

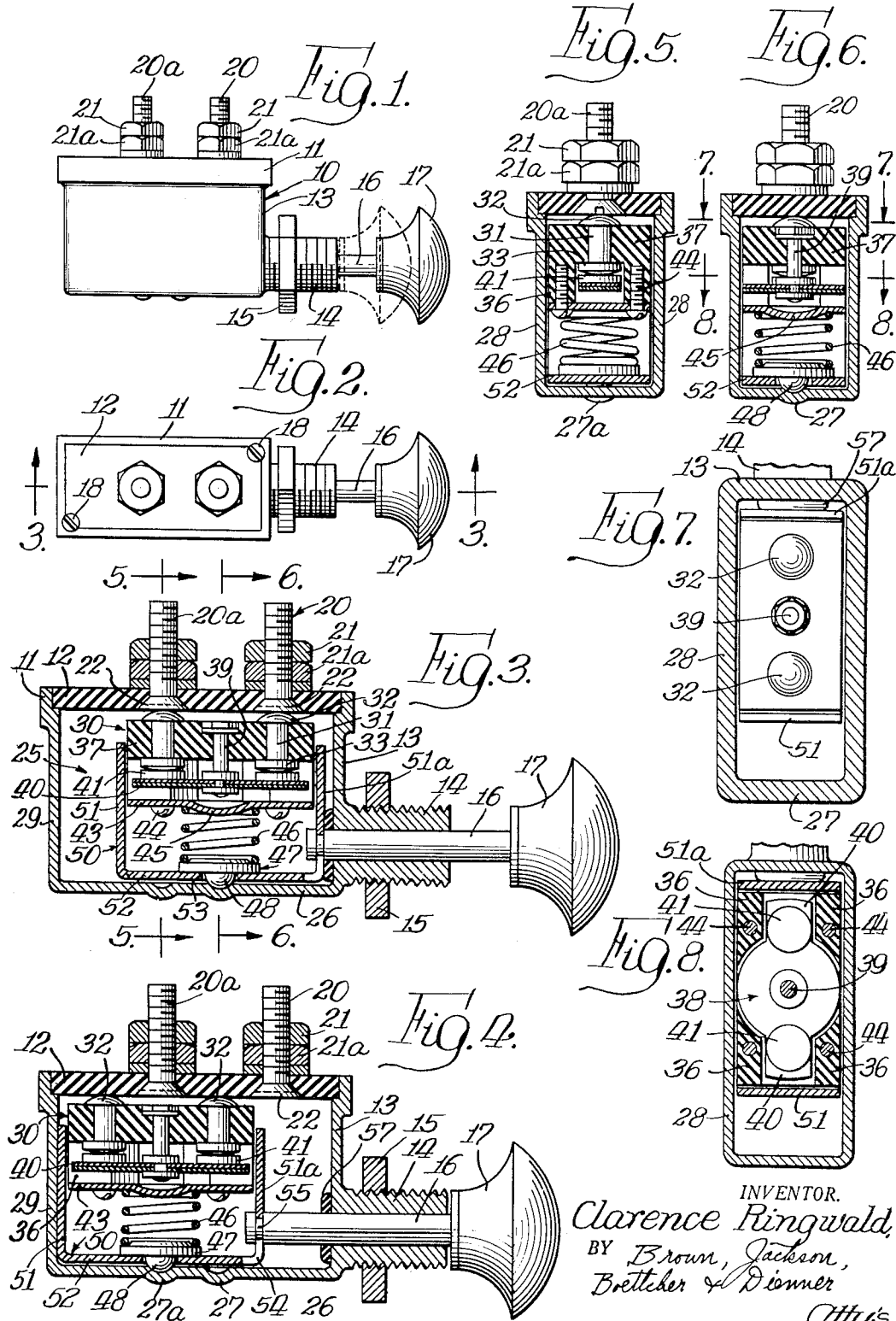
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C. RINGWALD

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CIRCUIT BREAKER SWITCH

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INVENTOR.
Clarence Ringwald,
BY Brown, Jackson,
Bretcher & Diemer
Attys.

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CIRCUIT BREAKER SWITCH

Clarence Ringwald, Springfield, Ohio

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This invention relates to circuit breakers and more particularly to thermostatic circuit breakers which are manually operable as a switch.

