Nov. 16, 1937. F. G. VON HOORN 2,099,585

CIRCUIT BREAKER

Filed Sept. 23, 1936

Fig. 1.

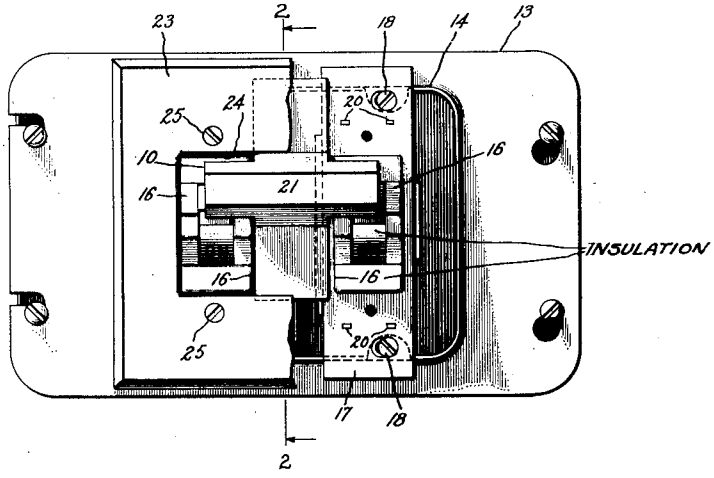


Fig. 2.

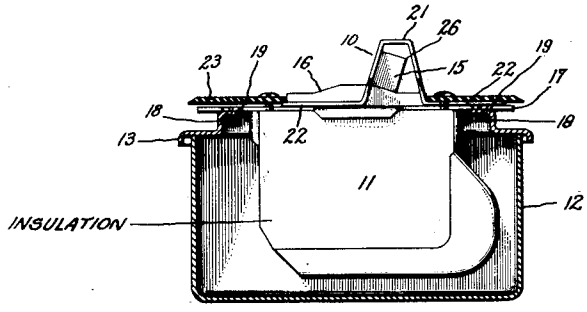
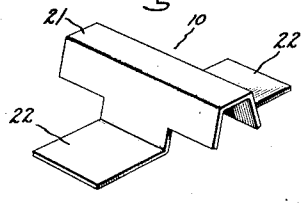


Fig. 3.



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CIRCUIT BREAKER

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Application September 23, 1936, Serial No. 102,155

6 Claims. (Cl. 200—18)

My invention relates to circuit breakers, more particularly to operators, or operating attachments, for simultaneously operating a plurality of circuit breakers, and has for an object the provision of a simple, reliable and inexpensive device of this character.

It is sometimes advantageous in the control of electric circuits to mount a plurality of individual circuit breakers, for example branch-circuit circuit breakers, in an outlet box or housing, and to provide means for simultaneously operating all or a plurality of the circuit breakers. It has heretofore been proposed rigidly to secure a crossbar or a common operating bar to the individual operating levers of the circuit breakers so that movement of the bar effects operation of all of the circuit breakers simultaneously. Such arrangements, however, are not entirely satisfactory, since a considerable twisting force may be exerted on the individual operating levers if the crossbar is grasped adjacent one end. This twisting moment may result in considerable damage to the operating mechanism of the circuit breakers and furthermore, the provision of a rigidly connected operating bar is considerably lacking in flexibility. Something is yet to be desired, therefore, in circuit breaker operators of this character, and it is a further object of my invention to provide a unitary slidable operator which may be easily applied to a plurality of circuit breakers, which is inexpensive to construct and which may be actuated to operate simultaneously a plurality of circuit breakers without damage to the circuit breaker mechanisms.

