

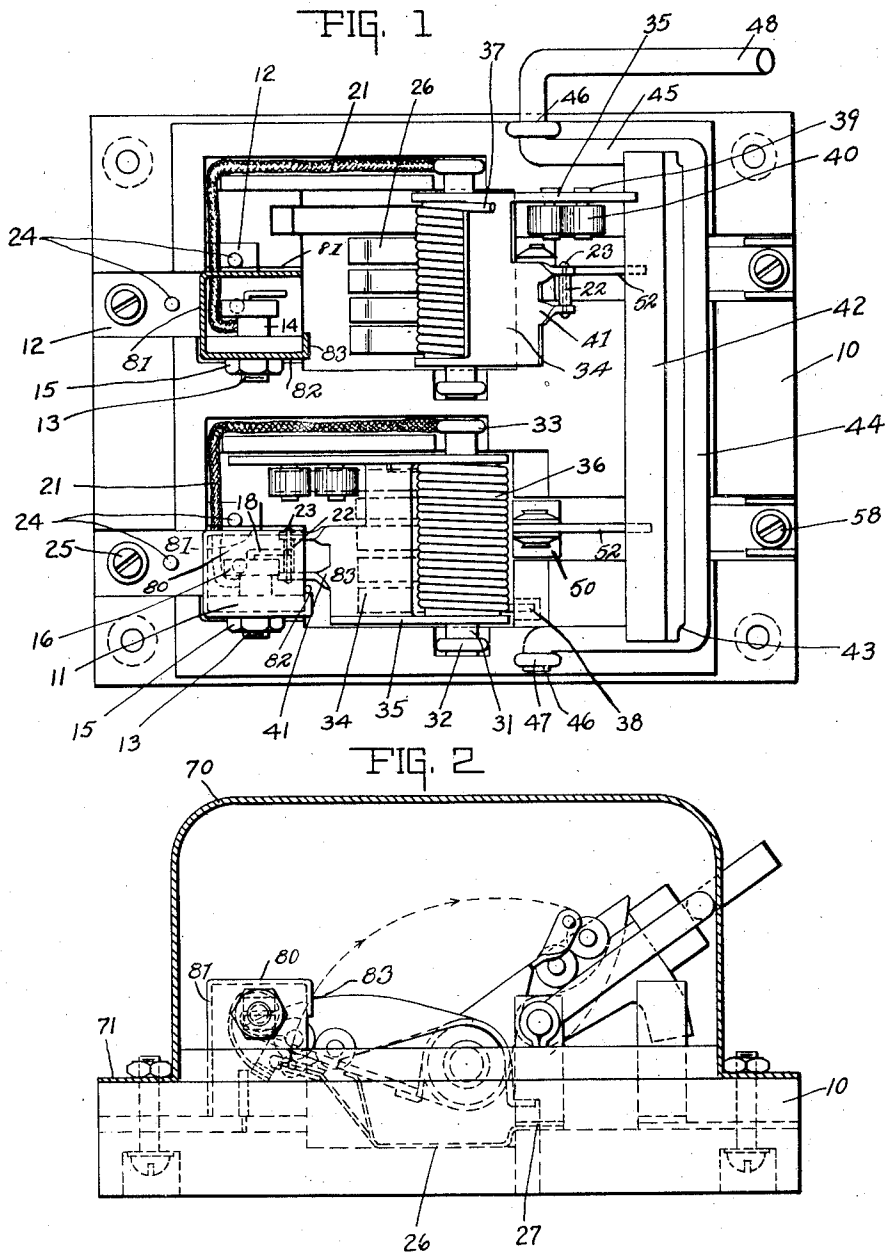
June 30, 1931.

