Sept. 8, 1936. C. R. BEALL 2,053,891

RAILWAY SWITCH CIRCUIT CONTROLLER

Filed May 24, 1935 2 Sheets-Sheet 1

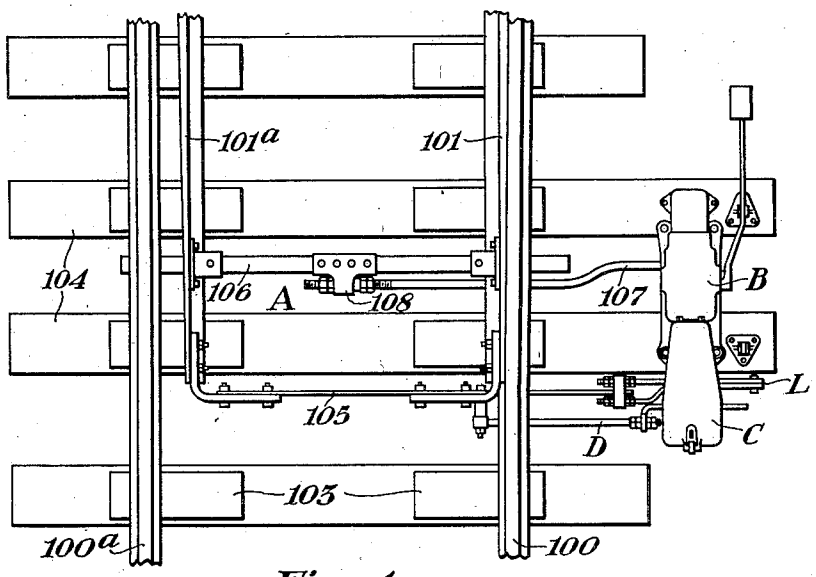


Fig. 1.

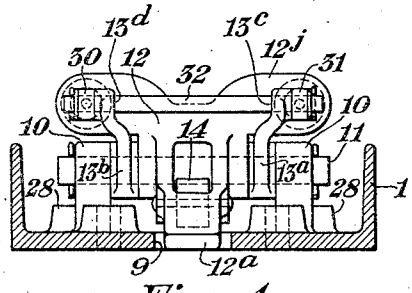


Fig. 4.

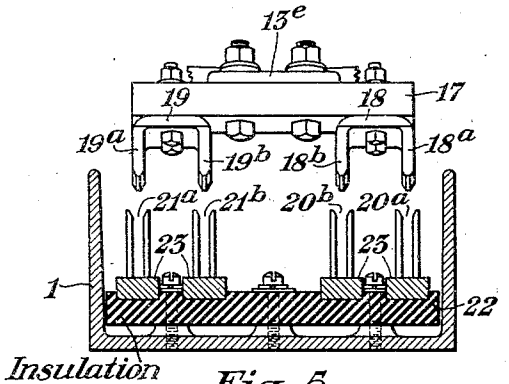


Fig. 5.

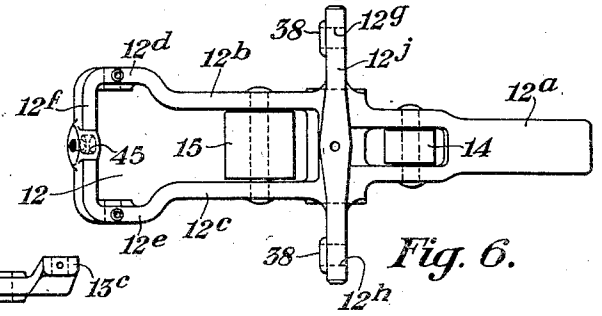


Fig. 6.

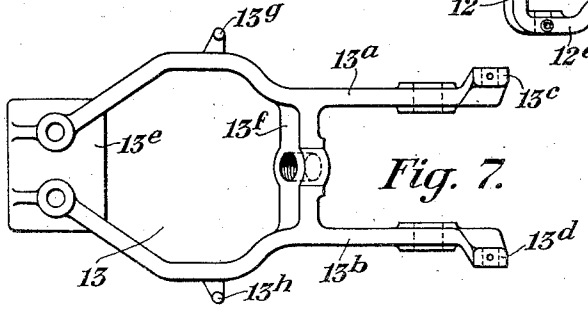


Fig. 7.

