(No Model.) 6 Sheets—Sheet 1.

E. M. ROBINSON.

RAILWAY SWITCH STAND.

No. 525,159. Patented Aug. 28, 1894.

Fig 1.

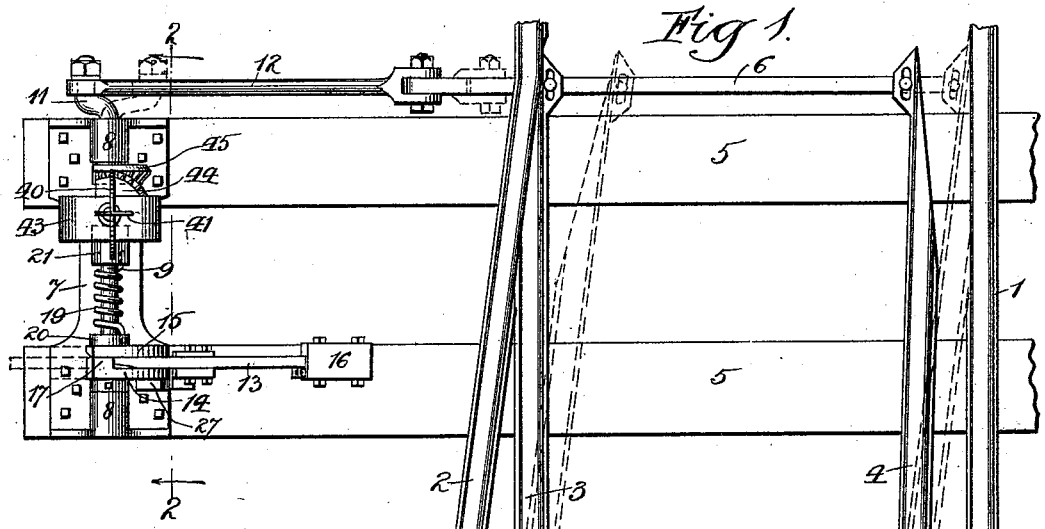
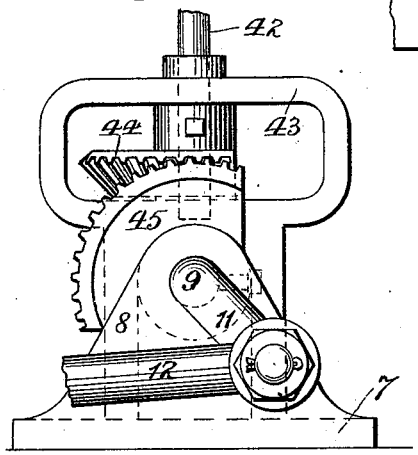


Fig 3.



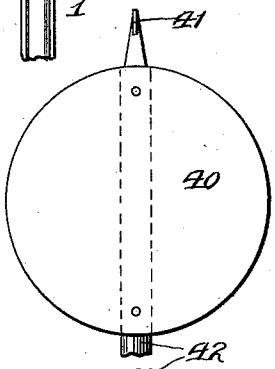
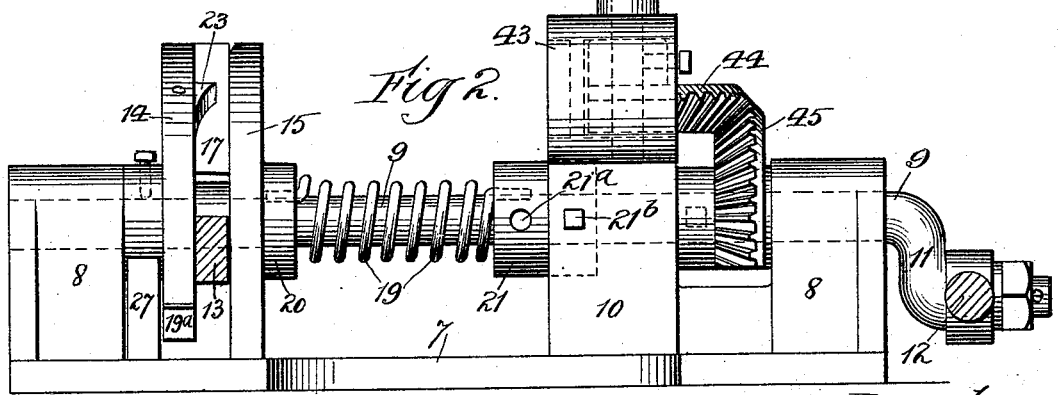


Fig 2.



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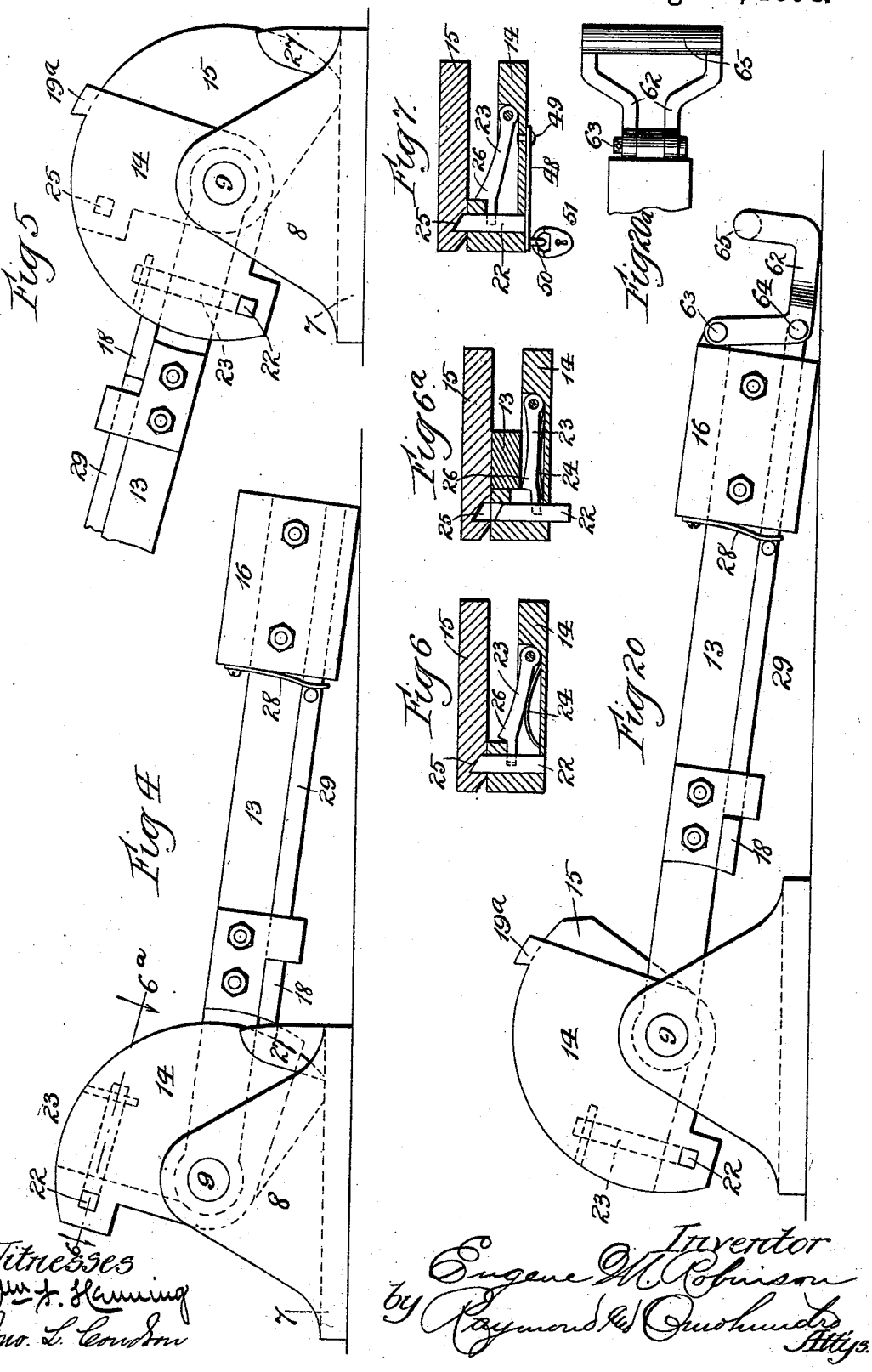
(No Model.)

