Aug. 27, 1940. L. C. FISHER 2,212,732

CIRCUIT BREAKER

Filed March 31, 1937

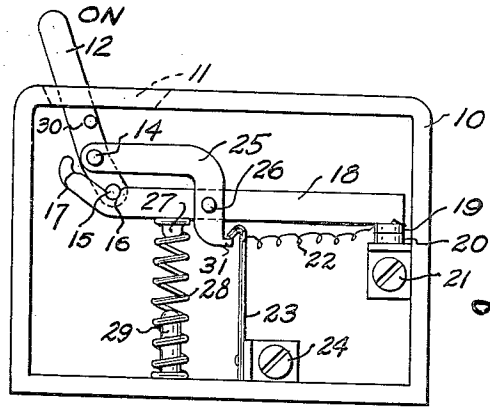


Fig. 1

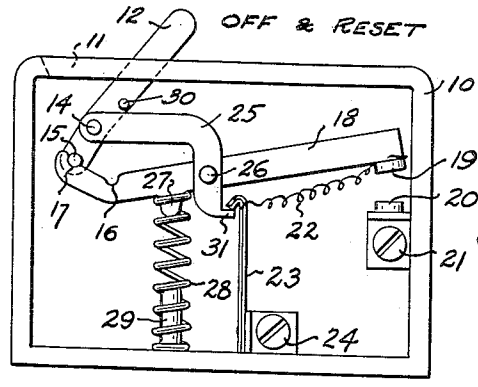


Fig. 2

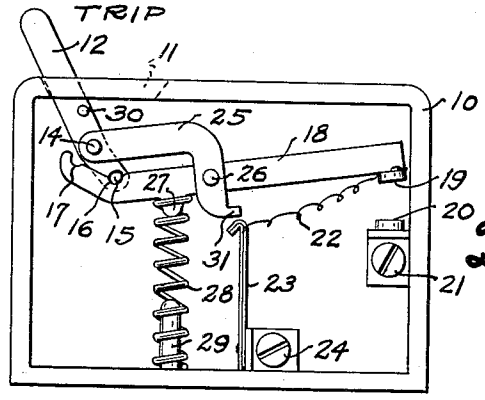


Fig. 3

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CIRCUIT BREAKER

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9 Claims. (Cl. 200—116)

This application relates to circuit breakers and particularly discloses a circuit breaker of the manual operation plus overload release type.

The breaker herein illustrated includes but four major elements: (1) a contact arm or operating bar having on one end a movable contact adapted to make with a stationary contact, (2) a handle for manually moving the contact arm or bar for manual operation to and from "on" and "off" positions and also for manually resetting the breaker in "off" position after an overload or automatic release of the breaker, (3) a coiled compression spring which constantly engages the contact arm for providing contact pressure and for insuring proper arm actuation, and (4) a bimetal tripping latch or thermal release element adapted to warp on overload for overload release of the parts.

For an understanding of the breaker herein disclosed, reference should be had to the appended drawing disclosing the same. In this drawing,

Fig. 1 shows the breaker with the parts in "on" position;

Fig. 2 shows the breaker with the parts in "off" position; this position is also the "reset" position for manual reset following overload release;

Fig. 3 shows the parts in overload released or trip position.

The breaker herein disclosed is mounted within a frame or casing 10 through whose slot 11 projects a handle 12 which is pivotally mounted in the casing or base on a fixed pivot 14 formed on the casing and which has its concealed end provided with a pin 15 adapted to seat in either one of the two notches 16—17 formed in the edge of a contact arm or operating bar 18 on whose end is a movable contact 19 adapted to make with a stationary contact 20 connected to a conductor binding post 21. A circuit is established from this binding post through the contacts 20 and 19, a flexible connector 22, and a bimetal thermal release latch or tripping element 23, to a second conductor binding post 24, and it is understood that the circuit including these conductors is the circuit which is controlled by movement of the handle 12 and which is protected on overload by overload release of the breaker operating through the contact arm 16 which causes separation of the contacts 19—20.

The disposition of handle pin 15 in one or the other of the two notches 16—17 of the arm 18 constitutes one point of connection between the handle 12 and the contact arm 18. Another point of connection between the handle 12 and the bar 18 is established through the medium of a bell crank or bridging element 25 which is pivotally connected to the handle 12 and to the casing 10 at the fixed pivot 14 and which is also pivotally connected at a floating pivot 26 to the contact arm 18. On the arm 18, between the points of connection 15 and 26 of the handle and the bar 18 is a bearing 27 surrounded by a coiled compression spring 28 which has an end surrounding a pin 29 fixed to the casing, the spring thus being operatively connected to the arm 18 and bearing on the base 10 and positively and permanently engaging the arm, between the handle-arm connection points, for contact pressure.

Inasmuch as the fixed pin 14 is the only fixed pivot in the breaker and inasmuch as this pivot does not directly form a pivotal bearing for the arm 18, it can readily be seen that the arm 18 floats on three points, (1) a handle-arm connection point, (2) the spring 28, and (3) the latch 23.

