

No. 724,821.

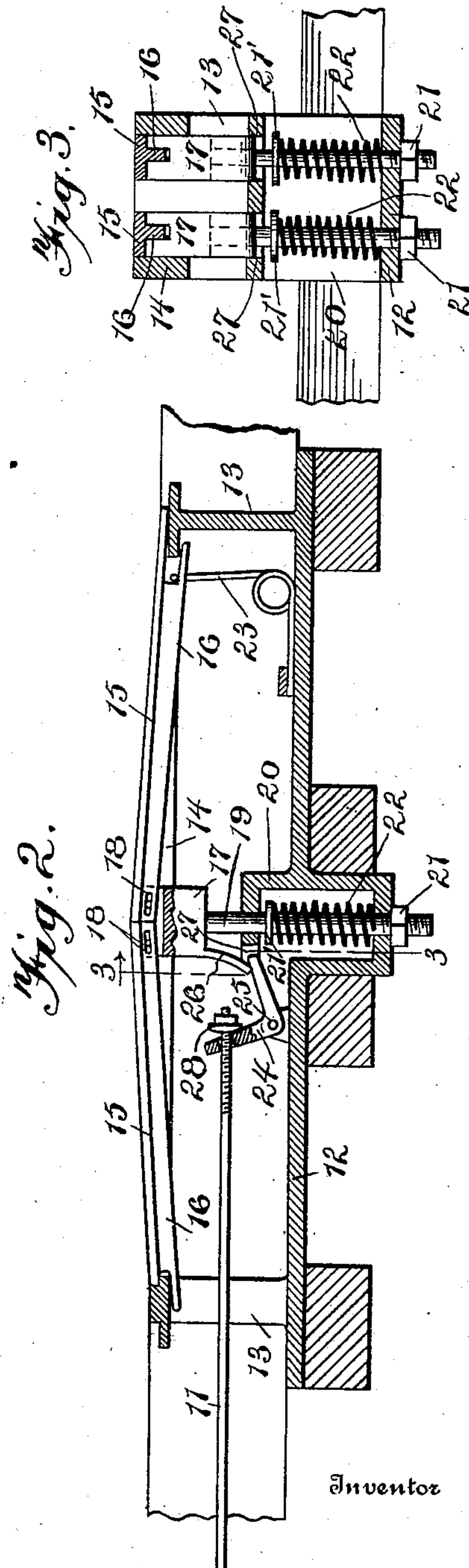
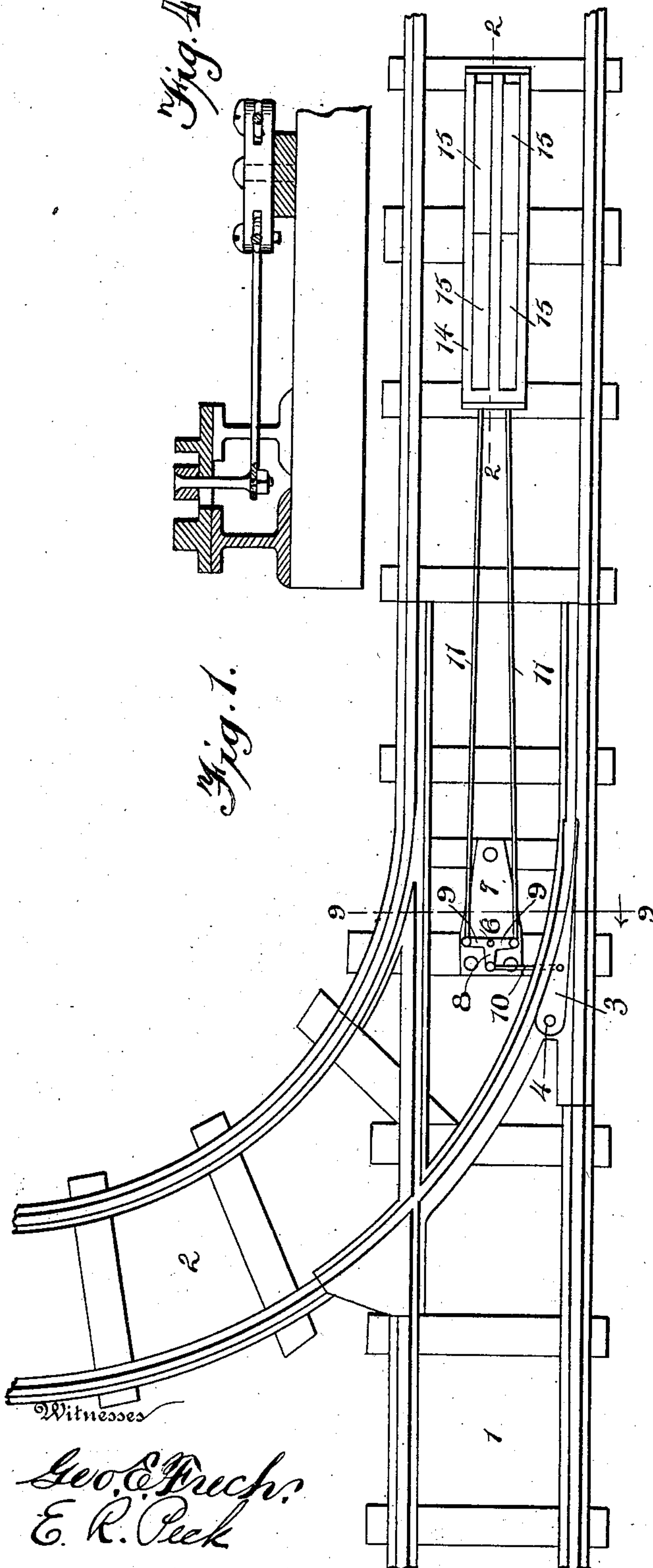
PATENTED APR. 7, 1903.

