L. C. BONELLI.

AUTOMATIC RAILWAY SWITCH.

APPLICATION FILED SEPT. 9, 1910.

988,073.

Patented Mar. 28, 1911.

4 SHEETS—SHEET 1.

Fig. 1.

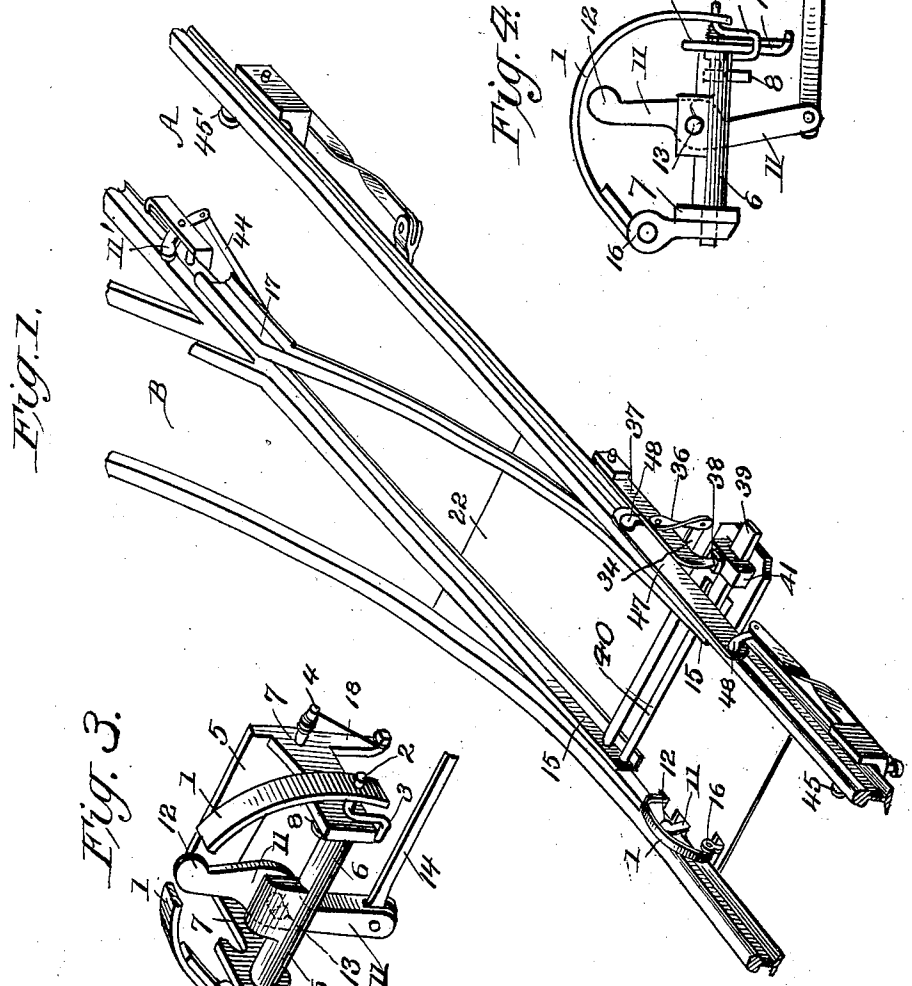

Fig. 4.

Fig. 3.

Witnesses

W. A. Williams

J. H. Drury

Inventor

L. C. Bonelli

By Munn & Co

Attorney

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4 SHEETS—SHEET 2.

Fig. 2.

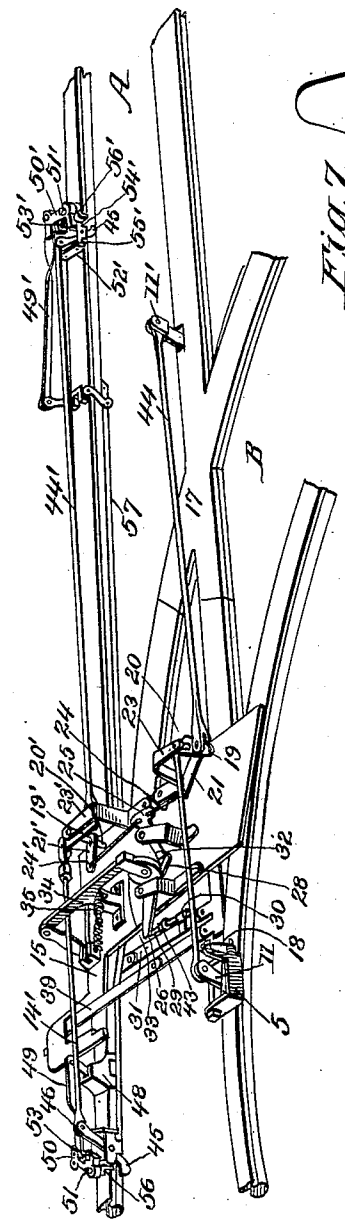


Fig. 7.

