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2,955,241

LATCHING ATTACHMENT FOR ELECTRO-MAGNETIC CONTACTORS

Harold E. Schleicher, West Hartford, Conn., assignor to The Arrow-Hart & Hegeman Electric Company, Hartford, Conn., a corporation of Connecticut

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8 Claims. (Cl. 317-187)

This invention relates to a unit attachable to electromagnetic contactors to enable the contactor to be latched in, or latched out, or both, and to be released by energization of an electromagnetic relay embodied therein by closing a circuit at a point inside or outside the box in which the contactor is usually housed or from a remote point, as desired.

It is sometimes desired to latch-in, i.e., to hold the parts in the position they occupy when the solenoid coil of the contactor is energized. This latching-in avoids the need to keep the solenoid coil energized, saves power, enables quieter operation and may be desired also for other reasons.

It is sometimes also desired to latch-out, i.e., prevent actuation of the contactor when the solenoid coil is energized, until a predetermined time or until a certain condition occurs in related apparatus.

It is sometimes also desired to provide for both latching-in and latching-out the contactor.

Since the demand varies in different usages for electromagnetic contactors and since it is not always necessary to provide for any latching, it is desirable for manufacturing economy to be able to utilize existing contactor structures when the customer calls for a contactor with latching means. Manifestly, ability to adapt existing types and forms of contactors to the desired latching condition or conditions by merely adding a single adjustable latching unit, would have great appeal and advantages. It would enable conversion to be made in the field or in the factory with ease.

Therefore an object of this invention is to provide an attachment for an electromagnetic contactor which can be economically constructed and attached as a unit to the contactor either in the field or at the factory and which can be used either to latch-in or latch-out the contactor, or both, and which is releasable electromagnetically.

Another object of the invention is to provide an attachment for electromagnetic contactor having the aforesaid characteristics in which the adjustment for latching-in or latching-out may be readily made in the field or factory by a simple adjustment of the position of the nose of the latching element without the need for any other change in the parts of the contactor or attachment.

Other objects and advantages of the invention will appear as the invention is described in connection with the accompanying drawing.

In the drawing—

Figure 1 is a side elevation view of an electromagnetic contactor embodying the invention;

Figure 2 is a plan view, partly broken away, of the invention.

Figure 3 is an end elevation view of the invention.

Figure 4 is a longitudinal section view taken along the line 4-4 of Figure 2 through the attachment;

Figure 5 is an exploded perspective view of the end of the latch and of the portion of the contactor carriage engaged by the latch nose.

Referring to the drawing, the attachment is shown in connection with an electromagnetic contactor as described and illustrated in my co-pending application Serial No.

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591,414, now Patent 2,859,302, entitled "Electromagnet and Magnetic Switch Mounting" but the attachment is of general usage in connection with many other electromagnetic contactor structures and is not limited to use with the exact structure illustrated herein.

As illustrated, a sheet metal backplate M has mounted thereon a block of insulation 12 supporting fixed contacts 14 adapted to be engaged and disengaged by bridging contacts 16 on a movable block of insulation 44 mounted upon one arm 43 of a movable Z-shaped carriage stamped from sheet metal. Another arm 45 parallel to arm 43 is connected thereto by arm 46 upstandingly directed relative to backplate M. The carriage is adapted to slide over and parallel to the backplate when actuated by a T-shaped armature 52 which is pivotally mounted in a pair of parallel arms 40 bent up from opposite sides of the carriage at the end remote from the contact block. The carriage and armature are guided also in their movement by extensions of the pivot pin, sliding in parallel slots in a pair of parallel arms 60 (outside the arms 40) mounted on and extending up from the backplate M.

The armature is attracted by energization of a solenoid coil 59 on the center leg of an E-shaped field piece 57 which is supported from the backplate.

