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RAILWAY SWITCH CIRCUIT CONTROLLER

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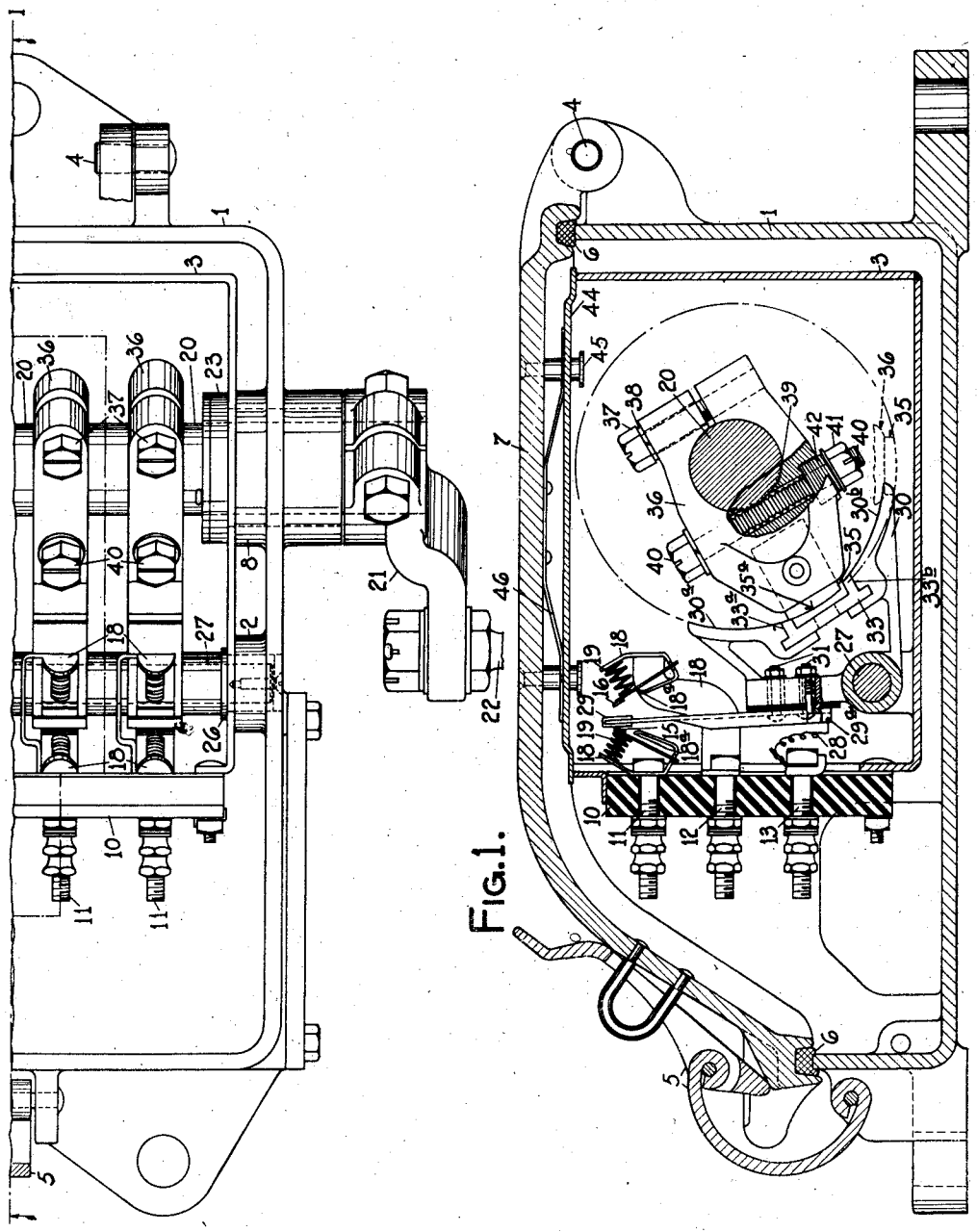


FIG. 1.

FIG. 2.

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RAILWAY SWITCH CIRCUIT CONTROLLER

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3 Claims. (Cl. 200—153)

This invention relates in general to circuit controllers, and relates more particularly to a circuit controller used in connection with and operated by a railway track switch. This invention is an improvement over similar circuit controllers disclosed in the U. S. Patent to Field, No. 1,899,894, dated February 28, 1933, and U. S. Patents to Henry, Nos. 1,169,957 and 1,332,215.

