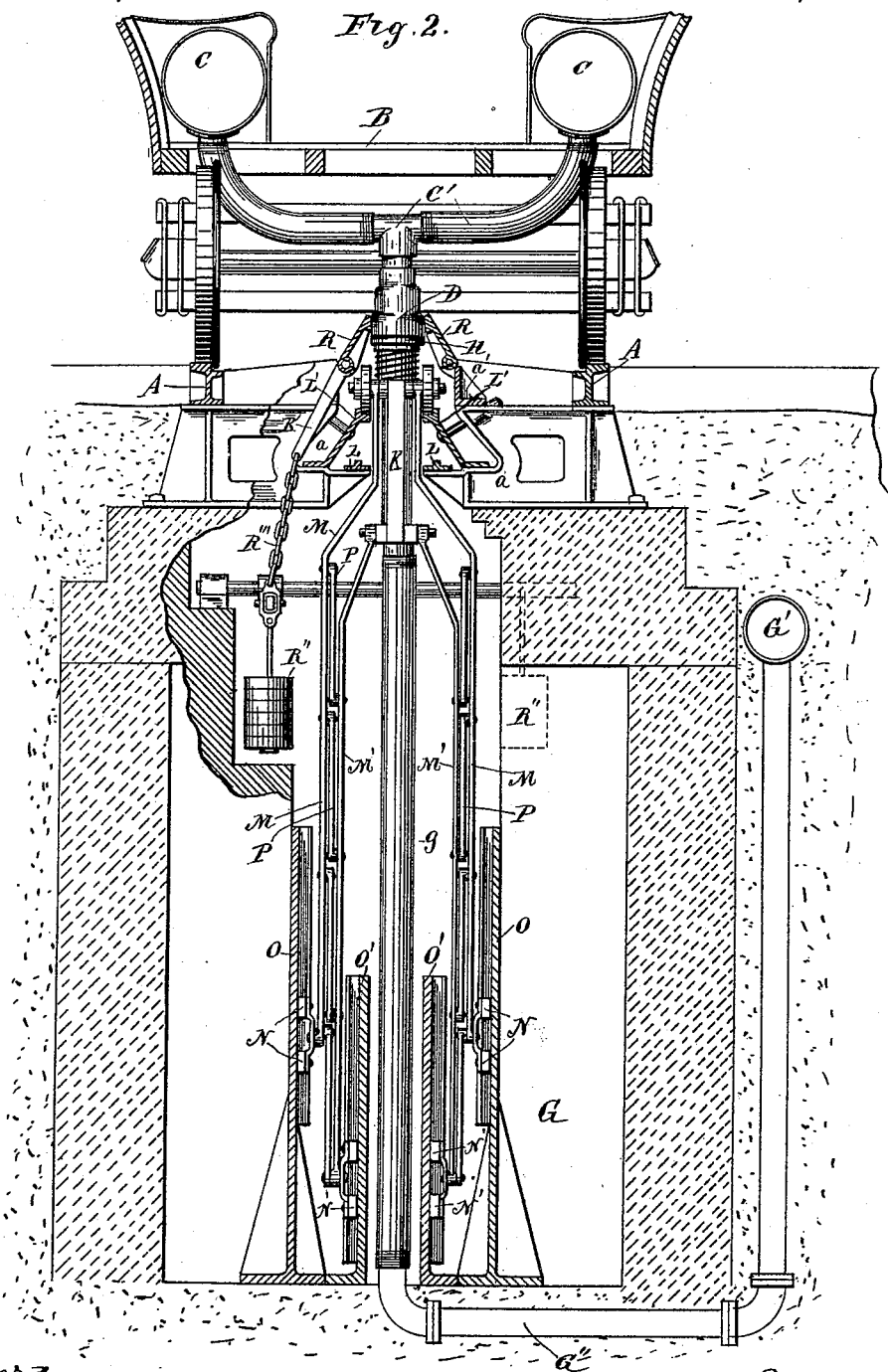


W. L. JUDSON.
STREET RAILWAY.

No. 464,614.

Patented Dec. 8, 1891.



Witnesses.

Wm. Opsahl.

Frank D. Merchant,

Inventor
Whitecomb L. Judson

By his Attorney.