INVENTOR
Charles R. Beall.
BY A R Vincill
HIS ATTORNEY

Sept. 8, 1936. C. R. BEALL 2,053,891

RAILWAY SWITCH CIRCUIT CONTROLLER

Filed May 24, 1935 2 Sheets-Sheet 2

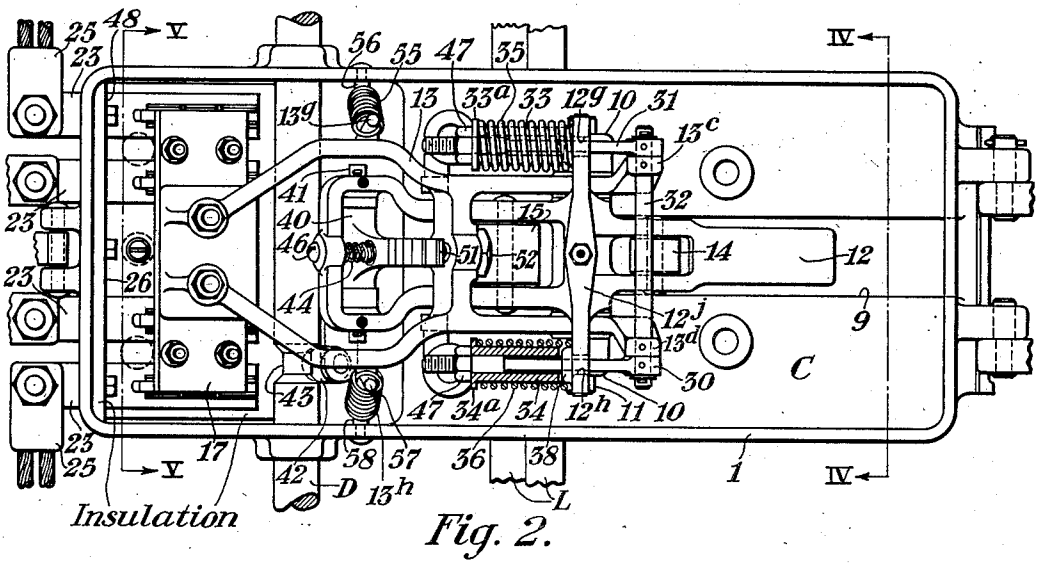


Fig. 2.

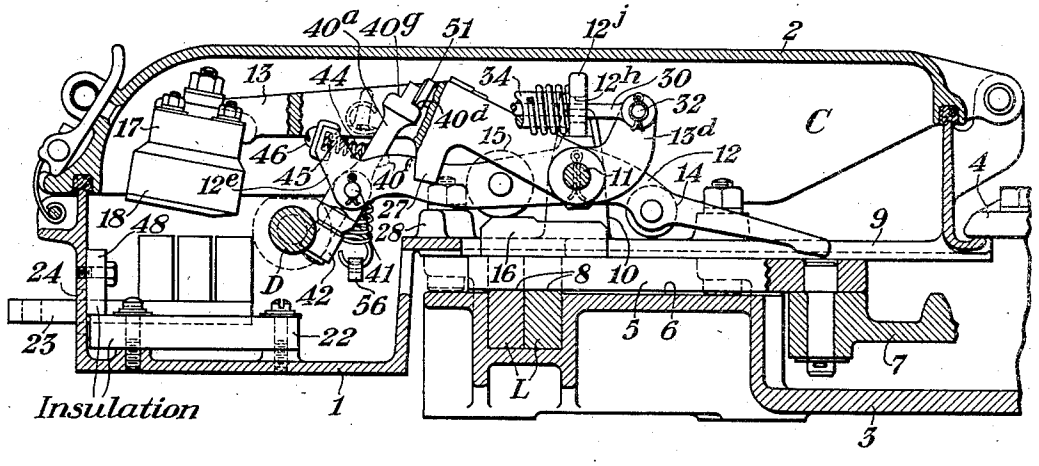


Fig. 3.

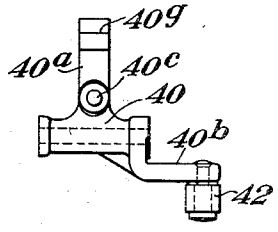

Fig. 8.

INVENTOR
Charles R. Beall.
BY A. R. Kimball
HIS ATTORNEY

Patented Sept. 8, 1936 2,053,891

# UNITED STATES PATENT OFFICE

2,053,891

## RAILWAY SWITCH CIRCUIT CONTROLLER

Charles R. Beall, Edgewood, Pa., assignor to The Union Switch & Signal Company, Swissvale, Pa., a corporation of Pennsylvania

Application May 24, 1935, Serial No. 23,292

17 Claims. (Cl. 246—253)

My invention relates to railway switch circuit controllers, and particularly to circuit controllers of the type known as heavy duty circuit controllers.

