VOLTAGE REGULATOR
GENERAL ELECTRIC TYPE TA-125, FORM L
DESCRIPTION

1. GENERAL:

1.01 The General Electric Company's type TA-125, form L, voltage regulators for a-c. generators described hereinafter are used in conjunction with engine-driven or motor-driven alternators in dial and toll power plants.

1.02 Each voltage regulator consists mainly of two parts, a d-c. controlling system and an a-c. controlling system. The former is simply a d-c. regulator having a d-c. magnet and relay governed by the exciter voltage. The latter is an a-c. magnet governed by one phase of the alternator through a potential transformer. The regulators as furnished for use in telephone power plants operate on the following voltage ranges:

Alternator Voltage	Exciter Voltage	Regulator Voltage
200-250	50-125	100-125

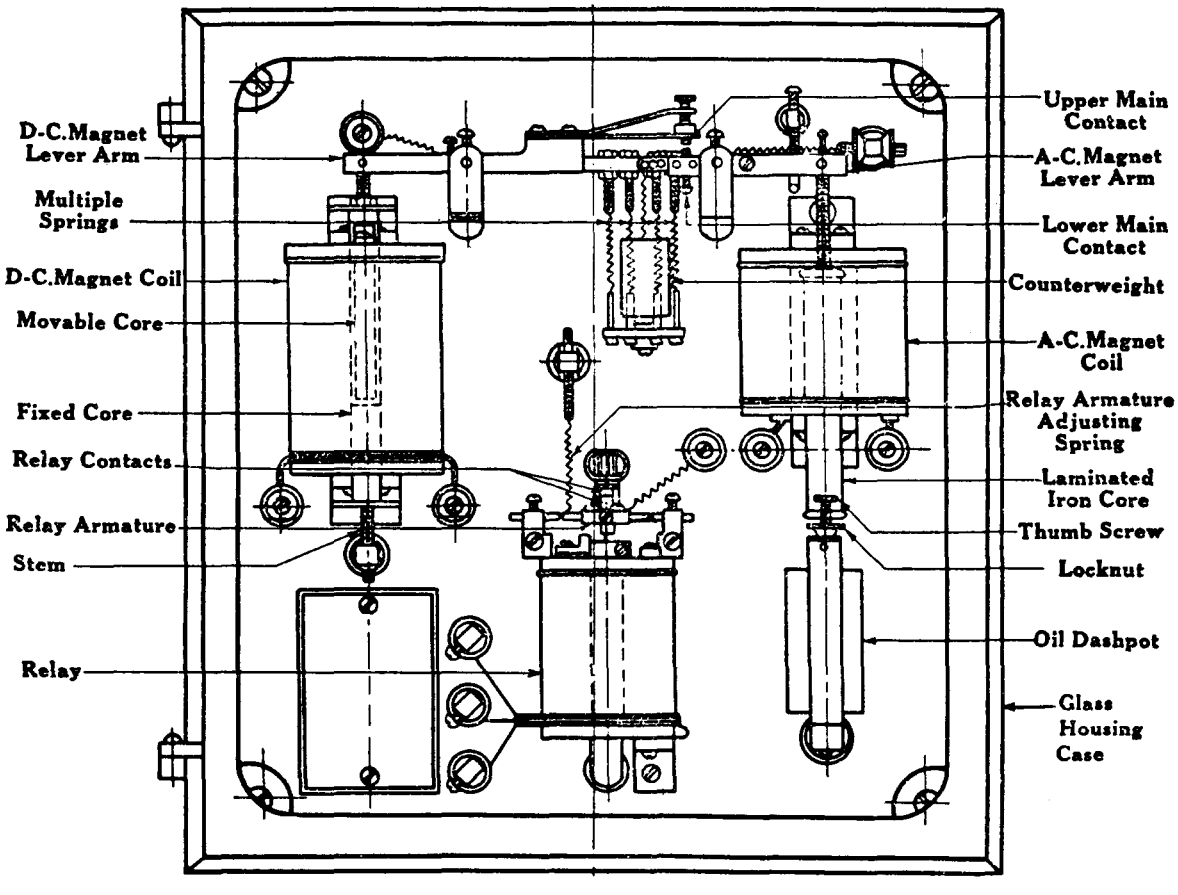

Fig. 1—General Assembly

2. DESCRIPTION OF APPARATUS:

D-C. Magnet:

