J. M. WALDRON AND J. P. COLEMAN.

CIRCUIT CONTROLLER.

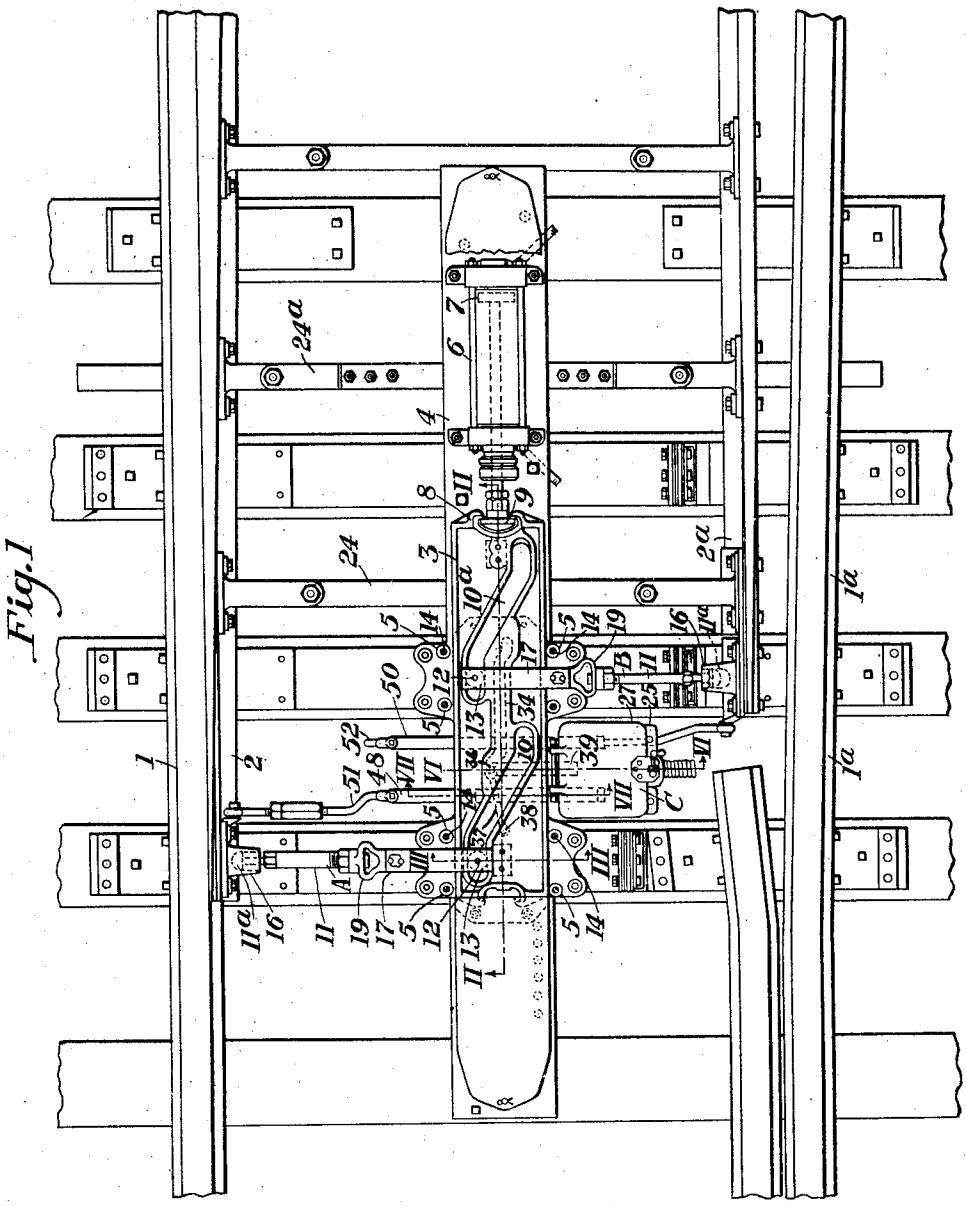
APPLICATION FILED OCT. 30, 1918.

1,362,205.

Patented Dec. 14, 1920.

4 SHEETS—SHEET 1.

Fig. 1



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4 SHEETS—SHEET 2.

