July 17, 1928. 1,677,334

B. E. GETCHELL

THERMOSTATIC OVERLOAD SWITCH

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Fig. 1.

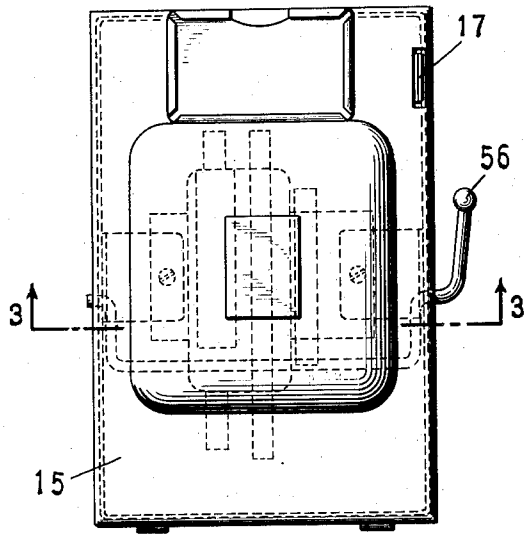


Fig. 2.

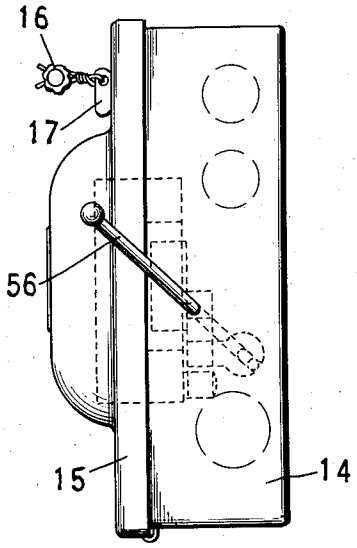


Fig. 4.

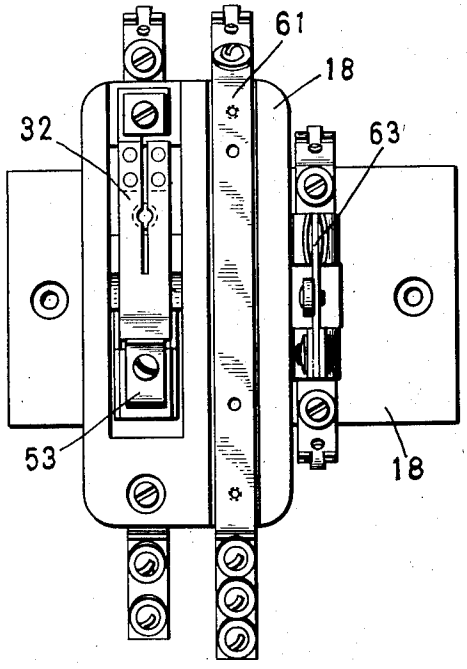
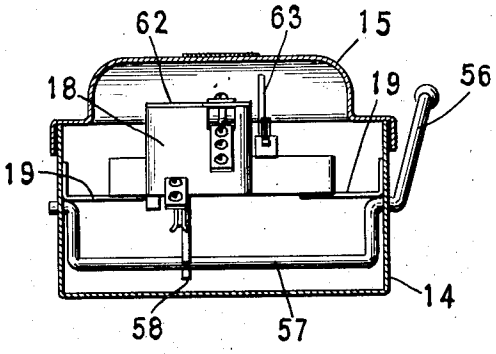


Fig. 3.



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Fig. 5.