Geo. F. Williamson

(No Model.)

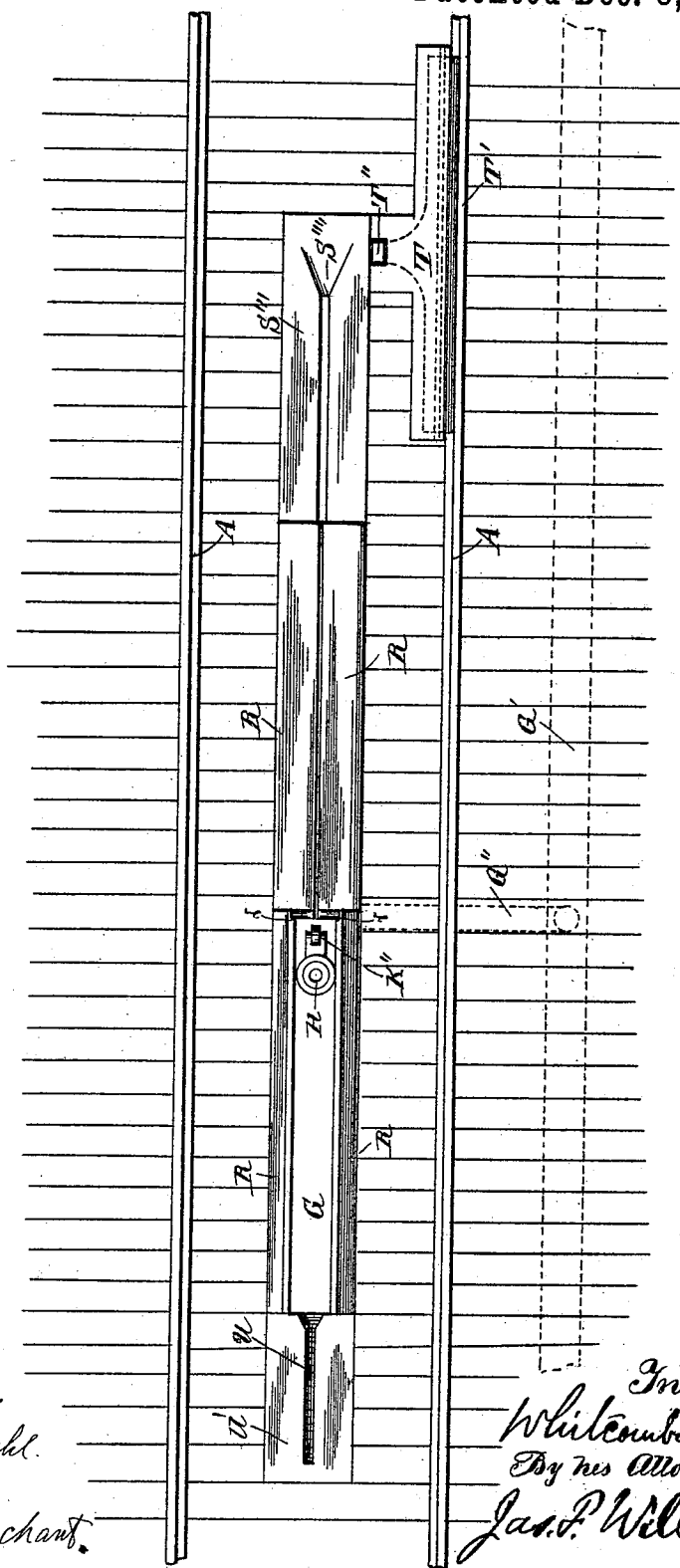
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Fig. 3.



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(No Model.)

4 Sheets—Sheet 4.

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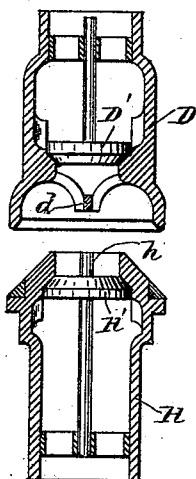


Fig. 4.