In switch circuit controllers of the character under consideration one or more movable contacts are arranged to be moved to either close a circuit or open a circuit during very small movement of the switch points at and near the extreme position of a switch movement of a railway track switch. The contacts that are closed when the track switch assumes an extreme position are usually employed in connection with the control of a railway signal directly associated with the switch or a signal at the entrance to the block in the rear of such signal. For instance, a contact closed only when the switch assumes the full main track position may be included in a circuit for the main signal governing over the track switch and the contact which is closed only when the track switch assumes its extreme take-siding position may be used to permit clearing of the take-siding signal. The contacts which are closed when the switch has been moved from such extreme position may, for instance, be used in a circuit for controlling the stop light in a multiple aspect stop-and-stay railway signal.

One of the objects of the present invention resides in the provision of interengaging mechanism which operates the movable contacts of the contact mechanism in a manner to cause rapid and definite operation of movable contacts at and near the end of the operating stroke and which holds these movable contacts stationary practically throughout the entire remaining movement of the track switch from one extreme position to the other extreme position.

Another object of this invention resides in constructing the interengaging mechanisms in a manner to eliminate interconnecting operating links and in a manner so that the number of bearings involved in this mechanism is a minimum.

Another object of the present invention resides in the provision of interengaging operating and operated elements constructed and arranged so that the operated element is operated only at a particular point in the stroke of the operation of the operating element and such that the contact operating function takes place only at such particular point in the movement near the operating stroke and is such that the operating element locks the operated element in its operated position throughout all other portions of movement of the operating member.

Another object of the present invention resides in so constructing these interengaging operating elements that the lever arm relationship between these elements remains substantially the same throughout their entire engaged relationship.

Another feature of the present invention resides in the provision of a closed casing within a closed casing in the inner casing of which the circuit controlling mechanism of the present mechanism is housed, this provision of a casing within a casing is resorted to to prevent the accumulation of moisture, as by condensation within the casing.

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

Fig. 1 illustrates a side elevation of apparatus embodying the present invention, portions of which are shown in cross-section taken on the line 1—1 of Fig. 2; and

Fig. 2 shows a partial plan view of the apparatus illustrated in Fig. 1, only two of a larger number of circuit controllers, differently adjusted, having been illustrated.

Structure.—The main casing 1 is of the general shape and configuration illustrated and is preferably constructed of cast iron provided with suitable bosses 2 and 8 on which the circuit controlling mechanism embodying the present invention, and also the inner casing 3, is preferably supported. This outer casing 1 is provided with the usual hinged cover 7 hinged as by a pin 4 and provided with the usual hasp fastener 5 not forming a part of the present invention. A suitable gasket 6, preferably supported in a groove in the cover 7, so as to seal the outer casing against the ingress of moisture as much as possible, is preferably provided. One side wall of the inner casing 3 is provided with a large opening in which is suitably secured an insulating panel 10 which supports binding posts such as posts 11, 12 and 13. As illustrated, the binding post 11 directly supports the stationary contact 15 whereas the binding post 12 directly supports the stationary contact 16. Similarly, the binding post 13 provides an electrical connection to the movable contact 29 through the medium of a flexible wire pig-tail 28.

It will be observed that each of the stationary contacts 15 and 16 is supported in a U-shaped member 18 in a manner such that the end 18a of each of these U-shaped members 18 serves as a back-stop for the associated stationary contact 15 or 16, these contacts 15 and 16 being biased against such back-stop 18a through the medium of a compression coil spring 19. The specific construction of these stationary contacts 15 is not a part of the present invention except insofar as they constitute a part of the contact structure.

As illustrated in Fig. 2 of the drawing the bosses 2 extend only inwardly from the main casing 1 whereas the bosses 8 extend both inwardly and outwardly from this casing 1. The boss 8 is perforated to receive a comparatively heavy shaft 20 which projects beyond the outer wall of the casing and is provided with a crank arm 21, having a crank pin 22 which in practice is operatively connected to the switch points of the track switch in such a manner that movement of the track switch from one extreme position to the other a distance of from 3.5 to 5.5 inches will cause a limited amount of rotation of about 45° of the shaft 20 through the medium of the crank arm 21. One crank arm that has been used successfully is 5⅞ inches long.

The opening in the boss 8 is somewhat larger than the diameter of the rock shaft 20 and the difference in these diameters is taken up by a bushing 23, this bushing 23 also passing through an opening in the inner casing so that this bushing 23 serves as a bearing and also as a support for this inner casing 3 within the outer casing 1. The boss 2 is similarly perforated to receive a bushing 26, which bushing supports the inner casing 3 in a similar manner. The contact shaft 27, supported in bushing 26, supports a spider or operated element 30 to which is secured, but insulated therefrom, a movable contact 29, the contact 29 being shown so secured by bolts 31. It will be observed that this movable contact 29 is U-shaped in cross-section so as to provide an up-standing re-inforcing lip 29a on each side of the contact blade, to thereby result in a comparatively rigid contact finger throughout a portion of its length.

