3 Sheets--Sheet 1.

W. H. VAN GIESON.

Railway Switches.

No. 139,635. Patented June 3, 1873.

Fig. 1.

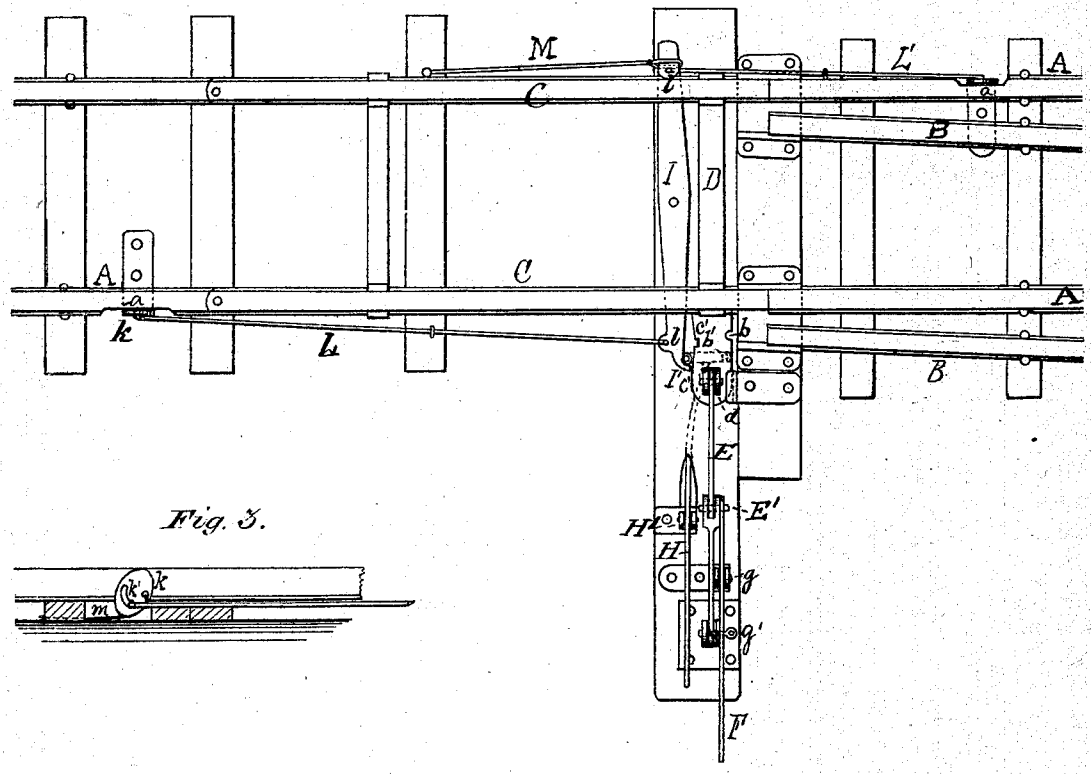
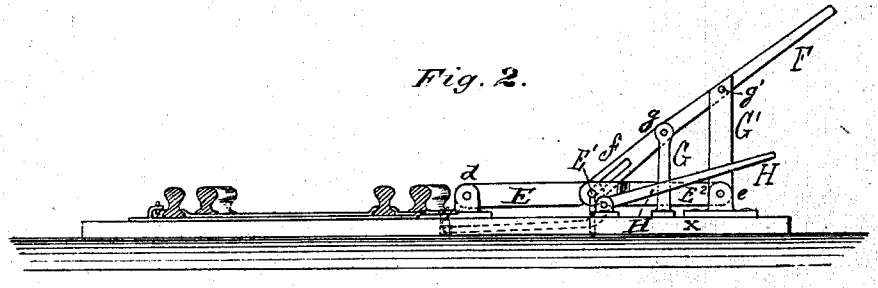


Fig. 3.

Fig. 2.



Witnesses:
Edwin James.
K. V. Gordon

Inventor:
William H. Van Gieson
per J. E. P. Holmead
Attorney.