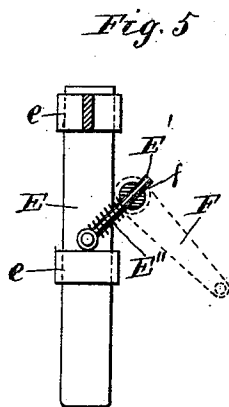


Fig. 5.

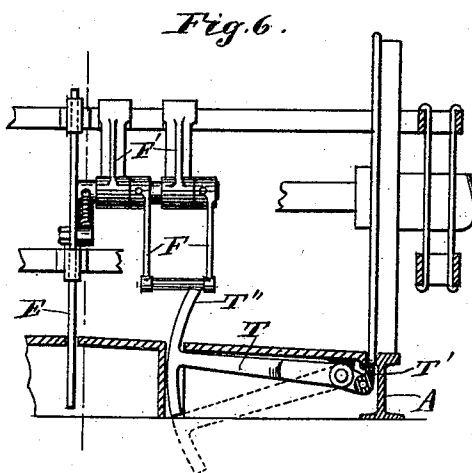


Fig. 6.

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UNITED STATES PATENT OFFICE.

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

STREET-RAILWAY.

SPECIFICATION forming part of Letters Patent No. 464,614, dated December 8, 1891.

Application filed September 25, 1890. Serial No. 366,163. (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 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 trolley-track, 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 always 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. To permit the necessary movements of this nozzle, the trolley is pivotally connected to the extremities of a pair of lazy-tongs, the lower ends of which are pivotally mounted in vertical guides rigidly fixed in the pit. These guides are so placed and the lazy-tongs so spaced apart that the inner turns through the outer pair as the nozzle shifts from its starting position to the end of its travel. 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 vertical 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 upwardly 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 or 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-track, 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. This outmost-pivoted section is spring-supported, and after the trolley has passed into the pocket returns to its normal position on the level with the body of the upper track. The trolley is then free to return on the lower track. This return movement is accomplished by a weight suspended in the pit connected by a cable passing over suitable sheaves to the end of the trolley. The pivoted section at the head of the track is without a spring and takes the

incline as its normal position. The trolley on its return movement lifts this pivoted section or pawl 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. For opening the trap-doors a lever is pivoted at the head of the pit which, when in its normal position, projects to a sufficient height to be struck by the movable guide on the car when set in its lowermost position. This lever is connected by a bell-crank arm with a chain, which in turning is connected to angular extensions of the pivoted traps. To assist in its action a weight may be also attached to the chain on the far side of the lever. The trap-doors are sufficiently heavy on the lip sides of their pivots to fall into their closed position by gravity. The part of the pit in which this opening-lever is placed has an extension on the track-level provided with a slot into which the movable guide drops before reaching the trap-doors, so that the doors are opened in advance. It has been stated that 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 trap-doors are made in two sets, so as to divide the opening into two sections. The first set have forwardly-projecting lips, which extend under the ends of the second set. Hence when the first set are opened they will open and hold open the second set, while the construction will permit the first set to close immediately after the passage of the nozzle between the second set. This is in order not to leave too long an opening in the rear of the nozzle. When the trap-doors are constructed in this way, there is no opening in the street in the rear of the car. In passing between the traps the weight of the same is sustained by the nozzle.

I have illustrated the invention in the accompanying drawings, wherein like letters refer to like parts throughout.

Figure 1 is a longitudinal sectional elevation through one of the pits, showing the car in its charging position. Fig. 2 is a cross-

section on the line X X' of Fig. 1. Fig. 3 is a plan view of the pit-section of the road-bed. Fig. 4 is a detail in section showing 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 trucks, showing the pivoted projection.

A A are the track-rails.

B is the car.

C are the receivers, which, as shown, are arranged under the seats and connected by a cross-pipe C' under the car-body.

D is the receiving-nozzle connected with the cross-pipe C'.

E is the movable guide mounted in straps, fixed to the truck.

F is the pivoted trip-lever mounted in hangers F', fixed to the truck and provided with a hole f for the passage of a connecting-rod E', pivotally connected to the guide E.

E'' is the resistance-spring on the connecting-rod E' between the shaft of the lever F and the guide.

G is the pit.

G' is the air-main. G'' is the bent section tapping the same.

H is the charging-nozzle; K, the trolley; g, the flexible section connecting the charging-nozzle with the air-pipe G''.