The relationship of the parts is such that the movable contact finger 29 will engage the stationary contact 15 when the contact supporting spider or operated element 30 assumes one extreme position and will engage the stationary contact 16 when this operated element 30 assumes the other extreme position. The operated element 30 consists of a casting having two wings provided with cylindrical surfaces 30a and 30b. The cylindrical surface 30a has a curvature such that the center of its curvature coincides with the axis of the rock shaft 20 when the element 30 assumes one extreme position and the other cylindrical surface 30b has a curvature such that its center of curvature coincides with the axis of this rock shaft 20 when this operated element 30 assumes the other extreme position. To assure against too rapid wear of the member 30 it has moulded therein a hardened steel insert bar 33 arranged substantially parallel to the contact shaft 27, which bar is U-shaped to provide two ribs 33a and 33b which constitute the inner hardened edges of the cylindrical faces 30a and 30b and form the substantially parallel sides of a gap between the wings 30a and 30b. The inner faces of the ribs 33a and 33b constitute hardened operating surfaces against which a hardened steel member or arm 35 is adapted to bear to perform an operating function. This arm 35 is imbedded in an operating member 36 firmly secured to the rocker shaft 20 as by a clamp bolt 37, which is provided with a lock washer 38 between its head and one of the two portions of the bifurcated rear end of this operating member 36.

In order to accurately adjust this operating member 36 with respect to the rock shaft 20 this rock shaft is provided with a threaded groove 39 into the threads of which the threads of a bolt 40, passing through the operating member 36, may engage. This bolt 40, after it has been turned to the proper position so as to properly position the operating member 36 with respect to the rock shaft 20, may be locked in place through the medium of the nut 41 and the lock washer 42. This operating member 36 preferably constitutes a suitable casting in which the hardened steel member or arm 35 has been inserted or moulded during the casting operation.

The hardened steel arm 35 preferably has its free end 35a rounded to the curvatures of wings 30a and 30b, which have the same curvature, and is of such length as to slip by the hardened edge of the insert 33a when the operated element 30 has been operated the desired number, say five, degrees. It is of a width such as to fit snugly in the U-shaped insert 33a so as to avoid lost motion as far as possible. By reason of accurate design, large bearings and hardened steel engaging parts the lost motion is reduced to and maintained at a minimum. The contact operating mechanism is so designed that about $\frac{1}{16}$ inch movement of the switch points will cause a full swing of the movable contact 29. Two additional movements of $\frac{1}{16}$ inch are required to remove and again apply contact pressure complete operation of the contacts will result from $\frac{3}{16}$ inch movement of the switch points.

The inner casing 3 is provided with a cover 44 which is guided by headed guide pins 45 secured in the cover 7, the cover 44 being urged away from the cover 7, through the medium of one or more leaf springs 46. By this construction the closing of the outer cover 7 upon the main casing 1 results in the spring pressed closing of the inner cover 44 upon the inner casing 3.

Although only a single movable contact 29 and its associated operated end operating member has been specifically illustrated in Fig. 1 it should be understood that a plurality (see Fig. 2) of such contacts may be used. One of these contacts may be adjusted to be operated when the track switch approaches one extreme position, another of which may be adjusted to be operated when the track switch approaches its other extreme position, and still another of which may be adjusted to be operated in an intermediate position of the track switch. As shown, the operating member 36 assumes a position corresponding to one extreme, say the normal, position of the track switch whereas the dotted position shown for the cam member 36 and arm 35 illustrates these elements in the other extreme position of the track switch. For the particular adjustment of the operating member 36 with respect to the rock shaft 20 illustrated only a small portion of the cylindrical surface 33a of the operated member 30 is used, this particular adjustment having been made to cause contact operation to take place at the very beginning of the movement of the track switch from its normal position. This operated member has been constructed in a manner so that each contact mechanism may be adjusted to perform any one of the various contact operating functions encountered in practicing the invention.