Circuit controllers embodying my invention are particularly suitable for, although in no way limited to, use in connection with manually operated switches which are installed on electrified roads in train control territory at locations where a track circuit extends for a considerable distance in both directions from the switch, and their function is to provide train control protection by short circuiting the track circuit whenever the switch is moved away from its normal position by the switch throwing and locking mechanism, or by a train trailing the switch.

A principal object of my invention is to provide novel means for operating the circuit controller to cause it to shunt the associated track circuit when a train trails the switch.

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

In the accompanying drawings, Fig. 1 is a top plan view showing a switch A operated by a switch throwing and locking mechanism B provided with a circuit controller C constructed in accordance with my invention. Fig. 2 is an enlarged top plan view with cover removed of the circuit controller C shown in Fig. 1. Fig. 3 is an enlarged view, partly in side elevation and partly in section, of the circuit controller C shown in Fig. 1, together with a portion of the operating mechanism B. Figs. 4 and 5 are sectional views taken on the lines IV—IV and V—V, respectively, of Fig. 2. Fig. 6 is an enlarged top plan view of the rocker arm 12 forming part of the circuit controller illustrated in Figs. 2 and 3. Fig. 7 is an enlarged top plan view of the contact operating member 13 forming part of the circuit controller shown in Figs. 2 and 3. Fig. 8 is a left-hand end view of the latching member 40 forming part of the circuit controller illustrated in Figs. 2 and 3.

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

Referring first to Fig. 1, the reference character A designates a railway switch comprising, as usual, two fixed rails 100 and 100a and two movable rails or switch points 101 and 101a. The fixed rails 100 and 100a are laid on tie plates 103 and are secured to cross ties 104 in the usual manner. The movable rails 101 and 101a are fastened together by a front rod 105 and a head rod 106, and may be moved into a normal or a reverse position by means of a switch operating mechanism B which is connected with the head rod 106 through the medium of a throw rod 107 and a switch basket 108. When the switch occupies its normal position, in which position it is shown in the drawings, the movable rail 101 engages the fixed rail 100, and the movable rail 101a is spaced a slight distance from the fixed rail 100a. When the switch is reversed, however, the movable rail 101a then engages the fixed rail 100a, and the movable rail 101 is spaced from the fixed rail 100.

The mechanism B forms no part of my present invention, and may be of any suitable type. As here shown, this mechanism is similar to that described and claimed in Letters Patent of the United States No. 1,654,023, granted to C. C. Thorn, on December 27, 1927, and since this mechanism forms no part of my present invention, only those parts thereof which are essential to a clear understanding of my present invention have been illustrated in detail in the drawings and will be described herein. Referring particularly to Fig. 3, the portion of the mechanism here illustrated comprises a locking plunger 5 which is slidably mounted in a longitudinally extending groove 6 formed in the tail-like extension 3 of the housing 4 of the mechanism. This locking plunger is secured at its right-hand end to the motion plate 7 of the mechanism and cooperates at its left-hand end with a lock rod L which is attached to the front rod 105 of the switch A. When the switch A and switch throwing and locking mechanism B both occupy their normal positions, the plunger 5 occupies the position shown, and when in this position, it enters a pair of aligned notches 8 in the lock rod L, thus securely locking the switch in its normal position. When, however, the switch throwing and locking mechanism is operated to its reverse position to move the switch to its reverse position, the locking plunger is moved toward the right to a retracted position, the parts being so proportioned that the plunger will be moved toward its retracted position far enough to withdraw the locking plunger from engagement with the notches 8 and unlock the switch before any movement of the movable rails of the switch takes place. When the switch throwing and locking mechanism is subsequently restored to its normal position to restore the switch to its normal position, the locking plunger 5 will not start to enter the notches 8 until after the switch has reached its full normal position. If a fuller description of the construction and operation of the switch throwing and locking

mechanism is desired, reference may be had to the previously referred to Thorn patent.

The circuit controller embodying my present invention, which circuit controller is designated as a whole by the reference character C, is enclosed in an auxiliary casing 1 which is secured to the tail-like extension 3 of the casing 4 of the mechanism B. The casing 1 is closed at its upper end by a hinged cover 2, and has formed in the bottom thereof directly above the locking plunger 5, a longitudinally extending slot 9. A transversely extending pin 11 (see Figs. 3 and 4) is mounted in two aligned lugs 10 which project upwardly from the bottom of the casing 1 on opposite sides of the slot 9, and pivoted on this pin is a rocker 12 and a contact operating member 13.

