

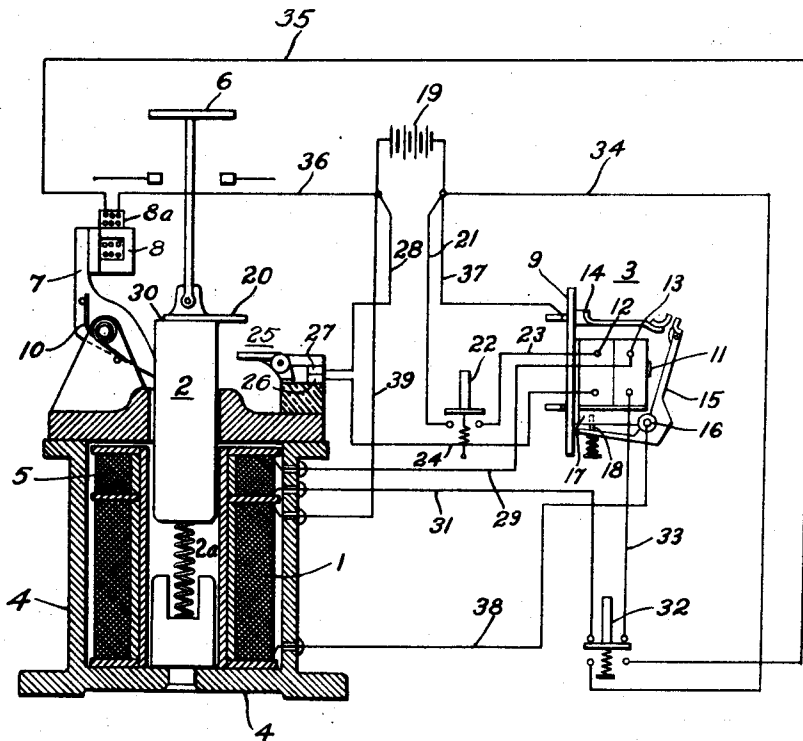
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CONTROL APPARATUS

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CONTROL APPARATUS

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My invention relates to electromagnetic devices and more particularly to those devices wherein movable armatures are actuated.

An object of my invention, generally stated, is to provide for maintaining an actuating coil of an electromagnetic device energized until the current in the coil has reached a substantially constant value.

A more specific object of my invention is to provide for actuating the armature of a circuit interrupter or similar device and for maintaining the exciting circuit for a period of time.

Other objects of the invention will become apparent when the description is considered in connection with the accompanying drawing, in which;

The single figure is a diagrammatic view illustrating an embodiment of my invention.

Referring now to the drawing, an electromagnetic circuit interrupter is illustrated, which comprises an actuating coil 1, a secondary coil 5, a movable armature 2, and an auxiliary contactor 3.

The coil 1 for actuating the armature 2 of the circuit interrupter may be mounted in any suitable manner and in this instance it is disposed in the frame 4. A secondary winding 5 is mounted on the actuating coil 1. In view of the close proximity of the coils 1 and 5 when the coil 1 is energized, the coil 5 will be energized by induction. The movable armature 2 which may be utilized for actuating any member, such for example, as the contact member 6 is disposed to reciprocate within the actuating coil 1 and secondary coil 5.

A spring 2a is mounted in the bottom of the frame 4 to bias the armature 2 to its upper position. Therefore, when the coil 1 is deenergized, the armature 2 is raised to actuate the contact member 6.

In this embodiment of the invention a latch 7 is provided for locking the armature 2 in its lower position in the frame 4. An electromagnet 8, for actuating the latch 7 is disposed, as illustrated, for unlocking the latch 7 which is biased to its latching position by the spring 10, the latch falling in

the groove 30 on the armature 2 when the latter is in its lower position.

An auxiliary contactor, shown generally at 3 and which may be employed for controlling the circuit utilized in energizing the exciting coil 1 of the interrupter 2, comprises a base member 9, a pair of coils 12 and 13, a stationary contact member 14 and a movable contact member 15.

The movable contact member 15 of the auxiliary contactor 3 may be secured in any suitable manner and in this particular embodiment, it is pivotally mounted by means of the pin 16 on the support 17 which is fixed to the base 9. A spring 18 or some similar resilient means may be utilized to bias the contact member 15 to its open position. The stationary contact member 14 is secured to the base 9 and disposed to receive the movable contact member 15.

The movable contact member 15 also functions as an armature and is actuated by the coil 12 which is mounted on the base 9 of the contactor. As illustrated, a second coil 13 for maintaining the contactor 3 closed is associated with the coil 12.

