

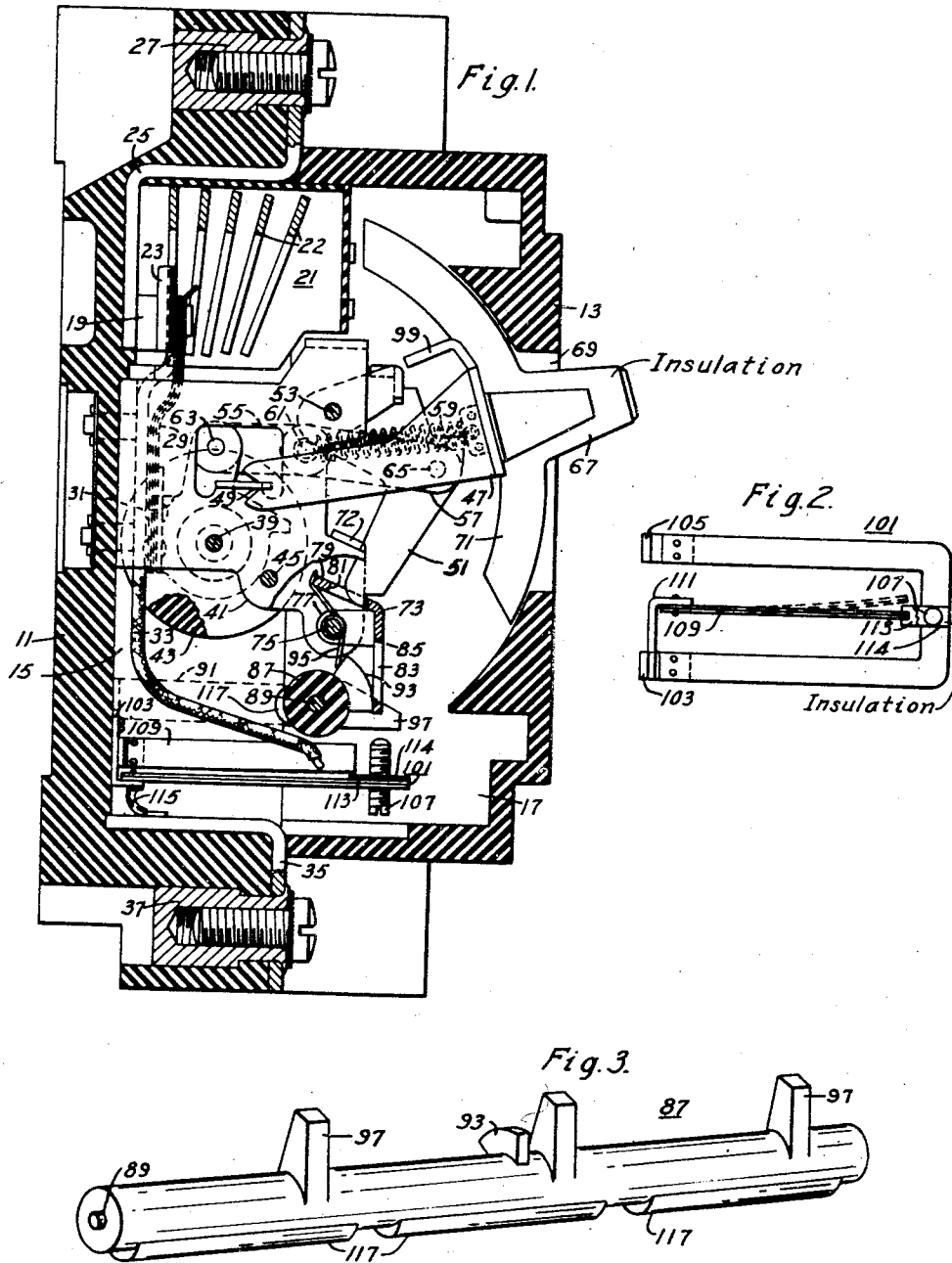
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SHOCKPROOF CIRCUIT BREAKER

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2,416,163

SHOCKPROOF CIRCUIT BREAKER

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The invention relates to circuit interrupters and, more particularly, to circuit breakers of the type which are manually operable to open and closed position and automatically tripped open in response to predetermined abnormal conditions, such as an overload in the circuit controlled by the breaker.

An object of the invention is the provision of an improved automatic circuit breaker of shockproof construction that is simple, accurate and reliable in operation, and inexpensive to manufacture.