3 Sheets--Sheet 2.

W. H. VAN GIESON.
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Fig. 4.

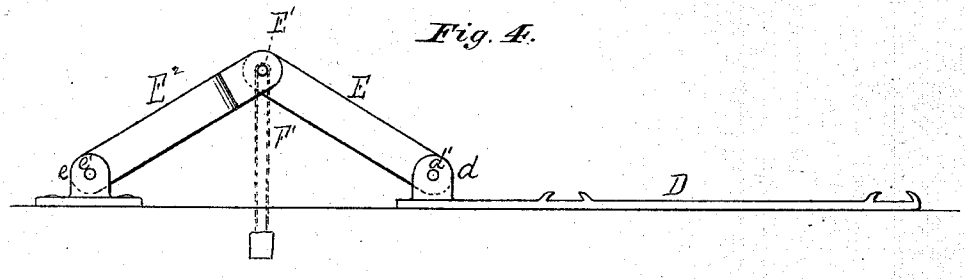

Fig. 5.

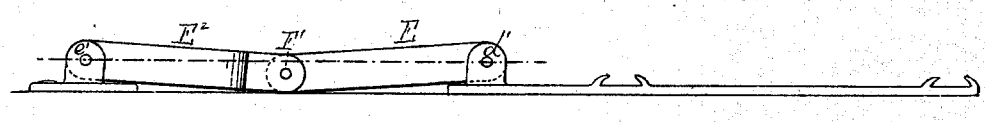

Fig. 6ª.

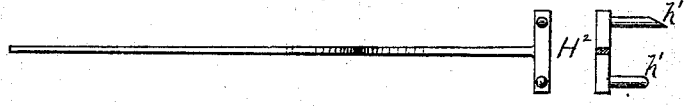

Fig. 6ᵇ.

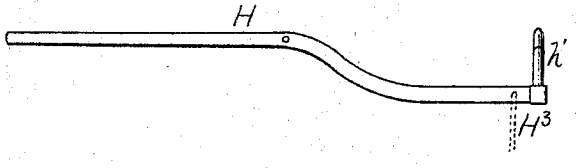

Fig. 7.

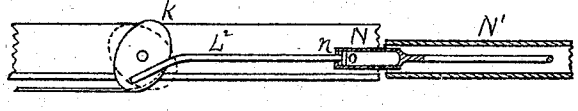

Fig. 8.

Fig. 9.

Witnesses:
Edwin James.
K. V. Gordon.

Inventor.
William H. Van Gieson
per J. E. F. Holmead
Attorney.

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Fig. 4a

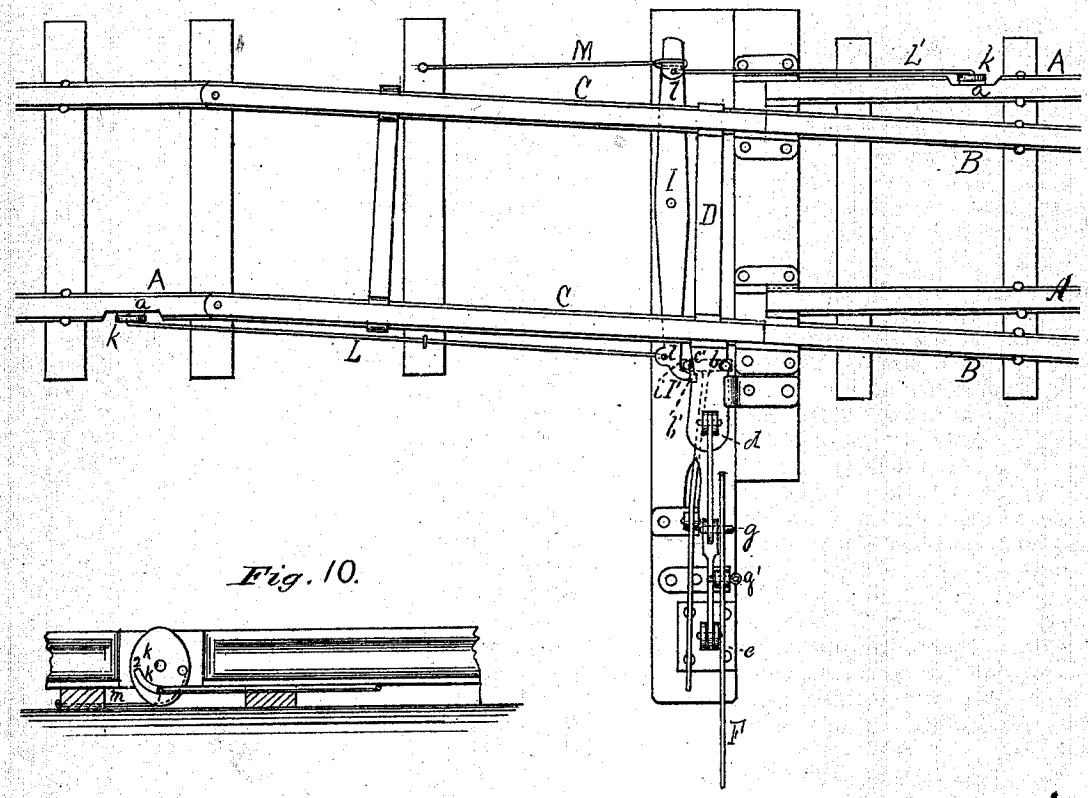
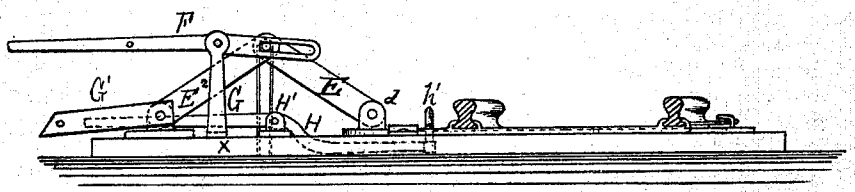