I is the lower section of the trolley-track, and L' the upper section thereof, both secured to bed blocks a, projecting from the sides of the pit. Each track is composed of a pair of rails spaced apart sufficiently far to permit the passage of the nozzle.

l is the pivoted section at the head of the track, and l' is the pivoted section at the foot of the same. The latter is held in its normal position by a spring l''. The lower section is dipped or curved at its foot to form a pocket L''.

K' is a guide-arm fixed to the trolley and provided with an anti-friction roller K'' at its upper end.

M is the outer pair of lazy-tong bars, and M' the inner pair. The outer pair are pivotally connected at their upper ends to the upper part of the trolley, and the inner to the lower part of the same. At the lower ends the outer pair are pivoted to cross-heads N, which slide in vertical guides O, fixed in the pit, and the inner pair are pivoted at the lower ends to cross-heads N', movable in vertical guides O'. The outer and inner pair of arms are pivotally connected by links P. This pair of arms therefor, with their connecting-links, make up a lazy-tong carrier or pivoted lever, which permits the trolley to make its complete movement and keeps it always in the vertical position.

Q is the weight on cable Q', which is attached to the end wall of the pit and at the other end to the trolley, passing over sheaves q q'.

R R are the trap-doors pivotally secured at

their ends in suitable bearings a' , fixed in the road-bed and provided with angular extensions or crank-arms R' .

R'' are the weights attached by chains R''' to the cranks R' .

The first set of traps are provided with projecting lips r , which project under the ends of the second set, as before described.

S is the trap-opening lever at the head of the pit, provided with a crank-arm S' , connected to the chain R''' .

S'' is a brace-rod connecting S and S' .

S''' is the cap-plate at the head of the pit, slotted in line with the meeting-point of the trap-doors and provided with an inclined mouth or guideway surface S'''' .

T is the pivoted stop in the road-bed, pivoted to a suitable support near the rail and provided with an extension T' , located in the path of the wheel-flange, the inner flange of the rail being cut away for the purpose. This pivoted stop has a segment-extension or crank-arm T'' , which, when the stop is in its uppermost position, engages with the trip-lever F on the car.

D' is the valve in the bell-mouthed receiving-nozzle D . d is the projecting central bridge fixed in said nozzle.

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

U is the inclined cam-surface at the foot of the pit for restoring the movable guide to its normal position. This lies under a slotted bed-plate U' .

The operation is as follows: When a wheel of the forward truck strikes the stop-lever projection T' , its arm T'' is thrown up in engagement with the pivoted trip F , which, acting through the connecting-rod E' , throws down the movable guide E into its lowermost position. In this movement of the lever F the connecting-rod E' slides through the pivoted shaft and leaves the spring, so that its line of resistance is below the horizontal plane through said shaft. Hence the spring will tend to hold and will hold the movable guide in its lowermost position. When this guide is returned by the cam-surface U at the foot of the pit, this connecting-rod is shifted to a point above the horizontal plane through the shaft of the lever F . Hence it will then hold the guide in its uppermost position and the pivoted lever in its forward position. This guide E , being in its lowermost position, will be directed by the mouth S'''' into the slot in the plate S''' , and as it moves forward it will engage the projecting end of the trap-opening lever S , opening up the trap-doors. The guide E engages the guide-arm K' on the trolley K and carries the same forward up the incline l onto the upper track L' , the nozzles thereby being made to unite, and the track L' at such elevation as to render the weight of the car available to make a tight joint. Inasmuch as the car is in motion the trolley must be carried upward as well as forward, and inasmuch as the guide E is parallel with

