

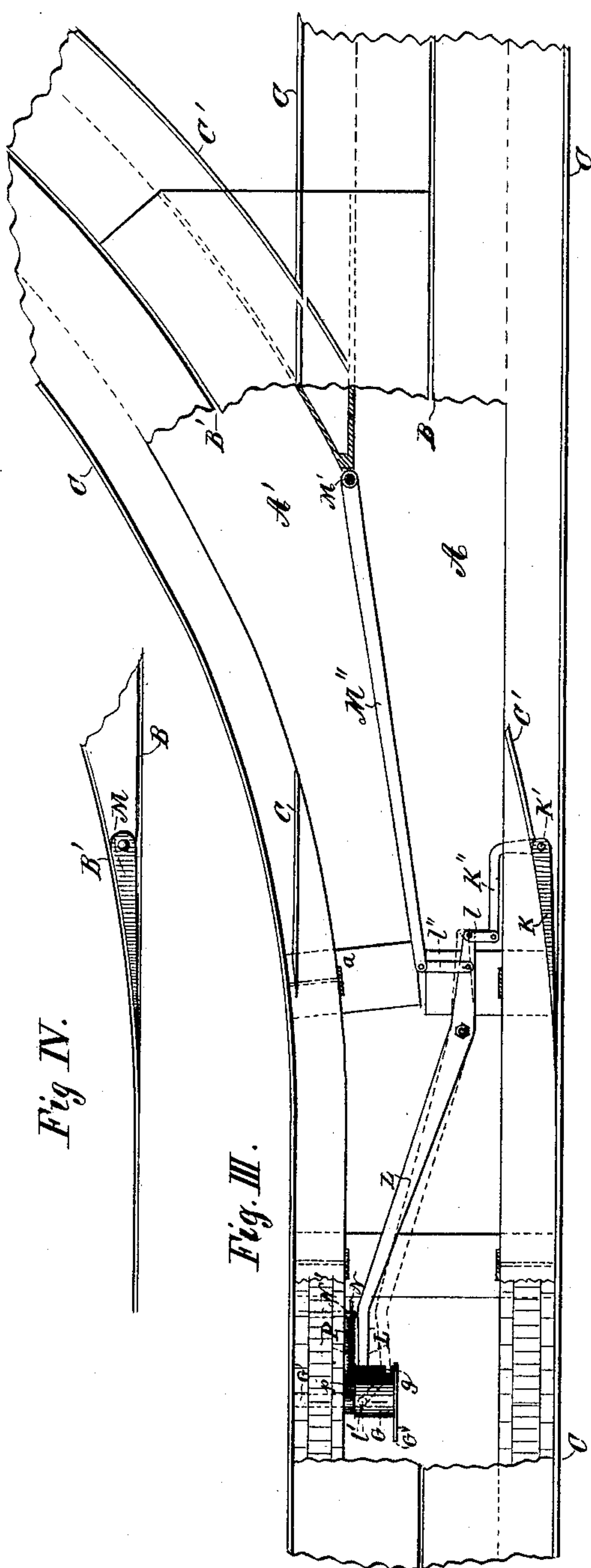
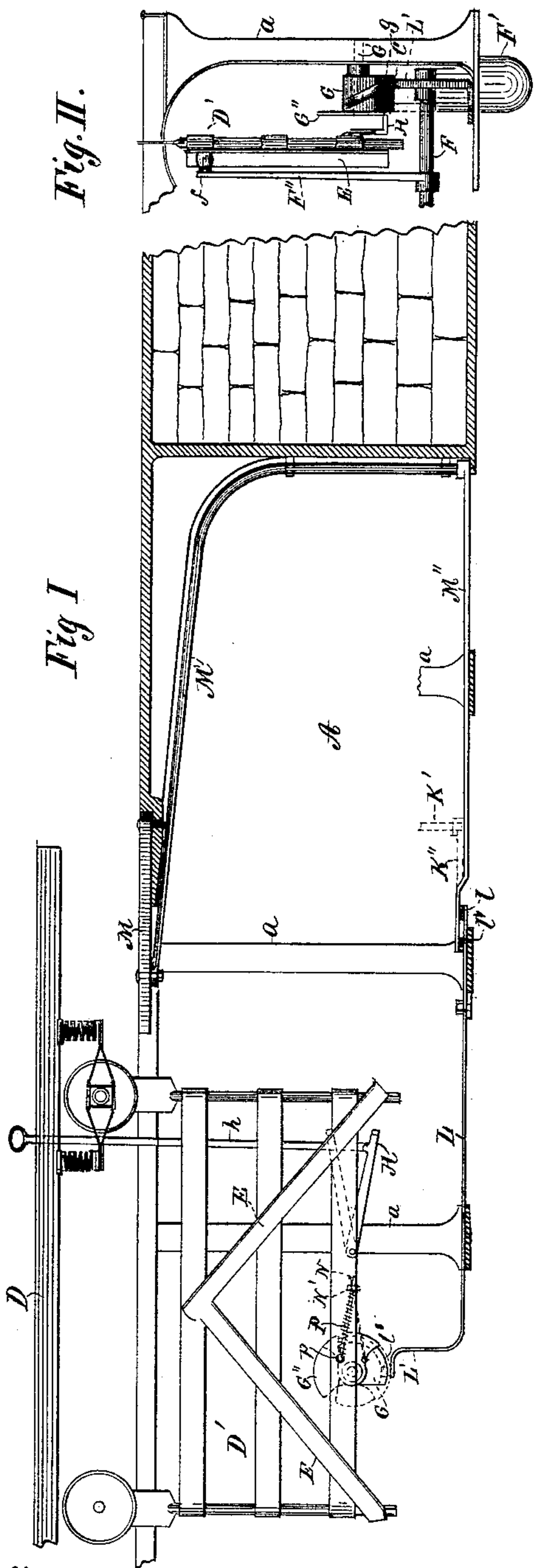
(No Model.)

