(No Model.)

3 Sheets—Sheet 1.

J. L. HILL.

RAILWAY SWITCH.

No. 278,548. Patented May 29, 1883.

Fig. 1.

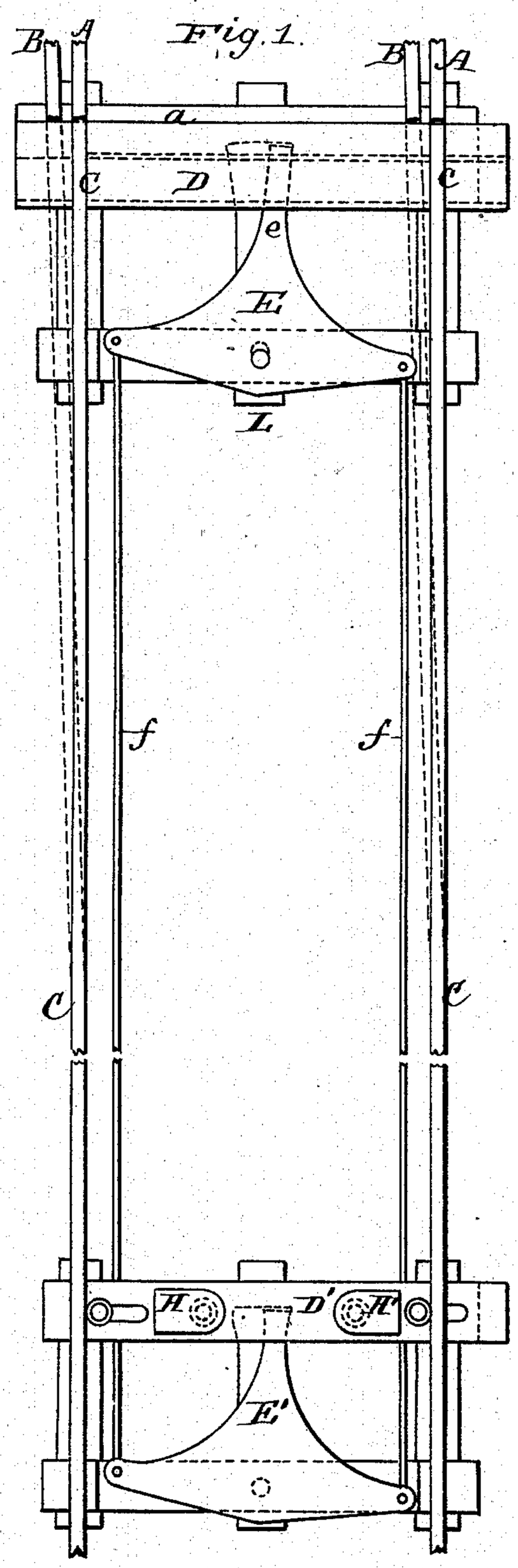


Fig. 2.

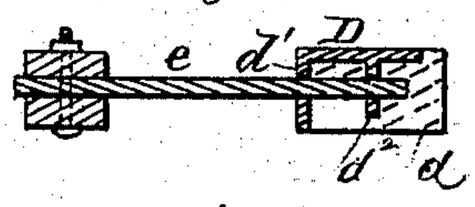


Fig. 3.

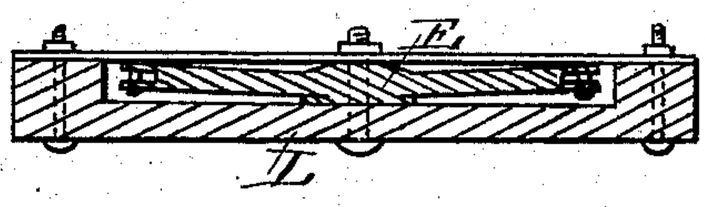


Fig. 4.

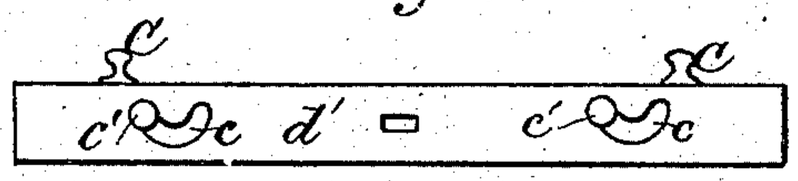


Fig. 5

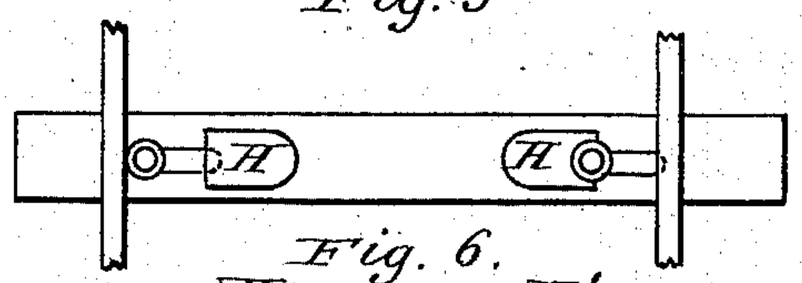


Fig. 6.

