Feb. 28, 1939. J. F. MERKEL 2,149,225

ELECTRICALLY OPERATED INDICATOR FOR RAILWAY TRACK SWITCHES

Filed July 9, 1932

FIG. 2.

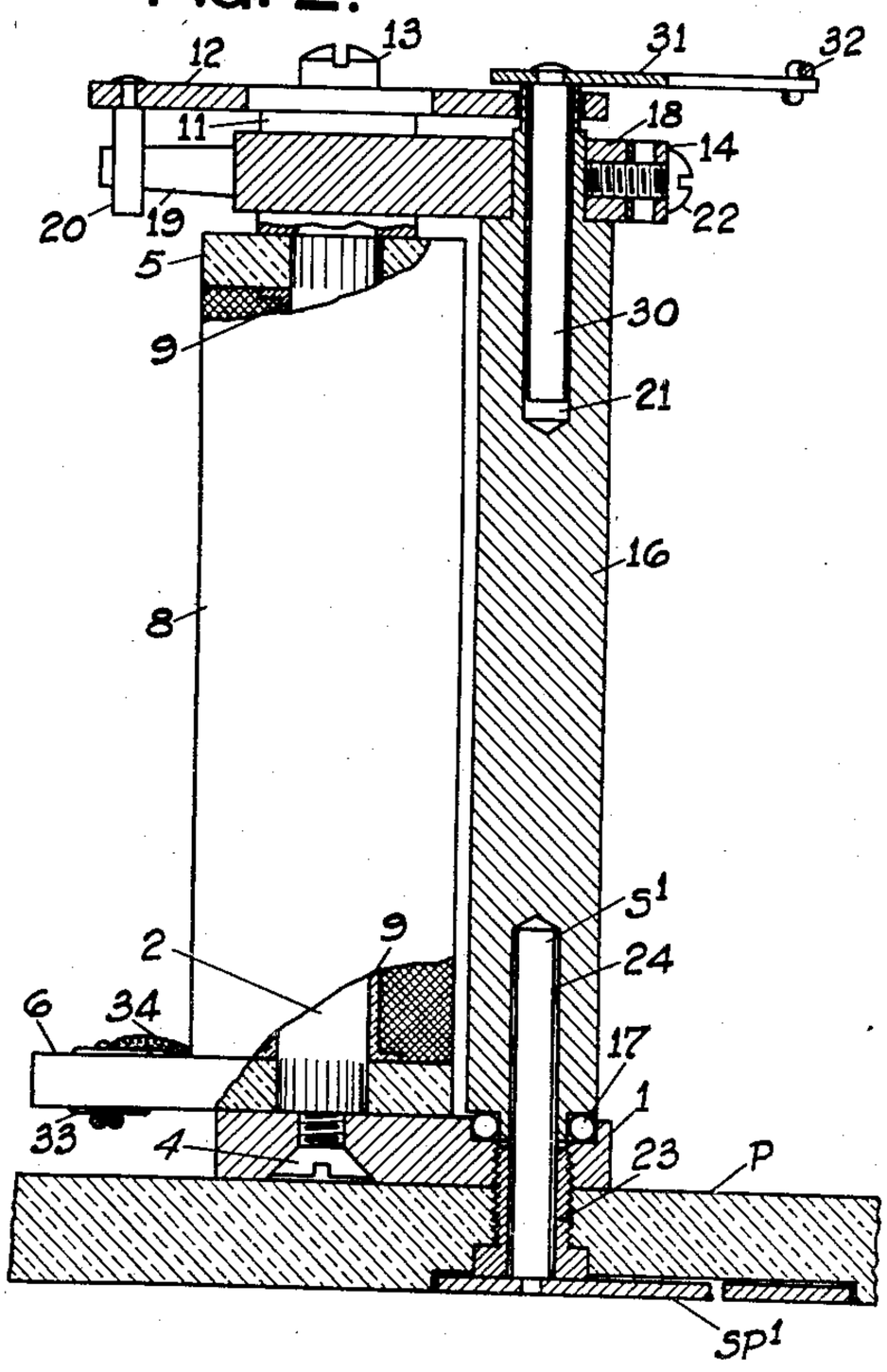


FIG. 3.