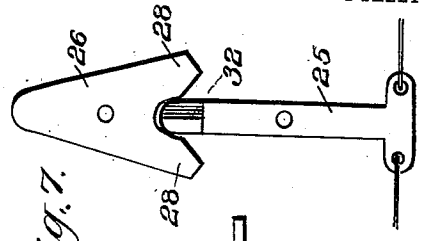


Fig. 8.

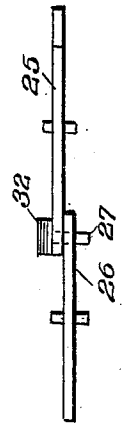
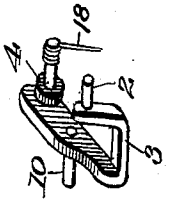


Fig. 6.

Fig. 5.



Witnesses

W. A. Williams

Jos. F. Gray

Inventor

L. C. Bonelli

By Jno. Thomson

Attorney

L. C. BONELLI.

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4 SHEETS—SHEET 3.

Fig. 9.

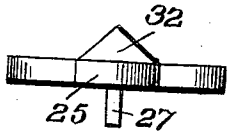


Fig. 10.

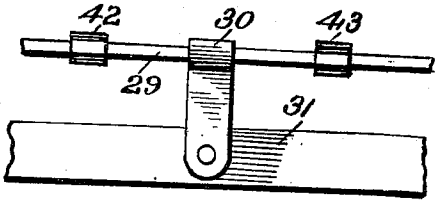


Fig. 11.

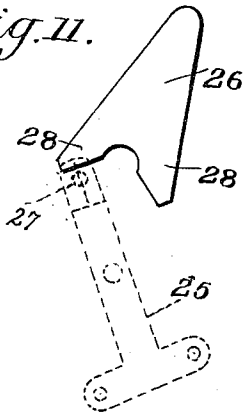
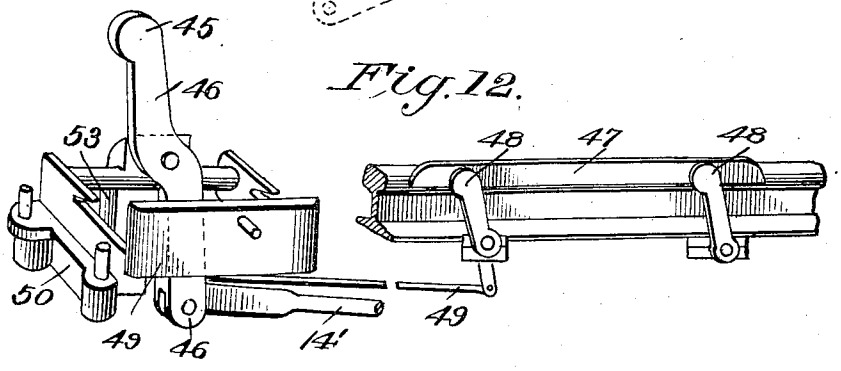


Fig. 12.



Witnesses

H. A. Williams

Jno. W. Gray

Inventor

L. C. Bonelli

By Munn & Co

Attorney

L. C. BONELLI.

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4 SHEETS—SHEET 4.

Fig. 13.