6 Sheets—Sheet 2.

E. M. ROBINSON.

RAILWAY SWITCH STAND.

No. 525,159. Patented Aug. 28, 1894.



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E. M. ROBINSON.

RAILWAY SWITCH STAND.

No. 525,159. Patented Aug. 28, 1894.

Fig 8.

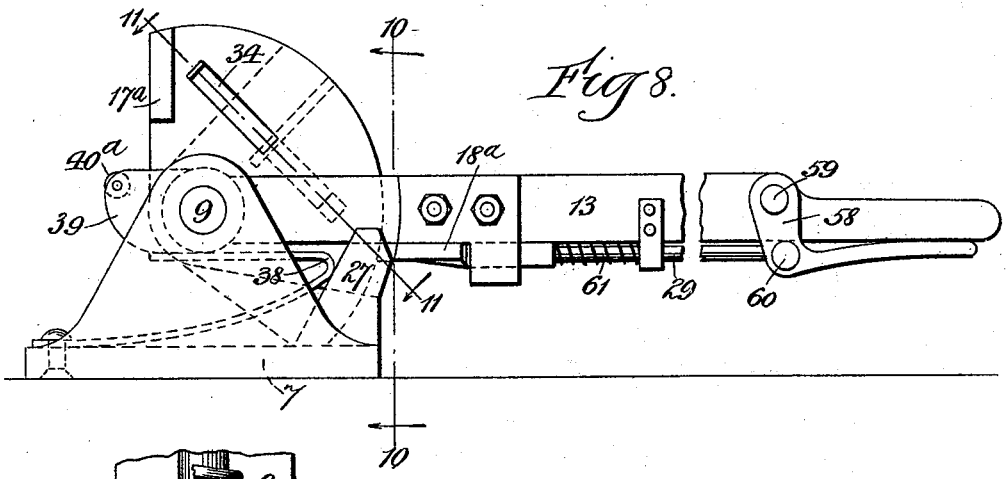


Fig 9.

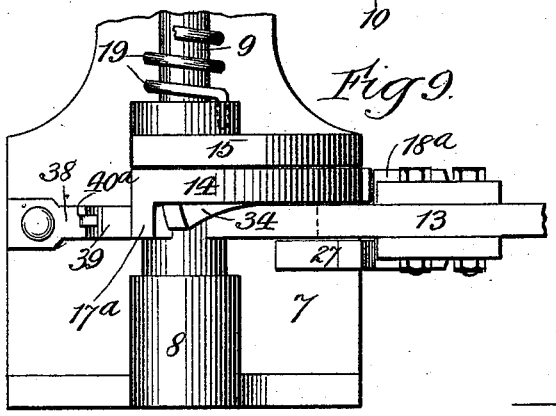


Fig 10

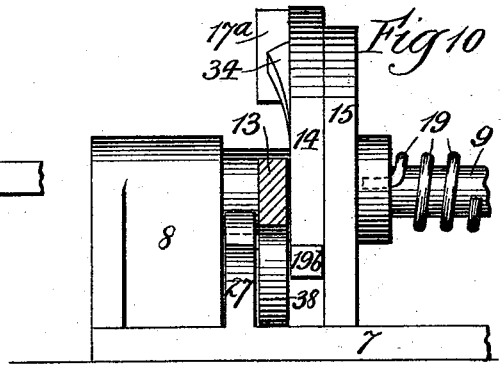


Fig 11.

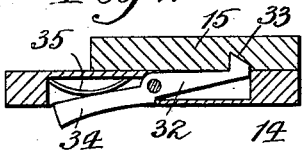


Fig 12.

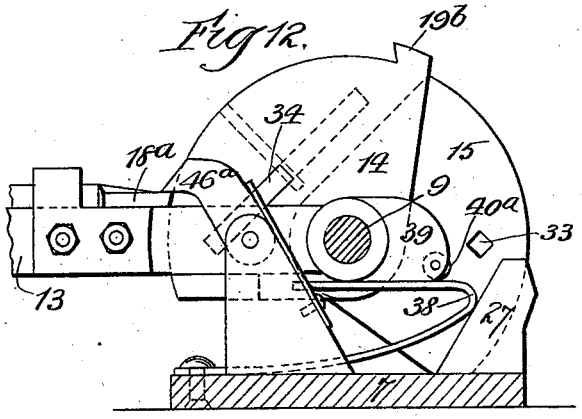
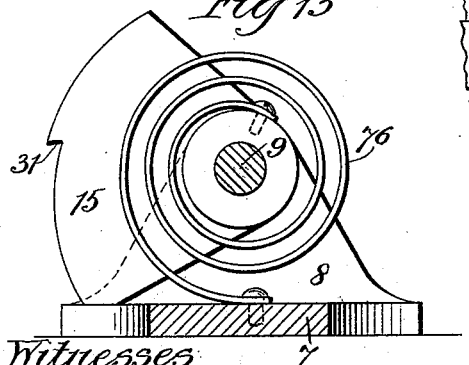


Fig 13



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(No Model.) 6 Sheets—Sheet 4.

E. M. ROBINSON.

RAILWAY SWITCH STAND.

No. 525,159. Patented Aug. 28, 1894.

Fig 14

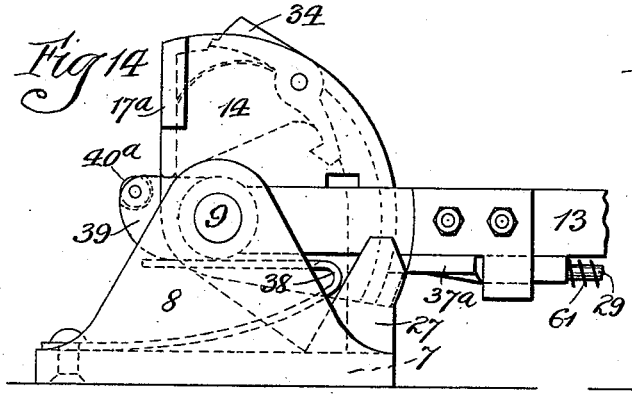


Fig 15.

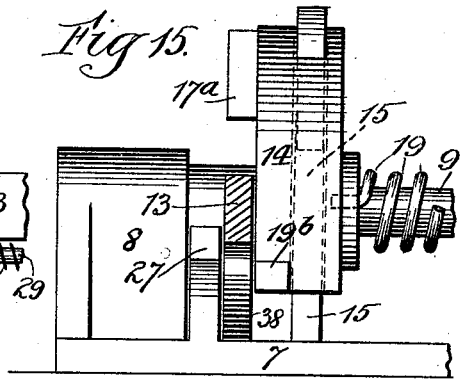


Fig 16

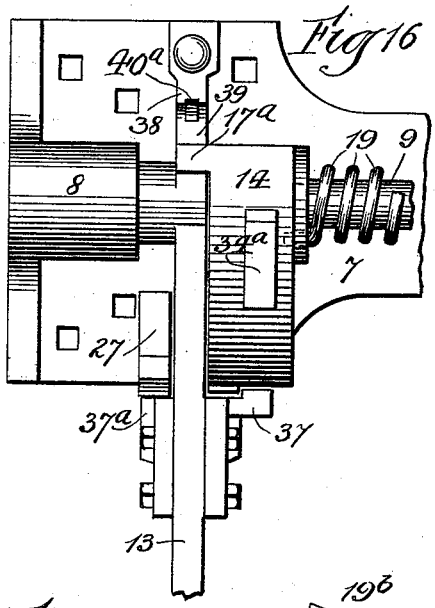


Fig 17.