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1,812,162

THERMOSTATIC CIRCUIT BREAKER

Original Filed Sept. 25, 1922 3 Sheets-Sheet 1



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FIG. 3

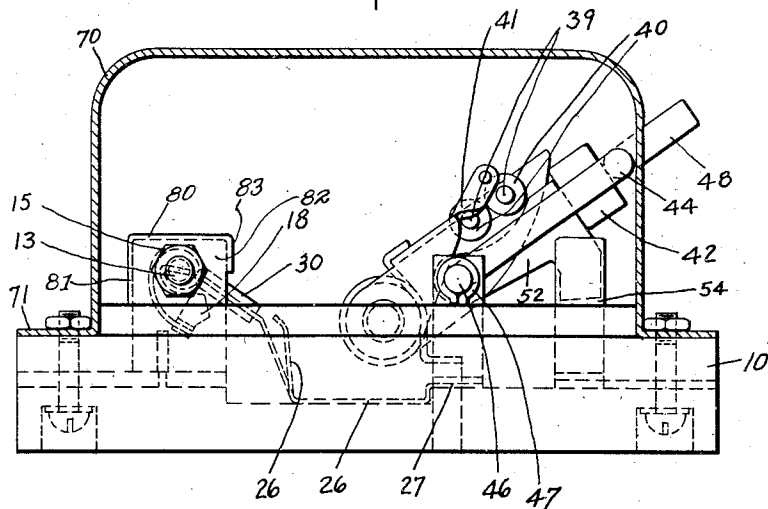
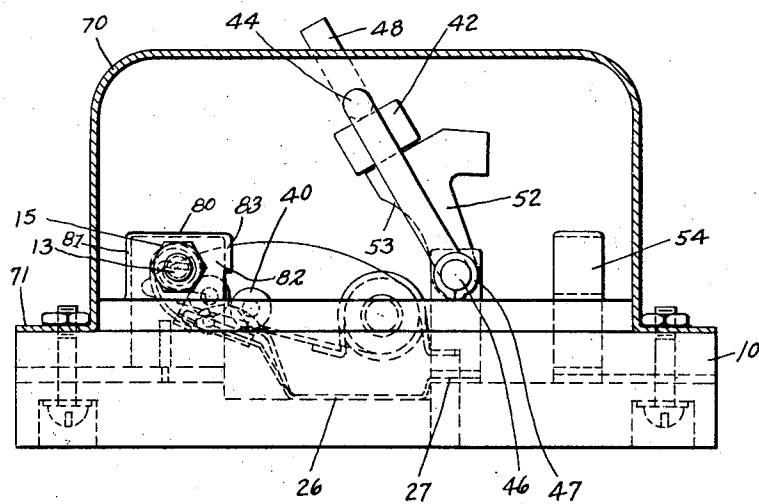


FIG. 4



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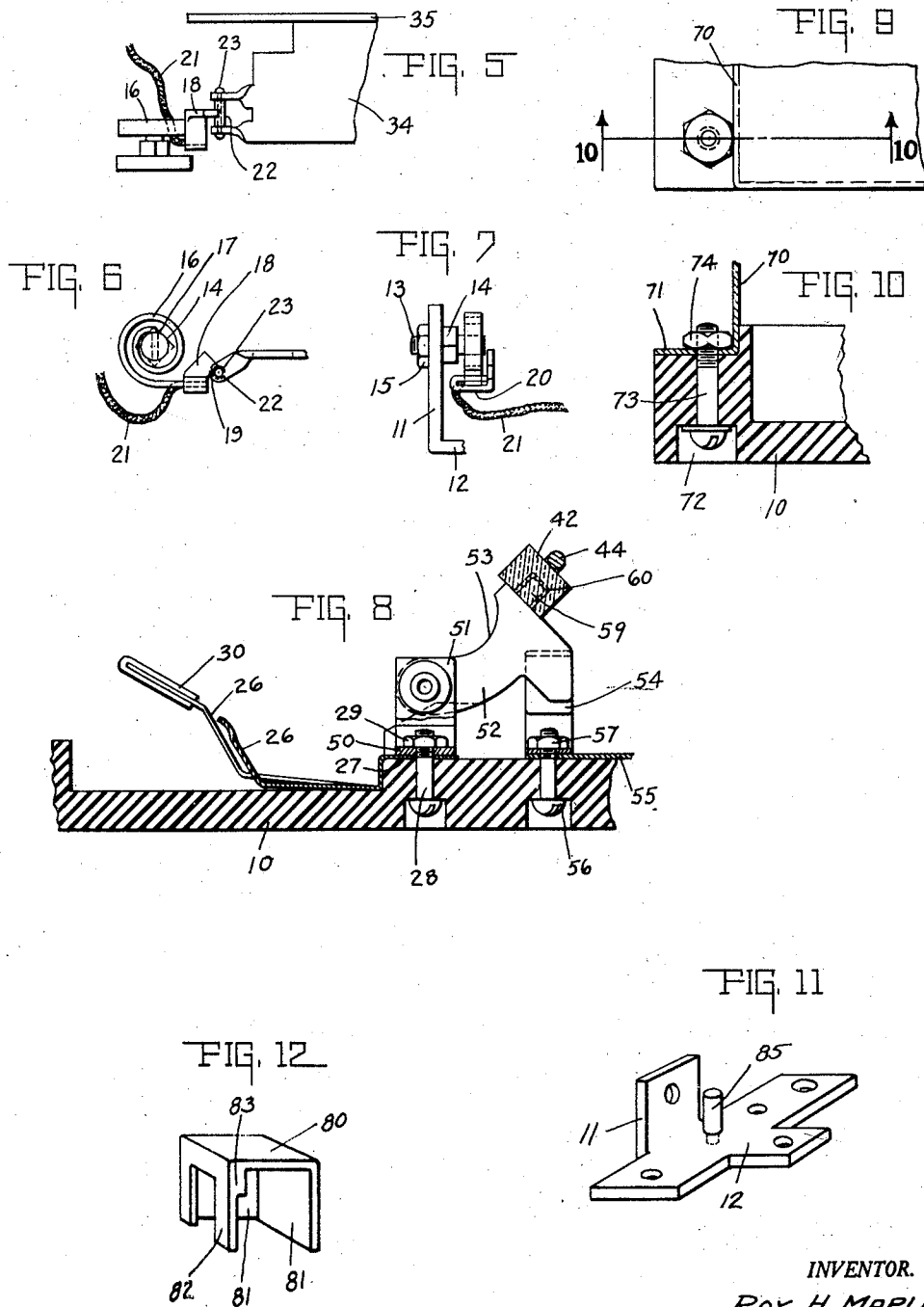
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THERMOSTATIC CIRCUIT BREAKER