My invention briefly concerns a conventional style of thermostatic circuit breaker having a familiar bimetal switch plate carrying contacts arranged to make and break a circuit in response to thermal influence, as for example at the overloading of a circuit. Certain arrangements and improvements have been made so that the bimetal thermostatic circuit breaker unit is also movable bodily between and across certain other contacts to perform as a line switch. The entire arrangement is such that a manually controlled switch is provided which when in a closed position has the added safety feature of acting through a circuit breaker responsive to thermal conditions to prevent overloading of the circuit and the like.

The main object of this invention is to provide a new and improved circuit breaker switch.

Another object of this invention is to provide a circuit breaker responsive to thermal conditions which is also manually operable to function as a line switch.

A still further object of this invention is to provide a new and improved switch assembly which combines a thermally responsive bimetallic actuator with certain pairs of contacts so that the same is arranged to cause interruption and closure of the circuit in response to ambient thermal conditions and which is also associated with a manually operated means to permit the movement of the circuit breaker as a unit between and across certain other contact elements thereby to form a line switch.

The above and further objects, features and advantages of this invention will be recognized by those familiar with the art from the following detailed description and specifications and with particular regard to the illustration of its embodied principles as found in the accompanying drawings.

In the drawings:

Figure 1 is a side elevational view of a combined circuit breaker switch of this invention showing the circuit energizing and de-energizing operational positions of the manual control means therefor;

Figure 2 is a top plan view of the unit illustrated in Figure 1;

Figure 3 is a cross sectional view taken substantially along the longitudinal center line of the unit as indicated by line 3—3 of Figure 2, showing the position of the thermostatic circuit breaker unit operated as a line switch in a circuit energizing position;

Figure 4 is a cross sectional view, similar to Figure 3, illustrating the positioning of the thermostatic circuit breaker unit operated as a line switch to de-energize a circuit;

Figure 5 is a cross sectional view taken substantially along line 5—5 of Figure 3;

Figure 6 is a cross sectional view, similar to Figure 5, taken substantially along the section line 6—6 of Figure 3;

Figure 7 is a cross sectional view taken substantially

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at line 7—7 of Figure 6 to show the location and arrangement of the line switch contacts therein; and

Figure 8 is a sectional view, similar to Figure 7, taken substantially along line 8—8 of Figure 6 to demonstrate the position and arrangement of the circuit breaker contacts and the bimetallic actuator therefor.

Referring now to Figures 1 and 2 of the drawings, it will be recognized that the illustrated embodiment of my invention includes a hollow cast metal housing 10 formed with an integral flange portion 11 substantially bordering a rectangular terminal wall 12 which, in this case, is made removable for easy repair of the unit. The housing 10 is substantially rectangular in shape and forms or comprises an enclosure for the working elements of my switch. One end wall 13 of housing 10 is distinguished by the projection of a collar portion 14 which is cast formed with housing 10 in the particular embodiment illustrated. Collar 14 is preferably threaded about its exterior for the reception of a mounting nut 15 and is formed with an axially extending cylindrical opening for guiding and receiving a cylindrical push-pull rod 16 associated with a manual control knob 17.

The upper or removable wall 12 of the housing 10 is preferably made of a suitable insulating material, as for example, Bakelite or other similar plastics. The wall 12, as noted, is arranged to fit within the periphery of the raised flange portion 11 and is held in place thereon by any suitable means, such as screw means 18—18 shown in Figure 2. Wall 12 supports a pair of terminal posts 20—20a comprising a pair of electrically conductive bolts having threaded stems adapted to mount pairs of connector and lock nuts 21 and 21a, respectively. Lower head portions 22—22 of the terminal posts lie substantially flush with the inner face of wall 12 so as to form a pair of spaced contacts for cooperation with a switch assembly indicated generally by numeral 25.

A lower longitudinal wall 26 of housing 10 is formed with a pair of embossments 27—27a which are depressed outwardly from the inside face of that wall to form a set of substantially semi-spherical indentations which cooperate with the switch assembly 25 in a manner to be described presently hereinafter. Opposed side walls 28—28 of the housing 10 are formed in spaced parallelism and are uninterrupted; the same being interconnected at their ends by the one end wall 13 and a second end wall 29, at their bottom edges by the wall 26 and supporting at their top edges, the upper wall 12. As thus shown and described, it will be appreciated that housing 10 defines a substantially rectangular cubical in which the switch assembly 25 is arranged for sliding movement as imposed by the manually operated push-pull rod 16.

