

Oct. 31, 1939.

J. G. JACKSON

2,177,775

CIRCUIT BREAKER

Filed July 25, 1936

2 Sheets-Sheet 1

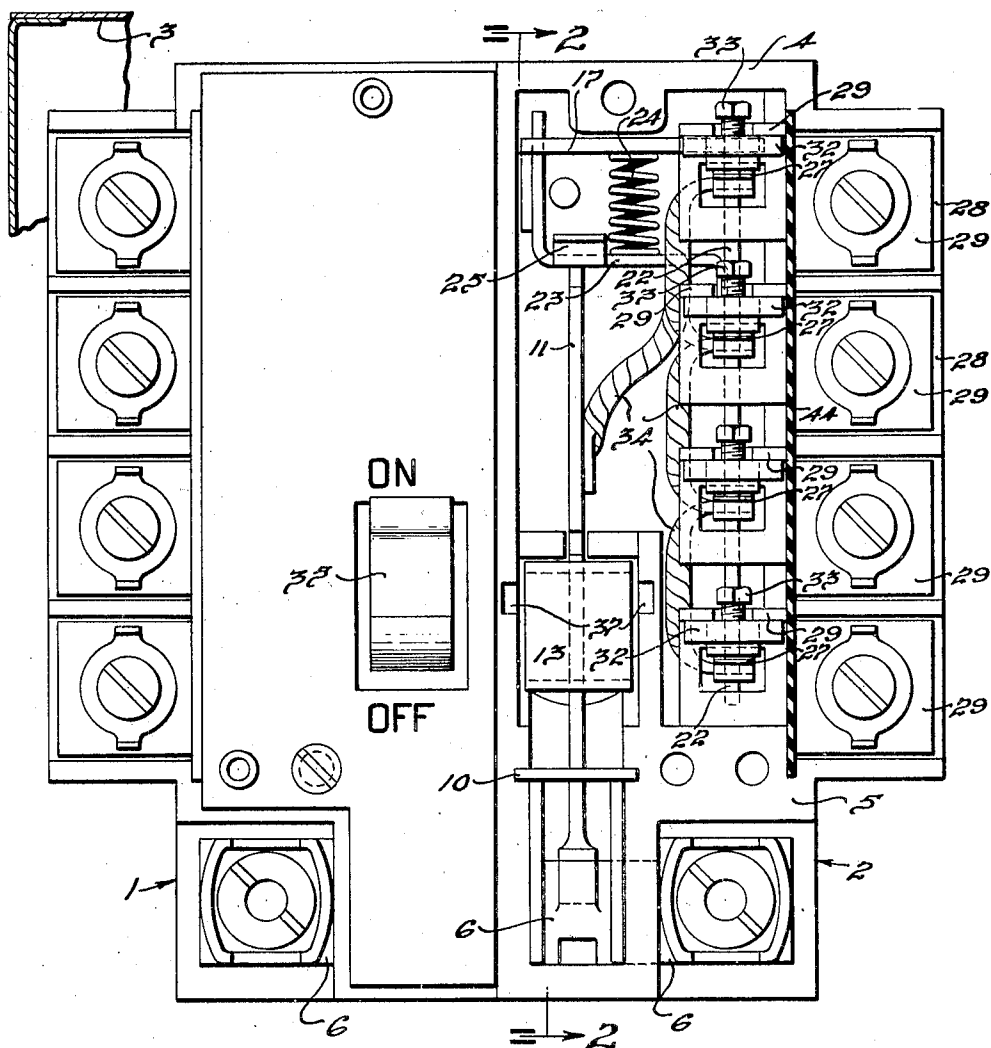


FIG. 1.