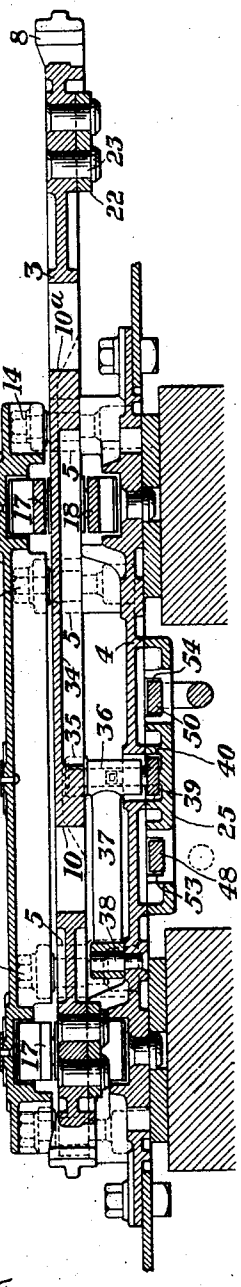


Fig. 2.

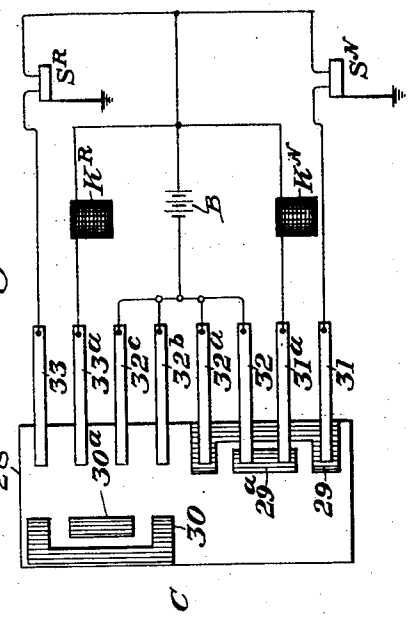


Fig. 8.

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4 SHEETS—SHEET 3.

Fig. 3

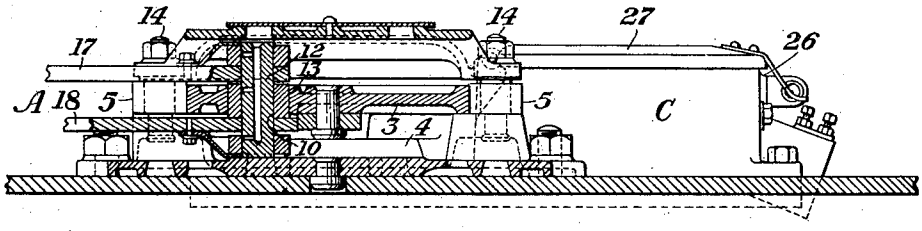


Fig. 6.

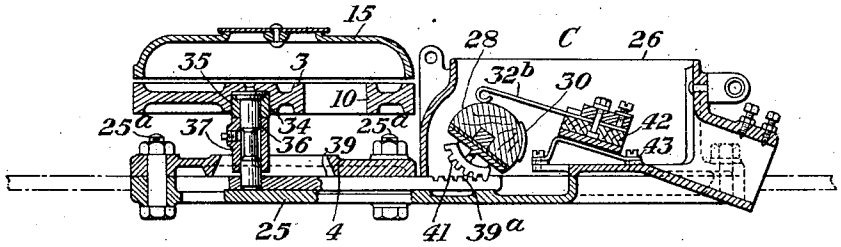
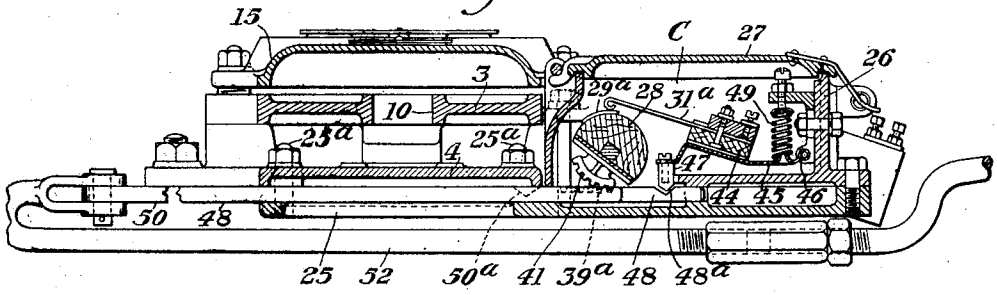


Fig. 7.