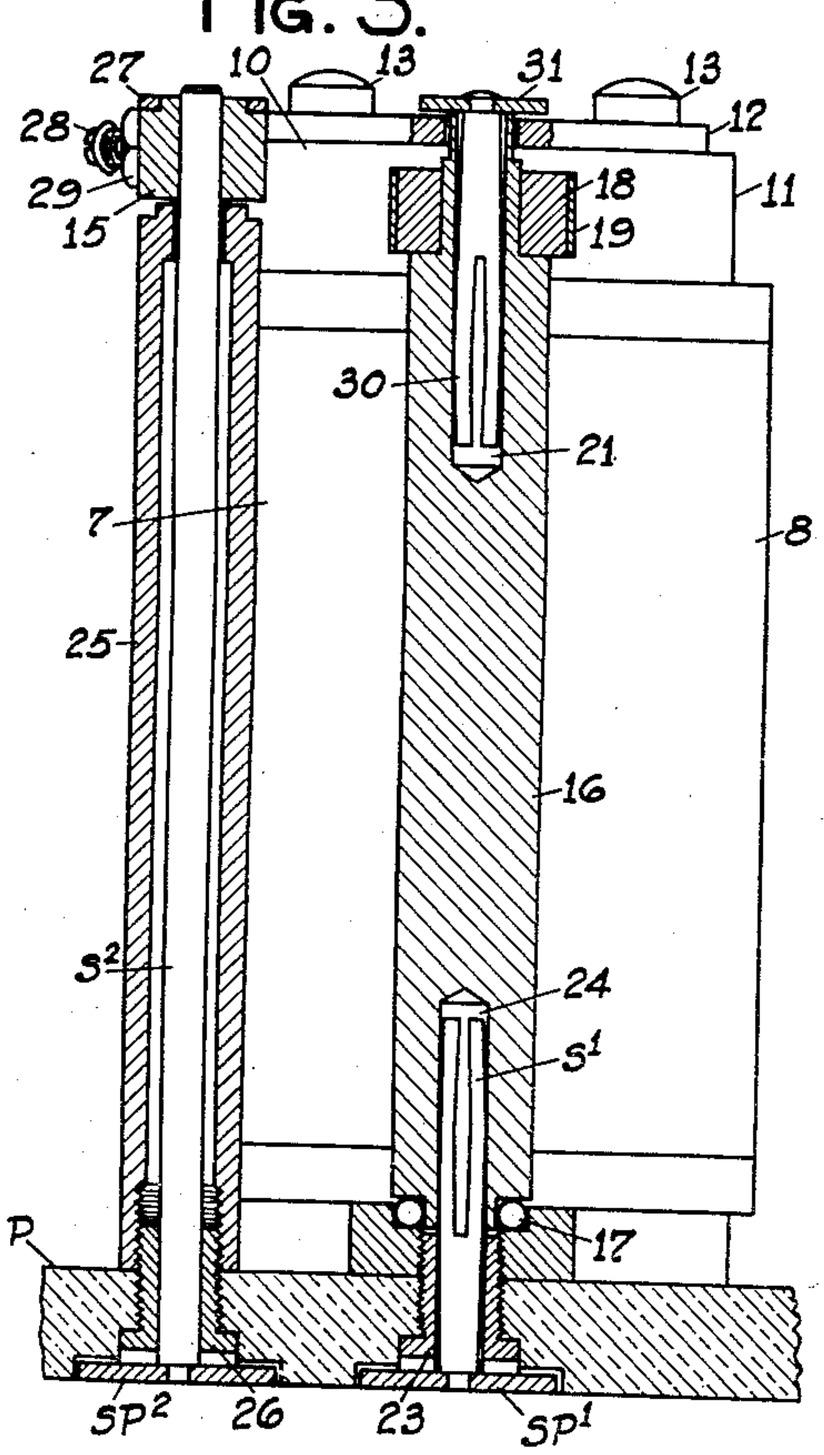


FIG. 1.