Operation.—As already pointed out the operating member 36, the operated member 30 and the movable contact 29 all assume a position corresponding to the extreme position of a track switch, as for instance the normal position. Let us now assume that the track switch is operated, as by the usual switch stand, toward the take-siding position. This will cause counter-clockwise rotation of the rock shaft 20. Upon a very slight

extent of rotation of this rock shaft **20** in a counter-clockwise direction, namely, to an extent to cause the rounded end **35a** of arm **35** to disengage one of the wings **30a** or **30b**, unlocking of the operated member **30** takes place, this unlocking being accomplished by the steel insert **35** entering into the gap or notch between the two ribs **33a** and **33b** of the insert **33**. As soon as this unlocking has taken place the lower edge of this hardened steel arm **35** engages the rib **33b**, constituting part of the wing **30b**, to thereby establish a positive operative connection between shaft **20** and movable contact **29** for counter-clockwise driving rotation of shaft **20** and clockwise driven rotation of contact **29**. After a few degrees, say about three degrees, of counter-clockwise rotation of the rock shaft **20**, after the driving connection just mentioned has been established, the steel insert **35** has operated operating member **30** far enough to allow this steel arm **35** to slip by the end of the rib **33b**. The end of the arm **35** then serves as a locking element bearing against the cylindrical locking face **30b** of the operated member **30** to lock this member **30** against counter-clockwise movement. The rock shaft **20** may then continue its counter-clockwise motion throughout a substantial arc without in any way moving the operated member **30**, the arm **35**, however, at all times serving to lock the element **30** in its then operated position insofar as counter-clockwise movement is concerned.

The purpose of the inner housing **3**, with its cover **44** spring supported by the main cover **7**, is to prevent, as much as possible, an ingress of dust and moisture. The extent and rapidity of change of temperature in the inner housing is much less as a result of which such condensation of moisture as takes place occurs mainly in the outer housing so that the contact operating mechanism as well as the contacts themselves are substantially free from moisture.

The applicant has thus provided a circuit controller particularly adaptable to manifest the position of a track switch to a very precise degree of movement and in which the movable contact is operated very quickly through a very small extent of movement of the track switch near its extreme position or an intermediate position, the structure provided being such that no interconnecting links or other mechanical movements are employed which links, etc., are undesirable by reason of the lost motion interposed upon slight wear of the apparatus, the structure being further such as to provide a positive operating connection between the operating and operated members which operating connection has substantially the same lever arm ratio throughout its entire extent of cooperative operation. It should therefore be understood that even though one specific embodiment of applicant's invention only has been disclosed this embodiment has been selected to disclose the nature of the invention and the principles of operation thereof and that various changes, modifications, and additions may be made to apply the invention to the particular problem encountered in practicing the same, without departing from the spirit, scope or nature of this invention, except as demanded by the scope of the following claims.

What I claim as new is:

1. In a circuit controller of the type described for railway track switches; a shaft operated by a track switch the specific position of which is to be electrically manifested; a member pivoted about an axis parallel to said shaft but spaced therefrom, said member including two arcuate wings both in the same plane of rotation about said axis, one arc being substantially concentric with respect to the axis of said shaft when said member assumes one extreme position and the other arc being substantially concentric with respect to the axis of said shaft when said member assumes the other extreme position, which wings are spaced to leave a gap therebetween having substantially parallel sides; an arm having substantially parallel sides supported by and projecting from said shaft and of a width slightly less than said gap, and having an arcuate free end of substantially the same curvature as said arcuate wings and of a length to project into said gap when said member assumes that intermediate position where the sides of said gap and the sides of said arm are substantially parallel; and a contact operated by said member.

2. In a circuit controller of the type described for electrically manifesting the position of a track switch; a shaft; a bifurcated member movable about an axis parallel to the axis of said shaft but spaced therefrom, with its plane in a plane of rotation about its axis of rotation, and with its bifurcated portion extending in a direction toward said shaft and capable of assuming extreme and intermediate positions; said bifurcated portion having a radial slot the side faces of which are substantially parallel; an arm supported by and projecting from said shaft and of a width in the direction of its rotation slightly less than the width of said slot and of a length to engage said slot when said member assumes an intermediate position in alignment with the axis of rotation of said bifurcated member, said width being such as to snugly fit into said bifurcation; arcuate wings supported by said bifurcated member for locking said member in an extreme position at all times except when its bifurcation is engaged by said arm, such locking being accomplished by the end of said arm engaging one of said wings, and a contact supported by and operated by said member.

3. In a circuit controller of the type described for railway signalling systems; a shaft; a bifurcated member movable about an axis parallel to the axis of said shaft but spaced therefrom and provided with two arcuate locking wings and with its bifurcation extending toward said shaft and capable of assuming extreme and intermediate positions; an arm projecting from said shaft and of a length and width to snugly engage said bifurcation when said member and arm assume intermediate positions and to engage with its free end the arc of one or the other of said wings when said arm has moved out of said bifurcation in one direction or the other; said arcuate locking wings having circular surfaces of the same curvature but having different centers of curvature the center of curvature of one of which wings is coincident with the axis of said shaft when said member assumes the particular extreme position in which such wing performs a locking function and the center of curvature of the other of which is coincident with the axis of said shaft when said member assumes the other extreme position; and a contact supported by and operated by said member.

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