The switch assembly 25 comprises a familiar type of thermostatic circuit breaker having a terminal block 30 formed of suitable insulating material and arranged to support a pair of terminal rivets 31—31 which extend entirely through block 30 and included upper contact head end portions 32—32 and lower contact end portions 33—33. The terminal block 30 includes a set of four leg portions 36—36 formed integrally at the four corners of the block and depending from a planar platform portion 37 thereof. For a better understanding of the formation of block 30 see Figures 5 and 6 of the drawings. Between the several leg portions 36 and beneath the platform portion 37 is located and mounted a bimetallic actuator blade 38 centrally suspended from a threaded post member 39 which is suitably carried centrally of the platform portion 37.

The bimetallic actuator 38 includes a pair of wing or arm portions 40—40 extending at its opposite ends and to each of which is attached a contact button 41. The central portion of the bimetallic actuator 38 is held rigidly at the lower end of the mounting post 39 as best

shown in Figure 3 of the drawings. The contact buttons 41 are arranged on the bimetal actuator 38 so as to lie in substantial registry beneath the contact button portions 33 of the terminal rivets 31. Therefore, when the blade 38 lies in its normal operating position, as illustrated, in Figures 3 and 4, the button portions 33 engage the contact buttons 41, associated with the blade 38. Conversely, upon overload current flow through the bimetallic blade or upon the occurrence of excessive ambient temperatures from any cause, the blade is arranged to snap outwardly from the contact portions 33 to break engagement with the buttons 41, and thus open the circuit through the bimetallic circuit breaker. This operation is according to conventional and familiar practice, and will not be amplified in greater detail herein.

Mounted beneath the bimetallic actuator 38 and extending across and between the several depending leg portions 36 of the terminal block 30 is a bearing plate 43 made of a material such as brass or the like. Plate 43 is held securely to the leg portions 36 by screw means 44, one screw being received in each of the leg portions 36. It will be noted that plate 43 is formed with a central embossed projection or portion 45 which is arranged to receive and locate the upper end of a compression spring 46. The lower end of spring 46 is similarly located and held in position by a detent plate 47 distinguished by a semi-spherical detent projection 48 formed centrally on its lower face and designed to cooperate with the semi-spherical depressions 27—27a in the bottom wall of the housing 10. Projection 48 is forced into depressions 27 and 27a by action of spring 46 and is movable between the two depressions 27 and 27a in response to operation of the manual control means 16.

The entire bimetallic switch blade, terminal block and related assembly (including spring 46 and the detent plate 47) are held in position by means of a substantially U-shaped metal bracket 50 having a pair of upwardly extending spaced arm portions 51—51a arranged to extend along the opposite ends of the terminal block 30. A bottom wall 52 joins walls 51 and 51a and is formed with a central opening 53 through which the embossed projection 48 of the detent plate 47 extends for engaging the depressions 27 and 27a. The wall 51a of bracket 50 is attached to the inner end of the push-pull rod 16 by any convenient means. For example, in the embodiment illustrated, a sliding connection is preferred between the end of rod 16 and wall 51a. This is best effected by forming a slotted opening 54 in wall 51a extending upwardly from the bracket's bottom wall 52 which slot receives a reduced neck portion 55 formed adjacent the inner end of the push-pull rod 16. Of course, sufficient room or spacing is formed in the wall 52 to permit the extreme inner end of the push-pull rod to pass into the slot 54. By such an arrangement quick disassembly of the bracket 50 from the push-pull rod may be effected by merely lifting the bracket outwardly of the housing 10 after removal of the insulating terminal wall 12 thereon. A buffer washer 57 is also provided in surrounding fashion on rod 16 immediately adjacent the inside face of wall 13, so that upon withdrawal action of the push-pull rod the washer 57 prevents the bracket 50 from striking wall 13.

From the above it will be recognized that the features and elements which comprise and make up my improved combination circuit breaker and switch have been set forth. While the operation of the unit is believed to be unmistakably clear from the face of the drawings, nevertheless, a brief discussion of its features will now be set forth.

Use and operation

In installing a device of the character described hereinabove, line conductors (not illustrated) are attached to the terminal posts 20 and 20a and held securely thereon between the nut members 21—21a. When the push-pull rod 16 is moved so as to place the bimetallic

circuit breaker assembly 25 in the position shown in Figure 3, it will be understood that circuit is established through the terminal posts 20, 20a, contact heads 22 thereon, contact head portions 32 of the contact rivets 31, contact portions 33, buttons 41 and the bimetallic plate or actuator 38. So long as the current flow is normal or the ambient temperature for the switch unit remains at a level insufficient to overheat plate 38, current will continue to flow through the bimetal plate to complete the circuit and energize whatever units are associated with and controlled thereby. The detent mechanism comprising detent plate 47 with projection 48 cooperates with depression 27 of the switch housing to maintain the switch in its Figure 3 position. With respect to such detent position, it will be understood that the compressibility of spring 46 permits resilient shifting of the unit 25 in response to action of push-pull rod 16.