To the foregoing electromagnetic contactor, my attachment can be connected by two screws 21. The attachment is supported by a U-shaped sheet metal bracket 20 through whose parallel side arms the screws 21 pass to hold said arms against the outsides of the guide arms 60. On the transverse arm of bracket 20 is secured one side of a laterally open cage constructed of a U-shaped sheet metal stamping 24 having parallel side arms 24a and 24b connected by a bottom or transverse arm 24c, and an L-shaped sheet metal stamping 25 extending across the open top of a stamping 24. An extending finger 24f (on arm 24b) extends through an aperture in the stamping 25 and serves to maintain the relative positions of the two stampings. The two stampings forming the cage are secured together by screws 26 which extend from the leg 25a into the arm 24a.

For the purpose of latching the contact actuating carriage an L-shaped latch lever 30 is pivotally mounted between the cage and the backplate by means of an inverted U-shaped bracket 32 through whose parallel arms the fulcrum pin 33 for the latch arm passes. The bracket 32 may be conveniently formed as an integral part of the supporting bracket stamping 20. The axis of fulcrum pin extends transversely of the lever 30. Latch lever 30 is biased by a coil tension spring 35, one end of which is hooked around a pin 36 extending from the short arm of latch lever 30 while the other end is hooked into a hole in the arm 25a of the top cage-bracket. The short arm of the latch lever is directed toward and its end abuts the bottom 24c of the cage to restrict the lever movement.

In order to arrange for latch-in, latch-out, or both, a latch nose 37 in the form of a wedge is adjustably attached on the end of the latch lever 30 by a screw threaded stud thereon extending through an aperture in the lever 30 and secured by a nut 38. This nose engages the tail end of the carriage arm 45 and is snapped into a rectangular aperture 45a by the biasing spring 35. When the wedge bends toward the contact block 12 the contactor will be locked out, i.e., in de-energized position of the contactor. When the wedge is reversed, the carriage is locked in, i.e., in the position the contactor parts occupy when the contactor coil 59 is energized. If the wedge is turned to point sideways, i.e., between latch-in and latch-out positions, the carriage will be latched against both in and out movement.

Only latching-out will occur when the flat end face 37

3 of the nose engages the outer edge 45' of the tail aperture 45a. Only latching-in will occur when the flat face 37' of the nose engages the inner edge 45e of the tail which is only possible after the contactor has been energized and the carriage is moved from under the nose. Both 5 latch-in and latch-out will occur when one side face of the nose can engage the outer edge 45' of the tail aperture and (after energization of the contactor and movement of its carriage) the other side of the nose can engage the inner edge 45e of the carriage.

To release the latch when desired, a relay solenoid coil 22 is provided within the cage of the attachment having an axial guide tube 23 in which a core armature 27 is slidable, being biased into a hollow cylindrical housing 34 on top of the bracket 25 in axial alignment with the guide tube 23. The coil compression biasing spring 28 has one end pressing against the inner end of the core armature and the other against a small cylindrical guide member 31 in the lower end of the tube 23. A latch releasing pin or striker 29 extending axially from the inner or lower end of the core armature 27 extends through an axial bore in the guide 31 and will strike the latch lever 38 on the opposite side of its pivot from the nose 37, thus moving the nose out of engagement with the carriage aperture 45a. The carriage and contacts are then free to move. If latched-out when the release occurred and if the contactor was energized at that time, the contactor will move into energized position. If the contactor had been latched-in at the time of release and if the contactor was not energized at that moment, the carriage will return to normal de-energized position.

Whether the parts will become latched upon reaching the new position, will depend on the position of adjustment of the latch nose, as will be apparent from the foregoing.

From the foregoing it will be observed that I have provided a unitary attachment connectible to a conventional electromagnetic contactor and particularly adapted to connection to contactors of the sort described in my above-mentioned co-pending application and that such connection can be easily made by inserting only two screws in the supporting arms of the attachment and screwing them into tapped holes in the frame of the contactor. The attachment provides for automatically latching the contactor in a predetermined position or positions due to bias of the latching lever and, also, the latch is releasable by electromagnetic relay action by closing the circuit of its solenoid coil by a conveniently located push-button or a switch in an automatic control circuit, or otherwise. The attachment may be assembled upon the contactor either in the field or in the factory with equal ease and can be removed in time for any purpose.

