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L. P. HUTT

1,944,084

CIRCUIT CONTROLLING DEVICE

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Fig. 1.

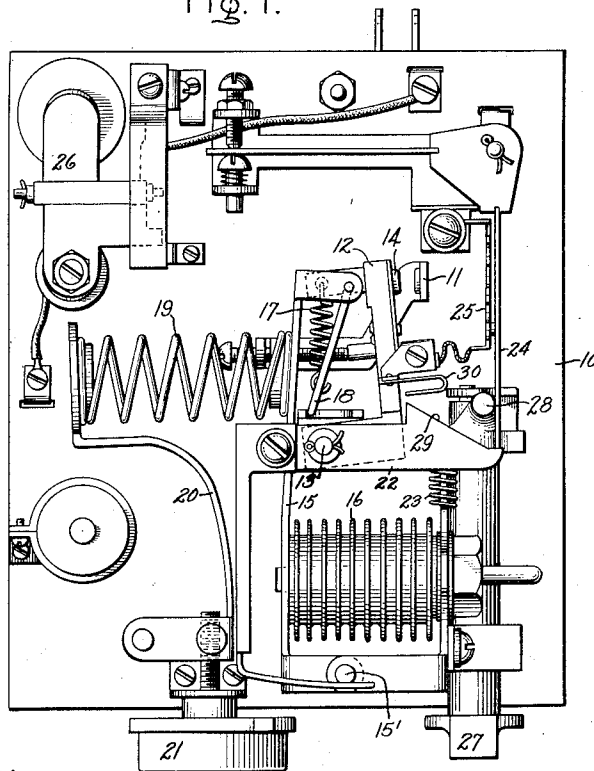


Fig. 2.

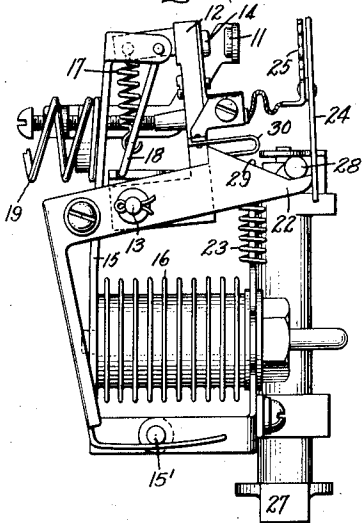
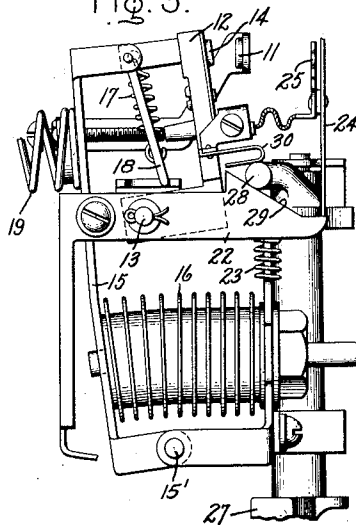


Fig. 3.



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UNITED STATES PATENT OFFICE

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CIRCUIT CONTROLLING DEVICE

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3 Claims. (Cl. 200—81)

My invention relates to circuit controlling devices, more particularly to pressure operated switch mechanisms such as used in connection with refrigerating apparatus.

Automatic circuit controlling devices of the class described are usually provided with a switch mechanism normally biased to the open position. A pressure responsive device in the form of a metallic bellows in response to varying pressures moves the switch from open position to closed position. An overload device is usually provided for causing the switch to be opened upon overload conditions and to be maintained in the open position until the overload device is reset. This is usually done by means of a resetting device in the form of a manually operated lever which returns the overload mechanism to normal position.

In the type of switch described in my copending application, Serial No. 432,204, filed February 28, 1930, and assigned to the same assignee as the present invention, a manually operated handle is provided for positively returning the overload mechanism to normal position. It has been found that where the voltage regulation of the power lines to which the device is attached is poor, more or less frequent tripping of the overload mechanism results. The user of the apparatus upon which this control device is mounted would in many cases tie the resetting handle in the reset position thereby rendering the overload mechanism inoperative which of course would eliminate the protection provided for overload conditions.

The invention of my said copending application was made prior to the present invention and I, therefore, do not herein claim anything shown or described in said copending application which is to be regarded as prior art with respect to this present application.

A principal object of my invention is to provide an improved type of circuit controlling device of the above described class in which the switch cannot be closed manually or automatically so long as the overload reset handle is maintained in the reset position.

In the preferred embodiment of my invention the switch member is operated in the usual manner by means of a metallic bellows device responsive to varying pressures. An overload member biased to move the switch member from closed position to open position is normally maintained in its inoperative position against its bias by means of a thermal responsive strip which releases the biased member upon overload con-

ditions. A handle is provided for returning the biased member to its inoperative position so that it may be re-engaged by the thermal responsive strip when it has returned to its normal position. A spring member attached to the movable switch member is engaged by means of a finger carried by the reset member which maintains the switch in the open position so long as the handle is in the reset position. Thus, if the reset handle is tied in the reset position it will be impossible to close the switch either manually or in response to the varying pressures in the metallic bellows insuring protection of the apparatus under the control of the control device.