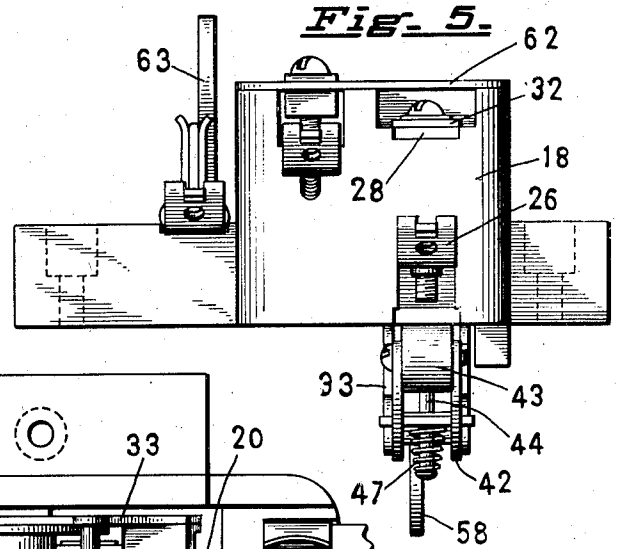


Fig. 6.

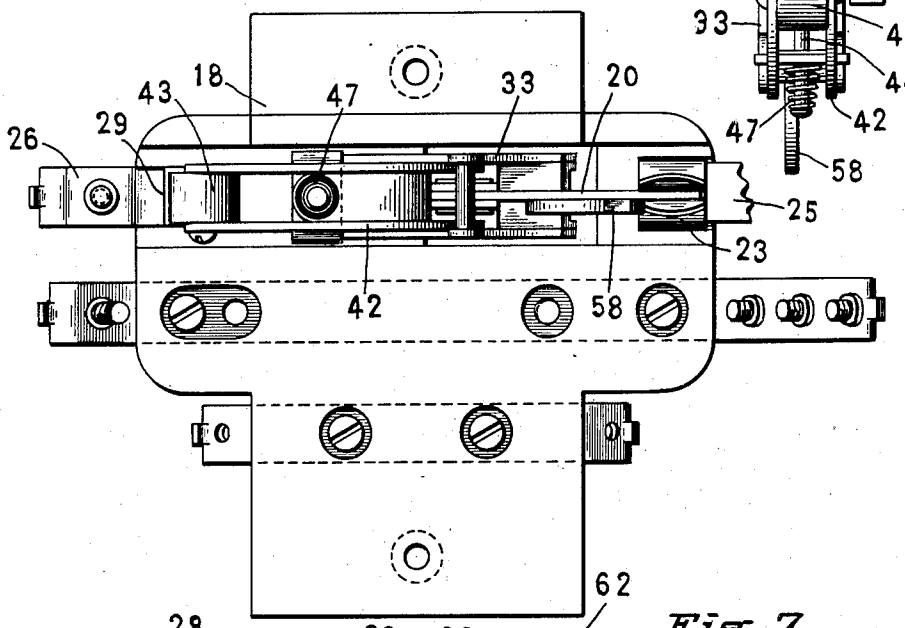
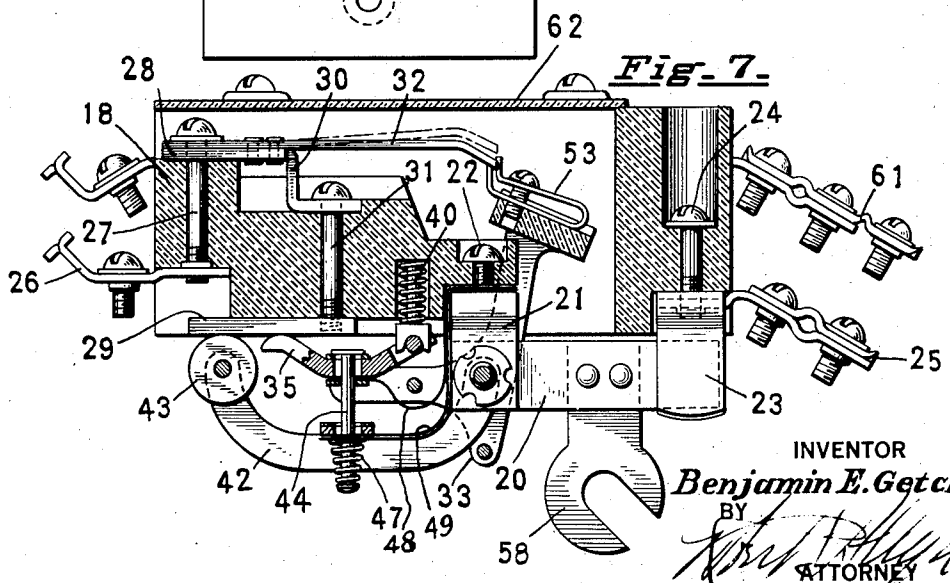


Fig. 7.



