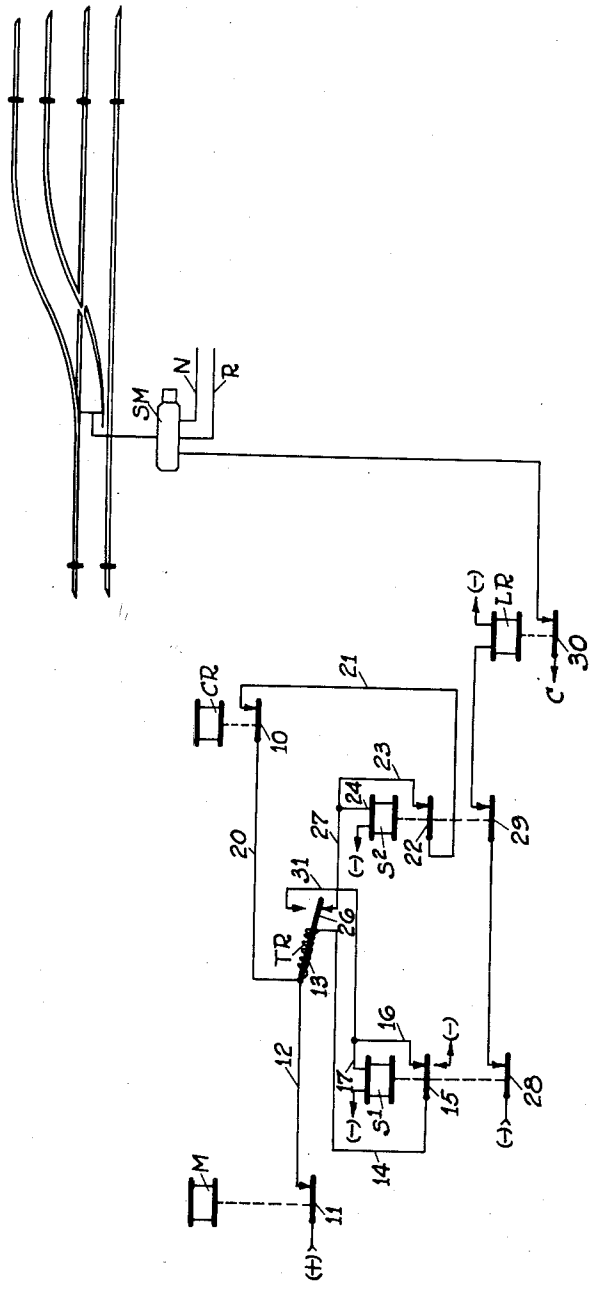
Dec. 4, 1934. F. B. HITCHCOCK 1,983,510

TRAFFIC CONTROLLING SYSTEM FOR RAILROADS

Filed June 15, 1932



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Patented Dec. 4, 1934 1,983,510

UNITED STATES PATENT OFFICE

1,983,510

TRAFFIC CONTROLLING SYSTEM FOR RAILROADS

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Application June 15, 1932, Serial No. 617,263

16 Claims. (Cl. 175—320)

This invention relates to time locking apparatus for switch machines of railway systems, and more particularly to timing means for such apparatus.

Where track switches in a railway system are operated by switch machines, it is important under certain traffic conditions that such track switch should not be controllable until a predetermined time has elapsed since another traffic governing device changed its condition. Under certain traffic conditions the element of time delay may be shorter than under other traffic conditions. In either case, the time should be definitely measured.

In accordance with the present invention it is proposed to employ a thermal relay, and require this thermal relay to be both heated and allowed to cool in order to measure the predetermined time where the time element is fairly long, and a shorter period of time is to be measured by the period of heating only. Under this latter condition, the period of heating will only perform its function if the thermal relay assumed its cool condition at the time the current was applied. In other words, the short period of time is definitely measured by the time required for the thermal relay to heat to a predetermined temperature above the surrounding atmosphere in the event the thermal relay was in its normal cool condition when called into service, but in the event that the thermal relay was not in its normal cool condition when called into service, the thermal relay must not only be heated, but must also again be allowed to cool before the release of interlocking or other function may take place.

Other objects, purposes and characteristic features of the present invention will in part be obvious from the accompanying drawing and will in part be more particularly pointed out hereinafter.

In describing the invention in detail, reference will be made to the accompanying drawing which shows conventionally one particular embodiment of the invention.

