

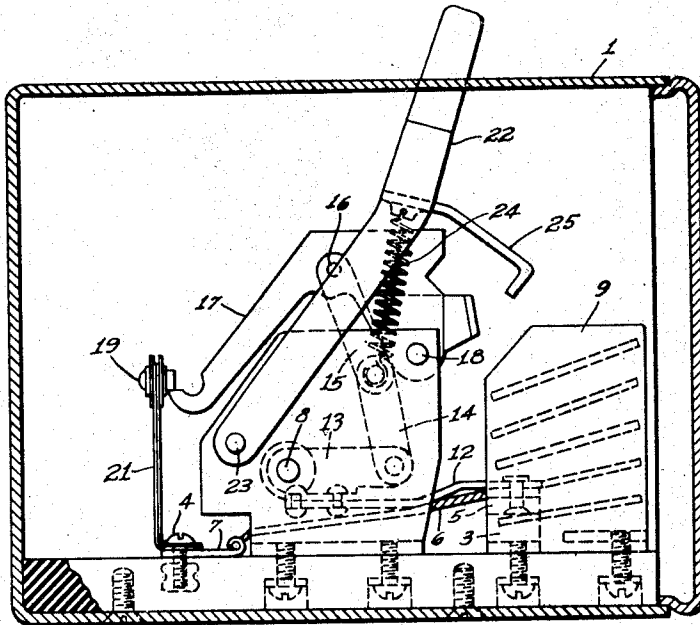
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BREAKER MECHANISM

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WITNESSES:

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2,315,633

BREAKER MECHANISM

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Application December 19, 1941, Serial No. 423,633

4 Claims. (Cl. 200—116)

My invention relates to circuit breakers and, in particular, relates to mechanisms for opening and reclosing circuit breakers of the trip-free type.

One object of my invention is to provide a mechanism for a circuit breaker which shall be biased to circuit-closing position.

Another object of my invention is to provide a mechanism for a circuit breaker of the trip-free type in which a single spring performs the functions of biasing the circuit breaker to circuit-closing position when the trip-free latch is in its normal or non-released condition, but moves the circuit breaker to circuit-opening position when the trip-free latch is released.

Another object of my invention is to provide a trip-free circuit breaker mechanism which is normally biased to circuit-closing position which shall be extremely simple in mechanical structure, cheap in first cost and adapted for ready manufacture in factory production.

Other objects of my invention will become apparent upon reading the following description taken in connection with the drawing in which the single figure shows a circuit interrupter in accordance with my invention.

One convenient field of use for circuit breakers in accordance with my invention is as a substitute for the circuit interrupter described in my copending application, Serial No. 423,631, filed December 19, 1941, for an Automatic reclosing breaker, in which the circuit breaker mechanism is biased to circuit-closing position by an external spring.

Referring in detail to the drawing, an enclosing box or container 1, which may be of insulating material if desired, but which I prefer to make of metal, contains the elements of a circuit breaker of the type described in Dorfman et al. Patent No. 2,044,157, issued June 16, 1936, and assigned to Westinghouse Electric & Manufacturing Company of East Pittsburgh, Pennsylvania, assignee of my present application.

Current may be conducted into the container 1 through the conventional conduit connections, one side of the line being connected within the container to a stationary terminal 3 of the circuit breaker and the other side of the line being connected to a terminal screw 4 within the container. The path of current through the circuit breaker is from the contact 3 to the movable contact 5, thence through a flexible lead 6 to a terminal block 7 and the two limbs of a bimetal 21 to the terminal screw 4. The contact elements 3 and 5 are housed within an arc-

extinguishing structure 8 of a conventional type which forms no part of the present invention and hence need not be more fully described here. The movable contact 5 is mounted upon a resilient arm 12 supported on a link 13 which turns upon a stationary pivot 8 fixed relative to the container 1. The free end of the link 13 is pivoted to a link 14 which, in turn, is pivoted to a second link 15, the latter turning upon a pivot 16 which remains stationary relative to the container 1 until the circuit breaker is tripped by an overload, as will later appear more fully. The pivot 16 is carried by an arm 17 which turns upon a pivot 18 having a fixed support relative to the box 1. The free end of the arm 17 forms one member of a trip-free latch, the other member 19 of which is attached to the bimetal 21 which is heated by the current through the circuit breaker. As long as the current through the circuit breaker does not exceed a predetermined normal value, the free end of the arm 17 is held in stationary engagement with the latch 19, but is released from engagement therewith upon the occurrence of an overload in the line through the circuit breaker.

