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EXTERIOR OPERATING MECHANISM FOR INCLOSED CIRCUIT CONTROLLING DEVICES

Filed Nov. 8, 1920

Fig. 1.

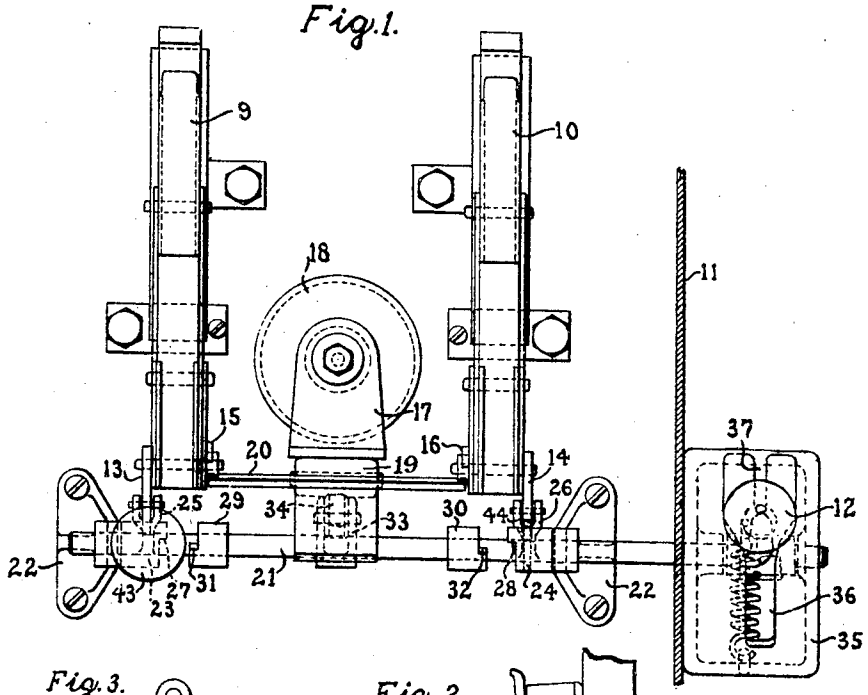


Fig. 3.

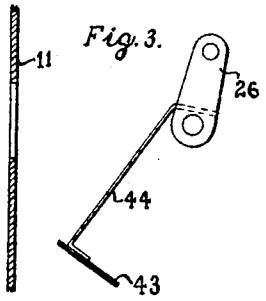


Fig. 2.

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UNITED STATES PATENT OFFICE.

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EXTERIOR OPERATING MECHANISM FOR INCLOSED CIRCUIT-CONTROLLING DEVICES.

Application filed November 8, 1920. Serial No. 422,498.

This invention relates to exterior operating mechanisms for inclosed circuit controlling devices, and while not limited thereto, is particularly applicable as a common actuating device for a plurality of circuit breakers.

In numerous installations it is necessary or desirable to employ a plurality of inclosed circuit breakers or other controllers and to provide for external operation thereof, and the present invention has among its objects that of providing simple and reliable operating means for such and similarly associated controllers.

Another object is that of providing an operating device for the foregoing and other purposes adapted to effect joint operation of a plurality of circuit breakers or other controllers in one sense and to effect selective operation of such breakers or controllers in an opposite sense.

Another object is that of providing such an operating device having parts adapted to afford externally visible indication as to the condition of the controllers to be operated thereby.

Another object is that of providing such an operating device for a plurality of circuit breakers arranged to effect joint control of a single circuit while maintaining at least one of said circuit breakers free to open without restraint by such operating device.

Other objects and advantages will hereinafter appear.

In the accompanying drawing, wherein is illustrated an embodiment of the invention,

Fig. 1 is a front elevational view thereof;

Fig. 2 is a side elevational view of the same; while,

Fig. 3 is a detail view also in side elevation.

As illustrated in Fig. 1, a pair of circuit controllers 9 and 10 are mounted within and inclosed by a suitable housing indicated at 11 and jointly provided with actuating means including a single operating handle 12 located exteriorly of the housing and adapted upon repeated upward movement thereof from an intermediate position to effect closure of said controllers selectively and upon downward movement from such position to effect opening of said controllers jointly. Said controllers are further provided with electro-responsive tripping means and with means providing visible indication of the circuit controlling condition thereof.

More particularly said controllers may comprise similar overload circuit breakers of known construction as illustrated more fully in Fig. 2, said breakers being respectively provided with closing levers 13, 14 and with latches 15, 16 for maintaining the same closed subject to joint and simultaneous tripping by a single overload device.