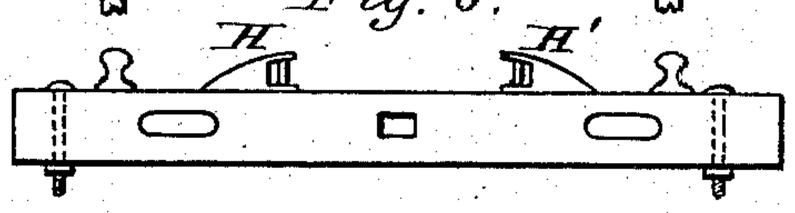
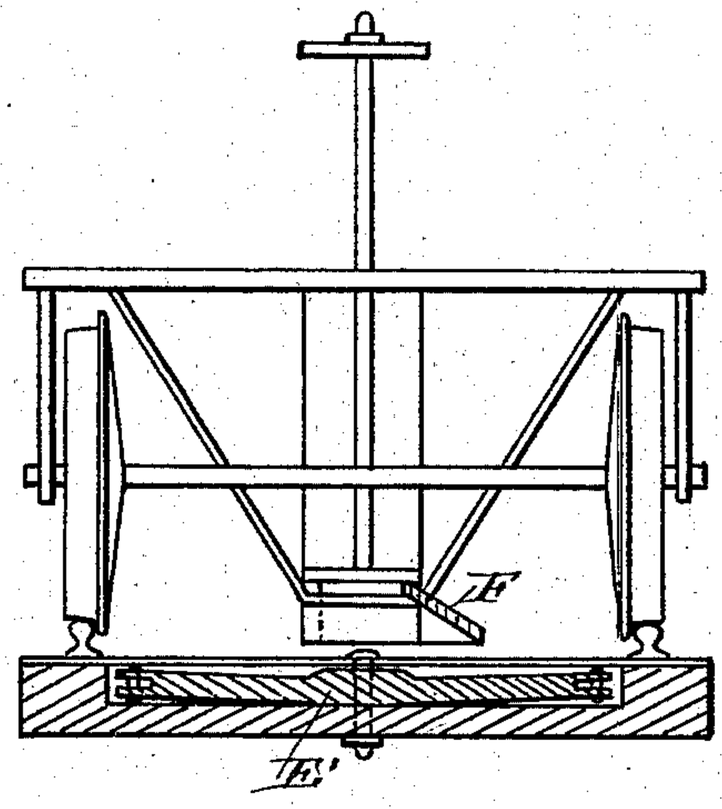


Fig. 8.



Witnesses:

E. E. Masson

Philip Mauro

Inventor:

John L. Hill

by Pollok.

his attorney.

(No Model.) 3 Sheets—Sheet 2.

J. L. HILL.

RAILWAY SWITCH.

No. 278,548. Patented May 29, 1883.

Fig. 9.