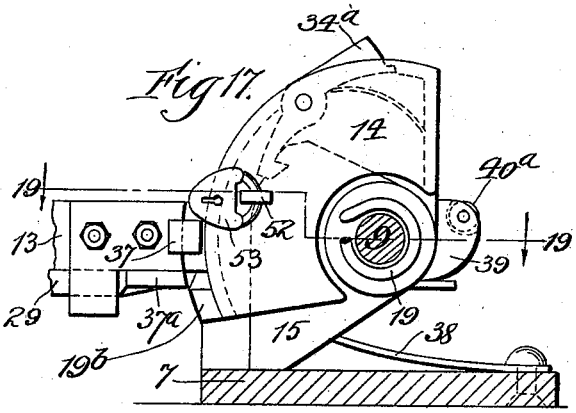


Fig 18

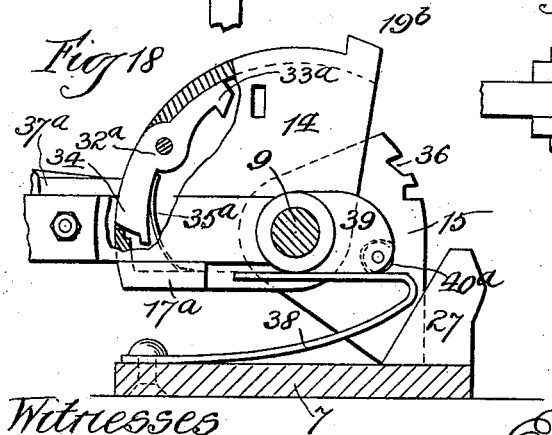
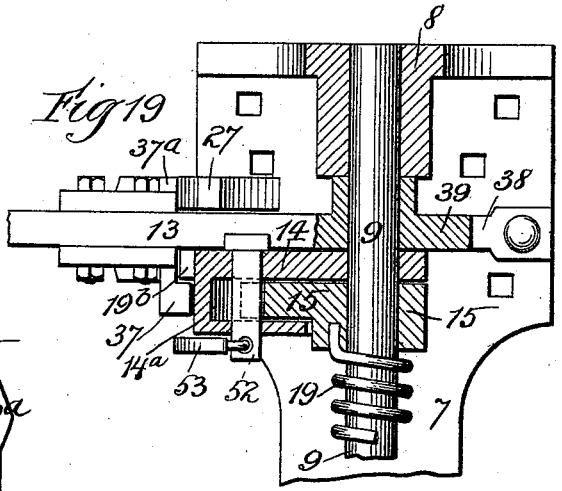


Fig 19



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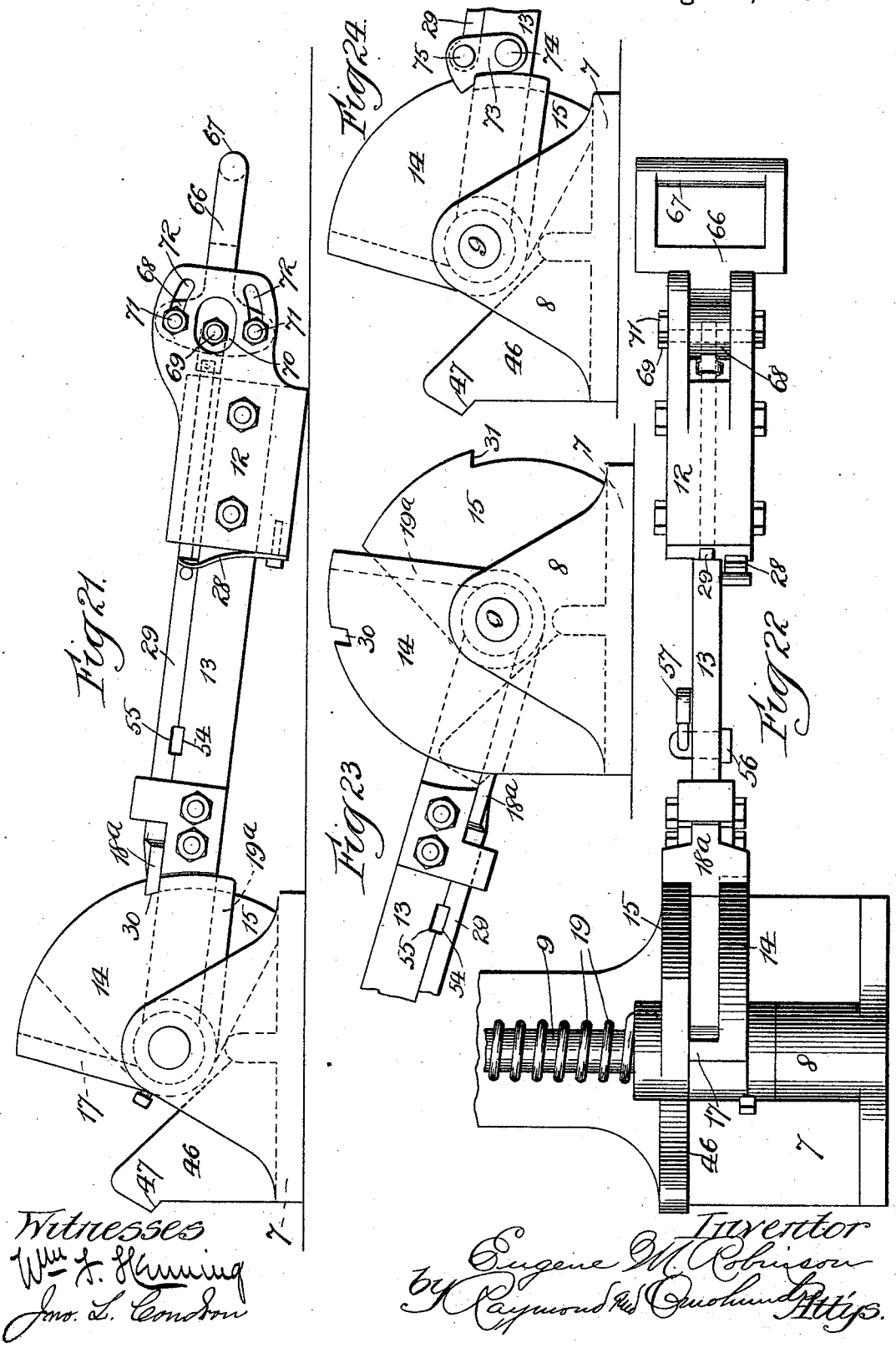
(No Model.) 6 Sheets—Sheet 5.

E. M. ROBINSON.

RAILWAY SWITCH STAND.

No. 525,159. Patented Aug. 28, 1894.



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(No Model.) 6 Sheets—Sheet 6.

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RAILWAY SWITCH STAND.

No. 525,159. Patented Aug. 28, 1894.

Fig 25.

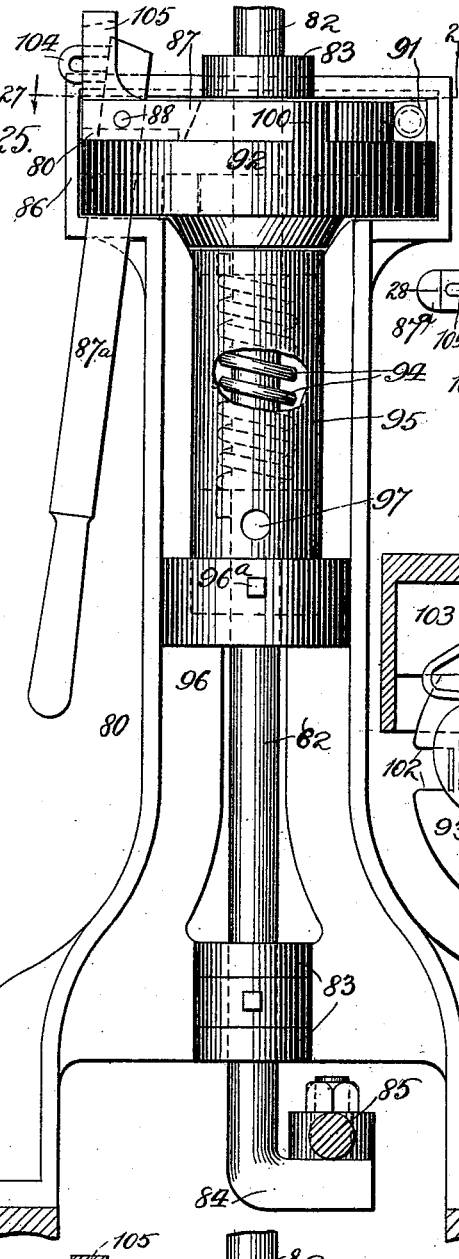


Fig 26.

