

(No Model.)

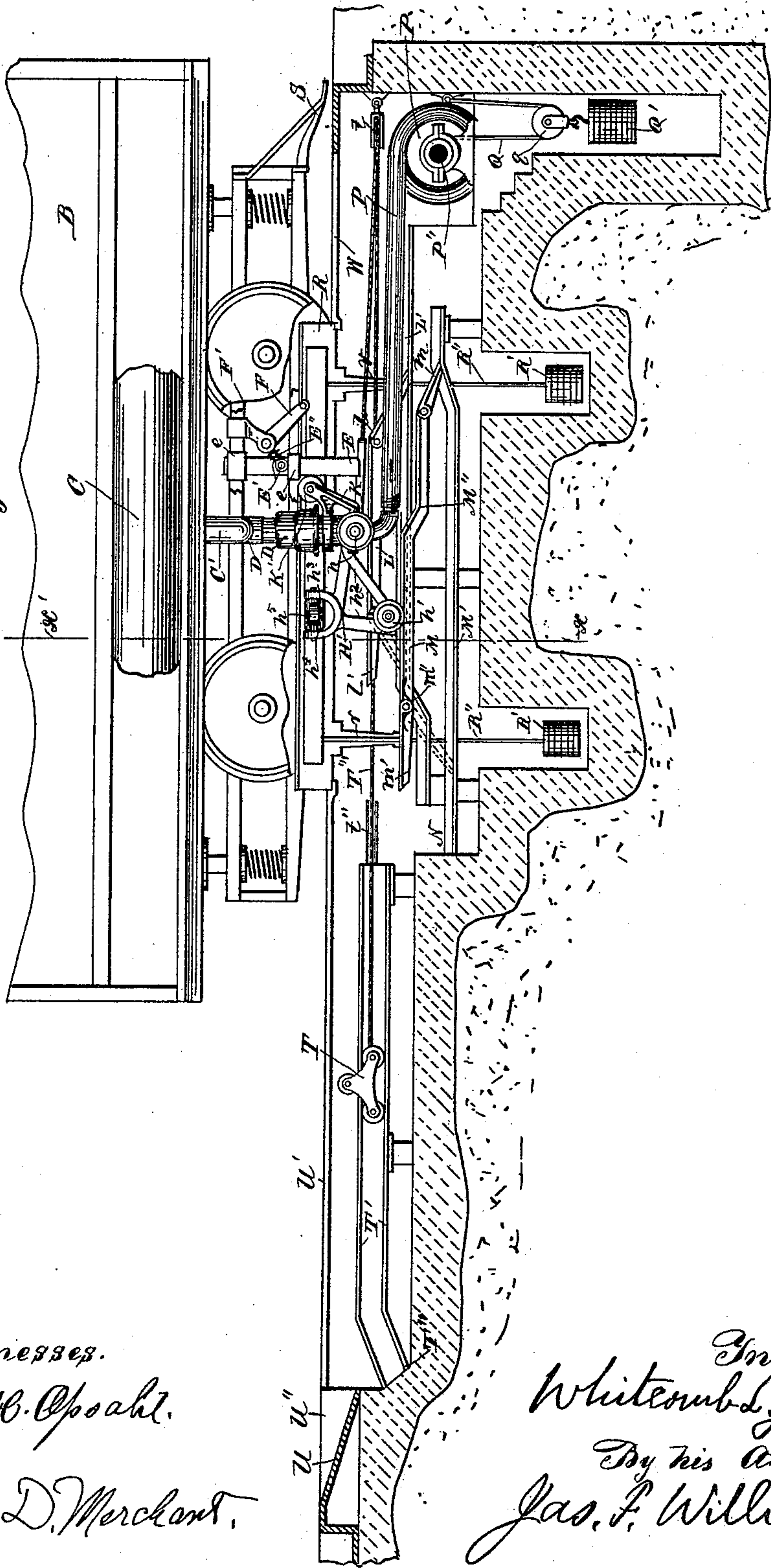
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W. L. JUDSON.  
STREET RAILWAY.

No. 464,615.

Patented Dec. 8, 1891.

Fig. 1.



Witnesses.

A. B. C. O. O. O. O.

R. D. Merchant.

Inventor.

Whitecomb L. Judson

By his Attorney.

Jas. F. Williamson

(No Model.)

