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1,921,272

SWITCH

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Fig. 1

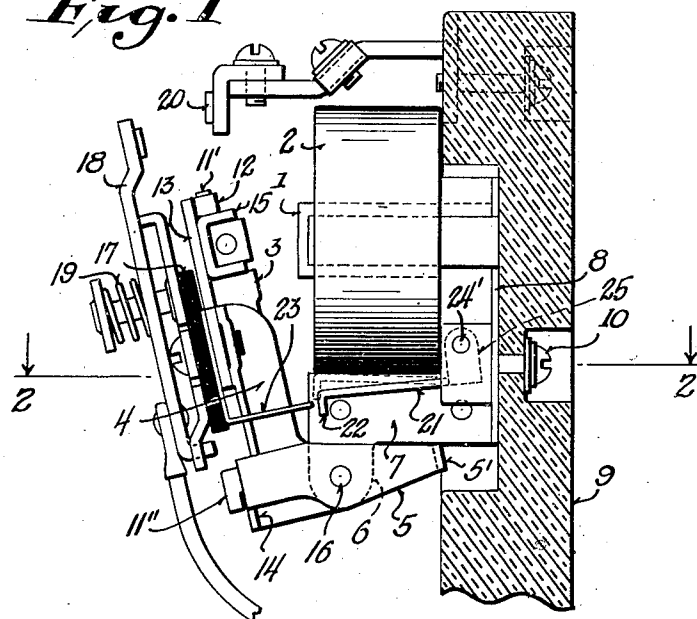
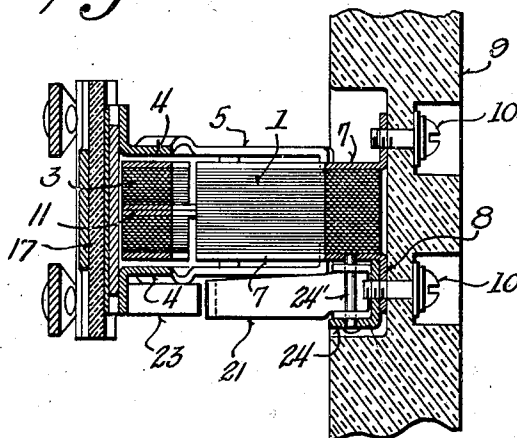


Fig. 2



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UNITED STATES PATENT OFFICE

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SWITCH

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4 Claims. (Cl. 200—103)

This invention relates to switches, and is particularly directed to latches for contactors.

Objects of this invention are to provide a novel form of power operated switch, such for example
5 as a magnetic contactor with means for preventing accidental closing of the contactor from jarring or from any other cause, so that when the contactor is open, although it is biased towards open position, nevertheless it is also positively
10 and automatically locked in open position and is not unlocked or released until the switch is energized, as for example from the magnet coil thereof, so that closing of the switch from any means other than from the power actuation
15 thereof is prevented.

Specifically, objects of this invention are to provide a magnetically operated contactor which is equipped with a magnetically operated latch, in which the contactor is biased towards open
20 position and the latch is biased towards locking position, the latch and the contactor both being operated by the same energizing coil, thereby materially simplifying the construction and avoiding any unnecessary complications thereof.

Further objects are to provide a magnetic contactor in which the pressure from the armature, when actuated upon by any force other than the magnet tending to close the contactor, is directly borne by the latch, and in which the pressure is
30 imparted to the latch substantially longitudinally thereof, whereby a very strong construction is provided which is free from fragile or easily damaged parts.

In this type of contactor it is highly desirable to keep the live or contact portions of the apparatus as far away as possible from the other parts of the apparatus, and this invention contemplates the provision of a latch which is located on the opposite side of the coil from that occupied by
40 the contacts, so that the provision of the latch does not increase the liability of failure of the contactor in any way whatsoever, and to so construct the latch that it may be added as a separate unit and carried by a stationary part of the device, the latch being freely removable from
45 the device for repair or replacement and being, as stated, carried by a stationary part of the device as a separate and distinct unit therefrom, the construction being such as to permit a very compact design without any sacrifice in the safety of operation of the device.