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Fig. 8.

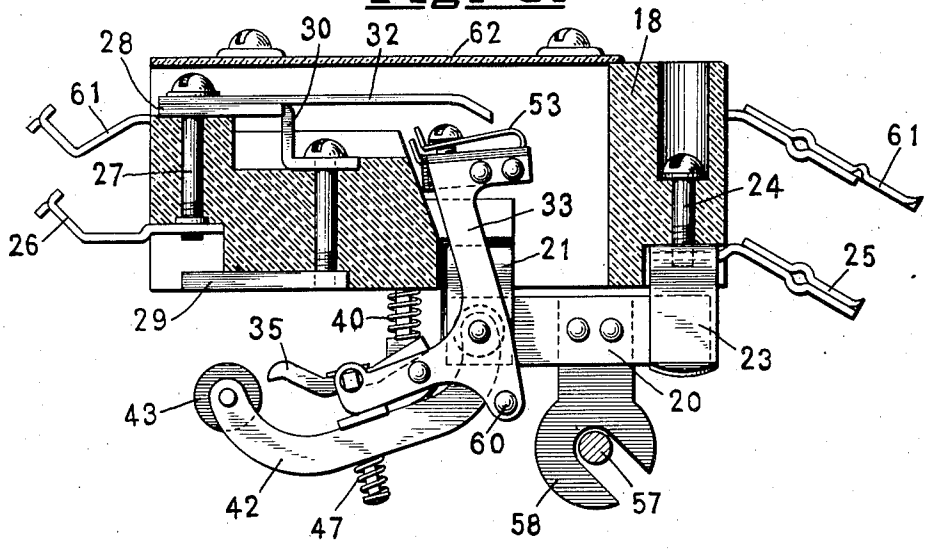
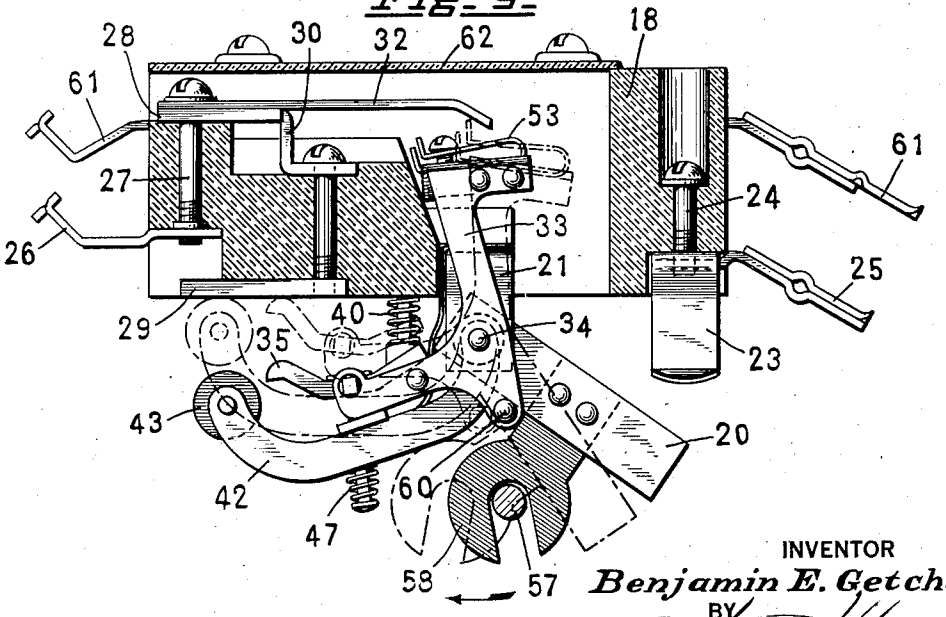


Fig. 9.



