

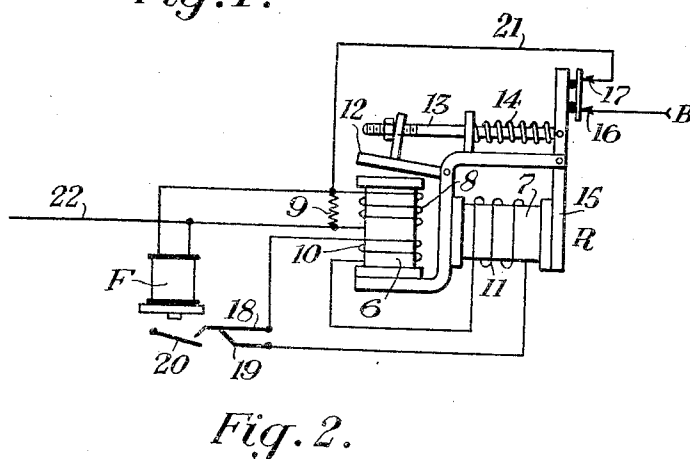
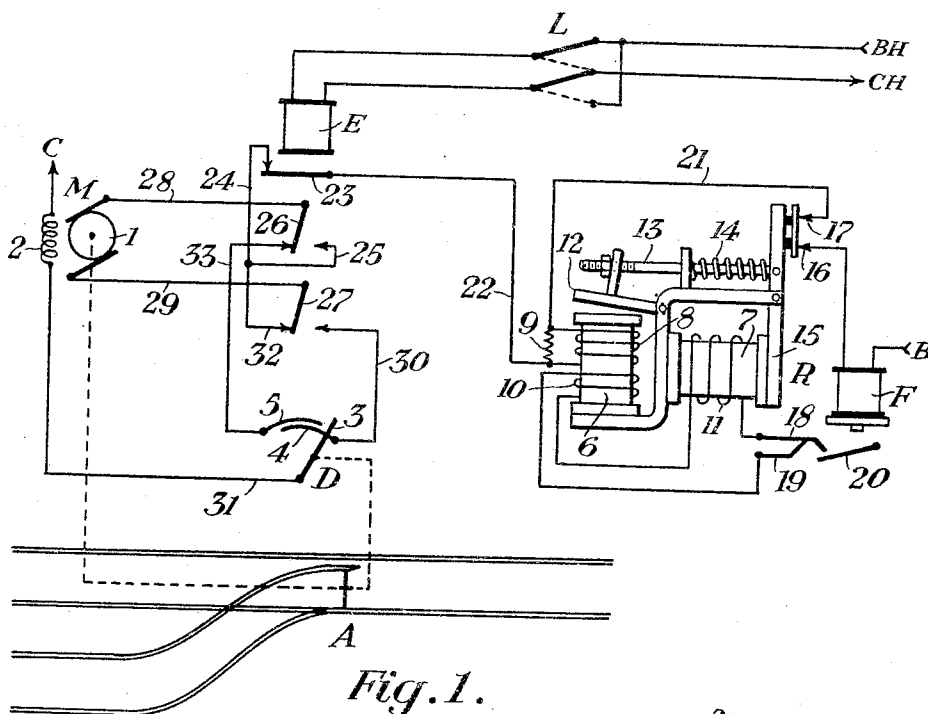
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RAILWAY TRAFFIC CONTROLLING APPARATUS

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RAILWAY TRAFFIC CONTROLLING APPARATUS

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My invention relates to railway traffic controlling apparatus, and particularly to apparatus for the protection of a railway switch motor against overload.

I will describe two forms of apparatus embodying my invention, and will then point out the novel features thereof in claims.

Fig. 1 of the accompanying drawing is a diagrammatic view showing one form of apparatus embodying my invention. Fig. 2 is a diagrammatic view showing a modification of a portion of the apparatus illustrated in Fig. 1, also embodying my invention.

Similar reference characters refer to similar parts in each of the two views.

Referring to Fig. 1 of the drawing, the reference character A designates a railway switch which is actuated by an electric motor M having an armature 1 and a field 2. Operatively connected with the switch is a cut-out controller D comprising a contact arm 3 and contacts 4 and 5. Contact 3—4 is closed at all times except when the switch occupies its extreme reverse position and contact 3—5 is closed at all times except when the switch occupies its extreme normal position.

The motor M is controlled by a polarized relay E, which in turn is controlled by a pole changer L, which may be incorporated in a switch lever of an interlocking machine.

The reference character R designates an automatic overload circuit breaker having a tripping core 6 and a holding core 7. Mounted on core 6 is a tripping winding 8 which is bridged by a resistor 9 constructed of material having a high positive temperature-resistance coefficient, such as nickel wire, for example. Mounted on core 6, in inductive relation with winding 8, is a second winding 10 which supplies energy to a holding winding 11 on core 7, over a normally closed contact 18—19.

Contact 18—19 is controlled by armature 20 of a slow-acting relay F in such manner that this contact becomes opened after a predetermined time interval following energization of relay F and motor M. Armature 12 of the circuit breaker is normally held open by rod 13 due to the compression of spring 14 and the attraction of armature 15.

Contact 16—17, which is in the circuit for motor M, therefore, remains closed at all times except when armature 12 has become actuated.

As shown in Fig. 1 of the drawing, the switch A occupies its normal position and polarized relay E as well as pole changer L also occupy the normal position, relay F being deenergized.