W. L. JUDSON.

SWITCH FOR PNEUMATIC STREET RAILWAYS.

No. 406,915.

Patented July 16, 1889.



Witnesses

A. H. Opsahl.  
Emma F. Elmore.

Inventor  
Whitecomb L. Judson  
By his Attorney  
Jas. F. Williamson.



# UNITED STATES PATENT OFFICE.

WHITCOMB L. JUDSON, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO THE  
JUDSON PNEUMATIC RAILWAY COMPANY, OF SAME PLACE.

## SWITCH FOR PNEUMATIC STREET-RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 406,915, dated July 16, 1889.

Application filed April 2, 1888. Serial No. 269,326. (No model.)

*To all whom it may concern:*

Be it known that I, WHITCOMB L. JUDSON, a citizen of the United States, and a resident of the city of Minneapolis, county of Hennepin, State of Minnesota, have invented a certain new and useful Improvement in Switches for Pneumatic Street-Railways, of which the following is a specification, reference being had to the accompanying drawings.

My invention was designed more especially for use in connection with that system of pneumatic street-railways which is fully set forth in another application for Letters Patent filed of even date herewith, under Serial No. 269,325; and it consists of the mechanism hereinafter fully described, and particularly pointed out in the claims.

In the drawings, like letters referring to like parts throughout, Figure 1 is a longitudinal section of the conduit, showing the car and part of the switch mechanism in side elevation. Fig. 2 is a cross-section of part of the conduit, showing end elevation of the dependent part of the car and part of the switch mechanism. Fig. 3 is a plan view of the stationary part of the switch mechanism in position in the conduit, a part of the road-bed being removed; and Fig. 4 is a detail showing a part of the slot-switch detached.

By reference to my other application it will be seen that I employ in my system a series of stationary motors located in a conduit under the road-bed at definite distances apart, and a car having a dependent portion projecting through a slot in the conduit to the interior of the same, the motors being adapted to act on the car in succession through suitable converting and connecting mechanism.