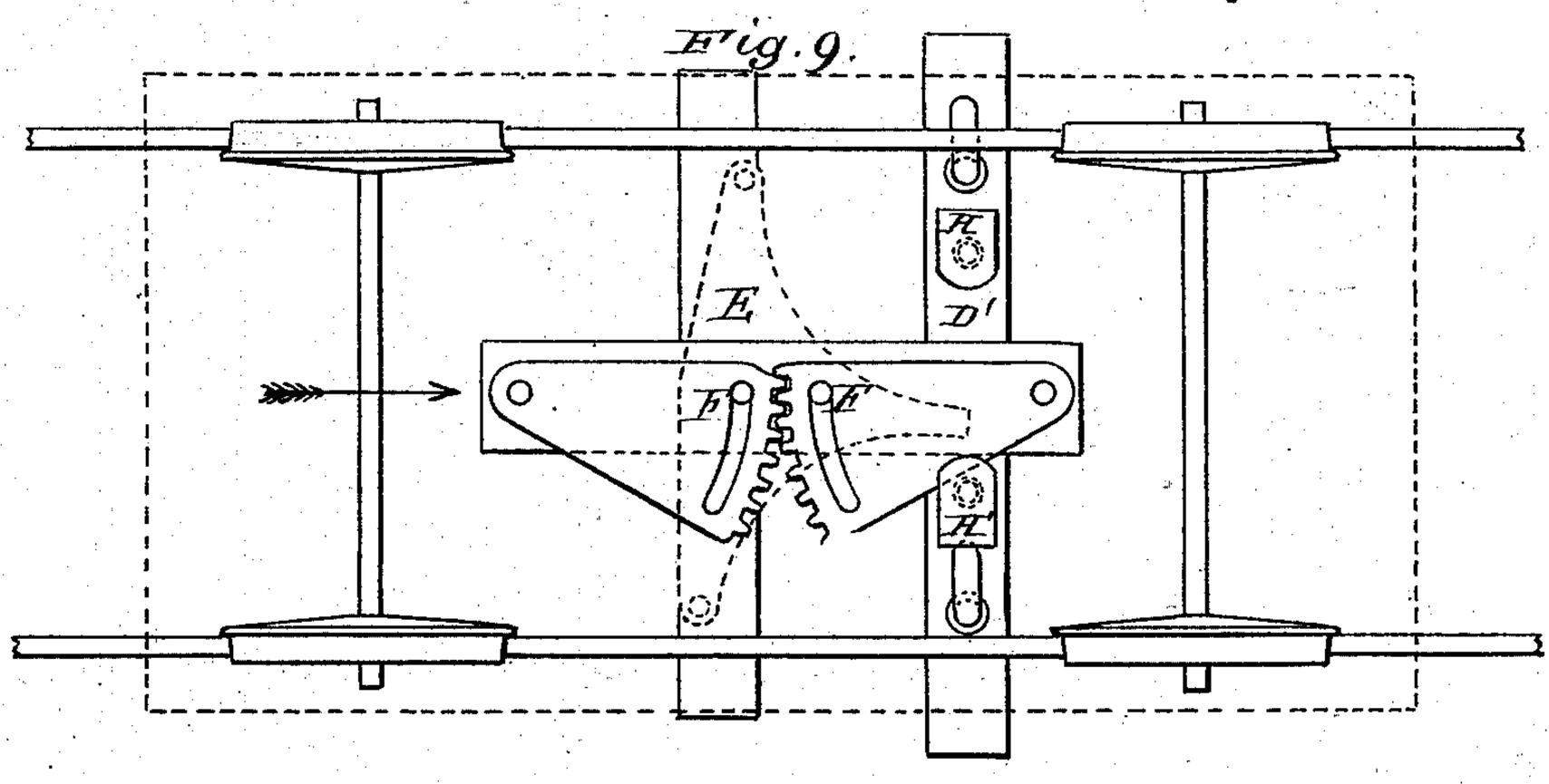


Fig. 7.

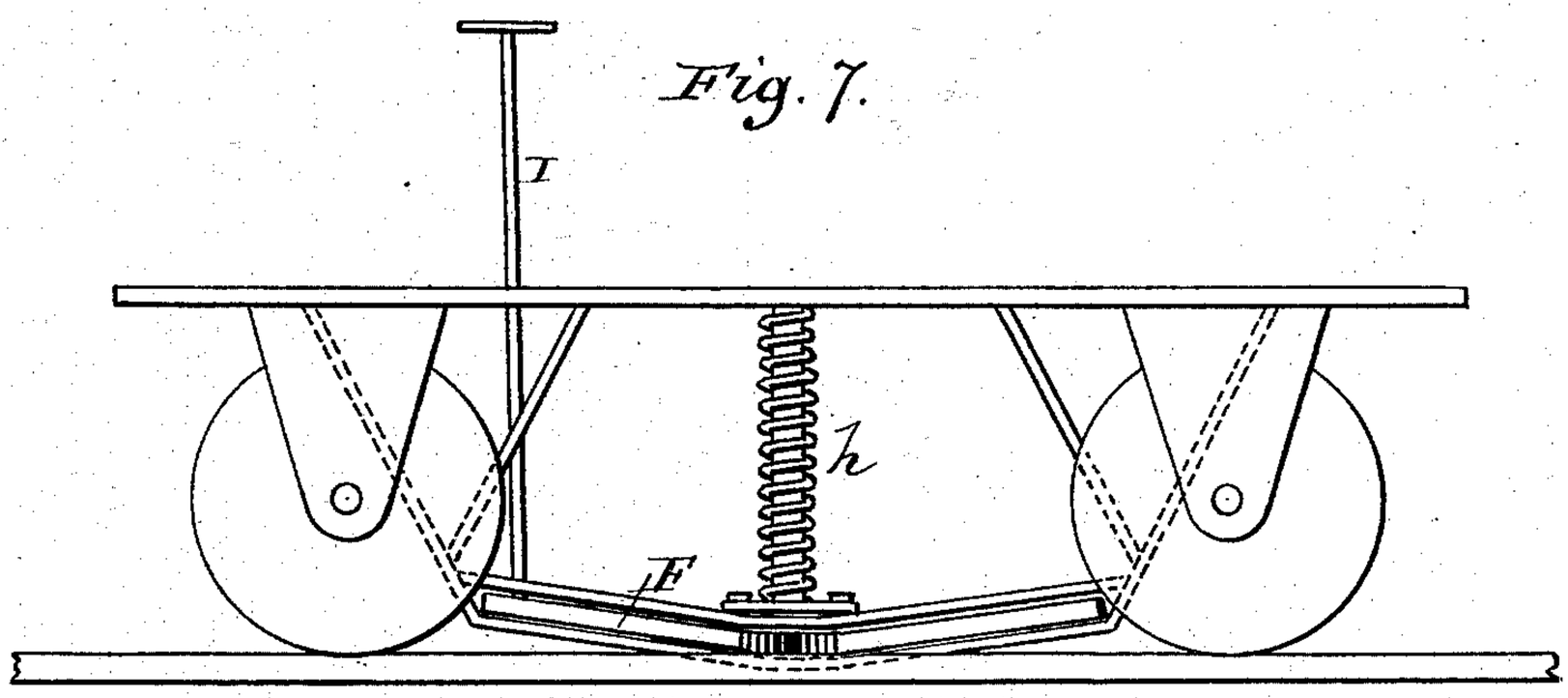


Fig. 10.

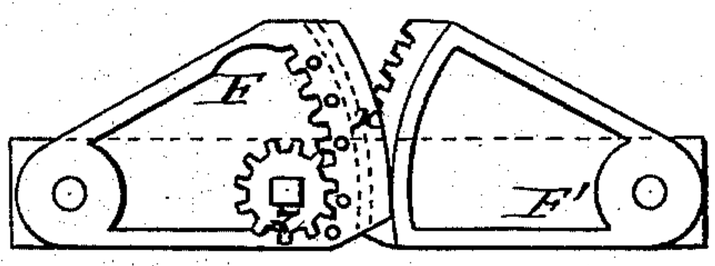


Fig. 11.

