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ANNUNCIATOR CIRCUIT

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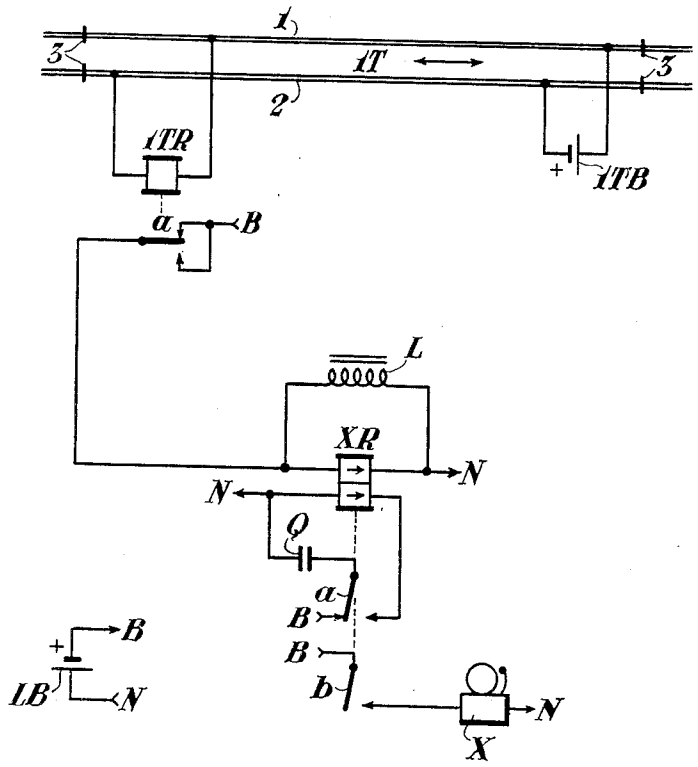

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ANNUNCIATOR CIRCUIT

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My invention relates to annunciator circuits, and particularly to an improved form of annunciator circuit for indicating the momentary interruption of a circuit.

It is often desirable to indicate the momentary interruption of a circuit by the operation of a controlling contact, and it has previously been proposed to provide circuits in which the controlling contacts are arranged in series in a circuit for energizing a relay, so that the relay would be momentarily deenergized when any one of the contacts is operated from one to the other of its two positions. With such circuits, it is necessary to provide an extremely fast operating relay, since the transit or open circuit time of the controlling contacts may be relatively short. When fast operating relays are employed, the period of deenergization is usually insufficient to provide for the proper energization of indicating apparatus, such as a bell, which is controlled by the annunciator relay. Accordingly, it has been necessary to provide auxiliary relays governed by the annunciator relay, to insure that the circuit for energizing the annunciator, whether it be a bell, lamp, or other visual or audible indicating device, is energized for a sufficiently long interval. Such an arrangement has the disadvantage of requiring several relays to accomplish this purpose.

Accordingly, it is an object of my invention to provide an annunciator circuit for indicating the momentary interruption of a control circuit, in which the apparatus is arranged in such manner that an impulse of energy of predetermined duration is supplied to the annunciating device.

Another object of my invention is to provide an annunciator circuit employing a single relay, which is governed by a circuit that is arranged to be momentarily interrupted when the conditions require annunciation, and having auxiliary circuits arranged to retain the relay in its deenergized position for a sufficient length of time to insure the supply of an adequate amount of energy to an indicating device.

A further object of my invention is to provide an annunciator circuit in which a biased relay is provided with a first or principal winding, and a second or auxiliary winding, which second winding is arranged to be supplied with energy from an energy storage device when the contacts of the relay are momentarily released, in such manner that the flux generated in the second winding by the discharge of energy from the energy storage device opposes the flux in the principal winding tending to pick the relay up, with the result that the relay is held in its deenergized position for a suitable time interval.

Other objects of my invention and features of novelty thereof will be apparent from the following description taken in connection with the accompanying drawing.