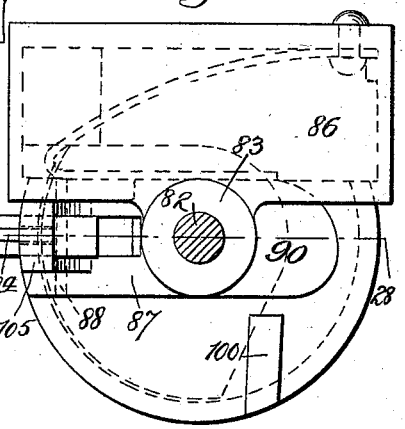


Fig 27.

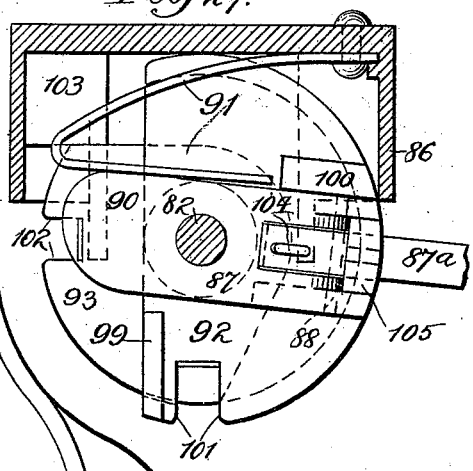
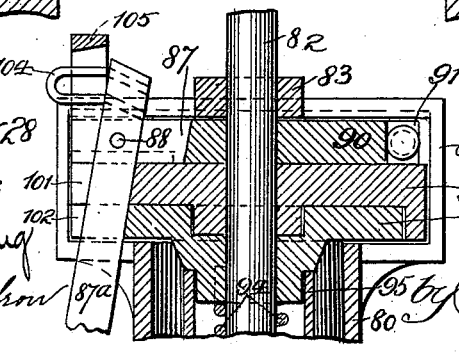


Fig 28



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UNITED STATES PATENT OFFICE.

EUGENE M. ROBINSON, OF CHICAGO, ILLINOIS.

RAILWAY-SWITCH STAND.

SPECIFICATION forming part of Letters Patent No. 525,159, dated August 28, 1894.

Application filed February 3, 1894. Serial No. 499,017. (No model.)

To all whom it may concern:

Be it known that I, EUGENE M. ROBINSON, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Railway-Switch Stands, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to appliances for setting or moving the switch-rails of railway-tracks, my invention being, in its more general character, particularly designed for use with split-switches, but certain features of my invention being applicable to various forms or types of switches.

Furthermore, the leading features of my invention are applicable both to horizontal and vertical (or to "low" and "high") switch-stands, while certain parts are particularly adapted for low or horizontal stands, and still other parts to high or vertical stands.

Among the primary objects of my invention is included that of producing a switch-stand in which an initial movement of the operating or throwing lever shall be capable of occurrence without any resistance from or effect upon the switch-rails or their connections, such arrangement being applicable to both horizontal and vertical stands, and being especially advantageous with horizontal stands, since it peculiarly lessens the labor incident to operating said stands and also increases both the speed and certainty of their action.

A further primary object of my invention is to produce a switch-stand in which the throwing-levers shall be capable of initial movement independent of the switch-rails and their connections until the lever has reached a predetermined point in its permitted movement; the ensuing movement of the lever serving to actuate the switch-rails, and this arrangement being especially advantageous in horizontal stands, since it enables the weight of the lever to be utilized for effecting the movement of the switch-rails.

A still further primary object of my invention is to produce a switch-stand in which a torsionally acting spring shall operate automatically to return the switch-rails to their proper position, after the switch has been "trailed" by a railway vehicle or train; such return-action of the spring being either independent of the throwing-lever or otherwise, as preferred, but serving to absolutely prevent all missetting of the switch, as the result of "trailing" or, in other words, of running over the switch in a direction from the pivots of the switch-rails to and beyond the free ends of such rails.

My invention also includes, among its primary objects, the production of improved attachments for regulating the tension of the torsion-spring, for effecting the engagements of the lever with and its disengagement from the rock-shaft, as required during the operations of the switch-stand. Also the production of improved attachments for actuating the catches employed for the purposes just mentioned; the production of improved attachments for locking the switch; and the production of improved attachments for transmitting the movements of the rock-shaft to the target-attachments.

A further primary object of my invention is to produce a switch-stand in which all of the devices and attachments concerned in the essential operations of the stand shall form parts of the stand itself; thus dispensing with the necessity of nice adjustments by incompetent persons after the stand has been put in place or during its installation.

The above-mentioned objects, and also such others as may appear from the ensuing description, are attained by the devices illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of a split-switch having a horizontal or low switch-stand embodying my invention applied thereto; the switch being set for the main-line. Fig. 2 is a view, principally in side elevation, of the stand shown in Fig. 1, and the direction of view being that indicated by the arrows applied to the section-line. Fig. 3 is an end elevation of the switch-stand, the direction of view being toward the upper end of the crank-shaft as shown in Fig. 1. Fig. 4 is an end elevation of the switch-stand, the direction of view being toward the lower end of the crank-shaft as shown in Fig. 1, and the stand being set to hold the switch open for the main-line

Fig. 5 is a view, in end elevation, of the switch-stand set to hold the switch closed for the main-line; the direction of view being similar to that of Fig. 4. Fig. 6 is a detail sectional view, taken on the line 6—6ª of Fig. 4 and showing the segment-connecting bolt in operative position. Fig. 6ª is also a detail sectional view, taken on the line 6—6ª of Fig. 4, but showing the segment-connecting bolt in idle position. Fig. 7 is a detail sectional view, similar to Figs. 6 and 6ª, but showing a locking-attachment for the switch-stand applied to the segment-connecting bolt. Fig. 8 is an end elevation of the switch-stand, showing modifications of the catch-attachments, segment-connecting devices, and other features. Fig. 9 is a plan view of the structure shown in Fig. 8. Fig. 10 is an inner side elevation of the structure shown in Fig. 9; the view being also partly in vertical section on the line 10—10 of Fig. 8. Fig. 11 is a detail sectional view, taken on the line 11—11 of Fig. 8. Fig. 12 is a view similar to Fig. 8, but showing the parts in opposite positions from those in Fig. 8. Fig. 13 is a transverse vertical section of the rock-shaft and certain immediate attachments thereof, and showing a modified form of returning-spring. Fig. 14 is an end elevation of a switch-stand provided with certain further modifications of construction and arrangement, relating more particularly to the segment connecting and disconnecting attachments. Fig. 15 is an inner side elevation of the structure shown in Fig. 14. Fig. 16 is a plan view of the same. Fig. 17 is an end elevation of the same, viewed toward the opposite end from that exposed in Fig. 14, and also showing a locking-attachment applied to the stand. Fig. 18 is an end elevation of the switch-stand, viewed in the same direction as in Fig. 14, but the position of the parts being opposite from their positions in Fig. 14. Fig. 19 is a horizontal section, taken on the line 19—19 of Fig. 17; the arrows in the latter indicating the direction of view. Fig. 20 is an end elevation of a switch-stand provided with certain further modifications of the segment catching and releasing attachment. Fig. 20ª is a plan view of the outer end of the throwing-lever and its handle-attachment. Fig. 21 is an end elevation of a switch-stand provided with further modifications in the arrangement of the throwing-lever, the segment catching and releasing attachments, and of certain other parts. Fig. 22 is a plan view of the same. Fig. 23 is an end elevation of the same, showing the parts in the opposite positions from those occupied in Fig. 21. Fig. 24 is an end elevation of the switch-stand provided with a modified form of segment catching and releasing attachment. Fig. 25 is a side elevation of a vertical or "high" switch-stand embodying my present invention. Fig. 26 is a plan view of the same. Fig. 27 is a horizontal section of the same, taken on the line 27—27 of Fig. 25. Fig. 28 is a transverse vertical section, of the upper part of the vertical switch-stand, taken on the line 28—28 of Fig. 26.

In Fig. 1 of the drawings 1 designates the main-line rails of a railway, 2 the stationary rails of a siding, branch-line, spur, or similar track leading into the main-line in the usual manner.