A represents the main-line conduit, and A' a switch-section diverging from the same. Arch-shaped trusses *a* form part of the supporting-walls of the conduit.

B and B' represent the slots in the main-line and switch conduit, respectively.

C and C' are the rails of the main and side tracks.

D is the driving-car, and D' is the dependent portion of the same projecting into the conduit.

E is the A-shaped cam-track attached to the portion D'.

F is one of the series of rock-shafts.

F' is one of the series of stationary motors for driving said shafts, and F'' is a cam-lever provided with the cam-head *f*, adapted to traverse said track and propel the car.

G is a cam in shape like a quarter-segment of a circle mounted on the outer end of a short shaft G', projecting from bearings in one of the trusses *a*. The segment G is several inches in breadth on its periphery, and is provided with a slot or camway *g*, extending diagonally from one edge to the other. To the outer end of the segment G is rigidly attached a cam-plate G'', in shape approximately that of a half-circle segment, preferably curved inward on its radial edges. To the dependent portion of the car is pivoted a lever H, having on its outward end a lateral projection adapted to engage with the cam-plate G''. From the lever H an operating-connection *h* extends to within reach of the operator on the car for raising and lowering the projection.

At the point where the inner rail of the switch and the rail of the main line converge together is placed a switch-tongue K. This is rigidly secured to the upper end of a vertical shaft K', which is pivoted in fixed bearings located in the floor and arch of the conduit. Near its lower bearing the shaft K' is provided with a crank-arm K'', projecting first toward the center and then lengthwise of the conduit.

In the floor of the conduit is pivoted a switch-operating lever L, the short end of which is connected by a link *l* with the crank-arm K''. The long end of the lever L is provided with a vertical arm L', having a cam-head *l'*, fitting and movable in the cam-groove *g*.

At the point where the slots of the main line and the switch converge is a switch-tongue M, pivoted to the top of the conduit-arch. A crane-shaped lever M' has the outer end of its horizontal arm rigidly secured to the under side of the free end of the tongue M and its vertical arm held in bearings attached to the conduit-wall at the diverging point of the



tracks. To the lower end of the vertical arm of the lever M' is rigidly attached a crank-arm M'', extending lengthwise of the conduit into proximity to the short arm of the operating-lever L. A link l'' connects the two.

The operation is as follows: Normally, of course, the car takes the main track, and all the parts would then be in the position shown in dotted lines. But suppose the car is to take the side track. Then the parts will all be moved into the position shown in full lines. This is done by the projection striking the forward radial edge of the cam-plate G'', turning it and the segment G through a quarter-revolution, approximately. This produces a corresponding lateral movement of the operating-lever L, which, through the link l, crank K'', and shaft K', throws the track-tongue K in line with the switch-rail C', and, through the link l'', the crank-arm M'', and crane-lever M', throws the tongue M in line with the switch-conduit. If the next following car is to take the main track, the projection H' is raised to its dotted-line position, when it will strike the rear radial edge of the cam-plate G'', reversing all the parts and throwing the tongues K and M, respectively, in line with the main track and conduit. This construction, therefore, affords an automatic switch operated by the car itself. All that the operator on the car has to remember is that if the projection H' is in its lowermost position the car will always take the side track, and if raised to its uppermost position it will always remain on the main line.

N is a rod attached at one end to the segment-plate G'', above its center, and at the other held in a keeper N', secured to a fixed support—as the wall of the conduit.

The rod N is provided with a shoulder p, near the point of its connection to the segmental plate. A spiral spring P encircles this rod, and bears at one end against the shoulder p and at the other against the keeper N'. The function of this rod and spring is to keep the plate G'' pushed to its limit either above or below the center of its supporting-shaft. This prevents displacement.

