

Oct. 19, 1937.

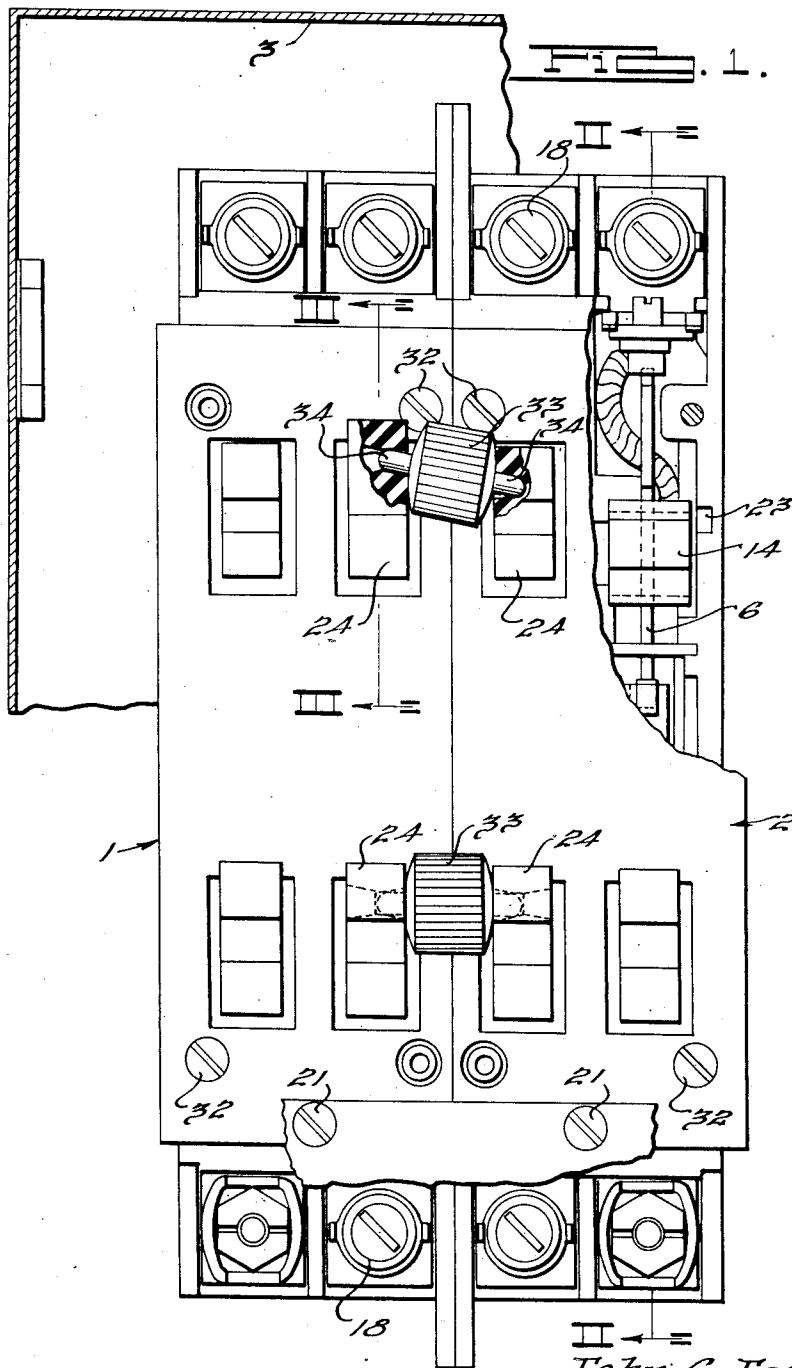
J. G. JACKSON

2,096,548

CIRCUIT BREAKER

Original Filed April 1, 1936

4 Sheets-Sheet 1



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Oct. 19, 1937.

