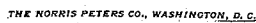


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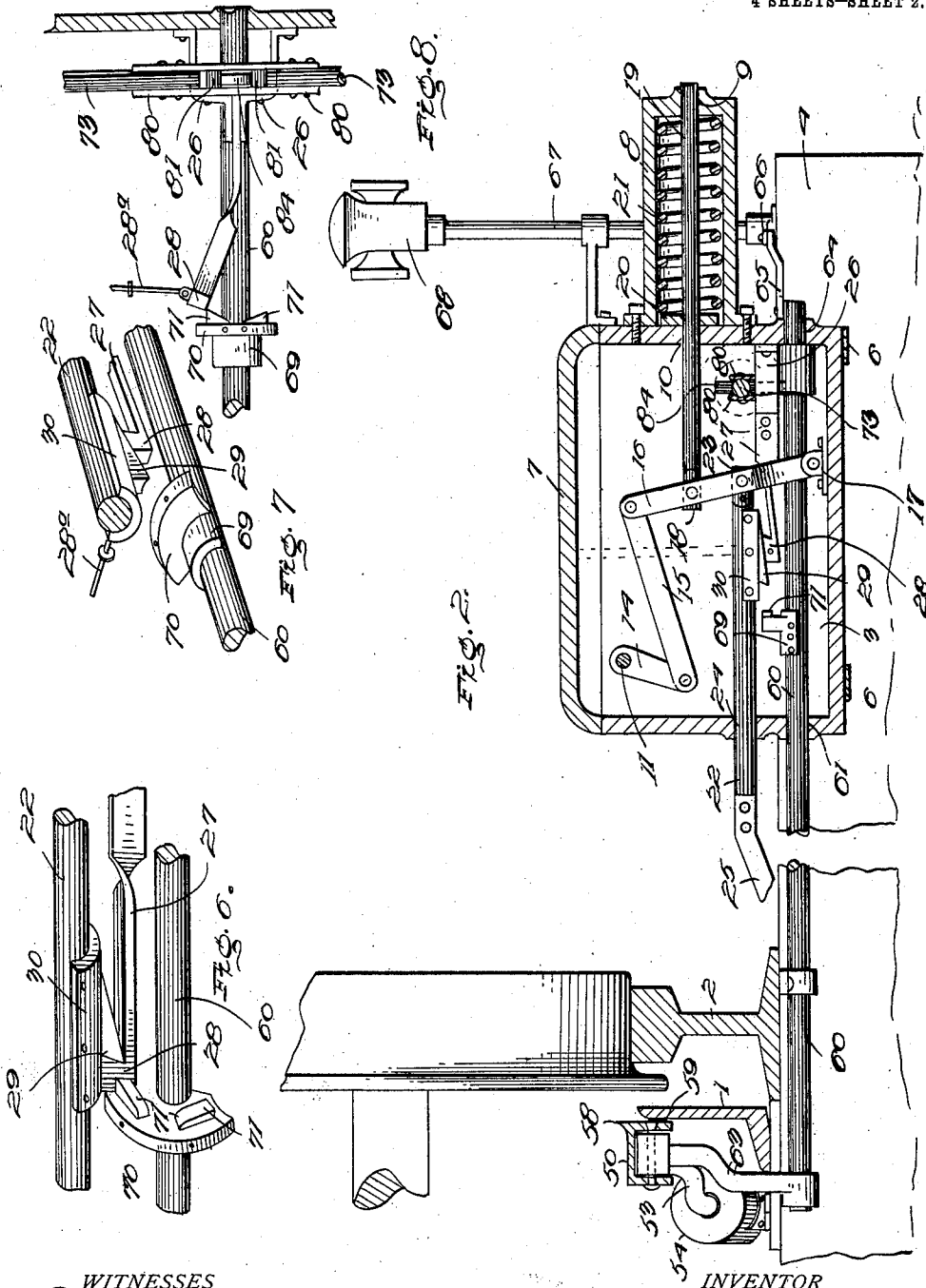


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 SWITCH OPERATING APPARATUS.
 APPLICATION FILED DEC. 3, 1910.

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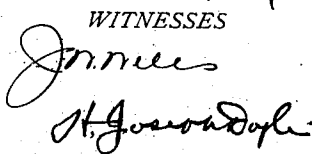


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4 SHEETS--SHEET 3.



