

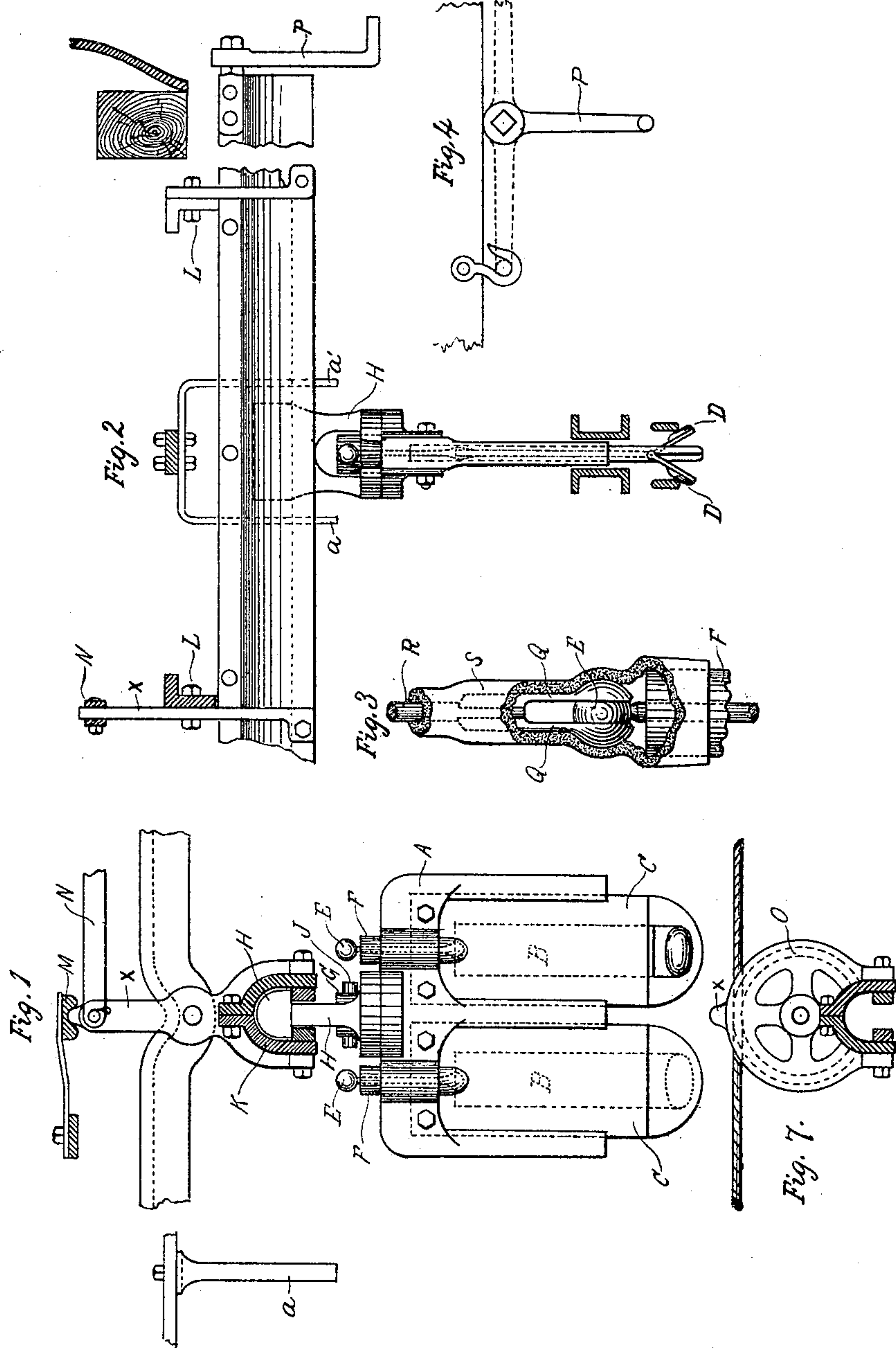
(No Model.)

3 Sheets—Sheet 1.

E. M. BENTLEY.  
ELECTRIC RAILWAY.

No. 389,278.