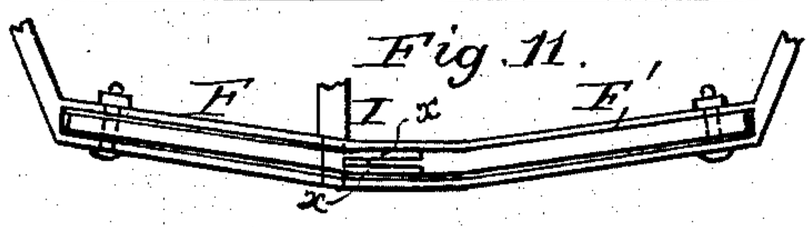
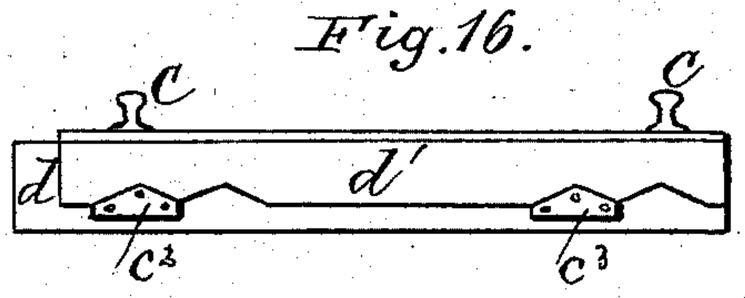


Fig. 16.



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(No Model.) 3 Sheets—Sheet 3.

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RAILWAY SWITCH.

No. 278,548. Patented May 29, 1883.

