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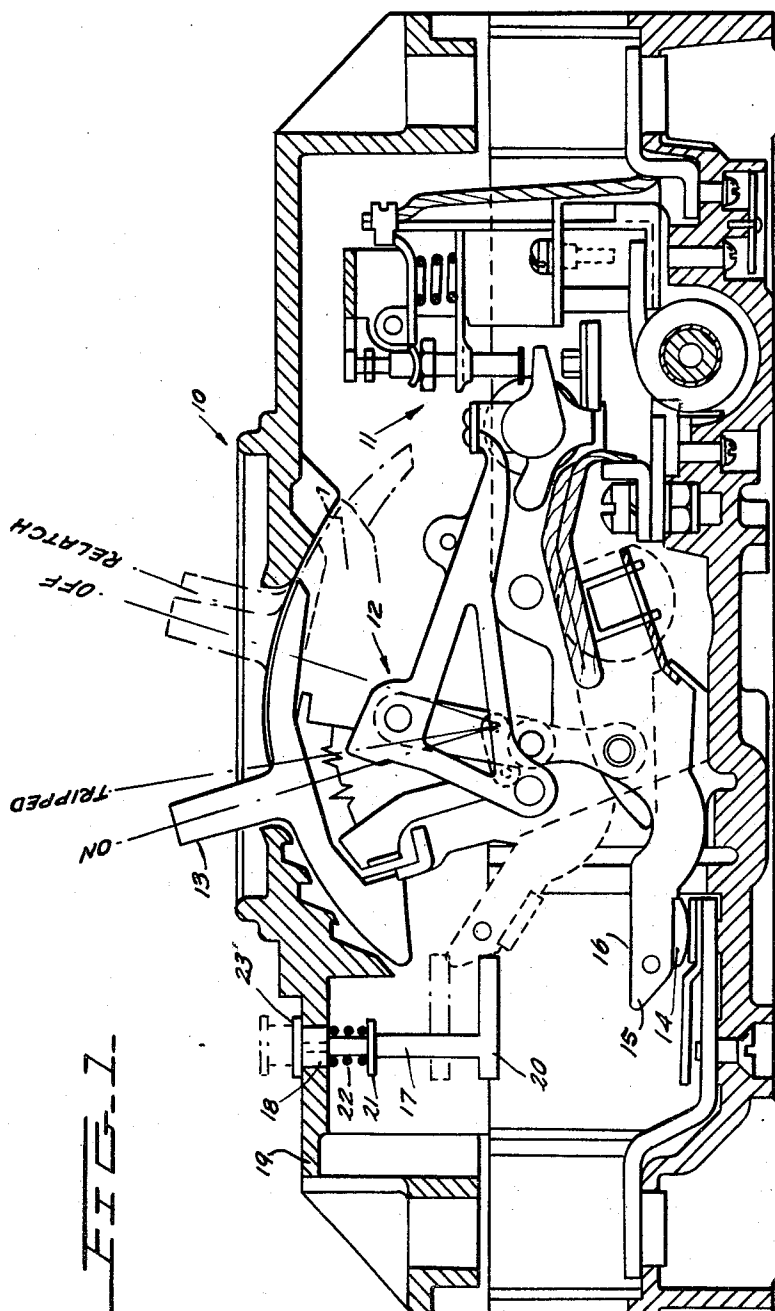
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INDICATING MEANS FOR MULTI-POLE CIRCUIT BREAKERS

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2 Sheets-Sheet 1



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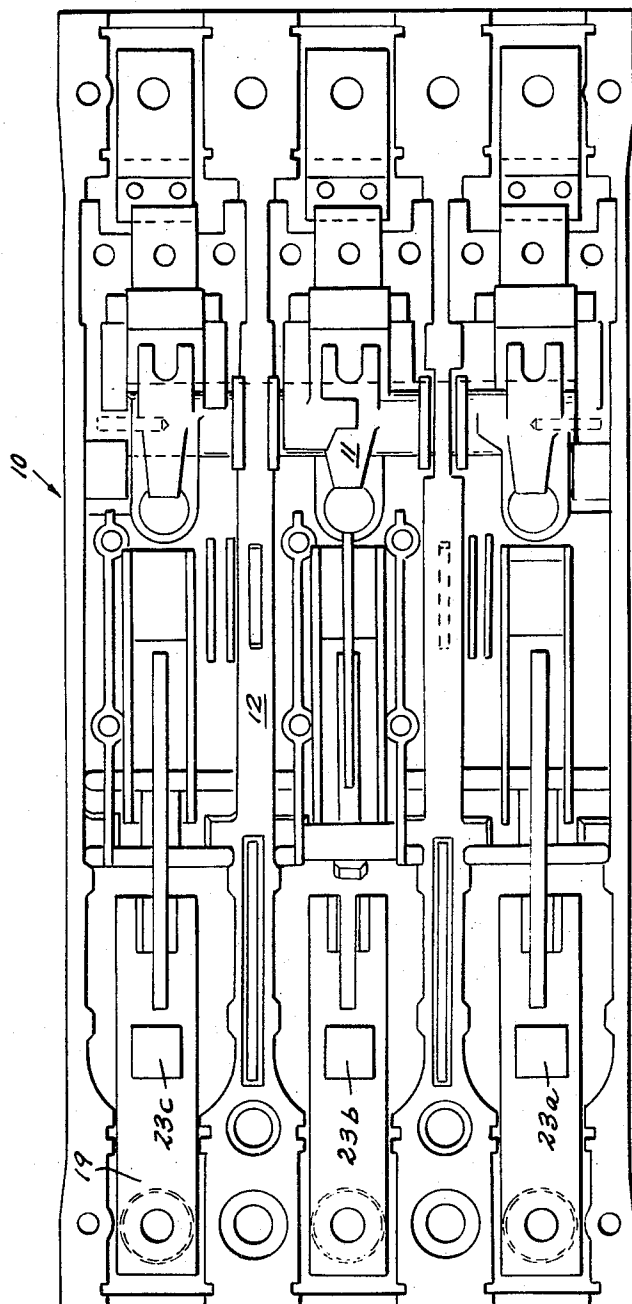
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FIG. 2-