REISSUED

Application filed September 25, 1922, Serial No. 590,237. Renewed November 10, 1930.

This invention relates to improvements in circuit breakers.

The chief object of this invention is to provide a circuit breaker which is of low capacity so that the same is adapted to replace the present fuse construction.

Another object of the invention, and probably the most important, consists in constructing the device in such a manner that the usual line switch associated with the fuse is replaced by a combination thermally controlled switch, which is positively protective in its action in that as long as the load is on the line the circuit cannot be permanently closed.

Another object of the invention is to construct the device in such a manner that the elements thereof are not releasable when subjected to excessive vibration.

A further object of the invention is to construct the same in such a manner that the device may be enclosed to prevent any access whatsoever to the mechanism, unless the complete switch mechanism is entirely removed from the circuit by prior removal from its support.

The full nature of this invention will be understood from the accompanying drawings and the following description and claims.

In the drawings Fig. 1 is a top plan view of the invention showing the same as a two pole switch construction with one switch construction in the closed circuit position and the other in the open circuit position. Fig. 2 is a cross sectional view. Fig. 3 is a similar view showing the thermally controlled parts in the open circuit position and the manually controlled parts in the closed position. Fig. 4 is a similar view showing the thermally controlled parts in the closed circuit position and the manually controlled parts in the open circuit position. Fig. 5 is a top plan view of the thermal member and the catch and latch associated therewith. Fig. 6 is a side eleva-

tional view of the same. Fig. 7 is an end elevational view of the same. Fig. 8 is a cross sectional view showing the details of mounting a portion of the switch mechanism. Fig. 9 is a top plan view of a portion of the cover and supporting base showing the means for securing the same together. Fig. 10 is a central sectional view taken on the line 10—10 of Fig. 9 and shows the same construction. Fig. 11 is a perspective view of the thermostat support and travel limit means. Fig. 12 is a perspective view of the thermostat protective cover.

In the drawings 10 indicates an insulating base provided in the present instance with a pair of thermally controlled devices, and a pair of switches associated therewith, the switches and the thermally controlled device being manually operable by a common member, in a manner hereinafter to be described. While a plurality of similar units are herein illustrated, the invention is not to be limited to a plurality, but may be constructed of a single thermally controlled device and a single switch or a plurality of each.

