(No Model.) 2 Sheets—Sheet 1.

R. F. BRIDEWELL.

HYDRO MOTOR FOR STREET RAILWAYS.

No. 326,198. Patented Sept. 15, 1885.

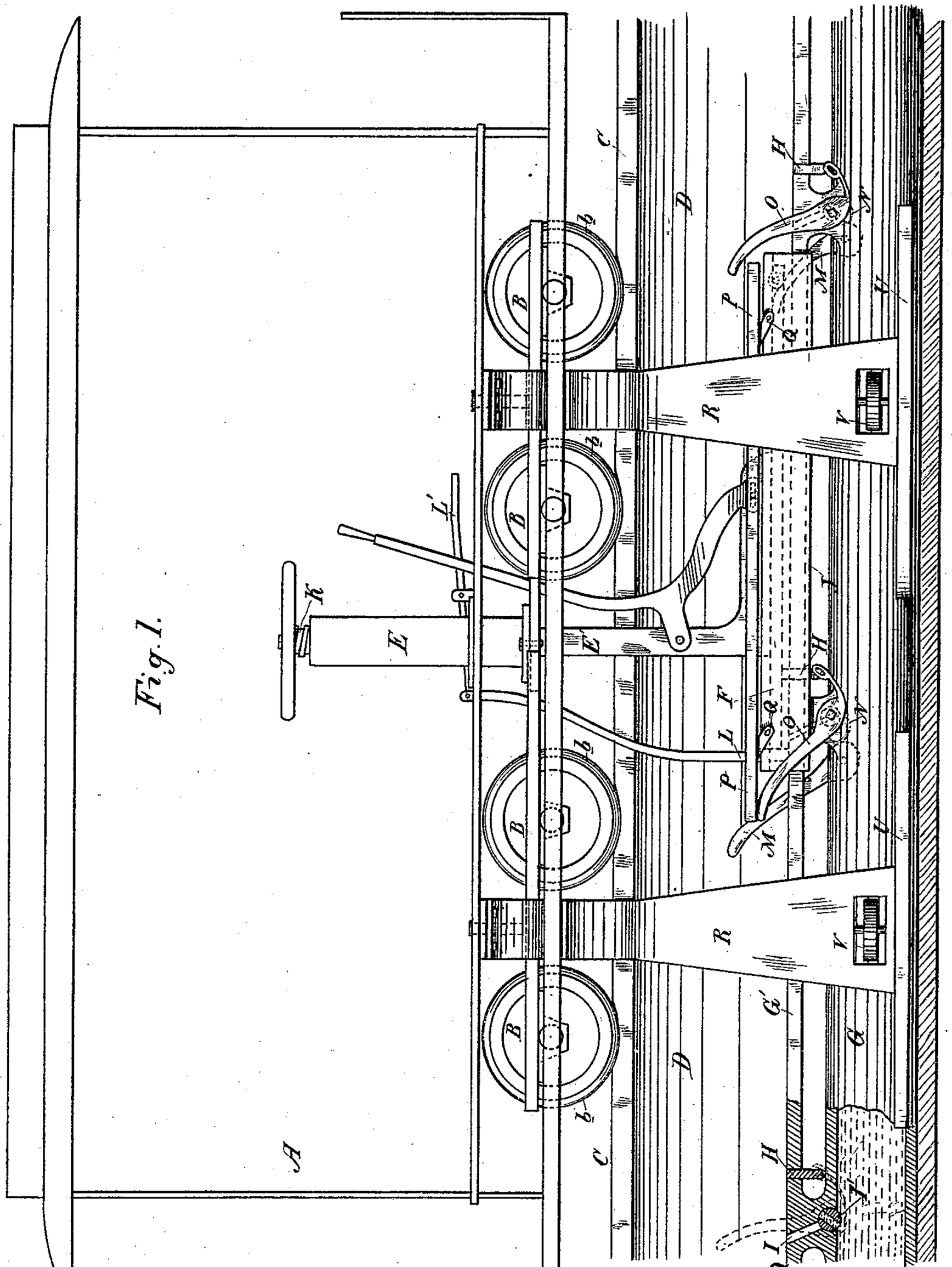

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

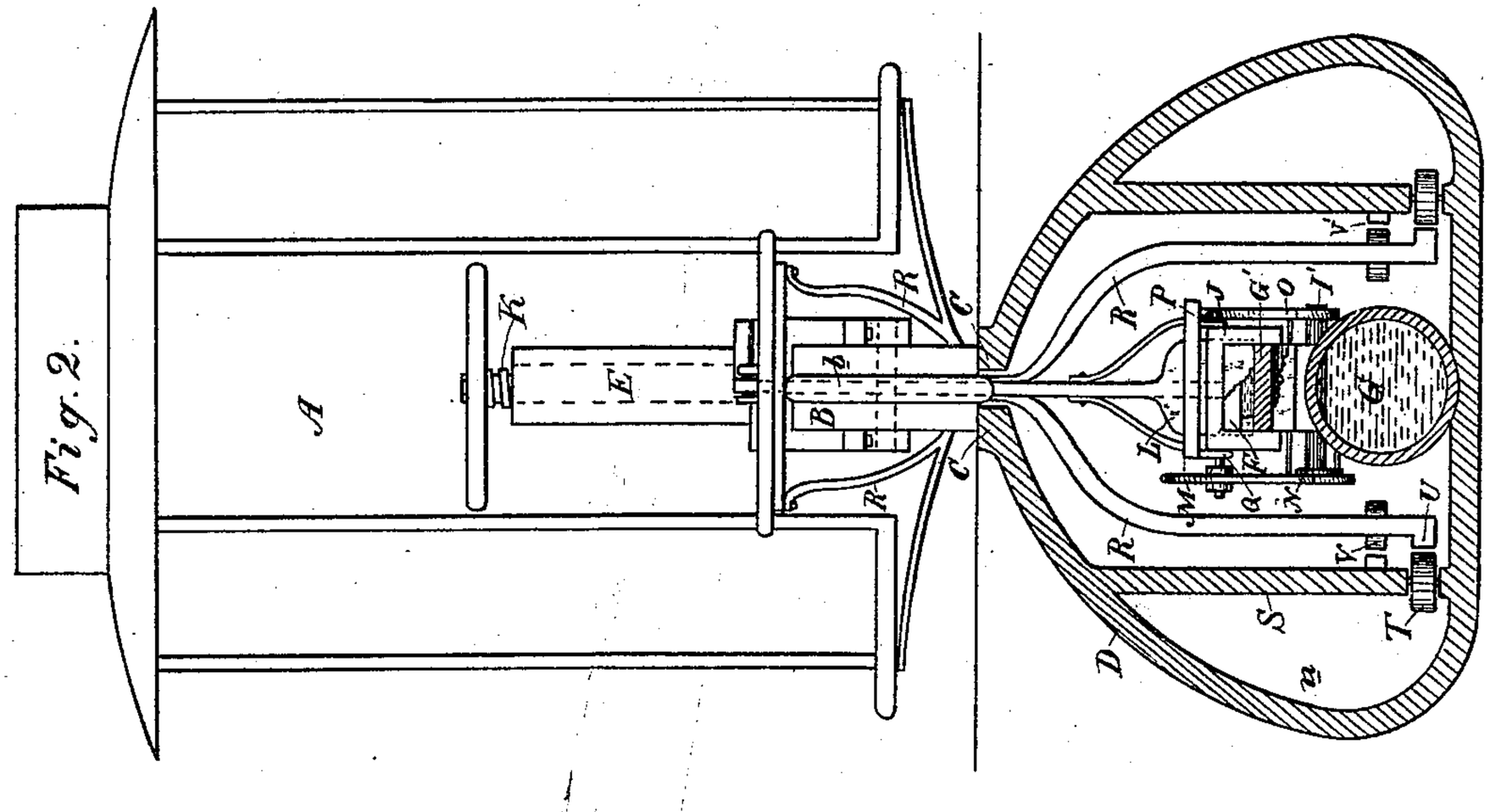


Fig. 3.