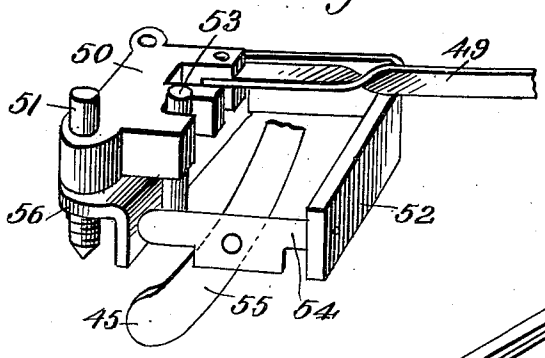


Fig. 14

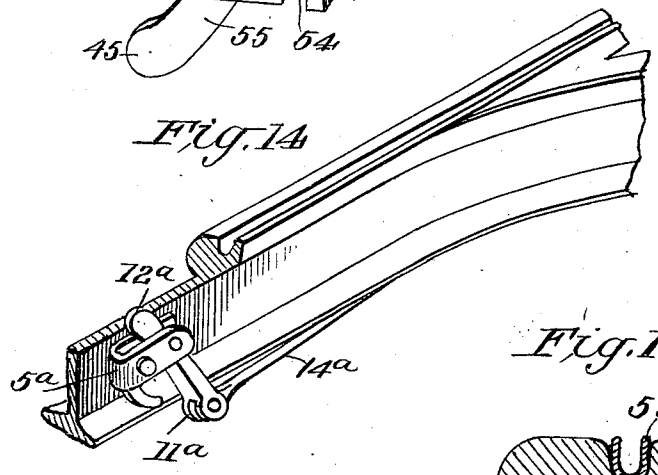


Fig. 16.

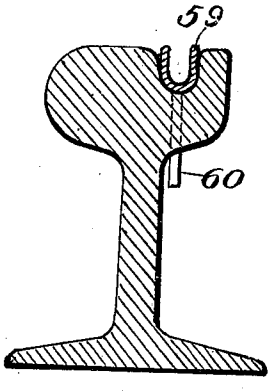
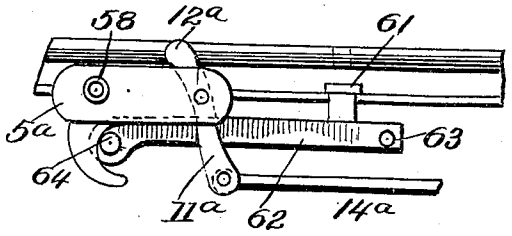


Fig. 15.



Witnesses.

W. W. Williams

Jos. T. Drury

Inventor

L. C. Bonelli

By Jno. Purcell

Attorney

UNITED STATES PATENT OFFICE.

LIBORIO C. BONELLI, OF SALTILLO, MEXICO.

AUTOMATIC RAILWAY-SWITCH.

988,073. Specification of Letters Patent. Patented Mar. 28, 1911.

Application filed September 9, 1910. Serial No. 581,285.

To all whom it may concern:

Be it known that I, LIBORIO C. BONELLI, subject of the King of Italy, residing at Saltillo, State of Coahuila, Republic of Mexico, have invented certain new and useful Improvements in Automatic Railway-Switches; and I do hereby declare that the following is a full, clear, and exact description of the invention.

My invention relates to improvements in automatic railway switches, and has for its object a switch which may be thrown by the driver of the locomotive or car, and which is rigid in its several positions, and, after the passage of the locomotive, car, or train of cars, is automatically reset; the nature of my improvements being more fully hereinafter set forth and described and shown in the accompanying drawings, which form a part of this specification, in which like characters of reference indicate identical parts in all of the figures.

In the drawings: Figure I is a perspective view of the switch complete showing such mechanism as would be visible from one point of view. Fig. II is a perspective view of the switch inverted. Fig. III is a perspective view of the switch-throwing mechanism, having a portion of its arched member cut away, so as to facilitate reference to its mechanism. Fig. IV is a side elevation of the switch-throwing mechanism. Fig. V is a perspective view of a crank which forms a part of the switch-throwing mechanism. Fig. VI is an end elevation of one of the rods and its appurtenances of the switch-throwing mechanism. Fig. VII is a plan view of an arm and a forked member forming intermediate parts of the mechanism for the transmission of the motion involved in the operation of the switch. Fig. VIII is a side elevation of said arms and forked member. Fig. IX is an end elevation of said arm. Fig. X is a plan elevation of the switch rod, one of the tie rods, and of the mechanism uniting same. Fig. XI is a plan view of the forked member. Fig. XII is a perspective view of one of the resetting devices, showing also the mechanism that throws the resetting device into inoperative position. Fig. XIII is a perspective view of one of the resetting devices inverted. Fig. XIV is a perspective view of the switch-resetting mechanism, as modified for use in tracks employing grooved rails, a portion of the ball and groove of the rail being cut away. Fig. XV is a side elevation of the switch-resetting mechanism in the modified form, showing the lever which throws such mechanism into inoperative position. Fig. XVI is a cross section of a grooved rail and a grooved bar fitting in the groove of the rail.