Since the thermally controlled devices are substantially identical, a description of one will suffice for them both. Reference may also be had to the co-pending application Serial No. 555,274, and in said application various details and the specific operation of the thermally controlled means are described in detail. A standard 11 having the base portion 12 suitably supports the stud 13 which is adjustably positioned in said standard by means of a tool engageable portion 14 and the lock nut 15. The portion 14 permits the stud to be engaged by a suitable tool and said stud may be turned in the bracket into the desired position to secure a predetermined amount of movement upon the passage of a predetermined current through the thermally responsive element herein shown in the form of a thermostat 16, which is coiled and has its inner end 17 secured in the slotted end

of the stud 13, see Figs. 5, 6 and 7. When stud 13 is adjusted it is permanently secured as by soldering. The other end of the thermostat is provided with a catch portion 18 having the retaining edge 19 and the supporting portion 20. The supporting portion 20 is not only secured to the front end of the coil thermostat, but also secures one end of a shunt or pig tail member 21. The particular angular position and form of the edge 19, when associated with a roller 22 carried by the pin 23, is such that said catch retains said roller in the latched position even under extreme vibratory conditions and the passage of current through the thermostat of slightly less value than the normal operative current of the thermostat. In operation the passage of the current through the thermal member 16 extends said thermal member and the retaining member 18 is withdrawn rearwardly or rather outwardly from the roller 22 and the movement is also such that the member 18 is moved downwardly as well. The roller rests upon the edge 19 until it is free from the retaining member 18 and, thereafter is released and moved upwardly with a support associated with the pin 23 and hereinafter to be described.

The base 12 supporting the standard 11, is suitably secured to the insulated base 10 at at least three points indicated by the numerals 24. This three point support insures absolute rigidity of the standard 11, whereby exactness and certainty of operation is secured. The base 12 is extended, as shown clearly in Fig. 1 and carries a terminal 25, whereby current carrying means is secured to said base. This terminal 25 is connected to the load side of the circuit.

The particular switch construction controlled by the thermal construction comprises a plurality of spring contact fingers 26 suitably secured, as shown in Fig. 2, to the base 10 at 27 and by the bolt and nut means 28 and 29 respectively. One of the spring fingers 26 carries an arc resisting protective member 30. The spring finger contacts 26 are connected to the live side of the line of the circuit.

Upon the particular pivot 31 suitably secured to the base 10 by means of the cotter pins 32 and 33 is a U-shaped plate 34 having the side portions 35 which are apertured to receive the pivot 31. Between the ears or sides 35 of the plate 34 and concentric with the pivot, is a coil spring 36, which has one end 37 bearing upon said side member 34 and the other end 38 suitably secured to or bearing upon the base 10 so that said coil spring normally tends to maintain the plate member 34 in the open circuit position. The side wall 35 of the plate member 34 pivotally supports at 39 a contact roller 40. Herein a pair of said rollers is illustrated in tandem, but it is to be understood that if desired a roller may

be associated with each of the side walls 35, or the number of rollers may be increased or diminished or other contact arc resisting means substituted therefor. The roller 40 engages the arc resisting contact member 30 and contacts the arc when the switch is open or closed. The plate 34 is provided with two forwardly extending arms 41 which are twisted and drilled to form a pair of bearings for the pin 23 carrying the roller 22. When the plate member 34 is caused to close the circuit by means of the roller 40 engaging the contact 30, current is transmitted from said plate member 34 to the plate 12 by means of the pig tail or shunt construction 21, which is electrically connected with the plate 34. By reason of the coil construction the thermostat moves outwardly to permit the roller 22 to pass and be latched thereby.

Suitable means for manually closing the thermally controlled switch comprises an insulating block 42 each end of which is grooved at 43 to be secured to a U-shaped handle 44 having the arms 45 which are provided with trunnions 46 pivotally supported by the cotter pins 47. One trunnion 46 is extended and forms a handle 48 whereby the insulated member may be moved into engagement with the plate 34 for closing the thermally controlled switch. The side walls 35 of the plate 34 engage the insulated member 42 as shown clearly in Fig. 2 and as shown in Fig. 4, said insulated member 42 is adapted to move the plate 34 into closed circuit position.

Reference will now be had to Figs. 1 to 4 inclusive and Fig. 8. In said Figs. a U-shaped current conducting member 50 is simultaneously secured to the base 10 with the spring finger 26 and is in electrical connection therewith. The U-shaped member 50 is provided with two inwardly extending parallel ends which pivotally support a switch plate 52. The switch plate 52 is herein shown cut away at 53 to form an arcuate edge for clearing coil spring 36 when latching the thermal switch member. Positioned in alignment with the switch plate 52, is a spring contact of any usual or preferred form 54, which is suitably secured to a contact strip 55 by means of the bolt and nut 56 and 57 respectively, thereby maintaining said switch contact and the contact strip 55 upon the insulated base 10. The contact strip 55 terminates in a terminal 58 substantially similar to the terminal 25 and said terminal 58 is adapted to be connected to the current supply line and, therefore, the live side of the line. The contact switch plate 52 is provided with a projecting portion 59 and the insulated member 42 is provided with an opening 60 adapted to receive the projecting portion 59.