If the push-pull rod 16 is actuated to place the bimetallic circuit breaker unit 25 in its Figure 4 position, that is, if it is pushed inwardly to bring bracket wall 51 adjacent wall 29 of the housing, circuit is broken through the bimetallic actuator 38 by virtue of the displacement of contact heads 32 from the contact ends 22—22 related with the terminal studs 20, 20a. In this condition, the circuit through the unit is entirely interrupted and de-energized. The detent mechanism in this case cooperates with the depression 27a of the housing to removably maintain the circuit breaker unit 25 in its non-operative Figure 4 position.

One of the more novel features of this device is thought to lie in the mobility of the entire circuit breaker unit and the association therewith of suitable contact members, for example, contact buttons or portions 32—32, which permit the circuit breaker to cooperate with terminal posts 20, 20a and the contact heads 22—22 in the manner of a line switch. The added guarantee or safety factor provided by the normal operation of the bimetal circuit breaker is of course present by the selected positioning of the circuit breaker unit 25. It will be recognized also that at any time when the circuit through the unit is completed, the bimetallic or thermostatic blade 38 is automatically placed in circuit to provide its safety functions.

Thus it will be appreciated that I have herein described and shown the features and concepts of a new and improved combination line switch and thermostatic circuit breaker and while I realize that numerous changes, modifications and substitutions of equivalent materials may be employed when practicing this invention, it is not believed that such alterations will depart from its spirit and scope. As a consequence, it is not my intention that I be limited to the particular form and features of the preferred device herein illustrated and described, except as may appear in the following appended claims.

I claim:

1. A circuit breaker switch of the class described, comprising in combination, a housing, an insulated wall in said housing, pairs of spaced terminal posts extending through said insulated wall, head portions on said posts constituting a first pair of contacts located within said housing, an insulated block member slidably mounted within said housing for movement parallel to said insulated wall and transverse to the axis of said terminal posts, a second pair of contacts carried by said block member for slidably engaging said first pair of contacts, a third pair of contacts carried by said block member in circuit with said second pair of contacts, a bimetal actuator blade carried by said block member and movable relative to said block member, a fourth pair of contacts carried by said blade arranged normally to engage said third pair of contacts and disengage therefrom in response to thermal actuation of said blade, bracket means within said housing for slidably carrying said block member, and means manually engageable exteriorly of said housing for sliding said bracket rectilinearly within said housing to

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move said block member thereby to selectively engage and disengage said first and second pairs of contacts.

2. A circuit breaker switch of the class described, comprising in combination, a housing defining a generally rectangular shaped chamber, an insulated wall for said housing defining one side of said chamber, a pair of spaced terminal posts extending through said wall, head portions formed on said posts and located within said chamber comprising a first set of contacts, an insulated block member slidably movable in parallel juxtaposition of said wall within said chamber, a second set of contacts carried on one side of said block member in rectilinear alignment with said first set of contacts, a third set of contacts carried on the opposite side of said block member and having circuit connection with said second set of contacts, a bimetal actuator blade supported on said block member and arranged in its normal operating position to bridge said third set of contacts, but to be disengaged therefrom in the presence of abnormal temperatures and excessive current flow therethrough, and means manually engageable exteriorly of said housing for rectilinearly moving said block member within said chamber thereby to selectively bring said first and second sets of contacts into engagement.

3. A circuit breaker switch of the class described, comprising in combination, a housing defining a generally rectangular shaped chamber, an insulated wall for said housing bounding one side of said chamber, a pair of terminal connector posts extending through said wall, a first set of contacts in circuit with said connector posts and located on said wall within said chamber, an insulated block member slidably supported for movement immediately adjacent said wall within said chamber, a second set of contacts carried by said block member for engaging said first set of contacts, a third set of contacts carried by said block member in circuit with said second set of contacts, but on the opposite side of said block member therefrom, a bimetal actuator blade supported on said block member and movable toward and away from said third set of contacts, a fourth set of contacts carried by said blade member for engagement with said third set of contacts, said third and fourth sets of contacts being engaged in the normal operating position for said blade, and means manually engageable exteriorly of said housing for slidably moving said block member within said chamber thereby to selectively separate said first and second sets of contacts.