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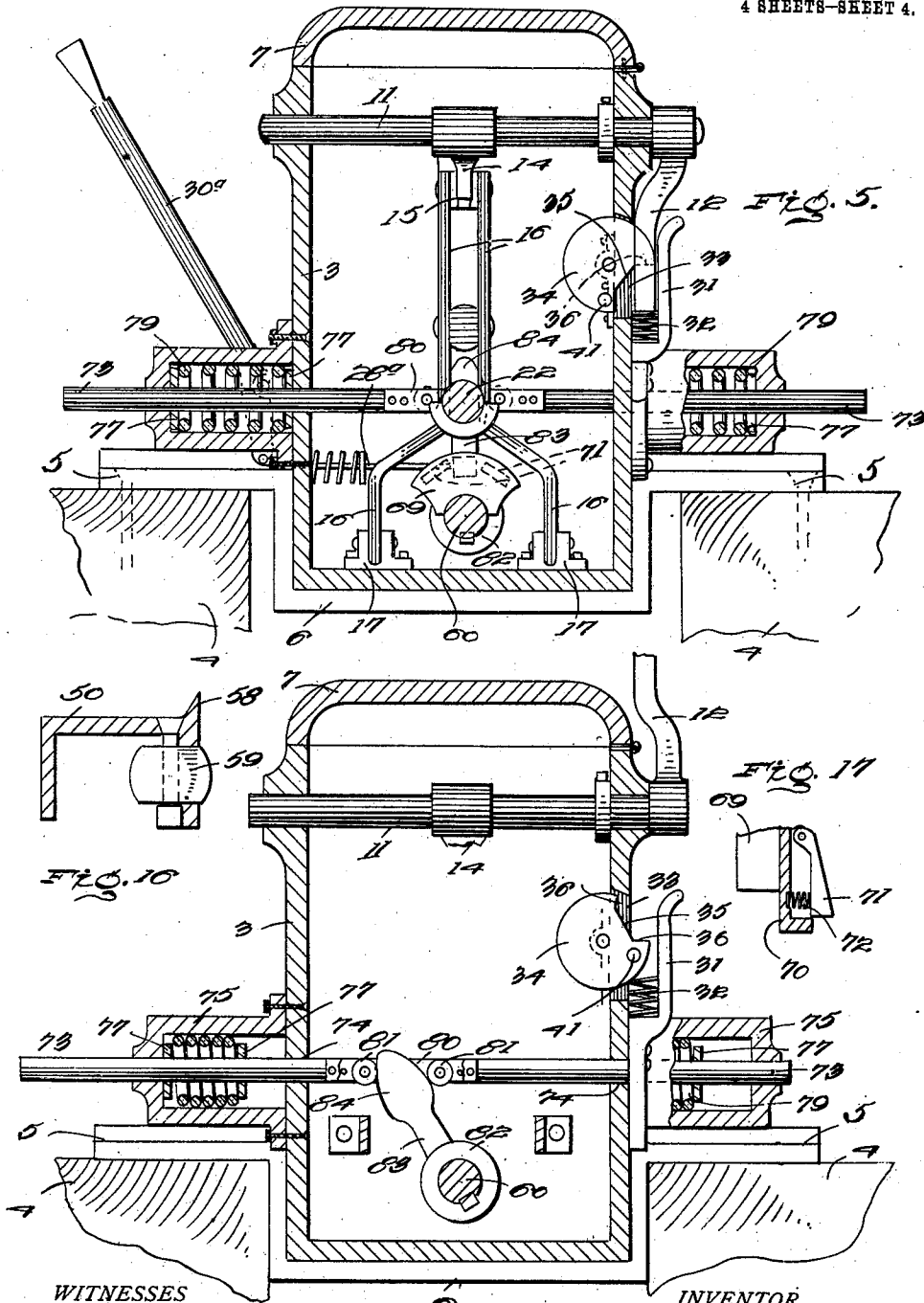
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UNITED STATES PATENT OFFICE.

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SWITCH-OPERATING APPARATUS.

991,387.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ERNEST R. SWAIN, a citizen of the United States, residing at Greensfork, in the county of Wayne and State of Indiana, have invented certain new and useful Improvements in Switch-Operating Apparatus, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to switch operating mechanism for railroads, and the principal object of the same is to provide novel means whereby a switch can be manually thrown to an operative position and with which co-operates novel means for throwing the switch to an inoperative position after a train has passed over the same.