Referring to the drawing, the relay M may be controlled in any suitable way, but is assumed to be a signal-at-stop relay, which is energized only if all the signals associated with the switch machine SM are at stop. The apparatus includes a thermal relay TR of the type which is compensated against ambient temperature changes, in a manner well known to those skilled in the art. The stick relays S^1 and S^2 perform functions more readily understood from the description of the operation hereinafter. Contact 10 of relay CR determines whether the lock relay LR shall be picked up after a short interval of time or after a long interval of time, and this contact 10 may be omitted if desired in the event that only a long or only a short interval of time is contemplated, under this latter condition a long interval of time will be imposed in the event that the thermal relay TR has not fully cooled before it is called upon for the second time. The contact 10 may be operated in any suitable way, but has been shown as a contact of an automatically controlled relay CR, the relay CR preferably being energized or deenergized depending upon the route set up at the time.

Operation

When the contact 11 of the relay M is closed, which may be assumed to be the normal condition as shown in the drawing, the stick relay S^1 is energized through the following stick circuit:—beginning at the terminal (+) of a suitable battery, front contact 11 of the relay M, wire 12, heating coil 13 of the thermal relay TR, wire 14, holding contact 15 of the relay S^1, wires 16 and 17, winding of the relay S^1, to the other terminal (—) of the same battery. Also, the relay S^2 is under this condition stuck up through the following holding circuit:—beginning at the terminal (+) of said suitable battery, front contact 11 of the relay M, wires 12 and 20, front contact 10 of the relay CR, wire 21, holding contact 22 of the stick relay S^2, wires 23 and 24, winding of the relay S^2, to the other terminal (—) of said battery. As the thermal relay TR has fully returned to its cool condition the following direct or pick-up circuit for the stick relay S^2 is also closed:—beginning at the terminal (+) of said battery, front contact 11 of the relay M, wire 12, back contact 26 of the thermal relay TR, wires 27 and 24, winding of the relay S^2, to the other terminal (—).

With the relays S^1 and S^2 both energized, the lock relay LR is energized through a circuit including the front contacts 28 and 29 of the relays S^1 and S^2, respectively, and readily traced in the drawing. With the lock relay LR energized, its front contact 30 is closed, which is included in the common return wire for the switch machine SM, so that this switch machine may be operated to its normal or its reverse position through the medium of the normal wire N or the reverse wire R, respectively. It is of course understood that the lock relay LR may perform other functions, such as preventing the clearing of a signal or preventing the operation of a de-

rail, and the like. Furthermore, the checked minimum time apparatus may be used for other purposes if desired.

Let us now assume that the contact 11 of the relay M opens, possibly because a signal associated with the track switch controlled by the switch machine SM has been cleared, which will of course result in deenergization of the relays S^1 and S^2 and in turn the lock relay LR. Let us now assume that the contact 10 of the relay CR is closed, or in the event this relay CR is omitted that the wires 20 and 21 are connected together. Reclosure of this contact 11 will then result in immediate energization of the stick relay S^2, through its direct circuit heretofore traced, and it is readily apparent that the relay S^2 once picked up will remain up through the holding circuit including its stick contact 22 in spite of the lifting of the contact 26 of the thermal relay TR as immediately explained.

Closure of contact 11, as just assumed, will result in the closure of an energizing circuit for the heating coil 13 of the thermal relay TR, which may be traced as follows:—beginning at the terminal (+) of said suitable battery, front contact 11 of the relay M, wire 12, heating coil 13, wire 14, back contact 15 of the stick relay S^1, to the other terminal (—) of the battery. Closure of this circuit will of course heat the coil 13 and in turn the thermal element of the relay TR, thereby gradually operating or lifting the contact 26 until it engages the front stationary contact, at which time the following pick-up circuit for the relay S^1 is completed:—beginning at the terminal (+) of said suitable battery, front contact 11 of the relay M, wire 12, front contact 26 of the relay TR, wires 31 and 17, winding of the relay S^1 and to the other terminal (—) of said battery.

Picking up of the relay S^1 through the completion of the circuit just traced results in the completion of the stick circuit heretofore traced for the relay S^1, which stick circuit includes the heating coil 13 of the thermal relay TR, thereby reducing the current in the thermal coil 13 to a point where the winding will cool to an extent to return the contact 26 to its normal condition. From the foregoing it is apparent that the relay S^2 is picked up immediately upon closure of contact 11 (the thermal relay TR being assumed to have been cool) and the relay S^1 is picked up as soon as the thermal relay TR has been heated, so that the elapsed time for picking up the relay LR under the assumed condition is the time necessary to heat the thermal relay TR.