Another object of the invention is the provision of a circuit breaker with an improved shockproof trip device operative to automatically trip the circuit breaker in response to predetermined abnormal conditions in the circuit, but which will not be falsely actuated by shocks or jars.

In accordance with the invention, the circuit breaker is provided with a trip element movable in one direction to trip the circuit breaker in response to predetermined abnormal conditions in the circuit, and provided with an additional element disposed in ninety-degree blocking relation to the trip element so as to normally prevent tripping movement of the trip element by shocks or jars, but which is moved out of the path of tripping movement of the trip element in response to said predetermined abnormal conditions in the circuit to permit automatic tripping of the breaker. The arrangement effectively prevents shocks from tripping the breaker.

The novel features that are considered characteristic of the invention are set forth in particular in the appended claims. The structure and mode of operation of the invention, together with additional objects and advantages thereof, will be best understood from the following detailed description of one embodiment of the invention when read in conjunction with the accompanying drawing, in which:

Figure 1 is a vertical sectional view of a three-pole circuit breaker embodying the features of the invention, the section being taken substantially at the center pole of the circuit breaker and the mechanism being shown in the closed circuit position;

Fig. 2 is a plan view of the current-responsive thermal trip element and the blocking element; and

Fig. 3 is a perspective view of the balanced trip bar which extends across the three poles of the circuit breaker.

The invention is illustrated as embodied in a circuit breaker which, except for the trip device,

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is generally similar to the main circuit breaker structure shown in Figs. 2 and 3 of Patents No. 2,162,577, issued to H. S. Gano June 13, 1939, and assigned to the assignee of the present invention.

Referring to the drawing, the three-pole circuit breaker illustrated is mounted in an insulating casing comprising a base 11 of molded insulating material and a removable cover 13 also of molded insulating material. The base and cover are provided with aligned barriers 15 and 17 which divide the casing longitudinally into three compartments, one for each pole of the breaker.

Each pole of the circuit breaker (only the center pole being shown) includes a stationary contact 19, an arc extinguisher 21, and a movable contact 23. The stationary contact is mounted on the inner end of a strip 25 of conducting material, the other end of which is secured to a terminal 27 mounted in the upper end of the base 11. The arc extinguisher 21 consists of a stack of slotted plates 22 of magnetic material disposed so that the movable contact moves through the slots of the plates. The arc drawn by the movable contact is deionized and extinguished by the plates in a well known manner. The movable contact 23 is carried by the free end of a spring steel contact arm 29 which is secured to a U-shaped switch member 31, and this movable contact is electrically connected by a flexible shunt conductor 33 to one of the current-responsive trip means of the trip device which will be hereinafter described. The other terminal of the current-responsive trip means is, in turn, electrically connected to a conducting strip 35 which is connected to the lower terminal 37 mounted in the lower end of the base 11. The three poles of the circuit breaker are of substantially identical construction, and hence only one pole has been shown and described.

The three movable switch members 31 are mounted for simultaneous rotation together about a common axis by means of a sectional pivot shaft 39, the center section of which is supported in the side walls of a U-shaped main frame 41 secured to the base 11 in the center pole compartment. The switch members 31 of the outer poles (not shown) are secured to the outer sections of the pivot shaft, and are mechanically connected to the center pole switch member, but insulated therefrom, by insulating connecting hubs 43 which connect the three separate sections of the pivot shaft together. Thus the three movable switch members 31, the three sections of the pivot shaft and the two connecting hubs all ro-

tate as a unit about the axis of the pivot shaft. The extreme outer ends of the sectional pivot shaft are supported in brackets (not shown) mounted adjacent the sides of the base 11. A stop pin 45 extending through the frame 41 co-operates with projections formed on the center pole switch member 31 to limit the opening movement of the assemblage of switch members.