4. A circuit breaker switch of the class described, comprising in combination, a housing having an insulated wall and defining a generally rectangular shaped interior chamber, a pair of terminal posts carried by said insulated wall, a first set of contacts mounted on said wall in said chamber and having circuit connection with said terminal posts, an insulated block member slidably mounted in parallel juxtaposition of said wall within said chamber, a second set of contacts carried on said block member for engaging said first set of contacts when said block member is in a first operational position, a third set of contacts carried by said block member and having circuit connection with said second set of contacts, a thermally responsive actuator having a fourth set of contacts disposed in adjacency to said third set of contacts for normally engaging said third set of contacts, said thermally responsive actuator serving to close and separate said third and fourth sets of contacts in the presence of preselected operating temperatures, a bracket means carrying said block member to guide the same for rectilinear sliding movement within said chamber relative to said wall, and means manually engageable exteriorly of said housing for rectilinearly sliding said bracket means and block member to a second operational position within said chamber thereby to selectively separate said first and second sets of contacts.

5. In a circuit breaker switch of the class described, the combination comprising, a housing having an insulated

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wall, a pair of terminal posts carried by said wall, a first set of contacts mounted on said wall within said housing and formed at one end of said terminal posts, an insulated block member carried in juxtaposition of said wall for rectilinear sliding movement within said housing, a second set of contacts carried by said block member for engaging said first set of contacts, a third set of contacts carried by said block member and having circuit connection with said second set of contacts, a thermally responsive actuator mounted on said block member, a fourth set of contacts mounted on said thermally responsive actuator, said actuator normally serving to cause said third and fourth sets of contacts to engage one another, but being capable, in the presence of abnormal current flow and operating temperatures of separating said third and fourth sets of contacts; a bracket means for supporting said block member, a spring means mounted between said block member and a longitudinal wall of said bracket lying adjacent a second wall of said housing, said spring means serving to normally bias said first set of contacts toward said second set of contacts, a detent ball means carried by said bracket member and engaged by said spring means, the spring means resiliently biasing said detent means into spaced depressions formed in said second wall of said housing, and means manually engageable exteriorly of said housing for rectilinearly shifting said bracket within said housing between selected positions thereby to engage and disengage said first and second sets of contacts; said detent means serving to arrest said bracket in said selected positions.

6. A circuit breaker switch of the class described, comprising in combination, a housing having a first insulated wall, a pair of terminal connectors carried by said wall, a first set of contacts carried by said wall in electrical circuit with said connectors and located within said housing, an insulated block member mounted within said housing for rectilinear sliding movement relative and parallel to said wall, a second set of contacts carried by said block member for engaging said first set of contacts in preselected positions of movement for said block member, a third set of contacts carried by said block member in registering relation with said second set of contacts on the opposite side of said block member, a bimetal actuator blade mounted on said block member, a fourth set of contacts carried by said actuator blade and arranged to normally engage said third set of contacts, said actuator blade in the presence of excessive current flow and abnormal operating temperatures being capable of independently separating said third and fourth sets of contacts and of reclosing such contacts at the return of normal operating temperatures; means connecting said third set of contacts in circuit with said second set of contacts, a bracket means within said housing for carrying said block member, a compression spring means mounted between said bracket means and said block member for normally biasing said first and second sets of contacts into engaging relation when the same are oppositely related in a first operational position of said block member, and a detent means carried by said bracket means and comprising a semi-spherical projection extending through a bottom wall of said bracket means and biased in such extending position by said spring means, said projection cooperating with spaced depressions formed in an adjacent wall of said housing and defining arresting positions for said first and a second operational position of said block member, and means manually engageable exteriorly of said housing and comprising a push-pull rod system for slidably moving said bracket means and block member within said housing between first and second operational positions; said detent means serving to removably lock said block member in said first and second operational positions as selected.

7. A circuit breaker switch of the class described, comprising in combination, a housing defining a generally rectangular shaped chamber, an insulated wall of said hous-

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ing forming one side of said chamber, a pair of terminal post means extending through said wall, head portions on said post means located within said chamber comprising first contact means, an insulated block member mounted within said chamber for sliding movement in parallel juxtaposition of said wall, second contact means carried on one side of said block member in rectilinear alignment with said first contact means, third contact means carried on the opposite side of said block member, a bimetal actuator supported on said block member and arranged in its normal operating position to close circuit through said third contact means and to interrupt circuit there-through in the presence of abnormal temperatures and

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excessive current flow, and means manually engageable externally of said housing for rectilinearly shifting said block member to selectively bring said first and second contact means into circuit closing engagement.

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