Patented Sept. 11, 1888.



WITNESSES,  
S. M. Caudwell,  
J. L. Blackwell.

INVENTOR,  
Edward M. Bentley,  
by Bentley & Knight,  
attys.

(No Model.)

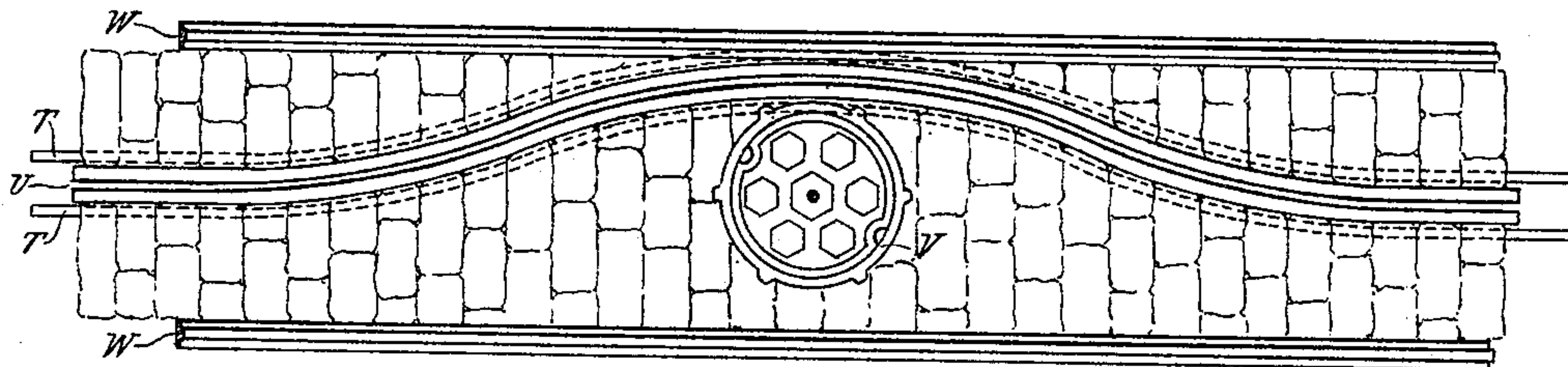
3 Sheets—Sheet 2.

E. M. BENTLEY.  
ELECTRIC RAILWAY.

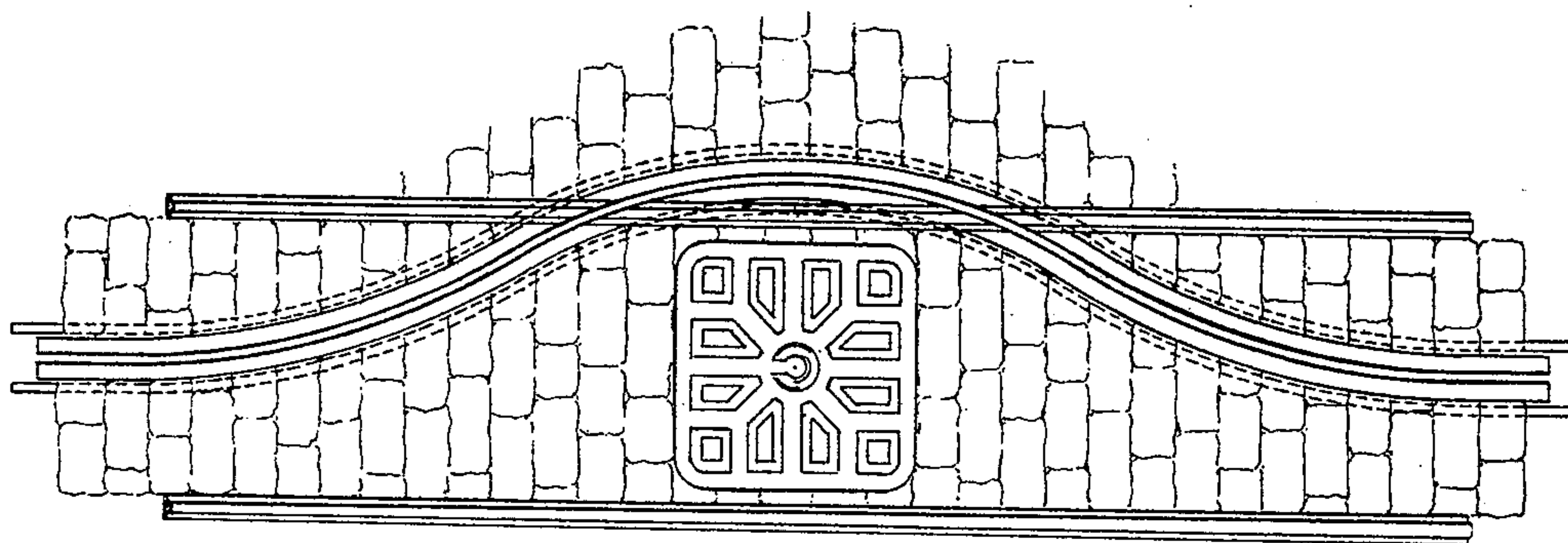
No. 389,278.