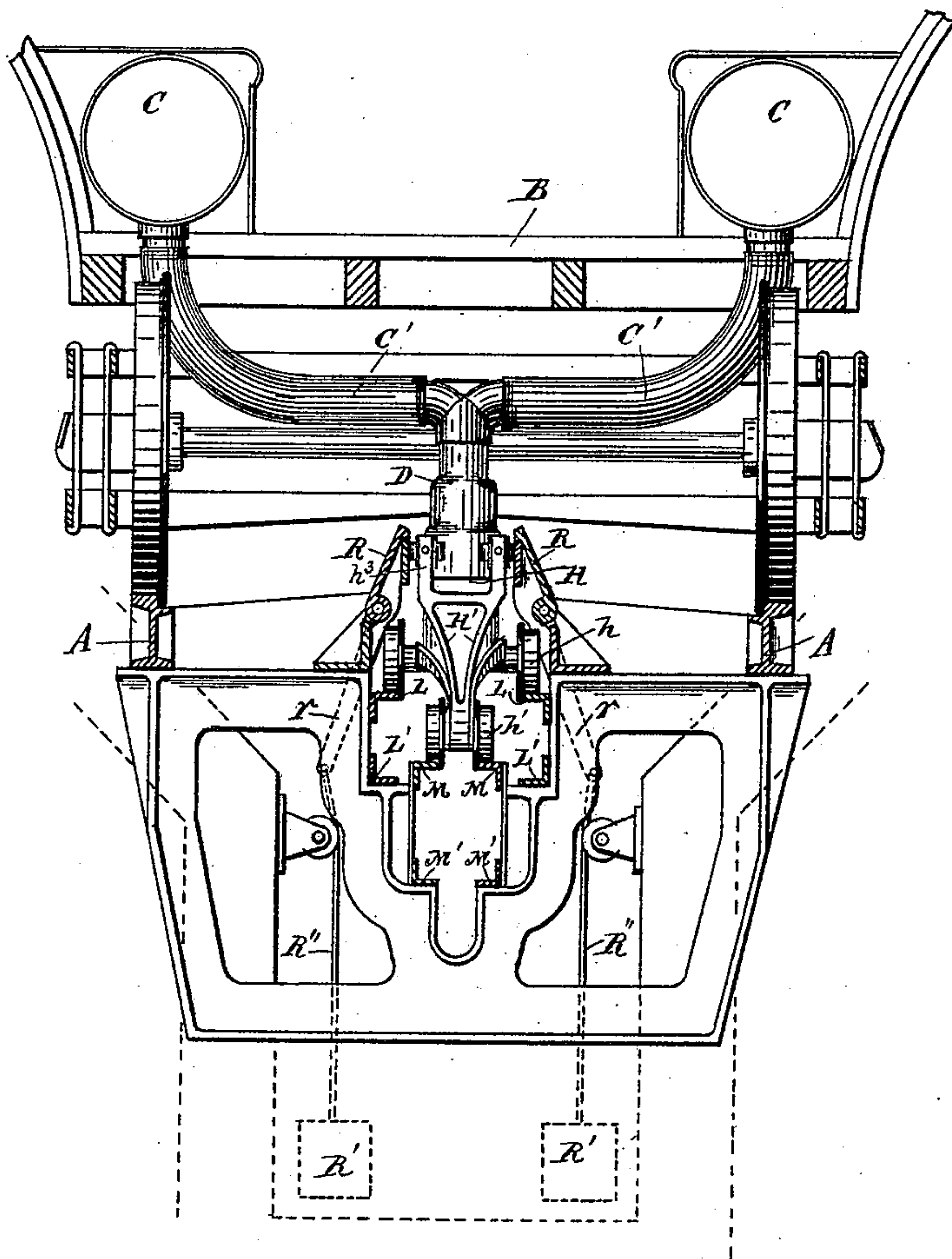
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W. L. JUDSON.  
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Patented Dec. 8, 1891.

*Fig. 2.*



*Witnesses.*

*Asb. Cpsahl.*

*Frank D. Merchant.*

*Inventor.*

*Whitecomb L. Judson*

*By his Attorney.*

*Jas. F. Williamson*

(No Model.)

