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APPARATUS FOR GOVERNING THE PASSAGE OF CARS OR VEHICLES ALONG A RAILWAY AND THE CONTROL THEREOF.

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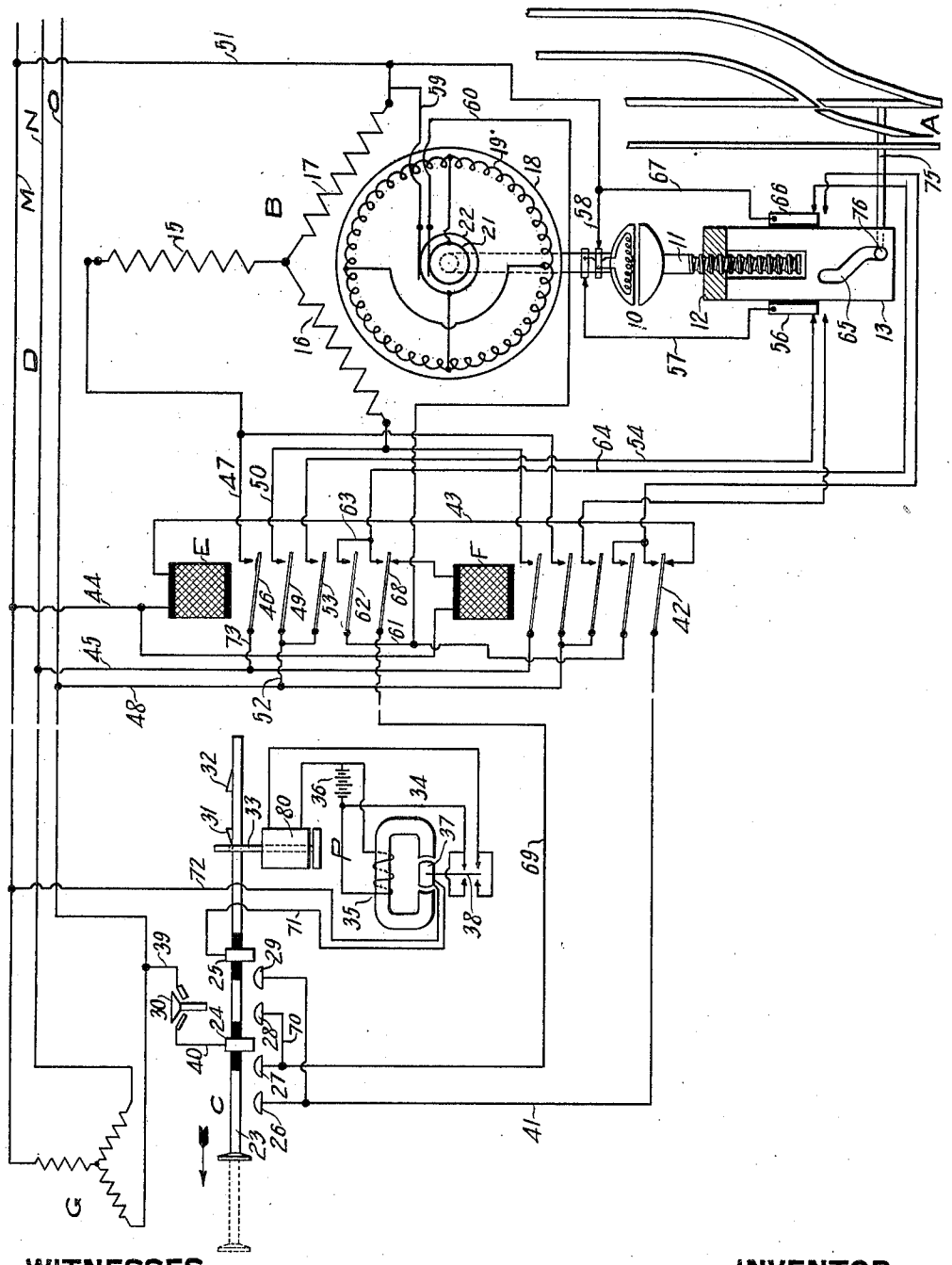

WITNESSES

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APPARATUS FOR GOVERNING THE PASSAGE OF CARS OR VEHICLES ALONG A RAILWAY AND THE CONTROL THEREOF.

1,067,228. Specification of Letters Patent. Patented July 8, 1913.