Modifications within the scope of the invention will occur to those skilled in the art. Therefore the invention is not limited to the specific form and configuration of the parts as illustrated and described.

What is claimed is—

1. In an electromagnetic switch comprising supporting means including a base plate, a carriage slidable over said base plate, an armature mounted on said carriage to move it when the armature is attracted, the combination with said carriage and supporting means of an electromagnetically releasable latching device attachable as a unit to said switch and comprising a frame attached to said supporting means, a latch member pivotally mounted on said frame and engageable with said carriage to latch it in a certain position, a spring connected at one end to the frame and at the other end with said latch biasing said latch into engagement with said carriage to latch the same, a solenoid coil and plunger-armature mounted on said frame in position for said plunger-armature to strike and disengage said latch member from said carriage.

2. The combination claimed in claim 1 having a nose on the latch member which engages the carriage, said nose being adjustably mounted on said latch member in

position for latching-in or latching-out said carriage or both.

3. The combination claimed in claim 1 having a nose on the latch member which engages said carriage, a stud on said nose extending through said latch member, and means on said stud to secure said nose in any of three different latching positions for latching-in or latching-out said carriage, or both.

4. In an electromagnetic switch comprising supporting means including a base plate, a carriage slidable over said base plate, an armature mounted on said carriage to move it when the armature is attracted, the combination with said carriage and supporting means of an electromagnetically releasable latching device attachable as a unit to said switch and comprising a frame attached to said supporting means, a latch member pivotally mounted on said frame and engageable with different edges on said carriage to latch it in two different positions, a solenoid coil and plunger-armature mounted on said frame in position for said plunger-armature to strike and disengage said latch member from said carriage.

5. In an electromagnetic switch having a mounting plate with parallel support arms extending forwardly thereof, a carriage slidable within said support arms over said mounting plate, said carriage having an aperture in spaced relation to the end of said carriage, an armature coupled to said carriage for moving it when the armature is attracted, the combination with said arms and carriage of an electromagnetically releasable latching device attachable as a unit to said switch, comprising a bracket with arms embraceably engaging said switch supporting arms for attachment thereto, a latch lever pivotally mounted on said bracket with a latching element positionable thereon to be engageable with said carriage end or the edge of said aperture to latch the carriage in certain positions, a solenoid coil and plunger-armature mounted on said bracket in position for said plunger-armature to strike against the said lever on the opposite side of the pivot from said latch element and disengage said latching element from the carriage, bias means to cause said lever to rotate upon its pivot to automatically engage the latch lever with the carriage.

6. The combination claimed in claim 5 having means to secure the latching element on the latch lever to engage the end of the carriage or the edge of the aperture to "latch-in" or "latch-out" the carriage.

7. The combination claimed in claim 5 having means to secure the latching element on the latch lever in different positions to engage the end of the carriage or the edge of the aperture to "latch-in" or "latch-out" the carriage or both.

8. In an electromagnetic contactor comprising a slidable carriage, contacts movable with said carriage and electromagnetic actuating means for moving said carriage and supporting means for said carriage and actuating means, the combination with said supporting means and carriage of an attachment connectible as a unit to said contactor and comprising a supporting frame, a solenoid coil mounted on said frame, a latch pivotally mounted on said frame, a spring connected at one end to the frame and at the other end with said latch biasing said latch into engagement with said carriage to latch the same in a predetermined position, a plunger-armature actuated by said solenoid to strike said latch and disengage it from said carriage, and means biasing said latch into engagement with said carriage.

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CERTIFICATE OF CORRECTION

Patent No. 2,955,241

October 4, 1960

Harold E. Schleicher

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, lines 65 and 66, strike out "and means biasing said latch into engagement with said carriage.";
same column 4, line 65, for "carriage," read -- carriage. --.

Signed and sealed this 26th day of June 1962.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents

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