Assuming that the normal position of the switch is with track B open and that the train is approaching the switch in such a direction that it will encounter first the switch-points 15 and then the frog 17, and that it is desired to take track A, the engineman will move a lever in the cab, which causes the lowering of a shoe or small wheel which presses downward against an arched member 1. Said shoe is situated slightly in advance of the first wheels of the pony trucks of the locomotive and the arched member 1 is affixed to the switch throwing mechanism, shown at Fig. III in a perspective view and in Fig. IV in a side elevation. The switch-throwing mechanism is attached to the base of the rail in such manner that the more elevated portions are maintained at a distance sufficient from the ball of the rail so that the flange of the wheels of the locomotive and rolling equipment do not normally come in contact with the switch-throwing mechanism. When, however, the depression of the arched member 1 is effected, the pin 2 of crank 3 pivotally connected at 4 with frame 5 of the switch-throwing mechanism, is lowered. The bar 6 is pivotally connected to the parallel arms 7 of the frame 5 of the switch-throwing mechanism and is provided with a plate 8 fixed vertically to its inner side (see Fig. VI) which has a slot 9 which engages the pin 10 of the crank 3 (see Fig. V).

When the crank 3 is swung into its lower position, the pin 10 forces the plate 8 downward, which causes sufficient rotation of the bar 6 to throw the arm 11 inward toward the plate 5 of the switch throwing mechanism frame. This new position of the arm 11 is such that its head 12 lies against the ball of the rail. While the shoe which was lowered from the locomotive is still depressing the arched member 1, the flange of the forward wheel of the pony truck of the locomotive encounters head 12 of the arm 11, pivotally connected with the rod 6 at 13, shown by dotted lines in Figs. III and IV. The height of the head 12 with relation to the ball of the rail is such that the

impact of the flange of the locomotive wheel is sufficient to throw the upper part of arm 11 forward. The part of said arm which is below its pivotal connection 13 is hence thrown backward and imparts the motion required to connecting rod 14, in order to throw the switch points 15—15, so as to open line A; the intermediate stages of which operation are hereinafter described in detail. The depression of the arched member 1 and the contact between the flange of the pony truck wheel with head 12 of arm 11 are not simultaneous in their inception, but the depression of the arched member is maintained during a period sufficiently great for the head 12 to remain against the ball of the rail until the flange of the pony-truck wheel shall have thrown the switch. The switch having been thrown, the advance motion of the locomotive carries the shoe which depressed arch member 1, forward, thus discontinuing the depression of the arched member, which assumes its normal position through the spring 18. One end of the arched member 1 is pivotally connected at 16. As will have been seen above, the lower portion of the arm 11 is thrown in a direction opposite to the travel of the locomotive, which advances so as to encounter first the switch points and then the frog. Upon pulling the connecting rod 14, pivotally connected to one end of the arm 19, this arm 19 forces a partial rotary motion of the pin 20, to which pin said arm 19 is fixed. Another arm 21 is firmly secured to pin 20 and at right angles to arm 19. Pin 20 is journaled in base plate 22 and the bearing arm 23. The longitudinal motion of connecting rod 14 thus imparts a lateral swinging motion to arm 21, which through connecting rod 24, imparts a lateral swinging motion to arm 25. One end of arm 25 partially overlaps the forked end of arm 26 (Figs. VII and VIII). Pin 27 of arm 25 extends downward between the prongs 28 of the forked arm 26. The impact of the pin 27 against the converging point of said prongs causes a lateral swinging motion to be imparted to forked arm 26. Switch rod 29 passes through the piece 30 fixed to the tie rod 31, the impact of the nuts 42 and of the nuts 43 with the piece 30, imparts the movement initiated by the pony truck wheel. As will be seen by reference to the drawings (Fig. X), the amount of throw of the switch is regulated by the nuts 42—43. One end of arm 25 is provided with prism 32. As the upper angle of this prism 32 passes under wheel 33, which rotates in a bearing projecting from lever 34, said lever 34 is made to see-saw on its bearings 35, imparting an up-and-down movement to twisted bar 36, thus raising bar 37 which lifts pin 38. Bar 39 fixed to the rod 40, slides through a groove in block 41. The raising of pin 38, which passes through block 41, bar 39 and base plate 22, releases bar 39 so that it may be moved or slid in the slot of block 41. As will be explained hereinafter, the sliding movement of bar 39 is not begun until the pin 38 is raised out of the hole through which it passes in said bar. The position of the bar 39 and hence that of the switch points is thus secured when the switch is set for a certain track, by the pin 38. A spring in bearing 35 maintains the position of the wheel 33 against prism 32.