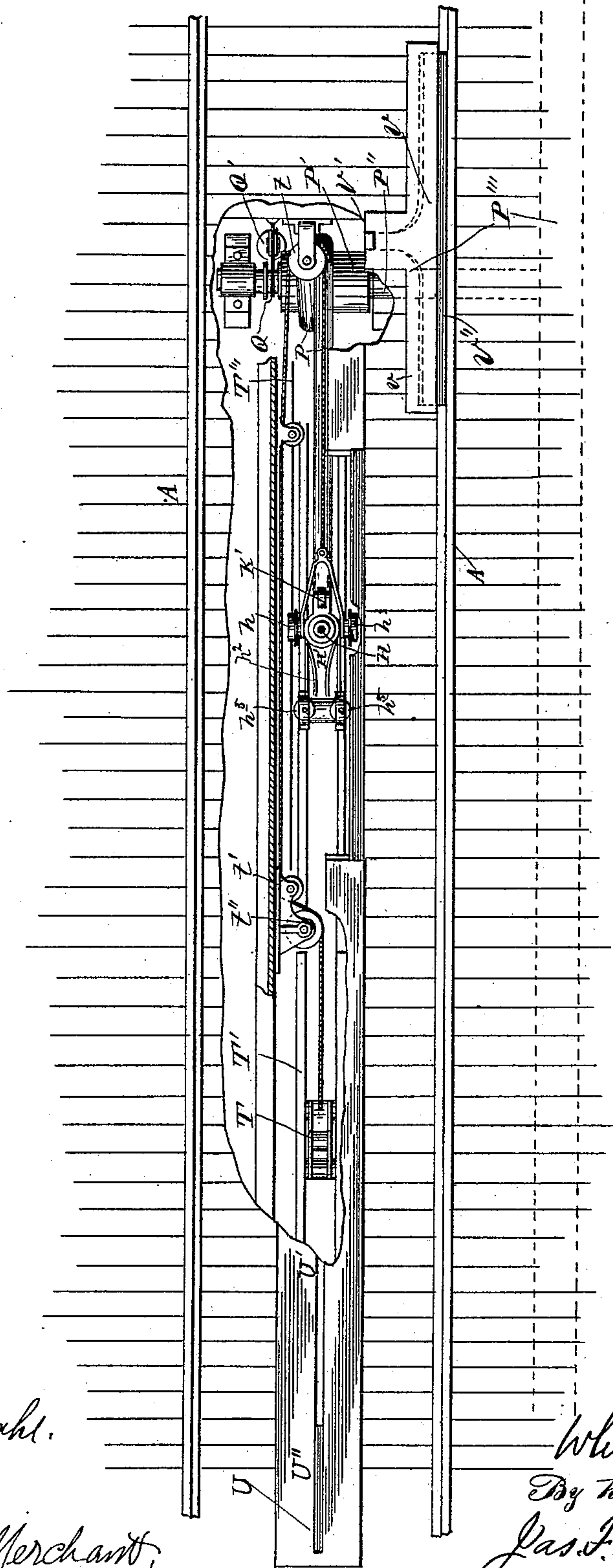
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W. L. JUDSON.  
STREET RAILWAY.

No. 464,615.

Patented Dec. 8, 1891.

Fig. 3.



Witnesses:

A. B. Osahl.

Frank D. Merchant.

Inventor.

Whitecomb L. Judson

By his Attorney.

Gas. F. Williamson



(No Model.)

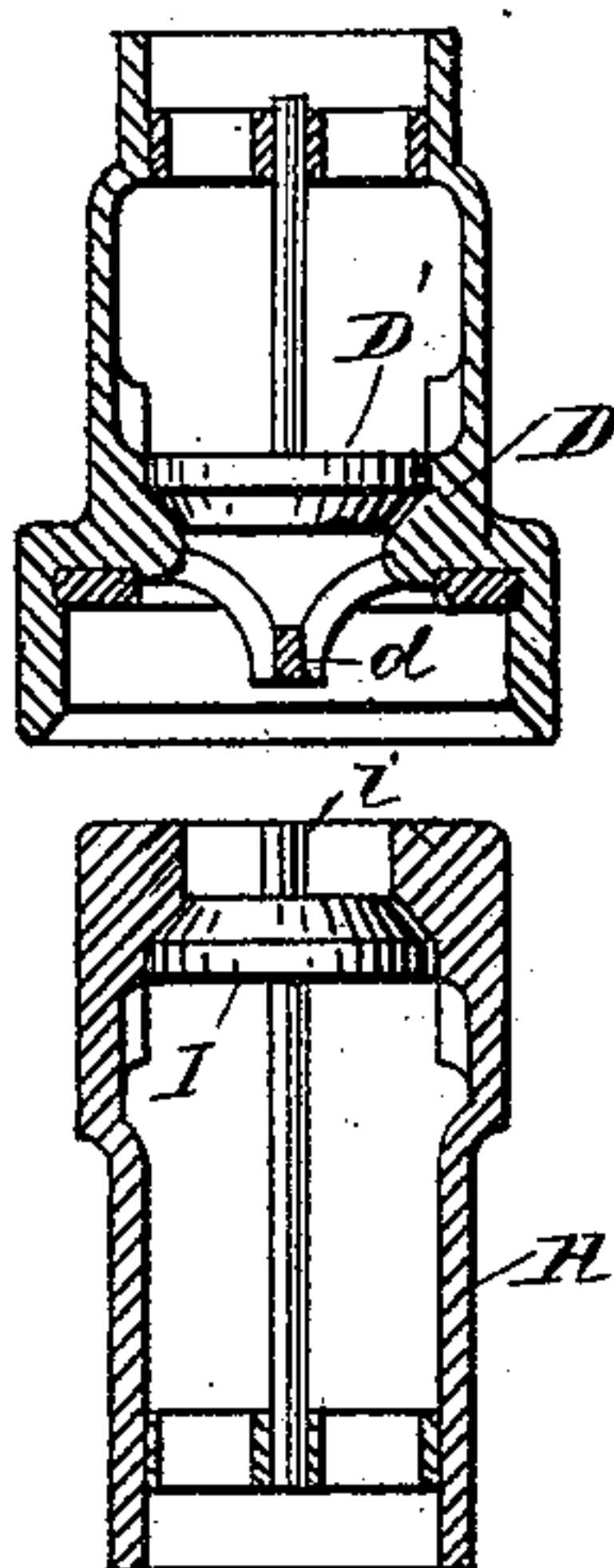
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W. L. JUDSON.  
STREET RAILWAY.