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2 Sheets-Sheet 2

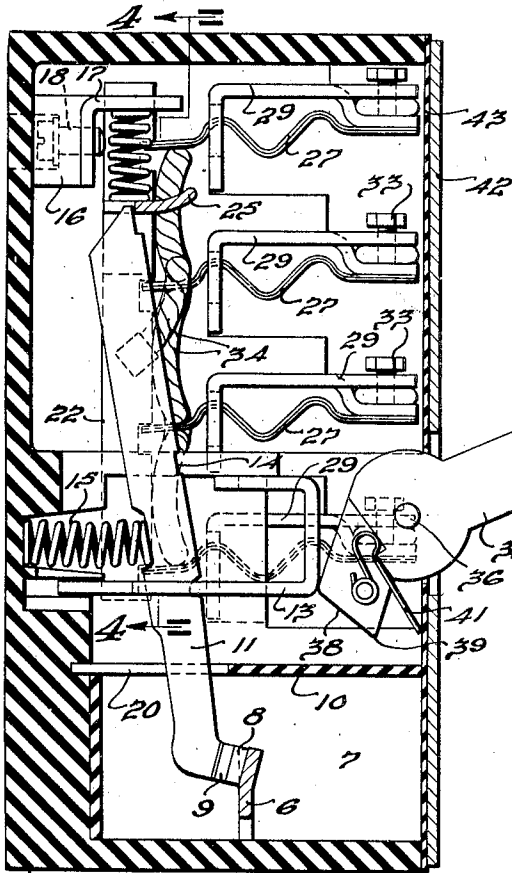


FIG. 2.

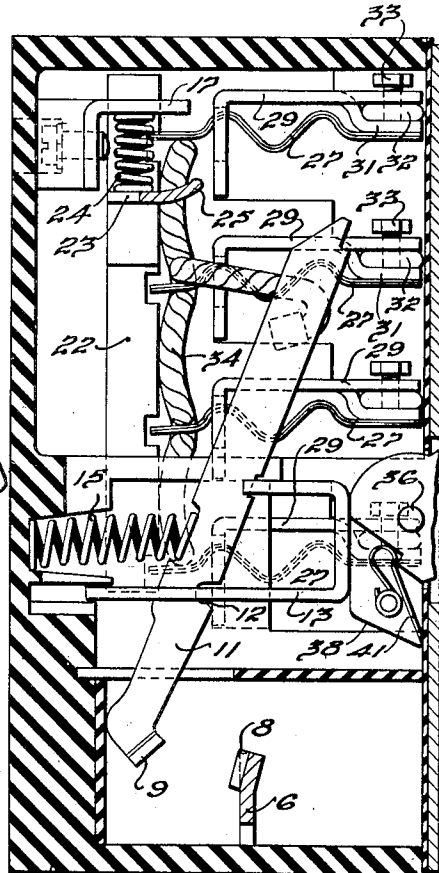


FIG. 3.

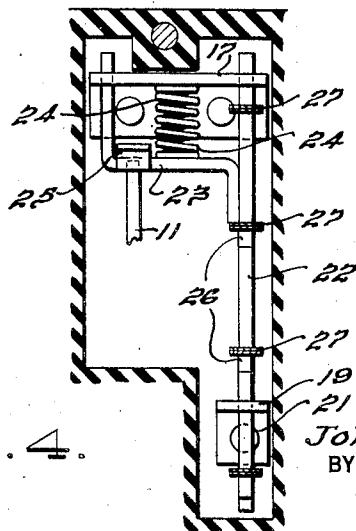


FIG. 4.

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CIRCUIT BREAKER

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Application July 25, 1936, Serial No. 92,645

7 Claims. (Cl. 200—116)

This invention relates to devices for making and breaking electric circuits and more particularly to electric circuit breakers automatically operable in response to current overload.

One object of the present invention is the provision of an electric circuit breaker supplying a plurality of branch circuits through circuit controlling elements and operating the elements to interrupt the current through all the branch circuits in response to a current overload in any one of them.

Another object of the present invention is to provide a circuit breaker having a single switching member and supplying a plurality of branch circuits, with tripping elements individual to the branch circuits, any one of which is operable to effect movement of the switching member to interrupt the current through all the branch circuits.