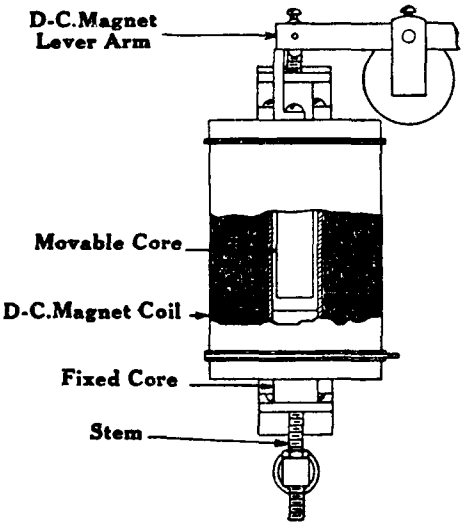

Fig. 2—D-C. Magnet

2.01 The d-c. magnet (solenoid type) consists of a single winding connected across the exciter terminals. Within this coil are two cores, a fixed core and a movable core. The movable core is attached to one end of a pivoted lever arm, while the fixed core is supported in the lower portion of the solenoid by a stem, and is adjustable. The pull of the magnet is opposed by four springs in multiple, which pick up at four different values of exciter voltage.

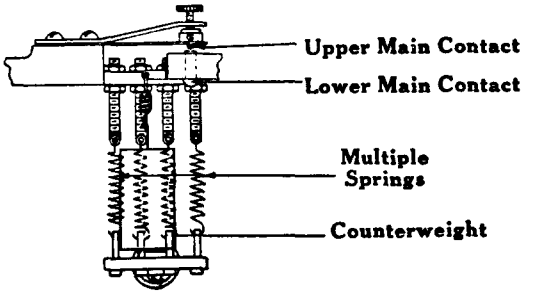

Fig. 3—Main Contacts

Relay:

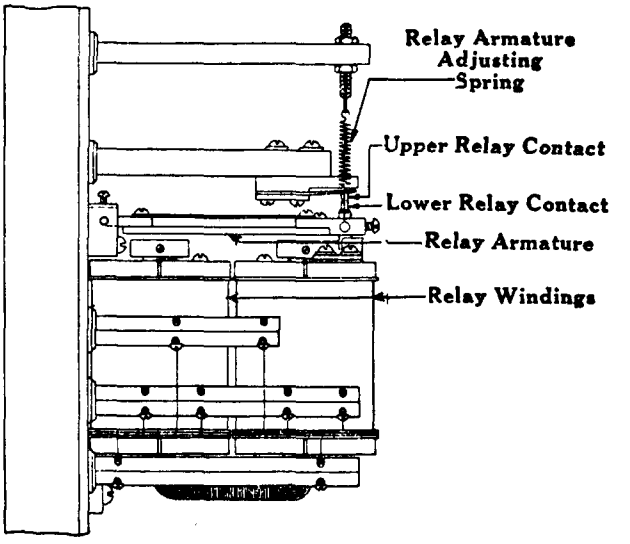

Fig. 4—Relay

2.02 A differentially wound relay is connected across the exciter terminals, one winding being permanently connected to the exciter terminals through a resistance, while the other is arranged to be opened and closed by the main contacts. The relay has a pivoted armature to which an adjusting spring is attached. This spring opposes the pull of the magnet. The relay contacts (movable contact mounted on the armature) are connected across the exciter field rheostat. Destructive arcing is prevented by a condenser connected across the relay contacts.

A-C. Magnet:

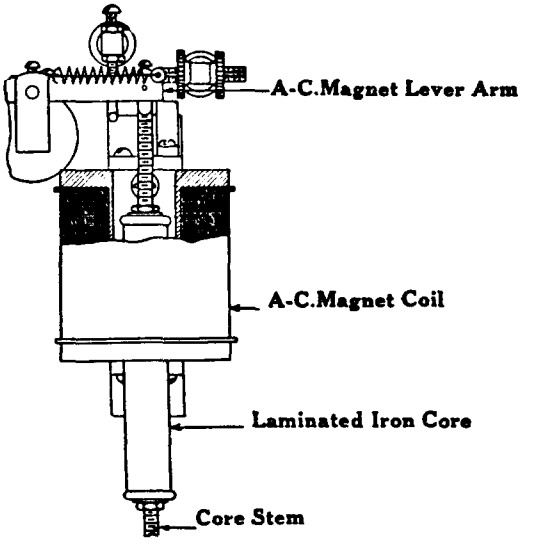

Fig. 5—A-C. Magnet

2.03 The a-c. magnet (solenoid type) has two opposing windings, a potential winding connected across one phase of the alternator through a potential transformer, and a compensating winding (furnished but not used). The magnetizing force of the solenoid actuates a laminated iron core which is directly connected to one end of a counterweighted, pivoted, lever arm. The counterweight consists of a brass cup partially filled with lead shot, the number of shot in the cup being changed to vary the weight of the cup. Mounted on the opposite end of this lever arm is a lower main contact, which, in combination with the upper main contact, comprises what are known as the main contacts.

Oil Dashpot:

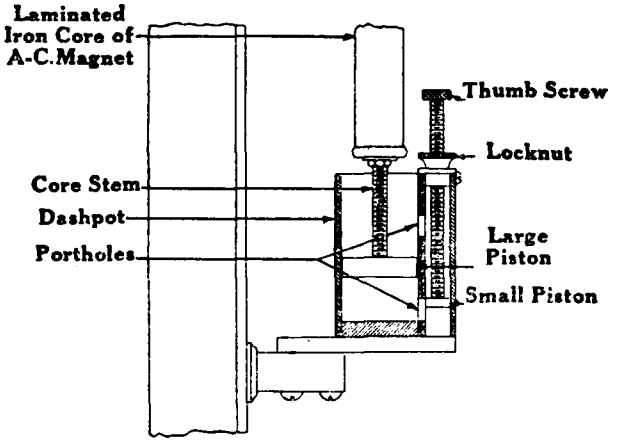

Fig. 6—Dashpot

2.04 The laminated iron core of the a-c. magnet is provided with an oil dashpot, the large piston of which is attached to the core by a core stem. This dashpot acts as a stabilizer during a momentary variation of the line voltage. The rate of movement of the large piston is governed by the position of the small piston with reference to the lower porthole in the adjacent chamber. With the dashpot full of oil, and the lower porthole very nearly closed (by the small piston), the large piston moves very slowly. As the opening of the porthole is enlarged, and the rate of transfer of the oil from above to below (or vice versa) the piston is increased, the movement of the large piston is more rapid. A thumb screw is used for setting the small piston as desired, and a locknut is provided to hold the small piston in place after the desired setting has been obtained.

Resistances:

2.05 The resistances for the d-c. magnet and relay coils of the regulator are of the tubular type mounted in a sheet metal box in the rear of the panel as near to the voltage regulator as possible.

Condensers:

2.06 The condenser furnished with the relay magnet is of the plate type, connected across the relay contacts and mounted on the rear of the panel. When more than one condenser is required, the condensers are connected in parallel.

Potential Transformer:

2.07 A potential transformer with a secondary winding for 110 volts, and a primary winding suitable for the voltage of the associated alternator is used with the a-c. magnet of each regulator. In instances where the voltage of the alternator itself, is 110 volts, a potential transformer is not furnished. The transformer is usually mounted on the rear of the panel or as near to the regulator as possible.

Switches:

2.08 The reversing switches associated with the relay and main contacts of the regulator are of the double-throw, multi-pole, lever type and mounted on the front and near the bottom of the panel. The switches are manually operated. The disconnect switches used to complete the circuit with the associated apparatus are of the single-pole lever type and mounted at the bottom of the panel between the reversing switches. These switches are manually operated.