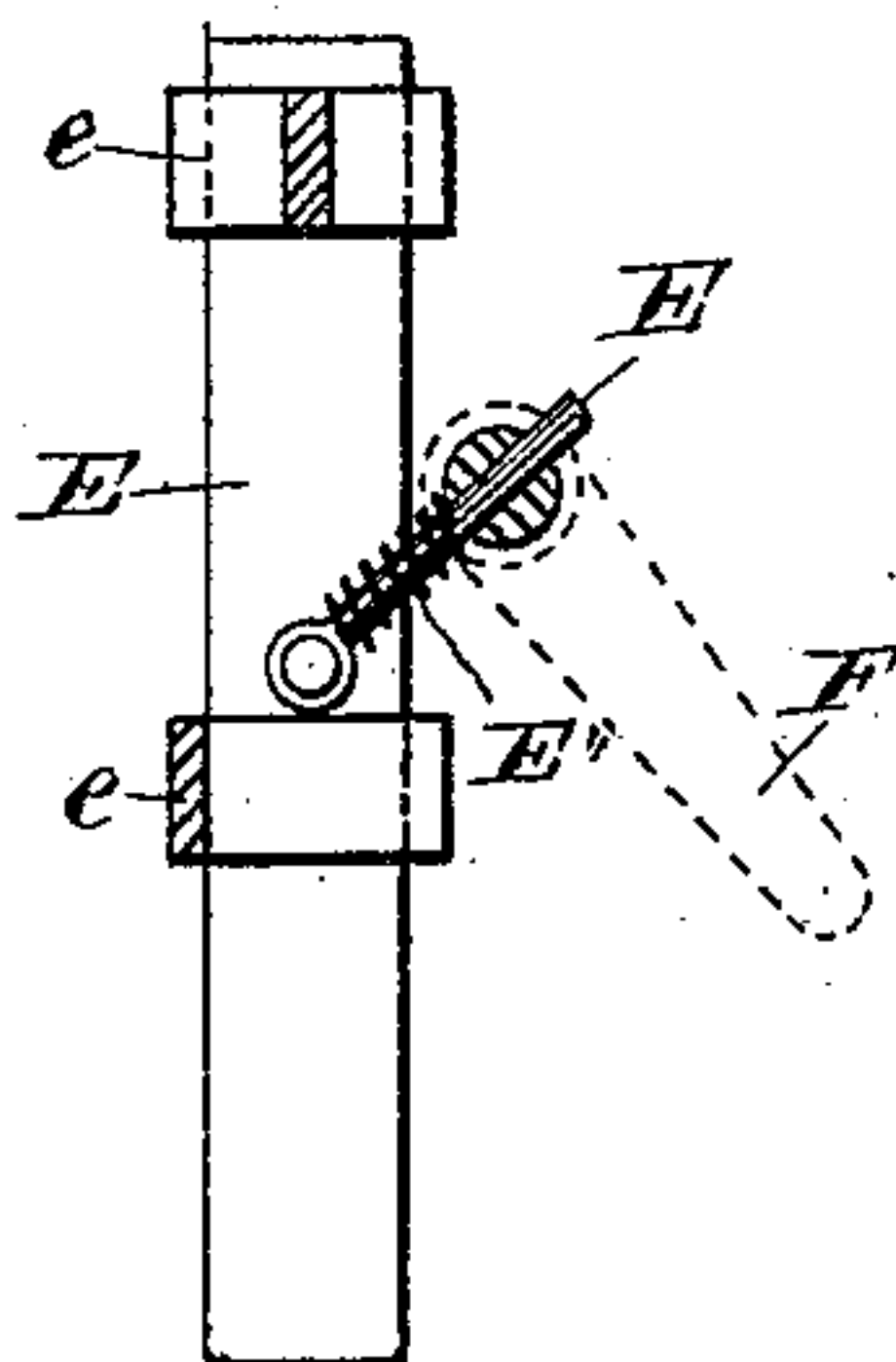
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