Let us now assume that the contact 10 of the control relay CR is open. Under this condition the relay S^2 becomes non-stick, so that the thermal relay TR must fully return to its cooled condition before the lock relay LR can be picked up, this because although relay S^2 may pick up upon closing of contact 11 it will drop as soon as back contact 26 of the thermal relay TR opens. That is, the thermal relay TR must not only be heated but must also be allowed to cool resulting in the lapse of a long period of time. In other words, if the thermal relay TR is called upon two times in close succession it is assured that the thermal relay TR under each condition will be in its normal cool condition, this because the thermal relay TR must go through a complete cycle of heating and cooling each time.

Reverting now back to the condition when contact 10 of the control relay CR is permanently closed, under which condition as heretofore explained, the lock relay LR may pick up after the interval of time required to only heat the thermal relay TR. It should be noted that such a time element is effective only if the thermal relay TR was in its full cool condition initially. In other words, if the contact 26 of the thermal relay TR is in some intermediate position when the contact 11 closes, the stick relay S^2 will not be picked up initially, but will only be picked up after the thermal relay TR has been heated, resulting in the picking up of the stick relay S^1, and has thereafter been cooled to a temperature to re-close the back contact 26. In other words, the system disclosed comprises a system in which time is measured by the time required for a thermal relay to be heated, but suitable checking means is provided so that a greater period of time will be measured in the event that the thermal relay TR was not in its full cooled condition when energy was first applied thereto for time measuring purposes.

Having now shown and described one particular embodiment of the present invention, and having illustrated how this invention may be applied to the control of a switch machine, it is desired to be understood that suitable additions and modifications may be made to adapt the invention to other uses, all without departing from the spirit or scope of the invention, except as demanded by the scope of the following claims.

What I claim is:—

1. In a time measuring device for railway traffic controlling systems, the combination with a thermal relay, two stick relays, pick-up circuits for said stick relays one closed only if said thermal relay is in its cool condition and the other closed only if said thermal relay is in its heated condition, a stick circuit for each of said stick relays with each such stick circuit independent of control by said thermal relay and the opposite stick relay, and means for signifying when both of said stick relays assume their energized condition.

2. In a time measuring device, the combination with a thermal relay, two stick relays, pick-up circuits for said stick relays one closed only if said thermal realy is in its cool condition and the other closed only if said thermal relay is in its heated condition, a stick circuit for each of said stick relays each being independent of control by said thermal relay and each for at times holding energized its respective stick relay, means for signifying when both of said stick relays assume their energized condition, and an energizing circuit for said thermal relay including a back contact of one of said stick relays.

3. In a time measuring device, the combination with a thermal relay, two stick relays, a pick-up circuit for each of said stick relays one closed only if said thermal relay is in its cool condition and the other closed only if said thermal relay is in its heated condition, a stick circuit for each of said stick relays each being independent of control by said thermal relay and each effective to at times render its respective relay energized, means for signifying when both of said stick relays assume their energized condition, and an energizing circuit for said thermal relay including a back contact of the stick relay which includes in its pick-up circuit a contact of said thermal relay closed when said thermal relay is in its heated condition.

4. In a time measuring device, the combina-

tion with a thermal relay, two stick relays, pick-up circuits for said stick relays one closed only if said thermal relay is in its cool condition and the other closed only if said thermal relay is in its heated condition, a stick circuit for each of said stick relays independent of control by said thermal relay and each including a contact of its respective stick relay, a special contact in one of said stick circuits to at times render the energization of the stick relay employing such stick circuit wholly dependent upon its pick-up circuit, and an energizing circuit for said thermal relay including a back contact of one of said stick relays.

5. In a time measuring device, the combination with a thermal relay, two stick relays, pick-up circuits for said stick relays one closed only if said thermal relay is in its cool condition and the other closed only if said thermal relay is in its heated condition, stick circuits for said stick relays independent of control by said thermal relay and independent of each other, a selectively operable contact in one of said stick circuits to at times render the energization of the stick relay employing such stick circuit wholly dependent upon its pick-up circuit, and an energizing circuit for said thermal relay including a back contact of the other of said stick relays.