3 and 4 designate the movable rails or "points" of a split-switch, said rails being each pivoted at one end and adapted to be moved laterally for opening and closing the switch in the usual manner. The stationary rails 1 and 2 and the switch-rails 3 and 4 are supported upon ties or sleepers 5 of any suitable kind, and the two switch-rails 3 and 4 are connected together at or near their free ends, as at 6, or in any suitable manner, so as to always move in unison. In fact, it is to be understood that the switch is shown in the drawing merely for the purposes of illustration and that its individual construction has no particular bearing upon my present invention.

Upon the corresponding extended ends of two of the ties or sleepers 5 is secured a horizontal base-plate 7, of any suitable form, and at the ends of which rise two bearings 8 for a horizontal rock-shaft 9; a third bearing 10 being also carried by the base 7, being located intermediately of the bearings 8, and serving to support certain of the target-devices as hereinafter described. This rock-shaft 9 is shown as formed at one end with a crank-section 11 to which is wristed the outer end of a link, 12, the latter being pivotally connected to the tie-rod 6, and at its opposite end-portion said rock-shaft carries a throwing-arm or lever 13, the inner end of which loosely surrounds the rock-shaft at a point near to the corresponding bearing 8 and between the latter and the intermediate bearing 10. Referring more particularly to Figs. 1, 2 and 3, the throwing-lever 13 is shown as interposed between two segmental plates 14 and 15, the former of which is keyed or bolted to the rock-shaft, so as move therewith, and the latter of which loosely embraces said shaft. At its outer or free end, the throwing-lever 13 carries a weight 16, to increase the power developed by the movements of the lever; said lever being arranged to extend either horizontally toward the tracks or horizontally outward away from said tracks, and also to be moved upward and over from either of said horizontal positions to the other.

In the arrangement illustrated in the figures of the drawings above referred to, the intention is to enable the throwing-lever 13 to be lifted upward and outward away from the rails, independently of the rock-shaft, until the lever has nearly reached the vertical; the lever to then automatically engage the segment 14 and, after having slightly passed the vertical, dropping by gravity and also carrying the segment 14 with it so as to oscillate the rock-shaft 9. These results are

attained by a lug 17 projecting toward the segmental-plate 15 and carried by that side of the segment-plate 14 which is proximate to the plate 15; said lug thus extending across the path of outward and downward movement of the lever 13. When the lever 13 is at its inward horizontal position, as shown in Fig. 1, the segment-plate 14 occupies its innermost position and the lug 17 is at an angle inward from the vertical over the center of the rock-shaft 9. Just before the lever 13 is carried outward beyond its vertical position, it engages the lug 17 and carries the segment-plate 14 with it, by gravity, to its outer horizontal position; the rock-shaft 9 being correspondingly oscillated and the switch-rails 3 and 4 being shifted from the position shown in solid lines in Fig. 1 to that shown in dotted lines in said figure. The segment-plate 15, being loose on the shaft 9 and not being engaged by the lever 13 or segment 14, does not move from its innermost position, during this outward movement of the lever 13. If now, (the lever 13 being in its outermost position, and the switch being set for the siding) the operator desires to reset the switch for the main-line, he lifts the lever 13 upward and moves it inward toward the tracks until it stands at an inward inclination from the perpendicular over the center of the rock-shaft 9; the rock-shaft and its segment-plates remaining stationary during this part of the movement of the lever 13. When the lever 13 has reached the described inwardly inclined position, a catch 18 carried by said lever engages a lug 19^a at the opposite end of the periphery of the segment-plate 14 (this lug standing inward from the perpendicular when the segment 14 is at its outermost position), and the dropping by gravity of the lever 13 to its inward horizontal position carries the segment 14 with the lever and oscillates rock-shaft 9 so as to shift the switch-rails back to position for the main-line. The intention, also, in the mechanism now being described, is when the lever 13 is at its innermost horizontal position, with the switch set for the main-line, (this being the normal position of the switch) that a railway train or vehicle may safely run from the siding upon the main-line, trailing the switch, and that the switch shall automatically reset itself for the main-line after the vehicle or train has passed; thus preventing a vehicle or train from running upon the siding from the opposite direction. For this purpose I provide a spring which operates to automatically oscillate the rock-shaft 9 in such manner as to return the switch-rails to closed position for the main-line after the switch has been trailed as above explained. This spring may be of various forms, either helical as shown at 19, or spiral as shown at 76, or otherwise, so long as it exerts such a torsional action upon the rock-shaft as will oscillate the shaft in such manner as to return the switch-rails to a normal position, after the switch has been trailed.

As shown in Figs. 1, 2, 3, 4, &c., the spring 19 surrounds the rock-shaft 9 between the intermediate bearing 10 and the segment-plate 15. One end of the spring is shown as secured to a hub 20 of the loose segment 15 and the opposite end of the spring is shown as secured to a sleeve 21; said sleeve being arranged to be rotated more or less upon the rock-shaft 9 (by a rod inserted in a hole 21^a in the sleeve, or in other suitable manner) so as to increase or decrease the tension of the spring. The adjusting-sleeve 21 is shown as working in the side of the intermediate bearing 10 and a set-bolt is shown as serving to hold the sleeve in its desired position of adjustment. Obviously any form of tension-controller may be used, or such device may be dispensed with, if so preferred; the end of the spring being secured directly to the bearing 10. It will thus be seen that when a railway vehicle or train trails the switch (throwing the switch-rails from the position shown in solid lines in Fig. 1 to that shown in dotted lines therein) the rock-shaft 9 will be oscillated so as to throw the segment from its inner to its outer position. Owing to the presence and action of a connecting-bolt carried by the segment-plate 14 this plate moves outward with the segment 15 (this being necessary because, the segment 15 being loose on shaft 9, no tension would be imparted to spring 19 by the described oscillations of the rock-shaft 9). This bolt may be of various forms and have various attachments for insuring its operation by the lever 13. However, the bolt normally extends through the two segment-plates laterally, and serves to carry the segment-plate 15 at times with the segment-plate 14. This bolt is further so arranged as to be moved longitudinally out of engagement with the segment-plate 15 by the outward movement of the lever 13 previous to the contact of said lever with the lug 17, as above described.

In Figs. 1, 2, 3, 6 and 6^a the connecting-bolt 22 is shown connected to an actuating-arm or dog 23 which is set in a recess in the segment 14; said arm or dog being pivoted at one end in said recess and entering at its opposite end into a recess in the bolt 22. A suitable spring, such as 24, operates to press the arm or dog 23 outwardly so as to throw one end of the bolt 22 into a recess 25 in the proximate side of the segment 15. The outer side of the arm or dog 23 is extended outwardly or laterally, as at 26, so as to normally protrude beyond the inner surface of the segment 14 and consequently so as to be engaged by the lever 13 and forced back into its recess; this movement drawing the bolt out of engagement with the recess 25 in the segment 15, and permitting the lever 13 to reach its outward position accompanied only by the segment 14.