INVENTOR

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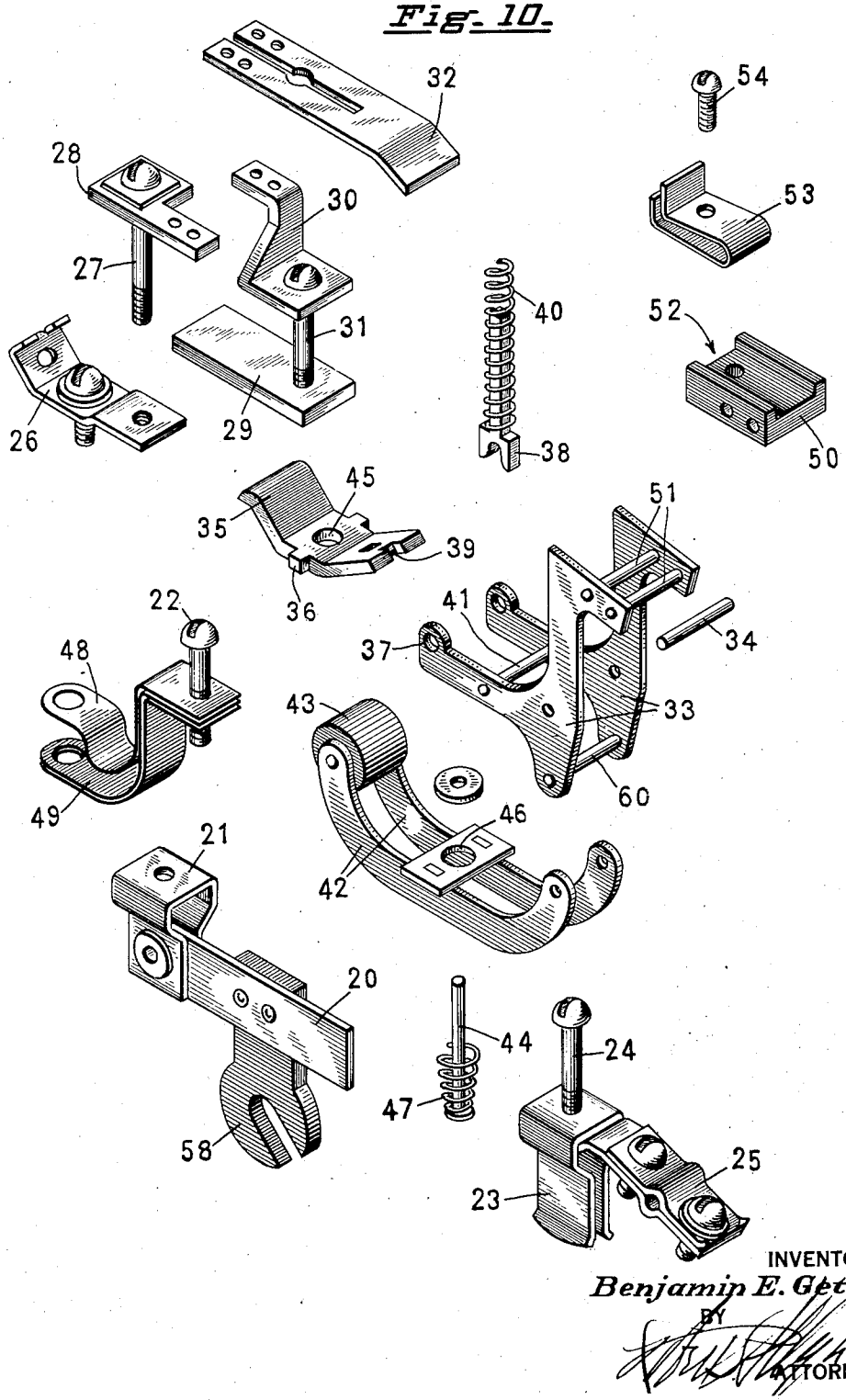
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Fig. 10.