Fig. 12

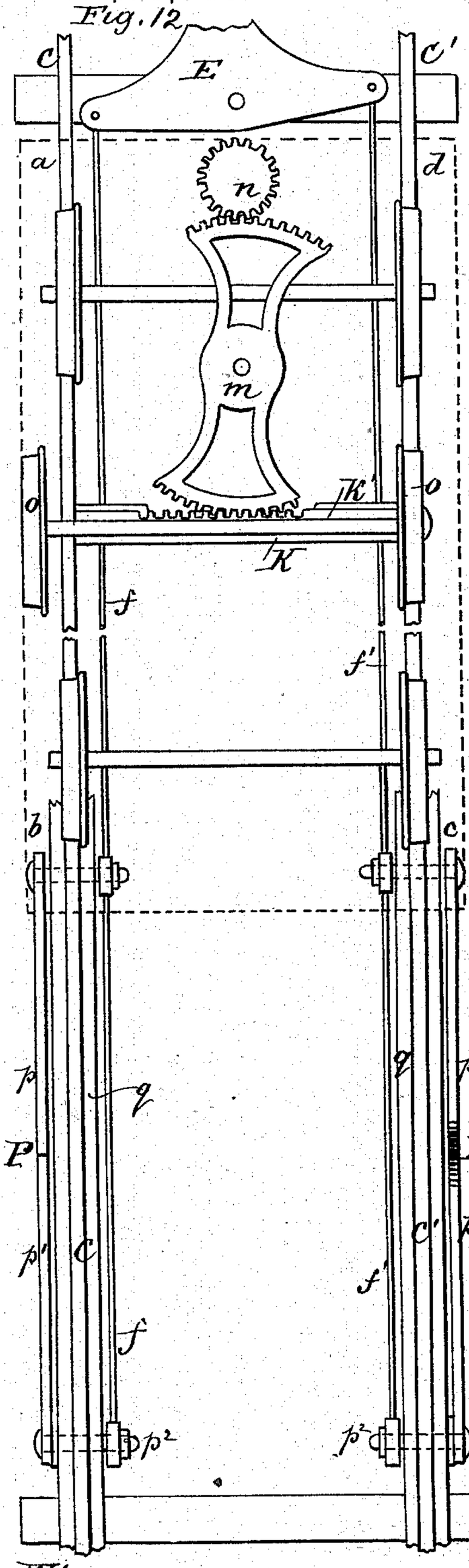


Fig. 15

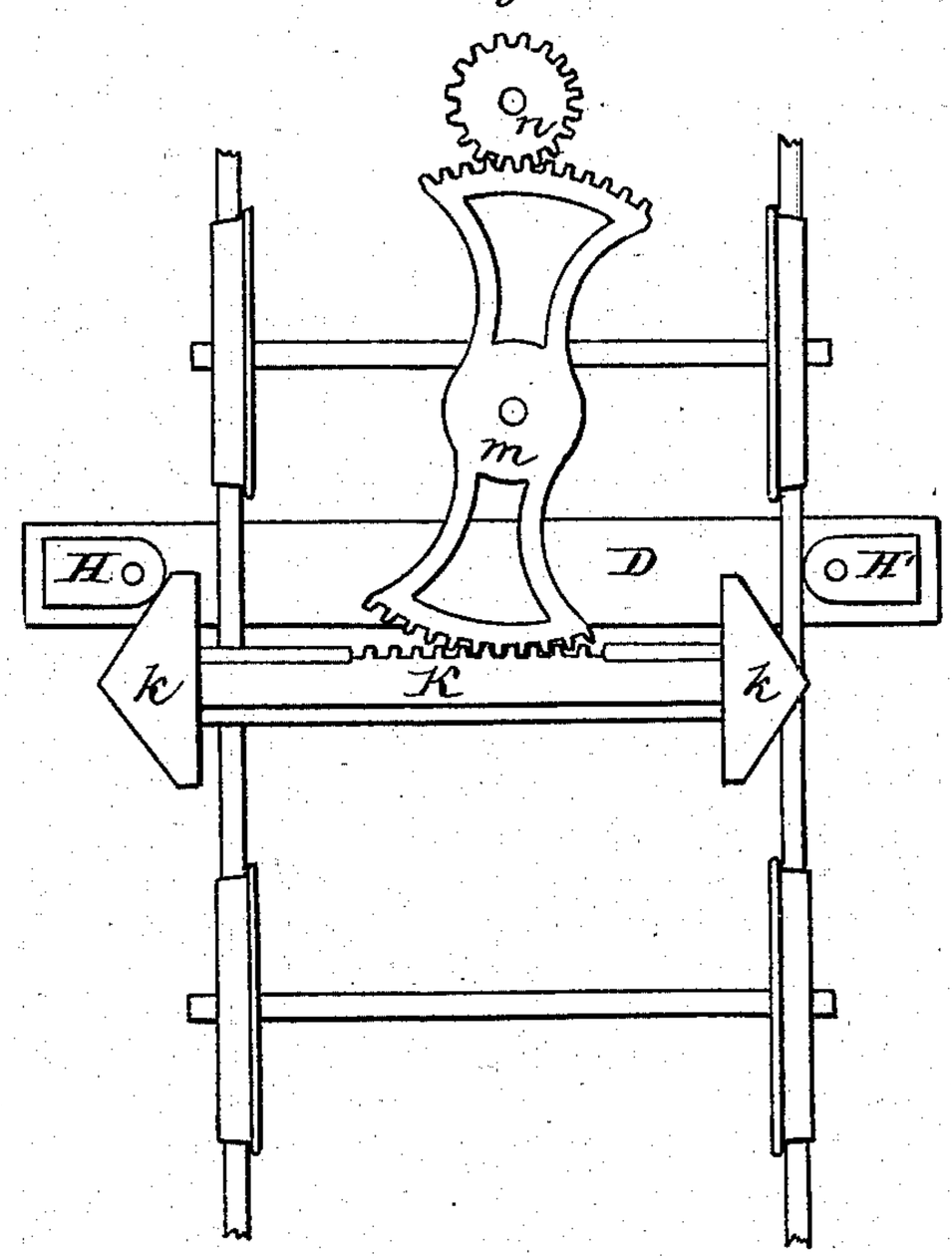


Fig. 13

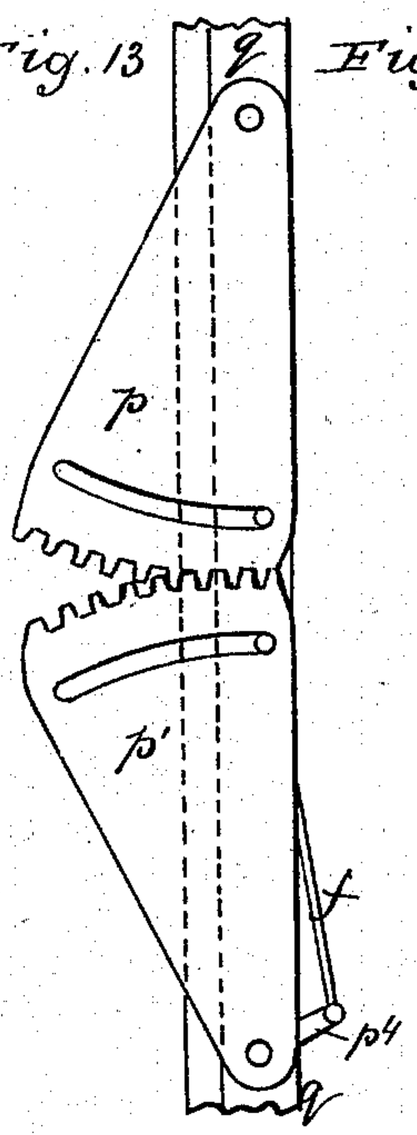
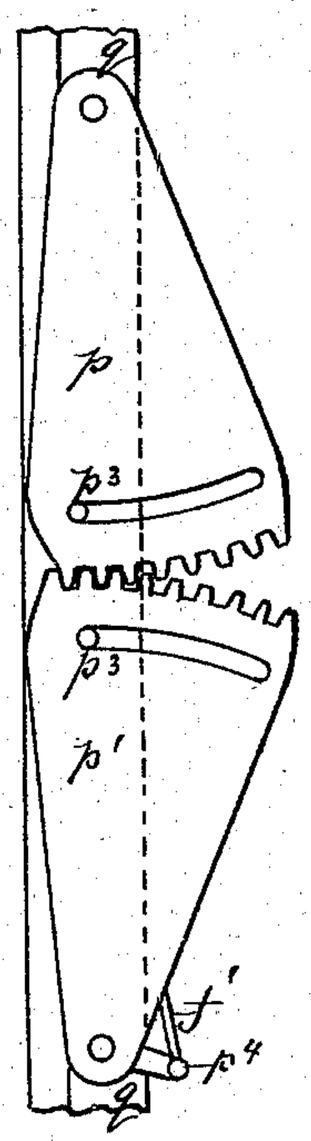


Fig. 14



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his attorney

UNITED STATES PATENT OFFICE.

JOHN L. HILL, OF BROOKLYN, NEW YORK.

RAILWAY-SWITCH.

SPECIFICATION forming part of Letters Patent No. 278,548, dated May 29, 1883.