With the lever 13 in its outermost position and engaging the lug 17 of the segment 14 (the switch being then set for the siding) a railway train or vehicle running upon the

main-line, and passing over the switch in such direction as to trail the latter, will, as its wheels shift the switch-rails, oscillate the rock-shaft 9 in such manner as to throw the segment 14 and lever 13 to their innermost position, thus setting the switch for the main-line. In the arrangement now being described, the lever 13 is not raised from its inner horizontal position when the switch is set for the main-line and is trailed by a vehicle or train passing from the siding to the main-line. This is due to the presence of a cam-lug 27 which is located between the segment-plate 14 and the adjacent bearing 8, and the face of which projects beyond the periphery of the segment 14, toward the tracks. The catch 18, before described as carried by the lever 13, is arranged to move longitudinally of said lever, and is normally held inward by a suitable spring, such for example as the spring 28 shown as acting against a stud on the bar 29 of the catch. Thus when the lever 13 is thrown, either automatically or by hand, to its inner horizontal position, the catch 18 is pushed, by the cam-lug 27, out of engagement with the lug 19^a of the segment 14, so that the lever 13, being loose upon the rock-shaft 9, and wholly disengaged from both segments 14 and 15 is not moved by oscillations of the rock-shaft due to trailing of the switch. With the switch set in its normal position (that is open to the main-line) the connecting-bolt 22 is in its operative position, and oscillation of crank-shaft 9, due to trailing of the switch, causes both segments to rock outward with the shaft; the spring acting upon the segment 14 and automatically returning the parts to their normal positions after the trailing train or vehicle has passed the switch. I have thus particularly described both the construction and operations of the form of switch-stand shown in Figs. 1, 2 and 3 because it embodies the essential principles of my invention, and hence the description of the modifications, which I have also shown as demonstrating the varied adaptability of my invention, will be rendered more clear by comparison with the above description. For example, in Figs. 21 to 24 of the drawings, I have shown an arrangement in which, when the lever 13 is in its innermost horizontal position and the switch is set for the main-line, the lever 13 is not disconnected from the segments 14 and 15 and consequently when the switch is trailed by a vehicle or train running from the siding to and upon the main-line, the oscillation of the rock-shaft 9 will cause the lever 13 to be raised to its position obliquely inward from the vertical; the lever automatically dropping back to its innermost horizontal position, under the combined action of its weight 16 and the rock-shaft spring, and thus resetting the switch for the main-line. This lifting of the lever 13 causes the subsequent dropping of said bar to insure the resetting of the switch in normal position and such lifting-movement is due to the fact that while the lever is in its innermost horizontal position, the catch 18^a of the lever is held by the spring 28 in engagement with a notch 30 of the segment 14 which is tight upon the shaft. The catch 18^a corresponds functionally with the catch 18 but is mounted upon the opposite side of lever 13, so as to remain in engagement with notch 30 as described. In order that the two segments 14 and 15 shall move outwardly together, when the rock-shaft is oscillated by the described trailing of the switch (so as subsequently to enable the returning-spring to reset the switch) a shoulder 31 is formed upon the periphery of the loose segment 15 at such point that when the lever 13 is at its innermost position the catch 18^a shall be in engagement with the shoulder 31 as well as with the notch 30; the catch 18^a being of sufficient width for this purpose. As the shoulder 31 faces toward the tracks, it is obvious that the catch 18^a will compel the two segments to move both outwardly and inwardly in unison; the outward movement being against the tension of the returning-spring, and the inward movement being with and produced or assisted by said spring-tension.

In the structure now being described, if it is desired to voluntarily set the switch open for the siding (the lever 13 being, of course, in its innermost horizontal position) the operator first draws the catch 18^a out of engagement with both segments 14 and 15 and lifts the lever upwardly to an outwardly inclined position beyond the vertical; this movement, until the lever nearly reaches the vertical, being wholly independent of the rock-shaft 9 as before, and at the termination of said movement the lever comes into contact with the lug 17 on the segment 14. As the lever drops by gravity to its outer horizontal position it throws the segment 14 and rock-shaft 9 as before and sets the switch for the siding. If a vehicle or train running on the main-line now trails the switch, the rock-shaft 9 and segment 14 will be thrown to their innermost position, and the lug 17 will throw the lever 13 inward so as to reset the switch for the main-line, as previously described; the catch 18^a, however, again engaging the notch 30 and shoulder 31 (there being no cam-lug, such as 27, employed).

In the construction now being described, the lever 13 being at the outermost limit of its movement (so that the switch is set open for the siding), if it is desired to set the switch for the main-line, the operator lifts the lever 13 and moves it to a position obliquely inward beyond the perpendicular, at which moment the lever comes into contact with an inner lug 19^a of the segment 14; the continued inward and downward movement of the lever under gravity carrying the segment with the lever and so oscillating shaft 9 as to set the switch open for the main-line.

In both forms of construction thus far described the throwing-lever 13 is interposed

between the two segment-plates 14 and 15, but, if preferred, the lever may be arranged otherwise with relation to the segment-plates. For example, in Figs. 8 to 19, both inclusive, I have shown switch-stands embodying my invention in which the two segments 14 and 15 are placed at one side of the throwing-lever 13 instead of at opposite sides thereof as before; said lever being shown in all of said figures as interposed between the segment 14 and the bearing 8 which is remote from the cranked end of the rock-shaft 9, and being, of course, mounted loosely upon the rock-shaft 9.

In the construction now being described, the segment 14, next to the lever 13, is the tight segment and the segment 15, remote from the lever, is the loose segment, as before. The tight segment 14 carries lugs 17^a and 19^b, corresponding functionally with the lugs 17 and 19, 19^a previously described, but in this instance the lug 17^a protrudes from the outer side of the segment 14, so as to be struck by the lever 13 in its outward movement; the purpose of the lug 19^b being precisely that, in engaging the catch on the lever 13, of the lugs 19 and 19^a previously described.

The external position of the throwing-lever 13 relative to the segments 14 and 15 involves certain changes in the form of the connecting-bolt attachments and the lever-catch; the functions of these parts, however, remaining the same as before. By reference to Figs. 8 to 11, both inclusive, a catch-arm 32 is shown as pivoted intermediately of its ends within a recess in the inner side of the segment 14, the front end of this arm or dog being hooked to enter at times into a recess 33 in the inner side of the companion segment 15. The opposite end of the arm or dog 32 is laterally enlarged, as at 34, and is pressed outwardly by a suitable spring, such as 35, so as to protrude normally through a slot in the segment 14 and to extend into the path of movement of the lever 13. Thus it will be seen that when the lever 13 is in its innermost horizontal position, the spring-pressed dog or arm 32 retains the two segments 14 and 15 in connected condition, while, when the lever 13 is thrown outward, it will strike the dog 32 and disconnect the loose segment 15 from the tight segment 14.

In the arrangement shown in Figs. 14 to 19, both inclusive, a connecting arm or dog 32^a is shown as employed, for connecting and disconnecting the segments 14 and 15, this arm or dog being also pivoted intermediately of its ends upon the inner side of the tight segment 14, but the pivot in this instance extending horizontally instead of vertically as before. The inner end of the dog 32^a is hooked as at 33^a to engage at times with the upper one of two notches 36 on the periphery of the loose segment 15, (the lower notch being designed to receive the locking-bolt presently to be described) and the opposite end of said dog is laterally enlarged, as at 34^a, so as to protrude normally upward through an opening or slot in an overlapping flange 14^a of the loose segment 14. This enlarged end of the dog 34^a is pressed outward by a suitable spring, such as at 35^a, so that the enlarged end of the dog shall normally extend into the path of movement of a lug 37 rigid upon the lever 13. The catch 37^a performs essentially the same functions as are performed by the catches previously described and is likewise movable longitudinally of the lever 13. But in this instance the lug 37 is laterally extended so as to engage the enlarged protruding end of the dog 34^a, so as to disconnect the segments 14 and 15 from each other during the outward throw of the lever 13.

It is not essential to my invention that the throwing-lever 13 be weighted, as above described, in order to properly perform its functions, it being permissible to employ either a weight or a spring, or both, to aid the gravity-actions of the lever. For example, in Figs. 8 to 19, both inclusive, I have shown a V-shaped spring 38 as employed for this purpose—that is, for insuring the dropping of the lever 13 to either its inner or outer position after it has been brought to either of its upward positions. At its lower end, the spring 38 is shown as bolted, or it may be secured in any suitable manner to the base 7, and the upper arm of the spring is engaged by an extension 39 of the lever 13; said extension protruding oppositely from the free end of the lever and being preferably rounded so as to engage the spring 38 with as little frictional development as possible. Any desirable number of anti-friction rollers 40 may also be journaled in the free extremity of this extension 39 so as to further reduce the frictional development.

It will be obvious from the above description, that during the upward movement of the lever 13 in either direction, the spring 38 will be compressed; and that as soon as the lever has passed beyond the perpendicular, the expansion of the spring 38 will act against the extension 39 to depress the lever 13. Obviously also the spring 38 may be used either in addition to or in lieu of the weight 16 as preferred.

