

July 14, 1936.

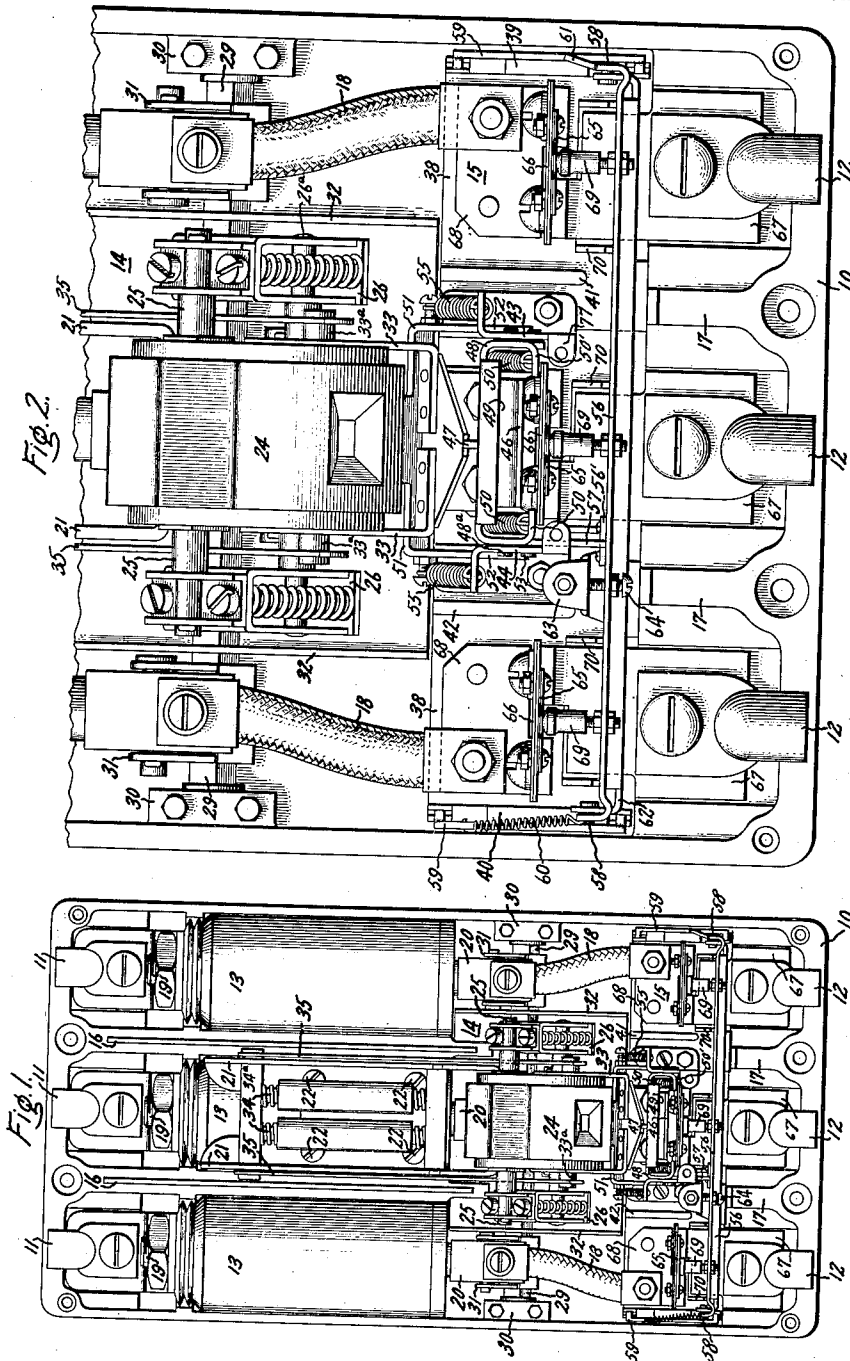
J. L. LAPPIN

2,047,828

CIRCUIT BREAKER

Filed Feb. 2, 1935

2 Sheets-Sheet 1



Inventor:
John L. Lappin,
by *Harry E. Dunham*
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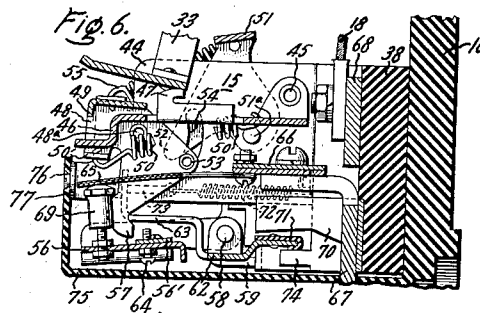
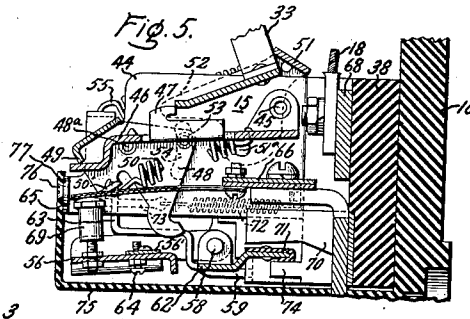
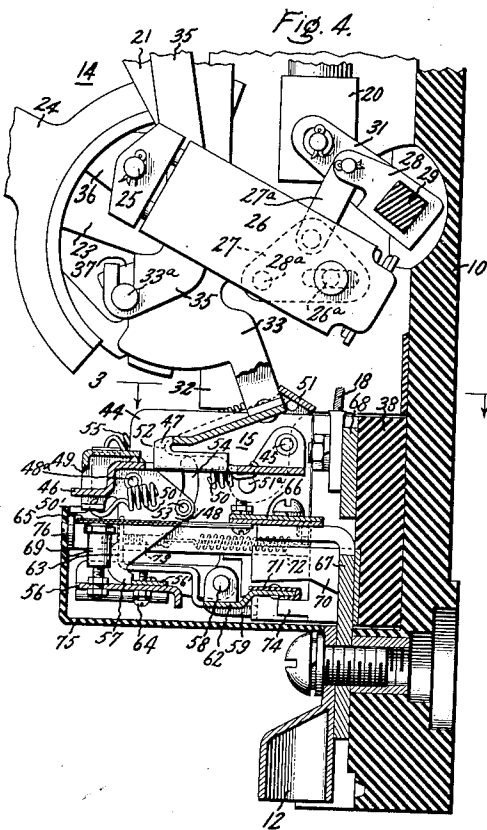
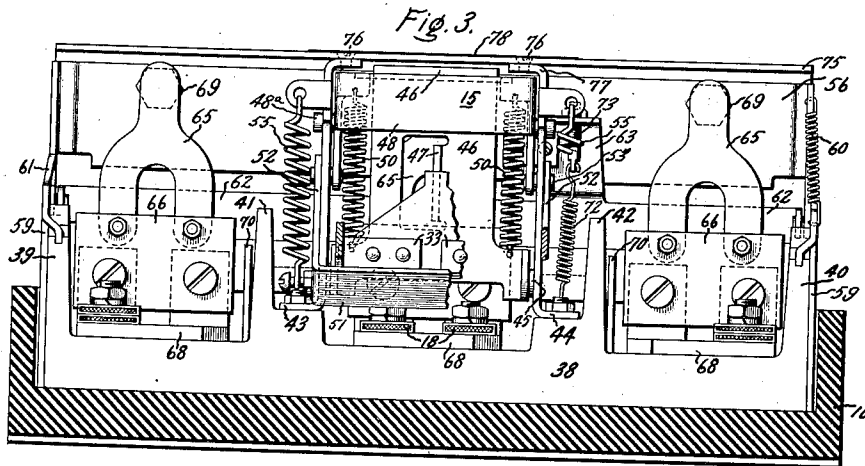
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CIRCUIT BREAKER

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2 Sheets-Sheet 2



Inventor:
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UNITED STATES PATENT OFFICE

2,047,828

CIRCUIT BREAKER

John L. Lappin, Drexel Hill, Pa., assignor to General Electric Company, a corporation of New York

Application February 2, 1935, Serial No. 4,659

15 Claims. (Cl. 200—116)

My invention relates to circuit breakers, more particularly to circuit breakers of the type provided with manually operable mechanism for operating the circuit controlling contacts between open and closed circuit positions and with automatic tripping means for operating the contacts to open circuit position upon the occurrence of an overload or short circuit, and has for an object the provision of a simple and inexpensive trip device for circuit breakers of this type which is reliable and positive in its operation.

