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SWITCHBOARD MOUNTING OF CIRCUIT BREAKER UNITS

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My invention relates to electrical circuit breaker structure for controlling or protecting electric circuits carrying current for power, lighting or other purposes.

In accordance with my invention, a housed or enclosed automatic circuit breaker unit is secured upon a switchboard carrying other electrical devices, as switches, circuit breakers, measuring instruments, etc., and more particularly in accordance with my invention, the base carrying the circuit breaker mechanism of the unit is secured to the switchboard, and the housing or enclosing structure of the unit is detachably mounted upon the base by structure which also secures the base to the switchboard, and the housing is preferably provided with means for holding and locking it in position.

My invention resides in features of structure, arrangement and combination hereinafter described and claimed.

This application is a division of my prior application Serial No. 655,196, filed August 2, 1923, Patent No. 1,597,332, issued August 31, 1926.

For an illustration of one of the various forms my invention may take, reference is to be had to the accompanying drawings, in which:

1. Fig. 1 is a side elevational view, partly in vertical section, of apparatus embodying my invention.

2. Fig. 2 is a front elevational view of structure shown in Fig. 1, with parts of the housing broken away.

3. Fig. 3 is a fragmentary top plan view of structure for mounting the housed circuit breaker unit upon a switchboard.

Referring to the drawings, 1 is a base, preferably of insulating material, such as slate, marble and the like, upon which are secured to circuit breaker arms A and B, Fig. 2, arranged in a double arm system. Inasmuch as the breakers A and B may be and preferably are similar, a description of one will suffice for both.

While my invention is applicable to relations other than indicated, it is here shown as applied to the two circuit breaker arms, A and B, forming a so-called “double arm” circuit breaker, the two arms or poles of which are independently operable to normal or circuit closing position, both connected in series in the same circuit, preferably in opposite sides of the circuit, with automatic tripping mechanism ensuring the tripping of an arm first closed if there obtains an overload or other abnormal electrical condition upon attempt to close the other arm, in general as described in my prior Letters Patent No. 1,389,996.

Each arm comprises the main terminals 2 and 3, adapted to be engaged and electrically bridged by the laminated bridging member 4 carried by the arm 5 pivoted at 6 to the bracket or housing 7 carried by the base 1. Pivoted to the arm 5 at 8 is the toggle member or link 9 pivoted at 10 to the second toggle link 11 pivoted at 12 to the bracket 7. The member 9 carries the operating pin or roller 13. Carried also by the member 9 is the locking pin or roller 14 engaged by the hook latch 15 pivoted to the bracket 7 at 16, and having the tail 16 disposed in the path of travel of the latch actuator or bar 17 pivoted concentrically with the latch 15 and extending in front of both arms A and B of the circuit breaker mechanism, and having in each breaker arm the tail 18 disposed in the path of travel of the member 19, secured to the armature 20, pivoted at 21 in operative relation to the poles 22, 22 of an electro-magnet having the overload or other winding 23, whose one end connects with the lower main terminal 3 and whose other end connects with the stud 24, which extends through the base 1 and the switchboard 8. A similar stud 25 extends through the base 1 and switchboard 8 and connects with the upper main terminal block 2, whereby a supply circuit conductor connected to the stud 25 conducts current therethrough and through the terminal 2, bridging member 4, lower terminal 3, winding 23 to stud 24, with which may be connected a consumption circuit conductor.

Enclosing the switch or circuit breaker mechanism is the housing H, preferably of sheet metal, having the front wall W, upon whose inner side is secured the bracket member 26 having at 27 and 28 bearings in which rotates a tubular or hollow shaft 29, to which is secured within the casing, in detached relation to the operating members or rollers 13, 13, the resetting member 50, rotatable in opposite directions for resetting or reclosing the switches or circuit breakers in succession.