A single operating mechanism is provided for simultaneously actuating the contact means of all three poles of the breaker to open and to closed circuit position. The operating mechanism is mounted on the U-shaped main frame 41, and comprises a U-shaped operating member 47, the legs of which are pivoted on the sides of the main frame by pivots 49, a releasable carrier lever 51 pivoted on the main frame by means of a pivot shaft 53, a pair of toggle links 55 and 57, and a pair of overcenter springs 59 (only one being shown). The toggle links 55 and 57 are pivotally connected together by a knee pivot pin 61, and the inner link 55 is pivotally connected by a pivot pin 63 to the center pole switch member 31. The other toggle link 57 is pivotally connected at its outer end by a pivot pin 65 to the releasable carrier lever 51. The overcenter springs 59 have their outer ends connected to the bight portion of the U-shaped operating member 47, and their inner ends pivotally connected to the knee pivot pin 61 which connects the toggle links 55 and 57. The operating member 47 has an operating handle 67 of molded insulating material secured to the outer end thereof. The handle 67 is provided with a knob portion which extends through an elongated slot 69 in the cover 13, and the handle also has an arcuate shield portion 71 which serves to close the handle opening 69 in all positions of the handle. Lugs 72 are struck out from the sides of the U-shaped main frame 41 for limiting the opening and closing movement of the operating member 47.

The carrier lever 51 is always biased in a counterclockwise direction (as viewed in Fig. 1) about its pivot 53 by a component of the force of the overcenter springs 59. The lower end of this lever is adapted to be normally engaged and restrained by a latch 73 to hold the carrier lever in a normal position as shown in Fig. 1. When the carrier is held in normal position by the latch, it provides a fixed pivot for the outer end of the toggle 55-57, so that the breaker contacts can be manually operated to open and closed position by the handle 67. When the breaker is in closed position and the carrier lever is held latched, it acts through the toggle 55-57 to hold the contacts locked in closed position until the carrier lever is released by the latch or until the contacts are manually actuated to open position. In the closed and latched position of the breaker, the toggle 55-57 is slightly overset, upward movement of the knee pivot pin 61 beyond the overset position being prevented by the pin 61 engaging the inner edge of the carrier lever 51. When the carrier lever 51 is released by the latch 73 in response to predetermined overload conditions, the circuit breaker is automatically actuated to open position by the springs 59 irrespective of the position of the handle 67, i. e., even if the handle is held in closed position. Thus the circuit breaker mechanism is trip-free of the handle 67.

The trip device of the circuit breaker includes the latch 73 which is pivotally mounted on a pivot pin 75 extending transversely between the side

walls of the main frame 41 at the lower end thereof. The latch is U-shaped, and the spaced legs 77 thereof are pivoted on the pin 75. An extension 79 projects inwardly at an angle from the bight portion of the latch and is provided with a rectangular aperture 81. The end edge of this aperture nearest the cover forms the latch surface which engages and restrains the carrier lever 51. The opposite end edge of the aperture 81 is adapted to be engaged by the free end of the carrier lever 51 to reset the latch 73 to latching position when the carrier lever 51 is manually reset to its latching position after a tripping operation of the breaker. The latch 73 is also provided with another extension 83 which projects downwardly from the bight portion of the latch, and this extension has a rectangular elongated aperture 85 therein.

A trip bar 87 extends transversely across the three poles of the circuit breaker and is mounted for rotation about its longitudinal axis by a shaft 89 embedded in and extending through the trip bar. The projecting ends of the shaft 89 are rotatably supported in brackets 91 (only one being shown) secured to the breaker base, one adjacent each side wall. The trip bar 87 is constructed of molded insulating material, and an arcuate metal latch piece 93 is embedded in the bar adjacent the center thereof in alignment with the rectangular aperture 85 of the main latch 73. In the latching position of the parts as shown in Fig. 1, the carrier lever 51 is latched by the main latch 73, and this main latch is, in turn, held in latching position by the latch piece 93, the lower end of the extension 83 of the main latch 73 bearing against the arcuate edge of the latch piece 93 on the trip bar 87. A spring 95 coiled about the pivot pin 75 biases the main latch in unlatching direction and biases the trip bar to latching position. A plurality of spaced projections 97 are formed on the trip bar, one for each of the three poles of the breaker.

The trip bar is adapted to be partially rotated in a counterclockwise direction as viewed in Fig. 1 to trip the circuit breaker mechanism in response to predetermined overload conditions in the circuit of any pole of the breaker. When the trip bar is rotated to tripping position, the latch piece 93 moves from under the lower end of the main latch extension 83, thereby permitting the main latch 73 to release the carrier lever 51. When the carrier lever is released, the contacts of the breaker are no longer held in closed position, and consequently the overcenter springs 59 quickly actuate the movable contacts to open circuit position. The carrier lever 51 is rotated by the springs 59 in a counterclockwise direction about its pivot 53, and during this movement the pivot pin 65 is shifted above the line of action of the springs 59 whereupon the toggle 55-57 collapses. The carrier lever 51 must be reset to latched position before the breaker can be closed again, and for this purpose the operating member 47 has a resetting projection 99 which engages and moves the carrier lever 51 back to latching position when the handle 67 is moved down slightly beyond the "off" position to reset the mechanism. During the latter portion of the resetting movement, the free end of the carrier lever moves into the aperture 81 of the main latch and restores the main latch to latching position whereupon the spring 95 returns the trip bar 87 to the latching position shown.