The rocker 12 is an irregularly shaped casting or forging and, as best seen in Fig. 6, is provided at one end with a slotted tail-like projection $12^a$, and at the other end with two spaced arms $12^b$ and $12^c$ having outwardly and upwardly extending offset portions $12^d$ and $12^e$ which are connected together at their upper ends by an integral web $12^f$. A roller 14 is rotatably mounted within the slot in the tail-like projection $12^a$ and a second roller 15 is rotatably mounted between the arms $12^b$ and $12^c$. The rollers 14 and 15 cooperate with a cam 16 secured to the locking plunger 5 in such manner that, when the locking plunger occupies its locking position in which it is shown in the drawings, the rocker will be positively rotated in a clockwise direction to an extreme position which I shall term its "normal" extreme position, but that, when the locking plunger is moved from its locking position to its retracted position, the rocker will then be rotated in a counter-clockwise direction from its normal extreme position to an intermediate extreme position before the locking plunger has been moved far enough to clear the lock rod, and that, as soon as the locking plunger has been moved far enough to clear the lock rod, the rocker will then be rotated in a counter-clockwise direction from its intermediate extreme position to what I shall term a "reverse" extreme position. The tail-like projection $12^a$ of the rocker is so constructed that, when the rocker occupies its normal position, there will be only a relatively small amount of clearance between the tip of this extension and the upper side of the locking plunger 5. The reason for this construction will be made clear hereinafter.

The contact operating member 13 is also an irregularly shaped casting or forging and, as shown in Fig. 7, this operating member comprises two side members $13^a$ and $13^b$ which straddle the rocker 12 at the pivot pin 11. The side members $13^a$ and $13^b$ are provided at one end with upwardly extending offset portions $13^c$ and $13^d$, respectively, (see Figs. 2, 3 and 4) and are connected together at their opposite ends by an integral plate $13^e$. The side members $13^a$ and $13^b$ are also connected together intermediate their ends by a cross member $13^f$.

An insulating block 17 is secured intermediate its ends to the under side of the plate $13^e$ of the contact operating member 13, and attached to this block adjacent its opposite ends are two U-shaped switch elements 18 and 19 (see Fig. 5). The legs $18^a$ and $18^b$ of the switch element 18 act as switch blades and cooperate respectively with slotted switch jaws $20^a$ and $20^b$ of the usual and well-known type. The legs $19^a$ and $19^b$ of the switch elements 19 likewise act as switch blades and cooperate respectively with slotted switch jaws $21^a$ and $21^b$, which latter jaws are similar to the jaws $20^a$ and $20^b$. The jaws $20^a$, $20^b$, $21^a$ and $21^b$ are secured in suitable spaced relation to an insulating block 22 which is bolted to the bottom of the casing 1. Formed integral with the switch blades $20^a$, $20^b$, $21^a$ and $21^b$, respectively, are conducting bars 23, which bars extend with considerable clearance through slots 24 formed in the end wall of the casing 1, and carry at their outer end terminal connectors 25. The conducting bars are maintained in the desired spaced relation by means of a notched insulating member 48 which is secured to the end wall of the casing 1, and the notches of which receive the bars relatively snugly. The contact operating member 13 is movable between an open position in which it is shown in the drawings, and a closed position in which stop lugs 27 formed on the side members $13^a$ and $13^b$ at the opposite ends of the cross member $13^f$ engage stop lugs 28 formed on the casing 1. When the contact operating member occupies its open position the switch blades are out of engagement with the associated switch jaws, and under these conditions the contacts of the circuit controller are open. When, however, the contact operating member 13 occupies its closed position, the switch blades then engage the associated switch jaws and the contacts of the circuit controller are closed.

The contact operating member 13 is operatively connected with the rocker 12 by means of spring mechanism comprising two eyebolts 30 and 31, the eyes of which are loosely pivoted on the opposite ends of a horizontal rod 32 which is mounted in the upper ends of the offset portions $13^c$ and $13^d$ of the contact operating member 13. The shanks of the eyebolts 30 and 31 extend with considerable clearance through holes $12^g$ and $12^h$ provided in an upright member $12^j$ which is formed on the rocker 12 directly above the pivot pin 11, and have slidably mounted thereon, between the upright member $12^j$ and nuts 47 which are adjustably screwed onto the threaded outer ends of the shanks, spring sleeves 34 and 33, respectively. The spring sleeve 33 is provided at the end adjacent the associated nut 47 with an annular flange $33^a$, and is surrounded by a compressed coil spring 35, one end of which engages the flange $33^a$, and the other end of which engages the upright member $12^j$. The spring sleeve 34 is similarly provided at the end adjacent the associated nut 47, with an annular flange $34^a$, and is surrounded by a compressed coil spring 36, one end of which engages the flange $34^a$, and the other end of which engages the upright member $12^j$. The nuts 47 are so adjusted that, when the rocker occupies its normal position and the contact operating member occupies its open position, there will be a small amount of clearance between the spring sleeves 33 and 34 and bosses 38 which are provided on the upright member $12^j$ to center the adjacent ends of the springs, and the parts are so proportioned that the springs will constantly bias the operating member to its closed position in all positions of the rocker.