When the switch is to be moved to the reverse position, pole changer L will be reversed, thereby reversing contacts 26 and 27 of relay E. The circuit for motor M can now be traced from one terminal B of a source, winding of relay F, contact 16—17, wire 21, winding 8 and resistor 9 in parallel, wire 22, front neutral contact 23 of relay E, wires 24 and 25, polar contact 26, wire 28, armature 1 of motor M, wire 29, polar contact 27, wire 30, contact 4—3 of controller D, wire 31, and field 2, to the other terminal C of the source.

When the switch A is to be restored to the normal position from the reverse, pole changer L, and therefore contacts 26 and 27 of relay E, will be restored to the position shown in the drawing. The circuit for motor M will now be the same as previously traced up to and including wire 24, from which it will continue through wire 32, polar contact 27, wire 29, armature 1 of motor M, wire 28, polar contact 26, wire 33, contact 5—3 of controller D, wire 31, and field 2, to the other terminal C of the source.

During the starting period of motor M, the surge of current will not trip the breaker because the voltage induced in winding 10 will be effective in energizing the holding winding 11 to keep the breaker from tripping. Since the pick-up time of relay F is adjusted to be slightly longer than the duration of the surge current upon starting of the motor, therefore, winding 8 will not be effective to trip the breaker until the initial surge has disappeared. Moreover, winding 8 is so designed that it will not trip the breaker with winding 11 on open circuit unless the motor current increases substantially over the value required in the normal operation of motor M.

Should the movement of switch A become obstructed, the motor current will rise, and

winding 8 will trip the circuit breaker, opening contact 16—17, because relay F having previously opened contact 18—19, there will exist no pull on armature 15 to overbalance the pull on armature 12 exerted by winding 8. Once contact 16—17 opens, it will be latched open mechanically and will not reclose until pole changer L is reversed to reverse the polarity of relay E. The details of the latching and reclosing arrangement for contact 16—17 are not shown as they form no part of my present invention.

In order to permit an immediate reversal of switch A away from an obstruction, the release time of relay F is made very short so that the circuit for holding winding 11 will be immediately effective to prevent tripping of the breaker upon a reversal of the switch, and in order that repeated attempts to move the switch can be made in rapid succession, if necessary.

The purpose of resistor 9 is to provide added protection against tripping of the breaker by minor surges of the motor current after contact 18—19 opens, and to make tripping more positive upon sustained overload, but it will be apparent that resistor 9 is not essential to the operativeness of my invention. Also, although I have shown a normally closed contact 18—19 in series with winding 11, it will be apparent that a normally open contact connected across winding 11 could be used to accomplish a similar result, armature 20 of relay F, in the latter case, operating to close the contact for short-circuiting winding 11 after a predetermined time interval.

Referring now to Fig. 2, the apparatus shown in this figure is the same as that shown in Fig. 1 except that relay F is energized from the voltage drop across winding 8, instead of being connected directly into the motor circuit. The operation of the apparatus of Fig. 2 is similar to the operation of the apparatus of Fig. 1 and will be clear without added description.

It will be apparent that the apparatus as disclosed is adaptable for either alternating current or direct current operation, because windings 10 and 11 will function on a surge of direct current, as well as on steady alternating current, during the starting interval.

Although I have herein shown and described only two forms of apparatus embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. In combination, an electric motor, an operating circuit for said motor, a circuit breaker for controlling the supply of current to said motor and having a first and a second

core, a first winding on said first core included in said operating circuit, means controlled by said first winding for tripping said circuit breaker, a second winding on said first core in inductive relation with said first winding, a third winding on said second core connected in series with said second winding through a normally closed contact, means controlled by said third winding for preventing said circuit breaker from tripping, and a slow-acting relay included in said operating circuit for at times opening said contact.

2. In combination, an electric motor, an operating circuit for said motor, a circuit breaker for controlling the supply of current to said motor, a first winding included in said operating circuit, means controlled by said first winding for tripping said circuit breaker, a second winding in inductive relation with said first winding, a third winding, means controlled by said third winding for preventing said circuit breaker from tripping, an energizing circuit for supplying said third winding with current induced in said second winding, and means controlled by current supplied to said motor for at times rendering said energizing circuit ineffective.

3. In combination, an electric motor, an operating circuit for said motor, a circuit breaker for controlling the supply of current to said motor, a first winding included in said operating circuit, means controlled by said first winding for tripping said circuit breaker, a second winding in inductive relation with said first winding, a third winding, means controlled by said third winding for preventing said circuit breaker from tripping, an energizing circuit for supplying said third winding with current induced in said second winding, and a time measuring device energized by current supplied to said motor for rendering said energizing circuit ineffective after a predetermined time interval following energization of said device.

4. In combination, an electric motor, an operating circuit for said motor, a circuit breaker for controlling the supply of current to said motor, a first winding included in said operating circuit, means controlled by said first winding for tripping said circuit breaker, a second winding in inductive relation with said first winding, other means controlled by said second winding for preventing said circuit breaker from tripping, and means governed by current supplied to said motor for at times rendering said other means ineffective.

5. In combination, an electric motor, an operating circuit for said motor, a circuit breaker for controlling the supply of current to said motor, a first winding included in said operating circuit, means controlled by said first winding for tripping said circuit breaker, a second winding in inductive rela-

tion with said first winding, other means controlled by said second winding for preventing said circuit breaker from tripping, and a time measuring device energized by the current supplied to said motor for rendering said other means ineffective after a predetermined time interval following energization of said device.

In testimony whereof I affix my signature.

CLAUDE M. HINES.