Circuit breakers of this general type, which combine the protective features of a fuse and the advantages of a manually operable switch, have found considerable application in the control of lighting and distribution feeder circuits. In the control of such circuits, however, much is yet to be desired in circuit breakers which are compact and sturdy in construction and which operate quickly in response to overload or short-circuit currents to interrupt the circuit. It is often desirable in circuits of this type to employ a multipole circuit breaker provided with a single operating mechanism for opening and closing all of the circuits, and with a unitary trip device which is responsive to the currents in the individual circuits and which cooperates with the operating mechanism to open all of the circuits upon the occurrence of overload or short-circuit conditions in any or all of the circuits. It has heretofore been proposed in circuit breakers of this type to provide a trip device cooperating with a releasable contact operating member for normally latching the releasable member to inoperative position, the tripping device being provided with a latch and with current responsive means for disengaging the latch from the releasable member upon the occurrence of abnormal current conditions. Circuit breakers of this general type, particularly multipole circuit breakers, which are designed to interrupt heavy currents, must necessarily be of rather rugged construction and usually employ strong springs to operate the contacts between open and closed circuit positions. The trip device, therefore, must be designed to withstand considerable strain and to exert a positive force of considerable magnitude on the latch in order to release the contact operating mechanism. Accordingly, it is a further object of my invention to provide a compact and rugged trip device for a circuit breaker in which a sharp impact is applied to the latching member in order to release the latch quickly and positively.

In carrying out my invention in one form there-

of, I provide in connection with a circuit breaker having a releasable member for operating the contacts to open circuit position, a trip device comprising a latch for normally engaging the releasable member, and an impact member normally held in one position and releasable therefrom to engage the latch with a hammerlike blow for moving the latch to releasing position. More particularly, I provide a trip device comprising a pivoted latch member, an impact member movable from one position to a second position for imparting a hammerlike blow to the latch member, current responsive releasable means for normally retaining the impact member in one position and for releasing the impact member upon the occurrence of abnormal current conditions, and spring means connected between the impact member and the latch member for biasing the latch member to latching position when the impact member is held in its one position and for moving the impact member into hammerlike engagement with the latch member when the impact member is released by the current responsive means. Means are also provided for automatically returning the impact member to its one position after each movement of the latch member to its releasing position.

For a more complete understanding of my invention, reference should now be had to the drawings in which Fig. 1 is a plan view of a circuit breaker provided with a trip device embodying my invention, the cover of the circuit breaker having been removed to show the breaker mechanism; Fig. 2 is an enlarged partial plan view of the trip end of the circuit breaker shown in Fig. 1; Fig. 3 is a sectional view, with certain parts broken away, taken along line 3—3 of Fig. 4 and rotated 90° clockwise; Fig. 4 is a detailed sectional view of the trip device embodying my invention, part of the circuit breaker operating mechanism associated therewith being shown in elevation; and Figs. 5 and 6 are sectional views similar to Fig. 4 but illustrating the operation of the trip device.

Referring to the drawings, I have shown my invention in one form as applied to a three-circuit multipole circuit breaker comprising a base formed of molded insulation for supporting a plurality of terminal members 11 and 12, a plurality of circuit interrupting devices 13, an operating mechanism therefor indicated generally by the reference numeral 14 and an improved trip device embodying my invention indicated generally by the reference numeral 15. Suitable insulating barriers 16 extending from one end of the circuit

breaker to the operating mechanism 14 are provided for insulating the individual pole circuits so as to prevent flashover. Similar insulating barriers 17 extend from the other end of the base to the trip device 15 to prevent short circuit between the terminal members 12. The circuit through each of the three poles of the circuit breaker is substantially the same and extends from one of the terminal members 11 through the associated circuit interrupter 13 across the operating mechanism by way of a flexible conductor 18 and through the trip device 15 to one of the terminal members 12.

Each of the circuit interrupting devices 13, which are of the type described and claimed in a copending application of Ludwig S. Walle, Serial No. 667,856, filed April 25, 1933, entitled "Circuit breakers" and assigned to the same assignee as the present invention, comprises a compression chamber of pressure resistant material provided with a fixed contact and a movable contact which respectively extend through opposite walls of the compression chamber, the extending end of the fixed contact being indicated at 19 and the extending portion of the movable contact being indicated at 20. Sealing means (not shown) are provided for substantially gas tightly sealing the compression chamber and when the movable contact 20 is operated to open circuit position, the arc which is drawn between the contacts 19 and 20 causes the pressure within the substantially sealed compression chamber to increase rapidly. This pressure may be in the order of 1000 pounds per square inch and, accordingly, the arc between the contacts is quickly extinguished in the manner set forth in the above identified application. The particular form of the compression chamber and the sealing means therefor form no part of the present invention and the features of the device here shown are fully described and claimed in another application of Ludwig S. Walle, Serial No. 4,448, filed Feb. 1, 1935, entitled "Circuit breakers", which application is also assigned to the same assignee as the present invention.