Patented Sept. 11, 1888.

*Fig. 5.*



*Fig. 6.*



WITNESSES,

*G. Renault.*  
*J. L. Blackwell.*

INVENTOR,

*Edward M. Bentley.*  
*by Bentley & Knight,*  
*Attys.*

(No Model.)

3 Sheets—Sheet 3.

E. M. BENTLEY.

ELECTRIC RAILWAY.

No. 389,278.

Patented Sept. 11, 1888.

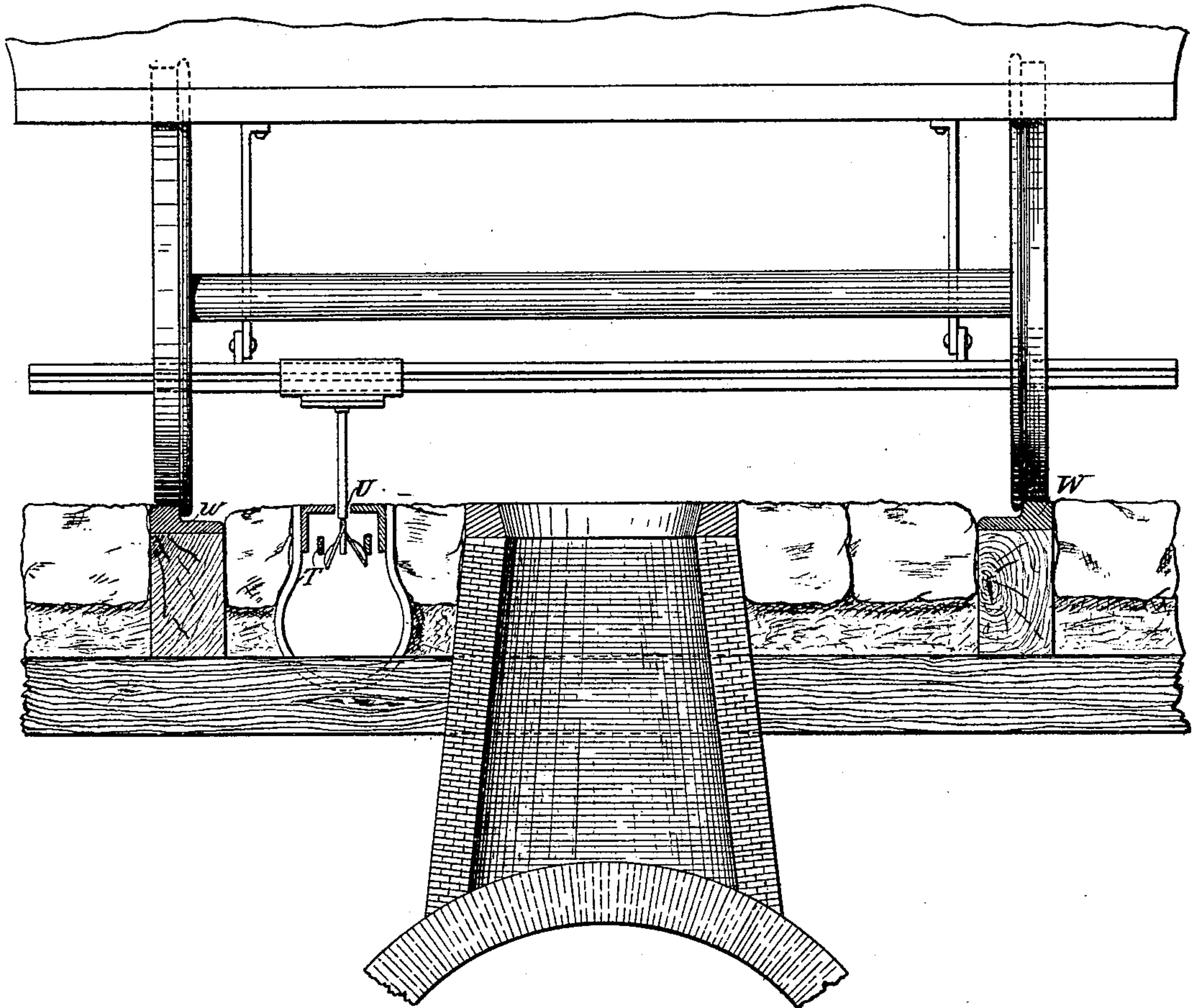


Fig. 8

WITNESSES,

*T. Renault,*

*Edw. S. McKimney.*

INVENTOR

*Edward M. Bentley*  
*by Bentley & Knight*  
*Attys.*



# UNITED STATES PATENT OFFICE.

EDWARD M. BENTLEY, OF NEW YORK, N. Y.

## ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 389,278, dated September 11, 1888.

Application filed October 13, 1887. Serial No. 252,268. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD M. BENTLEY, a citizen of the United States, residing at New York, in the county of New York, State of New York, have invented certain new and useful Improvements in Electric Railways, of which the following is a specification.

My invention pertains to electric railways; and it consists in details of construction of a contact device to be used in maintaining the connection between a moving vehicle and an electric conductor inclosed in a slotted conduit.

It also consists in means for permitting a conduit containing a conductor to be swerved around sewer-heads or similar obstructions in the streets which may interfere with the straight course of the conduit.

In the accompanying drawings, Figure 1 is a side elevation of a contact device or "plow," as it is termed. Fig. 2 is an end elevation of the same. Figs. 3 and 4 are detail views. Figs. 5 and 6 are plans of the conduit passing a sewer-head. Fig. 7 is a modification. Fig. 8 is a transverse section of a road-bed, showing a sewer and conduit.

