CONTACT MECHANISM FOR AUTOMATIC CIRCUIT BREAKERS AND SIMILAR ELECTRICAL SWITCHGEAR


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5 Claims. (Cl. 200—87)

1. This invention relates to electromagnetically operated switches, and is particularly concerned with contact mechanism for automatic circuit breakers for three phase motors, the object of the invention being to provide an improved arrangement of simple and compact construction.

According to this invention, the contact mechanism comprises one set of contacts adapted to be actuated by a push button for operating an auxiliary circuit, and another set of contacts adapted for closing the coil circuit of the magnet to cause attraction of an armature, means associated with the armature retaining the contacts in position after release of the button. The improved arrangement provides mechanism not only for actuating additional interlocking or signaling circuits and so on, but also for acting as a fourth pole or "holding on" device for the magnet after the coil has been energized.

In order to enable the invention to be adequately understood, reference will now be made to the accompanying drawings illustrating, by way of example, one construction for carrying out the invention in effect, in which drawings:

Figure 1 is a central vertical section.

Figure 2 is a section on the line II—II of Figure 1.

Figure 3 is a section on the line III—III of Figure 1.

Figure 4 is a perspective view, with parts removed, of the arrangement shown in Figure 1.

Figure 5 is a section on the line V—V of Figure 1.

Referring to the drawings, the contact mechanism comprises a small insulating carrier adapted to be removably mounted by screws b on a box c, which supports the coil e for the magnet d and which contains the mounting means for the traverse e of the armature f. A flat metal plate h has an insulating knob k secured on its front end protruding from the carrier c, and this knob k is engageable by the stem g of the "start" button g of the switch. The plate h has an upwardly extending lug h' for engagement by a nose e' on the armature traverse e.

The plate h is guidedly mounted at its front end in a groove m in the carrier c, this groove being enlarged to receive the knob k and a helical compression spring n, which spring acts to press the plate h forwardly. The plate h extends through an opening in a partition n' of the carrier c into a contact chamber, and has two contact strips o, o' loosely and transversely arranged on a reduced portion r of the said plate.

The contacts o, o' are maintained against shoulders on the plate h by a helical spring p disposed around the reduced neck r of said plate. In the contact chamber, there are arranged four terminal pillars, the pair s of which is normally engaged by one strip o, while the other pair s' is bridged by the other contact o' when the plate h is operated by the button g.

Thus one set of contacts s is made when the button g is pressed inwards for operating the coil circuit to attract the armature f. At the same time the contacts s' which may be in an interlocking or signal circuit, are broken. This operation causes the attraction of the armature f, so that the nose e' on the traverse e engages the plate to retain the contacts in position after release of the push button. A separate, normally closed push button (not shown), constitutes the "stop" button and is included in the holding circuit. When pushed, this "stop" button breaks the holding circuit, whereupon springs, such as those shown at e in Figure 1 of our copending application Serial No. 43,496, filed August 10, 1948, which issued as Patent 2,565,498, on August 28, 1951, serve to move the armature f to the left as viewed in Figure 1 of the accompanying drawings. The spring e then presses the plate h into the position shown in Figure 1.

The contact chamber is stepped as indicated at t in Figures 1 and 4 of the accompanying drawings, so that both pairs of terminals u, u' for the pillars s, s' are accessible from the front at different levels. The stepped formation also affords creepage paths of extended length.

Having thus described our invention, we claim:

1. An electromagnetic switch for making and breaking a main circuit and an auxiliary circuit, comprising a magnet having a coil circuit; an armature attracted to and held by said magnet upon energization of the coil circuit thereof; spaced sets of stationary contacts, one set connected to the coil circuit of said magnet and the other set connected to an auxiliary circuit; a reciprocating member; means for reciprocating said member; sets of contacts mounted on said member and disposed between the spaced sets of stationary contacts and spaced on said member a lesser distance than the spacing of the said sets of stationary contacts, one set of the contacts mounted on said member adapted to make and break the set of stationary contacts in the coil circuit of said magnet to control the main circuit, and the other set of contacts mounted on said member adapted to make and break the set of stationary contacts in an auxiliary circuit to
control said auxiliary circuit, the lesser spacing between the sets of contacts on said member permitting one set of stationary contacts to be broken prior to the making of the other set of stationary contacts; and means associated with said armature for retaining the one set of contacts on said member in contact with the set of stationary contacts in the coil circuit of the magnet when said coil circuit is energized by movement of said reciprocating member.

2. An electromagnetic switch as defined in claim 1 in which the reciprocating member has a lug thereon engaged by a part moved by said armature when said armature is attracted by said magnet, whereby the one set of movable contacts is retained in contact with the set of stationary contacts in the coil circuit of said magnet when said magnet is energized by movement of said reciprocating member.

3. An electromagnetic switch as defined in claim 1 in which the reciprocating member has a knob thereon, and in which a push button is associated with said knob to move said reciprocating member in a direction to close the coil circuit to energize the magnet and to break the set of stationary contacts in the auxiliary circuit.

4. An electromagnetic switch as defined in claim 1 in which the spaced movable contacts on the reciprocating member are slidably mounted thereon between spaced, fixed stops on said member with a compression spring on said member between said contacts urging said contacts against said stops.

5. An electromagnetic switch as defined in claim 4 in which the spring and spaced contacts are located at one end of said reciprocating member, and a second compression spring is disposed around the opposite end of said member and between a fixed stop and said member for moving said member and the contacts carried thereby in a direction opposite to that in which the member is moved to close the coil circuit of said magnet.

ERNST BESAG,
WALTER EDWARD HILL,
THOMAS DANIEL GUY WINTLE.

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