F. DAVISON.  
CAR OPERATED AUTOMATIC TRAMWAY SWITCH MECHANISM.

APPLICATION FILED MAR. 12, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses  
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Fig. 5.

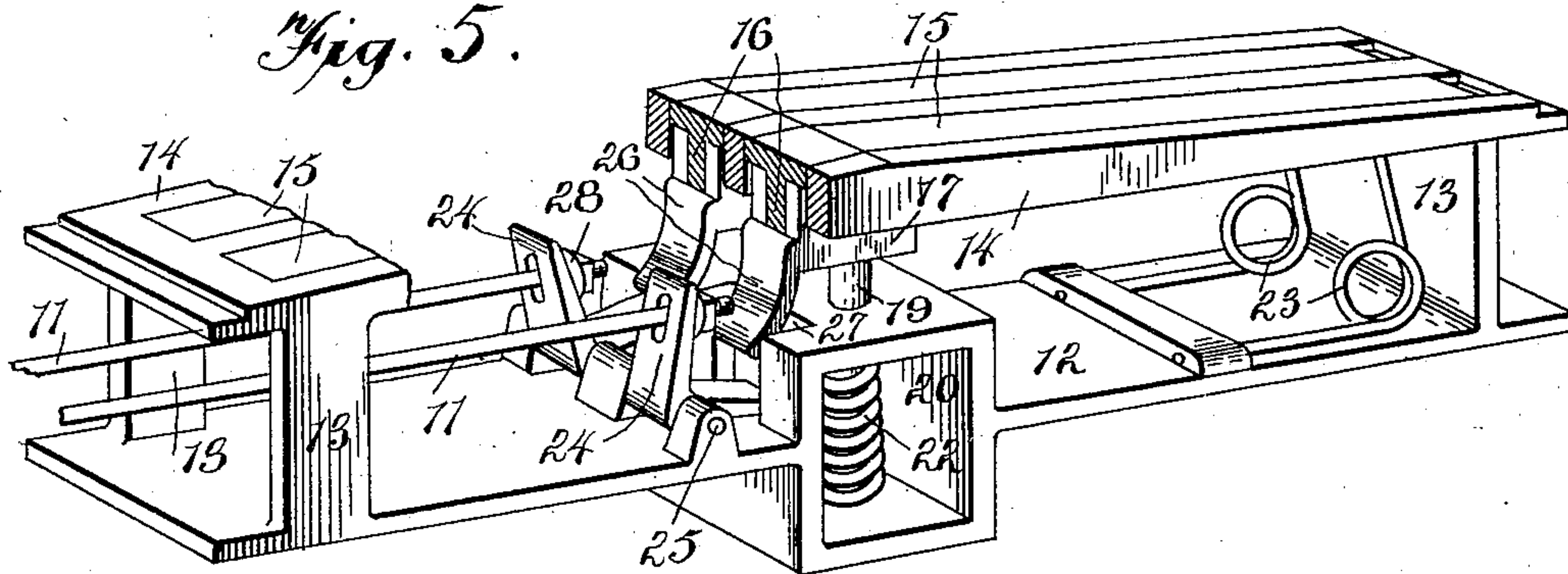
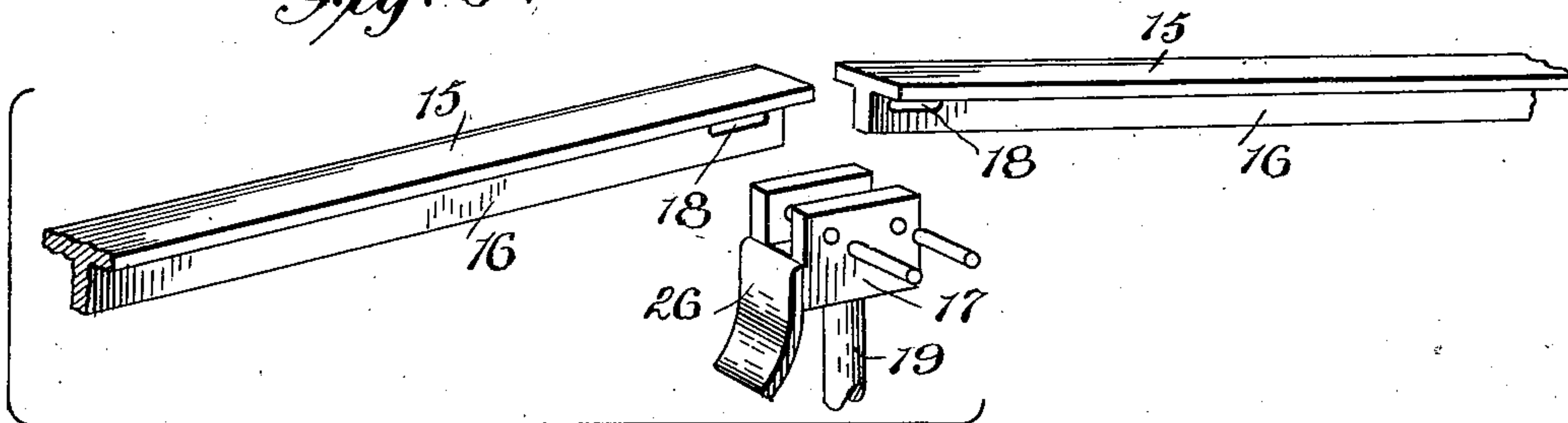


