

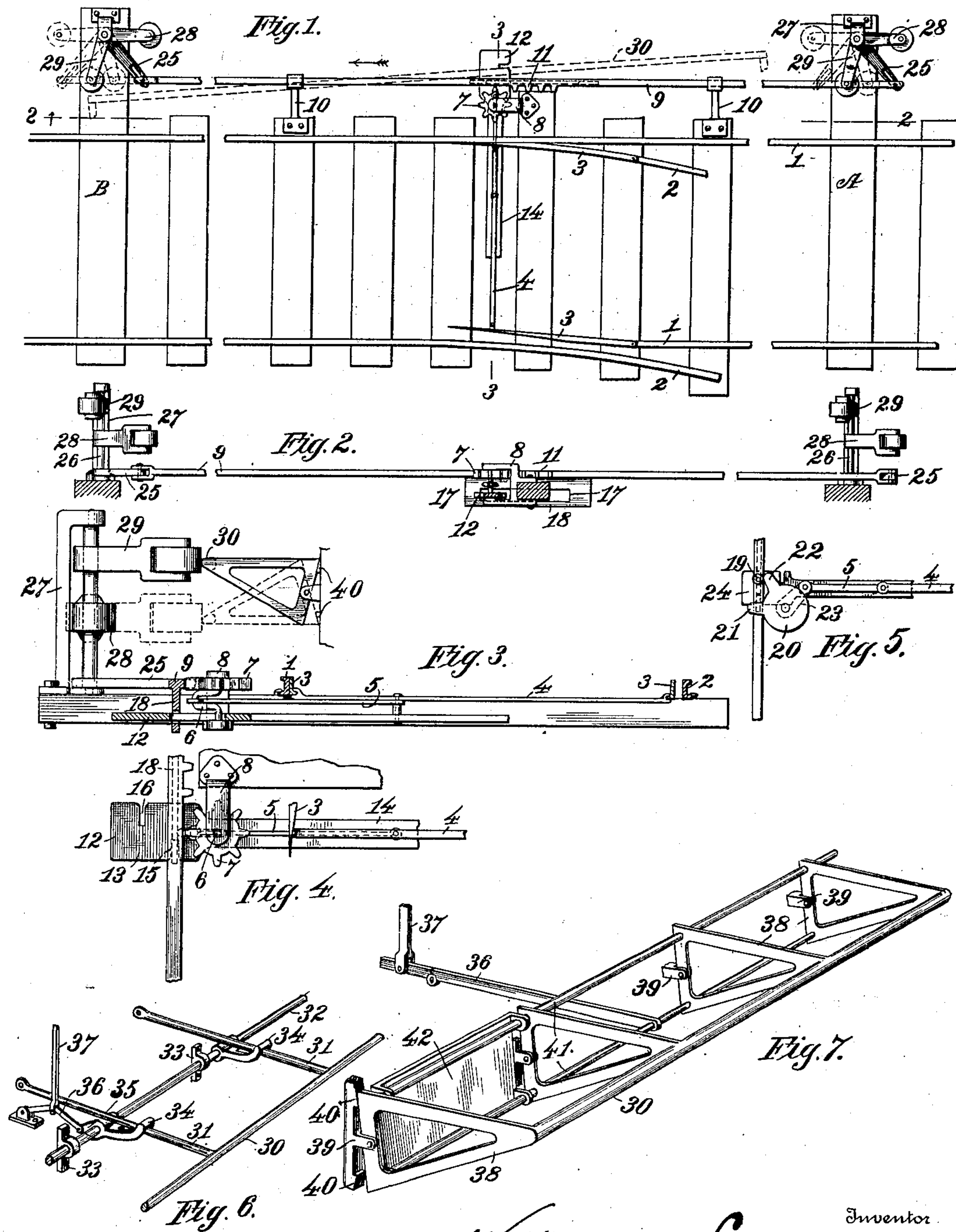
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W. C. SAYRS.  
AUTOMATIC RAILWAY SWITCH.

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NO MODEL.



Witnesses  
H. S. Austin  
K. M. Cornelius

Inventor  
William C. Sayrs.  
By Julian C. Howell  
Attorneys.



# UNITED STATES PATENT OFFICE.

WILLIAM C. SAYRS, OF WILMINGTON, OHIO.