the receiving-nozzle and occupies a fixed position with reference thereto the nozzles must come truly into a uniting position. By the act of their union the valve H' in the charging-nozzle is opened and the charge is made while the car continues in motion. On reaching the end of the trolley-track the trolley drops into the pocket L'' and the car passes forward, raising the guide E , as before described. The trap-doors close by their own weight, thereby restoring the trap-opening lever S to its normal position. Upon the trolley reaching the pocket the pivoted section l' returns to its normal position, and the weight Q comes into effect, restoring the trolley by the lower track to its normal position near the head of the pit. The lazy-tongs in which the trolley is mounted and the length of the flexible section g permit this movement from the head to the foot of the pit and return, as before described. These pits do not need to be more than about twelve feet in length, as the charge can be made in eight seconds or less. It will be seen that this charging mechanism is entirely automatic, being controlled from the car without requiring any attention whatsoever on the part of the operator. The charge can be taken, if so desired, under comparatively full speed; but it will ordinarily be found best to go over the charging-section at a slow rate of speed. Of course the car can be stopped, if necessary, in its mid-position. The general advantages of charging-stations of this character are well known, as it enables the use of low-pressure and small-volume receivers.

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

1. The combination, with the car and the air-main extending along the line of travel, of the receiving-nozzle on the car, the movable nozzle communicating with the main, a nozzle-guide located on the car parallel with the receiving-nozzle, and a guiding arm or projection on the charging-nozzle for engagement with said guide to effect registration of the nozzles.

2. The combination, with the car carrying the receiving-nozzle, of the trolley carrying the charging-nozzle, and the tracks for the trolley adjacent to the car's travel, and a nozzle-guide on the car adapted to engage said trolley and guide the nozzles together.

3. The combination, with the car having a receiving-nozzle, of the trolley-track composed of charging and return sections, the trolley having a charging-nozzle and movable on said tracks, a projection on the car for engagement with said trolley to effect its movement on the charging-section, and means for returning the trolley to its normal position.

4. The combination, with the trolley-track, the charging-nozzle thereon connected to the air-main by a flexible section, and a lazy-tongs for supporting the nozzle in a vertical position throughout its to-and-fro movement.

5. The combination, with the car, of the

movable nozzle-guide mounted thereon, a pivoted lever on the car for moving the guide, and a projection or tripping device in the line of travel for engagement with the pivoted lever to set the nozzle-guide.

6. The combination, with the car having the movable guide, of the pivoted lever on the car connected to said guide, and the pivoted projection in the road-bed having an extension in the path of the wheel-flange, whereby the wheel is made to throw up the projection.

7. The combination, with the movable guide on the car, of the pivoted lever for moving the same, the connecting-rod pivotally connected to the guide and passing through a hole in the pivotal shaft of said lever, and a resistance-spring on said connecting-rod between the guide and the shaft, whereby the spring is made to hold the guide in whichever of its extreme positions it may be set.

8. The combination, with a movable car, of the spring-held movable guide E, mounted on the car, and an inclined cam-surface in the road-bed for returning the guide to its normal position.

9. The combination, with the pivoted traps, of an opening-lever connected therewith projecting into the path of the car, and a projection on the car for engagement therewith to open the traps.

10. The traps for the charging-pits constructed in sections, each pair of traps having extended lips at their forward ends projecting under the rear ends of the traps of the next adjacent section, substantially as and for the purpose described.

11. The combination, with the trolley-track, of the trolley movable thereon and the counter-weight and cable connected to the trolley for returning the same to its normal position.

12. The combination, with the trolley-track, of the trolley movable thereon, the charging-nozzle on the trolley, the flexible section connecting the same with the air-main, the lazy-tongs for supporting the nozzle in its vertical position, and the weight and chains for effecting the return movement, substantially as described.

13. The combination, with the pivoted traps closable by their own weight, of the trap-opening lever pivoted at the head of the pit and a connection from the traps to the lever, whereby the forward movement of the lever under the action of the car opens the traps and the closing of the traps returns the lever to its normal position.

14. The combination, with the car, of the movable guide or projection thereon, the pivoted trip-lever for moving the guide, the stop-lever in the road-bed provided with an extension into the path of the wheel-flange, and the trap-opening lever engageable with said guide when set by the trip for opening the traps.

15. The combination, with a rock-shaft, of a body movable in fixed guides at right angles to said shaft, a connecting-rod having one end working freely through a guide on said shaft and having its other end pivotally connected to said body, and a resistance-spring on said rod between the shaft and the body, whereby the spring may be made to hold the body in any position which brings the line of resistance above or below a line at right angles to the rock shaft.

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

WHITCOMB L. JUDSON.

Witnesses:

H. L. EARLE,
OSWALD G. BOYLE.