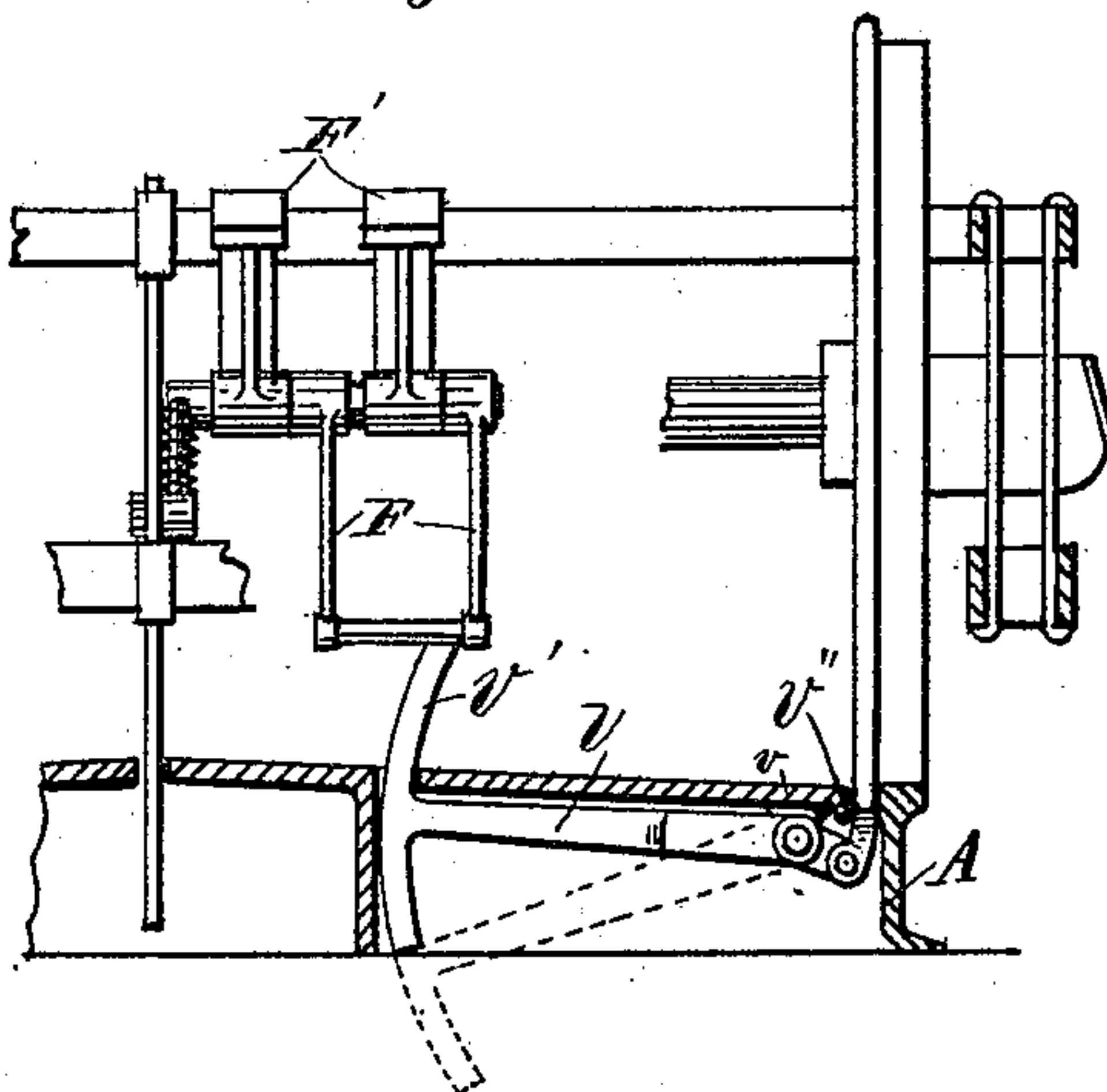
*Fig. 4.*