Fig. 6.



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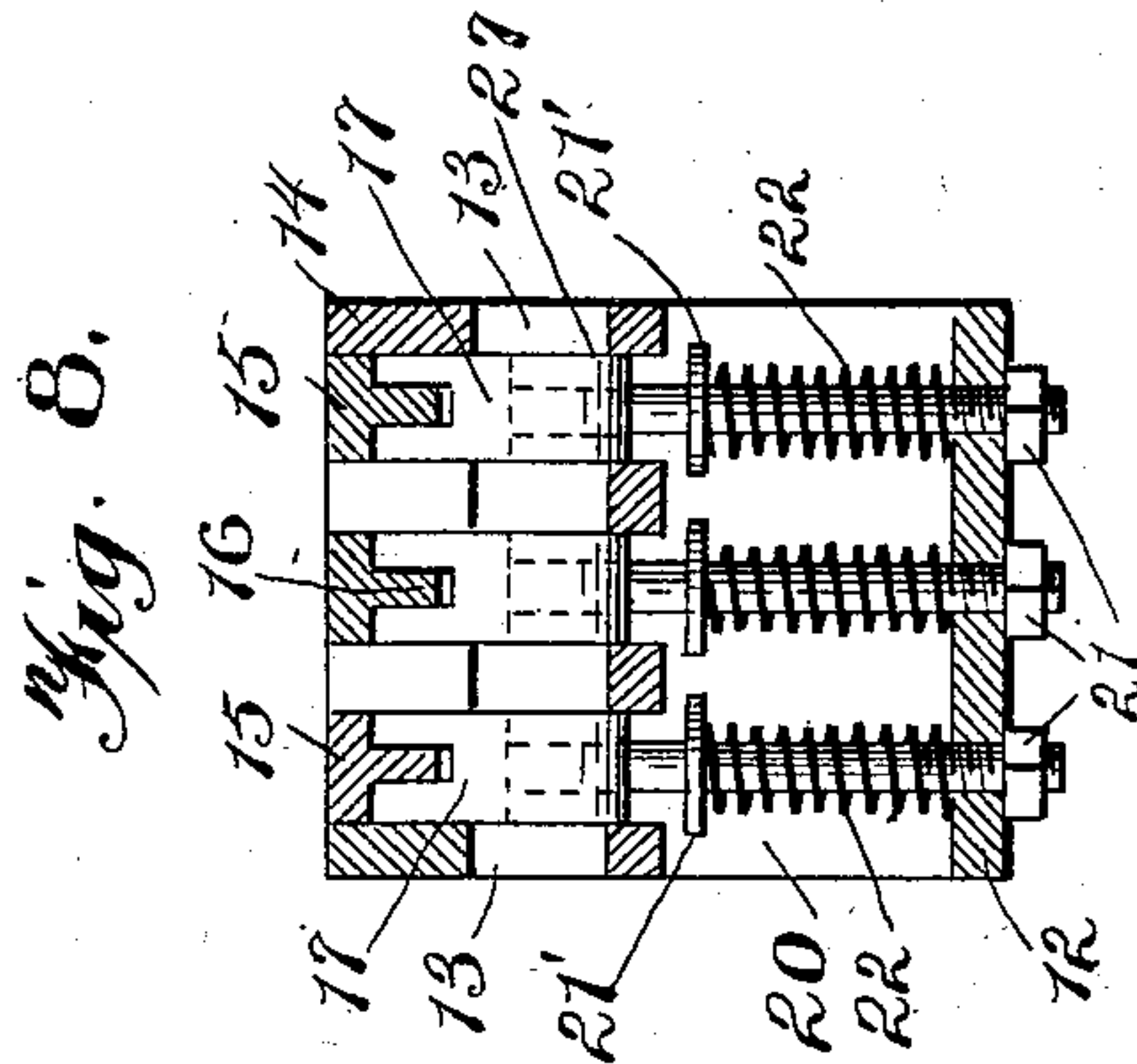
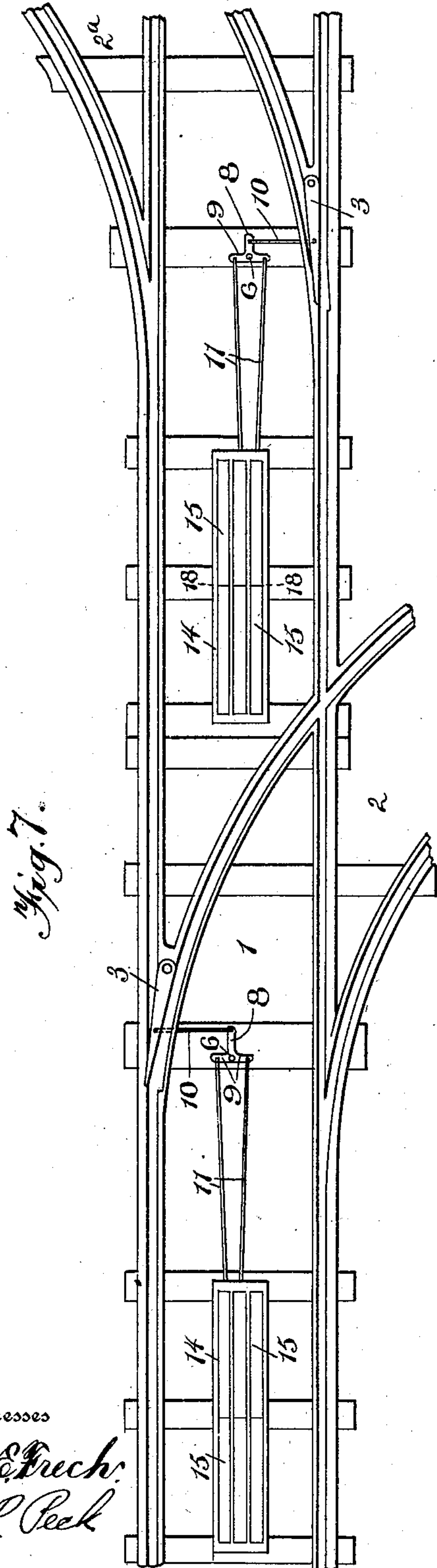
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NO MODEL.

3 SHEETS—SHEET 3.



Witnesses

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# UNITED STATES PATENT OFFICE.

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## CAR-OPERATED AUTOMATIC TRAMWAY-SWITCH MECHANISM.

SPECIFICATION forming part of Letters Patent No. 724,821, dated April 7, 1903.

Application filed March 12, 1902. Serial No. 97,903. (No model.)

*To all whom it may concern:*

Be it known that I, FRED DAVISON, a citizen of the United States, residing at Bath, Steuben county, State of New York, have invented certain new and useful Improvements in Car-Operated Automatic Tramway-Switch Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain improvements in automatic operating mechanisms for tramway-switches.

An object of the invention is to provide various improvements in the construction and arrangements of controlling mechanisms arranged along the road-bed for throwing the switch-point and adapted to be operated by suitable mechanism carried by a car.