In Fig. 1, A is a dependent frame adapted to extend into a slotted conduit. B B are two conductors carried by the frame and insulated therefrom by being embedded in insulating-panels C C. At their lower ends B B terminate in spring-contact shoes D D, adapted to be pressed against the two supply-conductors in the conduit. At their upper ends B B terminate in two shanks which pass up through an opening in the top bar of the frame and end in round knobs E E. The shanks are insulated from the frame by insulating-bushings F. The panels C slide up in grooves of the frame and are held by bolts or rivets passing through. Frame A has a turn-table on top, with a neck, G, passing up through an opening in the sliding head H, and held by a pin, J, so that the frame swivels freely about a vertical axis. The head H is adapted to slide in a hollow slotted guide, K, extending transversely across the car and pivoted on a transverse horizontal axis, L. The plow is held normally in a vertical position by a spring-stop, M, adapted to give way when an obstruction in the slot or conduit is encountered.

The plow may be operated manually by connecting-rod N or by segment O and rope, as

shown in Fig. 7. The operating device may be outside the car-body, the guide extending outside of the stringers a sufficient distance. This is shown in Figs. 2 and 4, where the guide terminates in a square end adapted to be embraced by a wrench, P. When it is desired to keep the plow in an elevated position, the wrench P may be left on and upheld by a hook embracing the end.