A circuit breaker operating arm 22 has a pivot 23 which is supported in fixed relation to the container 1 and extends through a slot in the cover of the container 1. The pivot 23 is positioned on the opposite side of the pivot 8 from that in which the link 13 extends in the closed-circuit position of the circuit interrupter. A spring 24 is connected between a suitable point on the arm 22 and the bearing pin which interconnects the links 14 and 15. When the circuit breaker is in its closed circuit position, that shown in the drawing, the arm 22 is so positioned relative to the links 14, 15 that the spring 24 tends to rotate link 14 in a clockwise direction about its pivot, but suitable stop members prevent the links 14, 15 rotating in this direction beyond the point at which they are shown in the drawing. It will be seen that the links 14, 15 constitute a toggle tending to hold the movable contact 5 into engagement with the stationary contact 3 so long as the arm 17 is held in the position shown in the drawing by the latch member 19. When it is desired to open the circuit breaker manually, the handle 22 is moved in a counterclockwise direction about the pivot 23, thus displacing the spring 24 to such a position that it pulls the pivot pin of the toggle link 15 clockwise in the drawing, thereby breaking the toggle 14, 15 and rotating the arm 12 about the pivot 8 to open the circuit breaker.

The handle 22 is always biased to the closed position by spring 24, after which spring 24 again pulls the toggle 14, 15 to the position shown in the drawing, rotating the arm 12 about the stationary pivot 8 to close the contact 5 into engagement with the contact 3.

It will be observed that the spring 24 thus biases the circuit breaker to its closed circuit position and likewise biases the handle 22 to the position shown in the drawing whenever the circuit breaker is closed. Handle 22 is biased to closed position whether contacts are open or closed, unless latch 13 has released arm 17.

When overload current flows through a circuit interrupter for a sufficient time, bimetal 21 is deflected enough so that the latch 13 is moved so far to the left in the drawing that it slips off the edge of the arm 17. When this occurs, the member 17 will move clockwise about its pivot 18 under the stress of the spring 24 acting on the knee of the toggle links 14, 15. The movable contact 5 will be rotated in a counterclockwise direction about the pivot 8 to open the circuit breaker. The cessation of current flow through the bimetal 21 permits it to move to its original position. The arm 17 may be relatched on 19 by rotating handle 22 counterclockwise so that bracket 25 forces arm 17 to the left until it is slightly past the latch 13. The biasing effect of spring 24 will then pull the arm 22 clockwise as soon as the attendant releases the handle and the circuit breaker will again be moved to its closed circuit position.

I claim as my invention:

1. In a circuit breaker, a stationary contact, a movable contact supported on a pivoted arm having its outer end connected through a linkage to a second pivoted arm, a latch governed by a current-responsive element engaging the free end of said second pivoted arm, a third pivoted arm having a fulcrum on the opposite side of the pivot for the first-mentioned pivoted arm than that toward which said first pivoted arm extends, and a bias means interconnecting a point on said linkage with a point on said third pivoted arm.

2. In a circuit breaker, a stationary contact, a movable contact supported on a pivoted arm having its outer end pivoted to a link which is connected by a second link to a second pivoted arm, a latch responsive to current flow through said contacts adapted to maintain said second pivoted arm stationary during normal current flow through said contacts, but to release said second pivoted arm for rotation about its pivot under predetermined overload conditions of the current through said contacts, a third pivoted arm having a fulcrum positioned on the opposite side of its stationary pivot from the first-mentioned pivoted arm, and bias means interconnecting a point on said third pivoted arm to the pivot connecting the two said links, the position of said point on said third pivoted arm being such that said bias

means constrains said separable contacts to circuit-closing position when the second pivoted arm is restrained by said latch and said third pivoted arm is in one of its extreme positions, but said bias means urges said separable contacts to open-circuit position when said second pivoted arm is released by said latch.

3. In a circuit breaker, a stationary contact, a movable contact supported on a pivoted arm having its outer end pivoted to a link which is connected by a second link to a second pivoted arm, a latch responsive to current flow through said contacts adapted to maintain said second pivoted arm stationary during normal current flow through said contacts, but to release said second pivoted arm for rotation about its pivot under predetermined overload conditions of the current through said contacts, a third pivoted arm having a fulcrum positioned on the opposite side of its stationary pivot from the first-mentioned pivoted arm, and bias means interconnecting a point on said third pivoted arm to the pivot connecting the two said links, the position of said point on said third pivoted arm being such that said bias means constrains said separable contacts to circuit-closing position when the second pivoted arm is restrained by said latch and said third pivoted arm is in one of its extreme positions, but said bias means urges said separable contacts to open-circuit position when said second pivoted arm is released by said latch, said bias means exerting a greater stress between its terminals when said third pivoted arm is moved to its circuit-opening position than when said third pivoted arm and said first pivoted arm are in their circuit-opening position.

4. In a circuit interrupter, a pair of separable contacts, a mechanism adapted to move said contacts from circuit-opening to circuit-closing position, a pivoted handle adapted in one extreme position to move said separable contacts to circuit-closing position and in its opposite extreme position to move said separable contacts to circuit-opening position, a bias means interconnecting said handle with said mechanism and acting in the circuit-opening position of said handle to urge said separable contacts to circuit-opening position, a trip-free arm provided with a current-responsive latch and adapted when in latched position to cooperate with said bias means to maintain said separable contacts closed when said handle is in its circuit-closing position, but to permit said bias means to move said separable contacts to circuit-opening position when it is unlatched, the pivot of said handle being so positioned that said bias means is more strongly stressed if said separable contacts are in circuit-closing position and said handle is in its circuit-opening position than if said handle were in its circuit-closing position.

JOHN W. MAY.