The circuit controller also comprises a latching member 40 which is pivotally suported on a rod 41 mounted in the offset portions $12^d$ and $12^e$ of the rocker 12 at the lowermost part of these offset portions. The latching member 40 is provided with an upwardly extending latching arm $40^a$,

and with a depending latch foot 40b, and is constantly biased to a latching position by means of a compressed coil spring 44, one end of which engages the arm 40a, and the other end of which engages the web 12f of the rocker 12 within a circular recess 45 formed in the web 12f. The spring 44 is prevented from jumping out of place at the end which engages the arm 40a by means of a boss 40c (see Fig. 8) which is provided on the arm, and the other end of the spring is prevented from jumping out of place by a screw 46 which is screwed through the web 12f of the rocker 12 and extends part way into the spring. A notch 40d is formed in the upper end of the arm 40a, and this notch cooperates with a latch catch 51 which is adjustably screwed through the cross member 13f of the contact operating member 13. The latch catch 51 is locked in its adjusted position by means of a lock nut 52.

The latching foot 40b carries a roller 42 which cooperates with an annular notch 43 formed in a point detector rod D. The point detector rod D is slidably mounted in suitable guides formed in the sides of the casing 1, and is secured to the movable switch point 101 of the switch A.

The parts are so designed and so adjusted that the latch catch 51 will enter the notch 40d when and only when the latching member occupies its latching position, and that, when the latch catch 51 is in the notch 40d, movement of the rocker 12 between its normal and intermediate positions will cause the contact operating member 13 to move between its open and closed positions in substantially the same manner as if the contact operating member and rocker were rigidly secured together for movement as a unit. The parts are further so proportioned that, when the rocker is moved to its normal position, the latching member 40 will remain in its latching position if and only if the roller 42 has then fully entered the notch 43 in the lock rod D, and that the roller 42 will fully enter the notch 43 when and only when the switch points are in their full normal positions and the then closed point 101 is in proper engagement with the associated fixed rail 100. The parts are further so proportioned that movement of the rocker to its full reverse position will cause sufficient relative movement of the rocker and contact operating member, in opposition to the bias of the biasing springs 35 and 36, so that if the latch catch 51 is out of engagement with the notch 40d in the latching member 40 prior to this movement, the latch will automatically move to the position in which the latch catch enters the notch.

A coil spring 55 is stretched between a lug 13g formed on the arm 13a of the contact operating member 13 and a pin 56 which is riveted to the side of the casing 1; and a similar spring 57 is stretched between a lug 13h formed on the arm 13b of the contact operating member 13 and a pin 58 which is riveted to the side of the casing 1. The function of the springs 55 and 57 is to minimize vibration of the parts due to the passage of trains over the switch when the parts of the circuit controller occupy the positions in which they are shown in the drawings.

The operation of the circuit controller, as a whole, is as follows: When the switch A occupies its normal position and is properly locked in this position by the locking plunger 5, all parts of the circuit controller normally occupy the positions in which they are shown in Figs. 2 and 3. That is to say, the rocker 12 is held in its normal position by engagement of the roller 15 with the cam 16, the latching member 40 occupies its latching position, and the contact operating member 13 is held in its normal position is opposition to the bias of the springs 35 and 36 of the biasing mechanism by engagement of the latch catch 51 with the notch 40d in the arm 40a of the latching member 40. If, now, with the parts in the positions just described, the switch throwing and locking mechanism is operated to reverse the switch, the rocker 12 will be rotated to its intermediate position before the locking plunger 5 has been moved toward its retracted position far enough to withdraw it from the notches 8 in the lock rod L and unlock the switch, and as soon as the locking plunger 5 has been moved far enough to withdraw it from the notches 8 and unlock the switch, the rocker will then be rotated to its full retracted position and will be subsequently held in its retracted position during the balance of the operation of the switch throwing and locking mechanism. The movement of the rocker 12 to its intermediate position will cause a force to be transmitted to the contact operating member 13 through the springs 35 and 36 of the biasing mechanism, which force, due to the previously pointed out proportioning of the parts, will cause the contact operating member to move to its closed position and thereby close the contacts of the circuit controller. When the contact operating member reaches its closed position, the lugs 27 will move into engagement with the stops 28, and will thus prevent further movement of the contact operating member. As a result, the movement of the rocker which takes place when the locking plunger 5 becomes withdrawn from the notches 8 in the lock rod L will compress the springs 35 and 36 beyond their initial compression, and will cause the latching member 40 to move to a position in which the bottom of the notch 40d is out of engagement with the latch catch 51, but in which the vertical side of the notch 40d is still in engagement with the face of the latch catch. After the rocker 12 has been moved to its full reverse position, the parts will remain in the positions which they then occupy as long as the switch throwing and locking mechanism remains in the position corresponding to the reverse position of the switch. It should be noted that since the movement of the rocker 12 to its intermediate position takes place before the switch points start to move, when the lock rod L moves due to the resultant movement of the switch points, the roller 42 will then have been rotated to a position in which it is out of engagement with the notch 43 in the lock rod, and it will be seen, therefore, that the movement of the lock rod will have no effect on the circuit controller under these conditions.