Whatever form of device may be used for turning guide K about axis L the same spring-stop M will be employed to hold the contact device in its operative position, the lever X extending up to engage with stop M whether the rod N, the segment O, or the wrench P is used to actuate the guide. The lever X may, however, form an extension of segment O, as shown in Fig. 7. In cases where a spring-stop has heretofore been used to hold the plow in its operative position the latter has had only the limited side play afforded by a joint with a horizontal longitudinal axis by which it is suspended, and it often happened that when the vehicle left the track the plow would be caught in the slot and broken before the stop could release. In this case, however, the side motion is taken up by the guide and the spring-stop relieved of all strains except those in a direct longitudinal direction, such as an obstruction in the slot. When the plow is raised out of the conduit by the lifting device, it comes up between the arms *a a'* of a forked stop, so that it will be in a position to be reinserted in the conduit.

The electrical connection between the plow and motor is maintained by a flexible conductor, R, which terminates in two spherical spring-clips, Q, adapted to embrace knob E and form a flexible joint. The insulation S of wire R is extended down and expanded to cover the spring-clip and the head of bushing F as well. By this means the electrical conductor in its course from the contact-shoe to the motor is completely covered and exempt from injury or interference by mud and moisture.

Figs. 5 and 6 show the manner in which a sewer-head or a surface box of any kind connected to a pipe system beneath the street may be located between the rails or between the tracks in the line of the conduit without material interference with the electrical communication. To accomplish this, the conduit,



which, with its inclosed conductors, follows the rails, is at a point where it is necessary to locate a surface-box made to swerve from its normal parallelism with the rails and even to cross the rails if necessary. The conductor is also bent to follow the slot of the conduit, while the contact device, being free to travel transversely across the car, is able to reach down into the conduit at all times and maintain the electrical connection in the normal manner.

In Fig. 5, W W are the rails; U, the slot of the conduit; T T, the conductors; V, a surface-box leading to a pipe under the conduit. The conduit is laid between the rails and does not go outside of them.

In Fig. 6 the conduit is also between the rails, but is swerved far enough to cut the rail. In all cases the conduit is entirely above the sewer or other pipe with which the surface-box is connected.

For street-work it is essential that the supply-conductors of a railway be inclosed in a slotted conduit, and it is of great importance that in this work inclosed car-bodies be employed and that the contact device be completely beneath the car-body. When in such instances a contact removable from the conduit has been employed, the actuating-lever or other lifting means therefor has usually been adjacent to the plow, and hence inaccessible except from the interior of the car, so that a disturbance of the passengers was necessary for throwing the contact into or out of its operating position. When, moreover, the contact device was provided with bearings permitting a relative movement transversely to the vehicle, the handle or lifting device partook of this movement, so that it would not be constantly in the same position. To obviate these difficulties I provide an extension reaching to a point outside of the vehicle, which is not only accessible from without, but is also independent of any transverse movement of the plow.

In an application filed on or about August 9, 1888, Serial No. 282,342, I have shown and claimed the segment for operating the plow-guide, substantially as set forth in Fig. 7.

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

1. The combination, in an electric locomotive, of a movable transverse horizontal guide, a bearing and stop therefor to hold the contact device in an operative position, a support sliding thereon, and a contact device extending into a slotted conduit and having a jointed connection with the said support, so as to be movable about a vertical axis.

2. The combination, with a vehicle and an electric supply-conductor therefor inclosed in a conduit, of a contact device extending into the conduit from the vehicle and movable transversely relatively thereto when in operation, a lifting device for raising the said contact device out of the conduit, and a stop preventing

its transverse movement when so raised, substantially as described.

3. The combination, in an electric locomotive, of a contact device, a transverse guide on which it is adapted to slide and which is pivoted on a transverse axis, with stops limiting the side motion of the contact device when the guide and contact device are turned up.

4. The combination, with a contact device for an electric locomotive movable relatively thereto, of a conductor leading from the motor to said contact device and joined thereto and a flexible insulating covering around the joint.

5. The combination, with the conductor of a contact device, of a conductor, R, leading to the motor, the engaging parts E and Q, attached to the two conductors, respectively, and forming a flexible joint between them, and the insulating-covering S around said joint.