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In practicing my invention, I provide an annunciator control relay of the polar bias type, having two operating windings. The relay is of the type in which the contacts are operated to a first position when energy flows through one or the other of the two windings in a given direction, but the contacts of the relay will operate to their second position upon the deenergization of the windings, or upon the supply of energy through the windings in the direction opposite to that required to pick up the relay. A first or principal winding of the annunciator control relay is supplied with energy by a circuit which includes in series therewith contacts of the controlling relays or other devices, arranged so that when the controlling relays or other devices change the position of their contacts, the circuit for supplying energy to the first winding of the annunciator control relay is momentarily deenergized. A second or auxiliary winding of the relay is provided with a circuit which includes a capacitor, normally charged from a direct current source when the contacts of the annunciator control relay are in their first position, and arranged to be discharged through the second winding of the annunciator control relay when the relay operates its contacts to their second position, in response to deenergization of the first winding by the interruption of the control circuit. The connections are arranged so that the energy supplied to the second winding of the annunciator control relay when the relay is deenergized will flow through the second winding of the relay in such a direction as to oppose the pick-up of the relay. Other contacts of the annunciator control relay may then be used to control any suitable type of annunciator circuits, such as a circuit for supplying energy to a single stroke electric bell.

I shall describe one form of annunciator circuit embodying my invention, and shall then point out the novel features thereof in claims.

The single accompanying drawing shows in schematic form a preferred embodiment of my invention as applied to provide annunciation of the occupancy of a railway track circuit, and to also indicate when the track circuit becomes unoccupied.

Referring to the drawing, the reference characters 1 and 2 designate the track rails of a stretch of railway track, which rails are divided by the usual insulated joints 3 to form a track section designated by the reference character 1T, through which traffic may move in either direction. Section 1T is provided with a conventional direct current neutral track circuit, comprising the track battery 1TB connected across the section rails at the right-hand end thereof, and a direct current neutral track relay 1TR connected across the section rails at the left-hand end thereof. The track relay 1TR is provided

with a contact *a*, which in accordance with the usual operation of railway track circuits is picked up when the section 1T is unoccupied, and is released when section 1T is occupied by a train or other vehicle which shunts the supply of energy from the winding of relay 1TR.

The annunciator circuit embodying my invention includes an annunciator control relay designated by the reference character XR, having an upper or first winding and a lower or second winding. The relay XR is of the type in which the contacts will be operated to their left-hand or normal position when and only when energy is supplied to either or both of the windings of the relay in a specified direction, in this case, from left to right, as indicated by the arrows on the relay windings. The contacts of the relay will be operated to their reverse or right-hand position when no energy is supplied to the windings of the relay, or when energy is supplied to the windings in the direction opposite to that required to pick the relay up.

In addition to the relay XR, a reactor L is provided for accelerating the release of the relay as will be subsequently described, a capacitor Q is employed for retaining the contacts of the relay XR in their reverse position for a predetermined time interval, and an electric bell X is provided and is governed by a contact of the relay XR, to provide a single stroke warning each time that a train enters or leaves the track section 1T.

Energy for the operation of the relay XR and the bell X is furnished by a suitable source of low voltage direct current, such as the battery LB shown, having its positive and negative terminals designated by the reference characters B and N, respectively.

The apparatus is shown in its normal condition, with the track section 1T unoccupied. At this time, energy is supplied to the upper winding of relay XR by an obvious circuit including the front contact *a* of the track relay 1TR, so that energy flows through the winding of relay XR, from left to right, and in addition, flows through the winding of the reactor L in the same direction, that is, from left to right. At this time, the capacitor Q is connected across the terminals of the direct current source over normal contact *a* of relay XR, and the normal contact *b* of relay XR is opened in the obvious circuit for supplying energy to the bell X.