Although any suitable type of operating mechanism may be provided for actuating the movable contacts 20 between open and closed circuit positions, I have shown for purposes of illustration the mechanism 14 which is supported on a frame comprising a pair of spaced plates 21 fastened as by means of the screws 22 to one of the interrupting devices 13 (Fig. 1), and extending beyond one end thereof. Pivottally supported on the extending portions of the supporting plates 21 is an operating member 23 (Fig. 4) provided with an operating handle 24 of molded insulation. A pair of pins 25, which are secured to the operating member 23 in alignment with each other and extend laterally from opposite sides of the operating member, respectively engage the adjacent ends of a pair of overcenter spring devices 26, the other end of each overcenter device being connected by means of a suitable linkage which includes a pair of toggle links 27 and 27a, to a U-shaped operating finger 28 carried by a pivoted insulated crossbar 29. As shown in dotted lines, the substantially triangular link 27, which is engaged by a pin 26a carried by the overcenter devices 26, is pivottally mounted on a fixed pin 28a and the ends of the link 27a are respectively connected to the link 27 and to the operating finger 28.

The insulated crossbar 29 extends across the three poles of the circuit breaker, the ends of the

crossbar being journaled in suitable bearings 30 carried by the base 10. Each of the movable contacts 20 is connected to the crossbar 29 by a U-shaped member 31 and it will be seen that when the operating member 23 is moved about its pivot, the overcenter spring devices 26 are carrier overcenter and rotate the toggle link 27 about its pivot 28a to actuate the toggle and rotate the crossbar 29 to move all of the contacts 20 between open and closed circuit positions with a snap action. Suitable insulating barriers 32 are arranged, as shown, to prevent short circuit between the individual poles of the circuit breaker in the region of the operating mechanism.

In order to provide for automatic tripping of the circuit breaker, the operating mechanism is provided with a U-shaped tripping member 33 which is pivottally mounted on the frame plates 21 and is provided with a portion (not shown) arranged to engage the pin 26a and rotate the link 27 about its pivot to break the toggle against the force exerted by the overcenter device 26 thereby to rotate the crossbar 29 and move the contacts 20 to open circuit position independently of the manually operable mechanism. Suitable tripping springs 34 arranged between the portions of the frame plates 21 which overlie the interrupting device 13, as shown in Fig. 1, are provided for normally biasing the tripping member 33 to its operated position, a pair of operating straps 35 being arranged with their adjacent opposite ends connected respectively to a movable thrust bar 34a engaged by the tripping springs 34 and to the pins 33a carried by the tripping member 33. The tripping member 33 is normally held in its latched-in position against the force exerted by the tripping springs 34 by my improved tripping device 15, and the operating element 23 is provided with a shoulder portion 36 which cooperates with a shoulder 37 on the tripping member 33 for returning the tripping member 33 to its latched position after the circuit breaker has been automatically opened thereby.

It is believed that this particular operating mechanism which is described and claimed in a copending application of Leonard J. Linde, Serial No. 5,036 filed Feb. 5, 1935, entitled "Circuit breakers" and assigned to the same assignee as the present invention, will be understood clearly from the foregoing description.

As shown best in Figs. 3 to 6, the trip device 15 is mounted on a sub-base 38, carried by and suitably fastened to the main base 10 and provided with a pair of end-walls 39 and 40 and with a pair of intermediate walls 41 and 42. The intermediate walls 41 and 42 are substantially in alignment with the insulating barriers 17 and provide a plurality of conductor receiving compartments. Centrally of the base 38, a pair of supporting plates 43 and 44, respectively mounted on the walls 41 and 42, are provided for pivottally supporting therebetween at 45 a latch plate 43 having a finger 47 arranged to engage the tripping member 33 in latching relation. Supported between the plates 43 and 44 is a U-shaped impact member 48 pivoted at 48a, the yoke portion of which is overturned to provide a striking surface 49 for engaging a portion of the latch plate 46 which is nested within the U-shaped impact member. A pair of operating springs 50, arranged with their respective adjacent ends connected to the lugs 50' on the impact member 48 and with their other ends connected to the latch plate 46, are provided for biasing the latch