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

1. In a system of surface street-railways having a slotted underground conduit for the propelling mechanism, the combination, with a car having a dependent portion projecting through said slot into the interior of the conduit, of a vertical shaft at the convergence of the switch and main rails, pivoted to swing in the horizontal plane, provided with a switch-tongue rigidly secured to the top of the same adapted to be thrown into line with either rail, a crank-arm on said shaft, a cam in the conduit in the path of the dependent portion of the car, and a connection from said cam to said crank-arm lever, substantially as described.

2. In a street-railway switch, the combina-

tion, with a car having a dependent portion, of a pivoted vertical shaft at the convergence of the main and switch rails, a switch-tongue rigidly secured to said shaft adapted to line with either rail, a crank-arm on said shaft, a segmental cam mounted on a fixed shaft in the path of the dependent portion of the car and provided with a diagonal cam-groove in its periphery, a pivoted horizontal lever arranged lengthwise of the car-track, a link connecting one end of the same with the crank-arm on said vertical shaft, and a vertical arm on the other end having a cam-head working in said cam-groove, substantially as described.

3. In a street-railway switch, the combination, with a car having a dependent portion, of a pivoted vertical shaft at the convergence of the rails, a switch-tongue rigidly secured to the same, a crank-arm on said shaft, a segmental cam mounted on a shaft fixed adjacent to the path of the dependent portion of the car and provided with a diagonal cam-groove on its periphery, a lateral projection on the dependent portion of the car adapted to engage with said plate, a pivoted horizontal lever arranged lengthwise of the car-track, and having a cam-arm at one end provided with cam-head working in said cam-groove, and a link connecting the other end of said horizontal lever with the crank-arm on said vertical shaft, substantially as described.

4. In a system of surface street-railways having a slotted underground conduit for the car-propelling mechanism, the combination, with a car having a dependent portion, of a pivoted slot switch-tongue at the convergence of the main line and switch-slots adapted to align with either, a crane-shaped lever mounted in bearings within said conduit, and having one arm attached to the free end of said switch-tongue, a cam in the path of the dependent portion of the car, and a connection from said cam to said crane-shaped lever, substantially as described.

5. In a system of surface street-railways having a slotted underground conduit for the car-propelling mechanism, the combination, with a car having a dependent portion projecting into said conduit, of a pivoted switch-tongue at the convergence of the slots, a crane-shaped lever having its vertical arm pivoted within the conduit at the divergence of the tracks and its horizontal arm attached to said tongue, a crank-lever on said vertical arm, a segmental cam mounted on a shaft fixed in the conduit adjacent to the path of the dependent portion of the car, and having a cam-groove on its periphery and an adjustable lateral projection on the dependent part of the car, a horizontal lever pivotally secured near the bed of the conduit, a cam-arm on one end of the same provided with a cam-



head working in said groove, and a link connecting its other end with said crank-lever, substantially as described.

5 6. In street-railways having slotted underground power-conduits, the combination, with the car having a dependent portion, of pivoted rail and slot tongues at the convergence of the main and branch rails and slots respectively, vertical horizontally-pivoted shafts  
10 supported within the conduit, having their upper ends directly attached to said pivoted tongues, crank-arms on said shafts, a cam within the conduit in the path of the dependent portion of the car, and connections  
15 from said cam to the crank-arms of said shafts, substantially as described.

7. In street-railways having slotted underground power-conduits, the combination, with

a car having a dependent portion, of a vertical horizontally-pivoted shaft at the convergence of the branch and main rails, having a switch-rail rigidly attached thereto, and provided with a crank-arm within the conduit, a pivoted slot-tongue at the convergence of main and branch slots, a vertical crane-  
25 shaped lever within the conduit at the convergence of the lines, having its free end attached to said slot-tongue and provided with a crank-arm, a cam within the conduit in the path of the dependent portion of the car, and  
30 connections from said cam to said crank-arms, substantially as described.

WHITCOMB L. JUDSON.

In presence of—

HARRY L. EARLE,

JAS. F. WILLIAMSON.