As above set forth, the lateral swinging movement of forked member 26 actuates the switch rod 29 and the lateral swinging movement of arm 25 actuates forked member 26, by reference to Fig. XI, it will be seen that forked member 26 is at rest until pin 27 engages its semi-circular opening at the converging points of prongs 28 and the initial movement of member 26 taking place at a perceptible interval of time, after the movement of arm 25 is begun. As the prism 32 of arm 25 actuates the pin lifting mechanism that sets the switch in its extreme or operative positions, it is evident that the pin 38 is lifted before the switch rod 29 and members whose movement is dependent thereon, begin to move. Thus rod 39 does not begin to slide through the groove or slot of block 41 until after the pin 38 is lifted.

In Fig. I, a switch throwing mechanism is shown, having an arm 11′ which, in the normal position of the switch, (*i. e.*, with track B open) is almost vertical, with its head almost on a level with the ball of the rail and against same. If the train be approaching the switch in a direction opposite to that considered above (or so headed that it encounters first the frog and then the switch points), the switch-throwing mechanism having the arm 11′, is brought into use, the forward wheel of the pony truck coming into contact with, and depressing the head of the arm 11′. By reference to Fig. II, it will be seen that the movement of arm 11′ by means of connecting rod 44 imparts a movement to arm 20 identical to that imparted to it when switch-throwing mechanism with the arm 11 is thrown, actuating connecting rod 44 operating in turn arm 19. Hence the succeeding mechanical movements are identical to those effected when the train approaches from a direction first considered and explained. When the train travels in the direction considered in the second instance (encountering first the frog and then the switch points) the wheels of the rolling equipment do not come in contact with the head of arm 11, since said head, as hereinbefore stated, is held against the ball of the rail only when arched member 1 is depressed. It is evident, without necessity of comment, that in the

direction of travel considered in the second instance, no attention is necessary on the part of the engine crew, as was the case in the first instance considered, when the necessity of lowering a shoe to engage the arched member 1 was set forth. Be the travel in whichever direction, the switch is automatically set in its primitive or normal position, after the passage of the train, in the manner explained below.

A study of Fig. II will reveal the fact that the mechanism on the side of the track considered up to the present is, in the main, duplicated on the opposite side. The principal distinction consists in that the switch throwing mechanism of the side heretofore considered has its counterpart on the opposite side in resetting devices, differing somewhat in detail, but similar in that the flange of the wheels of the rolling equipment initiate the movement necessary to accomplish the desired result.

When the motion of the train in either of the directions assumed causes the switch-throwing mechanism to operate, arm 25 executes a swinging movement in a horizontal plane. Pieces 15′, 19′, 20′, 21′, 23′, 24′ and 44′, dependent for their motion on arm 25, are analogous in form, arrangement and movement to pieces 14, 19, 20, 21, 23, 24 and 44, whose operation has been hereinbefore set forth; the impulse of the movement imparted being in reverse order in each of the groups of the pieces mentioned. Hence, when the flange of the wheel of the forward pony truck of the locomotive actuates the switch-throwing mechanism, the resetting mechanism is thrown into operative position. Assuming the travel of the train to be in a direction from the frog to the switch points, arm 11′ by operating connecting rod 44 and succeeding members, imparts a forward movement with relation to the direction of travel of the train of rod 14′. This causes arm 46 to assume a position almost upright, the head 45 of said arm, being approximately on a level with the ball of the rail, in its new position. However, there is a mechanism which throws its head away from the ball of the track by imparting a lateral swinging movement to arm 46, so that the flange of the wheels of the rolling equipment do not come in contact with the head of said arm of the resetting device until all of the wheels, except the last pair, pass the switch point. This is accomplished by the bar 47, which is pivotally supported from bars 48—48. Bar 47 is held somewhat higher than the ball of the rail; but the tread of the wheels of the rolling equipment depress the bar 47, swinging the bars 48—48 in such manner that connecting rod 49 is moved, impelling member 50 pivotally connected at 51 with the frame 52 of the switch resetting device. Pin 53 is thus caused to move, said pin being firmly affixed to bar 54, pivotally connected to the arms of frame 52. The switch resetting lever 55 is pivotally connected to said bar 54 which, by movement of the pin 53, rotates sufficiently to throw the head 45 of lever 55 away from the ball of the rail and hence beyond the range of the flange of the wheels of the rolling equipment, since its normal position, maintained by springs, is somewhat above the level of the ball of the rails.