*Fig. 5.*



*Fig. 6.*



Witnesses

*A. M. Opsohl*

*Frank D. Merchant*

Inventor.

*Whitecomb L. Judson*

By his Attorney.

*Jas. P. Williamson*

# UNITED STATES PATENT OFFICE.

WHITCOMB L. JUDSON, OF NEW YORK, N. Y.

## STREET-RAILWAY.

SPECIFICATION forming part of Letters Patent No. 464,615, dated December 8, 1891.

Application filed September 25, 1890. Serial No. 366,164. (No model.)

*To all whom it may concern:*

Be it known that I, WHITCOMB L. JUDSON, a citizen of the United States, residing at New York, in the county of New York, and State of New York, have invented certain new and useful Improvements in Street-Railways; 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.

My invention relates to that class of street-cars wherein the propelling mechanism is carried on the car and is actuated by air, gas, or liquid under pressure contained in a receiver on the car, which is recharged at suitable intervals along the line of travel.

My invention is especially designed for what may be called the "air-storage" system, wherein compressed air is used as the motive power, the receivers being of comparatively small size and adapted to receive charges at frequent intervals.

My invention is more particularly directed to the charging mechanism. An air-main extends along the entire line of the car's travel and is supplied with air under pressure from suitable pumping-stations or a general central station. When constructed for surface-roads, pits are placed at the desired intervals of a sufficient depth to receive the charging mechanism, and may be of sufficient length to allow the charge to be made while the car is in motion. The pit is covered by a pair of trap-doors automatically opened by the car. Horizontally lengthwise of the pit extends a pair of trolley-tracks constructed in upper and lower fixed sections, the upper of which has a pair of pivoted rails at its extremities for permitting a trolley to pass from one track to the other. The upper track is adapted to raise the trolley under the direction of the forward movement of the car and for convenience may be called the "charging-section." The lower track is adapted to permit the trolley to be returned to its normal position, and may be called the "return-section." Spring-seated on the trolley is a valved nozzle with a convex head, which may be termed the "charging-nozzle." It is supported in a vertical position, or, more broadly, in line with the receiving-nozzle carried by the car. This charging-nozzle is connected to the air-main

by a flexible section of sufficient length to permit the nozzle to be moved a sufficient distance to make the charge. On the car is a valved bell-mouthed nozzle, which is adapted to register with the charging-nozzle, and may be called the "receiving-nozzle," before noted. To effect this registration, there is placed on the car, parallel with the receiving-nozzle, a vertically-movable guide, which, when in its lowermost position, is adapted to engage with a guiding arm or projection on the trolley and by co-operation therewith carries forward and upward the trolley, with the nozzle, and guides the two nozzles into perfect union. This guide is automatically set by a projection thrown upward from the track by the tread of the wheel in co-operation with a pivoted trip-lever carried by the car, which on striking the projection forces the guide into its lowermost position. The guide is returned to its uppermost and normal position by an inclined surface cam at the foot of the pit. It is held in either position at which it may be set by a spring, the line of whose resistance is shifted by the pivoted lever. The trolley, when at the end of its forward or outgoing movement, passes onto one of the pivoted sections of the upper trolley-tracks and by its weight forces the pivoted section into an inclined position, which allows it to pass forward into a pocket provided on the lower track for that purpose. These outmost pivoted sections are spring-supported, and after the trolley has passed into the pocket return to their normal position on the level with the body of the upper track. The trolley is then free to return on the lower tracks. The pivoted sections at the head of the track are without springs and take the incline as their normal position. The trolley on its return movement lifts the pivoted sections or pawls and passes by the same.

The valve in the charging-nozzle is opened by the gravity of the car and closed by the pressure of the air. For this purpose the bell-mouthed nozzle on the car has a downwardly-projecting bridge, and the valve on the charging-nozzle has an extended stem, which engages with the bridge to open the valve. The pressure in the main, being greater than that in the receiver on the car, will open the valve on the receiving-nozzle and hold it



open until the pressures are equal. The trap-doors are opened by the trolley, which is of a special construction adapted to the purpose. Part of the trolley moves in advance of the nozzle, and by a jog in its track is raised before the nozzle starts to rise, thus opening the trap-doors. The trolley is also so constructed that it holds the traps open until it has moved to the limit of its track when they close by gravity. The charging-nozzle is maintained in a vertical position when approaching the charging-point of registration with the receiving-nozzle in virtue of its position on the trolley and the relative location of the trolley on its tracks.

The flexible section of hose which connects the charging-nozzle with the air-main is wound upon a drum provided with hollow journals in communication with the main by a suitable stuffing-box section. As the trolley moves forward the flexible section is unwound from the drum, and when it is returned a weight rewinds it onto the drum into its normal position. The trolley is returned to its normal position by a cable connected to the trolley at one end passing over a sheave at the head of the pit, other guide-sheaves at the foot of the pit, and connected at its outer end to a traveler mounted on a track extended beyond the foot of the pit. When the car has passed the charging-point, the movable guide strikes the traveler, moving it forward to its limit, where it drops into a pocket, clearing the guide. This forward movement of the traveler pulls back the trolley. The traveler remains in its pocket at the foot of its track until the trolley is carried up into its charging position and to its limit by the next car, which thereby, through the same cable and sheaves, returns the traveler to its normal position. When the car passes beyond the traveler's track, the movable guide strikes an inclined cam-surface and is thereby restored to its normal position. To operate this guide, a projection is thrown up in the track. This is done by pivoting the same to a fixed support adjacent to one of the rails and providing the same with an extension adapted to be engaged by the flange of the wheel. The inner flange of the rail is cut away in order to permit this extension to come into the proper position to be engaged by the flange of the wheel. The pivoted arm is segment-shaped, and its segment portion passes up through a suitable slot in a bed-plate placed between the rails. When the car has passed, the pivoted projection or stop-lever will fall to its normal position by its own weight.

The construction of the car, the charging and the receiving nozzles, and the arrangement for setting the movable guide on the car from the flange of the car-wheel are all substantially identical with the construction shown and described in another application made by me of even date herewith under Serial No. 366,163.

The principal points of difference in this ap-

plication lie in the particular construction of the trolley and its tracks, whereby it is made to open and hold open the traps, in the mechanism for returning the trolley to its normal position, and in the support of the flexible section of the air-tube.

A device is also added to the car for insuring the closing of the traps by positive action in case of failure to close by gravity.

The invention is illustrated in the accompanying drawings, wherein like letters refer to like parts throughout.