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INDICATING MEANS FOR MULTI-POLE CIRCUIT BREAKERS

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5 Claims. (Cl. 200—167)

My invention relates to indicating devices for molded case circuit breakers and more particularly is directed to a novel indicating means which is operative whenever the circuit breaker opens either automatically or manually.

In the usual construction of molded case circuit breakers, the operating mechanism is contained within a molded housing and the entire unit is then subsequently secured in position within a metal housing or, in some installations, on a panel board with a cover plate positioned over the front of the circuit breaker.

Even with the enclosure cover door open or the cover plate removed, it is not possible to see or determine the position of the cooperating contacts.

Furthermore, in most installations, the cover is sealed or permanently secured to the molded base of the circuit breaker. Hence, it is difficult and impractical to observe and determine the position of the contacts.

In many installations, it is desirable to note the position of the cooperating contacts without relying on the position of the operating handle. That is, although the operating handle is moved through several positions such as on, off, trip or reset, it does not represent a positive indication of the various positions of the cooperating contacts in a multi-pole circuit breaker. Thus, in the event there is an unsuccessful interruption and the cooperating contacts of one pole weld together while the remaining cooperating contacts separate, the operating handle may be in the trip position. Since current may continue to flow through the pole containing the welded contacts, the movement of the handle to the trip position will be a false indication to an operator or repair personnel that the load line can be repaired or worked upon with safety.

In the prior art, a transparent cover has been provided so that the operator can see the position of the cooperating contacts before he starts to work on the line and hence, does not have to rely on the position of the operating handle as an indication as to whether the contacts are engaged or disengaged. This visual means to determine the position of the contacts, however, is undesirable since the interruption of a fault current will usually result in carbonization of the transparent surfaces and the creation of hot gases, both of which may block visual indication.

Furthermore, in many standard constructions, the configuration of the arc chute is such as to completely surround the area adjacent the cooperating contacts so that the relative position of the contacts can not be determined even though a transparent cover is provided.

It will be noted also that in many prior art devices, indicating units have been provided for special conditions of the circuit breaker. That is, if the circuit breaker is automatically tripped, the indicating device will move to a second position. The indicator is in a first position when the cooperating contacts are closed or engaged. However, if the circuit breaker is manually opened, the indicating device remains in the first position. That is,

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the indicator is responsive only to automatic tripping of the interrupter.

Accordingly, a primary object of my invention is to provide an indicating device for a molded case multi-pole circuit breaker which permits positive indication of the position of the cooperating contacts regardless of the manner in which the contacts have been opened or closed.

Another object of my invention is to provide an automatic indicating device for multi-pole circuit breakers which is external to the circuit breaker so that carbonization or hot gases will not obstruct the view.

These and other objects of the present invention will be apparent from the following description when taken in connection with the drawings.

Figure 1 is a side view of a circuit breaker having my novel positive indicating means.

Figure 2 is a top view of the circuit breaker of Figure 1 and illustrates an indicator for each pole of a multi-pole circuit breaker.

The circuit breaker 10 may be of any standard construction well known in the art having a trip means 11, operating mechanism 12, and an operating handle 13 having an on, trip, off and re-latch position.

Each pole of the circuit breaker has a stationary contact 14 and a movable contact 15 with the movable contact secured to the movable arm 16. When the circuit breaker is manually or automatically tripped, the cooperating contacts 14 and 15 are moved from the engaged position shown in the solid lines of Figure 1 to the disengaged position as indicated by the dotted lines of Figure 1. The operation and control of the cooperating contacts is old and well known in the circuit breaker art.

Each pole of the circuit breaker is provided with an indicating device comprised of a pin 17 which extends through an appropriate opening 18 in the cover 19 of the circuit breaker 10. The pin 17 is provided with an extension member 20 which is positioned in the path of movement of the movable contact 16. Pin 17 has, between its intermediate ends, a ledge 21 and a biasing spring 22. The biasing spring 22 is positioned concentric with respect to the pin 17 and is lodged between the cover 19 and the ledge 21. The opposite end of the pin 17 contains the indicator section 23.