Said overload device may advantageously comprise a magnetic frame 17 having a coil 18, a pivoted armature 19 to be attracted upon predetermined energization of said coil, and an elongated bar 20 carried by said armature for direct and joint engagement and tripping of said latches upon such attraction of said armature.

The operating means for said circuit breakers preferably comprises a shaft 21 loosely supported by a pair of spaced brackets 22, carried by and within the housing 11, said shaft penetrating an exterior wall of said housing. The operating handle 12 is formed integral with or rigidly secured to said shaft, being spaced from the housing to provide for axial shifting and oscillation of the shaft relative to said housing. Collars 23 and 24 are loosely mounted upon the shaft 21, said collars having integral or rigidly secured projecting crank arms 25 and 26 respectively to be pivotally connected with the respective closing levers 13 and 14 of the circuit breakers. The adjacent faces of said collars are provided with shoulders 27, 28 whereas the shaft 21 is provided between said collars with integrally formed or rigidly secured enlarged portions 29 and 30 which are respectively provided with shoulders 31 and 32 adapted to co-operate selectively with the respective shoulders 27 and 28 of collars 23 and 24 for locking the latter to said shaft.

The foregoing arrangement thus provides in effect a pair of jaw clutches for effecting releasable power connections between the shaft 21 and the closing levers of the two circuit breakers, the enlarged portions 29 and 30 and the respective shoulders 31 and 32 thereof being so positioned upon the shaft 21 as to prevent simultaneous engagement of both of said jaw clutches but to provide for selective engagement of said clutches upon axial shifting of said shaft by means of the handle 12.

Further the shaft 21 is medially provided with a rigidly secured crank arm 33, the latter carrying at its free end roller 34, said roller being adapted upon rotation of said shaft in a direction opposite to that required to effect closing of the circuit breakers to engage and lift the armature member 19 for tripping of the latches 15, 16 to thereby effect joint and simultaneous release and opening of the circuit breakers.

A guiding element 35 is secured outside the housing 11 and adapted to surround the handle 12 for guiding and limiting the various movements thereof. Said element is provided with a branched slot 36 having a rib or septum 37 separating the branches thereof, the arrangement being such as to permit movement of the handle 12 out of one branch into the other without traversing the lower restricted portion of said slot.

An additional lever 38 is intermediately and pivotally mounted upon a stud 39, said lever having one of its terminal portions located below the handle 12 for direct co-operation therewith. The opposite end of said lever is resiliently anchored to a suitable portion of the element 35 by means of an interposed spring 40. Said lever 38 is further provided with a depending lug 41 adapted to co-operate with a stop 42 upon the element 35 for limiting movement of said lever in one direction. The lever 38 with its associated spring thus provides a yielding support for the handle 12 to thereby prevent unwarranted tripping of the circuit breakers by the latter, the force of said spring being adjusted to counterbalance the weight of said handle while the co-operation of lug 41 and stop 42 serves to prevent the possibility of closure of either breaker due to action of said spring. Also the respective breakers are preferably provided with targets indicated at 43 having individual supports 44 carried by the respective crank arms 25 and 26, said targets being arranged to be visible through suitably disposed openings in the housing 11 when the respective breakers are closed and to be invisible when the breakers are open.

The operation of the aforedescribed mechanism for control of the two circuit breakers may be outlined as follows. Upon axial shifting of the handle 12 to the left from the position shown in Fig. 1, the co-operating shoulders of the left hand jaw clutch mechanism are engaged and upon upward movement the lever within the left branch of the slot 36 the circuit breaker 9 is closed and latched in. Said handle may now be moved downwardly past the lower end of the rib 37 without tripping of the latch and upon shifting of said handle to the right the co-operating shoulders of the right hand jaw clutch mechanism are engaged. Thereafter the handle may be angularly elevated for effecting closure of the circuit breaker 10. Upon release of the handle following either of such upward movements thereof the same merely drops against the lever 38 and is thereafter supported by the force of the spring 40 without tripping of the breaker or breakers which may then be closed.

Voluntary opening of the breakers may be effected by simply forcing the handle 12 downward against the action of said spring thus effecting tripping of the latches 15 and 16 by engagement of the roller 34 against armature 19.

The foregoing construction and arrangement thus provide for closure of the breakers selectively and opening thereof jointly at will. Moreover, the use of the aforedescribed targets is adapted to furnish externally visible indication as to the open or closed condition of the breakers.

Further, assuming arrangement of the breakers for joint control of a single circuit it is apparent that the aforedescribed operating means is adapted to afford the characteristics of free tripping, in that it is impossible by means of the handle 12 to maintain the circuit closed during continuance of overload conditions.