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Patented July 17, 1928. 1,677,334

UNITED STATES PATENT OFFICE.

BENJAMIN E. GETCHELL, OF PLAINVILLE, CONNECTICUT, ASSIGNOR TO THE TRUMBULL ELECTRIC MANUFACTURING COMPANY, OF PLAINVILLE, CONNECTICUT, A CORPORATION OF CONNECTICUT.

THERMOSTATIC OVERLOAD SWITCH.

Application filed April 10, 1926. Serial No. 101,024.

My invention relates to automatic switches of the fuseless type and particularly to safety switches or enclosed switches provided with externally accessible means for operating the switch.

One object of the invention is to provide a switch of this character which will automatically open the circuit on an overload or abnormal surge in the circuit and yet which may be reset without requiring the insertion or removal of fuses.

Another object is to provide a manually operable main switch together with an auxiliary switch the latter being operable only in the event of an overload or excessive surge.

Another object is to provide an enclosed switch construction in which there is an automatic means for opening the circuit and also a main switch together with mechanism embodying a single external handle by means of which the main switch may be normally operated and also by means of which the auxiliary switch may be reset without opening the enclosing box.

Another object is to provide a switch of this character having a main circuit breaking element and an automatic auxiliary switch element, the latter being operable on overload conditions independently of the main element and in spite of any ordinary attempt to hold the circuit closed.

Another object is to provide a construction of this character in which the auxiliary element may be reset by the main element after a brief interval of time.

Another object is to provide a construction of the character described which may be reset to the protective position by a simple normal switch opening and closing operation of the main switch operating means.

Another object is to provide a switch of this character in which the auxiliary switch can only be closed after the main switch has been opened.

Another object is to provide a switch of this character in which there is a sufficient time lag in the auxiliary element to allow for a reasonable surge in the circuit without releasing the auxiliary switch.

Another object is to provide, in a switch of this character, means for readily and accurately calibrating the point at which the auxiliary switch is operated.

Another object is to provide rubbing or self-cleaning contacts and an independently movable arc rupturing contact to protect the main contact.

Another object is to provide a construction which can be readily adjusted and calibrated by the manufacturer or other authorized person but in which the adjustment and calibration is not accessible to the customer.

In detail I have sought to combine the elements in a safety switch, the construction of which is simple, compact and rugged, and yet practical and reliable.

In carrying out these objects in the preferred arrangement, I provide a manually operable main switch and an auxiliary switch which are connected together and enclosed in a suitable box, the main switch having an external operating member and the auxiliary switch having a thermostatic tripping latch with means for calibration so that it will automatically operate on a given overload condition.

Fig. 1 is a front view of a construction embodying my invention, indicating in dotted lines the interior parts with the switch in the closed circuit position.

Fig. 2 is a side view of the same.

Fig. 3 is a transverse sectional view on the plane of the line 3—3 of Fig. 1, looking in the direction of the arrows.

Fig. 4 is a front view of the switch and its supports removed from the box.

Fig. 5 is an end view of the switch parts.

Fig. 6 is a rear view of the base and the switch parts mounted thereon.

Fig. 7 is a longitudinal sectional view showing the parts in the normal closed circuit position with the thermostatic element also shown in dot and dash lines as warped to release the auxiliary switch.

Fig. 8 is a longitudinal sectional view similar to Fig. 7 but with the auxiliary switch in the open circuit position.

Fig. 9 is a similar longitudinal sectional

view showing the main switch open and also showing, in dot-and-dash lines, an intermediate position which the parts occupy when resetting the switch.

Fig. 10 is a perspective view showing the various parts of the switch separated.

The box 14 may be of any suitable type and provided with a cover 15 which may be hinged, for instance, at the bottom and it may be sealed in any suitable manner, as, for instance, by means of a seal 16 interlocked with the latch 17.

