

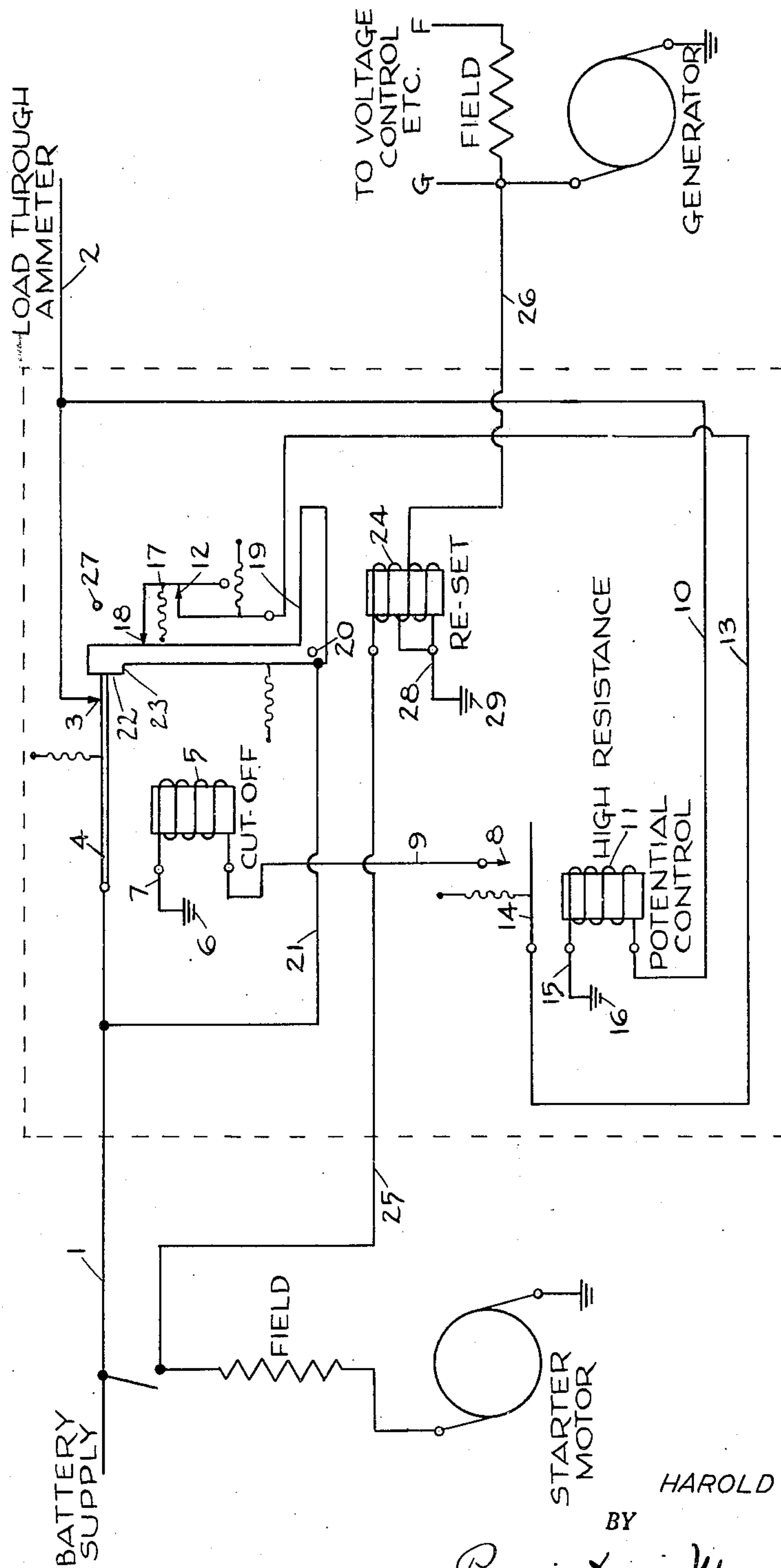
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PROTECTIVE DEVICE FOR AUTOMOTIVE ELECTRIC CIRCUIT

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PROTECTIVE DEVICE FOR AUTOMOTIVE
ELECTRIC CIRCUIT

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2 Claims. (Cl. 171-97)

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This invention relates to a protective device for storage batteries of automobiles and similar systems, and more particularly to a means whereby the load on the battery is disconnected when the engine is not running and when the voltage falls below a predetermined figure.

In carrying out the invention I provide a pair of relays, one of which controls a contact through which all current discharged from the battery must flow, except that used to operate the starter motor. The second relay controls the first relay through suitable contacts to energize it when the voltage falls below a predetermined value. Upon energization of the first relay, the circuit to the load (ignition, lights, etc.) is broken thus preventing further drain on the battery. While the arrangement of the two relays in this manner would suffice to protect the battery from further drain, it is necessary to provide additional means for rendering the second relay inoperative while the engine is running and also for rendering it inoperative during starting of the car to permit supply of current for ignition when starting. The protective system therefore includes a further means whereby the first relay may be disconnected from the source of current through the contacts of the second relay, when the starter motor is used to thus de-energize the first relay and permit the contact to be closed to the load to supply current for ignition, lights, etc. and to restore it to an operative condition when the engine is stopped.