When the switch has been moved to its reverse position by the switch throwing and locking mechanism, and this mechanism is subsequently operated to restore the switch to its normal position, the operation of the various parts of the circuit controller will be the reverse of that just described, and it is believed that this operation will be readily understood from the foregoing without further description.

I will now assume that the parts are in the positions in which they are shown in the drawings, and that the point detector rod is moved longitudinally toward the left as viewed in Fig. 1, due for example, to a train trailing the switch. Under these conditions, the movement of the point detector rod will force the roller 42 out of the notch 43 thus causing the latching member 40 to move to an unlatching position in which the notch 40d

is out of engagement with the latch catch 51. When the latch catch moves to its unlatching position, the springs 35 and 36 of the biasing mechanism will drive the contact operating member 13 to its closed position, thereby closing the contacts of the circuit controller. These contacts will then remain closed until the parts are restored to their normal latched positions in which they are shown in the drawings. This can be done either by opening the hinged cover 2 and manually raising the contact operating member 13 to its normal position, or by operating the switch throwing and locking mechanism from its normal position to its reverse position and back to its normal position, provided that the notch 43 in the point detector rod D is then in alignment with the roller 42, as will be the case if the switch has not been damaged. It should be noted that when the parts are restored to their normal positions by manually raising the contact operating member 13, the tail piece 12a will cooperate with the locking plunger 5 to prevent counterclockwise rotation of the rocker 12 due to the force which is transmitted to the rocker through the springs 35 and 36 of the biasing mechanism, thus making it possible to secure the necessary displacement between the contact operating member 13 and rocker 12 to permit the latch catch 51 to enter the notch 40d in the latching member 40. It should also be noted that as soon as the necessary displacement has been obtained, the spring 44 will automatically move the latching member 40 to its latching position. It should further be noted that when the parts are restored to their normal positions by moving the switch throwing and locking mechanism to its reverse position and back to its normal position, the previously described movement of the rocker 12 to its full reverse position which takes place as soon as the switch throwing and locking mechanism has been moved toward its reverse position far enough to unlock the switch, automatically causes the necessary displacement of the contact operating member 13 and rocker 12 to permit the spring 44 to restore the latching member to its latching position. It will be obvious, of course, that if the switch has been damaged by a trailing train a sufficient amount so that the point detector rod is prevented from returning to the position in which the notch 43 aligns with the roller 42, the latching member 40 will be prevented from moving to its latching position until the switch has been repaired.

When a switch is improperly trailed in the manner just described, it sometimes happens that the switch points are damaged sufficiently to make it undesirable to permit trains to move over the switch, but that, due to the resiliency of the parts, the point detector rod will spring back to its original position, after the train has passed the switch, far enough so that the latching member can be restored to its latching position. However, when this condition exists, the parts will usually be distorted sufficiently, so that, if the switch is once unlocked, it will be impossible to relock it until the switch has been repaired. With a circuit controller embodying my invention it is contemplated that the circuit controller casing will be locked by a lock to which only the maintainer will have a key, thus making it necessary for any resetting which is done by trainmen to be done by operating the switch throwing and locking mechanism in the manner previously described, and since this method of resetting the circuit controller necessitates unlocking the switch, it will be seen that an added degree of protection is obtained.

It may in some instances be desirable to prevent resetting of the switch except by having the maintainer manually raise the contact operating member 13, and when this is the case, this result can be obtained by removing the highest portion of the cam 16. When this is done, the operation of the apparatus will be similar to that just described except that the rocker 12 will only be moved between its normal position and the position which I have termed its intermediate position in the foregoing description, thus making it impossible to reset the circuit controller by operation of the switch throwing and locking mechanism.

It follows from the foregoing that a circuit controller embodying my invention causes a definite indication to be given when a switch is trailed by a train regardless of the extent of damage to the switch, and that this indication will continue to be given until the proper maintainer arrives at the switch to inspect it, and if necessary repair it, thus precluding the possibility of a dangerous condition existing at any time due to a train trailing the switch.