The shaft 29 extends to the exterior of the housing wall W, where there is secured there-
to the actuator member or block 31, carrying the operator's handle 32, of the resetting or reclosing structure or mechanism. Pivoted to the inner end 20 of the bracket 26 is a tripping lever or member 34 whose end is adapted to engage and actuate the bar 17 for actuating both latches 15 to trip both switches or circuit breakers. The shaft 29 at its left end is counterbored to receive the helical spring 35, which at one end engages the tripping lever 34 and at its other end engages the head 36 of the plunger 37, which extends into the bore of the shaft 29, longitudinally of which bore is movable the rod 39 carrying at its outer end, on a portion of reduced diameter, the button 40, whereby upon pushing the button 40 toward the left, Fig. 1, the rod 39 is moved toward the left, causing movement of the plunger 37 toward the left, thereby actuating the tripping lever 34 through the spring 35, in opposition to spring 41, connected at its one end to the tripping lever 24 and at its other end to the bracket 26.

Secured to the actuator block 31 is the U-shaped member 42 having the transversely extending top member 44, the latter spaced from the top of the block 31 to provide a channel in which is movable the sliding locking member or plate 45 adapted to extend through a locking aperture in the wall W. The operating or actuating member 47 engages the locking plate 45, whereby the member 45 slides with respect to the member 42 and block 31 under the control of the member 47. Disposed in a socket 49 in the block 31 is a spring 50, embracing a member on the member 47 and thrusting against the member 47 to hold the locking member 45 in its outward position.

The member 47 has an aperture for loosely embracing the outer end of the tripping rod 29, where it is of reduced diameter, the rod 29 at full diameter forming a shoulder against which the member 47 may thrust when the member 47 is moved in counterclockwise direction to actuate the tripping lever 34 and therethrough the latches 15 to trip both switches or breaker arms. As indicated, the spring 50 biases the locking member 45 to position in which the block 31 or actuator member is free to be rotated, thereby rotating the member 30 for resetting either or both switches or circuit breakers. If so desired, however, to lock the resetting member 30 in inoperative or neutral position and to which it is returned by the spring 30, the locking member 45 must be moved to the locking position, where its lug or end portion 46 enters the aperture in the wall W, by pressing inwardly upon the member 47, which, however, as it is moved inwardly, moves the tripping rod 29 toward the left, tripping such breaker or breakers as may be in the circuit closing position. To retain the actuating member 31 in the locked position in opposition to spring 50, there is inserted around the member 44 of the member 42 the hasp of a padlock, not shown, the hasp extending into the path of travel of the locking member 45, preventing its return by spring 50 to unlocking position.

The circuit breaker unit of the character hereinafore described, comprising a base carrying the automatic circuit breaker mechanism, and a housing enclosing that mechanism, is secured upon a switchboard S, preferably of insulating material, as slate or marble, along with other switchboard devices or instruments, such as switching or circuit breaker mechanism, ammeters, etc.

For this purpose the base 1 is secured to the switchboard S and the housing detachably secured either to the base or the switchboard.

At the upper end of the base 1 are one or more members 53 lying between and spacing the base 1 and switchboard S, or, if desired, disposed in a depression of either the base 1 or switchboard S. The member 53 may be secured either to the switchboard S or the base 1. In the example illustrated, the screw or bolt 54 extends through the base 1 from its front, and is threaded into the member 53 and extends through the switchboard S, and has applied to its rear end the nut 55. The member 53 has its upper end extending forwardly and upwardly, as indicated at 56, to form a hook or pivot received into a correspondingly shaped aperture in the end 57 of the member 58 secured upon the housing H.

By screws or bolts 54 at the lower end of the base 1, extending through it and the switchboard S, the base and switchboard are secured to each other. Here again the screw 54 may be threaded into the member 59 disposed between the base and switchboard, and having secured thereto the lugs or ears 60, in which is pivoted the bail or hump 61 engaging in the notch 62 of the toggle link 63, pivoted at 64 in the lug or ear 65 carried by the housing H. This fastening is in effect an overtraveling toggle lock for the housing. The link 65 is provided with an aperture 66 adapted to register with a similar aperture in a lug 67 carried by the housing H. The hasp of the padlock may be inserted through the registering apertures 66, thereby to effectively lock the housing to the base 1, switchboard S, or both, the housing H carrying on its interior a lug or bracket 68 engaging the base 1.