With the above generally stated object of the invention in view, it is contemplated providing a switch and manually operated mechanism therefor by means of which the switch is placed in operative position relative to a main line, and an auxiliary rail that is tripped by a passing train and which automatically actuates mechanism that causes the manually operated mechanism to throw the switch to an inoperative position after the train has passed over the said tripping rail.

In providing a switch operating mechanism capable of performing the functions stated above it will, of course, be understood that the essential features of the same are susceptible to a wide range so far as details of parts and structural arrangements are concerned, one preferred and practical embodiment of which is shown in the accompanying drawings, wherein:—

Figure 1 is a perspective view of the improved switch operating mechanism. Fig. 2 is a fragmentary vertical sectional view thereof, showing the switch in an inoperative position. Fig. 3 is a similar view showing the switch in an operative position. Fig. 4 is a transverse vertical sectional view taken on the line 4—4, Fig. 3, parts of the switch operating mechanism being omitted. Fig. 5 is a view similar to Fig. 4, showing the mechanism in the switch box in position it assumes when the switch is locked. Figs. 6, 7 and 8 are detail views showing the co-operation of the automatically actuated mechanism and manually operated mechanism

by means of which the switch is thrown to an inoperative position. Figs. 9, 10 and 11 are detail views of the hand lever locking means. Figs. 12, 13 and 14 are detail views of a tension shaft and abutments therefor which are used in connection with the operating rod of the automatically actuated mechanism. Fig. 15 is a detail fragmentary view of a spring connection for the tripping rail. Fig. 16 is a detail fragmentary sectional view of the tripping rail and an anti-friction device carried thereby. Fig. 17 is a similar view of a latch-releasing cam carried by the operating rod of the automatic mechanism.

The improved switch operating mechanism forming the subject-matter of this invention is shown as used in connection with the switch rail 1 of a main line rail 2 both of which are of the usual or any preferred type. The rail 1 is manually thrown to an operative position relative to rail 2 by mechanism (to be described in detail) that is partly inclosed by a box or casing 3 which is shaped so that it may be positioned between two ties 4 and supported on said ties by the laterally projecting ends 5 of straps 6 which extend transversely around the bottom and sides of the casing 3, so that by fastening said ends 5 transversely on the upper surfaces of two adjacent ties 4, said casing will be firmly suspended between said ties. Said casing 3 is sealed water-tight by a cover 7 which is hinged thereon and by means of which access can be readily had to permit the mechanism within the casing to be lubricated or for other purposes. At the rear end, casing 3 is provided with a laterally projecting housing 8 the rear end of which is provided with a centrally located transverse bearing opening 9 and the rear end wall of casing 3 is provided with a similar and alining opening 10. Said housing 8 is bolted or otherwise detachably fastened to casing 3.

The switch rail 1 is thrown to an operative position relative to the main rail 2 by manually operated mechanism and to an inoperative position by automatically acting mechanism and for convenience in describing the parts, they will be separately referred to.

The manually operated mechanism.—A

rocker shaft 11 is transversely journaled in the upper portion of casing 3 and has one end projecting well beyond one side of said casing. A hand lever 12 is fastened on the projected end of shaft 11 and has its free end equipped with a weight 13 that may be suitably painted for use as a signal. Within said casing 3, shaft 11 carries a centrally located crank arm 14 that projects between and is pivoted to the forward ends of a pair of links 15 which have their other ends pivotally connected to the upper ends of a pair of rocking levers 16. The lower ends of levers 16 are arranged in divergent relation and are pivotally mounted in ears 17 fastened to the bottom of casing 3. Intermediate their ends, levers 16 have a link connection 18 with a guide rod 19 that extends through housing 8 and is slidable in the openings 9 and 10 of said housing and the casing 3. An abutment collar 20 is fast on rod 19 within housing 8, and a spring 21 is coiled about said rod, one end of said spring bearing against said collar 20 and the other end bearing against the rear wall of said housing. Said spring 21 opposes a rearward movement of rod 19 such as is incidental to the raising of the hand lever 12 to a vertical position, as is shown in Fig. 3.

A switch operating rod 22 has a link connection 23 with intermediate portions of levers 16. Said rod 22 projects through an opening 24 in the forward end of casing 3 and connects with the bars 25 one of which is connected to the base flange of rail 1 and the other of which is connected to the other switch rail, not shown.

