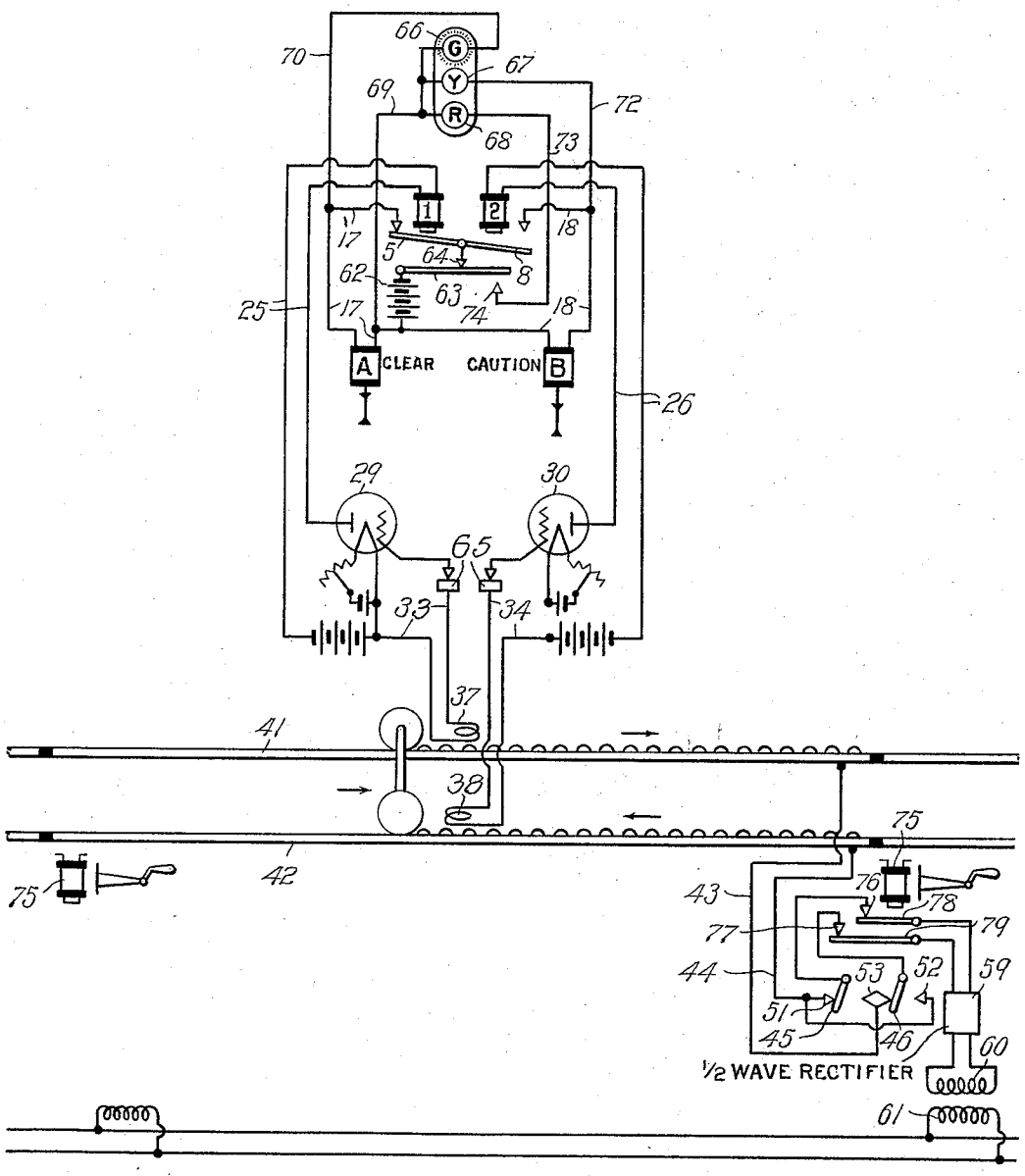
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INDUCTION TRAIN CONTROL APPARATUS

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INDUCTION TRAIN CONTROL APPARATUS

Original application filed August 21, 1928, Serial No. 301,021, now Patent 1,801,882, April 21, 1931. Divided and this application filed October 24, 1930. Serial No. 490,992.

The present invention relates to inductive train control apparatus, and aims to provide novel and improved means for inductively transmitting various controlling conditions from the trackside to a train or vehicle travelling thereover, the improvements being particularly intended for continuous control although being useful also for intermittent control.