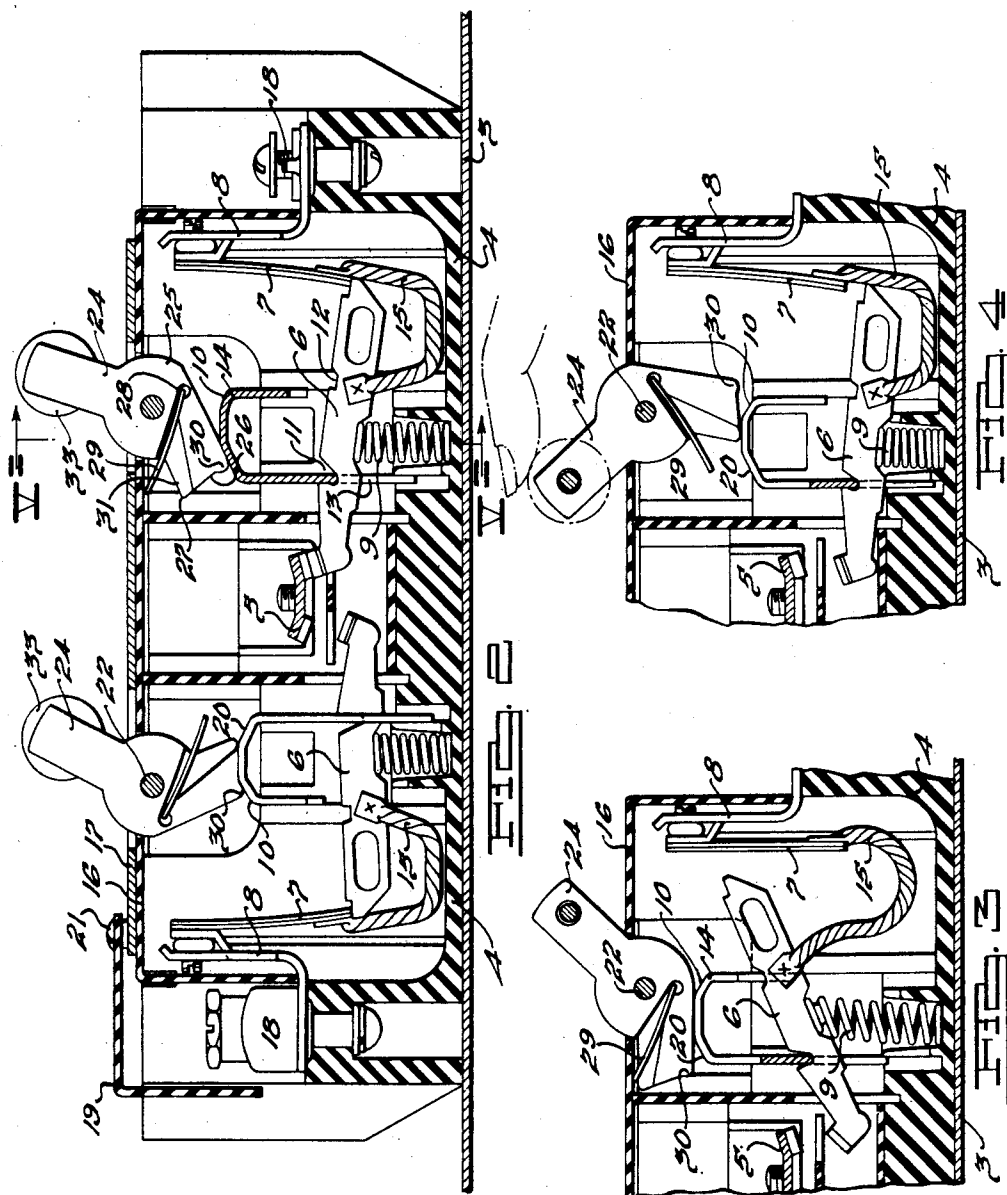
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CIRCUIT BREAKER

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4 Sheets-Sheet 2



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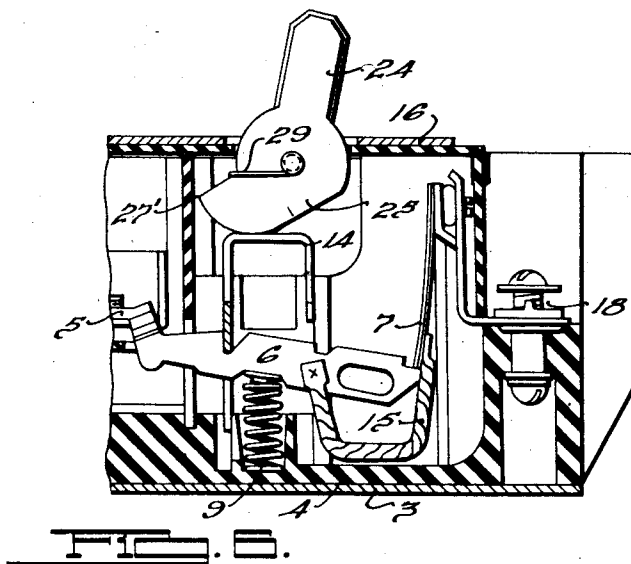
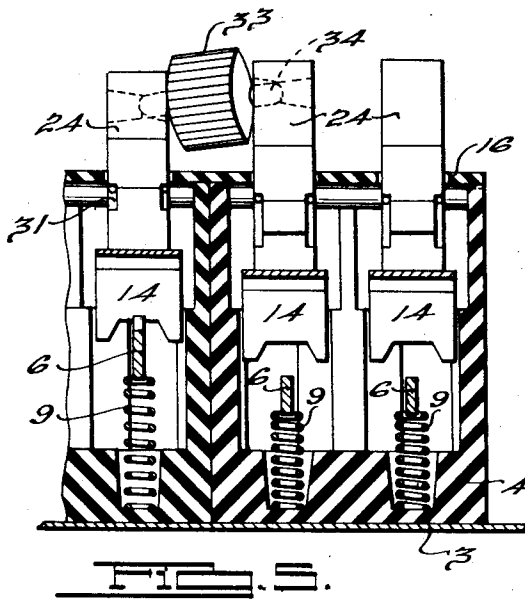
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CIRCUIT BREAKER