## AUTOMATIC RAILWAY-SWITCH.

SPECIFICATION forming part of Letters Patent No. 754,392, dated March 8, 1904.

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*To all whom it may concern:*

Be it known that I, WILLIAM C. SAYRS, a citizen of the United States, residing at Wilmington, in the county of Clinton and State of Ohio, have invented certain new and useful Improvements in Automatic Railway-Switches; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates particularly to that class of railroad-switches which are automatically opened or closed by the moving train at the will of the engineer. Automatic switches of this character are greatly advantageous over those of ordinary construction, for with the switches now in general use when it is desired to side track a train it becomes necessary to stop the train, send a man ahead to open the switch, start the train again, and carry it onto the side track, and then close the switch. All of this requires time and a waste of power both in overcoming the momentum of the train in order to stop and in overcoming the inertia of the heavy train at rest in order to move it onto the side track. Again, it often happens that a switch either carelessly or maliciously left open throws a fast or through train onto a siding, thereby causing much loss of life, limb, and property. On the other hand, such disadvantages are overcome with automatic train-operated switches, for the engineer can at will either open or close the switch without stopping or changing the speed of the train.

The principal object of the invention is to produce an improved automatic switch of the above-noted character with simple and efficient operating mechanism and means carried by the moving engine or train adapted to actuate said mechanism, whereby the engineer can from his cab either open the switch without stopping the train or even reducing the speed, except to the extent necessary to stop at the desired place, or in case of a through train insure that all switches are closed and locked in advance.

The invention will first be described with

reference to the accompanying drawings, 50 which are to be taken as a part of this specification, and will then be pointed out more particularly in the annexed claims.

In the said drawings, Figure 1 is a plan view of a switch embodying my invention, 55 with the actuating device which is attached to the train shown diagrammatically in dotted lines. Fig. 2 is a vertical section on line 2 2, Fig. 1. Fig. 3 is a vertical section on line 3 3, Fig. 1, enlarged. Fig. 4 is a detail plan 60 view of a portion of the switch-point operating and locking mechanism. Fig. 5 shows a modification of the mechanism of Fig. 4. Fig. 6 is a perspective view of the actuating device carried by the engine or train. Fig. 7 shows, 65 on an enlarged scale, a modification of said actuating device.

Referring by numerals and letters to the mechanism illustrated, 1 indicates the main track, 2 the side track, and 3 the two movable 70 switch-points, which are rigidly connected and directly operated by rod or switch-bar 4. Pivotaly connected to the switch-bar 4 is a pitman 5, which extends beyond the side of the track, where it is connected to a crank upon 75 a vertically-disposed shaft 6, having rigid therewith a pinion 7. The shaft 6, with its pinion 7, may be mounted in a bracket 8, which is shown attached to one of the cross-ties. Tangential to the pinion 7 and extend- 80 ing in opposite directions therefrom and parallel with the main-track rail is an operating-rod 9, which may be slidably mounted in brackets 10. A rack 11, consisting, preferably, of one-half as many teeth as the pinion 85 7, is formed on the side of the rod 9 in proximity to the pinion, so that movement of the rack past the pinion will impart half a revolution thereto, thereby either opening or closing the switch, according to the direction of 90 movement of the rack.

The arrangement is preferably such that when the rack moves past the pinion the crank on shaft 6 is left on a dead-center with respect to the pitman 5, so that the switch, 95 whether open or closed, thus becomes effectively locked. However, as the movement of a train along the track at this point might