A battery 19 may be provided as a source of supply of current for the control circuit. The actuating coil 12 of the auxiliary contactor is connected in circuit relation with the battery 19. The energizing circuit for the coil 12 may be traced from the battery 19 through the manually operated push button switch 22, conductor 23, the actuating coil 12, conductor 24, the circuit interrupting device 25 mounted on the frame 4 of the interrupter, and conductor 28 to the negative side of the battery 19.

The circuit interrupting device, as illustrated, comprises a stationary contact member 26 and a movable contact member 27 pivotally mounted on the frame 4 and provided with a horizontally extending projection. In order to operate the circuit breaking device 25, an element 20 is mounted on the armature 2 in alignment with the projection on the movable contact member 27. Therefore, when the armature 2 is actuated to its lower position to close the switch 6, the element 20 will operate the contact member 27

of the circuit interrupting device 25 to interrupt the circuit through the coil 12.

The coil 13 which is connected in series circuit relation with the secondary coil 5 may be utilized as a holding coil for the auxiliary contactor. In order to energize the coil 13 from the coil 5 as a source of energy, a circuit is provided extending from the secondary coil 5 through conductor 29, the holding coil 13, conductor 33, the manually operated push button switch 32 and conductor 31 to the other side of the secondary coil 5.

The coil 8a of a latch-release magnet 8 may be energized through a circuit extending from the positive side of the battery 19 through a conductor 34, the push button switch 32, conductor 35, the coil 8a and the conductor 36 to the negative side of the battery 19.

As shown and described hereinbefore, the push button switch 32 functions in a dual capacity since it may be utilized in the exciting circuit of the holding coil 13 and also employed in the circuit of the latching magnet coil 8a. It will be readily understood that inasmuch as the push button switch 32 has only one contact member, that only one circuit may be completed upon its actuation. When the push button switch 32 is depressed to close the actuating circuit of the latching coil 8a, the energizing circuit of holding coil 13 will be opened, thereby avoiding any influence which the movement of the armature 2 may have on the secondary coil 5, tending to close the auxiliary contactor 3.

In the operation of the device, when it is desired to actuate the interrupter armature 2, the main starting push button switch 22 is closed to establish a circuit from one side of the battery 19 through the actuating coil 12 of the auxiliary contactor as hereinbefore set forth.

The energization of the actuating coil 12 will cause the movable contact member 15 to be drawn into its circuit closing position, establishing a circuit from the positive side of the battery 19 through conductor 37, stationary contact member 14 and the movable contact member 15 of the auxiliary contactor 3, conductor 33, the actuating coil 1 of the interrupter and conductor 39 back to the other side of the battery 19.

The energization of the exciting coil causes the armature 2 to be drawn downward and actuates the projection 20 to open the circuit breaking mechanism 25 and interrupt the energizing circuit of coil 12. The holding coil 13 which is in circuit relation with and responsive to the current induced in the secondary coil 5, maintains the contactor 3 closed until the magnetic field enveloping the exciting coil 1 has become substantially constant. In such manner the

circuit of the actuating coil 1 is maintained closed for a period of time after the circuit of the actuating coil 12 of the auxiliary contactor has been interrupted.

The period of time elapsing, prior to the magnetic field enveloping the coil 1, becoming stabilized, permits the armature 2 to be actuated to its closed position and engaged by the latch 7. When the magnetic field enveloping coil 5 ceases to fluctuate there will be no current induced in the holding circuit of coil 13 and consequently there will be no magnetomotive force urging the movable contact member 15 of the auxiliary contactor to its circuit closing position and the latter will open through the action of its biasing spring 18.

When it is desired to actuate the armature 2 of the circuit interrupter upwardly, the push button switch 32 is depressed and the coil 8a for actuating the latch 7 is energized through a circuit described hereinbefore, and the latch is released.

While I have disclosed my invention in connection with an electromagnetic circuit interrupter it will be readily understood that a structure of this character may be varied without departing from the scope of my invention as defined in the appended claims.

I claim as my invention:

1. A circuit controller comprising a magnet having an exciting coil, a secondary coil and an armature actuated by the exciting coil, means for biasing said armature to a desired position, a source of supply, an auxiliary contactor comprising a plurality of coils, for controlling the current flowing from said source to said exciting coil, and a manually-operated push-button switch, one of said auxiliary contactor coils being connected to the source in circuit relation with said manually-operated push-button switch, another coil on the auxiliary contactor being connected in series relation with the secondary coil of the controller and responsive to the current flowing therein for maintaining the auxiliary contactor closed until relatively constant current conditions are maintained in said exciting coil.

