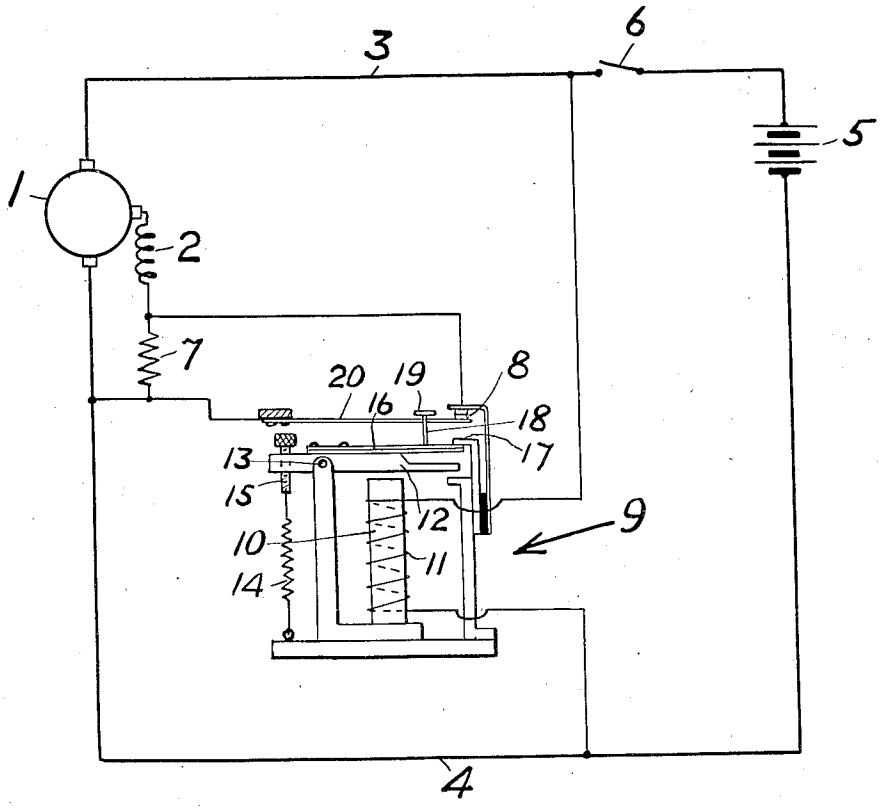
May 22, 1934. F. G. BEETEM 1,960,198

RELAY

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INVENTOR

Frank G. Beetem

BY

Augustus B. Stoughton

WITNESS:

Robt R. Kitchel

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## RELAY

Frank G. Beetem, Philadelphia, Pa., assignor to The Electric Storage Battery Company, Philadelphia, Pa., a corporation of New Jersey

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5 Claims. (Cl. 200—87)

My invention relates to charging apparatus adapted to provide a two rate charge, including means for reducing from the higher to the lower rate in response to the voltage of the battery.

One of the objects of the invention is to provide means whereby the value of the voltage to which the apparatus responds is automatically adjusted for changes in temperature.

In the single figure of the accompanying drawing I have shown diagrammatically one embodiment of the invention applied for the control of the field excitation of a third brush generator such as is commonly employed on an automobile for charging a storage battery.

In the diagram 1 is the charging generator here shown as of the third brush type with its field coil indicated at 2. The generator is connected across the circuit 3, 4 to which the storage battery 5 is connected through a cut out switch 6 which may be of any well known design. In series with the field coil 2 is shown a resistor 7, which is short circuited by the contacts 8 of the voltage responsive relay 9 when these contacts are closed. The voltage responsive relay comprises a magnetic core 10, on which is wound a voltage coil 11 connected across the conductors 3, 4. The armature of the relay is shown at 12, pivoted at 13 and held in a position away from the core 10 by a spring 14 whose tension may be adjusted by means of the screw 15. Mounted on the armature 12 is the bi-metallic thermal responsive strip 16, which is attached to the armature near the pivot 13 and in the upper position of the armature rests at its right hand extremity against the stop 17. The bi-metallic strip 16 is so located that upon increase of temperature its free end will turn upward and because of its contact with the stop 17 will move the armature 12 downward, reducing the air gap between the armature and the magnetic core 10. It will be seen therefore that with increase of temperature the relay will operate to open the contacts 8 at lower voltage than at lower temperatures. The contacts 8 are opened by the pin 18 mounted on the bi-metallic strip 16, and having a head 19 which when the armature 12 is drawn downward engages with the spring member 20, whose outer end carries one of the contacts 8.