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To all whom it may concern:

Be it known that I, LAURENCE A. HAWKINS, a citizen of the United States, residing at Schenectady, in the county of Schenectady and State of New York, have invented certain new and useful Improvements in Apparatus for Governing the Passage of Cars or Vehicles Along a Railway and the Control Thereof, of which the following is a specification.

My invention relates to that class of apparatus in which electric motors are employed for operating railway traffic controlling devices, and particularly to the use of alternating current motors for that purpose. The supply of current to an electric motor in this class of apparatus is generally controlled by a lever of an interlocking machine, which lever is usually provided with an "indication device"; this device is actuated to release its lever, upon a complete operation of the traffic controlling device controlled thereby, thus permitting the lever to be moved to its final position and thereby lock or release other levers which may control other traffic-controlling devices.

An object of my invention is to provide means for generating at the traffic controlling device a current which will control the indication device which current differs in character from the current used to operate the motor, the indication device being responsive to such generated current and not to the operating current. I accomplish this object by providing, in combination with an alternating current motor and the railway traffic controlling device driven thereby, an indication device which is not responsive to current of the frequency supplied to the motor, but responsive to current of a different frequency; and means controlled by the traffic controlling device for deriving from the motor and supplying to the indication device a current of a frequency to which the indication device is responsive.

As one embodiment of my invention, I provide the secondary or rotor member of the motor with a polyphase winding and with circuit connections controlled by the traffic controlling device for opening one phase of the secondary or rotor winding and connecting it to the indication device at the proper time, while the motor rotates on the remaining rotor phase or phases, so that low frequency current generated in the secondary winding of the motor is then supplied to the indication device.

I will describe one form of apparatus embodying my invention and then point out the novel features thereof in claims.

The accompanying drawing is a view showing one form of apparatus embodying my invention.

Referring to the drawing, A designates a railway traffic controlling device, here shown as being a railway switch; it is understood however that the application of my invention is not limited to this particular form of traffic controlling device.

B is an alternating current motor for the operation of the switch A. Current is supplied to this motor from a source G, through a power line D comprising conductors M, N and O, the application of current to the motor from the power line being controlled by a circuit controlling lever C, usually a lever of an interlocking machine. As here shown, the lever C controls the circuits of two control relays E and F, which relays in turn directly control the application of current to the motor from the power line D. The movements of the lever C are governed by an indication device P which device is controlled in a manner hereinafter explained.

The motor B is operatively connected with the switch A by a mechanism of any suitable type. As here shown this mechanism is similar to that shown and described in United States Letters Patent No. 768,204 granted to Louis H. Thullen on August 23, 1904. Briefly described, this mechanism comprises a screw 11 operatively connected with the rotor of the motor through the medium of an electric clutch 10. The screw 11 operates a nut 12 to which is secured a cam plate 13. The cam plate is provided with a slot 65 which coacts with a roller 76 to move a rod 75 which operates the switch A. It is understood however that this type of switch mechanism is purely illustrative, and that any desired type may be employed. The cam plate 13 operates two circuit controllers 56 and 66 for purposes hereinafter explained.

As here shown, the motor B is of the

three-phase induction type, and the source G delivers three-phase current. The motor has three stator windings 15, 16, and 17, and a rotor 18. This rotor is provided with a polyphase winding 19; as here shown it is connected as a two phase winding. One phase is permanently short-circuited by means of a conductor 20, while the other phase is not short-circuited within the rotor, but its terminals are connected with collector rings 21 and 22 upon which bear brushes for outside connections. While the motor is being operated to move the switch A, the latter phase is short-circuited outside the motor, but when the movement of the switch has been completed and the motor disconnected therefrom by the clutch 10, the circuit of this phase is opened and is then connected with the indication device P.

The circuit controlling lever C as here shown comprises a longitudinally movable rod 23 which carries two contact members 24 and 25 insulated from each other. These members may engage with two pairs of contacts 26, 28, or 27, 29 according to the position of the rod 23. The movements of the rod 23 are governed by the engagement of two dogs 31 and 32 with a latch 33 operated by a magnet 80 of the indication device P.