The invention consists in certain novel features in construction and in combinations and in arrangements of parts, as more fully and particularly pointed out and specified hereinafter.

Referring to the accompanying drawings, which merely show constructions as examples for purposes of explanation from among other arrangements within the spirit and scope of my invention, Figure 1 is a plan view of a tramway-track, somewhat diagrammatical, showing a two-way-switch arrangement, the roadway or road-bed being removed to partially show the switch-point-operating mechanism. Fig. 2 is a vertical longitudinal section, enlarged, on the line 2 2, Fig. 1. Fig. 3 is a cross-section on the line 3 3, Fig. 2. Fig. 4 is a detail section, enlarged, in the plane of the line 9 9, Fig. 1. Fig. 5 is a detail detached perspective of the controller-framework, showing the surface plate and contact-toggles partially broken away. Fig. 6 is a detail perspective view showing the plates of a contact-toggle and the reciprocating head separated from each other and partially broken away. Fig. 7 is a plan view showing a section of main or straight track and one track branching to the right and another branching to the left and controller-frames for each switch-point, each controller-frame having three surface or toggle plates.

Fig. 8 is a cross-section, enlarged, on the line 18 18, Fig. 7.

In the drawings, 1 is the main track, and 2 the branch track or siding.

3 is the pivoted switch-point, arranged to form a two-way switch to engage the wheel-flanges and direct the wheels from the main line to the branch line or to permit the wheels to continue on the main track. The track arrangement and switch-point are of the common or any suitable construction and detailed explanation thereof is needless. It might, however, be remarked that the switch-point is fulcrumed at 4 and that a suitable support is provided therefor on which the point slides between a main-line rail and a branch rail, so that the switch-point can swing between said rails to bring its free end in engagement with either of said rails for the purpose intended. The switch-point is provided with the rigid depending pin or stud 5, located between its ends and depending through a suitably-formed transverse slot in the support on which the point slides. In actual construction and uses suitable chambers or casings (not here shown) are provided beneath the road-bed or road-surface to receive the operating connections and parts extending from the surface plates or depressible toggles located a distance along the track in advance of the switch-point.

A horizontally-disposed three-arm or T-lever is usually located between the rails adjacent to the switch-point and in a suitable chamber below the roadway-surface. This lever, as shown, is fulcrumed on the vertical stud 6 of a support 7, rigid with the ties or other foundation for the track and arranged to support and uphold said lever. One arm 8 of said lever extends approximately longitudinally of the main track or approximately parallel with the switch-point and is operatively connected with said switch-point by a suitable connection, such as rod 10, at one end pivotally joined in any suitable manner to said arm 8 of said three-armed lever and at its opposite end pivotally joined to the lower end of said depending stud 5 of the switch-point. The two arms 9 9 of said three-armed lever are arranged transversely of the length of the track and preferably at right



angles to said arm 8, and operating connections, such as two pull-rods 11 11, are pivotally joined to the extremities of said two arms 9 9, respectively. These pull connections 11 11 extend through suitable passages beneath the roadway-surface and along the track to a point the necessary or desired distance in advance of the switch where the operating or controller box or casing is located which carries or contains the controlling or operating mechanism for the switch-point. Said casing or box consists of a suitably-formed, strong, rigid, durable, and usually elongated framework set down in or depressed within the roadway, usually at a point between the rails of the track. The boxing or framework is usually provided with a horizontal base or plate 12, resting on and secured to the ties or other track-supports and rigid with sides or end uprights 13, also rigid with the longitudinal bars and end pieces of the top elongated guide-frame 14, located at the surface of the roadway. This top frame, in effect, constitutes and forms a rigid elongated surface plate inclined downwardly and longitudinally from its raised central portion and formed with longitudinal slots in which the exposed operating plates or toggles are located and move vertically. The controller-casing can be formed to receive one or more of said depressible or vertically-movable exposed operating elements or members; but in several figures of the drawings said casing is formed to receive two of said operating elements, which in the specific example illustrated are composed of toggle links or plates. The two toggles are similar and are connected to operate said pull connections 11 11, respectively. Each toggle consists of two elongated strong metal plates 15 15, arranged end to end and located longitudinally throughout the length of one of said slots in the top frame 14. The outer end of each plate 15 can be longitudinally bifurcated or slotted to receive the end pieces or bars of the top or surface frame 14, so that the outer end of each said plate 15 rests on the top face of an end piece of said frame, with a rigid portion of the end of said plate projecting beneath said end piece, whereby the outer ends of said plates 15 are held down and maintained in position and are properly guided in their movements. The under faces of said plates 15 forming the toggle are preferably formed with the longitudinal strengthening ribs or flanges 16. The two plates of each toggle are preferably joined at their inner adjoining ends by a vertically-disposed reciprocating and yieldingly-supported head 17, on which the inner ends of the two plates rest and by which the center of the toggle is yieldingly upheld in its normal elevated position, with its top face approximately flush with the top face of the rigid surface frame or plate 14. The upper end of this head 17 is vertically slotted to receive the flanges 16 of the two plates 15. Each flange within said head has a longitudinal slot 18. The plates