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4 Sheets-Sheet 3



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CIRCUIT BREAKER

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4 Sheets-Sheet 4

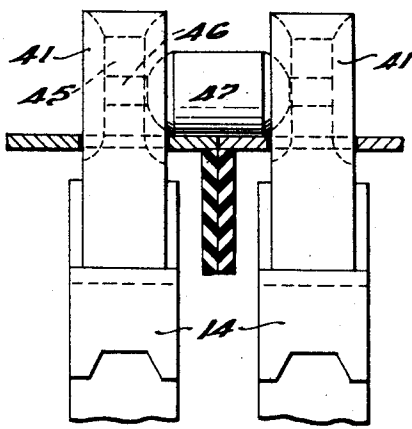


FIG. 7

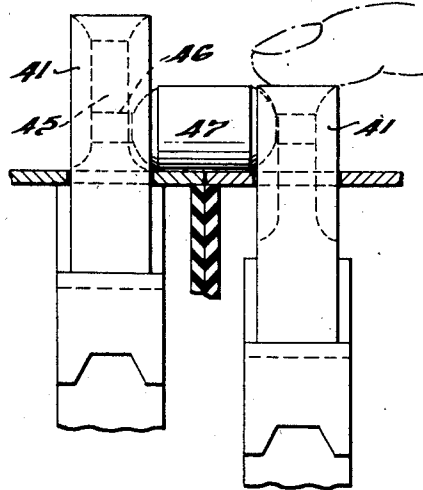


FIG. 8

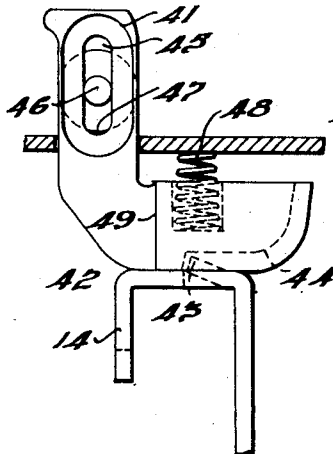


FIG. 9

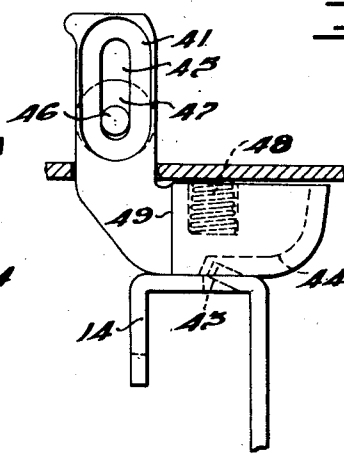


FIG. 10

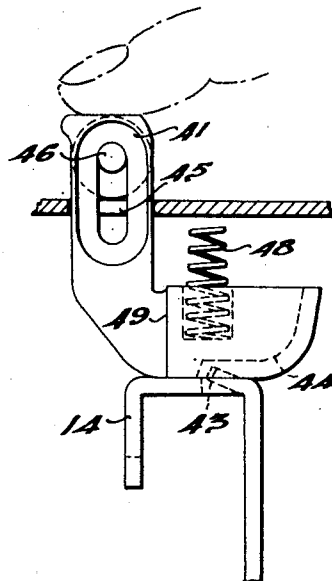


FIG. 11

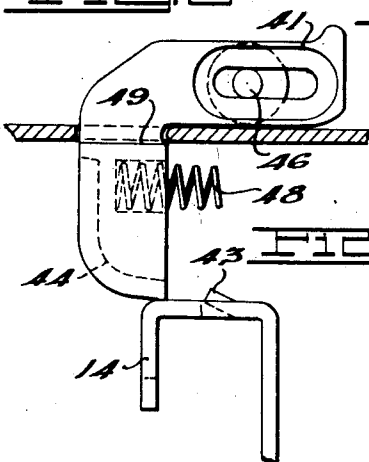


FIG. 12

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UNITED STATES PATENT OFFICE

2,096,548

CIRCUIT BREAKER

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tion of Michigan

Original application April 1, 1936, Serial No.
72,035. Divided and this application Decem-
ber 3, 1936, Serial No. 114,021

8 Claims. (Cl. 200—167)

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

5 One object of the present invention is to provide a means for joining the handles of juxtaposed circuit breakers to provide for common manual movement thereof to certain positions.

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

15 Figure 1 is a front elevational view of a circuit breaker assembly according to the present invention with certain parts broken away to show internal parts.

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

20 Figure 3 is a fragmentary sectional view taken on the line III—III of Figure 1.

Figure 4 is a view similar to Figure 3 showing the parts in another position.

25 Figure 5 is a fragmentary transverse sectional view taken on the line V—V of Figure 2.

Figure 6 is a fragmentary sectional view similar to Figures 3 and 4 showing a modified form of operating handle.

30 Figure 7 is a detail view showing a further modified handle and joining means therefor.

Figure 8 is a view similar to Figure 7 showing one of the handles in a different position.

Figure 9 is a side view of the handle illustrated in Figure 7.

35 Figure 10 is a view similar to Figure 9 in a different position.

Figure 11 is a view similar to Figure 9 with the parts in a third position.

40 Figure 12 is a view similar to Figure 9 with the parts in a fourth position.

45 The circuit breaker as herein illustrated and described embodies the main structural and operating features of that described in applicant's co-pending application, Serial No. 36,247, filed August 15, 1935, entitled Circuit breakers, and the present invention constitutes an improvement or a further development of the invention disclosed therein. This application is a division of applica-