Fig. 10.

Fig. 11.



Witnesses:
Edwin James.
K. V. Gordon

Inventor.
William H. Van Gieson
per J. E. F. Holmead
Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM H. VAN GIESON, OF WHITEWATER, WISCONSIN.

IMPROVEMENT IN RAILWAY SWITCHES.

Specification forming part of Letters Patent No. **139,635**, dated June 3, 1873; application filed May 16, 1873.

To all whom it may concern:

Be it known that I, WILLIAM H. VAN GIESON, of Whitewater, in the county of Walworth and State of Wisconsin, have invented certain new and useful Improvements in Railway Switches, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, and the letters of reference marked thereon making part of this specification, in which—

Figures 1 and 4^a are top-plan views. Fig. 2 is a side view of the switch-lever and its connections. Fig. 3 is a side view of the unlocking-lever. Figs. 4 and 5 are side views of the toggle-arms. Figs. 6^a, 6^b, and 6^c are views of the supplementary lever. Fig. 7 is a side view of the unlocking-cam. Fig. 8 is a sectional view of the rail and cam attached. Fig. 9 is a sectional view of Fig. 7. Fig. 10 is a side view. Fig. 11 is a longitudinal sectional view.

The nature of my invention consists in securing at the rear of the sliding bar, through which the switch-rails are operated, a vibrating lever, and to which is secured a spring and horizontal rods. The spring is so secured that its tension is constantly exerted in pressing the dog at the end of the lever against the sliding bar, and which, in connection with a notch or recess in the sliding bar, locks the switch-rails in position when the same are moved so as to act in connection with the branch track. The rods which are fastened at the opposite ends of the lever, and which extend in opposite directions, are secured to levers or cams which are held and work in the recessed faces of the main rails at or on pivot centers. These levers or cams are so arranged, and act in such manner with the horizontal rods, that when, through the tension of the spring, the dog effects the locking of the switch-rails, the movement of the vibrating lever which accomplishes this causes the rods to elevate the cams to such position as to leave a section of each of their faces above the plane of the track to which they are attached, and which renders it impossible for a train to approach in either direction on the main track without, through the tread of its wheel, so depressing a cam that, through the rod, the lever shall be so moved as to release the dog, when instantly, through its operating mechanism, the switch is returned to its normal position in connection with the main track. My invention also consists in constructing these cams or levers with a slotted face, and which is in the form of a true arc of a circle drawn from its pivot-center. The right-angled bearings of the horizontal rods rest and are secured in this slot in such manner that, while the depression of the cams caused by an approaching train will draw the rods so as to unlock the sliding bar, they can be depressed in the opposite direction, as in backing the train, without their depression in any manner affecting the rods, or through them the lever. My invention also consists in employing, in connection with the sliding bar, a supplemental lever, the forward section of which has attached a cross-bar, on which is secured vertical arms. This lever is so formed, and is so secured, that its forward section rests under the sliding bar, and so acts, in connection with the sliding bar and dog, that it can prevent or release the bite of the latter at pleasure, holding it entirely free from the sliding bar. At the same time, when the approaching train is to be run on the branch-track, this lever, through one of its arms, retains the sliding-bar, while with the other it so forces back the dog as to draw the horizontal rods to such a position as to render the cams inoperative. My invention also consists in operating the switch, and locking the same in connection with the main track, by means of toggle-arms and a spring, the latter being so arranged that its tension is constantly exerted to extend the toggle-arms, and to drive the switch-rails in connection with the rails of the main track, in which position they are securely locked by the toggle-arms, the arms being so constructed and arranged that, when they are extended, the bolt that forms their toggle-joint connection is below the level of the pivot center-bearings of the arms, thus rendering it impossible for the switch to be moved by the swinging momentum of the train, or from any other cause except design and through the action of the switch-lever, with a power sufficient to

overcome the tension of the spring, and at the same time draw up the toggle-arms.

The construction and operation of my invention are as follows:

A A is the main track. B B is a side or branch track, and C C are the switch-rails, and are all constructed and laid in the usual manner. To these switch-rails C C is secured the sliding bar D, through which the switch-rails are moved in the ordinary manner. To this sliding bar D is secured in suitable bearings *d d*, and at a pivot-center, *d'*, a lever or arm, E, and to which is pivoted, by a bolt, E^1, and in such manner as to form in connection therewith a toggle-joint, a duplicate lever or arm, E^2, which is secured in suitable bearings *e*, and at a pivot-center, *e'*. These toggle-arms E E^2 are so connected that, when extended, their center joint or bolt E^1 will have its bearing below a line drawn through the pivot-centers *d'* and *e'*, as clearly shown in Fig. 5, and which arrangement of the toggle-arms provides a most reliable and durable locking device, and one which renders it impossible for the switch-rails C C to be moved or vibrated by the momentum of the train, or their connection with the main track broken, except designedly and through the action of the lever F. This lever F is secured by a pivot-bolt, *g*, in the socket-head of an upright arm or post, G. The forward end of this lever F is slotted, as shown at *f*, and which slot fits and works over the bolt E^1 that forms the toggle-joint, or connects the levers E E^2. This lever F, like the toggle-arms or levers E E^2 may be constructed of any suitable material, and is usually, at its forward section, bent at a slight angle of inclination, which facilitates the working of its slotted face *f* over the bolt E^1; but there is nothing arbitrary about either the form of the lever or its connection with the toggle-arms, as this connection may be effected by any other suitable mechanical means. To the bolt E^1, which connects the toggle-arms, is secured a spring or weight, F', as shown in Fig. 4, and which may be of any desired form or character, and is to be so secured that its tension or weight shall be constantly exerted in extending the arms E E^2 to that line which causes them to drive the switch-rails toward or to lock them in connection with the rails A A of the main track, as shown in Fig. 1. G' is the lock-plate of the switch-lever, and is secured and operates in the usual manner. *g'* is a pin or bolt, and is used to fasten the lever F to the locking-plate. The end of the sliding plate D, which is toward the switch-lever, and to which one of the toggle-arms E is attached, is formed with recessed or socket openings *b b'*, and which are cut on the opposite lateral faces of the plate. From the opening *b* the plate extends with a straight edge, while from *b'* it is slightly angular or tapering in each direction, so as to provide inclined bearings *c' c'*, and which extend a short distance from the opposite sections of the plate toward the recess or shoulder-catch *b'*. On the platform X, to which the post G of the lever F is secured or seated, or on some other suitable support, is the pivot-bearing H^1 of the supplemental lever H. This lever is constructed of any suitable material, and is at or near its center of a double or reverse curved form, as shown in Fig. 6^b. To the forward section of this lever is attached a cross-bar, H^2, and from which projects two vertical bolts or arms, *h* and *h'*, as shown in Fig. 6^c. The forward section of this lever works in a trough-box or excavation below the surface or plane of the track and its operating mechanism, and rests at such a fall that unless the handle of the lever is depressed the bolts *h h'* are held entirely free from all contact with the sliding plate, and to which position the tension of the spring H^3 will instantly return it after being elevated, and so soon thereafter as the pressure on the lever-handle is removed. The bolt or stop *h* is relatively so arranged that, when the switch-rails C C are in line with the branch track B B, should the handle of the lever H be sufficiently depressed the stop *h* will be so elevated as to cause it to enter and engage with the opening *b*, and thus lock the sliding plate so long as the depression of the lever continues. The bolt or pin *h'* does not engage with the opening *b'*, but serves simply to release the bite of the dog I', and, when desired, to hold the dog free from all contact with the sliding plate, and is longer than the bolt *h*, and terminates in a pointed or wedge-shaped head, as shown in Fig. 6^c, and is formed and relatively so arranged in connection with the inclined face *c'* of the plate and the face *i* of the dog I', that the depression of the lever H will so elevate it as to cause it to enter between the surfaces of the plate and dog, and, through its wedge-shaped formation, to so release the bite of the dog as to leave the sliding plate D free from all contact therewith and the switch-rails in condition to be operated by the toggle-arms E E^2 and spring F', as shown in Fig. 4. I is a lever, pivoted at its center so as to allow of its free vibratory movement in locking and unlocking the switch-rails C C, in connection with the branch track. The arm of this lever, which projects on the side in which the branch track is, is provided with a dog, I', which engages with the opening or catch *b'* of the sliding plate D, and whose function is to so lock said sliding plate as to leave the switch-rails C C in contact with the branch rails B B. On the opposite rails of the main track A A, and on their outer face, are recesses *a a*, the recess *a* in one of the main rails A being a suitable distance beyond the point at which the switch-rails C C are pivoted, and the recess *a* in the other being a suitable distance beyond the point at which the main rails are cut off so as to form connections with the switch-rails. In these recesses *a a*, in the main rails, rest and work levers or unlocking-cams *k k*, which are se