The main circuit breaker structure as thus far described in detail, excepting the trip device, is

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substantially similar to the main circuit breaker structure disclosed in Figs. 2 and 3 of the aforementioned Patent No. 2,162,577.

Each pole of the breaker is provided with an individual current-responsive trip means comprising a U-shaped bimetallic element 101 which is electrically connected in series with the contacts of its pole and operable when heated a predetermined amount in response to overload currents above a predetermined magnitude—for example, above 125% or more of the normal rated current—to actuate the trip bar 87. The legs of the bimetal trip element are secured to terminal brackets 103 and 105 which are, in turn, secured to the base 11 adjacent the lower end of the corresponding pole unit compartment. The outer free end of the bimetal trip element carries an adjusting screw 107 which is disposed to engage one of the trip bar projections 97 to actuate the trip bar and thereby trip the breaker when the bimetal element deflects or warps upwardly upon being heated a predetermined amount by overload current in the circuit of its corresponding pole.

In accordance with the invention, the circuit breaker is made shockproof so that it will not be falsely tripped by shocks, jars or vibrations, by providing for each of the current-responsive tripping bimetal elements 101 a second current-responsive bimetal element or strip 109 which normally prevents tripping movement of the tripping bimetal element. The bimetal element 109 is secured at its inner end to an extension 111 (Fig. 2) of the terminal bracket 103 and is disposed at ninety-degree relation to the tripping bimetal element 101, i. e., with the plane of its flat side at ninety-degree relation to the plane of the flat side of the tripping bimetal element. The outer free end of the bimetal element 109 is normally disposed directly in blocking relation in the path of upward movement of a projection 113 (Fig. 2) on the center of the right portion of the tripping bimetal element 101, so that the bimetal element 109 normally prevents substantial upward movement of the bimetal trip element 101, such as might trip the circuit breaker. The bimetal element 109 is maintained in this blocking position when the bimetal is cold and as long as the current flow through the breaker pole remains substantially at normal value, so that it prevents tripping of the breaker by shocks or jars which, in the absence of the bimetal element 109, might move the free end of the tripping bimetal element 101 upwardly to actuate the trip bar and thereby trip the breaker. The bimetal element 109 is electrically connected in series relation with the trip bimetal element 101 and the contacts of the corresponding pole of the breaker. The flexible conductor 33 is connected to the bimetal element 109 adjacent the free outer end thereof, and the inner fixed end of this bimetal element is electrically connected to the terminal bracket 103 of the tripping bimetal element 101. The other terminal bracket 105 of the tripping bimetal element is electrically connected by a conductor 115 to the lower breaker terminal strip 35. A plate 114 of insulating material is positioned to the center of the right portion of the bimetal element 101 to cover the projection 113 and prevent the bimetal element 109 from shorting a portion of the bimetal element 109 if the bimetal element 101 should move into engagement with the tip of the bimetal element 109. The circuit through each of the poles of the breaker is substantially the same. The circuit for each pole extends from

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the upper terminal 27 through the conductor 25, contacts 19 and 23, flexible conductor 33, bimetal element 109, tripping bimetal element 101, conductors 115 and 35 to the lower terminal 37. It will thus be seen that both bimetal elements 101 and 109 of each pole are heated in response to the current of the circuit. When both bimetal elements are heated a predetermined amount by overload currents flowing in the circuit of the corresponding pole of the breaker, the bimetal element 109 deflects to one side of the path of the projection 113 on the tripping bimetal element 101, and the tripping bimetal element warps upwardly to actuate the trip bar 87 and thereby trip the breaker.

The trip bar 87 is rotatably mounted about its center of gravity, i. e., the axis of the shaft 89 extends through the center of gravity of the trip bar, and the bar is statically balanced by having projections 117 formed thereon which exactly counterbalance the projections 97 and the latch piece 93. Consequently, the trip bar is not affected by jars or shock, i. e., it will not be moved about its axis of rotation by jars or shocks applied to the circuit breaker.