What I claim as new and desire to secure by Letters Patent is:

1. Operating means for a plurality of independently operable electrical controllers comprising a permanently mounted element movable repeatedly through a given angular range for effecting operation of said controllers selectively.

2. The combination with a plurality of circuit breakers each including a movable contact element, of operating means therefor including a single operating handle adapted upon successive movements through a given range to effect selective closure of said contact elements, said operating handle being also movable to effect opening of said contact elements.

3. The combination with a plurality of independently operable circuit breakers, of joint operating means therefor comprising an element movable repeatedly through a given angular range to effect closure of said circuit breakers selectively and also movable to effect joint opening thereof.

4. The combination with a plurality of independently operable circuit controllers to be actuated selectively, of operating means therefor comprising a movable element to be moved in a given plane for preselecting certain of said controllers for actuation and also movable in a direction at right angles to such plane for actuation of the controller so selected and associated means providing for joint actuation of said circuit controllers by said element.

5. The combination with a plurality of circuit controllers to be actuated, of operat-

ing means therefor comprising a movable element to be moved parallel with the direction of movement of the movable elements of said controllers for actuation of the latter and also movable at right angles to such former direction to preselect certain of said controllers for operation thereby and associated means for adapting said element to effect joint opening of said circuit controllers.

6. The combination with a pair of circuit breakers to be inclosed within a housing, said circuit breakers having individual links providing for closure thereof, of operating means for said links comprising an angularly movable and axially shiftable shaft penetrating a wall of said housing and provided with an exteriorly located handle, collars loosely mounted upon said shaft and operatively connected with said links respectively, said shaft having parts adapted upon axial movement thereof to effect power connections between said shaft and said collars selectively.

7. The combination with a pair of circuit breakers to be inclosed within a housing, said circuit breakers having individual links providing for closure thereof and individual latching-in devices subjected to electro-responsive release, of operating means for said links comprising an angularly movable and axially shiftable shaft penetrating a wall of said housing and provided with an exteriorly located handle, collars loosely mounted upon said shaft and operatively connected with said links respectively, said shaft having parts adapted upon axial movement thereof to effect power connections between said shaft and said collars selectively, said shaft being angularly movable in a given direction to effect closure of said circuit breakers and in an opposite direction to effect tripping of said latching-in devices for opening of said circuit breakers.

8. The combination with a pair of circuit breakers to be inclosed within a housing, said circuit breakers having latching means and individual links providing for closure thereof and with individual latching-in devices subjected to electro-responsive release, of operating means for said links comprising an angularly movable and axially shiftable shaft penetrating a wall of said housing and provided with an exteriorly located handle, collars loosely mounted upon said shaft and operatively connected with said links respectively, said shaft having parts adapted upon axial movement thereof to effect power connections between said shaft and said collars selectively, said shaft being angularly movable in one direction from a given position to effect closure of said circuit breakers selectively and in an opposite direction from such position to effect tripping of said latching means for opening of said circuit breakers jointly, and means providing against unwarranted tripping of said latching-in devices upon release of said handle.

9. The combination with a plurality of inclosed automatic circuit breakers, of means providing for external operation thereof, said means providing for voluntary tripping of said breakers and tending to effect such action automatically and means to act upon said former means for relieving the circuit breakers from influence due to such tendency of said former means.

10. The combination with a plurality of inclosed electro-responsive circuit breakers, of externally operable means providing for selective closure thereof and also providing for voluntary tripping thereof jointly and tending to effect automatic tripping of said circuit breakers, and means to act upon said former means for minimizing influence of said former means upon the electro-responsive action of said circuit breakers.

11. The combination with a plurality of inclosed electro-responsive circuit breakers, of an externally operable lever movable in one direction from a given position to close said circuit breakers and in an opposite direction from such position to trip said circuit breakers, said lever tending to move in the latter direction, and a yielding support for said lever to neutralize such tendency thereof.

12. The combination with a plurality of inclosed electro-responsive circuit breakers, of an externally operable lever movable in one direction from a given position to close said circuit breakers and in an opposite direction from such position to trip said circuit breakers, said lever tending to move under the action of gravity in the latter direction, means biasing said lever in the former direction and means providing against action of said biasing means to move said lever through said given position.

13. The combination with a plurality of inclosed circuit breakers having automatic tripping means, of operating means for said circuit breakers comprising a common element providing for voluntary exterior closing and tripping of said circuit breakers, the latter having means providing externally visible indication of the open or closed condition thereof.

In witness whereof, I have hereunto subscribed my name.

WILLIAM C. STEVENS.