The conducting parts are carried by an insulating body 18 secured to brackets 19 which project inwardly from the sides of the box. The body and brackets are arranged so as to leave space for the movable parts of the switch and for the conducting wires.

The main switch consists of a blade member 20 hinged on a tubular bearing in the bracket 21 which is secured to the base by the screw 22. The movable end of the switch blade member 20 is adapted to engage the usual switch contact jaws 23 which are secured to the base by a screw 24. One of the circuit terminals 25 is also secured in place by the screw 24. The other circuit terminal 26 is secured to the base by a screw 27 which also secures a block 28.

The contact plate 29 and the bracket 30 are secured to the base by a screw 31. A bimetallic thermostatic latch member 32 is bifurcated at one end so as to provide two arms which are riveted or otherwise rigidly secured, respectively, to the block 28 and the bracket 30.

The frame 33 is pivoted on the pin 34 which passes through the hub or tubular bearing of the switch blade 20. A contact shoe 35 has projections 36 which are pivoted in the bearings 37 in the frame 33. A forked rod 38 engages the bridge 39 at one end of the contact member 35 and the parts are under pressure of the spring 40 tending to press one end of the contact member 35 against the abutment 41.

An arm 42 formed preferably of two side plates pivoted on the pin 34 carries a contact roller 43 at its opposite end adapted to engage the contact plate 29. A rod 44 passes through the opening 45 in the contact shoe 35 and through the opening 46 in the cross-piece of the arm 42 and has a spring 47 on its outer end tending to draw the contact member 35 and the arm 42 toward each other. A flexible conducting jumper or strip 48 connects the base of the member 21 to the contact shoe 35 and a similar flexible conductor 49 is connected to the cross-piece of the arm 42 so as to insure good electrical conductivity. An insulating block 50 is secured in the lever frame 33 by one or more pins 51. This block is grooved at 52 to receive the spring latch member 53 which is secured in place by a screw 54. The outer end of the latch member 53 is adapted to engage the movable end of the thermostatic member 32 and to hold the parts in their normal operative position, at which time the circuit may be traced as follows in Fig. 7—terminal 25, jaws 23, switch blade 20, support 21, conducting strips 48 and 49 to contacts 35 and 43, respectively, contact plate 29, screw 31, bracket 30, thermostatic arm 32, block 28, screw 27, and terminal 26. When there is an overload, the member 32 is warped by the heat produced so that it is disengaged from the catch 53. This releases the frame 33 and allows the springs 40 and 47 to operate and throw the switch parts to the position shown in Fig. 8, thus opening the circuit and the auxiliary switch by breaking the circuit when the contacts 43 and 45, respectively, leave the contact plate 29.

The main circuit, through the switch member 20, may also be opened by the operation of the handle 56 which has a crank 57 pivoted inside of the box and passing through the insulating arm 58 which is secured to the switch member 20. To open the main switch, it is simply necessary to swing the handle 56 from the usual upper to lower position.

After the switch has been operated automatically, it can be reset by the operation of the handle 56 in a manner corresponding to the usual manual switch opening movement. The switch blade 20 engages the pin 60, which is carried by the frame 33 and swings the frame from the full line position of Fig. 9 to the dot-and-dash line position. This, of course, carries with it the contact shoe 35 and the arm 42 and contact roller 43 until the catch 53 engages the thermostatic member 32 and is thus latched in position. The exact point at which the catch 53 will release the auxiliary switch may be determined and adjusted by tightening or loosening the screw 54.

Any number of these switch units may be mounted side by side to take care of the desired number of circuits in the single box. In the form shown, a circuit member 61 extends from end to end of the insulating body.

For convenience in circuit testing, a supplementary switch 63 may be provided at one side of the insulating body. By properly designing the thermostatic element 32 and adjusting the catch 53, the proper time lag may be provided so that the switch will stand the usual momentary surge difference.

I claim:

1. The combination of a pivoted main switch member, a switch frame pivoted coaxially therewith, a thermostatic element for normally latching said switch frame against

opening movement except on overload circuit conditions, and a contact member carried by said switch frame.