Figure 1 is a sectional elevation through one of the charging-pits, showing the car in charging position. Fig. 2 is a cross-section of the same on the line X X' of Fig. 1, looking from the front. Fig. 3 is a plan of part of the road-bed with some parts of the charging mechanism in position. Fig. 4 is a detail in section of the nozzles and their valves. Fig. 5 is a detail showing the connection of the movable guide to the pivoted lever on the car. Fig. 6 is a sectional elevation of a part of the road-bed and one of the car-trucks, showing the pivoted projection.

A are the track-rails.

B is the car.

C are the receivers, arranged under the seats and connected by a cross-pipe C'.

D is the receiving-nozzle, fixed to pipe c'. D' is its valve, and d its projecting bridge.

E is the movable guide, mounted in straps e, fixed to the frame parallel with the receiving-nozzle.

F is the pivoted trip-lever, having its pivotal shaft mounted in hangers F'.

E' is the connecting-rod, pivoted to the guide E at one end and having its free end working through a transverse hole in the shaft of the lever F. E'' is the resistance-spring on the same.

H is the charging-nozzle on trolley H'.

I is the valve in the charging-nozzle, provided with extended stem I'.

The trolley is composed of two pairs of small trucks  $h$  and  $h'$ , respectively. Of these the rear pair, directly over which is placed the charging-nozzle, are on the extremities of a longer axle. The two are connected by a triangular-shaped frame  $h^2$ . The point of the triangle is provided with upwardly-projecting arms  $h^3$ , in each of which is a pivoted yoke  $h^4$ . In the yoke  $h^4$  is pivoted a small wheel  $h^5$ . This yoke can turn on its pivots through ninety degrees. Hence the wheel  $h^5$  may have a caster-like movement on the frame  $h^2$ .

K is the guiding-arm, fixed to the trolley and provided with an anti-friction roller K' for co-operation with the movable guide E on the car.

L L' are the upper and lower tracks for the rear trucks of the trolley.

M and M' are the pair of upper and lower tracks for the forward truck of the trolley. The upper tracks of each pair are provided at their heads with pivoted sections  $l$  and  $m$ ,



respectively, and at the foot of the pit with like pivoted sections  $l'$  and  $m'$ , respectively, upheld by springs, one of which is shown at  $m''$ . The lower tracks are extended far enough beyond the upper tracks at the foot of the pit to provide a pocket N for the trolley. The upper tracks for the front of the truck of the trolley are provided with a jog  $M''$  near the head of the pit, for purpose hereinafter named.

P is the flexible section, connecting the charging-nozzle with the air-main through the hollow shaft of the drum  $P'$ , located at the head of the pit, to which it is connected. The shaft of the drum  $P'$  connects with the air-main  $P'''$  through a stuffing-box  $P''$ . The air-main extends along the entire line of travel and is supplied with air under pressure from a pumping station or stations.

Q is a small cable fixed at one end to the vertical wall of the pit adjacent to the drum and wound on the hub of the drum at its other end.

Q' is the weight, attached to a sheave q, mounted upon the cable Q. This weight winds up the flexible section on the return of the trolley to its normal position.

R R are the trap-doors, provided with angular or crank-arm extensions  $r$ , to which are weights  $R'$  attached by cables  $R''$ . These weights are not sufficient to overcome the weight of the pit portions of the traps, but assist to hold the same up and to some extent relieve the lifting strain on the trolley.

S is the plow-shaped projection, attached to the rear of the truck at such a level as to engage the tops of the traps and force them to close in case they fail to shut by their own weight.

T is the traveler, and T' its track, located in an extension from the foot of the main pit.

T'' is a pocket at the foot of the traveler-track.

T''' is a cable for returning the trolley and traveler to their normal positions, attached at one end to the rear of the trolley and at the other to the rear of the traveler and passing over suitable guide-sheaves  $t' t'' t'''$ , located at the head and foot of the pit, respectively.

U is the inclined cam, located at the foot of the traveler-track under a slotted bed-plate U'' for raising the movable guide E. The bed-plate U' extends to the head of the main pit as a cover for the traveler-track T'.

V is the pivoted stop or projection, located in the road-bed for co-operation with the trip-lever F. It is pivoted to a suitable support near the rail, and its free end is provided with a segment-like extension V', which passes up through a suitable bed-plate v, located in the road-bed.

V'' is the extension of the stop, projecting into the path of the wheel-flange, the rail having its inner flange cut away at that point for the purpose.

Suitable man-holes (not shown) may be provided for access to the pit. At the head of

the pit, over the normal location of the trolley, is located a slotted plate W.