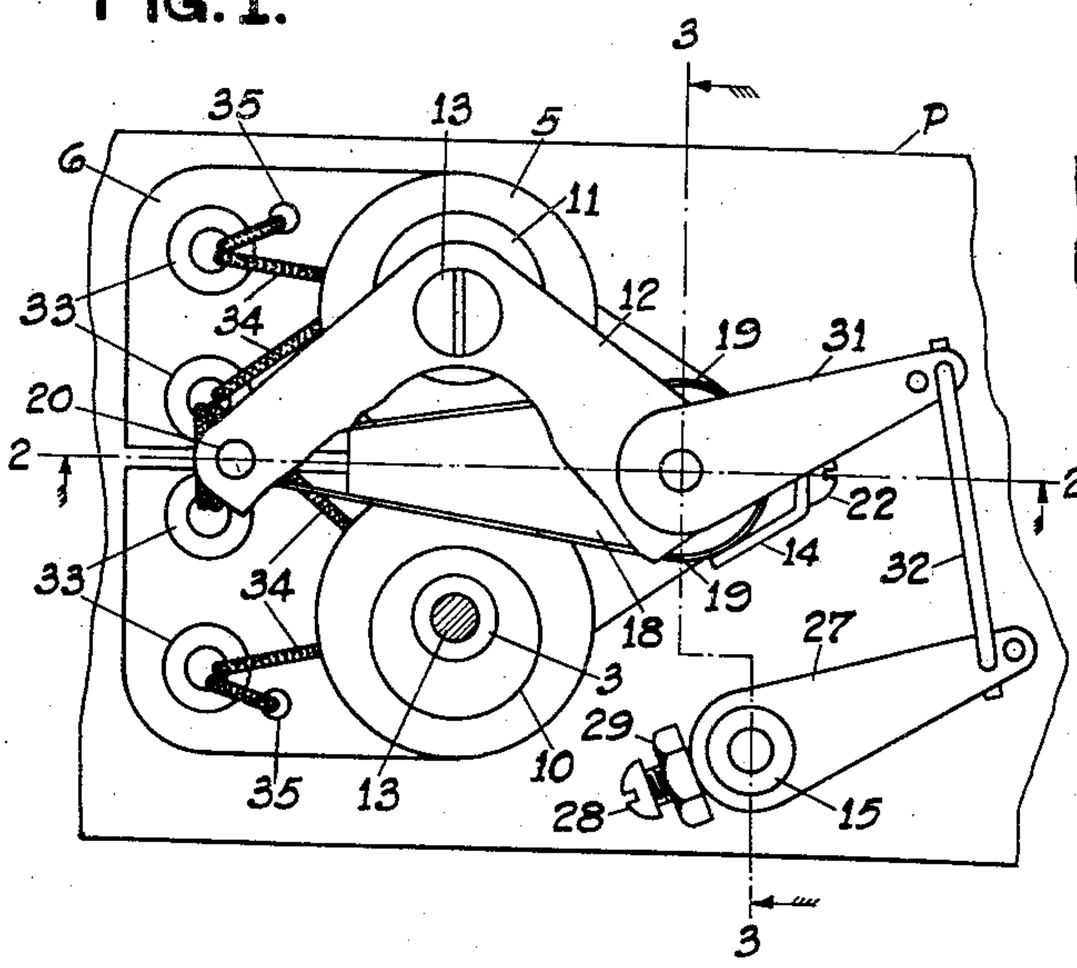
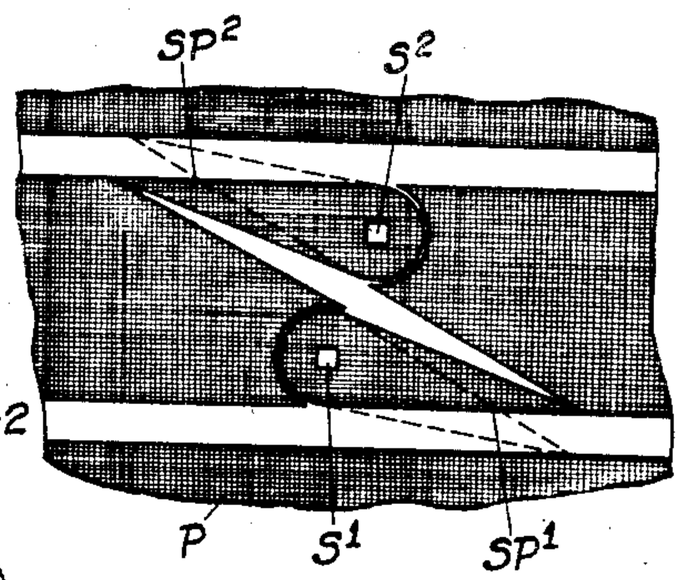