Application filed September 6, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN L. HILL, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Railway-Switches, which improvement is fully set forth in the following specification.

This invention has more particular reference to railway-switches that are operated by the passing train, but is, in part at least, applicable to railway-switches generally, and has for its object to provide a switch that can be operated at a distance either by hand or from a device on the locomotive or one of the cars of the train, and which, when thrown either to one side or the other, will be steadily held in that position until reversed by the proper means.

In the present invention the shifting or switch rails are supported on a cap or plate that fits closely over one of the cross-ties, and is capable of lateral motion thereon. This cap, and with it the switch-rails, is moved by a three-arm lever pivoted between the rails. From the opposite arms of this lever run connecting-rods to the arms of a similar lever, which is moved either by hand devices or by the train, as hereinafter pointed out. These levers may be at any desired distance from each other. The front edge of the sliding cap is turned downward in front of the tie on which it is supported, and is provided with double inclined or curved slots, with the point downward, through which pass bolts or pins into the tie. By this arrangement when the lever is operated to throw the switch the cap has a vertical as well as a lateral movement, rising until the point or lowest portion of the slot passes the pin, and then falling, the weight of the cap and rails from this point assisting the motion of the switch and causing it to move the entire distance to connect with the permanent rails. With this contrivance all liability of the switch being opened by the jarring of a passing train is avoided. As the switch has to rise in changing its position the additional weight of the train upon the switch-rails gives it additional steadiness. When it is desired to operate the switch from the train the locomotive or a suitable car is provided with a double-inclined shoe or plate, hereinafter more particularly described, which engages with stops on a sliding cap connected with one of the three-arm levers and throws it either to one side or the other, thereby imparting a pulling motion to one of the connecting-rods and operating the switch at a distant point through the second lever and sliding cap.

In the accompanying drawings, which form a part of this specification, Figure 1 is a plan view of the improved switch mechanism; Figs. 2 and 3, detail views in cross-section and longitudinal vertical section, Fig. 3 showing the top plate covering the lever and securing-bolts, which are omitted from Fig. 1; Fig. 4, a side view of the sliding cap, and Figs. 5 and 6 detail views in plan and side elevation. Fig. 7 is a side view of a car-truck with devices for operating the switch; Fig. 8, an end view of the same, partly in section; Fig. 9, a plan with the platform of the car removed; and Figs. 10 and 11, detail views in elevation and edge view of a modified form of the shoe or switch-operating device. Fig. 12 is a plan view of a modified form of the switch and car-truck with devices for operating the same; Figs. 13 and 14, detail views, in side elevation, of a portion of the switch mechanism; Fig. 15, a plan view of another form of switch mechanism, and Fig. 16 a detail view of a modified form of the sliding cap carrying the switch-rails.

The ends of the two tracks A and B are firmly fastened by the ordinary chairs and bolts to the tie, which is preferably plated at *a*. The movable or switch rails C rest upon and are securely fastened to a sliding cap, D, which covers the top of the tie *d*, fitting closely to the plate *a*, and is turned over so as to have a depending plate, *d'*, in front of the tie, and is also provided with a flange, d^2, which enters a groove in said tie. The tie *d* may be made in two parts and bolted together, forming a compound tie. The cap D slides to the right or left, carrying the tracks with it, and thus connecting the rails C with A or B at will. In this respect the plate D operates as the mere bar, by which the tracks are held in switches of ordinary construction. The power is applied to this sliding cap D by means of the triangular or three-arm lever E, the fore or longitudinal arm, *e*, of which projects through the side of the sliding cap and the flange d^2, as shown in Fig. 2, there being a mortise in the side of the tie through which the arm *e* of

the lever may project and play freely from right to left. It is obvious that if this fore or longitudinal arm of the lever E shall move to the right it will place the track C in connection with A. This lever E is moved directly by means of two connecting-rods, *f f*. The design of using these two connecting-rods is to avoid depending upon a movement by pushing on a rod, for, unless it is heavy and firmly braced at very short intervals, (and even then at times,) it is liable to bend and disappoint the manipulator. To avoid this objection the power is exerted in the improved switch by pulling, and never depending upon a pushing movement. There will of course be a slight pushing movement on the other rod, but that is wholly incidental and is not counted as an auxiliary. Where it is desired to operate the switch from the engine the power is communicated to these rods by the lever E′, which may be placed near to or remote from the lever E, as circumstances or judgment may indicate. It is preferred to locate the lever E′ so far from the lever E that the train might be brought to a full stop before reaching the switch in case of accident or any other misadventure. The front arm of the lever E′ projects into another sliding cap, D′, fitted over a tie under the rails C. The office of this cap is to receive the impulse from the apparatus upon the locomotive, as will presently be explained in detail. It is obvious that if this sliding cap D′ shall be moved to the right or left the cap D, which is its complement, will receive and obey a corresponding impulse and place the tracks in position.

In order to insure that the switch will be firmly held when placed, two or more slots, *c c*, are cut in the depending part *d′* of the cap D, through each of which is passed a strong bolt, *c′*, entirely through the tie. These slots may be cut in curved form, as indicated in Fig. 4, or in any form, so that it may present a double-inclined plane, the point downward. The same result might be accomplished by a notch cut in the lower edge of the side *d′* and double-inclined blocks c^3, as in Fig. 16, or by a double-inclined plane on the ties and sockets in the cap on the top, or by other equivalent constructions.