Referring to the drawing, Fig. 1 shows a top view of the control mechanism including my invention; Fig. 2 shows a portion of the switch mechanism after the overload mechanism has been tripped in response to overload conditions; Fig. 3 shows the position of the reset mechanism and overload mechanism with the reset handle in the reset position.

In Fig. 1 a base 10 supports the stationary contact 11 of the switch mechanism. A movable member 12 pivoted at 13 carries the movable contact 14. A lever 15 pivoted at 15' and operated by means of the metallic bellows member 16 is operably connected to the movable member 12 by means of spring 17 and link 18 which produce a snap action of the movable contact 14 in a manner well known to the art. A spring 19 biases the lever 15 to the position shown to maintain the contacts 11 and 14 open. The compression in this spring can be varied by means of lever 20 and adjusting knob 21. The overload mechanism comprises the lever 22 pivoted at 13 and biased in a counter-clockwise direction by means of the biasing spring 23. The member 22 is normally held against its bias by means of the thermal responsive strip 24 which has mounted adjacent thereto the grid 25. The grid becomes heated upon overload conditions and causes the thermal responsive strip 24 to bend outwardly to release the end of the lever 22. This permits the spring 23 to rotate the lever 22 in a counter-clockwise direction about its pivot 13 to move the movable switch member 12 to the open position. The rest of the control mechanism shown upon the base 10 is not pertinent to the present invention and is therefore not described except to say that the mechanism shown generally at 26 is a relay.

A reset handle 27 is provided with a finger 28 which cooperates with the beveled portion 29 upon the member 22 to return it to the position

shown in Fig. 1 as will be described below. A relatively stiff spring 30 is carried by the movable switch member 12 and cooperates with the finger 28 to hold the switch member 12 in the open position as shown in Fig. 3 so long as the

5 handle 27 is maintained in the reset position. In Fig. 2 it will be seen that the thermal element 24 in response to overload conditions has moved outwardly and released the end of the member 22 which in response to the biasing spring 23 has moved in a counter-clockwise direction and is engaging the movable member 12 and holding it in the open position. In Fig. 3 the reset handle 27 has been moved to the reset position and the bellows 16 is shown in the position for closing the contacts. However the switch cannot close until the member 22 is again latched into position. The finger 28 cooperates with the beveled portion 29 of the lever or tripping member 22 to rotate it in a clockwise direction to return it to normal position. The thermal element 24 having cooled re-engages the end of the tripping lever 22 to hold it against its bias in the normal position. The finger 28 also cooperates with the spring 30 to hold the movable member 12 in the open position as the finger 28 is moved along the beveled portion 29 and as shown will continue to hold the member 12 in that position so long as the handle 27 is in the reset position as shown in Fig. 3. The bellows 16 cannot move the switch member 12 to the closed position so long as the handle is in the position shown.

It will thus be seen that I have provided a unique and effective device for preventing the switch mechanism from being moved to the closed position so long as the resetting mechanism is in a position to render the overload protective mechanism inoperative.

While I have described my invention in concrete form and as operating in a specific manner in accordance with the provisions of the patent statutes, it should be understood that I do not limit my invention thereto since various modifications thereof will suggest themselves to those skilled in the art without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States, is:

50 1. In a resetting device for a circuit controlling switch, the combination with a switch member movable between open and closed position, a pivot for said switch member, a device responsive to predetermined conditions for moving said switch member to closed position, an over-center spring connected to said device and switch member for obtaining a snap action of said switch member to closed position and for maintaining said switch member biased to closed position when said switch member has been moved to the closed position, a tripping member mounted on the pivot adjacent said switch member for mov-

ing said switch member to open position, said tripping member being provided with a beveled portion, a second spring biased to operate said tripping member to open said switch against the bias of said first spring, a bimetallic element for maintaining said tripping member in inoperative position against the bias of said second spring and responsive to overload conditions for releasing said switch moving member, of a reset member provided with a finger operable into engagement with said beveled portion to return said tripping member to initial position against the bias of said second spring, and resilient means on said switch member engaging said finger for maintaining said switch member in open position against the bias of said first spring as said finger is moved along said beveled portion to reset said tripping member.

2. In a reset mechanism for thermal switches, the combination with a switch member normally movable to open and closed circuit positions, a movable member provided with an inclined portion, means pivotally mounting said movable member for movement into engagement with said member to open said switch, a bimetallic thermal element for normally retaining said movable member in a predetermined position against its bias to provide for independent operation of said switch, a spring carried by said switch member in juxtaposition to said inclined portion, of a reset member provided with means movable in one direction to release said movable member and movable in another direction into engagement with said inclined portion for operating said movable member to said predetermined position and concurrently therewith for simultaneously engaging said spring so as to maintain said switch member in its open circuit position.

3. In a reset mechanism for thermal control switches, the combination with a switch member normally movable to open and closed circuit positions, circuit opening means for independently moving said switch member between said positions, a tripping member provided with an inclined portion arranged to be movable into engagement with said switch member to open said switch, means for biasing said tripping member in a direction to open said switch, a bimetallic thermal element for normally retaining said tripping member in a predetermined position against its bias, of a reset member provided with means rotatable in one direction to release said tripping member for said bimetallic element and rotatable in the opposite direction into engagement with said inclined portion so that as said means is moved up said inclined portion said tripping member is returned to said predetermined position, said means at the same time engaging said spring to bias said switch member to the open circuit position.

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