FIG. 4.



INVENTOR
J. F. Merkel.
BY
Neil D. Preston.
his ATTORNEY

Patented Feb. 28, 1939 2,149,225

UNITED STATES PATENT OFFICE

2,149,225

ELECTRICALLY OPERATED INDICATOR FOR RAILWAY TRACK SWITCHES

Joseph F. Merkel, Rochester, N. Y., assignor to General Railway Signal Company, Rochester, N. Y.

Application July 9, 1932, Serial No. 621,580

7 Claims. (Cl. 246—162)

The present invention relates to electrically operated indicators and more particularly to electro-magnetically operated means for displaying an indication of the operated position of the track switch on a control panel of a railway centralized traffic controlling system.

The usual form of control panel used in railway centralized traffic controlling systems has a miniature diagram of the track layout engraved on the surface of the panel board, and it is convenient in aligning traffic routes to display to the operator the position of the various distant track switches controlled from the panel by a means which may be readily associated with the corresponding part of the track diagram. It has been found that a movable mechanical indicator located in the miniature representation of the track, such as a miniature switch point, displays a very comprehensive indication, and consequently an electro-magnetic means for operating such a mechanical indicator must be provided, in as much as, the indication of the operated position of the distant track switch is communicated over electrical circuits.

In view of the above and other considerations, it is proposed in accordance with the present invention to provide a miniature switch point located in a miniature railway track diagram which is electro-magnetically operated to two distinct positions to comprehensively display indications of extreme operated positions of an associated track switch, and to provide such a means which is arranged to assume a mid-position when an indication is not present of either of the aforesaid extreme positions of the track switch. It is further proposed to operate from a single electro-magnetic means a plurality of such miniature switch points which are associated with track switches controlled from a single control means, and to provide a very compact and rugged operating means which may be easily adjusted to obtain the proper operation of the miniature indicating switch points.

Other objects, purposes and characteristic features of the invention will be brought out as the description thereof progresses, during which references will be made to the accompanying drawing, in which:—

Fig. 1 is an enlarged end view from the rear of the panel of an indicator operating means constructed in accordance with the present invention with certain parts thereof broken away to more clearly show the construction.

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1 viewed in the direction indicated by the arrows, and also having certain parts broken away.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1 also viewed in the direction indicated in the arrows.

Fig. 4 is a smaller view of a typical application of the indicator to display an indication of switch positions on a control panel.