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CIRCUIT CONTROLLER.

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4 SHEETS—SHEET 4.

Fig. 4.

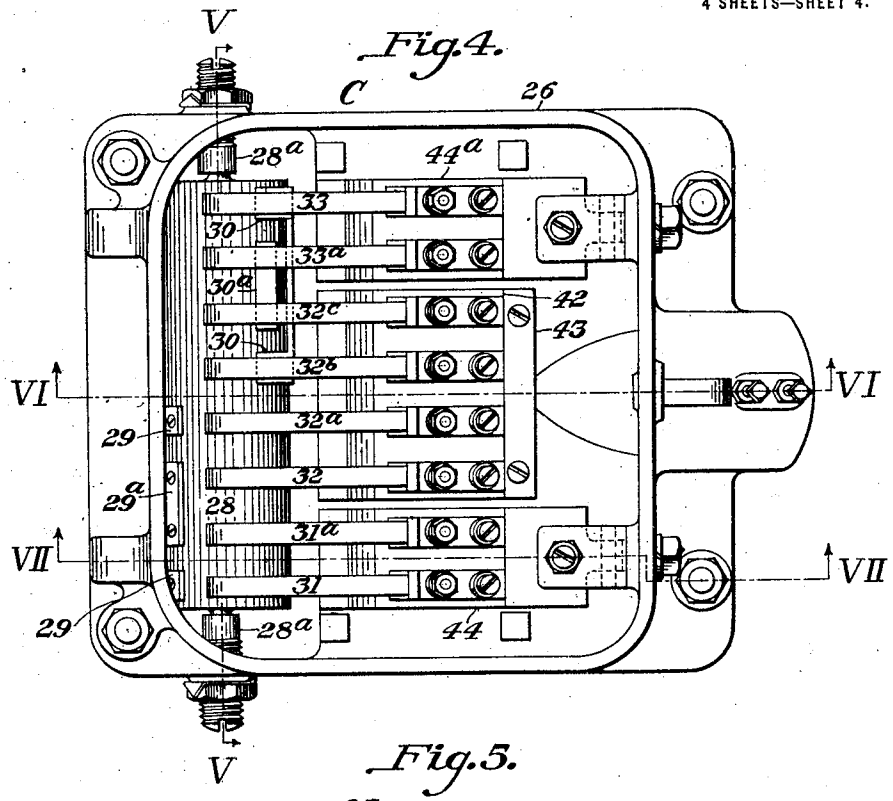
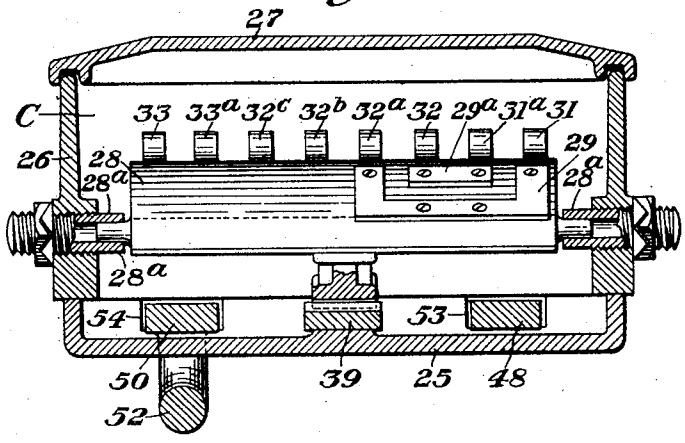


Fig. 5.



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UNITED STATES PATENT OFFICE.

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CIRCUIT-CONTROLLER.

1,362,205. Specification of Letters Patent. Patented Dec. 14, 1920.

Original application filed December 12, 1917, Serial No. 206,725. Patent No. 1,300,307, dated April 15, 1919. Divided and this application filed October 30, 1918. Serial No. 260,235.

To all whom it may concern:

Be it known that we, JAMES M. WALDRON and JOHN P. COLEMAN, citizens of the United States, residing, respectively, at Englewood, in the county of Bergen and State of New Jersey, and at Edgewood borough, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Circuit-Controllers, of which the following is a specification.

Our invention relates to circuit controllers, and particularly to circuit controllers which are adapted for use in connection with operating and controlling apparatus for railway switches.