The upper member 54, threaded into the member 55 holds the latter to the base 1 whereby the member 53 is comprised in the circuit breaker unit with the base 1 and housing H which latter is detachably held by the member 53. The member 54 also extends through the panel or switchboard S for hold-
ing the circuit breaker unit in operative relation to the member S. The member 54 is accordingly common to the circuit breaker unit and to the attachment of the unit to the switchboard S. Similarly the lower member 54, threaded into the member 58, similarly comprised in the circuit breaker unit, is common to the unit and to the attachment of the unit to the switchboard S.

In the example illustrated the members 53 and 59 serve as components of the circuit breaker unit for securing and mounting the housing H and also for spacing the base 1 of the unit from the switchboard S.

By structure of the character described, a circuit breaker unit, including a housing with means carried by the housing in detached relation to the circuit breaker mechanism for resetting it, is operatively related with a switchboard or a panel thereof, to provide protection or control of a circuit at a central point, as at a switchboard, in a grouping with other switchboard instruments, including other circuit breaker units of the character described, in lieu of installing the circuit breaker unit adjacent the motor or other translating device to be protected or controlled. Where the circuit breaker unit is installed near the motor or other translating device to be protected or controlled, it is generally provided with a rear housing as in the aforesaid Letters Patent, into which the circuit conductors extend for attaching to the circuit breaker studs, as 24 and 28. By the present structure such rear housing may be dispensed with, and the circuit connections may be upon the rear of the switchboard S. Where enclosed circuit breaker units have been grouped adjacent each other, but not upon a switchboard, there has been utilized a conduit box within which the service connections have been made, with conductors extending from the common conduit box to the individual units. By the construction herein disclosed such additional conduit box is not only not utilized upon the front of the switchboard, but is dispensed with, and the circuit connections made upon the rear of the switchboard, or, if the conduit box is utilized, it is positioned to the rear of the switchboard.

My construction, therefore, is a simplification, particularly when the circuit breaker unit or units are disposed at a central or common control point, as upon a switchboard. The circuit breaker unit is in the present combination in effect a switchboard instrument, permitting control at the switchboard of a translating device which may be more or less remote therefrom and connected in circuit with the circuit breaker unit at the rear of the switchboard.

What I claim is:

1. The combination with a switchboard, of a circuit breaker unit comprising a base, automatic circuit breaker mechanism, secured upon the front of said base, and a housing enclosing said circuit breaker mechanism, means securing said unit to said switchboard comprising means securing said base upon the front of said switchboard, structure for holding said housing in operative relation to said circuit breaker mechanism and to said base, said base-securing means serving to secure said structure to said base, and connecting studs extending from said circuit breaker mechanism to the rear of said switchboard.

2. The combination with a switchboard, of a circuit breaker unit comprising a base, automatic circuit breaker mechanism secured upon the front of said base, and a housing enclosing said circuit breaker mechanism, means securing said unit to said switchboard comprising means securing said base upon the front of said switchboard, a member disposed between said base and switchboard and secured by said base-securing means, said housing detachably engaging said member, and connecting studs extending from said circuit breaker mechanism to the rear of said switchboard.

3. The combination with a switchboard, of a circuit breaker unit comprising a base, automatic circuit breaker mechanism secured upon the front of said base, and a housing enclosing said circuit breaker mechanism, means securing said unit to said switchboard comprising means securing said base upon the front of said switchboard, a member disposed between said base and switchboard and secured by said base-securing means, means detachably securing and locking said housing to said member, and connecting studs extending from said circuit breaker mechanism to the rear of said switchboard.

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