The indication current delivered by the winding 19 of the motor is of comparatively low frequency and low voltage. For example, assuming that the operating current supplied to the motor from the source G is 110 volts at 25 cycles, that the ratio of the stator winding to the winding 19 is one to one, and that the slip of the motor when running freely (that is, when disconnected from the switch) is 5 per cent., then the current delivered by the winding 19 will be at $5\frac{1}{2}$ volts and $1\frac{1}{4}$ cycles. The indication device P should be arranged to be responsive to this indication current and not to the operating current. This may be accomplished in several ways; as here shown I provide an auxiliary polarized relay 34 comprising a field winding 35 permanently connected with a source of direct current 36, and an armature 37 to which indication current is supplied from the winding 19. The armature carries a member which, when in one extreme position or the other closes contacts 38 which close a circuit including the source of current 36 and the magnet 80 of indication device P. The armature 37 and its contact member may be mechanically tuned by adjustment of their moment of inertia so as to respond to the low frequency indication current by oscillations of sufficient amplitude to close contacts 38, but to respond to 25 cycle current or current of higher frequency merely by vibrations of insufficient amplitude to close the contacts.

The operation of the apparatus will now be readily understood. With the parts in the positions shown in the drawing, assume that it is desired to move switch A to the reverse position. Controlling lever C is moved in the direction of the arrow until stopped by the engagement of dog 32 with latch 33, and a floor-push 30 is then closed. Control relay E is then energized by the following circuit:—from conductor O through wire 39, floor push 30, wire 40, contacts 24 and 26, wire 41, armature contact 42 of relay F, wire 43, relay E, wire 44 to conductor M. The closing of relay E causes motor B to be energized by the following circuits:—from conductor O through wires 48 and 52, armature contact 49, wire 50 to stator winding 16; from conductor N through wires 45 and 73, armature contact 46, wire 47, to stator winding 15; from conductor M through wire 51 to stator winding 17. The electric clutch 10 is energized by the following circuit:—from conductor O through wires 48 and 52, armature contact 53, wire 54, contact 56, wire 57, clutch 10, wires 58 and 51 to conductor M. The motor therefore operates and moves the switch A to the reverse position. During the movement of the switch by the motor, the second phase of the rotor winding 19 is short-circuited by the following circuit:—from collector ring 21 through wires 60 and 61, armature contact 62, wires 63 and 64, contact 66, wires 67 and 59 to collector ring 22. As soon as the movement of the switch has been completed the circuit which energized the clutch 10 is broken at contact 56 and the motor is therefore disconnected from the switch and is permitted to rotate freely. At the same time the short circuit for the second phase of the rotor winding 19 is opened at contact 66, and that phase of the rotor winding is connected with the polarized relay device 34 by the following circuit:—from collector ring 21 through wires 60 and 61, armature contact 62, wire 63, armature contact 68, wires 69 and 70, contacts 28 and 25, wire 71, armature 37, wire 72, conductor M, wires 51 and 59 to collector ring 22. The current which then flows in the armature of the polarized relay device is of a frequency which will cause that device to close its contacts 38, and the indication magnet 80 is therefore energized to raise latch 33. As soon as the latch 33 has been raised, the movement of lever C can be continued in the direction of the arrow, to the position indicated by the dash lines, in which position contact members 24 and by will be disengaged from contacts 26 and 28. The opening of contacts 24 and 26 will open the circuit of relay E and the opening of the armature contacts of this relay will disconnect the motor from the power line. A movement of the switch A from the reversed position to the position shown in the drawing would be accomplished in the same manner as just de-

scribed, except that control relay F would be energized by the engagement of contacts 24 and 27, and stator windings 15 and 16 would be thereby connected with the main power line conductor wires O and N respectively. The indication device P would be energized through wire 41 and contacts 25 and 29. Further explanation of the movement of the switch in this direction is unnecessary.

It will be noted that for a movement of the switch in one direction wire 69 serves as the control wire and 41 as the indication wire, whereas for the movement of the switch in the opposite direction, wire 41 serves as the control wire and wire 69 as the indication wire. It will also be noted that the energizing circuit for each of the control relays E and F passes through an armature contact of the other control relay; this avoids any possibility of both relays E and F being energized at the same time and thereby short-circuiting the main power line D.

The purpose of the floor push 30 is to avoid the momentary closing of the circuits of control relays E and F, as the contact member 24 passes over contact 27 or 26 in moving to the position in which it is stopped by dog 31 or 32. It is intended that this floor push should not be closed until the control lever has reached the position in which it is stopped by the engagement of one or the other of these dogs with latch 33.