It will now be seen that when the last wheel of the train has passed over the bar 47, this member assumes its normal position, throwing the resetting device into operative position, by allowing head 45 of the lever to return to the ball of the rail. Bar 57 on the inner side of the same rail is similar in function to, and by levers not shown in the drawings, operates with bar 47. Bar 57, however, is depressed by the flange and not by the tread of the wheels of the rolling equipment. This bar 57 is sufficiently long to cause the depression to be continuous during the passage of the train, since either bar 47 or 57 will at all times during the passage of the train be depressed by at least one set of wheels. If the travel of the train be in a direction opposite to that just considered, then the resetting will be accomplished in a similar manner by the resetting device which contains members similar to those of the resetting device described at length, in which 48′, 49′, 50′, etc., are counterparts of 48, 49, 50, etc.

The principle of my invention may be applied to tracks having grooved rails, as for example those used for the urban lines of tramways. A slight modification is necessary in this instance, since the groove of the rail precludes the possibility of a lateral motion of upright levers of the switch throwing and switch resetting mechanism. However, these members are shifted from the range of the flange of the wheels of the rolling equipment by a depression of a certain portion of the mechanism in an adequate manner, of which the following is an example.

In Fig. XIV is shown the preferred form of the switch resetting mechanism, Fig. XV presenting a side elevation of same, when adapted to grooved rails. Pivotally connected at 58 to the web of the grooved rail is the switch-resetting mechanism supported by the frame 5^a. When the flange of the wheel depresses grooved bar 59 in the groove of the rail (see Fig. XVI), bar 60 depresses shoulder 61 of lever 62 connected to the web of the rail by pin 63. Pin 64, projecting from bar 62, in its downward movement, actuates shoulder 65, projecting from the frame 5^a and hence causes a slight rotary motion of the frame with pinion bearing 58 as a center. Head 12^a of lever 11^a is thus lowered

from the opening in the groove in the rail through which it normally projects, and is thus shifted from the range of the flanges of the wheels of the rolling equipment.

Having thus described my invention, what I claim is:

1. In an automatic railway switch the combination of the movable switch points, a setting element, a pivotally mounted operating lever adjacent the setting element, a rocking bar to which the operating lever is pivoted, a connection between the rocking bar and the setting element whereby when the latter is depressed the pivotally mounted lever will be rocked toward a rail to place it in position to be struck by the wheels of the rolling stock, a system of levers between the operating lever and the movable switch points, a locking device to lock the switch points in position, and means on one of the aforesaid system of levers for operating the locking device.

2. In an automatic railway switch, the combination of the movable switch points, a curved setting element pivoted at one end and adapted to be depressed to set the switch operating mechanism, a cranked lever pivoted to the opposite end of said curved setting element, a rocking bar, an operating connection between the rocking bar and the cranked lever, an operating lever pivoted to the rocking bar, whereby when the curved setting element is depressed the operating lever will be rocked toward the rail, a system of levers between the operating lever and the switch points, a locking device for holding the switch points in operative position and means on one of the aforesaid system of levers for operating the locking device.

3. In an automatic railway switch, the combination of the movable switch points, setting mechanism, an operating lever adjacent the setting mechanism, a system of levers interposed between the operating lever and the switch points including a sliding rod with abutments to permit movement of said levers before the switch points are operated, a locking device including a roller for locking the switch points in position, and means on one of the system of levers for coöperating with the roller to release the locking device.

4. In an automatic railway switch, the combination of setting mechanism, an operating lever adjacent the setting mechanism, a system of levers interposed between the operating lever and the switch points including a bifurcated lever having a rod with abutments thereon to permit of movement of the levers before the switch points are operated, one of said system of levers having a stud to coöperate with the bifurcated lever, a locking device for locking the switch points in position, a cam on one of the system of levers for operating the locking device, and a resting device connected to the system of levers.