In Figs. 1, 2 and 3, I have shown a target attachment as applied to the switch-stand; such attachment being applicable to any of the several forms of stands above described. The disk 40 and arrow 41 are shown as carried by the upper part of a vertical rock-shaft 42 the lower end of which is journaled in a loop or yoke 43 at the upper part of the intermediate bearing 10. This target-shaft carries at its lower end-portion a horizontal mutilated gear-wheel 44 arranged to turn with the shaft 42 and meshing with a mutilated vertical gear-wheel 45 arranged to turn with the rock-shaft 9. Thus as the rock-shaft is oscillated in one direction or the other, the disk 40 or the arrow 41 is displayed. I have also shown in the drawings several forms of

locking-attachments by means of which the switch-stand can be effectually locked in either of its two extreme positions. For example, in Figs. 21 to 24, both inclusive, I have shown a lug 46 as carried by the base 7, at the side thereof remote from the tracks and also in the path of movement of the catch 18^a. At its upper outer portion, the lug 46 carries an outwardly and downwardly inclined shoulder 47 beneath which the catch 18^a engages when the lever 13 is in its outermost position; the upper surface of the shoulder 47 first throwing the catch 18^a out of engagement with the segment 14 but the lug 17 of said segment remaining in engagement with the lever 13 and thus holding the segment 14 in its outermost position. When the lever is thrown by hand to its inner position, it is necessary for the operator to first withdraw the catch 18^a out of engagement with the shoulder 47, but if the switch be trailed, the inclined form of the under surface of the shoulder 47 allows the catch to slip upward over the shoulder, so that the switch will be reset by the trailing-operation. In Fig. 12 I have shown a spring-pressed dog 46^a adapted to engage the lug 18^a in lieu of the locking device above described.

In Fig. 7, I have shown a locking-attachment consisting of a guard-plate 48 pivoted, as at 49, at one end, to the outer side of the segment 14. When in use, the opposite end of the guard-plate 48 is slipped upon a staple 50 through which is passed the hasp of a padlock such as 51. In this position, the guard-plate lies across and in contact with the connecting-bolt 22, retaining said bolt in engagement with the recess in the segment 15. Thus no independent movement of the segments 14 and 15 can occur and the switch-stand is locked. If desired, the guard-plate 48 may be riveted at one end, as at the point 49, to the segment 14 and be tempered so as to press against the outer end of the bolt 22 and thus serve in lieu of the spring 24. The free end of the spring-plate 48 would in such event, however, receive the staple 50 as before and the padlock 51 would likewise be used on occasion as previously described.

In Figs. 14, 17, 18, and 19, I have shown a headed bolt 52 as passed transversely and removably through the segments 14 and 15; a padlock 53 being applied to the unheaded end of the bolt and thus locking the switch-stand by preventing independent movements of the segments.

In Figs. 21, 22 and 23, I have shown the carrier-arm 29 as provided with a transverse recess 54 and the lever 13 as provided with a similar transverse recess 55; these recesses being in register when the catch 18^a is in engagement with the segments 14 and 15. A headed bolt 56 is inserted through the registering recesses 54 and 55 and has a padlock 57 applied to its unheaded end. Obviously there can be no independent movements of the segments 14 and 15, and consequently the switch-stand is locked. In the drawings, I have also shown several forms of attachments for withdrawing the catches, which are carried by the lever 13. For example, in Fig. 8, I have shown a bell-crank shaped grip-lever 58 which is pivoted at its inner end, as at 59, to the outer end of the lever 13, and which also extends outwardly along said outer end of the lever. The grip-lever 58 is pivotally connected, as at 60, at its angle, to the outer end of the catch-rod 29. The catch 18^a is normally held against the segment 14 by a spring 61 surrounding the catch-rod and interposed between a fixed lug on the lever 13 and a shoulder on said catch-rod. Thus when the operator grasps the outer end of the lever 13 he also grasps the grip-lever 58, drawing the latter against the outer end of the lever 13 and so withdrawing the catch 18^a from operating-position. In Fig. 20 I have shown a U-shaped skeleton-handle as carried by the outer end of the lever 13 and as serving to withdraw the sliding-catch 18. The inner ends of this handle 62 are pivotally connected, as at 63, either to the outer end of the lever 13 or of its weight 16, while the handle is pivotally connected at its inner angles, as at 64, to the outer end of the sliding-catch rod 29. The spring 28 serves to normally hold the catch 18 in operative position, and the outer ends of the handle 62 are connected by a handle-bar or hold 65. The form and dimensions of the handle 62 are such that when the lever 13 reaches one limit of its throw, the outer angles of the handle shall first strike the ground or tie and the handle be thus tilted upward so as to withdraw the catch 18 from its operative position. In this position of the parts, when the operator grasps the hand-hold piece 65 to lift the lever 13, he of course retains the catch 18 in its inoperative position. At the opposite limit of the throw of the lever 13 there is no necessity, in this instance, of either of the functions just described.

In Figs. 21 and 22 I have shown an attachment whereby the slide is normally held in operative position, at either limit of the throw of lever 13, but by which the catch 18^a is automatically withdrawn at either such limit when the operator starts to raise the lever 13. In this instance, a flat skeleton-handle 66 having a holder 67 at its outer end and an inward extension 68 at its inner end. The extension forms also a T at the inner part of the handle 66, and at its middle said extension is pivotally connected to the outer end of the catch-rod 29, as at 69; the ends of the pivot 69 being freely movable in openings 70 in the sides of the outer end of handle 13, or of weight 12, as desired. Transversely through each end of the extension 68 extends a stop-pin 71 and the two ends of each stop-pin work in two segmental slots 72 in opposite sides of the lever or weight. There are two pairs of these slots, one pair for each pin 71, and the concave margins of each pair of

said slots are proximate to the concave margins of the opposite pair of slots. The spring 28 (or any equivalent spring) normally holds the catch 18ª in its innermost position; the stop-pins being consequently held in engagement with whichever may be the inner ends of the slots 72 (according to the position of the lever 13). The outer part of the handle 66 is of course normally held in longitudinally protruding position relative to the lever 13, and when the handle 66 is grasped by the operator, to lift the lever 13, one stop-pin 71 is held against the inner ends of its curved slots 72 while the other stop-pin is moved to the outer ends of its slots 72; the pivot 69 being consequently moved outwardly a sufficient distance to withdraw the catch 18ª from operative position.

In Fig. 24 I have shown a hooked dog 73 as employed in lieu of the sliding catches 18 or 18ª above described; one end of said dog being pivoted, as at 74, upon the lever 13 and the opposite end of the dog being hooked to engage the segment 14 and being also pivotally connected, as at 75, to the inner end of the operating-rod 29.

In Fig. 13, I have shown an ordinary volute spring 76 as employed for oscillating the crank-shaft 9, in lieu of the spiral spring 19, above described; one end of said spring being strongly secured to the base 7 and the opposite end of said spring being strongly secured to the loose segment 15. My purpose in showing this form of spring is to illustrate the fact that whatever the form of crank-shaft-oscillating spring, it is to act (through the segments 15 and 14) torsionally upon the crank-shaft regardless of whether the action of the spring, in itself, is torsional or otherwise.

Referring now to Figs. 25, 26, 27 and 28, I will describe a vertical, or what is known as a "high," switch-stand which embodies my invention. The principal operative parts are, in this instance, mounted within a vertical column or standard 80 having a suitable supporting-base 81. Within this standard 80 is suitably journaled and supported as at 83 a vertical crank-shaft 82, the lower end of which carries a crank-section 84 to which is connected the outer end of the link 85 leading from the switch-rails. To the upper end-portion of the crank-shaft 82 is connected the horizontal actuating or throwing-lever 87 which loosely surrounds the crank-shaft 82 so as to be capable of moving independently thereof at times. To one end of this lever is knuckle-jointed, as at 88, a handle-arm 87ª which is capable of assuming either a horizontal or a vertical position as desired. The opposite end 90 of the lever 87 extends inward beyond the rock-shaft 82 and bears against a horizontal **V**-shaped spring 91, one end of which is secured to one side of the standard-head 86 and the inner arm of which presses laterally against the lever 87. Directly below the lever 87 is located the tight segment 92 and directly below this tight segment is located the loose segment 93; the segments 92 and 93 corresponding structurally and functionally (in all essential respects) with the segments 14 and 15 previously described; but being in this instance placed horizontally the one above the other, instead of vertically side by side, as before. A spiral spring 94 is connected at its upper end to the under side of the loose segment 93 and surrounds the crank-shaft as far downward as to the lower end-portion of a sleeve 95 which serves as a tension adjuster for the spring. The lower end of the sleeve 95 is movable axially in a box-collar 96 carried rigidly upon the rock-shaft 82 and said end of the sleeve is normally held stationary in the collar by a set-bolt 96ª, which is threaded laterally through one side of said collar and which impinges firmly against the end of the sleeve. It will be obvious that by loosening the set-bolt 96 and inserting a rod or bar into one or another of a suitable number of holes, such as 97 in the sleeve 95 and turning said sleeve in one or the opposite direction, the tension of the spring 94 can be increased or decreased as desired.