It should be pointed out that the tail piece 12a of the rocker 12 in addition to cooperating with the locking plunger 5 to make possible the manual restoration of the parts to their normal positions after a train has trailed the switch in the manner described, also cooperates with the locking plunger to prevent the parts from vibrating sufficiently to move the latching member to its unlatching position in the event that the springs 55 and 57 should fail to prevent vibration of the parts for any reason, as might happen if these springs should break.

It will be readily understood that it is desirable to be able to locate a circuit controller of the type described on either side of the switch with which it is adapted to be used, and to be able to use the circuit controller with either a right-hand or a left-hand switch. In order to permit this to be done without the provision of right and left-hand parts, the latching member 40 has been so constructed that it may be turned end for end on the pin 41, and the latching arm 40a has been provided in the side opposite to the notch 40d, with a notch 40g which is similar to the notch 40d, and which, when the latching member 40 is turned end for end, cooperates with the latch catch 51 in the same manner that the notch 40d cooperates with the latch catch 51 when the latching member occupies the position in which it is shown in the drawings. Furthermore, the latching arm 40a has been provided on the side opposite to the boss 40c with a similar boss 40f, which latter boss cooperates with the spring 44 to maintain this spring in the proper position when the latching member 40 is turned end for end from the position shown. The operation of the circuit controller as a whole when the latching member is turned end for end is similar to that previously described, it being understood that under these conditions the notch 43 in the lock rod D would occupy the proper position to properly cooperate with the roller 42.

Although I have herein shown and described only one form of circuit controller 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 switch, a contact which is biased to a closed position, means for normally latching said contact in an open position when said switch occupies one extreme position, and means for tripping said latch to permit said contact to move to its closed position if a train trails the switch when the switch occupies said one extreme position.

2. In combination, a railway switch, a member biased to one position, means for normally latching said member in another position when said switch occupies one extreme position, means for operating said latching means to release said member if a train trails the switch when the switch occupies said one extreme position, and contacts controlled by said member.

3. In combination, a railway switch, a member biased to one position, means for normally holding said member in another position in opposition to its bias when said switch occupies one extreme position, means for releasing said member if a train trails the switch when said switch occupies its one extreme position, and contacts controlled by said member.

4. In combination, a railway switch, means for locking said switch in one extreme position, a member biased to one position, means for normally holding said member in another position in opposition to its bias when said switch is locked in said one extreme position, means for releasing said member if a train trails said switch when said switch is locked in said one extreme position, and contacts controlled by said member.

5. In combination, a railway switch, means for locking said switch in one extreme position, a contact biased to a closed position, means for normally retaining said contact in an open position in opposition to its bias when said switch is locked, and means for releasing said contact to permit it to be moved to its closed position if a train trails the switch when it is locked.

6. In combination, a railway switch, means for locking said switch in one extreme position, a first member biased to one position, a latching member normally effective to hold said first member in another position in opposition to its bias when said switch is locked in said one extreme position, a point detector rod secured to said switch, means controlled by said point detector rod for operating said latching member to release said first member if a train trails the switch when said switch is locked in said one extreme position, and contacts controlled by said first member.

7. In combination, a railway switch, a lock rod secured to the switch points to move therewith and provided with a notch, a locking plunger movable into and out of engagement with said notch when and only when the switch occupies its extreme normal position, means for moving said locking plunger into and out of engagement with said notch, a contact operating member movable between two positions and biased to one position, means including latching mechanism for normally holding said contact operating member in its other position when said locking plunger is in said notch, a point detector rod secured to said switch and cooperating with said latching mechanism to trip said latching mechanism and release said contact operating member if a train trails the switch when said locking plunger is in said notch, and contacts controlled by said contact operating member.

8. A circuit controller comprising a casing, a rocker and a contact operating member pivotally supported in said casing for rotation about a common axis, means for moving said rocker between two positions, spring mechanism for operatively connecting said contact operating member and said rocker in such manner that said contact operating member is constantly biased to one position, latch mechanism effective for at times latching said contact operating member in another position in opposition to the bias of said spring mechanism when said rocker is moved to one position, and a point detector rod slidably mounted in said casing and cooperating with said latch mechanism for at times operating said latch mechanism to release said contact operating member.

9. In combination, a railway switch, a switch throwing and locking mechanism for operating said switch, a contact biased to a closed position, means controlled by said switch throwing and latching mechanism and including a latch for normally latching said contact in an open position when said switch is moved to one extreme position, and means for tripping said latch if a train trails the switch when said switch occupies said one extreme position.