It is obvious that as the sliding cap D is moved from side to side it will be lifted from the tie and carried over to its new position. It could thus be easily lifted from one to two inches in sliding the width of the track and chair, which holds the tracks A A and B B. When this cap C is thus changed its gravity, with that of the superincumbent rails, (at, say, from fifty-six to sixty pounds per lineal yard,) will hold it in position, and there will be no fear of displacement from the jarring or rebounding tendency excited by a passing train. The power communicated through the rods *f f* in shifting the switch is sufficient to effect the lifting of the cap D and switch-rails; but this action is facilitated by the peculiar construction of the lever E. As shown in Fig. 3, the cross-arms of the lever are higher than the bearings at its axis. The bolt-hole through the lever is slightly enlarged at the top, though closely fitting the bolt at the bottom, so that the first pull of the rod to shift the switch will slightly lift the joint of the fore or longitudinal arm, (see Figs. 1 and 2,) and so assist the cap D and switch-rails in their upward movement.

In case a curved slot is used in the side of C, its inner line at each end may be slightly enlarged, so as to obtain a slightly-hooped effect. The bolts, too, might be sleeved or provided with rollers to lessen the friction. The bearing of the cap D when in position should always be upon the tie and not upon the bolts or sleeves. This method of locking or holding the switch will ordinarily prove sufficient; but if additional precautions are necessary the connecting-rods *f f* might be prolonged, or little bars or bolts might be connected with the cross-arms of the lever E, which would be pushed alternately through holes cut through the side of the cap D into the tie, thus effectually locking the switch in position.

In order to operate the switch automatically from the engine or one of the cars, the following construction is adopted: Upon the slide or cap D, connected with the lever E′, are two upright projections, H H′, which are preferably rollers or sleeves, turning on pins securely fastened to the plate or cap. Power from the train is applied to one or the other of these projections, and the cap or slide D′ moved either to the right or left. To move the slide the cam device or shoe shown in Figs. 8, 9, and 10 is or may be employed. It consists of two sections, F, pivoted to the under side of the car-truck, and provided with intermeshing teeth, as shown. These sections may be moved either to the right or left by rod J, according to the direction in which the switch is to be shifted. In the position shown in Fig. 10 the sectors are turned so that the inclined or cam surface is on the right, and the edge striking projection H′ will throw the cap D′, and consequently the cap D, to the right.

To insure that the shoe will always come in contact with the projection H or H′, it is inclined gradually downward from each end, so that the lowest point of the shoe is but slightly above the level of the ties. (See Fig. 7.) The shoe is held in this position by the yielding pressure of the spiral spring *h*, which, in striking a stone or any other obstruction between the rails, or in crossing the rails of intersecting tracks, allows the shoe to be lifted and ride over the obstacle.

In order to diminish the shock where intersecting tracks are to be crossed, inclined blocks may be laid on each side of the intersecting rail, so as to assist the shoe in riding over them.

Figs. 10 and 11 show a modification of the switch-operating device, by which greater rigidity is secured to the device when turned in

the proper position to throw the switch. The sector F is provided with plates *x*, extending slightly beyond the toothed part of the sector and forming between them a recess or groove, into which fits the toothed part of the sector F′. On the inner edge of the plate *x* are cut teeth, which are engaged by the pinion *z* on the rod J. Thus a greater leverage is obtained and the cogs are at the same time protected from foreign substances. A modification of this plan, in which the projections on the sliding cap are placed outside of the track, is shown in Fig. 15. In this construction the projections H H′ are raised a greater distance above the tie—say to the height of six inches. The car-truck is provided with a cross bar or rod, K, supported in a sleeve, K′, and movable transversely by means of the toothed lever *m* and pinion *n*. At each end of the rod K is a cam-piece, *k*, by which the projections on sliding cap D′ are engaged and the latter thrown to one side or the other, according to the position of the rod K.

In Figs. 12, 13, and 14 another modification of the switch-operating mechanism is shown. On each side of the rails C C′ are double-inclined or cam plates or sectors P P′, the two parts *p p′* of each being connected by cogged teeth at their adjacent ends. These plates are pivoted to the ties *q*, so that they have an up-and-down motion, which is limited by pins p^3, projecting from the tie through slots in the plates. To the pivots p^2 of levers *p′* are secured cranks p^4, to which are attached the connecting-rods *f f′*, leading to the three-arm lever E, operating the switch. When the lever P is depressed, as in Fig. 12, the crank p^4 imparts a pulling motion to the rod *f* and to the arm e^2 of the lever E and throws the switch to the left. The same motion of the lever E pulls the rod *f′* in the opposite direction and raises the lever P′, ready to be acted upon to reverse the switch.

Devices may be connected with the levers to operate the switch by hand. For operating it from the train the following mechanism is or may be employed: On the car-truck *a b c d* is supported a bar or rod, K, movable longitudinally in a sleeve, K′, and operated as in Fig. 15. Instead of the cam-blocks, however, a wheel, *o*, is mounted loosely on each end of this rod K, and, according as the rod is placed to the right or left, one or the other of the wheels *o* will come in contact with and depress the corresponding double-inclined lever, P or P′, and throw the switch to the right or left, as desired.

Some provision should be made for adapting the parts of the switch mechanism to different degrees of temperature. This may be done in part by running a screw-sleeve on the connecting-rods *f f*, so that they can be adjusted in very cold or warm weather, and by means of a slot cut in the plate L, upon which the lever E bears, so that the axis of lever E may move longitudinally very slightly.