Another object of the invention is the provision of a method or apparatus of the character indicated by means of which a variety of different vehicle controlling conditions may be employed and in using the two traffic rails of a railroad track with the same frequency of induced current to obtain various different vehicle controlling conditions.

A further object of the invention is the provision of an apparatus of the nature indicated which is simple in construction and efficient in operation, without involving complicated devices that are apt to cause trouble.

A particular object of the invention resides in the use of a rectified A. C. closed track circuit with a depending coil on the vehicle in inductive relation to each rail, a rectifier and an electron tube being connected in circuit with each coil so as to selectively operate a translating device by the direction of the current in the track rails.

It is also an object of the invention to provide inductive train control apparatus which is not apt to be disturbed by stray currents in the traffic rails.

The present application is a division of my prior copending application, Serial No. 301,021, filed Aug. 21, 1928, now Patent No. 1,801,882, April 21, 1931.

With the foregoing and other objects in view, which will be apparent as the invention is more fully understood, the invention resides in the method and apparatus as hereinafter described and claimed, it being noted that changes can be made within the scope of what is claimed, without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawing, wherein the figure is a diagrammatical view of the apparatus of this invention for three vehicle condition control.

Referring to the drawing there is shown a form of apparatus for three condition control, embodying solenoids or translating devices A and B. When the solenoid A is energized same will indicate or produce clear conditions in the vehicle equipment; when the solenoid B is energized with the solenoid A deenergized, same will indicate or produce caution conditions; whereas when both solenoids are deenergized same will indicate or produce danger conditions.

The solenoids A and B are controlled by Siamese twin relays 1 and 2 whose switches 5 and 8 are united so as to alternately engage their front contacts. The switch 5 is in a circuit 17 with the solenoid A, battery 62 or other source of electrical current, switch 63 and its front contact 64 connected to the switches 5 and 8. The switch 8 is in a circuit 18 with the solenoid B, battery 62, switch 63 and contact 64. The switch 63 is raised against its contact 64 when either of the relays 1 and 2 is energized, and the circuits 17 and 18 are alternately closed, both circuits being opened at the contact 64 when both relays are deenergized so as to release the switch 63.

The relays 1 and 2 are connected in the plate circuits 25 and 26, respectively, with the audion tubes 29 and 30, and the grid circuits 33 and 34 of said tubes include the receiving coils 37 and 38, respectively, which cooperate with the respective rails 41 and 42. As shown, the circuits 33 and 34 have crystal or other rectifiers 65 to permit the pulsating current to flow in one direction in each circuit but not in the opposite direction, to assist the tubes 29 and 30 in their polarized selection of current.

Electric lamps 66, 67 and 68 are provided for clear, caution and danger conditions, being preferably colored green, yellow and red, respectively. The lamps are connected to the battery 62 by the conductor 69. The lamp 66 is connected by a conductor 70 with the circuit 17 between the switch 5 and solenoid A, so that the lamp 66 is in parallel with the solenoid to be lighted when the solenoid is energized to control the air brakes, for clear conditions. The lamp 67 is connected by a

conductor 72 with the circuit 18 between the switch 8 and solenoid B, so that said lamp is in parallel with the solenoid B to be lighted when said solenoid is energized for controlling the air brakes for caution conditions. The lamp 68 is connected by a conductor 73 with a back contact 74 for the switch 63, so that when the relays 1 and 2 are deenergized, the switch 63 moving against the contact 74, will close the circuit including the battery 62, conductor 69, lamp 68, conductor 73, contact 74 and switch 63, thereby lighting the lamp 68.

A single trackside circuit is employed, using both rails 41 and 42. A polarized relay 75 is provided that is suitably controlled by traffic in the blocks ahead, and wires 43 and 44 are connected to the rails 41 and 42, respectively, at the exit end of the block. The wires 43 and 44 are connected through a reversing switch device with one-half wave rectifier 59 which is connected to the secondary 60 of a transformer, having the primary 61 supplied with suitable alternating current. The wire 43 is connected with a contact 53, and the wire 44 is connected with contacts 51 and 52, with which the reversing switches 45 and 46 cooperate, and said switches are connected with the front contacts 76 and 77 of switches 78 and 79 which are connected with the rectifier 59. The switches 45, 46, 78 and 79 are part of the relay 75, the switches 78 and 79 being moved against their front contacts when the relay is energized, and the switches 45 and 46 being moved to reversed positions when the relay is energized by current flowing in respectively opposite directions therethrough.