The inner face of the rear end of casing 3 is provided with a pair of laterally projecting plates 26 between which one end of a spring latch 27 is fastened. Said latch is preferably formed of an elongated flat resilient bar that is twisted intermediate its ends and terminated in an upstanding lug 28 at its free end. The upper surface of said lug is preferably inclined. The free end of the latch 27 projects parallel with and beneath rod 22 and the lug 28 carried thereby is in the path of movement of a cam 29 depending from a plate 30 fastened to the rod 22. As will be obvious, cam 29 slides over the upper surface of lug 28 and its forward end snaps into locking engagement with said lug when the rod 22 is moved longitudinally of casing 3 to throw the switch rail 1 into operative position relative to main rail 2 and thereby holds the switch rail locked in operative position until the spring latch is disengaged from the cam 29.

As will be understood from the foregoing, when the hand lever 12 is raised to the position shown in Fig. 3, the switch rail 1 is thrown into an operative position relative

to main rail 2 and simultaneously guides rod 19 compresses spring 21 so that the tension of said spring is tending to move the said rod 19 to cause rod 22 to throw the rail 1 to an inoperative position, but such movement is prevented by the engagement of latch 27 with the cam 29. In the automatically actuated mechanism which forms a part of this invention the latch 27 is disengaged from the cam 29 by the means which automatically operate when a train has passed over the rail 1 so that the tension of spring 21 causes the manually operated mechanism to throw the said rail 1 to an inoperative position. And in order to permit the cam 29 and latch 27 to be manually disengaged, such, for instance, as when it is desired to make a "flying switch," a rod 28^a is fastened to and projects laterally from the lug 28 of latch 27 and extends through one side of the casing 3 and carries a hand lever 30^a by means of which said latch may be released from cam 29.

Means for locking the hand lever.—The hand lever 12 drops into a seat 31 carried by casing 3 when the switch rail is thrown to an inoperative position, said seat being provided with a spring or other shock absorbing device 32 to cushion said lever. Adjacent said seat 31 the casing 3 is provided with a slot 33 through which a disk 34 projects. Said disk is suitably journaled in casing 3 and has a notched peripheral portion 35 which provides end shoulders 36. Normally the disk 34 is in the position shown in Fig. 4 so that as the lever 12 enters the seat 31 it will strike the shoulder 36 that is projecting into the said seat and rotate said disk so that the other shoulder 36 will engage over the lever 12 to retain the same in the said seat. A locking bolt 37 is slidable in casing 3 and has one end bearing against disk 34. A spring 38 is coiled about bolt 37 and bears against one of the bearings 39 in which the said bolt is slidable and an abutment 40 that is adjustably mounted on said bolt. Said spring normally holds the bolt 37 in contact with the disk 34 so that the same will enter a transverse opening 41 in the disk when said disk is rotated by the lever 12 entering seat 31. By this means, it will be seen that the disk 34 is normally locked in position to retain the lever 12 in seat 31.

Abutment 40 is provided with a depending arm 42 that hangs in the path of rotary movement of a key 43 that is passed through a key-hole 44 in casing 3, so that by rotating said key, the bolt 37 can be removed from disk 34 against the tension of spring 38. A gravity latching plate 45 has its upper portion hinged to casing 3 and its intermediate portion provided with a lug 46 that engages a recess 47 in bolt 37 to prevent said bolt being moved. The lower portion of plate 45

has a lip extension 45^a that is in the path of movement of the key 43 as said key is passed through the key-hole 44, so that the plate 45 is rocked by said key to disengage the lug 46 from recess 47, thereby freeing bolt 37 so that it can be moved longitudinally by rotating the key 43.

By means of the described locking mechanism it will be clear that the switch cannot be operated by unauthorized persons.

Means for automatically operating the switch.—The base flange of the switch rail 1 is provided with a plurality of regularly spaced laterally projecting pivot studs upon which the rocker arms 49 are mounted. Said arms 49 extend into and are pivotally connected to a tripping rail 50. Said rail is preferably channel-shaped and is supported in close with the rail 1 by means of spring arms 51 carried by a plate 52 that is fastened to the base flange of rail 1. Said arms 51 have their upper ends extended into rail 50. In addition to the arms 51 the rail 50 is yieldably supported by a rod 53 that is slidable through a cylinder 54 carried by a plate 55 extending from rail 1. A spring 56 coiled about said rod 53 bears upon a collar 57 carried by rod 53 and one end of cylinder 54 and yieldably opposes longitudinal movement of said rod in one direction. By means of the described spring arms 51 and yieldably mounted rod 53, the tread surface of tripping rail 50 is normally retained in a plane above the plane of the tread surface of rail 1, as is shown in Fig. 2.