50 tion Serial No. 72,035, filed April 1, 1936, for Circuit breakers.

55 As shown, the circuit breaker assembly comprises two units 1 and 2 mounted in juxtaposed relation within an enclosing box 3 having an openable cover, not shown, which may be hingedly or otherwise mounted on the box. These units may

be of identical construction and, as shown, each comprises an enclosure having a cup-shaped insulating base 4 within which is generally centrally disposed a contact plate 5 carrying contact surfaces at its corners. Cooperating with these contact surfaces are four individual floating contact bars 6 carrying contact surfaces at one end cooperating with the stationary contact surfaces and latched at the other end by bimetallic members 7 adjustably supported on connectors 8 leading to the exterior of the circuit breaker enclosure. Compression springs 9 bias the bars 6 against the stationary contact surfaces and the bimetallic latches 7. The top edges of the bars 6 are provided with pairs of notches 11 and 12 and are received within slots 13 in rectilinearly movable members 14 generally U-shaped in cross section. The longer legs of the elements 14 engage within the notches 11 at the top of the slots 13. Flexible leads 15 interconnect the free ends of the bimetallic latches 7 and intermediate points on the bars 6. The elements 14 and the bars 6 are provided with suitable guiding surfaces, as more fully explained in the aforementioned co-pending application.

25 The contact plate 5 may be disposed on a barrier wall dividing the lower portion of the base into two parts and the arc chamber adjacent the cooperating contact surfaces may be provided with suitable fibre barriers and openings but these features form no part of the present invention and constitute the invention described and claimed in a co-pending application, Serial No. 77,519, filed May 2, 1936.

35 A fibre sheet 16 is disposed over the top of the base and a cover 17 preferably of steel is riveted or otherwise sealably secured to the base to prevent access to the circuit breaker parts from the exterior. Terminal connectors 18 are provided on ledges at the opposite ends of the exterior of the breaker and over the line terminals may be disposed a fibre shield 19 attached to the cover by a pair of screws 21.

