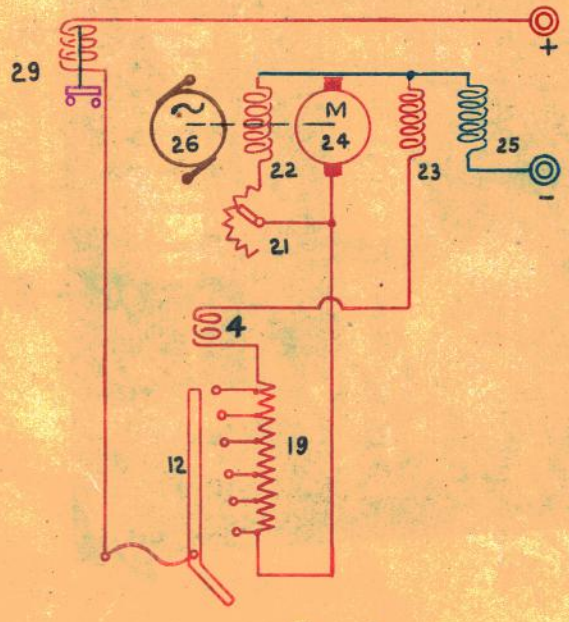


Fig. C.

AUTOMATIC STARTER SIZE Z

MA9

Date of design:- 1926.
 Power rating:- $1\frac{1}{2}$ to 3 kW.
 Reference:- Admiralty Handbook of W/T (1931) paragraph 247.

The Z size automatic starter is one of the earlier type of starters and will be replaced by the W size in due course.

A complete sketch of the starter is shown in figure a. a simplified sketch of the operating circuits in figure b. and of the motor starting circuits in figure c.

When the "ON" push (27) is pressed the circuit is completed from positive through the overload coil (29) the eddy current brake switch (33) the reducing resistance (1) (if in use) the contacts of the overload switch (29) the starting solenoid coil (10) and the "ON" push (27) to negative.

The eddy current brake switch (33) short circuits the eddy current brake coil (8) and economy switch (9) when the starter is in the off position by making contact with an extension at the bottom of the starter arm. A stud on the starter panel limits the movement of the eddy current brake switch (33) and breaks the contact between the starter arm (12) and the switch (33) when the starter arm moves a short distance upward.

The economy resistance (16) is short circuited by the bobbin of the overload switch (29) and the coil of the eddy current brake (8) (which are of a much lower resistance than the economy resistance (16)) when the economy switch (9) is closed.

The final movement of the starter arm (12) operates the economy switch (9) which breaks the circuit of the eddy current brake coil (8) and thus the short circuit of the economy resistance (16). This has the effect of introducing the economy resistance (16) in the circuit to the starting solenoid coil (10).

The bobbin of the overload switch (29) is in the operating circuits of the starter, as shown in figure b. until the economy switch (9) is broken. When the economy switch (9) has been broken by the starter arm (12) the bobbin of the overload switch (29) is in the supply to the motor only as shown in figure c. The overload switch (29) will break the circuit of the starting solenoid (10) and switch the starter off if the current to the motor is excessive.

The magnetic blow out (4) functions at the last connecting stop (13) of the starting resistance to prevent arcing. A separate copper stop (15) connects directly with the contact arm (12) when the starter is full on to short circuit the stops of the starting resistance (19) in case of bad contact between the contact arm (12) and the intermediate stops.

The self sustaining switch (11) and "OFF" push (28) function as described in Admiralty Handbook of W/T (1931) paragraph 247.

The starting resistance (19) reducing resistance (1) and economy resistance (16) are mounted behind the starter panel as a separate unit and secured to the panel by bolts.

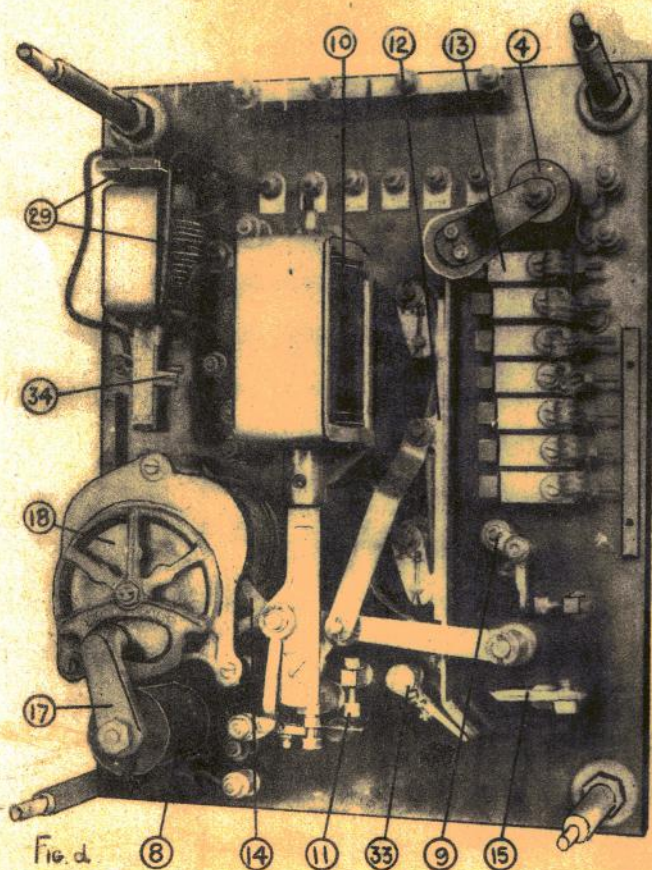


Fig. d

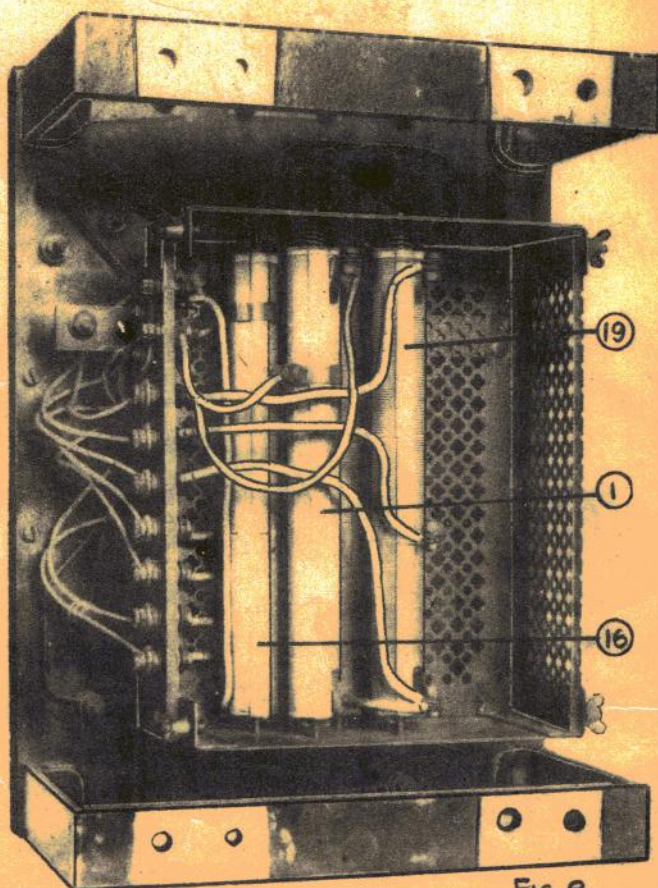


Fig. e