One object of our invention is the provision of a novel and improved circuit controller which may be governed by the switch operating mechanism and by the two switch rails separately, and which will insure that one switch rail or the other, depending on the position of the operating mechanism, shall be closed against its stock rail in order that the indication circuit may be closed.

The present application is a division of our application filed December 12, 1917, Serial No. 206,725, for railway switch operating apparatus, which application has matured into Patent No. 1300307, granted on April 15, 1919.

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

In the accompanying drawings, Figure 1 is a plan view showing one form of railway switch and operating apparatus therefor to which a circuit controller embodying our invention may be applied. Fig. 2 is a vertical longitudinal sectional view taken on the line II—II in Fig. 1 looking in the direction indicated by the arrows. Fig. 3 is a transverse vertical sectional view taken on the line III—III of Fig. 1 looking in the direction indicated by the arrows. Fig. 4 is a top plan view, with cover removed, of a circuit controller C shown in Fig. 1 and embodying our invention. Fig. 5 is a sectional view taken on the line V—V of Fig. 4, looking in the direction indicated by the arrows, the drum 28, however, being shown in elevation. Fig. 6 is a sectional view taken on the line VI—VI of Fig. 1 and of Fig. 4 looking in the direction indicated by the arrows, and showing the means for operating a portion of the circuit controller C. Fig. 7 is a sectional view taken on the line VII—VII of Fig. 1 and of Fig. 4, looking in the direction indicated by the arrows, and showing the means for operating two other parts of the circuit controller C. Fig. 8 is a diagrammatic view showing one arrangement of circuits which may be used in connection with the circuit controller C shown in certain of the preceding views.

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

Before describing the circuit controller C, we will explain certain parts of the switch operating mechanism shown in Fig. 1, in order that the coöperation of the circuit controller with this apparatus will be understood.

Referring first to Fig. 1, we have here shown a railway switch comprising the usual stock rails 1 and 1^a, and the usual movable rails or switch rails 2 and 2^a, the switch rails being rigidly connected for simultaneous movement by tie rods 24, 24^a, etc. The points of these switch rails are staggered longitudinally with respect to the track, that is, the point of rail 2 is some distance, preferably about 18 inches, in advance of the point of rail 2^a.

The movable rails of this switch are actuated by a switch operating mechanism which, as here shown, is located wholly between the rails of the switch. Referring now to Figs. 1, 2 and 3, this mechanism comprises a base plate 4 carrying a number of upright studs 14 provided with rollers 5. Between these rollers is a motion plate 3 which is arranged to reciprocate in a direction substantially parallel to the rails of the track. This plate may be reciprocated by any suitable means, this means as here shown being a fluid pressure motor device comprising a cylinder 6 and a piston 7, the piston being operatively connected with the motion plate 3 by means of a jaw 8 on the motion plate and a button 9 on the end of the piston rod.

The motion plate 3 is provided with two cam slots 10 and 10^a spaced longitudinally along the plate as shown in Fig. 1, the middle

portion of each slot being disposed at an angle to the direction of movement of the plate, and the end portions of each slot being parallel to this direction of movement. These two cam slots coöperate with two switch rail operating members A and B whereby reciprocation of the motion plate causes the switch rails to be actuated. Each operating member comprises a socket 16 attached to the switch rail as nearly at the rail point as possible, a rod 11 having a head 11^a at one end which fits in the socket, a weak member 19 connected with the other end of the rod, and two bars 17 and 18 attached to member 19 and arranged to straddle the motion plate 3, as shown most clearly in Fig. 3. Passing through these two bars 17 and 18 is a pin 12 (see Fig. 3) which carries a roller 13, which roller is located in the corresponding cam slot 10 or 10^a and coacts therewith to actuate the operating members A and B.

The operation of the mechanism is as follows: When the motion plate 3 occupies the position in which it is shown in Fig. 1, the rollers 13 occupy the left-hand ends of the slots 10 and 10^a, so that the switch rails are locked in the positions in which they are shown. When the motion plate is shifted to the left, no movement of the switch rails takes place during the first portion of the movement of the plate because the ends of the slots are parallel to the direction of the plate movement; during the middle portion of the movement of the plate, however, the operating members A and B are shifted transversely with respect to the rails due to the angular disposition of the middle parts of the cam slots, so that the switch rails are then shifted to the positions opposite to those in which they are shown in Fig. 1; during the last portion of the movement of the motion plate, no movement of the switch rails takes place, but these rails then become locked in the positions to which they have been shifted. The reverse operation of the switch rails takes place in a manner which is obvious from the foregoing.