In carrying out my invention in one form, I provide an operator for a plurality of circuit breakers mounted in side-by-side relation, which operator comprises a slidable member having a handle portion which is substantially U-shaped in cross-section and which extends across at least two of the side-by-side circuit breakers. This handle portion is supported with its open side adjacent the circuit breakers so that the operating levers of the circuit breakers extend thereinto by means of guiding and supporting portions which comprise flat plates extending outwardly from the legs of the U-shaped handle portion. These guide portions slidably engage portions of the individual circuit breakers and guide the operator for sliding movement so that the sides of the U-shaped handle portion engage and move all of the operating levers simultaneously to operate the circuit breakers.

More particularly, each of the circuit breakers includes a casing having an operating lever extending through one wall and a shoulder extending parallel to the path of movement of the operating lever. The circuit breakers are supported in spaced side-by-side relation, and the guide plate portions of the slidable operator extend across the spaces between adjacent circuit breakers so that the edges of the guide plate portions cooperate with the shoulders on the circuit breaker casings to guide the operator for sliding movement. Preferably, a common cover plate, provided with an aperture through which all of the operating levers extend, is supported closely adjacent the circuit breakers, and the slidable operator is arranged with its handle portion extending across the aperture and with its guide portions slidably extending between the cover plate and the circuit breaker casings.

For a more complete understanding of my invention, reference should now be had to the drawing in which Fig. 1 is a plan view of a plurality of circuit breakers having a slidable operator embodying my invention applied thereto, a portion of the cover plate being broken away more clearly to illustrate the constructional details; Fig. 2 is a sectional view, partly in elevation, taken along the line 2—2 of Fig. 1; and Fig. 3 is a detail perspective view of the slidable operator illustrated in Figs. 1 and 2.

Referring now to the drawing, there is shown a slidable operator 10 applied to a plurality of circuit breakers 11 supported in side-by-side relation within an outlet box or housing 12, which housing 12 is provided with a cover 13 having a flanged aperture 14 within which the circuit breakers 11 are supported. Although operators embodying my invention are not limited thereto, I have shown for purposes of illustration circuit breakers of the type described and claimed in my copending application Serial No. 50,907, filed November 21, 1935, now Patent No. 2,065,357, patented December 22, 1936, entitled "Circuit breaker", which application is assigned to the same assignee as the present invention.

As is more fully described in my above-referred to application, each of the circuit breakers includes an enclosing casing, preferably formed of insulating material, and an operating lever 15 which extends through one wall of the casing (the upper wall as shown in Fig. 2), this upper wall being provided with shoulders 16 which extend parallel to the path of movement of the operating lever 15. The circuit breakers may of course be supported in side-by-side relation within the housing 12 in any suitable manner, but I prefer to provide each circuit breaker with

a supporting plate 17 which may be detachably secured as by the screws 18 to suitable lugs 19 which extend inwardly from the edges of the flanged aperture 14.

Preferably, the supporting plates 17 are secured to the casings of the circuit breakers 11, as is more fully described in my above-referred to application, by suitable keys which engage the circuit breaker casing and extend through apertures in the supporting plates 17, the ends of the keys being overturned or riveted as indicated by the reference numeral 20 in Fig. 1.

As shown best in Fig. 3, the slidable operator 10 comprises a handle portion 21 which is substantially inverted U-shaped in cross-section, and a plurality of guide portions 22 which extend downwardly and outwardly from the legs of the U-shaped handle portion. The circuit breakers 11 are supported, as shown best in Fig. 1, in spaced side-by-side relation, and the width of the guide portions 22 of the operator 10 is such that when the operator is placed over the circuit breakers in the position shown in Fig. 1, these guide portions span or extend across the spaces between the circuit breakers 11 and thus prevent access to these spaces, the edges of the guide portions 22 cooperating with the shoulder portions 16 on the circuit breakers to guide the operator 10 for slidable movement along the supporting plates 17, the downwardly extending parts of the guide portions 22 supporting the handle portion 21 above the shoulders 16 so that the handle portion clears the shoulder 16 as the operator 10 is moved.