possibly jar the switch out of position after having been properly set I provide positive means for automatically locking it either open or closed, as the case may be. To accomplish this, I provide a member 12, consisting substantially of an oblong plate 13, provided with an arm or extension 14. The arm 14 is connected to the switch-bar 4, so that any movement of said switch-bar will impart a corresponding movement to the member 12. Said member 12 is also provided with a slot to accommodate the shaft 6, which shaft and slot serves the purpose of guiding the member or keeping it from having any lateral movement. The plate 13 is provided with two slots or notches 15 and 16, cut in its opposite edges, which are alternately engaged by the opposite internal edges or end walls 17 of a slotted plate 18, carried under the operating-rod 9 and through which said plate projects. It will be seen by reference to the drawings that any movement of the operating-rod 9 in the direction of the arrow will first disengage the plate 18 from the slot 15. Further movement of the rod will impart half a revolution to the pinion 7, thereby closing the switch and shifting the plate 13 until the slot 16 is in line with the plate 18. The balance of the movement of the rod will throw the plate 18 into the slot 16, securely locking it. On opposite throw of the operating-rod 9 the reverse actions of unlocking, opening the switch, and locking occur. Without departing from the scope of my invention I may employ in place of the rack 11 and pinion 7 other constructions for shifting the switch-points—for example, a construction such as represented in Fig. 5 and which I will now describe. Instead of the pinion 7 a disk 20 is shown on the shaft 6, having two radial arms 21 and 22, adapted to be engaged alternately by an antifriction-roller 19 on the rod 9 and disposed at such a distance apart as to impart the proper amount of motion to a crank-arm 23, to the outer end of which is connected the pitman 5, which in turn is connected to the bar 4, as previously described. A plate 24, substantially like the plate 13, is similarly located and serves a like purpose.

The operating-rod 9 extends a considerable distance—say, one hundred feet or more—each side of the rack, and its opposite ends are connected to switch-stands or operating mechanisms which are similar in construction and operation, wherefore a description of one will suffice for both. Each end of said rod 9 is connected to a lever 25, rigidly affixed to a vertically-disposed rock-shaft 26, journaled in a bracket 27, preferably secured to the end of a cross-tie, which may be made somewhat longer than usual for this purpose. Said lever is preferably connected to the rod by a suitable pin-and-slot or sliding-pivot connection to

permit travel or reciprocation of the bar in a straight line when it is shifted by turning of the lever. Upon said rock-shaft 26 above the lever 25 are rigidly affixed two arms 28 and 29, one a little above the other and disposed, preferably, at equal angles each side of the lever 25 and at such an angle from each other that when one is thrown back to its farthest distance from the track the other will remain on the opposite side of a line running at right angles from the main track through the axis of the rock-shaft 26. The outer ends of arms 28 29 carry antifriction-rollers, with which an actuating-bar longitudinally disposed along the side of the engine or train contacts to turn the rock-shaft.

The actuating-bar 30 is horizontal, but set at a slight angle to the track, with its forward end nearer thereto, so that as the train advances said bar will shove the innermost arm outward by contact with its roller, thereby operating the switch through the mechanism hereinbefore described. It will now be seen that the reason for placing the arm 28 below the arm 29 is so that either one or the other may as it swings inward clear the bar 30. The bar is suitably attached to the outside of the engine and preferably extends along the entire length of the engine and tender, while for a very fast train it may also extend along the foremost car. As shown in Fig. 6, said bar 30 is supported upon a series of pivoted rods 31, attached at convenient points on the engine. Beneath the rods 31 and running parallel with the bar 30 is a shaft 32, mounted in brackets 33, attached to the trucks or elsewhere upon the engine or train. Mounted upon the shaft 32 and rigidly connected thereto are arms 34, the outer ends of which support the rods 31. A lug 35 projects inwardly from one of the arms 34 and is connected to a toggle-joint 36, which is operated by a rod 37, extending up into the cab. By depressing the rod 37 the bar 30 will be raised along its entire length, while by lifting the rod the bar will be lowered accordingly. It will be understood, of course, that said actuating-bar has a counterpart at the opposite side of the engine, so that the switch may be operated in whichever direction the train is running. In Fig. 7 a different form of actuating device is illustrated. Instead of supporting the bar 30 upon rods, as described, triangular pieces 38 are shown mounted in brackets 39, which may be attached to the engine in the same manner as the brackets 33. Either upon the engine or upon the brackets 39 I provide lugs or shoulders 40, against which the inner angles of the triangular pieces abut. At the inner angles of said triangular pieces rods 41 extend along the entire series of said pieces, which, together with the bar 30, form a rigid framework. In this construction the toggle-joint 36 is attached directly to



the lower one of the rods 41 and is operated in the same manner by the rod 37. Balancing-weights 42 may also be provided at convenient points between the pieces 38 in order to facilitate the operation of the rod 30. I do not limit myself, however, to any precise construction of actuating mechanism, whereby the rod 30 can be raised or lowered to the proper position.