The present invention may be said to comprise an electro-magnetic operating means for a mechanical switch indicator, the control circuits of which are fully described in the prior application of S. N. Wight, Ser. No. 431,748 filed February 27, 1930, and the partial view of a control panel shown in Fig. 4 illustrates one embodiment of the present mechanical indicator to display the positions of two track switches arranged in a cross-over between two parallel tracks. On a control panel such as P in Fig. 4 a miniature diagram of the railway system is engraved and conspicuously colored such as by white grooves on a black panel board, and in Fig. 4 two movable points SP^1 and SP^2 which are also of the same color as the panel P are operated about their respective operating shafts S^1 and S^2 to either the positions shown which indicate the alignment of routes straight through on the parallel tracks or to the dotted positions which indicate a cross-over route by the way of the diagonal connecting track.

An operating means for such miniature switch point indicators is shown in the accompanying drawing, and comprises a magnetic end yoke 1 to which two magnetic cores 2 and 3 are fixed by screws 4 passing through the magnetic yoke 1 and threaded into the ends of the cores 2 and 3. Each of these cores 2 and 3 has two end insulating washers 5 and 6 pressed upon straight knurled ends to form end supports for their respective coils 7 and 8 which are wound about the cores 2 and 3 and protected therefrom by an insulating sleeve 9 of material such as fibre with upturned ends resting against the end washers 5 and 6 as shown in Fig. 2. The end washers 6 on each core extend beyond the coils 7 and 8 as shown in Fig. 1 to hold eyelets 33 for terminating leads 34 from the operating coils. The end leads 34 of each coil are wound through the eyelets 33 and holes 35 in the end washers 6, with the leads soldered to the metal portion of the eyelet and a common lead from each coil is wound through the two center eyelets. This arrangement permits the external wire connections to be threaded through the eyelets and soldered thereto to form a permanent low resistance connection.

Smaller free ends of the cores 2 and 3 extend

beyond their coils and hold round eccentric pole pieces 10 and 11 which rest against the shoulders formed by the larger body of the cores. These eccentric pole pieces 10 and 11 are covered by a non-magnetic end yoke 12, which yoke 12 is clamped against the ends of the pole pieces by screws 13 threaded into the free ends of the cores 2 and 3, and these free ends of the cores 2 and 3 do not extend to the outside surface of the eccentric pole pieces 10 and 11 to thereby enable the screws 13 to clamp the yoke 12 against the surface of the eccentric pole pieces and not against the ends of the cores.

A third core 16 is rotatably mounted between the magnetic end yoke 1 and the non-magnetic yoke 12 by bearings formed at one end by a smaller end of the core 16 extending through a hole in the non-magnetic yoke 12 and at the other end by a frictionless bearing formed by steel balls 17 held in a race in the magnetic end yoke 1 by a shoulder formed by the reduced end of the core 16. The rear end of the rotatable core 16 carries an armature 18 on a reduced end thereof which armature extends between the two eccentric pole pieces 10 and 11, and is biased to a center position by a non-magnetic strip 19 of spring material, such as phosphor bronze, which extends completely around the edge of the armature 18 and beyond the free end so that the ends thereof are biased against opposite sides of a stationary pin 20 riveted to non-magnetic end yoke 12. This biasing spring 19 is held by a U-shaped member 14 arranged to hold the sides of the strip 19 against the sides of the armature 18, which U-shaped member 14 is held by a screw 22 threaded into the armature 18 and the end of this screw being forced against the core 16 also serves to prevent turning of the armature thereon.

The entire operating means as thus assembled is held on a control panel P by a bushing 23 having an enlarged end resting in a counterbored portion on the front of the panel and extending through the panel and threaded into the magnetic end yoke 1 so as to align with the rotatable core 16. A hole 24 is drilled into the front end of the rotatable core 16 into which is placed a shaft S^1, which shaft carries the movable switch point indicator SP^1 secured on a squared smaller end thereof as by soldering or welding. The shaft S^1 is split at its free end and bent outwardly as shown in Fig. 3 so that when placed in the hole in the end of the rotatable core 16 the sides of the shaft S^1 spring outwardly to frictionally couple the shaft and the rotatable core 16.