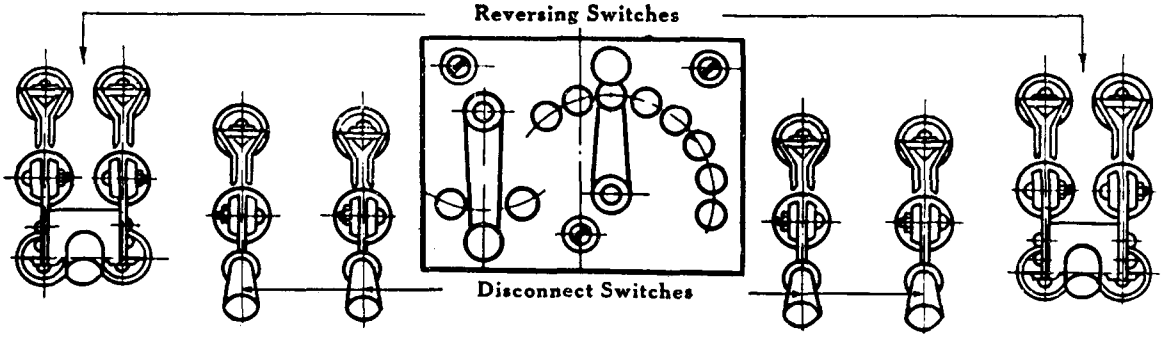

Fig. 7—Switches

Theory of Operation:

2.09 The alternator voltage is regulated indirectly by the rapid opening and closing of a shunt circuit across the exciter field rheostat, thus varying the field excitation of the exciter, which in turn varies the excitation of the alternator. At any constant load and speed, the a-c. magnet core does not actually move, and the regulator acts as a d-c. regulator maintaining the proper exciter voltage to give the correct alternator voltage. Should a heavy load be thrown upon the alternator, the a-c. magnet core will drop slightly. This forces the lower main contact against the upper main contact, which in turn closes the relay contacts. This short circuits the exciter field rheostat, resulting in an increase in the exciter voltage. The a-c. magnet core will move up and down until the exciter voltage reaches a value corresponding to that required to give normal a-c. voltage, when the d-c. side of the regulator operates and maintains this voltage constant. As the load on the alternator drops, the reverse action takes place and the regulator maintains a lower exciter voltage, in order to give the correct alternator voltage. The action of the regulator is continuous.

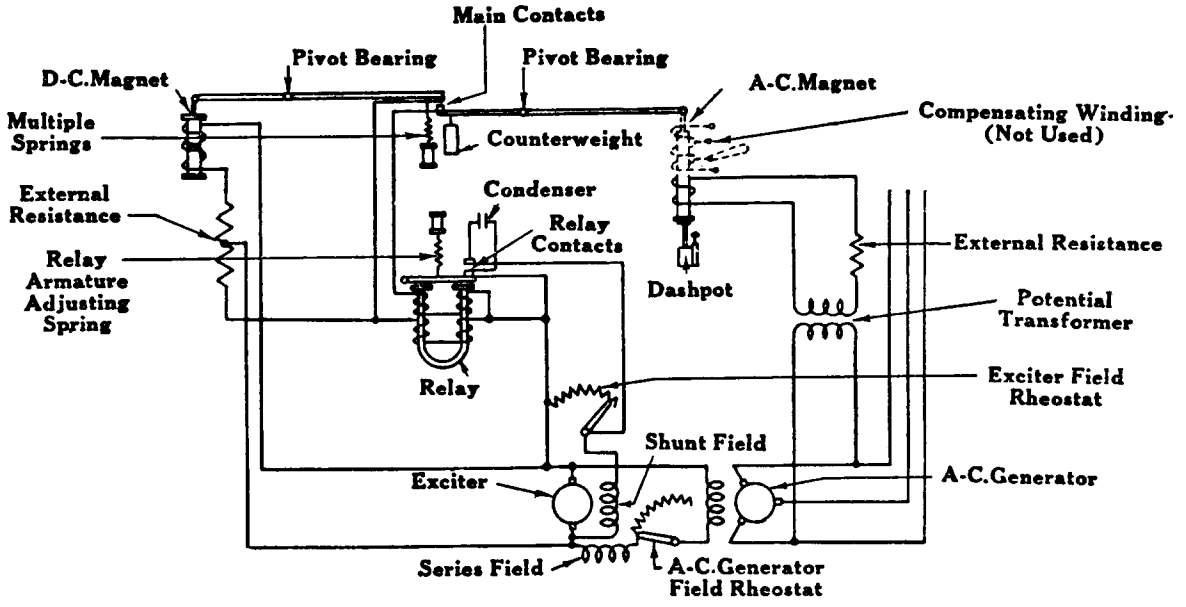

Fig. 8—Wiring Diagram