45 Pivotal support as by means of shafts 22 within recesses 23 in the side walls of the base 1 are operating handles 24 having interior operating portions 25. These interior portions bear against the top surfaces of the rectilinearly movable elements 14 and constitute cam surfaces which upon rotation move the elements rectilinearly. The operating portions 25 are provided with flat surfaces 26 and projections 30 which form stable supports for the elements 14 in a depressed position corresponding to the manual
55 "off" position of the circuit breaker mechanism, 55

and with tips 27 for causing a further movement of the elements 14 to reset the breaker mechanism after an automatic operation as will be more fully described hereinafter. The top corners of the elements 14 are beveled as at 10 and 20 to cooperate with the projections 30. The projections 30 bear against the bevels 10 in the manual "off" position and this provides a yielding resistance to the initial movement of the operating handles toward "on" position. The bevels 20 provide clearance for the projections to properly position the handles in the "on" position. The portions 25 of the operating handles are provided with openings 28 into which project the ends of springs 29 serving to bias the handles against the members 14. The interior portions 25 of the handles may be provided with cutout portions 31 to provide for free movement of the springs with relation to the operating portion of the handles.

The units are mounted in juxtaposed relation within the box 3 by means of studs 32 and when the studs on either unit are removed that unit may be readily moved sidewise. With the units mounted in this manner the immediately juxtaposed handles on the separate units may be joined together for common movement to certain positions by means of a large manually engageable portion 33 disposed between the handles and having reduced end portions or pins 34 disposed within conical or otherwise elongated holes in the handles 24. It can readily be seen that once the units are in a juxtaposed position the manually engageable means 33 cannot be detached from the cooperating handles unless the studs 32 on one unit are released and this unit moved sidewise.

The operation of the parts shown in Figures 1 to 5, inclusive, will now be explained.

As seen in Figure 2, the circuit breaker mechanism at the right therein is in the normal "on" position. When the handle 24 is rotated to engage the flat surface 26 and projection 30 with the rectilinearly movable member 14 the parts will assume the positions substantially shown at the left in Figure 2, corresponding to manual "off" position, with the movable contact surface moved to a disengaged position against the bias of the spring 9. This position constitutes a stable position which the parts will retain until the operating handle is moved in reversed direction to permit the movable contact surface to move into engaged position under the bias of the spring 9. The spring 29 in the normal "on" position of the device shown at the right in Figure 2 biases the handle 24 into engagement with the element 14 and biases this element within the notch 11 in the bar 6. Upon the occurrence of an overload the bimetallic latch 7 will become heated and move to the position shown in Figure 3, thus unlatching the end of the bar 6 and permitting it to rotate into the position shown in Figure 3. Here the bar is rotated about its engagement with the element 14 and moves the contact surface to a disengaged position. The notch 12 is engaged by the shorter leg of the element 14 which serves to limit the rotative movement of the bar and by its engagement with the notch, serves to further insure the proper positioning of the bar with respect to the element 14. As the compression spring 9 is considerably stronger than the light handle spring 29, in the released position the element 14 will be forced upwardly from the position shown at the right in Figure 2 and will rotate the handle 24 into an indicating position beyond the "on" position as shown in Figure 3.

To reset the mechanism after an automatic

operation, the handle is rotated beyond the normal "off" position into that shown in Figure 4, whereupon the tip 27 on the operating portion 25 of the handle engages the element 14 and forces it into the position shown. In this rotation of the handle the contact end of the bar 6 engages the bottom of the arc chamber and causes the bar to rotate about its engagement with the member 14 into the position shown. When the handle is released from the position in Figure 4, the parts will assume the position of normal "off" as shown at the left in Figure 2. To again close the circuit through the breaker the handle is rotated to the normal "on" position whereupon the parts will assume the position shown at the right in Figure 2.

So far, the operation of the individual breaker mechanisms in the breaker unit have been described. Where the immediately juxtaposed handles are joined together by the engageable portion 33, their movement to manual "on", manual "off" and reset positions will be substantially common and will take place by the proper manipulation of the element 33. However, due to the enlarged openings in the handles 24 which receive the pins 34, provision is made for a limited independent movement of the handles so that they may independently indicate their tripped position. The joined handles shown at the bottom of Figure 1 are both in the "off" position. The joined handles in the upper part of Figure 1 and in Figure 5 are in different positions and that shown at the left indicates the tripped position of the breaker of which it forms a part, while that at the right is still in the normal "on" position. By this means it is possible to know which of the breakers has been automatically operated even though the handles are together for substantially common movement.

In Figure 6 is shown a slightly modified form of operating handle in which the manual "off" and reset positions are the same. In this handle, when the tip 27' engages the element 14 a stable condition is produced and in this position the contact bar 6 and the other parts have assumed the resetting position shown in Figure 4. In this form of handle it is necessary to disengage the latching end of the bar from the bimetallic latch each time the contacts are moved to manual "off" position and as this may disturb the calibration of the breaker, the handle illustrated in Figures 1 to 5, inclusive, is preferred.