The operation of the circuit breaker is briefly as follows: Assuming the breaker is in closed circuit position to manually open the breaker, the operating handle 67 is moved downwardly to the "off" position. The opening movement of the handle moves the line of action of the springs 59 below the axis of the pivot 65, and consequently the springs actuate the toggle 55—57 to collapsed position, thereby causing the movable contacts of the breaker to be actuated to open position with a snap action. To close the breaker, the operating handle 67 is moved upwardly to the "on" position shown. This movement of the handle shifts the line of action of the springs 59 above the pivot 65, and consequently the springs actuate the toggle 55—57 to the extended overset position shown, thereby actuating the three movable contacts to closed position with a snap action.

When an overload above a predetermined value—for example, 125% or more depending on the trip setting of the trip device—occurs in the circuit of any pole of the breaker, the overload current heats the bimetal elements 101 and 109 of the corresponding pole. When the bimetal elements have been heated a predetermined amount by the overload current, the bimetal element 109 deflects to one side out of the path of movement of the projection 113 (Fig. 2), and the bimetal trip element 101 deflects or warps upwardly to engage one of the projections 97 and actuate the trip bar 87 in tripping direction. Actuation of the trip bar causes the latch 73 to release the carrier lever 51, whereupon the springs 59 quickly actuate the three movable contacts to open position. The carrier lever 51 is rotated in a counterclockwise direction about its pivot 53 and the toggle 55—57 collapses. The mechanism is reset by moving the handle 67 slightly beyond the "off" position in an opening direction. This movement resets the carrier lever to latched position and the main latch 73 to its latching position, whereupon the trip bar 87 is returned by the biasing spring 95 to its latching position. The breaker can now be closed by moving the handle 67 to the "on" position.

Due to the balanced construction of the trip bar 87 and the provision of the blocking bimetal elements 109, the breaker cannot be falsely tripped by shocks or jars. Any shock trans-

mitted to any bimetal trip element 101 in a direction tending to move it in tripping direction will not produce tripping of the breaker, because the bimetal element 109 blocks tripping movement of the bimetal trip element since the bimetal element 109 is immovable in an upward or tripping direction. Shocks in a direction which will move or deflect the bimetal element 109 laterally will not affect the tripping bimetal element 101, since these shocks are not in a tripping direction. This trip bar itself is unaffected by shocks due to its balanced construction. The contacts are locked in closed position by the overset disposition of the toggle, and this toggle and the handle are strongly held in closed position by the strong force of the overcenter springs 59 so that these elements cannot easily be shocked or jarred to open position.

While a specific embodiment of the invention has been disclosed in accordance with the provisions of the patent statutes, it is to be understood that various changes in the form, construction and arrangement of parts and different combinations of elements may be used without departing from some of the essential features of the invention. It is desired, therefore, that the language of the appended claims be given the broadest reasonable construction permissible in the light of the prior art.

We claim as our invention:

1. In a circuit breaker having relatively movable contacts and operating mechanism therefor operable to effect quick break of said contacts, a trip device comprising a trip member operable to cause opening operation of said mechanism, a trip element movable in response to predetermined abnormal conditions in the circuit to operate said trip member and cause said mechanism to open said contacts, a member movable in a direction transverse to the plane of movement of said trip element and normally disposed to prevent substantial tripping movement of said trip element as long as normal conditions obtain in the circuit to prevent tripping movement of said element by jars or shocks, said member being movable in response to said predetermined abnormal conditions to permit tripping movement of said trip element.

2. In a circuit breaker having relatively movable contacts and operating mechanism therefor, a trip member operable to effect opening operation of said mechanism, a trip device comprising an overload current-responsive trip element movable in one direction in response to predetermined overload conditions in the circuit to operate said trip member and cause said operating mechanism to automatically open said contacts, a second current-responsive element movable in a path transverse to the plane of movement of said trip element and having a portion that is normally disposed directly in the path of tripping movement of a part of said trip element to block tripping movement of said trip element by jars or shocks, said second current-responsive element being moved out of the path of tripping movement of said trip element in response to said predetermined overload conditions to permit tripping movement of said trip element.