When a train enters section 1T from either direction, the track circuit will be shunted and relay 1TR will release, opening its front contact *a* and closing the back contact. During the time that the movable contact of the track relay is in transit between the front and back contacts, the circuit for supplying energy to the upper winding of relay XR will be opened. Additionally, at this time the supply of energy to the reactor L from the direct current source is cut off, but the collapse of the magnetic field from the reactor will generate an induced electromotive force from which will flow through the upper winding of relay XR from right to left. Accordingly, it will be seen that the relay XR will be momentarily disconnected from its normal source of energization, and at the same time, the energy supplied by the reactor to the upper winding of the relay will flow through the winding in the direction which is effective to operate the contacts of the relay to their reverse position. Thus, the contacts will be operated to their reverse or right-hand position, the energy from the reactor accelerating this operation. When contact *a* of relay XR operates to its right-hand position, the capacitor Q is connected across the lower winding of relay XR, and it will be seen that the connections are such that the discharge of energy from the capacitor Q through the lower winding of relay XR is in such direction as to prevent the relay from operating its contacts to the left-hand or normal position. When the back contact *a* of relay 1TR is closed, energy is supplied over the back contact to the upper winding of the relay XR and reactor L, and the flux generated in the relay XR will tend to pick the relay up. However, at this time the energy from capacitor Q is discharging through the lower winding, so that the flux set up in this winding tends to keep the relay contacts in their right-hand or reverse position, until such time as the charge from condenser Q is sufficiently dissipated so that the flux generated thereby is overcome by the flux in the upper winding, at which time the relay XR will operate its contacts from their reverse to their normal position.

During the time that contact *b* of relay XR occupies its reverse position, energy is supplied to the bell X, and the parts are proportioned and arranged, particularly the value of the capacitor Q, so that contact *b* remains in its reverse position for a sufficiently long interval to insure the supply of an adequate amount of energy to the bell X to properly operate the bell.

When the contacts of relay XR move to their normal position, the capacitor Q is connected across the low voltage source, so that it takes on a new charge, in preparation for subsequent operation of relay XR.

When the train vacates section 1T, the track relay 1TR picks up, and during the time that its contact *a* is moving between its released position and its picked up position the circuit for supplying energy to the upper winding of relay XR from the battery LB is again interrupted, resulting in the same sequence as described above for the deenergization and release of contact *a* of relay 1TR.

It will be apparent that the control circuit for governing relay XR may include contacts of more than one relay, connected in series, and that the operation of any one of the controlling contacts from one to the other of its two positions will cause the relay XR to operate in the manner described above.

It is to be noted that the reactor L, connected across the upper winding of relay XR, comprises an old and well-known expedient for accelerating the operation of a relay, and as such, it forms no part of my invention. Moreover, the reactor L may or may not be required.

It will be seen from the foregoing that an annunciator circuit arranged in accordance with my invention will provide a time interval sufficient for the supply of an adequate amount of energy to an annunciator device, which must respond to the momentary interruption of a controlling circuit.

Although I have herein shown and described only one form of an annunciator circuit embodying my invention, it is to be 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 relay having a first and a second winding and having contacts which are

operated from a first to a second position when and only when energy flows through either or both of said windings in a given direction, a source of direct current energy, a first circuit for supplying energy to said first winding in said given direction from said source, means for momentarily interrupting said first circuit, an energy storage device, a second circuit including a contact of said relay closed in its second position for supplying energy from said source to said storage device, and a third circuit including a contact of said relay closed in its first position for supplying energy from said storage device to the second winding of said relay in the direction opposite to said given direction.

2. In combination, a relay having a first and a second winding and having contacts which are operated from a first to a second position when and only when energy flows through either or both of said windings in a given direction, a source of direct current energy, a first circuit for supplying energy to said first winding in said given direction from said source, means for momentarily interrupting said first circuit, an energy storage device, a second circuit including a contact of said relay closed in its second position for supplying energy from said source to said storage device, a third circuit including a contact of said relay closed in its first position for supplying energy from said storage device to the second winding of said relay in the direction opposite to said given direction, and a control circuit governed by a contact of said relay.

3. In combination, a relay having a first and a second winding and having contacts which are operated from a first to a second position when and only when energy flows through either or both of said windings in a given direction, a source of direct current energy, a first circuit for supplying energy to said first winding in said given direction from said source, means for momentarily interrupting said first circuit, a capacitor, a second circuit including a contact of said relay closed in its second position for supplying energy from said source to said capacitor, and a third circuit including a contact of said relay closed in its first position for supplying energy from said capacitor to the second winding of said relay in the direction opposite to said given direction.