The indicator section has a flange portion which is larger than the opening 18 in the cover 19. The biasing spring 22 urges the pin 17 and its attached indicator 23 to the left so that the indicator 23 will be substantially flush with the cover 19.

When the circuit breaker is opened, either due to manual or automatic means, the movable contact arm 16 engages the extension 20 thereby moving the indicator device to the right against the biasing action of its spring 22, as indicated by the dotted view in Figure 1. Hence, the indicator 22 will be moved upwardly away from the cover thereby providing a visual indication that the cooperating contacts 14, 15 are in a disengaged position. As clearly seen in Figure 2, a construction similar to that outlined in Figure 1 is provided for each pole of the molded case multi-pole circuit breaker 10.

Thus, in summary, I have provided a positive indicating device which is operative regardless of the manner in which the circuit breaker cooperating contacts have been separated and which will not be obstructed by carbonization or hot gasses. Furthermore, each indicating device is associated with a pole of a multi-pole circuit breaker so that each indicating device is independent of the other. Thus, in the event that one pole should weld together during an unsuccessful interruption, the indicator for that pole will indicate that the cooperating

contacts are still engaged even though the remaining indicators are raised above the level of the cover to indicate that their respective cooperating contacts are opened.

In the foregoing, I have described my invention only in connection with the preferred embodiments thereof. Many variations and modifications of the principles of my invention within the scope of the description herein are obvious. Accordingly, I prefer to be bound not by the specific disclosure herein but only by the appending claims.

I claim:

1. In a molded case multi-pole circuit breaker having pairs of cooperating contacts with an engaged and disengaged position; said circuit breaker having manual and automatic means to simultaneously move said pairs of cooperating contacts from said engaged position to said disengaged position; an indicating device associated respectively with each pair of said cooperating contacts; said indicating device having a first position when its respective pair of said cooperating contacts are in said engaged position; said indicating device having a second position when its respective pair of said cooperating contacts are moved to said disengaged position by either said automatic or said manual opening means; said indicating device being disengaged from both said manual and automatic means when its respective pair of cooperating contacts are in said engaged position.

2. In a molded case multi-pole circuit breaker having a pair of cooperating contacts with an engaged and disengaged position; a pair of said cooperating contacts associated with each pole of said multi-pole circuit breaker; an indicating device associated respectively with each pole of said multi-pole circuit breaker; each of said indicating devices being biased to a first position when its respective pair of said cooperating contacts are in said engaged position; movement of said cooperating contacts from said engaged position to said disengaged position being operative to move its respective indicating device to a second position against the action of said bias.

3. In a molded case multi-pole circuit breaker having a pair of cooperating contacts with an engaged and disengaged position; a pair of said cooperating contacts associated with each pole of said multi-pole circuit breaker; an indicating device associated respectively with each pole of said multi-pole circuit breaker; one of said contacts in each of said pairs of cooperating contacts mounted on a movable contact arm; each of said indicating devices having a biasing means to move said indicating device to a first position; said biasing means operative to move said indicating device to said first position when said movable contact arm maintains its respective pair of said cooperating contacts in said engaged position; said movable contact operative to move its associated indicating means to a second position against the bias of said indicating means when said co-

operating contacts are moved to said disengaged position by either automatic or manual means.

4. A multi-pole automatic circuit interrupter being comprised of trip units, operating mechanism, pairs of cooperating contacts, and an operating handle; said trip unit, said operating mechanism and said cooperating contacts being contained within a molded insulating housing; one of said trip units and one of said pairs of cooperating contacts associated respectively with each pole of said multi-pole automatic circuit interrupter; said operating handle and said operating mechanism common to all poles of said multi-pole circuit interrupter; an indicating means associated with each pair of said cooperating contacts; said operating handle and said indicating means extending through one surface of said molded insulating housing; each of said pairs of cooperating contacts having an engaged and disengaged position; said operating handle being positioned and operative to simultaneously move said cooperating contacts through said operating mechanism from said engaged to said disengaged position and vice versa; said trip units being positioned and operative to simultaneously move said cooperating contacts through said operating mechanism from said engaged to said disengaged position and vice versa; each of said indicating means biased in a first direction towards its respective pair of said cooperating contacts; one of said cooperating contacts of each pair adapted to engage its respective indicating means when said cooperating contacts are moved from said engaged to said disengaged position; said indicating means being moved to a second position against its bias when its respective pair of said cooperating contacts are moved from said engaged to said disengaged position.

5. In a multi-pole molded case circuit breaker having a pair of cooperating contacts for each of said multi-poles operable with a snap action to an engaged and a disengaged position; said circuit breaker having manual and automatic means to simultaneously move said pairs of cooperating contacts from said engaged to said disengaged position; a separate indicating device associated with each of said pairs of cooperating contacts mounted independently thereof; said indicating device being in a first position when its associated pair of cooperating contacts are in said engaged position; said indicating device being operatively engaged by its associated pair of cooperating contacts and moved thereby to a second position when its associated pair of cooperating contacts are moved to said disengaged position by either said automatic or said manual means; said indicating device being disengaged from its said pair of cooperating contacts when they are in said engaged position.

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