From the foregoing it will be observed that the insulating member 42 is rigidly secured in position by means of the U-shaped handle 44

and the contact plate or plates 52. It will also be noted that in order to close the thermally controlled switch it is necessary to open the circuit between the switch plate 52 and the contact 54, and after said switch has been closed in order to supply current to the circuit, the handle 44 must be moved into the opposite direction, as shown in Figs. 2 and 8, and close the circuit through the switch plate 52 and contact 54. If the abnormal circuit conditions persist, current will again pass through the thermostat and release the switch controlled thereby and thereby prevent the passage of current to the load. Thus, the load will be protected at all times. In order to close the thermally controlled switch, after the second operation thereof, it is again necessary to open the main line switch including the plate 52 and contact 54 and thereby open the whole circuit in order to close the thermally controlled switch. So long as the abnormal condition exists in the load circuit it is impossible to supply current to the load circuit without having the thermally controlled switch operate.

With the foregoing construction it will be realized that the device is absolutely fool proof so far as a single line is concerned and the device is adapted to replace the fuse and switch construction now employed as standard wiring members. It will, of course, be understood that the capacity of the switch is determined by the kind and amount of material and the construction of the thermostat. All of the current passes through the thermostat, although, if desired, the thermostat may be shunted and a portion of the current pass through the shunt.

In the drawings there is illustrated a double switch construction which may be utilized in direct current wiring or single phase alternating current wiring system. The generic idea of the invention is shown herein, which may be briefly stated as non-closing, load in the line switch, may be extended to multiple phase alternating current system without departing therefrom, but such an extension co-operative arrangement between the phases forms no part of the present invention, but is reserved for subsequent application.

A further feature of the invention is to make the same fool proof, in that it is always desirable to prevent tampering or unauthorized interference with the switch construction. A cover 70 is provided which is suitably apertured to permit the handle 48 to extend through said cover and the cover 70 is provided with a flange portion 71 and, as shown clearly in Figs. 2, 3, 4, and 10, the base 10 is apertured at 72 and in said aperture there is secured a bolt 73 which is associated with the nut 74 which is provided with a flat face, said face engaging upon the side of the cover 70. The nut thus is held against rotation by the cover. Likewise the cover, when secured to

the base 10 by means of the bolt 73, cannot be removed from said base without first removing the base 10 from its support. Under the underwriters' present wiring requirements, a grounded cabinet must be provided and said grounded cabinet is so constructed that the line wire and the load wire must be disconnected from the switch construction supported by the base 10 before said base can be removed from said cabinet. The removal of the cover 70 from the base 10, to permit access to be had to the switch construction, necessitates the removal of base 10 from its support to get at bolt 73. Only a competent electrician will follow the foregoing inconvenient procedure, and this is what the device is intended to insure, as well as automatically protect the load circuit.

In order to fully protect the catch, thermostat and the mounting thereof, a cap is provided, said cap comprises a top portion 80, a pair of adjacent depending walls 81 and an apertured side wall 82 with a retaining portion 83. Said cap construction is adapted to substantially enclose the thermostat member 16 and yet permit the latch to be associated with the catch portion. The nut 15 secures the cap 80 to the stud 13, and preferably is soldered to the standard 11 when said stud 13 and nut 15 are soldered thereto, thereby forming a rigid joint.

To prevent excessive movement of the thermostat, thus permanently deforming the same, a stop member 85, see Fig. 11, is provided which is suitably secured to the plate 12 and limits movement as indicated in Figs. 1 to 4 inclusive.

The invention claimed is:

1. An electric switch construction including in combination a plurality of thermally operable switches, each having a current conducting and movable switch controlling member, a plurality of manually operable switches each in series with one of the other switches, and a single common means differentially associated with both types of switches at the same time.

2. In an electric switch construction the combination of a plurality of manually controlled switches, a plurality of thermally controlled switches each having a current conducting and movable switch controlling member and being each in series with one of the other switches, and a single common means associated with all of said switches for closing the same.