3. In a circuit breaker having relatively movable contacts and trippable operating mechanism therefor operable to effect quick break of said contacts, a trip device comprising a trip element energized by the current of the circuit and movable in one direction in response to a predetermined energization thereof by overload cur-

rent, a pivoted latch operable by said trip element to trip said circuit breaker operating mechanism, a second element energized by the current of the circuit movable in a path transverse to the plane of movement of said trip element and having a portion normally disposed directly in the path of tripping movement of a portion of said trip element to prevent tripping movement of said trip element except when predetermined overload conditions obtain in the circuit, said second element being moved out of the path of tripping movement of said trip element upon predetermined energization thereof by overload currents to permit said trip element to operate said latch.

4. In a circuit breaker having relatively movable contacts and releasable operating mechanism therefor, latch means normally restraining said operating mechanism against circuit opening operation, a trip device comprising a trip element movable in one direction in response to predetermined overload conditions in the circuit to release said circuit breaker operating mechanism, a bimetallic element heated in response to the current of the circuit and movable in a direction transverse to the plane of movement of said trip element, said bimetal element having an edge portion normally disposed directly in the path of movement of a part movable with the trip element so as to prevent substantial tripping movement of said trip element except when predetermined overload conditions obtain in the circuit, and said bimetallic element being movable out of the path of movement of said part in response to predetermined overload conditions in the circuit to permit said trip element to release said operating mechanism.

5. In a circuit breaker, relatively movable contacts, operating mechanism therefor including a member releasable to cause opening operation of said operating mechanism, latching means for restraining said member, a current-responsive trip element movable in one direction in response to predetermined overload conditions in the circuit to actuate said latching means to effect release of said member, a bimetallic element heated in response to the current of the circuit and movable in a direction that is transverse to the plane of movement of said trip element, said bimetallic element having an edge portion normally disposed directly in the path of tripping movement of a part carried by said trip element so that said bimetallic element prevents said trip element from releasing said latching means except when predetermined overload conditions obtain in the circuit, and said bimetallic element being movable out of the path of tripping movement of said part carried by the trip element in response to predetermined overload conditions in the circuit to permit tripping movement of said trip element.

6. In a circuit breaker, relatively movable contact means, operating mechanism therefor comprising an operating toggle connected to the movable contact means, manually operable means for moving said toggle to an overset position to close said contacts, a member having a latched position in which it supports one end of said toggle in operative position, said member being releasable to cause opening of said contact means irrespective of the position of said manually operable means, said contact means being locked in closed position when said toggle is in overset position and said releasable member is held in latched position, shockproof latching means for

holding said releasable member in latched position, a trip element movable in one direction in response to predetermined overload conditions in the circuit to actuate said latching means to effect release of said releasable member, and a bimetallic element heated in response to the current of the circuit and movable in a direction transverse to the plane of movement of said trip element, said bimetallic element having an edge portion normally disposed directly in the path of movement of a part carried by said trip element so that said bimetallic element prevents said trip element from releasing said latching means except when predetermined overload conditions obtain in the circuit, and said bimetallic element being movable out of the path of movement of said part in response to predetermined overload conditions in the circuit to permit tripping movement of said trip element.

7. In a circuit breaker having relatively movable contacts and operating mechanism therefor, a trip member operable to effect opening operation of said mechanism, a trip device comprising a trip element energized by the current of the circuit and movable in one direction in response to predetermined overload conditions in the circuit to operate said trip member and trip the breaker mechanism and thereby cause automatic opening of said contacts, a second current-responsive element movable in a direction ninety degrees transverse to the plane of movement of the trip element and having a normal position in which it positively prevents said trip element from tripping the breaker as long as said second element is in said normal position, said second element being moved in response to predetermined overload conditions in the circuit to permit said trip element to operate said trip member and trip the breaker.

8. In a multipole circuit breaker having a set of relatively movable contacts for each pole, operating mechanism for actuating said contacts, a rotatably mounted trip bar movable from a normal position to a tripping position to effect tripping of the breaker, said bar being statically balanced with respect to its axis of rotation so that it will not be actuated by shocks or jars applied to the breaker, a separate trip element for each of at least two of the poles of said breaker movable in response to predetermined overload conditions in the circuit of its pole to move said trip bar to tripping position, and means associated with each trip element disposed to block tripping movement thereof except when predetermined overload conditions obtain in the circuit, said means being movable to a non-blocking position in response to predetermined overload conditions to permit said trip element to actuate the trip bar.