It is obvious that parts of the invention could be used separately. For example, the switch-operating mechanism described, comprising the sliding cap, triangular levers, and connecting-rods, could be used to operate the switch by hand, and may under some circumstances be very advantageous for that purpose. For instance, where it is desired to operate a number of switches at a single point the connecting-rods of all the switches could be led to that point and suitable hand-operating mechanism attached to each, so that an operator could superintend a number of switches without moving from place to place.

It is obvious, moreover, that modifications other than those already described could be made without departing from the spirit of the invention. For example, different means could be adopted for causing the cap D and switch-rails to rise and fall as the switch is thrown from one side to the other; and other devices for operating the switch from the train could be employed instead of those described.

I am aware that heretofore switches have been devised to be operated from a train in which motion is conveyed to the switch-rails from a three-arm lever operated by connection-rods, and this construction, broadly, is not claimed herein.

I am also aware that shifting of the switch-rails has heretofore been prevented by forming in the switch-bar double-inclined notches, and providing the cross-tie with pins which engage said notches, and I therefore do not claim this construction, broadly, as part of my invention.

What I do claim, however, and desire to secure by Letters Patent, is as follows:

1. The combination, in a railway-switch, of the two three-arm levers, the rods connecting the lateral arms of the two levers, a slide connected with the forward arm of one lever and adapted to be moved from side to side by the passing train, and a sliding cap carrying the switch-rails connected with and operated by the forward arm of the other lever, said levers being separated a sufficient distance to permit of the stopping of a train before the switch is reached, should the latter fail to be properly operated, substantially as described.

2. The combination, with the switch-rails and their movable support, of a sliding cap provided with contact devices for receiving motion from a train, a three-arm lever operated directly by said sliding cap, and connection-rods for transmitting the motion to the said switch-rails, substantially as described.

3. The combination, with the sliding cap supporting the switch-rails, of a second sliding cap adapted to operate said first-named cap through levers and connection-rods, as set forth, said second cap being provided with upright pins or projections for receiving motion by contact with a suitable device on the locomotive or car truck, substantially as described.

4. The combination of the sliding cap sup-

porting the switch-rails, the three-arm lever for shifting said cap, the connecting-rods, a second lever attached to said rods, and a second sliding cap provided with devices, substantially as described, for receiving motion from a passing train, as set forth.

5. The combination, with a switch and connecting-rods for operating said switch, leading to a distant point, of a lever connected with said rods, a sliding cap for operating said lever, and upright pins or projections on said cap, adapted to be struck by a suitable projection on the locomotive or car truck to shift said cap either to one side or the other, as desired, substantially as described.

6. The combination of the sliding cap supporting the switch-rails, bolts or pins projecting from the tie and engaging with inclined or curved slots or notches in said cap, or equivalent devices for causing it to rise and fall in changing the switch, and the three-arm or triangular lever having its forward arm connected with said cap, so as to move the same, and its side arms connected with operating-rods, the ends of said side arms being raised slightly above the fulcrum or bearing of said lever, substantially as and for the purpose set forth.

7. The combination, with the sliding cap having a perpendicular face provided with inclined or curved slots or notches, and the tie supporting the cap, provided with pins or bolts engaging with said slots or notches, of the lever connected with said cap and fulcrumed so as to move it horizontally, and rods for moving said lever, and connected thereto above its fulcrum, so that in operation said lever imparts to said cap an upward as well as a horizontal movement, substantially as described.

8. The combination, with the switch-rails, their movable support, and levers and connection-rods for transmitting motion thereto, of the geared sectors and the contact devices on the car or locomotive, substantially as described.

9. In combination with the switch devices for transmitting motion thereto, and the contact-pieces on a sliding cap controlling said switch, of the shoe or operating device having double faces inclined both forward and backward, so as to impart a gradual motion to said cap through said contact-pieces in whichever direction the train may be moving, substantially as described.

10. The combination, with the car-truck, of a shoe or switch-operating device, comprising two sectors with inclined faces connected together by teeth, said shoe being supported by said truck between the wheels and held with yielding pressure below the level of the rails, substantially as described.

11. A switch-operating device or shoe supported under the car-truck and depressed at its middle part by a spring, so as to be capable of yielding to ride over intersecting rails or other obstructions, substantially as described.

12. A switch-operating device or shoe supported under the car-truck, said shoe having inclined or cam faces and an inclined under surface, and being held with yielding pressure below the surface of the rails, substantially as described.

13. The switch-operating device composed of two sectors with faces inclined both forward and backward, said sectors being geared together, substantially as described.

14. The combination, with a car-truck, of the switch-operating device, comprising two sectors with inclined faces, connected at their adjacent ends by cogged teeth, so that the motion of one is communicated to the other, and an operating-rod for setting said device, substantially as described.

15. The combination, with the shoe, comprising two connected sectors with inclined sides, of a spiral spring arranged to depress said shoe at its middle part below the level of the rails, and capable of yielding to allow said shoe to ride over intersecting rails or other obstacles, substantially as described.

16. The combination, with the sectors, of plates *x*, adapted to protect the teeth of said sectors, and the pinion *z*, engaging with teeth on the inner edge of one of said plates, substantially as and for the purpose described.

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

JOHN L. HILL.

Witnesses:
J. ANNISE,
E. H. COLE.