10. In combination, a railway switch, a lock rod secured to the switch points to move therewith and provided with a notch, a switch throwing and locking mechanism for moving said switch between its two extreme positions, said mechanism being provided with a locking plunger which enters the notch in said lock rod when said switch is moved to one extreme position by said mechanism to lock said switch in said one extreme position, an auxiliary casing secured to said mechanism, a pivoted rocker in said auxiliary casing controlled by said locking plunger in such manner that said rocker will be moved to one extreme position when said locking plunger is fully within the notch in said lock rod and to another position before the locking plunger becomes withdrawn from the notch in said lock rod, a contact operating member pivotally supported in said casing and operatively connected with said rocker by spring mechanism in such manner that said contact operating member is constantly biased to one position, a latching member in said casing normally effective to hold said contact operating member in another position in opposition to its bias when said rocker occupies its one extreme position, and a point detector rod secured to the switch points and cooperating with said latching member in such manner that said point detector rod will operate said latching member to release said contact operating member if a train trails the switch when the switch occupies its one extreme position.

11. In combination, a railway switch, a locking plunger movable into and out of a locking position in which it engages a lock rod secured to said switch to lock said switch in an extreme position, a pivoted rocker, means for moving said rocker to one position when said locking plunger occupies its locking position and to another position before said switch becomes unlocked when said locking plunger is moved out of its locking position, a pivoted contact operating member operatively connected with said rocker in such manner that said contact operating member is constantly biased to one position, latching mechanism normally effective for preventing said contact operating member from moving to its one position due to its bias when said rocker occupies its one position but not when it occupies its other position, a point detector rod connected with said

switch and cooperating with said latch mechanism in such manner that said point detector rod will operate said latching mechanism to permit said contact operating member to move to its one position due to its bias if a train trails the switch while the switch is locked, and contacts operated by said contact operating member.

12. In combination, a railway switch, a lock rod secured to the switch points to move therewith and provided with a notch, a switch throwing and locking mechanism operatively connected with the switch, said switch throwing and locking mechanism being provided with a locking plunger which is moved to a locking position in which it enters the notch in said lock rod when said switch is moved to its one extreme position and to a retracted position in which said plunger is withdrawn from the notch in said lock rod when said switch is moved to its other extreme position, a pivoted rocker, means for moving said rocker to one extreme position or another according as said locking plunger occupies its locking position or its retracted position and to an intermediate position when said locking plunger is moved away from its locking position but is still in engagement with said notch, a pivoted contact operating member, biasing mechanism operatively connecting said rocker and said pivoted contact operating member and effective to constantly bias said contact operating member to one position, a latching member pivotally secured to said rocker and biased to a latching position and provided with a notch, a latch catch secured to said contact operating member and adapted to cooperate with said notch, the parts being so proportioned that said latch catch will occupy the notch in said latching member when and only when said latching member occupies its latching position and that when said latch catch is in said notch movement of said rocker between its one extreme position and its intermediate position will move said contact operating member between another extreme position and its one extreme position, a roller secured to said latching member, a point detector rod secured to one of the points of said switch and provided with a notch which receives said roller when and only when said switch occupies said one extreme position and said latching member occupies its latching position, and contacts controlled by said contact operating member.

13. In combination, a railway switch, operating mechanism for moving said switch between its two extreme positions, a contact which is biased to a closed position, means for normally latching said contact in an open position when said switch is moved to one extreme position by said operating mechanism, and means for tripping said latch to permit said contact to move to its closed position if the switch points are displaced from said one position when said operating mechanism occupies the position corresponding to said one position.

14. In combination, a railway switch, operating mechanism for moving said switch between its two extreme positions, a contact which is biased to a closed position, means for normally latching said contact in an open position when said switch is moved to one extreme position by said operating mechanism, and means for tripping said latch to permit said contact to move to its closed position if the switch points are moved away from said one position by means other than said switch operating mechanism.

15. In combination, a railway switch, means for locking said switch in one extreme position, a member biased to one position, means for normally holding said member in another position in opposition to its bias when said switch is locked in said one extreme position, means for releasing said member if said switch is moved away from said one extreme position while it is locked in said one extreme position, and contacts controlled by said member.

16. In combination, a railway switch having normal and reverse positions, switch operating mechanism having normal and reverse positions and operatively connected with said switch for moving said switch between its normal and reverse positions, a member biased to one position, means effective when and only when said switch occupies its normal extreme position and said switch operating mechanism occupies a corresponding extreme position for latching said member in another extreme position, and contacts controlled by said member.

17. A circuit controller comprising a casing, a contact operating member biased to one position in said casing, a point detector rod slidably mounted in said casing, means for latching said contact operating member in another extreme position in opposition to its bias when and only when said point detector rod occupies a predetermined position, and contacts controlled by said contact operating member.

CHARLES R. BEALL.