cured to suitable bearing-plates; or, what is preferable, they may be pivoted or bolted directly to the rails, and in which case any springing or deflection of the rails, caused by the passage of a heavy train, will not affect the levers or unlocking-cams, as they will necessarily be depressed with the rails, always leaving their faces in the same relative position to the surface of the rail. In either case, however, the levers or cams must be so secured as to allow of their free movement in their pivot-centers. These levers or unlocking-cams *k k* are of the form shown, and are provided with curved slots *k' k'* at their lower sections. The curves of these slots are in the form of a true arc of a circle, and are cut on a line drawn from the pivot of the cam as a center. In these curved slots *k' k'* are secured the right-angled bearings of the rods L L^1, which rods each extend toward the operating mechanism of the switch, and consequently run in opposite directions. These rods L L^1 are each bolted at *l* to the lever I, one to each end of the lever, and at the opposite sides of the track, the rod L being secured to the rear section of the dog I', in which the lever I terminates. M is a spring, and may be of any desired form or character, and is to be so connected with the lever I that its tension shall be constantly employed to drive the dog I' against the sliding bar D. *m m* are springs, connected with the cams or levers *k k*, and serve to elevate the cams or levers so as to leave their faces above the surfaces of the rails when said cams have been depressed by the backward or return movement of the train. These rods L L^1, and the spring M, may, if desired, be inclosed so as to operate in an outer casing or tube.