9. In a multipole circuit breaker having relatively movable contacts for each pole, operating mechanism for said contacts including a member releasable to cause automatic opening of said contacts, shockproof latching means for restraining said releasable member, said latching means including a rotatably mounted trip bar movable about its axis from a normal position to a tripping position to effect release of said releasable member to thereby trip the breaker, said bar being statically balanced with respect to its axis of rotation so that it will not be moved to unlatch said releasable member by shocks or jars, a separate trip element for each of at least two of the poles of the breaker movable in response to predetermined overload conditions in the circuit of its pole to

actuate said trip bar to tripping position, and means associated with each of said trip elements disposed to prevent movement of said trip element by shocks or jars, said means being movable in response to predetermined overload conditions in the circuit to permit said trip element to actuate the trip bar.

10. In a multipole circuit breaker having a set of relatively movable contacts for each pole, operating mechanism for actuating said contacts, a rotatably mounted trip bar movable from a normal position to a tripping position to effect tripping of the breaker, said bar being statically balanced with respect to its axis of rotation so that it will not be actuated by shocks or jars applied to the breaker, a separate trip element for each of at least two of the poles of said breaker movable in one direction in response to predetermined overload conditions in the circuit of its pole to cause said trip bar to be actuated, a current-responsive element associated with each trip element, said current-responsive element being movable in a direction ninety degrees transverse to the plane of movement of said trip element and having a normal position in which it blocks tripping movement of said element, said current-responsive element being movable to a non-blocking position in response to predetermined overload conditions in the circuit to permit operation of said trip element to release the operating mechanism.

11. In a multipole circuit breaker having a set of relatively movable contacts for each pole, operating mechanism for actuating said contacts, a rotatably mounted trip bar movable from a normal position to a tripping position to effect tripping of the breaker, a separate trip element for each of at least two of the poles of the breaker movable in one direction in response to predetermined abnormal conditions in the circuit to cause said trip bar to be actuated to trip the breaker, a bimetallic element adjacent each trip element heated in response to the current of the circuit and movable in a direction ninety degrees transverse to the plane of movement of the trip element, said bimetallic element having an edge portion normally disposed in the path of tripping movement of a part of the trip element so as to prevent tripping movement of said trip element except when predetermined overload conditions obtain in the circuit, and said edge portion of the bimetallic element being moved out of the path of tripping movement of the trip element in response to predetermined overload conditions in the circuit to permit tripping operation of the trip element.

12. In a circuit interrupter having relatively movable contacts and releasable operating mechanism therefor, a trip device comprising a bimetal trip element heated in response to the current of the circuit and movable in one direction in response to predetermined overload conditions in the circuit to trip said mechanism and thereby cause said mechanism to automatically open said contacts, a second current-responsive bimetal element movable in a direction transverse to the plane of movement of said bimetal trip element and having a normal position in which it prevents said bimetal trip element from improperly tripping the breaker in response to shocks, said second bimetal element being movable in response to predetermined overload conditions in the circuit to permit said bimetal trip element to trip the breaker operating mechanism.

13. In a circuit interrupter having relatively

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movable contacts and trippable operating mechanism therefor, a trip device comprising a bimetal trip element heated in response to the current of the circuit and movable in one direction in response to predetermined overload conditions in the circuit to trip said mechanism and thereby cause said mechanism to open said contacts, a second current-responsive bimetal element bendable in a direction ninety degrees transverse to the plane of movement of said trip element and having an edge portion normally disposed directly in the path of tripping movement of a part of the bimetal trip element to block tripping movement of said trip element, said second bimetal element bending to a nonblocking position when heated a predetermined amount in response to predetermined overload conditions to permit said trip element to trip the breaker.

14. In a circuit breaker having relatively movable contacts, operating means therefor including a rotatably mounted trip bar movable from a normal position to a tripping position to effect tripping of said breaker, said trip bar being statically balanced with respect to its axis of rotation, a current-responsive bimetal trip element movable in one direction in response to predetermined overload conditions in the circuit to actuate said trip bar to tripping position, a second

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current-responsive bimetal element movable in a direction transverse to the plane of movement of said bimetal trip element and having a normal position in which it blocks tripping movement of said bimetal trip element to prevent it from actuating said trip bar, said second bimetal element being movable to a non-blocking position in response to predetermined overload conditions in the circuit to permit said trip element to actuate the trip bar.

LLOYD W. DYER.
HILLER D. DORFMAN.

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