Thus the operator 10 is supported with the U-shaped handle portion 21 extending across the circuit breakers 11, with its open side adjacent the circuit breakers so that the operating levers 15 extend thereinto, and it will be apparent that when the operator 10 is moved relative to the circuit breakers, the sides of the U-shaped portion 21 will engage and move the operating levers 15 of all of the circuit breakers so as simultaneously to operate the circuit breakers between open and closed circuit positions.

As shown in Figs. 1 and 2, a flush cover plate 23 is provided which extends over the flanged aperture 14 in the cover 13 and which is provided with a somewhat smaller aperture 24 through which the operating levers 15 and the shoulders 16 of the circuit breakers extend. This cover plate 23 is spaced slightly from the supporting plate 17, as shown best in Fig. 2, so that the guide portions 22 of the operator 10 may slidably extend into the spaces between the cover plate 23 and the supporting plate 17. Thus the operator 10 is slidably retained in the proper relative position for operating the circuit breakers 11 simultaneously. As shown, the cover plate 23 is detachably secured by screws 25 which threadedly engage the supporting plate 17, and if desired, suitable stops, not shown, may be provided for positioning the cover plate 23 so as to prevent excessive friction between the cover plate and the guide portions 22 of the operator 10.

It will now be apparent that I have provided a simple operating device which may be easily and quickly assembled relative to a plurality of circuit breakers, and it will likewise be apparent that the guide portions 22 of the operator cooperate with the shoulders 16 on the circuit breakers 11 so as to prevent any tendency of the operator to twist or bend during operation. As shown best in Fig. 2, when the operator 10 is moved from the extreme right-hand position shown so as to operate the levers 15 from an "on" to an "off" position, the right-hand side of the U-shaped handle portion 21 engages a corner 26 of the lever 15 and thus a maximum mechanical advantage is obtained.

Each of the circuit breakers 11, as is fully described in my above-referred to application, includes trip-free current responsive tripping means for operating the contacts to open circuit position independently of the operating lever 15 so that the circuit breakers cannot be held against tripping by the operator 10. Likewise, each circuit breaker includes means for moving the operating lever 15 to a mid-position to indicate that the circuit breaker has been automatically tripped. When two or more circuit breakers are mounted in side-by-side relation and provided with my improved operator for simultaneous operation, the circuit breakers will usually be connected in related portions of a common electrical circuit so that upon the occurrence of heavy overloads or short circuits, all of the circuit breakers will trip simultaneously, and accordingly, the slidable operator 10 will be moved by the operating levers 15 to a mid-position so as to indicate that the circuit breakers have been tripped automatically.

Under certain light overload conditions, it may happen that one of the circuit breakers will trip, while the other circuit breakers remain in a closed circuit position. In such a case, the operator 10 will of course be held against movement to its mid-position by the operating levers of the closed circuit breakers. This action is not objectionable, however, since the contacts of the one circuit breaker will open even though the operating lever 15 is restrained, and the remaining circuit breakers will immediately trip if a dangerous condition exists in the circuit.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto, since many modifications may be made and I, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. An operator for simultaneously operating a plurality of circuit breakers between open and closed circuit positions, said circuit breakers being supported in side-by-side relation and each including a casing having an operating lever extending outwardly from one wall thereof, said operator comprising a handle portion substantially U-shaped in cross-section extending inverted across at least two of said circuit breakers, and guide members extending outwardly from said U-shaped portion slidably engaging said circuit breaker casings for supporting said U-shaped portion with its open side adjacent said circuit breakers so that said operating levers extend thereinto, said guide portions supporting said handle portion for slidable movement in a direction at right angles to said handle portion whereby the side walls of said U-shaped handle portion engage and move said operating levers simultaneously to operate said circuit breakers.