As shown in Figs. 25 to 28, the forms and functional arrangements of the segments 92 and 93 are essentially the same as those of the segments 14 and 15 in Figs. 21 and 23; no sliding connecting-bolt being used to produce simultaneous movements of the segments, or to permit independent movements thereof, and the jointed handle-arm 89 serving (like the catch 18ª in Figs. 21 to 23) to insure simultaneous movements of the two segments when desired. On its upper side, the tight segment 92 is provided with two upwardly extending lugs or shoulders 99 and 100, corresponding to the lugs or shoulders 17 and 19ª of the segment 14 in Figs. 21 to 23. The segment 92 is also formed with a marginal notch 101 corresponding to the notch 30 of said segment 14, while the segment 93 is formed with a similar marginal notch 102 corresponding to the shoulder 31 of said segment 15. A block or abutment 103 is located within the standard-head 86 and against this block strikes the lower segment 93 when the switch is opened for the main-line. When the switch is set in its normal position, that is open for the main-line, the two notches 101 and 102 are in register with each other and the handle-arm 87ª extends through both of them. Consequently if the switch be trailed by a train or vehicle running from the siding upon the main-line, the crank-shaft 82 will be oscillated and the two segments will both oscillate with it. As soon as the train or vehicle has passed the switch, the spring 94 will oscillate the two segments and the rock-shaft back again to their original position, carrying the lever-arm back also. When it is desired to set the switch open for the siding, the handle-arm 87ª is lifted to a horizontal position and turned upon the crank-shaft until the lever 88 strikes the lug 100 of the fixed segment 92 and is then

carried on to the limit of its movement; the first part of the lever's movement being independent of the switch-mechanism and the segment 92 moving independently of the segment 93. If the switch be trailed when in this position, the segment 92 will be brought back to a position in which the notches 101 and 102 register and the lever-arm 89 will drop into said notches as before; such lever being thrown to place by the spring 91. Various means may be used for locking this vertical switch-stand, and for example I have shown a staple 104 carried by the inner end of the arm 89 so as, when said lever is down, to extend through a standing lug 105 on the lever 87. A padlock hasp being passed through the protruding part of the staple 104 locks the stand.

Obviously various further minor modifications may be adopted in the construction, form, and relative arrangement of the several parts of the switch-stand without departing from the essential spirit of my invention. The crank-section may, of course, for example be at the opposite end of the rock-shaft (in the horizontal form of the stand) and the target-mechanism with its bearing be located at the remote end of the stand from the crank, lever, and segments. Moreover, the springs for throwing the lever, in lieu of the weight, may be of any other than V-form as desired. In fact, I do not wish to be understood as in any sense limiting myself to precise details of construction other than where specifically referred to in my ensuing claims.

I desire to call attention to the fact that all of the operative parts and attachments for a switch-stand embodying my invention constitute immediate members of the stand as a whole, and that none of such parts are remote from or are, so far as location is concerned, extraneous to the stand. The result is that all adjustment and assemblage of parts are capable of being effected before or during the installation of the stands and by those who are capable of properly attending to such assembling and adjustment; nothing necessarily being left to the common and crude workmen employed upon the road-bed work.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. A railway switch-stand comprising an oscillatory crank shaft for connection with the switch rails, an actuating lever loosely connected to the shaft so as to have initial movements independently thereof, and tight and loose devices carried by said shaft, with which said lever contacts or engages to effect the oscillation of the shaft by the continued movement of the lever, substantially as set forth.

2. A railway switch-stand, comprising an oscillatory crank-shaft for connection with the switch-rails, an actuating-lever loosely connected to the shaft so as to have initial movements independent thereof, a spring acting torsionally upon the shaft, and tight and loose devices carried by the shaft and establishing terminable connection between the lever and the shaft and spring so that subsequent movements of the lever shall cscillate the shaft, substantially as set forth.

3. A railway switch-stand, comprising an oscillatory rock-shaft for connection to the switch-rails, an actuating-lever loosely connected to said shaft and having initial movements independent of the shaft, a returning-spring acting torsionally upon the shaft to oscillate the same, and a plurality of plates fast and loose upon the shaft for establishing operative connection from the actuating-lever to the shaft and spring during the effective movements of the actuating-lever, substantially as set forth.

4. A railway switch-stand, comprising an oscillatory crank-shaft for connection with the switch-rails, an actuating-lever connected loosely to the shaft so as to have initial movements independently thereof, a segment-plate tight upon said shaft and formed for engagement and disengagement by the lever, a returning-spring acting torsionally upon the shaft, and a loose segment upon said shaft, to which said spring is connected; the loose segment being formed to move with the tight segment and lever, and also to remain stationary independent of said lever and tight segment, substantially as set forth.

5. A railway switch-stand, comprising an oscillatory crank-shaft provided with a torsionally acting returning-spring, a segment-plate mounted loosely upon said shaft and connected to said spring, a tight segment also carried by the shaft and an actuating lever movable independently of the shaft and arranged to engage the tight segment, and a movable attachment operated by the lever and serving to separably connect the tight and loose segments, substantially as set forth.

6. A railway-switch-stand, comprising an oscillatory crank-shaft, an actuating-lever mounted loosely upon the shaft so as to have movements independent thereof, a returning-spring acting torsionally upon said shaft, a loose segment carried by the shaft and connected to the spring, and a tight segment carried by the shaft and formed for engagement by the actuating-lever, and a movable catch carried by said lever and serving to effect separable engagement of the lever with the segments, substantially as set forth.

7. A railway switch-stand, comprising an oscillatory crank-shaft, an actuating-lever mounted loosely on said shaft so as to have movements independent thereof, a returning-spring acting torsionally upon said shaft, a loose segment carried by the shaft and connected to the returning-spring, a tight segment also carried by the shaft and having lugs for engagement by the actuating-lever, and a movable spring-pressed catch carried

by the lever and serving to effect separable engagement of the lever with the segments, substantially as set forth.

8. A railway switch-stand, comprising an oscillatory crank-shaft, an actuating lever mounted loosely upon said shaft so as to have movements independent thereof, a tight segment carried by the shaft and formed for engagement by the lever, a loose segment also carried by the crank-shaft, a returning-spring connected to the loose segment and acting torsionally upon the shaft, a movable catch carried by the lever and effecting engagement between the latter and the segments, and a cam for engaging the catch at times and holding it out of engagement with the segments, substantially as set forth.

9. A railway switch-stand, comprising an oscillatory spring-returned rock-shaft, a tight and a loose segment carried by said shaft, an actuating-lever loosely mounted upon the shaft, a movable catch carried by the lever and arranged to engage the segments, and a pivoted handle carried by the lever and connected to the catch and also serving to throw the latter out of engagement with the segments automatically, when the latter is moved by hand, substantially as set forth.

10. A railway switch-stand, comprising an oscillatory crank-shaft, an actuating-lever movable independently thereof, a tight segment, formed for engagement with the lever and carried by the shaft, a loose segment also carried by the shaft, a movable catch carried by the lever and serving to engage the segments, and a locking-pin applied attachably to certain of the moving parts so as to prevent independent movements thereof and thus to lock the switch-stand, substantially as set forth.

11. A railway switch-stand, comprising an oscillatory crank-shaft, an actuating-lever movable independently thereof, a tight segment formed for engagement with the lever, a loose segment also carried by the shaft, a returning-spring connected to the loose segment and acting torsionally upon the shaft, a target-rod carried by the frame of the stand, and beveled gearing on the rod and shaft for transmitting the oscillations of the latter to the former, substantially as set forth.

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