15 are loosely joined together and to the head by pins passed transversely through said head and through said slots 18. However, I do not wish to limit my invention to this specific manner of joining the toggle-plates, although, as at present advised, I consider it a desirable feature of construction whereby certain specific advantages are attained.

Each head 17 is provided with a rigid depending shank 19, passing loosely through the top and bottom walls of a rigid boxing 20, carried by the floor or base of the controller-framework, hereinbefore described. These walls of said boxing form guide for the reciprocating heads 17 and the shanks 19 thereof. The lower end of each shank 19 is shown provided with a stop 21, below the lower wall of the boxing, to limit the upward movement of the head 17.

22 22 are heavy or strong expansive coiled springs surrounding the shanks 19 and located between the top and bottom walls of said boxing. The lower end of each spring preferably bears against said bottom floor and the upper end of the spring against a stop 21', rigid with the shank. Each head (and the toggle resting thereon) is hence yieldingly supported and held up to its limit of upward movement by a strong spring, preferably of sufficient strength to uphold the toggles when vehicles pass over the same.

If desired, each toggle can be provided with an additional spring-support. For instance, I show springs 23 located within the frame beneath the toggles and each provided with an inwardly-pressing free end engaging the outer end of a toggle and tending to press the same inwardly, and hence tending to raise the center of the toggle. However, I do not wish to limit my invention to the employment of an additional spring-support for each toggle, although I may find it desirable to use additional spring-support.

Suitable operating connections are provided between each spring-held reciprocating head and a pull-rod 11, whereby depression of the head will move the rod longitudinally and swing the T-lever and move the switch-point. The toggles are preferably independent of each other in operation, and the same is also true in the specific example of the spring-held heads and the operative connections between the heads and pull-rods 11.

In the specific example illustrated each said operative connection between a pull-rod 11 and a reciprocating spring-held head consists of an angle-lever 24, fulcrumed at its angle on a horizontal shaft or rod 25 and having the upright arm through which a pull-rod loosely passes and the horizontally-disposed arm arranged beneath a part rigid with a reciprocating spring-held head. Usually the rigid boxing receiving the shanks of the reciprocating heads is vertically slotted to receive and permit the necessary swing of the angle-levers 24, and said slots can be continued upwardly through the top wall of the boxing to



receive the rigid depending arms or projections 26 of the said heads. If desired, each head can be provided with a rigid projection 26, arranged above the rearwardly-extending horizontal arm of the lever 24, actuated by said head and arranged to engage said arm of the lever as the head is forced down and swing the lever to move the pull connection longitudinally. The slot 27, heretofore described, in the boxing acts as a guide for the lever 24 and the depending strike-arm of the reciprocating head. Also the top wall of said boxing serves as a stop for the reciprocating heads to limit the downward movement thereof and of the toggles carried thereby.

The toggles are arranged side by side and parallel, and the spring-held reciprocating heads are also arranged parallel with each other. In the specific example illustrated the two angle-levers 24 are arranged side by side and independently mounted on the same horizontal cross shape or bar 25, carried by lugs or ears extending up from the floor or base of the controller-framework. Each pull-rod 11 passes loosely through the upright arm of its angle-lever, so as to move independently therethrough in one direction, and is provided with an adjustable stop, such as a nut 28, at the rear face of the arm of the lever, so that when the horizontal arm of the lever is depressed and the upright arm moves rearwardly the pull-rod will also be drawn in the same direction through the medium of the stop 28. When one pull-rod is thus drawn to throw the switch-point, the other pull-rod moves in the opposite direction, which is permitted, as the angle-levers are free to swing independently of the reciprocating heads when said heads are in their normal elevated positions. The arrangements of the parts are such that the depression of one toggle will throw the switch-point to the main-track rail, and hence deflect the car to the branch track, while the depression of the other toggle will throw the switch-point to the branch-track rail and leave the main track open for the passage of cars. The arrangements of parts to permit movement of the switch-point and pull connections independent of the operating-toggles and the supporting-heads thereof render it possible to swing or throw the switch-point by a passing car or by hand without disturbing the toggles. The act of depressing a toggle by the trip-arm or other device carried by the car simultaneously throws the switch-point and the toggle immediately returns to its normal position as the trip-arm passes beyond it without disturbing the position of the switch-point.