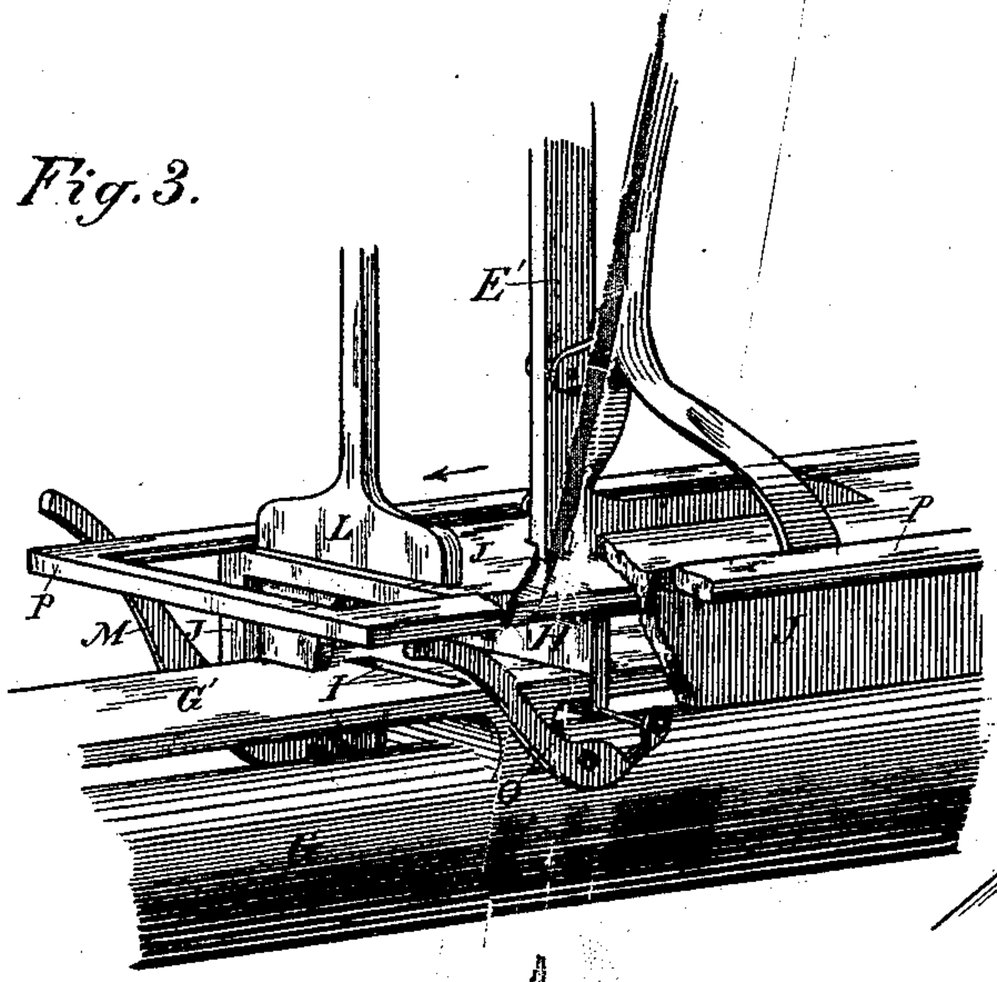
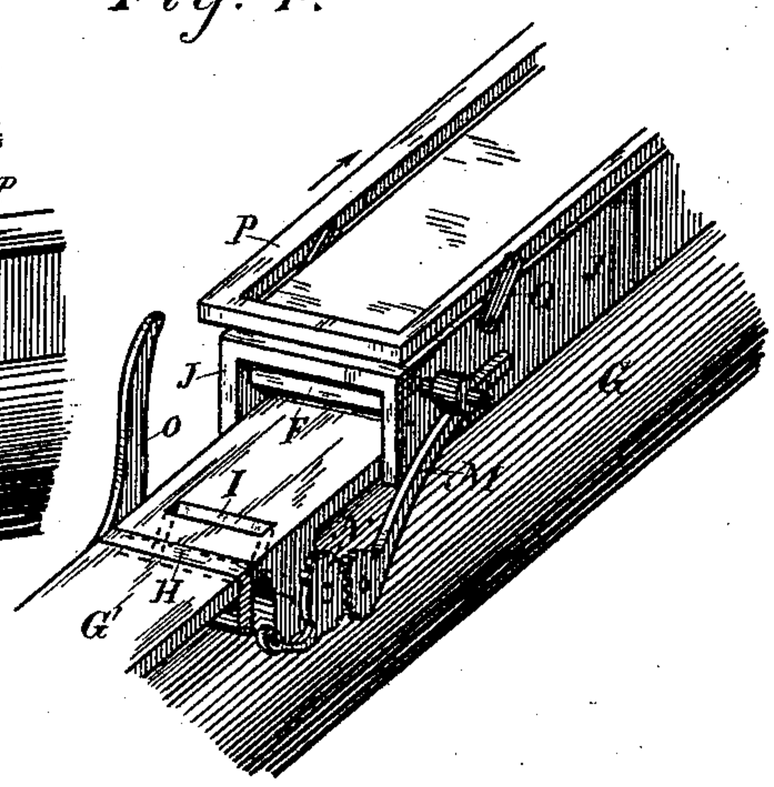


Fig. 4.