By reference to Fig. 1, it will be seen that the rod L is so secured in the slotted face of the cam *k* as to cause the cam to operate the arm and release the dog, when it is depressed by the forward movement of the train, but allows such play or lost motion of the slot over the bearing of the arm when the cam is depressed in the opposite direction, or by the backward movement of the train, as not to draw the rod. Instead of this connection, however, the device and arrangement shown in Fig. 7 may be substituted, and which will accomplish the same results in a most advantageous manner. In this figure a short rod, L^2, is pivoted to the face of the cam *k*, and is provided with a disk or shoulder, *o*, which works in a small tube, N, which may be secured in a tube, N', of larger diameter. To this tube N is attached the rod L that is secured to the lever I. The depression of the cam *k* by the forward movement of the train draws the shoulder *o* against the head *n* of the tube N, and draws back said tube and the rod L so as to release the dog I', while the play allowed the shoulder *o*, in the tube N, permits of the cam being depressed in the opposite direction, or by the backward or return movement of the train, without causing the rod L^2 to draw the rod L.

I desire it distinctly understood, in the foregoing description, wherever a spring is referred to as operating any feature of the mechanism, a weight may be substituted therefor, and can be so arranged in each and every instance to be made readily to accomplish the same results.

The operation of my invention is as follows: In Fig. 1 my improvement and the several features thereof are all in their normal condition. The switch-rails C C are in line with the main rails A A of the track, and the lever F is fastened by the pin *g* to the plate G', as shown in Fig. 2. Now, when the switch-rails are in this condition they are firmly locked and held by the toggle-arms E E^2, as shown in Fig. 1, and, owing to the arrangement of the toggle-arms, and the fact that when extended as shown in Fig. 5, the pivot-center of their toggle-joint is below the level of their pivot-centers *d' e'*, as shown by dotted line, Fig. 5, they retain the switch-rails in position by a most direct and positive pressure, and one that cannot be overcome except through the action of the lever F. We will now suppose a train to be approaching which it is desired to run on the branch track B B. The lever F is released and depressed, which draws up the toggle-arms E E^2 and spring F' to the position shown in Fig. 4, and brings the switch-rails C C in contact with the branch-rails B B, as shown in Fig. 4^a. But this movement of the toggle-arms E E^2 has drawn the sliding bar to such position as to leave its notch or recess *b'* opposite to the dog I'. The tension of the spring M being always so exerted on the vibrating lever I as to hold the dog in contact with the sliding bar D, therefore, as the bar has been drawn along it has constantly impinged against the inclined edge *c'* of the bar, and continues to do so until the notch or recess b^1 is reached. When this is done the tension of the spring M drives the dog into the notch, temporarily locking the sliding plate. This action of the dog I' has moved the lever I and caused its opposite ends to draw on the rods L L^1, and as the bearings of these arms rest directly against the wall of the slot *k'* of the levers or cams K K, it is impossible that these rods can be drawn on without turning on their pivot-centers the cams K K, and which elevates their upper oval joint or section above the surface of the rail, as shown in Fig. 10. Now, with the cams in this position it is utterly impossible for a train to advance in either direction along the main track without, through the tread of its wheels, so depressing the cams as to return them to the positions shown in Fig. 3, and which will necessarily so draw on either the rod L or L^1, as the case may be, as to move the lever I to such position as to free the dog I' from contact with the notch *b'*, when instantly, through the tension of the spring F', the tog-

gle-arms E E^2 will be drawn down and extended, as shown in Fig 5, and which shifts the switch-rails back in contact with the rails A A of the main track. Thus, it will be seen without some other and additional appliance the switch would be entirely impracticable. This additional appliance or device the lever H, and its arms or pins *h h'*, provides. But, before entering on a detailed description of the operation of this lever F, I would remark that the purely automatic fastening or locking of the sliding bar D by the dog I', and the impossibility of the bar being thus locked by said dog without causing the lever I to so draw on the rods L L^1 as to elevate the levers or cams *k k*, leaving their sections above the upper surface of the rail, is a feature of the very highest importance, and renders my improvement in reality a safety-switch. For, when the switch-rails C C are in contact with the branch rails B B, it is impossible for a train to advance along the main track without depressing one or the other of the levers or cams *k k*, and which, as we have seen, necessarily, through either one or the other of the rods L or L^1, will so move the lever I as to release the dog I, when instantly the spring F' and the toggle-arms E E^2 will drive the switch into position in connection with the main track, which renders it impossible for the train to run off in consequence of the switch being left open; and, what is still more important, renders it impossible for the advancing train to collide with a train waiting on the branch-track B B; but to return to the lever H and the means it provides of retaining the switch-rails in connection with the branch-track, and also the means it provides of releasing the dog and of holding the same entirely free from all contact with the sliding plate D. For convenience sake this lever H is secured alongside of the lever F, and in such position that it can be depressed by the foot of the switch-tender, while with his hands he is depressing the lever F, and thus secure the simultaneous action of both levers. When the levers are thus operated, at first the lever H cannot be depressed its full distance, for when the bolt or arm *h* strikes the lower surface of the sliding plate D the further fall of the lever is arrested until, through the action of the lever F, the plate D has been drawn to such position as to leave its opening *b* immediately over the bolt *h*, when, if the pressure on the lever is continued, the bolt will be driven up so as to lock the plate D. The bolt or arm *h'* being longer than *h*, it only requires a very slight depression of the lever to force it up, as shown in Fig. 11, and which releases the dog I' from the notch *b'* and holds said dog entirely free from all contact with the inclined face *c'* of the plate D.