plate 46 about its pivot 45 to its latching position as shown in Fig. 4, and for operating the impact member 48 when released about its pivot 48a so that the portion 49 strikes the latch plate 46 a hammerlike blow. It will be observed that as the impact member 48 is moved thereby, the springs 50 collapse and accordingly, the bias exerted on the latch plate decreases so that at the instant that the striking portion 49 of the impact member engages the latch plate, substantially the only force tending to maintain the latch plate in its latching position in opposition to the hammer blow imparted thereto is the frictional force between the latch finger 47 and the tripping member 33. In this connection it should be noted that as shown in Fig. 4 the force applied by the tripping member 33 to the latch plate 46 at the finger 47 is directed along a line passing through the pivot 45 and consequently does not bias the latch plate about its pivot. Pivoted on the supporting plates 43 and 44 at 51a is a U-shaped reset member 51, the yoke portion of which is arranged in the path of the tripping member 33 and each leg portion of which forms a cam finger 52 arranged to cooperate with one of a pair of pins 53 mounted on the legs of the U-shaped impact member 48 and extending through slots 54 in the supporting plates 43 and 44. A pair of resetting springs 55 having their adjacent ends respectively connected to the supporting plates 43 and 44 and their other ends connected to the legs of the U-shaped reset member 51 at points near its yoke portion are provided for biasing the reset member to the position shown in Fig. 6. The impact member 48 is normally retained in its reset or closed circuit position by releasable means which includes a pivoted trip bar 56 provided with a catch plate 56' arranged to engage a finger 57 extending from the impact member 48. It will be observed that the end of the finger 57 engages the trip bar 56 and consequently the effective area of latching surface available is determined by the thickness of the plate 56'. The amount of latching at this point should be limited to a minimum in order to obtain efficient tripping with a small movement of the trip bar 56.

In order that the trip device may be responsive to the current in any one or all of the circuit breaker poles, the trip bar 56 extends entirely across the sub-base 38 (Figs. 2 and 3) and is pivotally supported at each end on pivots 58 carried by a pair of supporting plates 59 fastened respectively to the end-walls 39 and 40. The trip bar 56 is held in its normal, finger-engaging position by a spring 60 connected between an end of the trip bar and one of the supporting plates 59, and is provided with a stop finger 61 for engaging one of the plates 59 to limit the travel of the trip bar during the interval between the tripping and the resetting operations. Also mounted on the pivots 58 is an armature member 62 extending across the sub-base 38 provided with an extending finger 63 arranged to engage an adjustable pin 64 on the trip bar 56 to move the trip bar against the force exerted by the spring 60 when the armature 62 is moved about its pivot point.

Arranged in each conductor-receiving compartment adjacent the trip bar 56 and the armature 62, I provide thermal and magnetic means for actuating the trip bar 56 to move the catch plate 56' out of engagement with the finger 57 thereby to release the impact member 48, in response to either a sustained overload or a short-circuit condition. The thermal actuating means

in each compartment comprises a bifurcated bimetallic element 65, the leg portions of which are connected to a shunt 66 connected between the conductor members 67 and 68, which are respectively connected to one of the terminals 12 and to one of the flexible conductors 18, so that a portion of the load current flows through the thermal element. When the thermal element 65 becomes sufficiently heated by the flow of current therethrough, to cause flexure of the element, the upper end thereof moves to engage an insulating button 69 adjustably secured to the trip bar 56. It will be seen that upon the occurrence of an overload in any one of the circuit breaker poles of sufficient duration to heat excessively the associated thermal strip, the trip bar will be moved from its normal biased position by the thermal element to release the impact member 48, the relation of each thermal element to the trip bar being individually adjustable by means of the buttons 69.

The magnetic actuating means in each conductor compartment comprises a U-shaped magnet 70 partially encircling the conductor 67, the legs of the U extending outwardly in proximity to the pivoted armature 62 to form pole faces. A strip of insulating material 71 is arranged on the armature 62 in order to prevent short circuiting between the circuit breaker poles and to prevent the armature from freezing or sticking to the magnet pole faces when it is attracted thereto by the flux induced in the magnet 70 upon the occurrence of a heavy flow of current through the conductor 67. The armature 62 is normally biased to its unattracted position by a spring 72 (Fig. 3), the tension of which may be varied to adjust the setting of the armature by means of a threaded link 73 which engages the armature finger 63, and the wall portions 41 and 42 are provided with extending portions 74 which serve as stops to retain the armature 62 in its biased position. As pointed out above, the catch plate 56' is arranged to provide a minimum of latching with the finger 57 in order to obtain efficient tripping on short circuits with a small air gap between the magnets 70 and the armature 62.