In cases such as the cross-over shown in Fig. 4 where two track switches are to be indicated by a single operating means, the second miniature switch point indicator SP^2 is mounted on a shaft S^2, which extends through a hollow support 25 held to the panel P by a bushing 26 arranged in a similar manner to the bushing 23 which forms a bearing for one end of the shaft S^2 and the free end of the support 25 is shaped to form the bearing for the other end of the shaft S^2. Upon the free end of the shaft S^2 is placed a collar 15 carrying an arm 27 either soldered or welded thereto, and this collar 15 is held on the shaft S^2 to rotate therewith by a screw 28 which is locked by a nut 29.

A means for connecting this shaft S^2 to the operating means is provided by a shaft 30 which is split like the shaft S^1 and is placed in a hole 21 in the rear end of the rotatable core 16 to thus be frictionally coupled thereto in a manner similar to the shaft S^1. This shaft 30 carries an arm 31 riveted on a smaller squared end thereof which arm 31 is connected to the arm 27 by a connecting rod 32. The end portions of this connecting rod 32 are bent at right angles to the connecting portion and these end portions extend through either of two holes on the arms 27 and 31. It is obvious that slight adjustments in the ratios obtained by these arms may be obtained by selecting the holes in which the ends of the connecting rod 32 are placed, that is, in Fig. 1 it is obvious that the arrangement of the connecting rod 32 slightly multiples the rotation of the shaft S^1 in the transmission to the shaft S^2. Such an adjustment is useful to compensate for slight inaccuracies in the width of the miniature track which requires a greater movement of one miniature point than is allowed by the other.

It is now obvious from the foregoing description that the armature 18 will be attracted against either the pole piece 10 or 11 by energizing the corresponding coil 7 or 8 which causes flux to pass through the core of the energized magnet, through the magnetic end yoke 1, through the rotatable core 16, and entering the armature 18 which is thus attracted to the eccentric pole piece of the energized magnet to decrease the reluctance of this flux path. It is also obvious that the armature biasing strip 19 being of non-magnetic material will separate the armature 18 from the pole pieces 10 or 11 when thus attracted to form a residual stop, or a means for preventing the residual magnetism of the magnetic circuit from retaining the armature 18 in its attracted position after de-energizing the operating coil. It is also obvious that the travel of the armature 18 may be readily adjusted by turning the eccentric pole pieces 10 or 11 to a different position about their associated cores 2 or 3, or, as may be seen in the drawing, the position of the eccentric pole pieces shown in Fig. 1 permits the maximum travel of the armature 18, and it is obvious that turning of the pole pieces 10 and 11 through 180 degrees will adjust this armature travel from this maximum to an opposite minimum travel.

An electrically operated indicator for a control board has thus been provided which enables a rotary indicator to be operated to either of two extreme positions by selectively energizing one of two electro-magnets, and which rotary indicator is biased to a neutral or mid-position when neither of the electro-magnets is energized (whereby to indicate that the actual track switch is in the course of operation, and is then in either of its final thrown positions) by a spring biasing means which acts also as a residual stop for the operated motion of the armature, which biasing means also inherently prevents a bobbing motion of the armature in returning to this center position from either direction.

An eccentric pole piece has been provided on each electro-magnet which easily permits an individual adjustment of either operating stroke of the armature by turning the eccentric pole pieces about free ends of the cores of the electro-magnets. A further adjustment of the operation of the points is provided by a friction means which couples the operating mechanism with the indicator points which permits placing the points in a proper operating position relative to the operating means and yet is coupled to the operating means with sufficient friction to permit the transmission of the operating motion therethrough.

A means for operating a plurality of such rotary indicators from a single operating means has also been provided, which possesses the same frictional means for coupling the second indicator with the operating means and further incorporates a means for varying the relative amount of travel between the two rotary indicators. It is contemplated that there may be application in which more than two track switches are operated by a common means or at least by a plurality of means which are commonly controlled, and in this case it is obvious that more than two rotary indicators may be actuated by a single operating means in the same general manner.