The operation of the breaker herein disclosed is as follows: Assume the parts to be in "on" position (Fig. 1). If the handle 12 be moved clockwise to the position of Fig. 2, pin 15 will cause the arm 18 to rotate counterclockwise on latch 23 as a pivot. In the initial part of the handle movement, spring 28 resists movement of the contact arm 18; in the latter part of the handle movement, spring 28 provides a resilient influence towards contact separating movement of the arm 18; such double functioning of the spring produces a simulated quick break action.

For closing the circuit manually, the arm 18 is rotated counterclockwise from the position of Fig. 2 so that pin 15 relieves the contact arm of the handle influence, thus permitting spring 28 to cause the arm to rotate clockwise about its latch held point as a pivot to closing position, Fig. 1.

Thus it will be seen that circuit opening is caused by the handle aided by the spring; and that circuit closing is caused by the spring as permitted by movement of the handle.

If the parts are in "on" position (Fig. 1) and an overload arises, the latch 23 warps to the right and releases bell crank 25 and with it the arm 18 so that the spring 28 can open the circuit by moving the arm 18 counterclockwise on the handle connection point 15—16 as a pivot. Such action of the parts automatically causes the handle 12 to move out of its "on" position to the "trip" position whereby the trip of the breaker is indicated by the changed position of the handle.

For manual reset of the breaker following trip, handle 12 is rotated clockwise from the trip posi-

tion of Fig. 3 to the "off" and "reset" position (Fig. 2). Such movement of the handle from the trip position, as far as terminated by engagement of the handle with the end of the slot 11, causes a pin 30 on the handle to engage the bell crank 25 and force it to the latch engaged position of Figs. 1 and 2 where the hooked end 31 of the bell crank is caught and held by the tip of the latch 23, with such movement being against the influence of the spring 26 so that such movement encounters some slight resistance by such spring. During such movement of the handle and the bell crank 25, the spring 26, coupled with the shifting of the pin 15 from the "on" position (notch 16) to the "off" position (notch 17) of Fig. 2, prevents the contact arm from going into the "on" position despite the movement of the bell crank 25 into the "on" position. Thus reset of the parts, with the parts in circuit open position, and with the handle ready to be given a movement to its "on" position for circuit closing, is accomplished.

In normal manual operation the handle and the contact arm are the only parts that move and their movement is controlled by the spring 28. On overload release operation the latch releases the contact arm and the latter is moved directly, and without movement of intervening parts, by the spring 28, inasmuch as the spring bears directly on the contact arm. This contrasts the present breaker with breakers now known where a complicated linkage between the spring and the contact arm requires movement following trip of the latch on overload, before the contact arm is moved to open circuit position by the spring.

Now having described the breaker hereof, reference will be had to the claims which follow for a determination of the inventions sought to be protected herein.

I claim:

1. A circuit breaker having a contact arm provided with a contact on one end thereof, resilient means providing a shiftable bearing therefor and pressure thereon, a handle, means operatively connecting the handle to the arm at spaced points on opposite sides of the bearing, and a bimetal latch holding the arm and engaging it, release of the latch on overload permitting the arm to be rotated about one of the handle-arm connection points as a pivot by the resilient means to a released position, the handle then automatically rotating out of "on" position and into a "trip" position, between which and the "off" position, is the "on" position.

2. A circuit breaker having a contact arm provided with a contact on one end thereof, resilient means providing a shiftable bearing therefor and pressure thereon, a handle, means operatively connecting the handle to the arm at spaced points on opposite sides of the bearing, and a bimetal latch holding the arm and engaging it, release of the latch on overload permitting the arm to be rotated about one of the handle-arm connection points as a pivot by the resilient means to a released position, the handle then automatically rotating out of "on" position and into a "trip" position, between which and the "off" position, is the "on" position, reset of the arm in "off" position thereafter being accomplished by movement of the handle manually from "trip" position at least to "off" position and far enough so that the other handle-arm connection point causes the arm to be caught and held by the latch, the arm, during such movement of the handle, being prevented from going into "on" position by virtue of the first mentioned handle-arm connection and the movement of the handle out of "on" position and at least to "off" position.

3. A circuit breaker having a contact arm provided with a contact on one end thereof, resilient means providing a shiftable bearing therefor and pressure thereon, a handle, means operatively connecting the handle to the arm at spaced points on opposite sides of the bearing, and a bimetal latch holding the arm and engaging it, movement of the handle from "on" position to "off" position causing the arm to be rotated about the latch as a pivot, return of the handle from "off" to "on" position permitting the arm to be rotated about the latch as a pivot by the resilient means, release of the latch on overload permitting the arm to be rotated about one of the handle-arm connection points as a pivot by the resilient means to a released position, the handle then automatically rotating ont of 'on" position and into a "trip" position, between which and the "off" position, is the "on" position, reset of the arm in "off" position thereafter being accomplished by movement of the handle manually from "trip" position at least to "off" position and far enough so that the other handle-arm connection point causes the arm to be caught and held by the latch, the arm, during such movement of the handle, being prevented from going into "on" position by virtue of the first mentioned handle-arm connection and the movement of the handle out of "on" position and at least to "off" position.