It will be seen then that upon the occurrence of a relatively light overload of long duration in any one or all of the circuit breaker poles, one or more of the thermal elements 65 will be flexed to engage the associated insulating button 69 and move the trip bar 56 to release the impact member 48, and that upon the occurrence of a heavy overload of short-circuit characteristic a magnetic flux will be induced in one or more of the magnets 70 to attract the armature 62 and cause the finger 63, carried thereby, to engage the pin 64 on the trip bar 56 and release the impact member.

My improved trip device is preferably provided with a cover (Figs. 3 to 6, inclusive) which comprises an L-shaped member 75 of insulating material arranged to be secured in position by a pair of screws 76 which threadedly engage a pair of ears 77 formed on the supporting plates 43 and 44. The cover 75 serves to restrict the circulation of air around the thermal strips 65 and to protect the trip device against mechanical injury from accidental blows when the circuit breaker is being connected in circuit. In addition, the cover 75 provides means for sealing the trip device, which sealing may be accomplished by pasting a suitable label 78 (Fig. 3) on the cover over the flat head screws 76, so that the cover may not be removed without destroying the label.

It is believed that with this description of the elements in mind, a complete understanding of my improved tripping and resetting arrangement may be had from a description of the operation. Assume first that the operating mechanism of the switch has been moved to the position shown in Fig. 4, in which the tripping member 33 is engaged by the latch finger 47, and the impact element 48 is engaged by the trip bar 56. It will be seen that the tripping member 33 has engaged the reset member 51 and moved the reset member about its pivot to store energy in the resetting springs 55, and that the operating springs 50 are stressed to bias the latch plate 46 to latching position.

Assume now that an overload occurs of sufficiently long duration to flex one or more of the thermal elements 65 and move the trip bar 56 so as to release the impact member 48. As soon as the impact member 48 is released, the springs 50 are effective quickly to move the impact member to the position shown in Fig. 5, the yoke portion 49 of the impact member striking the upper end of the latch plate 46 a hammerlike blow. As pointed out heretofore, the collapse of the springs 50 so decreases the bias normally exerted thereby on the latch plate 46 that the hammer blow imparted by the impact member 48 is effective quickly and positively to move the latch plate 46 about its pivot 45 to disengage the latch finger 47 from the tripping member 33. The force applied to the impact member 48 by the springs 50, as well as the force applied thereby to the latch member 46, is decreased greatly when the impact member moves in a counterclockwise direction about its pivot 48a. During the initial movement thereof, however, the impact member is accelerated by the springs 50, thereby storing energy to move the latch member 46 against the decreased force of the springs. Fig. 5 illustrates the trip device at an instant when the impact member 48 has just engaged the latch plate 46 to move the latch plate to releasing position and it will be observed that the striking portion 49 exerts a force multiplying wedging or cam action upon the latch plate 46, which is instrumental in overcoming excessive friction between the engaging surfaces of the latch finger 47 and the tripping member 33. When the latch finger 47 has been moved completely to disengage the tripping member 33, the tripping member will be operated by the tripping springs 34 to the position shown in Fig. 6, thereby releasing the reset member 51. The resetting springs 55 will thereupon automatically move the reset member from the position shown in Fig. 5 to the reset position shown in Fig. 6. During this movement of the reset member the cam fingers 52 cooperate with the pins 53 on the impact member to return the impact member to its normal position, again storing operating energy in the springs 50 and biasing the latch plate 46 to latching position.

As shown in Fig. 6, the finger 57 on the impact member 48 is now in position to be engaged by the trip bar 56 and the catch plate 56' when the thermal element 65 has cooled sufficiently to allow these parts to return to their normal position. The tripping member 33 may then be operated to its latched position by moving the operating member 23 about its pivot in a direction toward the trip device 15, the shoulders 36 and 37 on the members 23 and 33 cooperating as heretofore described, and when the operating member 23 is returned to the position shown in Fig. 4 to reclose the circuit breaker, the tripping member 33 will

be releasably retained in its latched-in position by the latch finger 47.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made, and I, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

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

1. A trip device for a circuit breaker comprising a latch member movable between latching and releasing positions, an impact member movable from one position to a second position to strike said latch member, a spring connecting said members for biasing said latch member to its latching position and said impact member to said second position, and current responsive means for normally retaining said impact member in said one position whereby said spring is stressed.