A marked defect which heretofore existed in magnetically operated contactors, namely, the interference of the latch with the free positioning or removal of the coil, is overcome by this in-

vention, and this invention provides a construction such that the latch does not overhang the coil and does not interfere with its free removal or replacement, but instead in which the coil may be as freely removed after the latch has been
60 positioned as in the forms in which no latches are employed. This feature has been found from actual practice to provide a facility very much in demand and heretofore unsatisfied.

An embodiment of the invention is shown in
65 the accompanying drawing, in which:

Figure 1 is a side elevation of the contactor with the latch, the contactor and latch being in open position, part of the figure being in section.

Figure 2 is a fragmentary sectional view on the
70 line 2—2 of Figure 1.

The particular construction of contactor chosen for illustration may be very widely varied, and other forms of mounting and other arrangements of contacts could, of course, be employed than
75 that actually chosen for illustration. However, in the form chosen for illustration, a contactor has been shown which is provided with an operating magnet having a central core 1, which extends beneath the coil 2 and upwardly on the rear side of the coil into proximity to the magnetic portion 3 of the armature. Both the armature and the core are formed of laminated material, as indicated in the drawing. The armature is provided with side frame bars 4 which
80 continue downwardly in the form of rear arms 5 pivoted upon ears 6 of the side plates 7, which latter carry the laminations of the core 1, and are provided with outwardly turned feet or flanges 8 secured to the base 9 in any suitable manner, as
90 by means of the screws 10.

It is preferable to provide the arms 5 with inwardly turned stops or lugs 5' which may contact with the plates 7 or with the upturned portion of the core, as indicated in the drawing.

The magnetic portion 3 of the armature is preferably freely floating and this characteristic may be secured in any of the usual ways, for instance the laminations 3 may have centrally located thereof a pair of bars 11 slidably and slightly rockingly carried by the other portions of the armature.

As shown in Figure 1, a small forward tongue 11' of the central bars 11 is carried beneath a saddle or strap 12 of the top frame portion 13 of the armature. The rear end of the central bars 11 may be provided with an upwardly projecting extension 11'' which slidably and loosely fits over the yoke 14, which integrally joins the arms 12 of the side frame bars 4. This construction
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does not form any part of the present invention and any other suitable mounting of the magnetic portion of the armature may be resorted to without departing from the spirit of the invention, as the form chosen is merely illustrative.

It is also preferable to provide a shading coil 15 of any suitable type, as shown for instance in Figure 1.

The armature is, as stated, pivotally supported from the ears 6 preferably by means of a removable pintle pin 16 so as to permit the free removal of the armature upon withdrawal of the pin. In the actual practice, this pin is temporarily removably locked in place, although it has not been thought necessary to illustrate this well known construction.

The armature carries an insulating member 17 upon which the movable contacts 18 are mounted in any suitable manner. These contacts are preferably pivoted adjacent their rear ends and are yieldingly urged toward the plate 17 by means of the springs 19 in any usual or customary manner, one form of construction being shown in Figure 1.

The stationary contacts 20 are mounted on the side of the magnet coil 2 away from the pivot point and may be as shown in Figure 1, or may take any other form desired, the simplest form being chosen merely for the sake of illustration.

The latch consists of a pivotally mounted arm 21 which is supported from a stationary portion of the apparatus and is provided with a rearwardly turned or otherwise formed bearing lug or pressure head 22 to provide a somewhat extensive upper surface against which a stop 23 carried by the armature is adapted to strike when the armature is inadvertently moved towards closed position without energizing the magnet.

A very convenient way of mounting the latch is to provide a removable support 24 therefor, such support being removably held by means of one of the screws 10, see Figure 2. This support may have an outer upturned portion pivotally carrying the pintle pin 24' for the latch. The other end of the pintle pin may be seated within an aperture formed in the adjacent side frame bar 7, as shown in Figure 2, or the pintle pin may be wholly supported by the member 24.

It is the usual practice to mount these contactors vertically, that is to say, in the position shown in Figure 1 of the drawing, so that the contactor tends to drop to open position without the use of springs. Similarly, by means of this invention the latch also tends to drop towards locking position, or is biased towards such position, without the use of any springs whatsoever. In fact it has been found convenient to slightly offset the pintle pin 24' with respect to the arm 21, see Figure 1.