Thus it will readily be understood how the lever can be depressed, so as to free the dog, by pushing the wedge-shaped head of the arm *h'* up between the face *i* of the dog and the inclined face of the plate, and how, at the same time, if desired, by the further depression of the lever, its arm *h* can be made to so engage with the opening *b* as to lock the plate D. It will readily be understood, now, how, through the action of this lever H, the plate is held while the train runs on the branch track. As the lever F is depressed the lever H is depressed. When the opening *b* passes over the arm *h* the arm engages with it and locks the plate. The arm *h'* holds the dog free from contact with the plate, and thus the lever I does not draw on the rods L L^1, and consequently the cams *k k* are not acted on. The advancing train now passes on the switch-rails. The pressure on the lever H is now removed, when the spring H^3 instantly draws it down, carrying with it, of course, the arms *h h'*. The dog I', no longer being held back by the arm *h'*, now engages with the notch *b'*, and thus still continuing the connection between the switch and branch rails; but the dog I' cannot lock the plate without the movement of the lever I, through the rods L L^1, elevating the cams *k k*. The advancing train will now depress one or the other of the cams and unlock the switch. So soon as the train passes the switch is drawn back through the lever F and locked by the dog I'. The train now on the branch track can be backed on the main track and will pass over the cam *k* without unlocking the switch, there being sufficient distance between wall 2 of the slot and wall 3 to allow of the depression of the cam without bringing the bearing of the rod L or L^1 in contact with the rear wall of the slot. So soon as the train is backed over the cam the spring M will elevate the cam, leaving it in position to be depressed in the opposite direction by the onward movement of the train, when instantly it unlocks the switch, and the arms E E^2, through the spring F', drives the switch-rails in contact with the main rails and there locks them, as shown in Fig. 1.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The levers or cams *k k* having slots *k' k'*, springs or weights *m m*, and the rods L L^1 or other equivalent connections, the same being combined and arranged in connection with the main rails of the track and a suitable locking device for the switch-rails, substantially as described, as and for the purpose specified.

2. The rails A A, levers or cams *k k* having slots *k' k'*, rods L L^1, lever I having a dog or catch, I', spring or weight M, the same being combined and arranged to operate in connection with the sliding bar of a switch-rail, substantially as described.

3. In combination with the sliding bar D, the toggle-arms or levers E E^2, arranged and connected to operate in the manner described, and which, when the arms are extended to lock the switch-rails in connection with the main rails, leaves the toggle-joint connection

E′ below the pivot-centers d' e' of the arms, substantially as set forth and shown, as and for the purpose specified.

4. The sliding plate D of the switch-rails, toggle-arms E E^2, and spring or weight F′, the whole being combined and arranged to operate substantially as described, as and for the purpose specified.

5. The lever H, having arms or pins h h', arranged as shown, and secured to operate in connection with the sliding bar D and its automatic locking mechanism, substantially as described.

6. The lever H, having arms or pins h h', arranged as shown, and spring H^3, the whole being combined and arranged to operate in connection with the sliding-bar D, substantially as described.

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

WILLIAM H. VAN GIESON.

Witnesses:
THOS. BASSETT,
GEO. S. MARSH.