5. In an automatic railway switch, the combination of the movable switch points, setting mechanism located in front of the switch points, an operating lever adjacent the setting mechanism, a system of levers between the operating lever and the switch points, a locking device for locking the switch points in position, means on one of the system of levers for operating the locking device, switch resetting mechanism connected with the system of levers, means for operating the system of levers when a train is coming from the rear of the switch points including an operating lever, a connection between said operating lever and the system of levers, a rocking support to which the operating lever is pivoted, a rocking element adjacent the rocking support to rock the latter, a bar on the side of the track in the path of the wheels of the rolling stock, crank levers supporting said bar, and a rod connecting the rocking element and one of the crank levers.

6. In an automatic railway switch, the combination of the movable switch points, setting mechanism in front of the switch points, an operating lever adjacent the setting mechanism, a system of levers between the operating lever and the switch points, a locking device for locking the switch points in position, means on one of the system of levers for operating the locking device, switch resetting mechanism in rear of the switch points and connected with the system of levers, means for operating the system of levers when a train is coming from the rear of the switch points including an operating lever, a rocking support to which the latter operating lever is pivoted, a connection between the latter operating lever and the system of levers, a rocking element adjacent the rocking support to rock the latter, a bar in the path of movement of the wheels of the rolling stock, cranks supporting said bar, a rod connecting the rocking element and the said bar and means for resetting the last mentioned switch operating means and including a pivoted lever, a connection between the latter lever and the system of levers, a rocking support therefor, a tilting element for rocking the latter support, a vertically movable bar, a rod connecting the tilting element and the vertically movable bar, whereby to hold the last mentioned lever out of contact with the rail while a train is passing over the switch points.

7. An automatic railway switch, the combination of the movable switch points having a perforated lug, a pivoted bifurcated lever, a rod pivotally connected to the bifurcated lever and provided with abutments and extending through the perforation in

the lug on the movable switch points, a pivoted lever having a stud engaging the bifurcated portion of the aforesaid bifurcated lever, said pivoted lever also having a cam, a system of levers connecting the operating lever and the cam lever, means for setting the operating lever, a locking device including a roller for locking the switch points in locked position, said roller being engaged by the cam.

8. In an automatic switch, the combination of the switch points, setting mechanism located in front of the switch points, an operating lever adjacent thereto, a system of levers interposed between the operating lever and the switch points, one of the system of levers having a rod provided with abutments to permit the movement of said levers before the switch points are operated, a locking device for locking the switch points in operative position, means on one of the system of levers for operating the locking device, a resetting lever beyond the switch points, a connection between said resetting lever and the system of levers, means in rear of the switch points for operating the latter by a train coming in the opposite direction and comprising an operating lever, a rocking support to which the rocking lever is pivoted, a rocking element to operate the rocking support, a rod pivoted to the rocking element, a bar along the track, a cranked lever pivoted to said bar and the rocking element, means in front of the switch points for resetting said latter operating means and comprising a pivoted operating lever, a connection between the latter operating lever and the system of levers, a rocking support to which the operating lever is supported, a rocking element for rocking the rocking support, a guard rail alongside the rail of the track, cranked levers for supporting the guard rail, and a rod connecting the rocking elements with one of the cranked levers.

9. In an automatic switch, the combination of the switch points, setting mechanism, an operating rod alongside the setting mechanism, a system of levers interposed between the operating rod and the switch points, the operating rod and setting mechanism being positioned in front of the switch points to operate said points when the train is coming toward the latter, mechanism in rear of the switch points for operating the latter when the train is coming in the opposite direction including an operating lever, a rod connecting the operating lever and the system of levers, a bar alongside the rail of the track, cranked levers for supporting the bar and to which the latter are pivoted, a rocking element, a connection between the rocking element and one of the crank levers, a rocking support to which the operating lever is pivoted, means between the rocking support to the rocking element whereby one operates the other, means in front of the switch points for resetting the switch after the latter has been operated by the mechanism located in rear of the switch points and comprising an operating lever, a connection between the operating lever and system of levers, a rocking support for said latter operating lever, a tilting element, means between the tilting element and the rocking support whereby the one operates the other, a guard rail adjacent one of the rails of the track, cranked levers for supporting the guard rail, a connection between one of the cranked levers and the tilting element, and means for locking the switch points in position.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

LIBORIO C. BONELLI.

Witnesses:
TIB HENSON,
J. Y. SLEEK.