Usually the toggle which throws the switch-point to the right, for instance, is located on the right-hand side of the controller-framework and the toggle which throws the point to the left is located on the left-hand side of the framework or surface exposed plate of the controller-framework.

In the drawings the casings and the road-

way-surface covering over the switch-operating parts have been omitted to avoid confusion in illustration.

The cars movable on tracks equipped with switch-point-operating devices within the scope of my invention are provided with suitable trip or actuating devices, usually under the control of the motorman, arranged to engage and depress either one of the exposed operating-toggles set in the surface of the roadway without stopping the car, and hence avoiding the waste of time and annoyance of detaining the car while the motorman or conductor manually operates a switch.

According to my improved devices the motorman as his car approaches the switch and without stopping the car sets the trip or actuating device of his car to engage and depress the trip, which will throw the switch-point to direct his car in the direction desired.

Various actuating devices can be provided on the cars for actuating the switch-operating mechanisms substantially as hereinbefore described, and as at present advised I do not wish to limit my invention, relating to the switch-operating mechanism, to any particular actuating devices carried by the car.

I usually prefer to make the controller-boxes to what might be termed a "standard," as shown in Figs. 7 and 8—that is, with three operating toggles and heads—although but two toggles are required at any one switch-point. It will hence be observed that said controller-box is adapted for use in connection with switch-points at either right or left hand branches from the main or straight-ahead track. For instance, in Fig. 7 the controller-box is connected to operate the switch-point between the main track and the right-hand branch 2 and has only its central and left-hand toggles operatively connected with the switch-point, the right-hand toggle being "dead" and performing no function.

The same construction of three-toggle box is provided for the left-hand branch track 2<sup>a</sup> and is spaced between the rails the same as the first-mentioned box of said figure, but has its left-hand toggle out of action. The central toggle will open the main or straight track, while the right-hand toggle will close the main track and open the branch to the left.

It is evident that various changes and modifications might be resorted to without departing from the spirit and scope of my invention, and hence I do not wish to limit myself to the exact construction disclosed, but consider myself entitled to all such departures and variations as fall within the spirit and scope of my invention.

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

1. In combination, a switch-point, a T-lever arranged adjacent thereto and having one arm operatively connected with the switch-point to throw the same, two adjacent paral-



lel spring-upheld exposed surface toggles, independently operative, and operative connections between said toggles and the remaining arms of said lever, respectively, substantially as described.

2. In combination, a swinging switch-point and its support, said support having a transverse slot, a stud rigid with said point and depending through said slot, a support adjacent to the switch-point, a horizontally-disposed T-lever fulcrumed on said support, a stiff connection at one end pivotally joined to said stud and at its opposite end pivotally joined to the third arm of said lever, exposed independent depressible devices arranged along the track in advance of said switch-point, and independent operative connections between said devices and the corresponding arms of said lever, respectively, and each free to move in one direction independently of said devices, substantially as described.

3. In an automatic tramway-switch, the combination of a switch-point, exposed depressible yieldingly-upheld surface toggles adapted to be depressed by a member carried by a passing car, said toggles being independent of each other, and operative connections between said toggles, respectively, and pivotally joined to said switch-point, and comprising loose connections with said toggles arranged to permit swing of the switch-point independently of said toggles, and whereby the depression of one toggle will throw the switch-point independently of the other toggle, substantially as described.

4. In an automatic tramway-switch, the combination of a track and switch-point, a rigid controller-framework arranged along the track and provided with yieldingly-upheld depressible independent surface or exposed contacts, a switch-point-operating lever, swinging levers mounted in said framework and having separate pull connections to said point-operating lever, each lever operatively arranged with respect to a contact to be swung thereby on the depression of the contact to throw the switch-point, said levers being movable independently of the contacts when the same are in their normal elevated positions, substantially as described.

5. In combination, in an automatic tramway-switch, a switch-point and track, yieldingly-upheld independent depressible surface contacts, switch-point-operating swinging levers operatively connected with the switch-point to throw the same in opposite directions, pull connections connected with said levers to move in one direction independently thereof, said levers being normally movable independently of said contacts, and said contacts movable upwardly independently of said levers, each lever operatively arranged with respect to its contact to be swung to throw the switch-point on the depression of said contact, substantially as described.