Although I have herein shown and described only one form and arrangement 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, a railway traffic controlling device, an alternating current motor connected therewith and having a polyphase rotor winding, a source of alternating current, an indication device, and means for connecting one of the phases of said rotor winding with the indication device for the control of said device while the motor operates on the rest of the rotor winding.

2. In combination, a railway traffic controlling device, an alternating current motor connected therewith, the rotor of which comprises a polyphase winding, an indication device, and means for opening one of the rotor phases and connecting it with the indication device while the motor rotates, said indication device being responsive to current of the character generated in said rotor winding and not responsive to current of another character.

3. In combination, a railway traffic controlling device, an alternating current motor operatively connected therewith, the rotor of which comprises a polyphase winding, a source of alternating current, a circuit controlled for the control of said motor, an indication device for governing the circuit controller, and means operated by the traffic controlling device upon the completion of a movement of said device for opening one phase of the rotor winding and connecting it with the indication device while the motor continues to rotate on the rest of the rotor winding.

4. In combination, a railway traffic controlling device, an alternating current motor operatively connected therewith, the rotor of which comprises a winding having two phases each normally closed, a source of alternating current, a circuit controller for the control of said motor, an indication device for governing the circuit controller, and means operatively connected with the traffic controlling device and operating when the traffic controlling device has completed a movement to open one of the said rotor phases and connect it with the indication device while the motor continues to rotate on the other rotor phase.

5. In combination, a railway traffic controlling device, an alternating current motor operatively connected therewith, the rotor of which comprises a polyphase winding, a source of alternating current, a circuit controller for the control of said motor, an indication device for governing the circuit controller, and circuit controllers operatively connected with the traffic controlling device and operating when the device has moved to a predetermined position to disconnect the motor from the traffic controlling device, and to open one phase of the said rotor winding and connect it with the indication device while the motor continues to rotate freely on the rest of the rotor winding.

6. In combination, a railway traffic controlling device, a polyphase motor operatively connected therewith and comprising a rotor having a polyphase winding one phase of which is permanently closed, collector rings on the rotor connected with the terminals of another phase, a source of polyphase current, a circuit controller for the control of the motor, an indication device, means operatively connected with the traffic controlling device and acting to short-circuit the collector rings while the device is being moved, and acting when the device has moved to a predetermined position to open the said short circuit and connect the collector rings with the indication device while the motor operates on the other rotor phase.

7. In combination, a railway traffic controlling device, a polyphase induction motor connected therewith the rotor of which

comprises a polyphase winding, a source of alternating current, an indication device, and means for connecting one of the rotor phases with the indication device for the control of said device while the motor operates on the remainder of the rotor winding.

8. In combination, a railway traffic controlling device, an induction motor connected therewith the rotor of which comprises a polyphase winding, a source of alternating current, an indication device, and means for connecting one of the rotor phases with the indication device for the control of said device while the motor operates on the remainder of the rotor winding, the said indication device being responsive to current of the character generated in the said rotor winding and not to current of the character of the said source.

9. In combination, a railway traffic controlling device, an induction motor connected therewith, a source of alternating current for the motor, an indication device, and a circuit controlled by said traffic controlling device for supplying to said indication device a low frequency current generated in the secondary member of said motor while running, said indication device being responsive to said low frequency current and unresponsive to current of the frequency of the source.

10. In combination, a railway traffic controlling device, an alternating current motor for the operation thereof, a source of current for said motor, means for deriving from said motor while running a current generated thereby which differs in frequency from said source, and an indication device responsive to said current generated by the motor but not responsive to current from said source.

11. In combination, a railway traffic controlling device, an alternating current motor for the operation thereof, comprising a stator and a rotor winding, a source of alternating current for the stator winding, means for deriving from the rotor while the motor is running an alternating current generated in said rotor and differing in frequency from the source, and an indication device responsive to said current generated in the rotor but not responsive to current from the said source.

12. In combination, a railway traffic controlling device, an alternating current motor for the operation thereof, comprising a stator and a rotor winding, a source of alternating current for the stator winding, means for deriving from the rotor while the motor is running an alternating current generated in said rotor and having the frequency of slip of the rotor, and an indication device responsive to current of the frequency of said current generated by the motor and not responsive to current of the frequency of the said source.

In testimony whereof I affix my signature in presence of two witnesses.

LAURENCE A. HAWKINS.

Witnesses:
BENJAMIN B. HULL,
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