The tread of rail 50 has one longitudinal edge provided with an upstanding guiding flange 58 which prevents the flange of a car wheel getting between the rails 1 and 50, as is shown in Fig. 3. Rails 1 and 50 are prevented from having frictional contact by the rollers, or other anti-friction devices 59 carried by rail 50.

From the foregoing description it will be clear that the rail 50 is permitted to have vertical and longitudinal movement relative to rail 1 by means of the rocker arms 49, and said rail 50 being normally in the position shown in Fig. 2, it will be seen that with the rail 1 set in operative position relative to rail 2, a train passing over the rail 1 depresses rail 50 against the tension of spring arms 51 and the spring pressed rod 53 as is shown in Fig. 3, and when the last car leaves said rail, said arms 51 and rod 53 automatically restore the rail 50 to its original position. The movement of rail 50 when returning to its original position actuates the mechanism which will now be described so that the manually actuated mechanism which sets the switch rail will be operated to throw the said rail to an inoperative position.

A shaft 60 is journaled in casing 3 below and in parallel relation to rod 22. Said shaft 60 projects through an opening 61 in

the front end of casing 3 and beneath rails 1 and 2 and terminates in a crank arm 63 that is pivotally connected to rail 50. The rear end of shaft 60 extends through an opening 64 in the rear end of casing 3 and is provided with an arm 65 that is pivotally connected to a crank 66 projecting laterally from the base of a standard 67 that carries the usual light signal 68.

Within casing 3 shaft 60 is provided with a plate 69 which carries a flange 70 having laterally projecting cam arms 71 hinged thereto. Springs 72 are employed for normally holding the free ends of said arms spaced from said flange. Arms 71 are used to move the free end of latch 27 laterally so that cam 29 will be released from lug 28 and thereby permit spring 21 to move rod 22 so that rail 1 is thrown to an inoperative position and cause the rod 19 to rock levers 16 and through the link connection of said levers with shaft 11, cause the hand lever 12 to be dropped into seat 31 and be locked therein by the disk 34.

With the parts of the invention in the positions shown in Fig. 2, it will be seen that by raising hand lever 12, rod 22 is projected rearwardly, causing cam 29 to snap into engagement with the lug 28 of latch 27 and simultaneously throw rail 1 into operative position relative to rail 2. Tripping rail 50 being carried by rail 1, it moves with said rail 1 and thereby imparts a longitudinal movement to shaft 60 so that the flange 70 abuts the free end of latch 27 and the arms 71 are in position to contact with the sides of said latch. When a train is passing over the switch rail and tripping rail, said tripping rail is depressed, as shown in Fig. 3 and through the crank connection of said rail with shaft 60 said shaft 60 is rotated. This rotary movement of the shaft 60 is in a direction to permit the cam arms 71 to be pressed into the flange 70 against the tension of the springs 72, so that the said arms will slide past the outer end of latch 27. After the last car has left the switch and tripping rail, said tripping rail rises to the position shown in Fig. 2 so that shaft 60 is rotated in a direction opposite to that just described. This last mentioned rotary movement of shaft 60 causes the free end of one of the arms 71 to contact with one side of the latch 27 and force said latch from engagement with cam 29, thereby releasing the switch mechanism so that the switch rail is thrown to an inoperative position and the hand lever 12 dropped into seat 31 and locked therein by disk 34.

To cause the rail 50 to instantaneously rise above rail 1 after the last car has passed over said rails, means are provided which yieldably oppose rotation of shaft 60. Said means comprise a pair of rods 73 which are transversely slidable through openings 74

in the sides of casing 3. Said rods 73 are also slidable through housings 75 that project laterally from the sides of casing 3 and are provided with longitudinal grooves 76.

5 Sectional collars 77 are carried by said rods and have lugs 78 which engage said grooves. Said collars are within the housings 75 and are slidable on said rods. Springs 79 are coiled about said rods between said collars.

10 The rods 73 extend above shaft 60 and their inner ends are connected in spaced relation by the loop 80 in which a pair of rollers 81 are mounted. Shaft 60 has a collar 82 keyed thereon to cause said collar and shaft to rotate together and also to permit said shaft to have longitudinal movements relative to said collar. A lever 83 projects from said collar 82 and has its free end 84 extended through loop 80 between the rollers 81.