From the above description it will be seen that when the generator 1 is connected to charge the battery 5 and the battery voltage is at a voltage below that at which the relay 9 will operate, the resistor 7 is short circuited at the contacts 8 and the generator is operating with maximum field excitation, thus charging the battery at the higher rate. When the voltage of the battery rises to a point at which the relay 9 operates to open the contacts 8, the resistor 7 will be inserted in series with the field winding 2 and the generator voltage will be reduced to the lower value, continuing the charge at the lower rate. During the high summer temperatures, it is desirable to reduce the charging rate from the high to the low at a lower battery voltage than that provided for in cold weather, and the relay 9, as described above, by reason of the action of the bi-metallic strip 16 in changing the air gap of the magnetic circuit automatically provides this adjustment.

I do not intend to be limited in the practice of my invention save as the scope of the prior art and of the attached claims may require.

I claim:

1. An electromagnetic relay comprising in combination a coil, a core in said coil, an armature mounted adjacent said core and having an air gap therebetween, a spring acting on said armature to stress it away from said core, a switch actuated by said armature, a lost motion connection between said armature and said switch, a thermostat mounted adjacent said armature, and a stop in contact with said thermostat so that, upon heating, said thermostat moves said armature closer to said core independently of the position of said switch and changes said air gap.

2. An electromagnetic relay comprising in combination a core, an armature pivotally mounted adjacent said core and having an air gap therebetween, a spring acting on said armature to stress it away from said core, a thermostat fastened on said armature, a stop in contact with said thermostat so that, upon heating, said thermostat moves said armature closer to said core and changes said air gap, a switch actuated by said armature, and a lost motion connection between said armature and said switch.

3. An electromagnetic relay comprising in combination a coil, a core in said coil, an armature mounted adjacent said core and having an air gap therebetween, a spring acting on said armature to stress it away from said core, a thermostat mounted adjacent said armature, a switch actuated by said armature and stressed to closed circuit position and closed when said armature is in extreme position away from said core, a stop in contact with said thermostat so that, upon heating, said thermostat moves said armature closer to said core independently of the position of said switch and changes said air gap, and a lost motion connection between said

switch and said armature for opening said switch when said armature is attracted by said coil.

4. An electromagnetic relay comprising in combination a coil, a core in said coil, an armature pivotally mounted adjacent said core and having an air gap therebetween, means for stressing said armature away from said core, a bimetallic thermostatic strip fastened at one end to said armature, a stop for the free end of said strip adapted to limit the travel of the armature away from said core, said strip in cooperation with said stop being adapted to reduce the air gap upon increase of temperature, a stop for said armature adapted to limit its travel toward the core, a switch arm having a movable member actuated by said armature and carrying a contact, and a fixed contact independent of said stops and adapted to cooperate with said movable contact.

5. In combination in an electromagnetic relay, a magnetic core, an exciting coil for said core, an armature adjacent said core, a support for said armature at one side of said core adapted to permit movement of said armature toward and away from said core to provide a variable air gap between the armature and the core, a thermal responsive bi-metallic strip attached to said armature adjacent said support and arranged to flex its free end away from the free end of the armature with increase of temperature, means for stressing said armature and strip away from said core, a fixed stop at the free end of said strip adapted to limit its travel away from said core whereby said air gap is reduced with increase of temperature when the strip is bearing against the stop, a switch adjacent said armature having normally closed contacts, and means attached to said strip adjacent its free end and adapted to open the switch contacts only after the armature by its motion towards the core has moved the strip away from its stop.

FRANK G. BEETEM.