Referring to Fig. 1, suppose, for instance, that a train is passing along the main track from right to left. The switch being open, as shown, would likely derail the train, especially if it should be a fast one. To obviate this, the engineer has merely to depress the rod 37, thereby raising the rod 30. This being done, as soon as the train reaches the point marked A the rod 30 will contact with the roller of arm 29 of the right-hand switch-stand, and as the train advances will gradually shove said arm 29 around to the position indicated by dotted lines, thus closing and locking the switch, as previously described. Should the train be moving in the opposite direction, it is evident that it would be side-tracked, the switch being set as shown; but if the rod 30 be raised, as in the former instance, as soon as the train reaches the point marked B said rod 30 will throw the arm 29 of the left-hand switch-stand back in the same manner as before, thereby closing the switch. Should the switch be closed and it be desired to side track a train, all that is necessary is for the engineer to lower the rod 30 by raising the rod 37. Then as soon as the train reaches the point A or B, according as to whether it is moving toward the left or right, the rod 30 will operate upon the arm 28 of the nearer switch-stand, throwing it back and opening the switch.

In case of a through train the engineer may have the lever in his cab set all the time for "main track," and should an open switch be encountered at any time the engine will close it before reaching it and pass on without danger even though the engineer be inattentive and the train running at high speed, since the actuating-bar at the side of the engine by reason of its length and inclination will contact with the roller without sudden impact and properly turn the rock-shaft to operate the switch.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination with a railway-switch, operating mechanism for closing and locking the same, and means for actuating said mechanism both directly and reversely by the moving train at the same place in advance of the switch.

2. In combination with a railway-switch, means for opening as well as closing said switch and locking the same from the moving train at the option of the engineer at places on both or opposite sides of the switch.

3. In combination with a railway-switch, operating mechanism for opening or closing the switch and locking the same in position, and means for actuating said mechanism by the moving train in advance of the switch, to unlock from either position, shift to the other and lock in the latter position, at the option of the engineer.

4. In an automatic railway-switch, the combination with switch-operating mechanism, of a switch-stand located beside the track at a distance from the switch having two roller-carrying devices arranged one above another and connected to said mechanism, one or the other of which devices, according to whether said mechanism is to be operated directly or reversely, is adapted to be engaged by a horizontally-disposed bar inclined with respect to the track carried by the advancing train, to shift the device engaged outwardly.

5. In an automatic railway-switch, the combination with switch-operating mechanism, of an operating-rod therefor extending along the track a distance from the switch, and a switch-stand located beside the track comprising a rock-shaft having a lever connected to said rod and an arm provided with a roller with which an inclined bar carried by the advancing engine or train is adapted to contact to turn the rock-shaft and thereby operate the switch.

6. In an automatic railway-switch, the combination with switch-operating mechanism, of an operating-rod therefor extending along the track a considerable distance on opposite sides of the switch, and switch-stands located beside the track at the opposite ends of said rod, the latter each comprising a rock-shaft having a lever connected to said rod and a roller-carrying arm adapted to be contacted by an inclined bar carried by the advancing engine or train to turn the rock-shaft and operate the switch.

7. In an automatic railway-switch, the combination with switch-operating mechanism for opening and closing the switch, of a switch-stand located beside the track in advance of the switch, the same comprising a rock-shaft suitably connected with said mechanism and having two arms disposed at an angle and at a distance from each other on the rock-shaft, one or the other of which is adapted to be engaged by a part carried by the advancing engine or train according to whether the switch is to be opened or closed.

8. In an automatic railway-switch, the combination with switch-operating mechanism for opening and closing the switch, of a switch-stand located beside the track at a distance from the switch, the same comprising a vertically-disposed rock-shaft connected to said mechanism and having two roller-carrying arms disposed one above another and at an angle, one or the other of said arms being adapted to be turned by contact with its roller



by an inclined bar carried by the advancing engine or train, the arrangement being such that when an arm is thrown by said bar farthest away from the track the other will stand at the side of a line running at right angles from the track through the axis of said rock-shaft in position for engagement by said bar when moved to a different altitude.

9. In an automatic railway-switch, the combination with the main rails, and the switch-points, of a switch-bar connecting said switch-points, a crank-shaft, a pitman connecting said crank-shaft with the switch-bar, and means for operating said crank-shaft by the advancing train from either side of the switch.