Inasmuch as the remaining parts of the switch operating mechanism shown in Figs. 1, 2 and 3 have nothing to do with the structure and functions of the circuit controller C, no reference to such parts will be made herein. This mechanism is fully and completely described, however, in our parent application of which the present case is a division.

The circuit controller C is mounted on a plate 25 (see Figs. 2, 6 and 7) which is attached to the under side of base plate 4 by bolts 25^a. The controller comprises a box 26 attached to an overhanging part of the plate 25, which box is closed by a hinged cover 27 (omitted from some of the views). The box contains a drum 28 of insulating material journaled to oscillate in bearings 28^a mounted in the walls of the box, and on the drum are two pairs of contact members 29, 29^a and 30, 30^a. Coöperating with these contact members are a plurality of contact fingers designated 31, 31^a, 32, 32^a, 32^b, 32^c, 33 and 33^a, which fingers are mounted in a way which will be explained hereinafter.

The drum 28 is operatively connected with the motion plate 3, to be rocked thereby, in the following manner. The under surface of the motion plate 3 is provided with a cam groove 34 shaped as shown in Fig. 1, the middle portion of this groove being parallel to the direction of movement of the plate and the ends being at angles to this direction as shown. Co-acting with this cam slot is a follower 35 (Figs. 2 and 6) in the form of a roller which is mounted on a stud 36. This stud is carried in one end of an arm 37 the other end of which is attached to a journal pin 38 pivotally mounted on the base plate 4 (Figs. 1 and 2). It will be seen, therefore, that reciprocation of the motion plate 3 will cause oscillation of the stud 36 around the stud 38 as a center. This movement of stud 36 causes reciprocation of a bar 39 (Figs. 1, 2 and 6) which is pivotally connected with the stud 36 and which slides in a groove 40 in the plate 25, this groove being wide enough, as shown in Fig. 2, to permit of the slight lateral motion of the bar due to the fact that the movement of stud 36 is in an arc of a circle. The end of the bar 39 opposite to the stud 36 is provided with teeth to form a rack 39^a which meshes with a segmental gear 41 attached to the contact drum 28, so that reciprocation of the bar causes oscillation of the drum about its journals.

The parts of the drum operating apparatus are so proportioned that contact members 29, 29^a, or contact members 30, 30^a, are contiguous to the free ends of contact fingers 31 to 33, according as the motion plate is in one extreme position or the other, that is, according as the switch is locked in one extreme position or the other. In Fig. 4 the drum is shown in an intermediate position wherein none of the contact members are contiguous to the contact fingers, in order to illustrate all of the contact members in this view.

The four middle contact fingers 32, 32^a, 32^b and 32^c are constantly in the path of the drum-carried contact members, these fingers (see Figs. 6 and 4) being attached to a block 42 of insulating material which is rigidly attached to a frame 43, which frame in turn is fixed to the bottom of the controller box 26.

The outer pair of contacts 31, 31^a is, however, so mounted that these contacts may be raised out of the path of their coöperating drum-carried contact members, and the other outer pair of fingers 33, 33^a are mounted in

a similar manner. The fingers 31, 31ª (see Fig. 7) are mounted on a block 44 of insulating material which is attached to a frame 45 mounted to swing about a rod 46 carried in the controller box. This frame is biased by a spring 49 to such position that the fingers are in the path of the drum carried contact members, but may be raised out of such position against the action of the spring by a tappet 47 which is controlled as hereinafter explained. Fingers 33 and 33ª are carried by a block 44ª (Fig. 4) which is pivotally mounted and controlled in the same manner as block 44.

The tappet 47 for fingers 31, 31ª and the corresponding tappet (not shown) for the other movable fingers, are controlled by the two movable switch rails 2 and 2ª respectively, this control being through the medium of two slide bars 48 and 50 (Figs. 1, 2, 5 and 7). Bar 48 is connected directly with switch rails 2 by a rod 51, while bar 50 is connected with a rod 52 which turns back on itself and is attached to rail 2ª. The two bars 48 and 50 reciprocate in slots 53 and 54 respectively in the plate 25, and pass directly under the two tappets 47. These two bars are provided with V-shaped transverse grooves 48ª and 50ª respectively (Fig. 7) which coact with the V-shaped ends of the corresponding tappets 47. When a tappet 47 is in the groove of its corresponding bar, the contact fingers controlled by such tappet are in the path of the drum-carried contact members, but when the bar is moved so that its groove does not register with the tappet, the tappet raises its fingers out of the path of the contact members. The rods 51 and 52 which connect the bars 48 and 50 with the switch rails are adjustable for length, so that the proper relation may be secured and maintained between the switch rails and the contact fingers.