20 Said free end 84 is preferably in the form of an arrow-head so that rounded edges will be in contact with said rollers. With this construction it will be seen that the rotary movements of shaft 60 imparts longitudinal movements to rods 73 so that the springs 79 are compressed, and when the pressure on rail 51 is removed, said springs instantaneously rotate shaft 60 to the position shown in Fig. 5, which throws rail 51 to its elevated position.

It will be clear from the foregoing that this invention provides positively acting co-operating mechanism by means of which a manually set switch is automatically thrown to an inoperative, or open, position as soon as a train leaves the switch. It should also be understood that rail 50 should be of sufficient length to accommodate a truck of any car in use.

40 What I claim as my invention is:—

1. A switch operating apparatus comprising manually-operated means including a hand lever and switch rod for setting a switch, a cam carried by said rod, a spring latch for engaging said cam to lock said means in a switch-setting position, and automatically actuated means for releasing said latch from said cam to cause said manually operated means to throw said switch to an open position.

2. A switch operating apparatus comprising a box, manually-operable switch setting mechanism including a hand lever carried by said box, a rest for said lever when in an inoperative position, a locking disk carried by said box for holding said lever to said rest, means for locking said disk in a lever holding position, means for releasing said disk, means for locking said mechanism when a switch is set, and means for releasing said mechanism.

3. A switch operating apparatus comprising manually-operable switch-setting mechanism, a resilient latch for locking said mechanism in a switch-setting position,

means for releasing said latch, a pivotally supported tripping rail adapted to be depressed by a train to release said latch, and means for elevating said rail to actuate said releasing means.

4. A switch operating apparatus comprising a box, mechanism carried thereby for setting a switch, a hand lever for operating said mechanism, a latch for holding said mechanism in a switch-setting position, a 75 rotatable and longitudinally movable shaft extending through said box, cam carried by said shaft in said box for releasing said latch, and means for operating said shaft.

5. A switch operating apparatus comprising a box, a switch rod slidable therein, rocking levers in said box for actuating said rod, means for rocking said lever, a housing projecting from said box, a guide rod slidable in said housing and pivotally connected to 85 said levers, a spring in said housing and coiled about said guide rod for opposing movement of said rod in one direction, means for locking the switch rod against movement in one direction, and automatically actuated means for releasing said locking means.

6. A switch operating apparatus comprising a box, a switch rod slidable therein and provided with a cam, manually operable 95 means for sliding said rod to a switch-setting position, a latch for engaging said cam to hold said rod in a switch-setting position, means for releasing said latch, and spring actuated means for moving said rod to open 100 said switch.

7. A switch-operating apparatus comprising a box, mechanism carried thereby for setting a switch, means for locking said mechanism when a switch has been set, a 105 shaft rotatably and longitudinally movable in said box, means carried by said box for opposing rotation of said shaft, means carried by said shaft for releasing said mechanism, and means for actuating said shaft.

8. A switch operating apparatus comprising a box, housings projecting laterally from the sides thereof, switch-setting mechanism carried by said box, means in said box for locking said mechanism, a shaft 110 rotatable and longitudinally movable in said box, means carried by said shaft for releasing said mechanism, spring pressed bars slidable in said housings, means carried by said shaft and engaging said bar for opposing rotation of said shaft, and means for actuating said shaft.

9. In a switch operating apparatus, the combination with a switch rail, of a vertically and longitudinally movable tripping 125 rail carried thereby, said tripping rail provided with a guiding flange, anti-friction rollers carried by the tripping rail and held in contact with the switch rail, mechanism for setting the switch rail, and mechanism 130

operated by the tripping rail for causing the setting mechanism to throw the switch rail to an open position.

10. A switch operating apparatus comprising switch setting mechanism, a box therefor, a spring latch carried by said box for engaging said mechanism, a shaft longitudinally slidable and rotatable in said box, a flange carried by said shaft, spring-pressed cam arms carried by said flange for releasing said latch from said mechanism, means for actuating said shaft, and means for causing said mechanism to throw a switch to an open position when released by said cam arms.

11. A switch operating apparatus com-

prising a switch rod, manually actuated means for operating said rod to set a switch, a pendent latching cam carried by said rod, a resilient latch for engaging said cam to lock said rod against movement in one direction, a rotatable cam for releasing said latch from said latching cam, and means for causing said rod to throw said switch to an open position when the latch is released from said latching cam.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

ERNEST R. SWAIN.

Witnesses:

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BENJ. R. INMAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