For clear conditions, with current flowing through the relay 75 in one direction, the switches 45 and 46 are moved toward the left against the contacts 51 and 53, respectively, thereby connecting the rectifier 59 or source of pulsating direct current with the rails 41 and 42 so that the waves flow in the direction of the arrows in opposite directions in the rails, as seen in the drawing, the trucks of the train or vehicle bridging the rails 41 and 42 to complete the circuit. The pulsating direct current in the track rails, as shown, induces in the coil 37 a current which is of the proper sign to pass the rectifier 65 to energize the tube 29 but the current induced in coil 38 is not of proper sign to pass rectifier 65 and the tube 30 is not energized, so that the relay 1 is energized to move the switch 5 against its front contact, while relay 2 is deenergized thereby closing the circuit of the solenoid A and lamp 66.

When current flows through the relay 75 in the opposite direction, the switches 45 and 46 will be moved toward the right against the contacts 53 and 52, respectively, and the pulsating current will flow in the opposite direction in the rails 41 and 42, thereby energizing the tube 30 through rectifier 65 but not the tube 29 as the current in coil 37 is not of proper sign to pass rectifier 65, so that the relay 2 is energized to move the switch 8 against its front contact while relay 1 is deenergized, thereby opening the switch 5. The solenoid B and lamp 67 are therefore energized for caution condition.

When the relay 75 is deenergized, the switches 45 and 46 move to neutral position, and the switches 78 and 79 are released, so as to open the trackside circuit, and both relays 1 and 2 and solenoids A and B will be deenergized. The switch 63 is therefore released and will close the circuit of the danger lamp 68.

The pulsating current flowing in either rail is polarized, and the relation of the receiving coils with the rails and the audion tubes is such as to selectively excite the audion tubes. Thus, when pulsating current of one polarity flows in the rail 41 it is induced through the coils 37 and 38 into the respective circuits 33 and 34. However, the flow of pulsating currents in said circuits is reversed with reference to the audion tubes 29 and 30, the flow of current in one tube being from the grid to the filament and in the other tube from the filament to the grid, it being understood that the flow in one direction only being effective to excite either tube to increase the flow in the plate circuit. When the pulsating direct current flows in the opposite direction in the rail 41, the flow of pulsating direct currents in the circuits 33 and 34 is reversed accordingly, and the other tube, either 29 or 30, will be excited.

There are various types of rectifiers and other devices which may be used for selecting the particular polarized pulsating current desired, including piezo-electric crystals, and what are known as twin magneto-striction oscillators.

Having thus described the invention, what is claimed as new is:

1. In a train controlling system, the combination, a track circuit including both rails of the track, an A. C. supply, a transformer connected with said supply and having a secondary circuit with a rectifier connected therein, means including said rectifier for energizing said track circuit with pulsating current from said secondary circuit, an independent inductive receiver for each rail of said track circuit, a rectifier, an amplifier and a relay connected in circuit with each receiver and a translating device selectively controlled by said relays.

2. In a train controlling system, the combination, a track circuit including both rails of the track, an A. C. supply, a transformer connected with said supply and having a secondary circuit with a rectifier connected therein, means including said rectifier for en-

ergizing said track circuit with pulsating current from said secondary circuit, an independent receiving coil for each rail of said track circuit, an electron amplifier and a rectifier for each receiving coil, said coil connected in series with said rectifier and the grid of said amplifier, a relay connected in the output circuit of each amplifier and a translating device selectively controlled by said relays.

3. In a train controlling system, the combination, a track circuit including both rails of the track, an A. C. supply, a transformer connected with said supply and having a secondary circuit with a rectifier connected therein, means including said rectifier for energizing said track circuit with pulsating current from said secondary circuit, an independent receiving coil for each rail of said track circuit, an electron amplifier and a rectifier for each receiving coil and said coil connected in series with said rectifier and the grid of said amplifier, a relay connected in the output circuit of each amplifier, said relays being selectively controlled from said track circuit so that when either relay is energized the other one is deenergized and a translating device controlled by said relays.

4. In a train controlling system, the combination, a track circuit including both rails of the track, an A. C. supply, a transformer connected with said supply and having a secondary circuit with a rectifier connected therein, means including said rectifier for energizing said track circuit with pulsating current from said secondary circuit, means for controlling the relative direction of the flow of current in said rails, an independent receiving coil for each rail of said track circuit, an electron amplifier and a rectifier for each receiving coil, said coil connected in series with said rectifier and the grid of said amplifier, a relay connected in the output circuit of each amplifier and a translating device selectively controlled by said relays in response to the direction of the current in said rails.

In testimony whereof I hereunto affix my signature.

DANIEL HERBERT SCHWEYER.