4. In combination, a relay having a first and a second winding and having contacts which are operated from a first to a second position when and only when energy flows through either or both of said windings in a given direction, a source of direct current energy, a first circuit for supplying energy to said first winding in said given direction from said source, means for momentarily interrupting said first circuit, a capacitor, a second circuit including a contact of said relay closed in its second position for supplying energy from said source to said capacitor, a third circuit including a contact of said relay closed in its first position for supplying energy from said capacitor to the second winding of said relay in the direction opposite to said given direction, and a control circuit governed by a contact of said relay.

5. In combination, a polar biased relay having a first and a second winding, and having contacts which are operated from a reverse to a normal position when and only when energy flows through either or both of said windings in a given direction, a source of direct current energy, a first circuit for supplying energy to said first winding in said given direction from said source, means for momentarily interrupting said first circuit, an energy storage device, a second circuit including a contact of said relay closed in its normal position for supplying energy from said source to said storage device, and a third circuit including a contact of said relay closed in its reverse position for supplying energy from said storage device to the second winding of said relay in the direction opposite to said given direction.

6. In combination, a polar biased relay having a first and a second winding, and having contacts which are operated from a reverse to a normal position when and only when energy flows through either or both of said windings in a given direction, a source of direct current energy, a first circuit for supplying energy to said first winding in said given direction from said source, means for momentarily interrupting said first circuit, a capacitor, a second circuit including a contact of said relay closed in its normal position for supplying energy from said source to said capacitor, and a third circuit including a contact of said relay closed in its reverse position for supplying energy from said capacitor to the second winding of said relay in the direction opposite to said given direction.

7. In combination, a signaling device requiring a predetermined time of energization for its operation, a first circuit including in series therewith at least one controlling contact which at times momentarily interrupts said first circuit, the duration of the momentary interruption being substantially less than said predetermined energization time of said signaling device, and means for supplying energy to said signaling device for a period at least as great as said predetermined energization time in response to said momentary interruption of said first circuit, comprising a relay having a first and a second winding and having contacts which are operated from a first to a second position when and only when energy flows through either or both of said windings in a given direction, a source of direct current energy, means including said first circuit for supplying energy to said first winding in said given direction from said source, an energy storage device, a second circuit including a contact of said relay closed in its second position for supplying energy from said source to said storage device, a third circuit including a contact of said relay closed in its first position for supplying energy from said storage device to said second winding in the direction opposite said given direction, the parts being proportioned and arranged so that the energy supplied to said second winding from said storage device is sufficient to retain the contacts of said relay in their first position for a time interval at least as long as said predetermined energization time, and a fourth circuit including a contact of said relay closed in its first position for supplying energy to said signaling device from said source.

8. In combination, a signaling device requiring a predetermined time of energization for its operation, a first circuit including in series therewith at least one controlling contact which at times momentarily interrupts said first circuit, the duration of the momentary interruption being substantially less than said predetermined energization time of said signaling device, and means for supplying energy to said signaling device for a period at least as great as said

predetermined energization time in response to said momentary interruption of said first circuit, comprising a relay having a first and a second winding and having contacts which are operated from a first to a second position when and only when energy flows through either or both of said windings in a given direction, a source of direct current energy, means including said first circuit for supplying energy to said first winding in said given direction from said source, a capacitor, a second circuit including a contact of said relay closed in its second position for supplying energy from said source to said capacitor, a third circuit including a contact of said relay closed in its first position for supplying energy from said capacitor to said second winding in the direction opposite said given direction, the parts being proportioned and arranged so that the energy supplied to

said second winding from said capacitor is sufficient to retain the contacts of said relay in their first position for a time interval at least as long as said predetermined energization time, and a fourth circuit including a contact of said relay closed in its first position for supplying energy to said signaling device from said source.

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