Further objects and features of the invention will be readily apparent to those skilled in the art from the following specifications and the appended drawings illustrating certain embodiments of the invention in which:

Figure 1 is a front elevational view of a circuit breaker assembly according to the present invention with the cover and operating handle of one unit removed to show internal parts.

Figure 2 is a vertical sectional view on the line II—II of Figure 1.

Figure 3 is a view similar to Figure 2 but showing the parts in automatically tripped position.

Figure 4 is a reduced detail sectional view on the line IV—IV of Figure 2.

The circuit breaker as shown in Figure 1 embodies two distinct and identical units 1 and 2, mounted within an enclosing box 3. These units are electrically distinct and are adapted for feeding through wires of opposite polarity to a plurality of branch circuits. Each of these units includes a generally cup shaped base 4 having a ledge 5 adjacent to one end, upon which is rigidly secured a conducting connector plate 6 as by means of a spun over portion of a metallic insert, not shown. The connector 6 extends within an arc chamber 7 beside the ledge 5 and here supports a stationary contact surface 8. Cooperating with the stationary contact surface 8 is a movable contact surface 9 mounted adjacent to one end of a floating contact bar 11. The front edge of the contact bar 11 is provided with a notch 12 which receives the upper edge of a slot generally centrally disposed in an elongated leg on a generally U shaped element 13. The element 13 is suitably guided by projections on the

base for rectilinear movement at right angles to the back of the base. The front edge of the contact bar 11 is provided with a second shallow notch 14 which interengages with a shallow notch in the shorter leg of the element 13 to limit the movement of and properly position the bar in the automatically tripped position. A heavy compression spring 15 biases the contact bar 11 against the stationary contact surface and against a latching surface to be hereinafter described. A fibre barrier plate 10 is disposed between the arcing chamber 7 and the circuit breaker mechanism and has a restricted slot 20 at its back end closely receiving the contact bar 11.

Upon a boss or projection 16 at the bottom of the base is rigidly secured an L shaped bracket 17 as by means of studs 18. At a position beside the element 13 is similarly mounted an L shaped bracket 19 as by means of stud 21. Guided within slots in these brackets 17 and 19 is an elongated tripping bar 22. An S shaped bracket 23 is rigidly welded or otherwise secured to trip bar 22 and is also guided within a slot in the bracket 17 so as to provide a three point guiding and supporting means for the tripping unit. A compression spring 24, interposed between the brackets 17 and 23, biases the tripping unit into the latching position. To the bracket 23 is attached a latching portion 25 which is curved outwardly and upwardly to provide for easy passage of the latching end of the contact bar 11 in moving to resetting position. The trip bar 22 is provided with a plurality of elongated notches 26 in which are disposed the movable ends of current responsive bimetallic members 27.

Upon side ledges 28 at the exterior of the circuit breaker enclosure are mounted conducting supports 29 as by means of spun over portions of metallic inserts, not shown. These supports are generally L shaped and extend within the interior of the circuit breaker and are there provided with central pressed out portions 31, to which the fixed ends of the bimetallic members 27 are welded or otherwise rigidly secured. Between the central portions 31 and the straight portions of the supports 29 are disposed bridging portions 32 in which are threaded studs 33 bearing against the pressed out portions 31 and providing adjusting means for the bimetallic members 27. Flexible leads 34 are brazed or otherwise secured to the contact bar 11 and to each of the bimetallic members 27 thus placing each of the bimetallic members 27 in series with the contact bar 11.

An operating handle 35 is pivotally mounted on shaft 36 disposed within grooves 37 at the front edge of the base. This handle has an interior cam portion for moving the element 13 rectilinearly in response to rotary movement of the handle and this cam surface includes a flat portion 38 forming a stable support for the manual disengaged position, and a resetting tip 39. A light spring 41 biases the handle for rotation in a clockwise direction as shown. The circuit breaker enclosure is provided with a front metallic cover 42 which may be sealably secured to the base 4 and beneath the cover 2 is provided a thin fibre sheet 43 which may include a side portion 44 for sealing the side of the circuit breaker enclosure adjacent to the current responsive bimetallic members.