3. In an electric switch construction the combination of a plurality of manually controlled switches, a plurality of thermally controlled switches each having a current conducting and movable switch controlling member and being each in series with one of the other switches, and a manually operable single means simultaneously associated with all the thermally operable switches for closing

ing the same or all the manually operable switches for closing the same.

4. An electric switch construction including in combination a thermostatically controlled switch having a current conducting and movable switch controlling member, a manually operable switch in series therewith, and means associated with both switches but at different times for closing the same.

10 5. An electric switch construction including in combination a plurality of thermostatically controlled switches each having a current conducting and movable switch controlling member, a plurality of manually operable switches, each in series with one of the other switches, and a single common means differentially associated with both types of switches at the same time.

6. In an electric switch construction the combination of a plurality of manually controlled switches, a plurality of thermostatically controlled switches each having a current conducting and movable switch controlling member and being each in series with one of the other switches, and a single common means associated with all of said switches for closing the same.

7. In an electric switch construction the combination of a plurality of manually controlled switches, a plurality of thermostatically controlled switches each having a current conducting and movable switch controlling member and being each in series with one of the other switches, and a manually operable single means simultaneously associated with all the thermostatically controlled switches for closing the same or all the manually operable switches for closing the same.

8. In a thermally controlled switch the combination of an enclosing casing, a thermally expansible member, means for limiting the expansion movement of said thermally expansible member, and a protective cap for said thermally expansible member.

9. In a thermally controlled switch the combination of an enclosing casing a thermally expansible member, a supporting member therefor, means for limiting the expansion movement of said thermally expansible member and supported by said supporting member, and a protective cap for said thermally expansible cap also supported by said supporting member.

10. In a thermally controlled switch the combination of a current conducting and movable thermally expansible switch controlling member, a switch member controlled by said thermally expansible member, a second switch member positioned adjacent the first mentioned switch member, a roller means carried by said first mentioned member for engaging said second mentioned switch member.

11. In a thermally controlled switch the

combination of a current conducting and movable thermally expansible switch controlling member, a switch member controlled by said thermally expansible member, a second switch member positioned adjacent the first mentioned switch member, a roller means carried by said first mentioned member for engaging said second mentioned switch member, and arc resisting material upon said second mentioned switch member for the purpose described.

12. In a thermally controlled switch the combination of a current conducting and movable thermally expansible switch controlling member, a switch member controlled by said thermally expansible member, a second switch member positioned adjacent the first mentioned switch member, a plurality of rollers carried by said first mentioned member for successively engaging said second mentioned switch member.

13. In an enclosed switch the combination of a casing, a support, a switch thermostat, and a housing therefor including a pair of adjacent sides, a top and an apertured side for the reception of a thermostat support.

14. In an enclosed switch the combination of a casing, a support, a switch thermostat, and a housing therefor including a pair of adjacent sides, a top and an apertured side for the reception of a thermostat support, and a retaining portion associated with the top and one of the sides positioned as a fourth side.

15. In a thermally controlled switch the combination of a current conducting and movable thermally actuated control member, a catch controlled thereby, a pivotally supported plate provided with a pair of projecting portions in spaced relation, a pivot pin supported by said projecting portions, and a roller supported by said pin in the space between said portions and engageable by said catch.

16. In a switch construction the combination of a pivotally supported switch member, an insulating member extending transversely of said switch member, a U-shaped rod pivotally supported and adapted to straddle said insulating transverse member, and a pin and slot connection between said switch member and said insulating transverse member, whereby the latter is rigidly secured between said switch member and said second mentioned transverse member.

17. In a switch construction the combination of a plurality of pivotally supported switch members, an insulating member extending transversely of said switch members, a U-shaped rod pivotally supported and adapted to straddle said insulating transverse member, and a pin and slot connection between each of said switch members and said insulating transverse member, whereby the latter is rigidly secured between said switch

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member and the U-shaped rod and the switch members are simultaneously movable.

18. An electric switch construction including a plurality of thermally releasable switches, each including a current conducting and movable switch controlling member, a plurality of other switches, each other switch being in series with one of said thermally releasable switches, and a common closing means for successively and simultaneously closing different types and each type of switches respectively.

In witness whereof, I have hereunto affixed my signature.

ROY H. MAPLE.