2. The combination of a pivoted switch frame, a thermostatic element for latching said frame in operable position, a hinged switch arm, a contact member pivotally carried by said arm, spring-pressed means for drawing said contact member and said arm toward each other, and spring-pressed means for operating said arm.

3. The combination of a pivoted switch frame, a thermostatic element for latching said frame, a contact member pivoted to said frame, a spring for moving said contact in one direction, a contact arm and means of connection between said arm and said contact member.

4. A main switch member, a switch frame movable independently thereof, an auxiliary contact carried by said frame, and a thermostatic element normally latching said frame against movement except in response to an overload in the circuit.

5. The combination of a main switch blade and two switch contacts having a resilient connection and hinged with respect to said main switch blade, and a thermostatic element for latching said switch members in closed circuit position.

6. A spring pressed switch member, a normally inactive thermostatic member adapted to normally hold said switch member in a closed circuit position, and a hand operable switch in series with said spring pressed member and said thermostatic member for resetting said spring pressed member without closing the circuit through said hand operable switch.

7. A spring pressed switch member, a normally stationary latch member for holding said switch member in a closed circuit position, thermally operable means for retracting said latch member in case of an overload, a manually operable switch in series with said spring pressed member and said latch member for resetting said spring pressed member and a switch contact having a free motion connection with said spring pressed member.

8. A spring pressed switch member having an insulating block, an adjustable calibrating catch carried by said block and a thermostatic member to engage said catch to normally hold said switch member in closed circuit position and to release said switch member on a predetermined overload in the circuit.

9. A spring pressed switch member having an insulating block, an adjustable calibrating catch carried by said block, a thermostatic member cooperating with said catch to hold said switch member closed under normal circuit conditions and a hand operated switch member for resetting said spring pressed switch member without closing the circuit through said switch members.

10. The combination of a switch frame having a calibrating catch, a thermostatic element adapted to engage said catch, a switch contact carried by said frame, a manually and normally independently operable switch element, and means of connection between said frame and said element for permitting said switch to automatically open in response to an overload in the circuit and to be manually reset and permitting said switch frame to move to off position independently of said manually operable switch element.

11. The combination of an insulating body, a contact plate and a thermostatic element carried by said body, a switch frame having a contact engaging said contact plate, and having a catch co-acting with said thermostatic element to prevent circuit opening movement of said frame except when automatically released by means of an excessive overload in the circuit, and a manually operable switch member for normally controlling the circuit and for resetting said frame.

12. A spring actuated switch member, a thermostatically operable latch normally in circuit therewith for holding the switch member in closed circuit position, a manually operable switch member for opening and closing the circuit independently of the spring actuated switch member and means of connection between said switch member by which after release by the latch member the spring actuated switch member may be reset by the manually operable switch member.

13. A manually operable main switch for normally controlling a circuit in combination with an auxiliary overload switch comprising a spring pressed switch member together with appurtenant contacts, a thermostatic latch to normally hold said auxiliary switch in closed circuit position and to automatically release said auxiliary switch on a predetermined overload in the circuit and means of connection between said switches whereby the circuit normally passes through both switches.

14. A manually operable main switch for normally controlling a circuit in combination with an auxiliary overload switch comprising a spring pressed switch member together with appurtenant contacts, a thermostatic latch to normally hold said auxiliary switch in closed circuit position and to automatically release said auxiliary switch on a predetermined overload in the circuit and means of connection between said switches whereby the circuit normally passes through both switches, said switches being operable independently whereby the circuit may be opened through either of said switches.

15. The combination with a manually operable main switch, of an auxiliary protective switch, together with appurtenant contacts for said switches, a thermostatic latch to hold said auxiliary switch in an inactive position on normal load conditions and to release said auxiliary switch on a predetermined overload and means of connection between said switches whereby the circuit may be opened by the opening movement of either of said switches and whereby the said auxiliary switch may be moved to closed position by the opening movement of said manually operable switch.

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