4. In a circuit breaker, a stationary contact, a circuit current responsive latch, a contact arm having a contact for engaging the stationary contact, a handle means providing a connection between the handle and the arm whereby the handle may move the arm out of "on" position, and a link connecting the handle and arm independently of the first named connection to support the arm, and having a part to be engaged by the latch, and a spring, the spring having a constant tendency to rotate the arm on its link support so as to move the arm contact towards the stationary contact when the link is held by the latch and to press the arm contact against the stationary contact when the latch holds the link, and for moving the arm contact away from the stationary contact upon latch release, the handle operating for moving the arm, about the link as a pivot, so that the arm contact leaves the stationary contact, and also operating for permitting the arm to be moved, about the link as a pivot, by the spring so that the arm contact approaches the stationary contact, the handle also operating for moving the link into latch engaged position following latch release.

5. In a circuit breaker, a stationary contact, a circuit current responsive latch, a contact arm having a contact for engaging the stationary contact, a handle means providing a connection between the handle and the arm whereby the handle may move the arm out of "on" position, and a link connecting the handle and arm independently of the first named connection to support the arm, and having a part to be engaged by the latch, and a spring, the spring having a constant tendency to rotate the arm on its link support so as to move the arm contact towards the stationary contact when the link is held by the latch and to press the arm contact against the stationary contact when the latch holds the link, and for moving the arm contact away from the stationary contact upon latch release, the handle operat-

ing for moving the arm, about the link as a pivot, so that the arm contact leaves the stationary contact, and also operating for permitting the arm to be moved, about the link as a pivot, by the spring so that the arm contact approaches the stationary contact, the handle also operating for moving the link into latch engaged position following latch release, without moving the arm contact against the stationary contact.

6. In a circuit breaker, a stationary contact, a circuit current responsive latch, a contact arm having a contact for engaging the stationary contact, a handle means providing a connection between the handle and the arm whereby the handle may move the arm out of "on" position, and a link connecting the handle and arm independently of the first named connection to support the arm, and having a part to be engaged by the latch, and a spring, the spring having a constant tendency to rotate the arm on its link support so as to move the arm contact towards the stationary contact when the link is held by the latch and to press the arm contact against the stationary contact when the latch holds the link, and for moving the arm contact away from the stationary contact upon latch release, the handle operating for moving the arm, about the link as a pivot, so that the arm contact leaves the stationary contact, and also operating for permitting the arm to be moved, about the link as a pivot, by the spring so that the arm contact approaches the stationary contact, the handle also operating for moving the link into latch engagd position following latch release, the first named connection between the arm and handle being at one end of the arm, with the second named connection between the arm and handle, through the link, being between the ends of the arm, the arm contact being at the other end of the arm.

7. In a circuit breaker, a stationary contact, a circuit current responsive latch, a contact arm having a contact for engaging the stationary contact, a handle means providing a connection between the handle and the arm whereby the handle may move the arm out of "on" position, and a link connecting the handle and arm independently of the first named connection to support the arm, and having a part to be engaged by the latch, and a spring, the spring having a constant tendency to rotate the arm on its link support so as to move the arm contact towards the stationary contact when the link is held by the latch and to press the arm contacts against the stationary contact when the latch holds the link, and for moving the arm contact away from the stationary contact upon latch release, the handle operating for moving the arm, about the link as a pivot, so that the arm contact leaves the stationary contact, and also operating for permitting the arm to be moved, about the link as a pivot, by the spring so that the arm contact approaches the stationary contact, the handle also operating for moving the link into latch engaged position following latch release, the first named connection between the arm and handle being at one end of the arm, with the second named connection between the arm and handle, through the link, being between the ends of the arm, the arm contact being at the other end of the arm, the arm moving about its end handle connection on latch release and about its intermediate handle connection when the latch holds the link.

8. A spring actuated circuit breaker having a contact arm, a handle connected thereto and movable into three separate and readily distinguishable positions, "on", "off", and "tripped" and a latch for holding the arm, the latch controlling movement of the parts into "tripped" position and the handle controlling movement of the parts to and from "on" and "off" positions, and operable by movement in one direction from "tripped" position to the "off" position for resetting the parts in the "off" position after they have moved to the "tripped" position, the parts being so arranged that "on" position of the handle is between "off" and "tripped" positions.

9. A spring actuated circuit breaker having a contact arm, a handle connected thereto and movable into three separate and readily distinguishable positions, "on", "off", and "tripped", and a latch for holding the arm, the latch controlling movement of the parts into "tripped" position and the handle controlling movement of the parts to and from "on" and "off" positions, and operable by movement in one direction from "tripped" position to the "off" position for resetting the parts in the "off" position after they have moved to the "tripped" position, the parts being so arranged that "on" position of the handle is between "off" and "tripped" positions, the contact arm being moved by the spring about its latch-held part as a pivot when the handle is moved and about its handle-held part as a pivot when the latch releases.

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