Figures 7 to 12, inclusive, show in detail the joining together of the types of handles shown in the co-pending application Serial No. 36,247, and more fully explained in that application. Here the handle portions have a straight line or push button movement to reset the parts and a rotary movement about the cover to manual "off" and "on" position. These operating handles 41 have interior portions 42 for operating the elements 14. The tops of the elements 14 may be provided with guiding projections 43 received within slots 44 in the cam surfaces of the handles. The exterior portions may be provided with elongated slots 45 receiving the reduced ends 46 on an engageable joining member 47 disposed between the handles. A compression spring 48 may be provided to serve the function of the spring 29 in the preferred form of handle.

In the operation of the breakers by this type of handle the normal "on" positions are represented in Figures 7 and 9. Upon the occurrence of an overload the element 14 moves upwardly and serves to move the handle longitudinally into

the position shown in Figure 10. Due to the large elongation of the slot 45, this movement may be made by either of the joined handles independent of the other. The resetting operation in this form of handle is performed independently as shown in Figures 8 and 11, in that only the handle of the tripped breaker is engaged and moved inwardly by a push button movement to the reset position, whereupon when released, the parts will move to their normal "on" position. The position of the parts of the affected breaker in the reset of Figures 8 and 11 is the same as Figure 4 with the exception of the operating handle. In moving the handles to the manual "off" position the handles as viewed in Figure 9 are rotated clockwise together into the position of Figure 12, whereupon the elements 14 are depressed and the parts assume the position shown at the left in Figure 2. The handle in this position is prevented from moving through the cover by means of the engagement of an enlarged abutment 49 with the underside of the cover.

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.

What is claimed is:

1. In a circuit breaker assembly, two individual automatic electric circuit breaker mechanisms mounted in side by side relation, each of said mechanisms including an exterior operating handle, said handles being in substantial sidewise alignment, and means joining said handles for common movement substantially as a unit, said means providing for limited individual movement of the handles to individually indicate their automatically tripped condition.

2. A circuit breaker assembly as defined in claim 1 in which the joining means is an element having an enlarged manually engageable portion between the handles a reduced end portions disposed in openings in the handles.

3. A circuit breaker assembly as defined in claim 1 in which the circuit breaker mechanisms are individually removably mounted as units and the joining means is readily detached by the sidewise movement of a unit.

4. A circuit breaker assembly as defined in claim 1 in which the operating handles have a substantially common movement to manual "off" and manual "on" positions and in resetting a breaker mechanism after an automatic operation.

5. In a circuit breaker assembly, two individual automatic circuit breaker units mounted in side by side relation, each of said units including a plurality of individual circuit breaker mechanisms within a common sealable enclosure, each of said mechanisms including an exterior operating handle, at least one handle of one unit being in sidewise alignment with one handle of the other unit, said operating handles being pivotally mounted and having a plurality of positions for manual "off" and "on", reset and overload "off", and means joining said aligned handles for substantially common movement to manual "off" and "on" and reset positions but providing for limited independent movement of said handles to overload "off" positions so as to independently indicate the automatically tripped position of the respective breaker mechanisms.

6. In a circuit breaker assembly, two individual circuit breaker units mounted in juxtaposition, each of said units including at least one circuit breaker mechanism within an enclosure with an exterior operating handle, a handle in one unit being mounted in juxtaposition with a handle in the other unit, means joining said handles for substantially common movement to certain positions and limited independent movement to other positions of the handles.

7. In a circuit breaker assembly, two individual circuit breaker units mounted in juxtaposition, each of said units including at least one circuit breaker mechanism within an enclosure with an exterior operating handle, a handle in one unit being mounted in juxtaposition with a handle in the other unit, and means joining said handles for substantially common movement to manual "off" and "on" positions and providing for independent movement to overload "off" and reset positions.

8. In a circuit breaker assembly, two individual circuit breaker units mounted in juxtaposition, each of said units including at least one circuit breaker mechanism within an enclosure with an exterior operating handle, a handle in one unit being mounted in juxtaposition with a handle in the other unit, said handles having a rotary movement in opposite directions to manual "off" and "on" positions and a rectilinear movement in opposite directions to overload "off" and reset positions, and means joining said handles for substantially common rotary movement and providing for independent rectilinear movement.

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