The slide bars 48 and 50, and the grooves 48ª and 50ª in these bars, are so arranged that the groove in bar 48 registers with the corresponding tappet 47 only when switch rail 2 is tight against its stock rail 1. If the motion plate 3 is then in the position for locking this rail in such position, contact members 29 and 29ª are contiguous to fingers 31 and 31ª, so that the contact between these members and fingers is closed. Similarly, the groove 50ª in bar 50 registers with the tappet for fingers 33 and 33ª only when switch rail 2ª is tight against stock rail 1ª, whereby if the motion plate 3 is then in corresponding locking position these fingers engage with contact members 30 and 30ª. In other words, when the motion plate and switch coincide in position, one pair of contact fingers 31 or 33 engages the corresponding pair of contact members 29 or 30, and the other pair of fingers is raised out of the path of its corresponding contact members. Then if the switch rails should be moved while the motion plate remains stationary, the fingers which engaged their contact members would be raised away from such members; and if the motion plate should be moved while the switch rails remain stationary, the drum 28 would move the contact members away from the fingers which are down. Engagement of a pair of contact fingers with a pair of contact members, then, requires coincidence of motion plate and switch rails in locked position, and one pair of contacts or the other is closed depending on whether the switch is in one extreme position or the other.

The operation of the circuit controller C by the switch and switch operating mechanism is as follows: When the motion plate and the switch rails are in the positions shown in Fig. 1, the drum 28 occupies the position in which it is shown in Figs. 6 and 7, and contact fingers 31 and 31ª are down so that these fingers are in engagement with drum-carried contact members 29 and 29ª. Assume now that the motion plate 3 is shifted to the left, as viewed in Fig. 1 to reverse the position of the switch. During the first part of this movement, no motion of the switch rails takes place, because of the parallel end portions of the cam slots 10 and 10ª, but during this first portion of the movement of the motion plate (while the switch is being unlocked) the circuit controller drum 28 is shifted to its middle position wherein none of the contact members carried thereby are contiguous to the contact fingers. This movement of the drum is, of course, due to the inclined end portion of cam groove 34, which operates the slide bar 39 (Fig. 6). All contacts in the circuit controller are now open and will remain open as long as the roller 35 occupies the straight middle portion of the cam slot 34. The switch rails are then shifted by the further movement of the motion plate 3, and when this shifting is completed, that is, after the end portions of the cam slots have reached the rollers 13, the circuit controller drum 28 is shifted through the remainder of its stroke (while the switch is being locked, so that contact members 30 and 30ª are contiguous to contact fingers 33 and 33ª. If the switch rails have completed their movement in response to the movement of the motion plate, contact fingers 33 and 33ª will be released by the registry of slot 50ª in slide bar 50 with the tappet 47 which controls these fingers, so that these fingers will then fall into engagement with their contact members 30 and 30ª. The first part of the movement of the switch rails, of course, raised contact fingers 31 and 31ª out of the path of contact members 29 and 29ª, but this is immaterial so long as the mechanism operates in the manner intended, because these contact members were shifted

out of engagement with their contact fingers before the movement of the switch rails began (during the unlocking of the switch).

Referring now to Fig. 8, I have here shown one arrangement of circuits which may be used in conjunction with the circuit controller C shown in the preceding views. K^N and K^R represent the usual indication magnets included in an interlocking machine, which magnets govern the movements of the lever, which in turn governs the switch operating mechanism. S^N and S^R are two signals governing traffic through the switch.

Indication magnet K^N is controlled by a circuit from battery B through contact finger 32, contact member 29^a, finger 31^a, magnet K^N, to battery B. This circuit is closed when the drum 28 is in the position shown in the drawing, provided that finger 31^a is in engagement with member 29^a; that is, provided that finger 31^a is in engagement with member 29^a; that is, provided that the switch rails are in the extreme position corresponding to the position of the motion plate 3. The circuit for the signal S^N is from battery B through contact finger 32^a, contact member 29, finger 31, operating mechanism of signal S^N to battery B.