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UNITED STATES PATENT OFFICE.

RICHARD F. BRIDEWELL, OF SAN FRANCISCO, CALIFORNIA.

HYDROMOTOR FOR STREET-RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 326,198, dated September 15, 1885.

Application filed February 15, 1884. (No model.)

To all whom it may concern:

Be it known that I, RICHARD F. BRIDEWELL, of the city and county of San Francisco, State of California, have invented an Improvement in Hydromotors for Street-Railways; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to a novel apparatus which I call a "hydromotor" for car propulsion; and it consists of an underground slotted tube, into which a shank from the car extends, and upon the slot-irons of which a single line of wheels run and support the car, a central longitudinal water-pipe within the tube with a flattened top, upon which a channeled casing and shoe at the lower end of the shank fits and travels, a plate or abutment at the front of the shoe, and vertically-moving gates in the pipe acted upon by the passing shoe, so as to admit water into a temporarily-inclosed space, where by its pressure it acts to drive the shoe and the car along.

My invention further relates to certain details of construction, all of which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a side elevation showing the apparatus and its connection with a car. Fig. 2 is a transverse section across the tube, shoe, and car. Fig. 3 is an enlarged perspective view of part of the water-tube, showing also the traveling shoe and part of the shank, the horizontal adjusting-plates, the abutment, and the levers for operating the water-gates in the pipe. Fig. 4 is a view of these parts from the opposite side.

A is a car, which is supported upon a single line of centrally-placed wheels, B, with axles suitably journaled upon trucks. These wheels have projecting central flanges, *b*, around the periphery, which run in the groove or channel formed between the slot-irons C of the underground tube or tunnel D.

Upon the wheel-truck frame is fixed a vertically-slotted guide, E, through which a shank, E′, moves, its lower end passing down through the slot into the tube, where it is attached to a plate, F, of some eight or more feet in length. This plate or shoe fits within a casing, J, somewhat longer than itself, and having the form of a rectangular inverted trough without bottom or ends, as shown in Fig. 4. The sides of this casing fit water-tight upon the edges of the plate or table G′, which is formed upon the upper side of the water-tube G. This tube extends along the bottom of the underground tunnel, as shown, and has its upper part made with a flat smooth surface or table, G′, as before stated, so that the casing J (which is connected with the car) may travel along with its sides fitting closely. The tube G is provided with abutment-gates H and ports I just in front of the gates, through which water is allowed to pass into the space above the tube, and which is inclosed by the sides of the casing. The plate or shoe F is raised, so as to form a space between itself and the top of the plate G′, by means of a lever or a screw, K, acting upon its shank E′, and water is admitted into the space thus formed between the inclosing sides J of the shoe and the tube, and acts upon an abutment or gate, L, to drive it forward. This abutment L extends upward through a slot in the casing J just in front of the plate or shoe F, and its upper end is connected with a horizontal foot-lever, L′, by which it may be raised up from the top of the tube, and allows the water to escape when it is desired to stop. At the same time the shoe or plate F may be forced down upon the top or flat portion of the tube G to act as a brake and stop the car. When in position to drive the car forward, the shoe F is raised up so as to form a space of considerable size above the top of the plate G′ and within the casing J, the movement being accomplished, as before described, by the wheel and screw K. The abutment L is let down so as to rest upon the table or plate of the tube and fill the space in front of the shoe within the casing. The gates H in the tube are made to slide vertically up into the space within the casing J, thus forming a perfect water-tight partition, and when the ports I, just in front of the gates, are opened water will rush into the space between this stationary partition H and the abutment L, which travels with the casing J and the car. The pressure of the water between the two acts to force the abutment L and the casing forward, and with them the car. As soon as the shoe has passed over its length from the fixed abutment H, the latter is drawn down so that its upper edge is flush with the top of the tube by a lever, M, connected with it

through gear N and projecting up at the side of the tube, so that the edge of the casing J (or an arm projecting from it) will strike the lever and force it down while passing. The port I is also closed at the same instant by a rotary valve, I′, Fig. 1, which is turned by the lever M and gear N. When a car has reached a point when the casing J has passed over one of the abutments H, and the abutment L of the casing is in front of it, the edge of the plate P of the casing will strike a lever, O, which is upon the opposite side of the tube from the lever M, and force it down. The opposite end of this lever is connected with the gate H, as shown in Fig. 3, and raises it so that it forms a stationary abutment, and the same movement of the lever opens the valve I′ to admit water between the abutments L and H. This drives the shoe forward its length, when the valve I′ is closed and the abutment H is drawn down, as before described. Just before the shoe has passed one gate H the next one is thrown up and its port I is opened, thus continuing the pressure to drive the car along. The water escapes into the tunnel, and thence into a sewer as soon as the shoe has passed. The plate P is hinged to the casing by two arms, Q, so that it acts like a parallel ruler, and may be let down so that it will strike the lever O to open the port; or it may be raised up out of the way and clear of the lever at will.