2. A trip device for a circuit breaker comprising a latch member movable between latching and releasing positions, an impact member movable from one position to a second position, a portion of said impact member being arranged to strike said latch member a hammerlike blow, a spring having its respective ends connected to said latch member and said impact member, said spring serving to bias said latch member to latching position, and means including a current responsive device for normally releasably retaining said impact member in said one position and for releasing said impact member for movement to said second position by said spring, the bias exerted by said spring on said latch member decreasing as said portion of said impact member moves to strike said latch member to move said latch member to releasing position.

3. A trip device for a circuit breaker comprising a latch member movable between latching and releasing positions, a pivoted impact member having a portion arranged to strike said latch member a blow, said striking portion being arranged for movement at the instant of impact in a path at a substantial angle to the direction of movement of said latch member to exert a force-multiplying wedging action on said latch member, spring means for operating said impact member from one position to striking position, releasable means for normally retaining said impact member in said one position, and current responsive means for actuating said retaining means to release said impact member.

4. A trip device for a circuit breaker comprising a latch member movable between latching and releasing positions, a pivoted impact member having a portion arranged to strike said latch a blow for moving said latch to releasing position, said striking portion being movable in a direction at a substantial angle to the direction of movement of said latch at the instant of impact whereby a force-multiplying cam action is exerted on said latch, spring means for operating said impact member from one position to striking position, and current responsive means for normally retaining said impact member in said one position and for releasing said impact member upon the occurrence of predetermined current conditions.

5. A trip device for a circuit breaker comprising a latch member movable between latching and releasing positions, an impact member movable from one position to a second position to

strike said latch member, a spring connecting said members for biasing said latch member to its latching position and said impact member to said second position, the force applied by said spring being decreased greatly by movement of said impact member to said second position, and current responsive means for normally retaining said impact member in said one position, said impact member when released being accelerated by said spring and thereby storing energy to move said latching member against the decreased force of said spring.

6. A trip device for a circuit breaker comprising a latch member movable between latching and releasing positions, an impact member having a portion arranged to strike said latch a blow for moving said latch to releasing position, spring means connected between said latch and said impact member for operating said impact member from one position to striking position and for biasing said latch to said latching position, releasable means for normally retaining said impact member in said one position, current responsive means for actuating said retaining means to release said impact member, and resetting means for automatically returning said impact member to said one position whereby operating energy is stored in said spring means after each operation of said impact member to striking position and said latch is biased to said latching position.

7. A trip device for a circuit breaker comprising a frame having spaced supporting walls, a latch plate pivotally mounted between said walls movable between latching and releasing positions, a U-shaped impact member pivotally supported by said walls having a yoke portion arranged to strike said latch plate a hammerlike blow for moving said latch plate to releasing position, said latch plate having a portion thereof nesting within said U-shaped impact member, spring means for operating said impact member from one position to striking position, releasable means normally engaging said U-shaped impact member for retaining said member in said one position, current responsive means for actuating said retaining means to release said impact member, and resetting means for automatically returning said impact member to said one position whereby operating energy is stored in said spring means after each operation of said impact member to striking position.

8. A trip device for a circuit breaker comprising a latch member movable between latching and releasing positions, an impact member movable from one position to a second position, a portion of said impact member being arranged to strike said latch member when said impact member moves to said second position, a spring connected to said latch member and said impact member, said spring serving to bias said latch member to latching position and said impact member to said second position, releasable means for retaining said impact member in said one position whereby said spring is stressed, and means for actuating said retaining means to release said impact member for movement to said second position by said spring, the bias exerted on said latching member decreasing as said spring collapses and said portion of said impact member striking said latch member to move said latch member to releasing position.

9. A trip device for a circuit breaker comprising a latch member movable between latching and releasing positions, an impact member movable from one position to a second position, a

portion of said impact member being arranged to strike said latch member a hammerlike blow, a spring having its respective ends connected to said latch member and said impact member, said spring serving to bias said latch member to latching position, current responsive means for normally retaining said impact member in said one position and for releasing said impact member for movement to said second position by said spring, the bias exerted on said latch member decreasing as said spring collapses and said portion of said impact member striking said latch member a hammerlike blow to move said latch member to releasing position, and normally stressed means releasable when said latch member is moved to releasing position for returning said impact member to said one position against the force exerted by said spring.