2. An operator for simultaneously operating a plurality of circuit breakers between open and closed circuit positions, said circuit breakers being supported in side-by-side relation and each including a casing having a pivoted operating lever extending outwardly from one wall thereof and a shoulder extending parallel to the path of movement of said operating lever, said operator com-

prising a handle portion substantially U-shaped in cross-section extending inverted across said circuit breakers and guide members extending outwardly from said U-shaped portion slidably engaging said circuit breaker casings for supporting said U-shaped portion with its open side adjacent said circuit breakers so that said pivoted operating levers extend thereinto, said shoulder and said guide portions cooperating to support and guide said handle portion for slidable movement in a direction at right angles to said handle portion whereby the walls of said U-shaped portion engage and move said operating levers simultaneously to operate said circuit breakers.

3. An operator for simultaneously operating a plurality of circuit breakers between open and closed circuit positions, said circuit breakers being supported in spaced, side-by-side relation and each including a casing having an operating lever extending outwardly from a wall thereof and a shoulder extending parallel to the path of movement of said operating lever, said operator comprising a handle portion substantially U-shaped in cross-section extending inverted across said circuit breakers, and guide plates extending outwardly from the legs of said U-shaped portion for supporting said U-shaped portion with its open side adjacent said circuit breakers so that said operating levers extend thereinto, said guide plates extending across the spaces between said circuit breakers and the opposite edges thereof cooperating with said shoulders to support and guide said handle portion for slidable movement in a direction at right angles to said handle portion, whereby the legs of said U-shaped handle engage and move said operating levers simultaneously to operate said circuit breakers.

4. In combination, a plurality of circuit breakers each of which is provided with a casing having an operating lever extending from a wall thereof, means for supporting said circuit breaker casings in side-by-side relation, a cover plate having an aperture through which all of said operating levers extend, and means for operating all of said circuit breakers simultaneously comprising a slidable operator having guide portions slidably extending between said cover plate and said circuit breaker casings and a handle portion substantially U-shaped in cross-section extending inverted across said aperture and supported on said guide portions with its open side adjacent said aperture so that all of said operating levers extend thereinto, the sides of said U-shaped handle portion being thereby positioned to engage said operating levers to operate all of said circuit breakers simultaneously when said operator is slidably moved in a direction at right angles to said handle portion.

5. In combination, an enclosing casing having an aperture in one wall, a plurality of circuit breaker units each of which includes an operating lever, means including a supporting plate for each circuit breaker for supporting said circuit breakers in side-by-side relation within said enclosing casing with all of said operating levers extending through said aperture, a cover plate for said aperture having an opening therein, means supporting said cover plate on said supporting plates in spaced relation thereto with said operating levers extending through said opening, and means for simultaneously operating all of said circuit breaker units comprising a slidable operator having guide portions slidably extending into the spaces between said cover plate and said supporting plates and a handle portion substantially U-shaped in cross-section extending inverted across said opening in said cover plate and supported on said guide portions with its open side adjacent said opening so that all of said operating levers extend thereinto, the sides of said U-shaped handle being thereby positioned to engage and move said operating levers simultaneously when said operator is slidably moved in a direction at right angles to said handle portion.

6. In combination, an enclosing casing having an aperture in one wall, a plurality of circuit breakers each of which includes an individual casing having an operating lever extending from a wall thereof and a shoulder extending parallel to the path of movement of said operating lever, means for supporting said circuit breakers in side-by-side, spaced relation within said enclosing casing with said shoulders and said operating levers extending through said aperture, a cover plate for said aperture having a smaller aperture therein through which said shoulders and said operating levers extend, means mounting said cover plate in spaced relation to said wall of each circuit breaker casing, and means for simultaneously operating all of said circuit breakers comprising a slidable operator having guide plates slidably extending into the spaces between said circuit breaker walls and said cover plate and a handle portion substantially U-shaped in cross-section extending inverted across the aperture in said cover plate and supported on said guide plates with its open side adjacent said aperture so that all of said operating levers extend thereinto, said guide plates spanning the spaces between said circuit breakers and the edges thereof engaging said shoulders to guide said handle portion for slidable movement in a direction at right angles to said handle portion whereby the sides of said U-shaped handle engage and move said operating levers simultaneously to operate said circuit breakers.

FRED G. VON HOORN.