This construction puts the pintle pin in a position out of alignment with the screw 10 which holds the support 24 in place, as may be seen from Figure 1, so that if the screw is longer than usual, it nevertheless will not engage the pintle pin, nor will it engage any portion of the latch, as the latch is preferably provided with forwardly turned spaced lugs or ears 25 through which the pintle pin passes.

The latch is made of magnetic material so that when the magnet is energized, the leakage flux will draw the latch towards the magnet. It is cushioned by the coil 2, or if desired, a separate stop could be provided for limiting the forward motion of the latch.

In the operation of the device, assuming the contactor is open, the parts will be in the position shown in full lines in Figure 1, and it will be noted that the upper end or outer end 22 of the latch is directly in line with the stop 23 of the armature, so that if the armature is jarred or otherwise moved towards closed position, it is prevented from closing the contactor, as the stop engages the latch.

Further, any pressure imparted to the latch is longitudinally transmitted through the latch and consequently this construction has been found very sturdy and strong. Also, the latch is located on the side of the magnet coil away from the contacts, in actuality such latch being located in a position somewhere between the magnet coil and the hinge or pivot point of the armature.

When the magnet is energized, the leakage flux draws the latch towards the coil, thus moving the latch away from the stop carried by the armature and allowing the armature to be drawn towards the magnet, thus closing the contactor.

Upon cessation of the current in the magnet coil 2, the leakage flux, of course, disappears and inasmuch as the latch is not contacting directly with a portion of the magnet body, there will be no residual magnetism which will hold the latch in place, but instead the latch will freely drop to locking position to thereby guard against inadvertent closing of the contactor, as hereinbefore described.

It will be seen, therefore, that the latch constitutes a magnetically operated, pivoted lockout member which is automatically moved to releasing position whenever the magnet is energized to close the switch.

It will be seen that the construction is very simple, that it overcomes the defects heretofore present in this type of apparatus, and that it is strong, easy to make, and easy to apply even to existing types of contactors without any material change in the construction of the contactors.

Further, the construction is such that the coil 2 may be freely removed from the magnet, the latch in no way hindering this free removal.

Another very desirable result secured by this invention is that the latch and its support may be freely removed or replaced as desired without in any way affecting other portions of the apparatus.

This construction therefore provides a great facility for renewal or replacement of parts or for repair or for the conversion of an ordinary type contactor into a contactor automatically locked in open position when deenergized.

Although this invention has been described in considerable detail, it is to be understood that such description is intended as illustrative rather than limiting, as the invention may be variously embodied and is to be interpreted as claimed.

I claim:

1. A magnetically operated switch comprising a movable member, an electromagnet for operating said movable member, movable contacts operated by said movable member, cooperating stationary contacts, and a latch for locking said movable member in switch-open position and retracted by said electromagnet to releasing position, said latch being biased towards locking position and the movable portion of said latch being out of contact with any magnetic portion of said electromagnet when in releasing position, whereby the effect of residual magnetism upon said latch is avoided.

2. A magnetic contactor comprising an elec-

tromagnet, a movable armature provided with movable contacts, cooperating stationary contacts, said contacts being located upon one side of said electromagnet, and a pivoted lockout member pivoted on the opposite side of said electromagnet from said contacts, said lockout member being biased towards locking position and being moved to releasing position by said electromagnet, said latch being out of contact with any magnetic portion of said electromagnet when in releasing position, whereby the effect of residual magnetism upon said latch is avoided.

3. A magnetically operated contactor comprising an electromagnet provided with a core and a winding, an armature operated by said electromagnet, contacts operated by said armature, and a pivoted latch for locking said armature in open position, said latch being biased towards locking position and moved to releasing position by said electromagnet, said latch be-

ing cushioned against the winding of said electromagnet when moved to releasing position and being spaced by said winding from said core.

4. A contactor comprising an electromagnet, an armature pivoted at one end on one side of said electromagnet and provided with contacts adjacent the other end and located on the other side of said electromagnet, stationary contacts cooperating with said armature contacts, a magnetic lockout member pivoted between the pivot point of said armature and said electromagnet and biased towards locking position for normally locking said armature in open position, said pivoted lockout member being drawn towards said electromagnet when said electromagnet is energized, and being remote from said contacts, said latch when in latching position being adapted to receive any thrust from said armature longitudinally of said latch.

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