The above rather specific description of one form of the present invention is given solely by the way of example, and is not intended in any manner whatsoever in a limiting sense. It is also to be understood that various modifications, adaptations and alterations may be applied to meet the requirement of practice, without in any manner departing from the spirit or scope of the present invention, except as limited by the appended claims.

Having thus shown and described my invention, what I claim is:

1. In an indicator, a three-position rotatable indication displaying means, a supporting magnetic member, two spaced electro-magnets magnetically coupled at one end to said supporting member, a rotatable magnetic member having one end magnetically coupled to said supporting member and an armature attached to the other end operable by selectively energizing said electro-magnets to engage the free end of either of the magnets, leaf spring means biasing said armature to a position midway between the free ends of said magnets, and means arranged to frictionally couple said indication displaying means to said rotatable magnetic member, and eccentric means on the free ends of said magnets for adjustably limiting the travel of said armature.

2. In an indication displaying means, two electro-magnets joined at one end, an armature connected by magnetic means to the joined ends of said electro-magnets, means allowing the operation of the armature toward the free end of either of said magnets, and a U-shaped flat non-magnetic spring strip positioned about the armature to bias said armature to a position between the free ends of said magnets and be between the armature and each free end of the magnets to provide a residual stop for either operated position of said armature.

3. In an indication displaying means for railway control panels, two electro-magnets joined at one end, an armature magnetically connected to the joined ends of said electro-magnets and operable toward the free end of either of said magnets, means biasing said armature to a position between the free ends of said magnets, a track diagram, a first indicator simulating a switch point and frictionally coupled to said armature, an arm frictionally coupled to said armature, and a similar second indicator operable by said arm the indicators being positioned to indicate routes on the track diagram.

4. In a switch indicating means, two parallel magnetic members joined at one end by magnetic means, a winding on each of said magnetic members, a neutral armature cooperating with the joined ends of said magnetic members in a manner to operate toward the free end of one or the other of said magnetic members in response to the energization of one or the other of said windings, means biasing said armature to an intermediate position during the de-energization of both of said windings, a maniature representation of a railway track switch, a movable point cooperating with the said representation and means thereon to positively limit the extent of travel of the movable point, means adjustably coupling the point to said armature and cooperating with the representation of the track switch in a manner to represent a normal, reverse or intermediate position of the track switch in accordance with the energization of said windings.

5. In a switch indicating means, two parallel magnetic members joined at one end, a winding on each of said magnetic members, an armature cooperating with the joint ends of said magnetic members in a manner to operate toward the free end of one or the other of said magnetic members in response to the energization of one or the other of said windings, means biasing said armature to an intermediate position during the de-energization of both of said windings, a plurality of miniature representations of railway track switches, a movable point in each miniature representation of said track switches each being adjustably coupled to said armature to thereby represent a normal, reverse or intermediate position of a plurality of track switches in accordance with the energization of said windings.

6. In a railway track switch indicating means, a supporting panel, two electro-magnets on said panel having the cores thereof magnetically joined at one end, an armature cooperating with the joined ends of said cores in a manner to operate toward the free end of either of said cores by selected energization of said electro-magnets, a representation of a first railway track on the face of said panel having a second track diverging therefrom, a movable point at the junction of said first and second tracks, means for adjustably coupling said movable point to said armature and means for adjusting the operating distance of said armature whereby to correlate the movement of said movable point with the representation of said tracks.

7. In a railway track switch indicating means, a supporting panel, and two electro-magnets on said panel having the cores thereof magnetically joined at one end, a neutral armature cooperating with the joined ends of said cores and positioned so as to operate toward the free end of either of said cores by selected energization of one or other only of said electro-magnets, a representation of a first railway track on the face of said panel having a second track diverging therefrom, a movable point at the junction of said first and second tracks, means for coupling said movable point to said armature and means for adjusting the operating distance of said armature whereby to correlate the movement of said movable point with the representation of said tracks.

JOSEPH F. MERKEL.