In the accompanying drawing I have diagrammatically illustrated an arrangement of circuits, contacts and relays to carry out the invention. In this showing the reference numeral 1 designates the current supply line from the battery connected to a line 2 extending to the lights, ignition, etc. Line 2 is provided with a contact 3 adapted to be engaged by a movable contact 4, and the contacts 3 and 4 must be closed to supply current to the parts of the vehicle system, with the exception of the starter motor. Contact 4 is controlled by the first relay 5 and when the relay is energized, the contact is drawn downwardly to open the supply of current to the load. Suitable means may be provided for restoring contact 4 to its normal position. One side of relay 5 is connected to a ground 6 by wire 7 and the other side of relay 5 is connected to a contact 8 by wire 9.

A wire 10, which extends from the main feed wire 2, is connected to the second relay 11 and the opposite side of this relay is connected to a ground 16 by lead wire 15. A movable contact

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14 is controlled by relay 11 and is adapted to engage contact 3, extending from the wire 13.

Wire 13 is provided with a stationary contact 12 which engages a movable member 17. The member 17 is provided with a contact 18 and this contact engages an L-shaped arm 19 which is pivoted at 20. The arm 19 is connected to the main feed 1 by a wire 21 as shown. The upper end of the arm 19 adjacent contact 4 is provided with an enlargement 22 forming a shoulder or ledge 23 under which the contact 4 rests when in lowered position. Arm 19 is controlled by a relay 24. The relay 24 is provided with two windings, one of which is connected to the starter motor by a lead wire 25 and to a lead 28 which is connected to ground 29. The other winding is connected to a wire 26 leading to the main generator output terminal as shown, and is also connected to ground 29 by lead 28.

In the operation of the protective device with normal voltage on the battery, the parts are in the position shown in the drawing with the contacts 3 and 4 closed and with contacts 8 and 14 open. Current is thus supplied to the lights, when the lighting switches are operated, and current is available for ignition. Relay 11 is wound with a high resistance winding and maintains contacts 3 and 14 open while the voltage is normal so that no current flows to relay 5. As soon as the voltage drops below a predetermined value, contacts 8 and 14 are closed to deliver current to relay 5 and thus pull the contact 4 downwardly to break the connection to the load. This operation also de-energizes relay 11 which is connected to the load side of lead 2. When the contact 4 moves downwardly, arm 19 swings over to latch it, breaking contact between the arm 19 and the contact 18, thus removing the battery supply connection from relay 5 through contacts 8 and 14 of relay 11, and opening the circuit to the relay 5.

As relay 5 is now de-energized, contact 4 is free to resume its normal closed position upon its release from the latch 23. This is effected by operation of the starter motor. When the operator closes the starter switch current is delivered to the starter motor, relay 24 is energized by battery from starter motor through line 25 and ground 29, but as long as the contacts 3 and 4 are open, the engine cannot start. Relay 24 causes arm 19 to swing in a clockwise direction and allows the contact 4 to assume its normal position to supply current for ignition. The movement of arm 19 continues until the arm engages stop 27 which breaks contact 12 and

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thereby prevents the relay 5 from energizing through contacts 8 and 14. When the engine begins to run and current is removed from the starter motor, current generated by the generator supplies current to relay 24 through lead 26 and ground 29. This holds the arm 19 in its position against stop 27 and therefore prevents energizing of relay 5, but relay 11 is energized from the load side of line 2 and is in condition to operate when the engine is stopped.

When the engine is stopped, relay 24 is de-energized as soon as the voltage generated by generator drops to a predetermined value, which permits arm 19 to move a slight distance counter-clockwise insufficient to break contact 18 but sufficient to close the contact 12, thus connecting battery supply from line 1, to contacts 8 and 14 which remain open. The contacts 8 and 14 remain open, if the voltage is above the minimum value for which the relay is set, and these contacts, being open, keep the relay 5 de-energized. The operation of the system is then normal as long as the voltage remains above the predetermined minimum value but upon a drop in voltage below this figure, the device again functions as heretofore described.

I claim:

1. An ignition and starting system for an internal combustion engine comprising a battery, a generator, a load, a line connecting the load to the battery, a movable contact in the line, a relay controlling said contact, a connection from the relay to the line on the load side of the movable contact, a movable contact in said connection, a second relay controlling said second movable contact, said second relay being connected to the load side of the line to maintain the second contact open and the first relay de-energized when the voltage from the battery is above a predetermined minimum and being de-energized to permit said contact to close and energize the

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first relay upon a drop in voltage, a relay in circuit with the generator, and another movable contact in the line from the first relay to the load side of the line controlled by said last-mentioned relay to disconnect the first relay from the source of current when the generator is running.

2. An ignition and starting system for an internal combustion engine comprising a battery, a starter motor connected to the battery, a generator, a load, a line connecting the load to the battery, a movable contact in the line, a relay controlling said contact, a connection from the relay to the line on the load side of the movable contact, a movable contact in said connection, a second relay controlling said movable contact, said second relay being connected to the load side of the line to maintain said second contact open and the first relay de-energized when the voltage from the battery is above a predetermined minimum and being de-energized to permit said contact to close and energize the first relay upon a drop in voltage, relays in circuit with the starter motor and with the generator, and another movable contact in the line from the first relay to the load side of the line controlled by said last-mentioned relays to disconnect the first relay from the source of current when the generator is running or the starter motor is in operation.

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