When the motion plate and the switch are reversed in position, contact members 30 and 30^a will engage with fingers 32^b, 32^c, 33^a and 33, so that indication magnet K^R will become energized and the circuit for the signal S^R will be closed at the circuit controller C.

In the event that a train trails through the switch, there is nothing to resist the movement of the closed rail except the operating connection 17—11, and this connection includes the weak member 19 which will yield and so will permit movement of the rail without disturbing the other parts of the apparatus. The movement of the rail will shift the corresponding slide bar 48 or 50, and so will elevate the corresponding contact 31 or 33 to open the circuit of the signal which pertains to the rail that is opened by the trailing movement.

It is understood, of course, that the circuits for the indication magnets and for the signals will usually be governed by apparatus other than that shown in Fig. 8, but inasmuch as such other apparatus forms no part of our present invention it is eliminated from this view in order to simplify the drawing.

Although we have herein shown and described only one form of circuit controller embodying our 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 our invention.

Having thus described our invention, what we claim is:

1. A circuit controller for use in combination with a railway switch and mechanism for operating said switch, comprising a drum mounted to oscillate and operatively connected with the switch operating mechanism, contacts carried by said drum, two independently movable sets of contact fingers coöperating with said drum contacts, and means connected with the movable rails of the switch for lifting one set of fingers or the other away from said drum contacts according as the switch occupies one position or the other.

2. A circuit controller for use in combination with a railway switch and mechanism for operating said switch, comprising a drum carrying two sets of contacts, two sets of contact fingers coöperating with said drum contacts, means interposed between the switch operating mechanism and said drum for oscillating said drum so that one set of contacts or the other is brought into contiguity with the contact fingers according as the switch is locked in one extreme position or the other, and means interposed between each switch rail and said sets of fingers for permitting one set or the other to rest on the drum contacts according as the switch rails occupy one extreme position or the other.

3. A circuit controller for use in combination with a railway switch and mechanism for operating said switch, comprising a drum operatively connected with the switch operating mechanism, two contact fingers one for each movable rail of the switch, said drum carrying two contacts one or the other of which is brought into contiguity with its respective finger according as the operating mechanism occupies one extreme position or the other, and means interposed between each movable switch rail and the corresponding contact finger for raising each finger out of the path of its drum contact except when such rail is fully closed against its stock rail.

4. A circuit controller for use in combination with a railway switch and mechanism for operating said switch, comprising two contact fingers, a drum operatively connected with the switch operating mechanism and carrying two contact members one for each finger and one or the other of which members is brought into contiguity with its corresponding finger according as the mechanism occupies one extreme position or the other, and means operatively connected with the movable rails of the switch for holding said fingers out of the path of the contact members and for permitting one finger or the other to fall into the path of its corre-

sponding member only when the switch occupies one extreme position or the other.

5. A circuit controller for use in combination with a railway switch and mechanism for operating said switch, comprising two contact fingers, a drum operatively connected with the switch operating mechanism and carrying two contact members one for each finger and one or the other of which members is brought into contiguity with its corresponding finger according as the mechanism occupies one extreme position or the other, and means operatively connected with the movable rails of the switch and acting to hold said fingers out of the path of said contact members and to allow one finger or the other to fall into the path of the corresponding member when the switch occupies one extreme position or the other, the contact member which is brought into contiguity with a contact finger for each extreme position of the mechanism being the one which corresponds to the finger which is allowed to fall into the path of its member when the switch occupies the extreme position corresponding to the position of the mechanism.

6. A circuit controller for use in combination with a railway switch and mechanism for operating said switch, comprising two contact fingers, a drum operatively connected with said mechanism and carrying two contact members one for each finger and one or the other of which members is brought into contiguity with its corresponding finger according as the mechanism occupies one extreme position or the other, and means operatively connected with the movable rails of the switch for holding said fingers out of the path of said contact members and acting when the switch occupies the extreme position corresponding to the position of the operating mechanism to allow the finger to which a contact member is then contiguous to fall into the path of such member.

In testimony whereof we affix our signatures, each in the presence of two witnesses.

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JOHN P. COLEMAN.

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HARRY JACKSON.
Witnesses as to Coleman:
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E. P. CRUM.