The operations of the circuit breaker will now be described.

The incoming line to the circuit breaker is attached to a terminal connector on the conducting plate 6 and the current traverses the plate 6 to the stationary contact 8, movable contact 9, contact bar 11 and through the flexible leads 34 to the individual bimetallic members 27, and thence through the individual conducting supports 29 to the branch circuit conductors. The parts as shown in Figure 2 are in the normal closed circuit position. Upon the occurrence of an overload in any branch circuit the corresponding bimetallic member 27 will become heated and will warp upwardly and by its engagement with the trip bar 22 within its slot 26 will also move the trip bar upwardly, thus moving the latching portion 25 away from the latching end of the contact bar 11 and permitting the parts to assume the position shown in Figure 3 with the contact bar rotated to contact disengaged position under the bias of compression spring 15. As illustrated in Figure 3 it is the top bimetal which has carried the overload and which has effected tripping of the circuit breaker. It is noted that due to the fact that the length of the notches 26 is greater than the movement of the trip bar necessary to effect tripping of the contact bar, movement of the trip bar by any one bimetal may be effected independently of the other bimetals and that the warping bimetal does not have to bear the load of moving the bimetals which are unaffected. As the compression spring 15 is considerably stronger than the light handle spring 41, in the automatically tripped position the element 13 has been moved forwardly and the operating handle 35 rotated into a position indicating the automatically tripped position of the circuit breaker.

To effect resetting of the circuit breaker mechanism after an automatic trip, the operating handle is rotated clockwise until the resetting tip 39 has pushed the element 13 far enough toward the back of the base to cause the latching end of the contact bar 11 to have moved back of the latching portion 25. When the handle is again moved to the "on" position, the parts will then assume their normal closed circuit position.

To effect manual separation of the contact surfaces 8 and 9, the handle is rotated in a clockwise direction until the flat surface 38 engages the front of the element 13. In this movement the contact bar will be rotated about its engagement with the latching portion 25 and a stable condition will be attained which the parts will maintain until the operating handle is again rotated into closed circuit position.

With the circuit breaker as herein illustrated and described, it is possible to feed a plurality of branch circuits through individual tripping elements which may have widely different ratings and to interrupt the current through the circuit breaker upon the occurrence of an overload in any one of the branch circuits. All the branch circuits are controlled by a single switching member whose tripping unit is independently under the control of the individual tripping members in the branch circuits. It can readily be seen that this permits a very desirable economy in manufacture while maintaining independent protection of the branch circuits in accordance with their individual ratings.

While certain preferred embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto as many variations will be readily apparent to those skilled in the art and the invention is to be given its broadest possible interpretation within the terms of the following claims.

I claim:

1. An electric circuit breaker for feeding a plurality of branch circuits comprising separable contacts adapted to interrupt the current through all the branch circuits, and a bimetallic element serially connected in each of the branch circuits, each of said elements having an independent rating in accordance with the individual branch circuit protection desired and each being independently movable in response to current overload in its individual branch circuit to effect separation of said contacts and interruption of the current through all the branch circuits, and manual means for effecting separation of said contacts at will, said last mentioned means being operable to effect the manual switching operation without in any way affecting the bimetallic elements.

2. An electric circuit breaker comprising relatively movable contacts, a switching member biased to move said contacts to separated position, a latch restraining such movement of said switching member, a plurality of bimetallic members connected to independently move said restraining means to releasing position, each of said bimetallic members being in series circuit with a branch circuit feeding through said relatively movable contacts, and manual means for effecting movement of said switching member at will.

3. An electric circuit breaker for supplying a plurality of branch circuits comprising a set of stationary and movable contacts, a plurality of individual bimetallic members connected in parallel to individually feed a plurality of branch circuits therethrough and serially connected with said contacts so that separation of the contacts will effect the opening of the circuits through all said branches, latching means for maintaining said movable contact in engagement with said stationary contact, spring means biasing said latching means into restraining position, said bimetallic members being operatively connected to effect movement of said latching means against said spring means upon the flexing of a member due to the passage of an overload current therethrough, said latching means being releasable by such movement of any one bimetallic member independently of the other members, and manual means for effecting movement of said movable contact at will and without disturbing said latching means or bimetallic members.