From the driving-car, and also from the cars which may be drawn by it, and which are mounted upon similarly-arranged wheels, broad plates R extend down into the tunnel through the slot, and are bent outward near the sides, after which they extend down parallel with the vertical sides S of the tunnel to points near the bottom. Horizontal rollers T are journaled in these sides, and rails U are fixed to the arms R near the bottom, so that they will move in contact with the rollers bearing upon them, thus steadying and supporting the car upon its single line of wheels. Where the car is passing around curves, rails V′ are fixed around the inner line of the curve above the plane of the rollers T, and rollers V are journaled upon the arms R, so as to travel upon these rails at the curves. The underground tunnel has spaces *n* formed outside of its vertical sides, through which wires may be carried for telegraphic or other purposes.

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

1. A means for propelling cars consisting of a water-tube laid in a slotted underground tunnel and having a flattened top plate with ports and vertically-moving abutments at short regular intervals, in combination with a shoe, a casing fitting over the shoe, the sides extending down over the edges of the top plate, an abutment or gate at the front of the casing, and means for moving the gates and opening and closing the ports of the water-pipe as the casing and shoe pass them, substantially as herein described.

2. A means for propelling and stopping cars consisting of a water-tube laid in a slotted underground tunnel, a plate or shoe fitting the flattened top of the tube, and an exterior casing inclosing the shoe and fitting over the edges of the top plate of the tube, a water-tight abutment extending down through the casing against the top of the tube, and vertically-moving abutments within the tube which may be raised into the casing, and ports through which water may be admitted into the space between the abutments, in combination with a screw or mechanism within the car connected with the plate or shoe, and by which it may be forced down upon the tube to act as a brake, substantially as herein described.

3. The water-tube with flattened upper-surface abutments and ports, as shown, a rectangular casing with sides fitting the edges of the tube-surface and an abutment fitting the interior of the casing and the top of the tube in front, in combination with a plate or shoe within the casing, having a shank extending up into the car-body, and a screw or mechanism by which the plate may be raised or lowered to increase or diminish the area of the space within the casing, substantially as herein described.

4. The water-tube with flattened upper-surface abutments and ports, as shown, and a rectangular casing, the sides of which inclose and fit the upper part of the tube, in combination with an abutment fitted to the front of the casing and a lever or means by which it may be let down to fit against the top of the tube or raised to open a passage out at the front, substantially as herein described.

5. The water-tube with a flattened upper surface, a rectangular casing, the sides of which inclose and fit the upper part of the tube, and an abutment in the front part of the casing by which it may be closed, in combination with vertically and automatically moving abutments within the tube, levers by which they may be successively raised up to fit the interior of the casing, and a plate, P, connected with the casing, having a lever by which it may be lowered so as to engage the gate-levers or raised above them, substantially as herein described.

6. In a railway, an underground tunnel with an open slot at the top, a water-tube extending along the bottom, with abutments and ports, as shown, a rectangular casing fitting the water-tube, so as to form a chamber within which the pressure of water from the tube may be caused to act continuously by the successive opening of the ports, in combination with a car with wheels journaled to it, so as to travel upon the rails forming the open slot, arms extending downward from the car-body through the slot, rails supported from these arms in close proximity with the sides of the tunnel, and wheels or rollers journaled in the sides, against which the rails travel and by

which the car is steadied, substantially as herein described.

7. In a railway, an underground tunnel with an open slot at the top, cars having wheels journaled in line so as to travel upon the rails forming the slot, arms extending down from the car-body into the tunnel and diverging so as to carry short rails which move in contact with rollers journaled in the sides of the tunnel, in combination with rollers journaled upon the arms above the rails, and corresponding rails bent to fit the inside of the curves where such occur and upon which the rollers travel while turning a curve, substantially as herein described.

In witness whereof I have hereunto set my hand.

RICHARD F. BRIDEWELL.

Witnesses:
JOHN WHITE,
S. H. NOURSE.