2. A circuit interrupter comprising an electromagnet having an actuating coil, a secondary coil and an armature member disposed to be actuated by the actuating coil, a source of current, a circuit for connecting said actuating coil in circuit relation with said source, means actuated by the armature member for interrupting the current from the source to the actuating coil, and means responsive to current induced in the secondary coil for maintaining said actuating coil energized until the current therein has reached a relatively constant value.

3. A circuit controller comprising an electromagnet having an actuating coil, a sec-

ondary coil associated therewith, and an armature actuated by said actuating coil, a source of current, an auxiliary contactor for controlling the flow of current to the actuating coil, said auxiliary contactor having two coils associated therewith, means for connecting one of said coils to said source of supply, means actuated by said actuating coil for disconnecting said coil from said source of supply, the other coil being connected to the secondary coil and responsive to the current induced therein.

4. A circuit controller comprising an electromagnet having an actuating coil, a secondary coil and an armature disposed to be actuated by the actuating coil, a source of current and an auxiliary contactor for controlling the energization of the actuating coil, manual means for initiating the closing of said auxiliary contactor to energize the actuating coil and means responsive to the current induced in said secondary coil for maintaining said contactor in circuit making position until the current in the actuating coil has reached a substantially constant value.

5. A circuit controller comprising an electromagnet having an actuating coil, and an armature actuated by the actuating coil, a secondary coil, a source of current and an auxiliary contactor for controlling the flow of current to the actuating coil, said auxiliary contactor having a plurality of coils therefor, one of said coils being energized from the source, manual means for controlling the circuit to said first-mentioned auxiliary contactor coil, further means for interrupting the circuit to said coil when the armature is actuated, the other of said coils on the auxiliary contactor being energized by the current induced in said secondary coil, also mechanical means on the controller for locking said armature in a desired position, and means for releasing said armature.

6. A circuit controller comprising an electromagnet having an actuating coil, a secondary coil, and an armature actuated by the actuating coil, a source of current, and an auxiliary contactor for controlling the flow of said current to the actuating coil, said auxiliary contactor having a plurality of coils therefor, one of said coils being in circuit relation with said source, manual means for completing said circuit to close the auxiliary contactor, another of said coils on said auxiliary contactor being connected responsive to the current induced in said secondary coil, and disposed to maintain the auxiliary contactor closed until a substantially constant current value has been reached in said actuating coil, means in circuit relation with the exciting coil of the auxiliary contactor and operated by said armature for interrupting the circuit to said

exciting coil when said armature is actuated, means for locking the armature, and magnetic means manually controlled for releasing said armature, and at the same time interrupting the circuit from the secondary coil to the auxiliary contactor coil which is in series relation therewith.

7. In an electro-magnetic device, in combination, a movable armature, means for actuating the armature, a source of current, contactor means for connecting the actuating means in circuit relation with said source, said contactor means being normally open, a manually-operable switch, a plurality of coils associated with said contactor means, one of said coils arranged to be connected to the source by said switch, and means including another of said coils responsive to the current flowing in the actuating means for maintaining said actuating means in circuit relation with said source for a limited time.

8. A circuit controller comprising an electro-magnet having an exciting coil and a secondary coil, an armature disposed to be actuated by the exciting coil, a contactor device, a circuit including said exciting coil the contactor device and a source of current, said circuit being normally open at said contactor device, means including a coil for closing said contactor, and means associated with said contactor and responsive to current induced in said secondary coil of the electro-magnet for maintaining the exciting coil energized for a period of time after the operation of said armature.

9. An electro-magnetic device comprising an exciting coil, a secondary coil, and an armature disposed to be actuated by said exciting coil, a source of supply, magnetically-operated means for connecting said exciting coil to said source, said magnetically-operated means comprising a plurality of coils, one of said coils arranged to be energized from the source, manual means for controlling the circuit to said first-mentioned coil, means for interrupting the circuit to said coil when the armature is actuated, and means including another of said coils associated with said magnetically-operated means and responsive to current induced in said secondary coil for maintaining the connection between said exciting coil and said source until the current in the exciting coil has reached a relatively constant value.

10. A circuit controller comprising an electro-magnet having an exciting coil and a secondary coil, an armature arranged to be actuated by the exciting coil, a contactor, a circuit including said exciting coil the contactor and a source of current, said circuit being normally open at said contactor, a closing coil for said contactor, an energizing circuit for the closing coil including said source and a control switch, said closing coil

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being energized upon closure of said switch,
and means associated with said contactor
and responsive to current induced in said
secondary coil for maintaining the exciting
5 coil energized for a period of time after the
operation of said armature.

In testimony whereof, I have hereunto
subscribed my name this 8th day of April,
1927.

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NIELS K. ANDERSEN.

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