10. In an automatic railway-switch, the combination with the main rails, and the switch-points, of a switch-bar connecting said switch-points, a crank-shaft, a pitman connecting the switch-bar with said crank-shaft, a longitudinally-movable operating-rod extending along the track adapted to be shifted by the advancing train, and means for turning said crank-shaft by movement of said operating-rod.

11. In an automatic railway-switch, the combination with the main rails and switch-points, of a switch-bar connecting the switch-points, a rotatory member eccentrically connected to said switch-bar, a longitudinally-movable operating-rod beside said member extending along the track a distance from the switch, means adapted to be actuated by the advancing train for moving said rod in one direction or the other according to whether the switch is to be opened or closed, and means for rotatably engaging said member by said rod on movement of the latter to operate the switch.

12. In an automatic railway-switch, the combination with the main rails and switch-points, of a switch-bar connecting the switch-points, a rotatory member eccentrically connected to said switch-bar, a longitudinally-movable operating-rod beside said member extending along the track a distance from the switch, means adapted to be actuated by the advancing train for moving said rod in one direction or the other according to whether the switch is to be opened or closed, and means for rotatably engaging said member by said rod on movement of the latter to operate the switch together with automatic means for positively locking the switch in open or closed position.

13. In an automatic railway-switch, the combination with the main rails and switch-points, of a switch-bar connecting the switch-points, a stationary pinion eccentrically connected to said switch-bar, a longitudinally-movable rod extending along the track having a rack for engaging said pinion and turning the same to operate the switch, and means located at a distance from the switch adapted to be actuated by the advancing train for moving said rod.

14. In an automatic railway-switch, the com-

bination with the main rails and switch-points, of a switch-bar connecting the switch-points, a rotatory member eccentrically connected to said switch-bar, a longitudinally-movable rod extending along the track and having means for engaging said member to turn the same, and a switch-stand located beside the track at a distance from the switch comprising a vertically-disposed rock-shaft having a lever connected to said rod and having two roller-carrying arms disposed one above the other and at an angle, one or the other of which is adapted to be moved to operate the switch by an inclined actuating-bar carried by the advancing engine or train, the arrangement being such that when one arm is thrown back from the track the other is moved to a position beside a line running at right angles from the track through the axis of said rock-shaft in position for contact by said actuating-bar when at a different altitude.

15. In a railway-switch, the combination with the main rails and switch-points, of a switch-bar connecting said switch-points, a rotatory member eccentrically connected to said switch-bar, a longitudinally-movable rod adapted to rotatably engage said member, and means for shifting said rod.

16. In a railway-switch, the combination with the main rails and switch-points, of a switch-bar connecting said switch-points, a rotatory member eccentrically connected to said switch-bar, a longitudinally-movable rod adapted to rotatably engage said member, and means for shifting said rod together with means for automatically locking and unlocking the switch at the final and initial movements respectively of said rod.

17. In a railway-switch, the combination with the main rails and switch-points, of a switch-bar connecting said switch-points, a rotatory member eccentrically connected to said switch-bar, a longitudinally-movable rod having means for engaging and turning said member, a plate connected to the switch-bar and extending through a slot in said rod, said plate having notches at opposite sides separated by a distance substantially equal to the movement of the switch-bar, said notches being alternately engaged by the opposite end walls of said slot to lock the switch in open and closed position, according to the position of said rod, and means for shifting said rod.

18. In a railway-switch, the combination with the main rails and switch-points, of a switch-bar connecting said switch-points, a suitably-mounted pinion eccentrically connected by a pitman to the switch-bar, and a longitudinally-movable rod having a rack for engaging and turning said pinion, said rack being adapted to turn the pinion a semi-rotation to shift the switch and to leave the pitman on a dead-center with respect to the crank, and means for shifting said rod.

19. In combination with a switch-operating



mechanism, including a switch-stand located  
beside the track at a distance from the switch,  
said switch-stand comprising a vertically-dis-  
posed rock-shaft connected to said mechan-  
5 ism and having two roller-carrying arms dis-  
posed at an angle and one above another, an  
actuating-bar for contact with said roller longi-  
tudinally supported at the side of the engine  
or train and inclined with respect to the track  
10 with its front end nearer the center of the

track and means operated from the engine or  
train for raising and lowering said actuating-  
bar to contact with the roller of either arm.

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

WILLIAM C. SAYRS.

Witnesses:

H. G. CARTWRIGHT,  
SARA KIRK.