4. An electric circuit breaker for feeding a plu-

5 rality of branch circuits comprising a stationary
 contact, a movable switching member having a
 contact surface thereon cooperating with said
 stationary contact to perform the switching op-
 10 eration, spring means biasing said switching
 member to a position to separate said contact
 surface from said contact, latching means for
 holding said switching member in a position to
 15 effect engagement of said contact surface with
 said contact, manual means for effecting move-
 ment of said switching member at will to move
 said contact surface into and out of engagement
 with said contact, a plurality of independent
 20 bimetallic members connected in parallel to feed
 through said contact and contact surface to a
 plurality of independent branch circuits, each of
 said bimetallic members having a rating corre-
 sponding to the desired protection for the branch
 25 circuit fed therethrough, a common trip bar
 adapted to effect movement of said latching
 means to releasing position, and means whereby
 each of said bimetallic members may effect move-
 ment of said common trip bar to release the
 latching means upon the occurrence of an over-
 load current in the branch circuit which it sup-
 plies.

5. An electric circuit breaker for feeding a
 plurality of branch circuits comprising a sealable
 30 enclosure, switching contacts within said en-
 closure, means biasing said switching contacts to
 separated position, a reciprocable latch bar with-
 in said enclosure having a latching surface there-
 on for restraining said contacts in engaged posi-
 tion, a plurality of independent terminals at the
 exterior of said enclosure and having connectors
 extending to the interior thereof, independent
 bimetallic members mounted on said connectors
 within the enclosure, means connecting said bi-
 metallic members in parallel with each other and
 in series with said switching contacts, and means
 connecting the free ends of said bimetallic mem-
 bers to said trip bar to effect movement thereof
 in response to an overload current through any
 one bimetallic member.

6. An electric circuit breaker for feeding a plu-
 rality of branch circuits comprising a sealable
 enclosure, a main terminal at the exterior of said

enclosure, a stationary contact within the en-
 closure and connected to said main terminal, a
 switching member having a contact surface coop-
 erating with said stationary contact, means bias-
 5 ing said switching member to a position separat-
 ing said contact surface from said contact, latch-
 ing means restraining said switching member in a
 position to permit engagement of said contact
 surface with said contact, a plurality of branch
 10 circuit terminals at the exterior of the en-
 closure, a plurality of individual bimetallic mem-
 bers within the enclosure, each connected to one
 of said branch circuit terminals, means connect-
 ing said bimetallic members in parallel to said
 15 switching member, and means for effecting move-
 ment of said latching means to releasing position
 by any one of the bimetallic members in response
 to an overload current in the branch circuit which
 it supplies.

7. An electric circuit breaker for feeding a plu-
 20 rality of branch circuits comprising a sealable
 enclosure, a main terminal at the exterior of
 said enclosure, a stationary contact within the
 enclosure and connected to said main terminal,
 25 a switching member having a contact surface
 cooperating with said stationary contact, means
 biasing said switching member to a position sep-
 arating said contact surface from said contact,
 latching means restraining said switching mem-
 30 ber in a position to permit engagement of said
 contact surface with said contact, a plurality
 of branch circuit terminals at the exterior of
 the enclosure, a plurality of individual bimetal-
 lic members within the enclosure, each connected
 to one of said branch circuit terminals, means
 connecting said bimetallic members in parallel
 to said switching member, means for effecting
 movement of said latching means to releasing
 position by any one of the bimetallic members
 in response to an overload current in the branch
 circuit which it supplies, and manual means ac-
 cessible at the exterior of the enclosure for effect-
 ing movement of said switching member at will
 to move the contact surface to engaged and dis-
 engaged position.

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