6. Means for closing a circuit a definite minimum time after closing a particular contact comprising, a thermal relay, two stick relays, a pick-up circiut for one stick relay including a contact closed when said thermal relay is heated, a pick-up circuit for the other stick relay including a contact closed only when said thermal relay is in its cool condition, an effective stick circuit for each stick relay including said particular contact, and front contacts of said stick relays included in series in said first mentioned circuit.

7. Means for closing a circuit a definite minimum time after closing a particular contact comprising, a thermal relay, two stick relays, a pick-up circuit for one stick relay including a contact closed when said thermal relay is heated, a pick-up circuit for the other stick relay including a contact closed only when said thermal relay is in its cool condition, a stick circuit for each stick relay including said particular contact, front contacts of said stick relays included in series in said first mentioned circuit, and a selectively operable contact in the stick circuit for said other stick relay, whereby if said last mentioned contact is open said first mentioned circuit is not closed until said thermal relay has first been heated and has thereafter cooled to its cool condition, whereby the position of said selectively operable contact determines whether a short or a long time is to be measured before the closure of said first mentioned circuit.

8. In combination, a thermal relay normally assuming a cool condition, a controlled circuit, a control contact, and means including two stick relays for causing said thermal relay to close said control circuit a specific minimum time after closure of said controlled contact, said minimum time being the time required to heat said thermal relay and said time being a minimum only if said thermal relay was in its cool condition when said control contact was closed.

9. In combination, a control contact, a thermal relay, a control circuit, and means including said thermal relay for closing said control circuit a period of time after closure of said control contact equal to the time necessary for said thermal relay to be operated to its heated position upon energization thereof and for closing said control circuit after a longer interval of delay in the event that said thermal relay was not in its cool condition when current was applied thereto.

10. In combination, a circuit to be controlled, a thermostatic device having an operated position and a released position, a control contact, a first means responsive to the closed condition of said control contact whenever said thermostatic device is in its released position, a second means effective to maintain said first means responsive to the closed condition of said control contact irrespective of said thermostatic device, a third means initially responsive to said control contact only when said thermostatic device is in its operated position, and a fourth means responsive to said control contact only when said first and third means are responsive to said control contact to thereby control said circuit.

11. In combination, a circuit to be controlled, a thermostatic device having an operated position and a released position, a control contact, a first means for registering whether said device is in a released position upon the initial closure of said control contact, a second means for registering whether said device has been in an operated position any time subsequent to the initial closure of said control contact, and a third means effective to control said circuit when said first and second means have registered their respective positions of said device.

12. In combination, a circuit to be controlled, a thermostatic device having an operated position and a released position, a control contact, a source of current, means to cause said source of current, to heat said device and cause its actuation to its operated position upon the closure of said control contact, a first means for registering whether said device is in a released position upon the initial closure of said control contact, a second means for registering whether said device has been in an operated position any time subsequent to the initial closure of said control contact, and a third means effective to control said circuit when said first and second means have registered their respective positions of said device.

13. In combination, a circuit to be controlled, a thermostatic device having an operated position and a released position, a control contact, means for causing actuation of said device to an operated position upon the closure of said control contact, and means effective to control said circuit at the time said device assumes its operated position only if said device was in its released position upon the initial closure of said control contact.

14. In combination, a circuit to be controlled, a control contact, a thermostatic device having an operated position and a released position, and means effective to control said circuit when said device is in an operated position only if said control contact is closed contemporaneously with said device in its released position.

15. In combination, a circuit to be controlled, a thermostatic device having an operated position and a released position, a control contact, means for causing actuation of said device to an operated position upon the closure of said

control contact, and means effective to control said circuit at the time said device assumes its operated position only provided said device was in its released position upon the closure of said control contact but effective only to prepare said circuit at the time said device assumed its operated position if said device was out of its released position upon the closure of said control contact.

16. In combination, a circuit to be controlled, a control contact, a thermostatic device having an operated position and a released position, means for causing actuation of said device to an operated position upon the closure of said control contact and then the return of said device to its released position, means effective to control said circuit at the time said device assumes its operated position only provided said device was in its released position upon the closure of said control contact but effective only to prepare said circuit at the time said device assumed its operated position if said device was out of its released position upon the closure of said control contact, and means effective to control said circuit upon the return of said device to its released position if said circuit was only prepared when said device was in its operated position.

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