6. The combination, with conductor B, of a contact device extending into a slotted conduit and a conductor, R, leading to the motor from conductor B and having a detachable connection therewith and insulating material surrounding the joint.

7. The combination, with a railway-track having surface-boxes adjacent thereto, of a slotted conduit following it, but deviating from parallelism therewith at intervals to avoid said surface-boxes, an electric conductor in said conduit parallel with the slot, an electrically-propelled vehicle adapted to travel on said track, a contact device extending from said vehicle into the conduit and maintained substantially vertical, and a transverse horizontal guide by which the contact device is permitted to move transversely to the vehicle without injury.

8. The combination of a railway-track, a sewer or other pipe below the surface of the roadway, a surface-box adjacent to the track extending down to connect with said pipe, a slotted conduit above the pipe following the track and deviating from parallelism therewith at said surface-box, an electric conductor in the conduit parallel with the slot, an electrically-propelled vehicle on the railway-track, a contact device extending into the conduit and maintained substantially vertical, and a transverse guide permitting the said contact device to move transversely to the vehicle a sufficient distance to avoid the surface-box.

9. The combination of a railway-track, a sewer or other pipe below the surface of the roadway, a surface-box adjacent to the track extending down to connect with said pipe, a slotted conduit above the pipe following the track and deviating from parallelism therewith at said surface-box, an electric conductor in the conduit parallel with the slot, an electrically-propelled vehicle on the railway-track, a contact device extending into the conduit, and a transverse guide of a length substantially equal to the distance from the normal position of the slot to the edge of the surface-box, by which the contact device may move relatively



to the vehicle a sufficient distance to follow the slot.

10. The combination, with an electrically-propelled vehicle, of a contact device adapted to extend into a slotted conduit, and a transverse guide therefor extending beyond the track-rail to permit the contact device to move transversely relatively to the vehicle to a point beyond the wheel.

11. The combination, with an electrically-propelled vehicle, of a supply-conductor inclosed in a slotted conduit beneath the body of the vehicle, a plow or contact device extending into the conduit, but removable therefrom, and provided with bearings permitting a transverse movement relative to the vehicle, and a lifting device for raising the plow out of the conduit, the said device extending outside of the vehicle to a fixed point substantially independent of the transverse movement of the plow.

12. The combination, with an electrically-propelled vehicle, of a supply-conductor inclosed in a slotted conduit, a plow or a contact device extending into the conduit from beneath the body of the vehicle, and a lifting device for the said plow extending transversely to a point at one side of the vehicle, so as to be manually operated at said point, substantially as described.

13. The combination, with an electrically-propelled vehicle, of a supply-conductor in a slotted conduit beneath the surface of the roadway, a plow or contact device extending down into the conduit from the vehicle, a transverse guide for said plow extending from below the body of the vehicle to a point outside the said body, and a manual lifting device for the plow at the said outside point by which the plow

may be elevated above the conduit, substantially as described.

14. The combination, with an electrically-propelled vehicle, of a supply-conductor in a slotted conduit, a plow or contact device extending from beneath the body of the vehicle into the conduit, a lifting device for the plow by which it may be raised out of the conduit, the said lifting device extending from beneath the vehicle-body to a point outside, where it is provided with a handle, and a stop also actuated from outside the vehicle for holding the plow in an elevated position, substantially as described.

15. The combination, with an electrically-propelled vehicle, of a supply-conductor in a slotted conduit beneath the surface of the roadway, a contact device extending into the conduit, a transverse guide for said device permitting its movement transverse to the vehicle, and a stop in the line of longitudinal progress of the plow, made weaker than the plow itself, by which it is held in its operative position, yet allowed to give way without injury when an obstruction is encountered, substantially as described.

16. The combination, with an electrically-propelled vehicle and a contact device therefor movable into and out of an operative position, of a spring-stop and a supplementary stop for holding the contact device in and out of its operative position, respectively.

In testimony whereof I sign this specification, in the presence of two witnesses, this 5th day of October, 1887.

EDWARD M. BENTLEY.

Witnesses:

ROBERT W. BLACKWELL,  
G. RENAULT.