The operation is as follows: Upon the wheel-flange striking the pivoted projection in the roadway its outer arm is thrown up and is engaged by the pivoted lever on the car. The pivoted lever is thereby turned, throwing down the movable guide, and as the resistance-spring on the connecting-rod is thrown below the pivotal point, it will hold the guide in its lowermost position. When the guide strikes the cam-surface at the far end of the pit, it will thereby be returned to its uppermost or normal position, and the connecting-rod, with its resistance-spring, having been shifted to a point above the pivot, will hold the guide there. The guide having been set in its lowermost position, engages the anti-friction roller on the end of the guiding-arm attached to the trolley. On the forward movement of the trolley its front trucks first rise onto their upper tracks, forcing the face of the caster-wheel against the under surface of the trap-doors and partially opening the same. On its continued movement the forward trucks strike the jog in their upper tracks and simultaneously therewith the rear trucks pass up the inclined sections in their upper tracks, thus raising the entire trolley vertically, opening up the trap-doors to their limit, and in virtue of the guiding effect of the movable guide on the car bringing the nozzles into perfect registration. The car may then be stopped for a few seconds to complete the charge. On the renewed movement of the car the trolley will pass down the inclined track-sections at the foot of the pit into the pocket, permitting the car to move onward over the traveler's track. The pivoted sections of the trolley-track will then fly back into their normal position, leaving the trolley free to be returned on its lower tracks. When the car strikes the head of the traveler-track, the movable guide will engage with the anti-friction roller on the little traveler and carry the same forward to the foot of the trolley-track, where it will fall into a pocket, permitting the guide to clear the same as the car goes onward. The forward movement of the traveler, acting through the return cable, draws the trolley back into its normal position, and on the next car carrying forward the trolley the reverse movement of the cable brings the traveler back into its normal position at the head of its track. The trap-doors close by their own weight, following the trolley in its downward movement as it passes into its pocket. If they fail to close by gravity, the plow at the rear of the car-truck will force them shut. The movement of the casters in their action on the trap-doors is to swing from the vertical to the horizontal plane, the contact being all the time by a rolling surface. The caster-wheels, therefore, both open the traps and hold them open until the car has passed the charging-pit. In order to obtain the proper bear-



ing for these caster-wheels on the under part of the traps, face-plates are rigidly secured thereto at such an angle that the face-plates will be parallel with the caster-wheel axes when the traps are in their uppermost position. If the charging-pits and the trolley-tracks located therein be of the requisite length, the charge can be made while the car is in continuous motion. If, on the other hand, the tracks are made comparatively short, it will be found necessary to stop the car for a few seconds in its charging position. These charging-pits are placed at such frequent intervals as will enable the receivers on the car to be of comparatively small size, and permit the use of low pressure, the advantages of which are obvious and well known. It should be noted that when the nozzles are drawn together the projecting bridge in the receiving-nozzle strikes the extended stem of the valve in the charging-nozzle, forcing the same downward, thus rendering the weights of the car effective to open the valve in the charging-nozzle. The valve in the receiving-nozzle is opened by the pressure from the main.

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

1. The combination, with a movable car, of a pivoted trap located on the line of travel and a trolley located under the said trap and movable by the car to open the trap.

2. The combination, with a movable car having a receiving-nozzle, of a pivoted trap located on the line of travel and a trolley located under the said trap having a charging-nozzle movable by the car to open the said trap and effect the registration of the said nozzle.

3. The combination, with a pivoted trap, of an inclined track under said trap and a trolley movable on said track provided with a projecting head engageable with the under surface of the trap for opening the same.

4. The combination, with a pivoted trap, of an inclined track under the same, a trolley movable on said track provided with a projecting head, and a roller mounted on said head in a swinging block, whereby the face of the roller follows the under face of the trap in its opening movement.

5. The combination, with the pivoted traps, of the inclined tracks under the same, the trolley movable on said tracks and provided with projecting heads, one for each of the traps, the swinging yokes journaled in said heads, and the bearing-rollers journaled in said yokes, substantially as and for the purpose set forth.

6. The combination, with the car having a projection, of the trolley and the traveler connected by a cable guided by sheaves and the traveler and trolley-tracks, each provided with a pocket at its foot for clearing the car at that point, substantially as described.

7. The combination, with a car having the receiving-nozzle and the nozzle-guide, of the double-truck trolley having a charging-nozzle and guiding-arm engageable by said nozzle-guide and the parallel set of tracks for said trucks, whereby the nozzle maintains the vertical position when approaching the point of registration.

8. The combination, with the double-truck trolley, of a double set of tracks, one set for each of said trucks, the two tracks of each set being at different levels and connected by pivoted sections at their ends and the upper track for the front truck having a jog near its head, the car provided with a receiving-nozzle and the nozzle-guide, the trap-opening projection on the front corner of the truck-frame, and the charging-nozzle on the trolley having a guiding-arm engageable by said nozzle-guide, substantially as described.

9. The combination, with the trolley, of the charging-nozzle thereon, the air-main, the hollow revoluble drum communicating therewith, and the flexible section wound about said drum and connecting its interior with said nozzle, whereby the nozzle may be moved the requisite distance to make the charge.

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

WHITCOMB L. JUDSON.

Witnesses:

H. L. EARLE,

OSWALD G. BOYLE.