10. A trip device for a circuit breaker comprising a frame having spaced supporting walls, a latch plate pivotally mounted between said walls and movable between latching and releasing positions, an impact member pivotally supported on said walls for movement from one position to a second position, a portion of said impact member being arranged to impart a hammerlike blow to said latch plate when said impact member is moved to said second position, a spring having its respective ends connected to said latch plate and to said impact member, said spring serving to bias said latch plate to latching position, releasable means for normally retaining said impact member in said one position, and means for actuating said retaining means to release said impact member for operation to said second position by said spring, said bias exerted on said latch plate by said spring decreasing as said spring collapses and said latch plate being moved to releasing position by the hammerlike blow imparted thereto by said impact member.

11. A trip device for a circuit breaker comprising a frame having spaced supporting walls, a latch plate pivotally mounted between said walls and movable between latching and releasing positions, an impact member pivotally supported on said walls for movement from one position to a second position, a portion of said impact member being arranged to impart a hammerlike blow to said latch plate when said impact member is moved to said second position, a spring having its respective ends connected to said latch plate and to said impact members said spring serving to bias said latch plate to latching position, releasable means for normally retaining said impact member in said one position, means for actuating said retaining means to release said impact member for operation to said second position by said spring, said bias exerted on said latch plate decreasing as said spring collapses and said latch plate being moved to releasing position by the hammer blow imparted thereto by said impact member, and a normally stressed resetting spring releasable when said latch plate is moved to releasing position for returning said impact member to said one position against the force exerted by said first spring.

12. A trip device for a circuit breaker comprising a frame having spaced supporting walls, a latch plate pivotally mounted between said walls for movement between latching and releasing positions, a U-shaped impact member pivotally supported on said walls with a portion of said latch plate nesting within said U, the yoke portion of said U-shaped impact member being arranged to engage said latch plate when said

impact member moves from one position to a second position to impart thereto a hammerlike blow, spring means connected between said latch plate and a portion of said impact member remote from said yoke portion, said spring serving to bias said latch plate to latching position, releasable means for retaining said impact member in said one position and means for actuating said retaining means to release said impact member for operation to said second position by said spring, said bias exerted on said latch plate decreasing as said spring collapses and said latch plate being moved to releasing position by the hammer blow imparted thereto by said impact member.

13. A trip device for a circuit breaker comprising a frame having spaced supporting walls, a latch plate pivotally mounted between said walls for movement between latching and releasing positions, a U-shaped impact member pivotally supported on said walls with a portion of said latch plate nesting within said U, the yoke portion of said U-shaped impact member being arranged to engage said latch plate when said impact member moves from one position to a second position to impart thereto a hammerlike blow, spring means connected between said latch plate and a portion of said impact member remote from said yoke portion, said spring serving to bias said latch plate to latching position, releasable means for retaining said impact member in said one position, means for actuating said retaining means to release said impact member for operation to said second position by said spring, said bias exerted on said latch plate decreasing as said spring collapses and said latch plate being moved to releasing position by the hammer blow imparted thereto by said impact member, a U-shaped reset member pivoted on said frame walls and means for automatically moving said reset member to return said impact member to said first position after each movement of said latch plate to releasing position.

14. A trip device for a circuit breaker having a releasable tripping member, comprising a movable latch member for normally holding said tripping member in latched-in position, an impact member having a portion arranged to strike

said latch member a hammerlike blow for moving said latch member to releasing position, spring means for operating said impact member from one position to striking position, releasable means for normally retaining said impact member in said one position, and for releasing said impact member for operation to striking position by said spring, a reset member movable between two positions having a portion thereof arranged in the path of movement of said impact member and a second portion arranged in the path of movement of said tripping member, said tripping member being normally effective to hold said reset member out of engagement with said impact member, and normally stressed spring means for operating said reset member to return said impact member to said one position when said tripping member is released for movement to its operated position.

15. A trip device for a circuit breaker having a releasable tripping member, comprising a frame having spaced apart walls, a latch plate pivoted between said walls for holding said tripping member in latched-in position, a U-shaped impact member pivotally engaging said walls, the yoke portion of said U being arranged to strike said latch plate a hammerlike blow for moving said latch plate to releasing position, spring means for operating said impact member from one position to striking position, releasable means for normally retaining said impact member in said one position and for releasing said impact member for operation to striking position by said spring means, a U-shaped reset member pivoted on said frame, portions of the legs of said U being arranged in the path of said impact member and the yoke portion of said U being arranged in the path of said tripping member, said tripping member being effective when in latched-in position to hold said reset member out of engagement with said impact member, and a pair of resetting springs connected between said frame and said reset member for operating said reset member to return said impact member to said one position when said tripping member is released for movement to its operated position.

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