6. In combination, a rigid framework, a sur-

face contact-toggle having the outer ends of its plates lapping the framework ends, a reciprocating yieldingly-upheld head located beneath and loosely confined to the meeting ends of the plates of the toggle, and operating connections arranged in operative relation to said head, substantially as described.

7. In combination, a rigid framework, a surface contact-toggle, a vertically-reciprocating head beneath the adjoining ends of the plates of the toggle, means loosely securing the adjoining ends of said plates to said head, a spring-support upholding said head and the toggle, a swinging member operatively arranged in relation to the head, and operating connections from said member, substantially as described.

8. In combination, a rigid framework having a slotted exposed surface plate and a base provided with a boxing, a surface contact-toggle located in the slot of said surface plate, a vertically-reciprocating head upholding the toggle and arranged under the joint thereof and movable through and guided by the walls of said boxing, and a spring yieldingly upholding said head and toggle, substantially as described.

9. In combination, a framework, a surface contact-toggle comprising plates arranged end to end and formed on their under surfaces with longitudinal flanges, a yielding upheld reciprocating head slotted to receive said flanges, and means loosely confining said flanges in said head and thereby connecting and forming the joint between the plates, substantially as described.

10. In combination, a framework having a surface plate and a base provided with a boxing, said boxing vertically slotted to form guides, angle-levers swinging in said slots, surface contact-toggles, and yieldingly-upheld heads upholding said toggles and slidable through said boxing and provided with portions movable in said slots to engage and swing said levers, substantially as described.

11. In a car-operated tramway-switch mechanism, a controller-box depressed in the road-bed, and provided with three independent exposed depressible members, each provided with independent operated mechanism, a switch-point, and operative connections from two of said mechanisms to throw the switch-point, the third mechanism and its member remaining dead, substantially as described.

12. In a car-operated tramway-switch-point-controlling mechanism, a controller-box adapted to be set in the road-bed and provided with a series of depressible exposed operating members, one of said members being dead, for the purpose described.

13. In a car-operated tramway-switch-point-controlling mechanism, the combination of a switch-point, several adjacent exposed depressible and yieldingly-upheld members, angle-levers controlled by the depression of said members, respectively, a switch-point-operating connection, and separate pull connec-



tions from said point-operating connection to said levers respectively, substantially as described.

14. In combination, a switch-point, an inclined longitudinally-slotted surface plate fixed along the track, exposed yieldingly-upheld depressible contact-toggles arranged in the slots of said plate, movable devices actuated by the depression of a toggle, and operative connections from said devices to the switch-point, substantially as described.

15. In combination, a switch-point, a slotted surface plate fixed along the track, exposed contact-toggles arranged in the slots of said plate, means yieldingly upholding said toggles with their jointed or intermediate portions elevated, movable devices actuated by the depression of said toggles, and operative connections between said devices and the switch-point, substantially as described.

16. In a switch-point-operating mechanism, in combination, a slotted surface plate, a contact-toggle arranged in the slot of said plate and having its outer ends lapping above and below the surface plate, means yieldingly upholding the central or intermediate portion of the toggle, and operating devices actuated by the depression of the toggle, substantially as described.

17. In combination, a switch-point, a depressible surface contact member, an angle-lever actuated thereby, and switch-point-operating connections comprising a pull-rod passing loosely through an arm of said lever and provided with a stop to be engaged by said arm when the lever is swung in one direction and permitting movement of the pull-rod in one direction independently of said lever, substantially as described.

18. In combination, a switch-point, a pair

of yieldingly-upheld independent depressible surface contact-plates, a pair of vertically-swinging angle-levers actuated by the depression of said plates, each contact-plate movable upwardly independently of its lever, and switch-point-operating connections comprising separate pull connections to said angle-levers, substantially as described.

19. In combination, a switch-point, a horizontally-disposed three-armed lever, an operative connection between the switch-point and the third arm of the lever, a pair of independent depressible contact-plates arranged along the track, a pair of vertically-swinging angle-levers actuated by the depression of said plates, means yieldingly upholding said plates, and pull connections from the corresponding arms of said lever to said angle-levers, substantially as described.

20. In combination, a switch-point, a depressible surface contact-plate, a vertically-reciprocating head supporting said plate, means yieldingly upholding said head and the plate, and switch-point-operating connections actuated by the downward movement of said head, substantially as described.

21. In combination, a switch-point, an exposed depressible contact-plate, a vertically-reciprocating head beneath said contact-plate, means yieldingly upholding said head and plate, a movable member actuated by the downward movement of said head, and operative connections between said member and said switch-point, substantially as described.

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

FRED DAVISON.

Witnesses:

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CHAS. A. SHIELDS.