3 Sheets—Sheet 1.

J. B. ATWATER.

Street-Car Propellers.

No. 205,991. Patented July 16, 1878.

Fig 1.

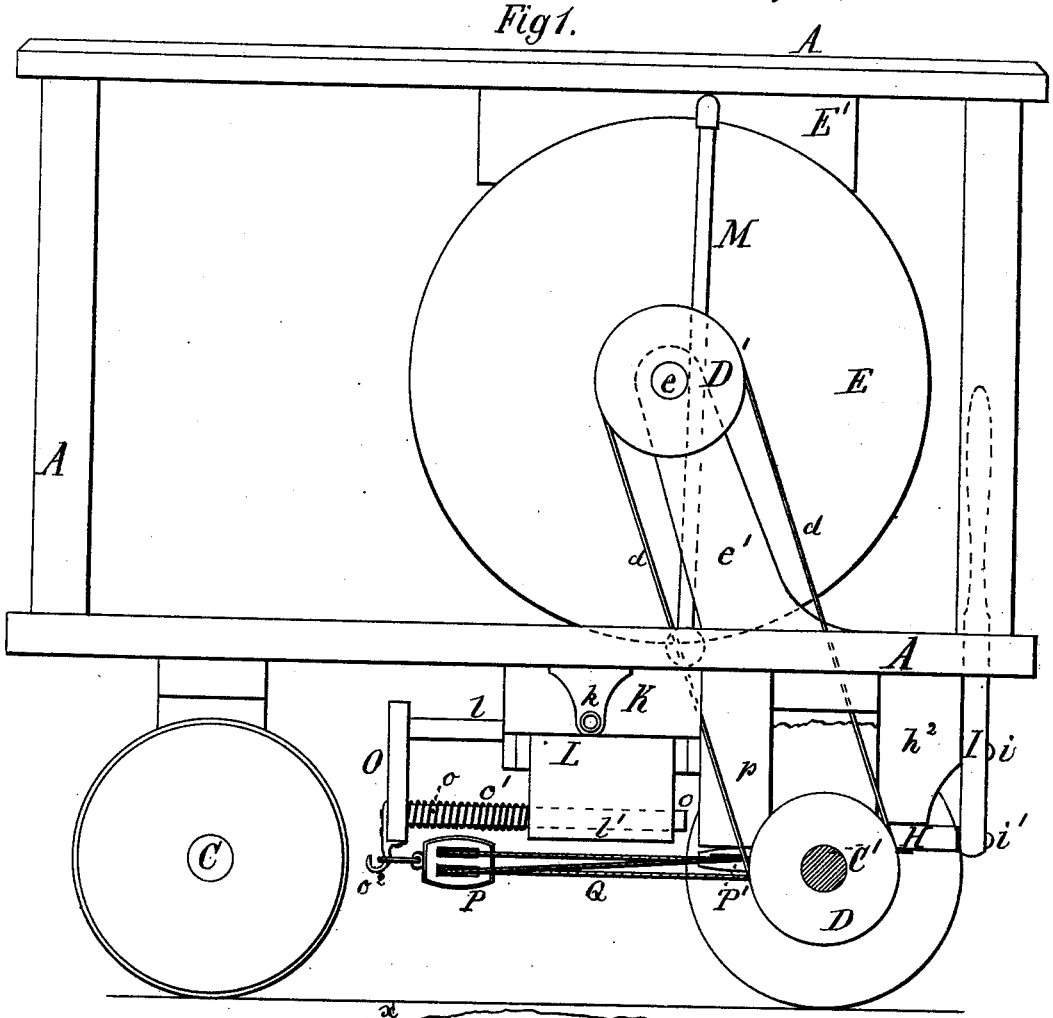

Fig 2.

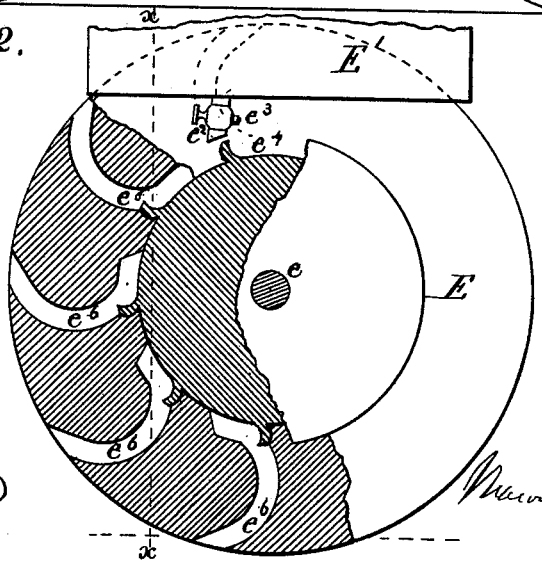

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Fig 3.

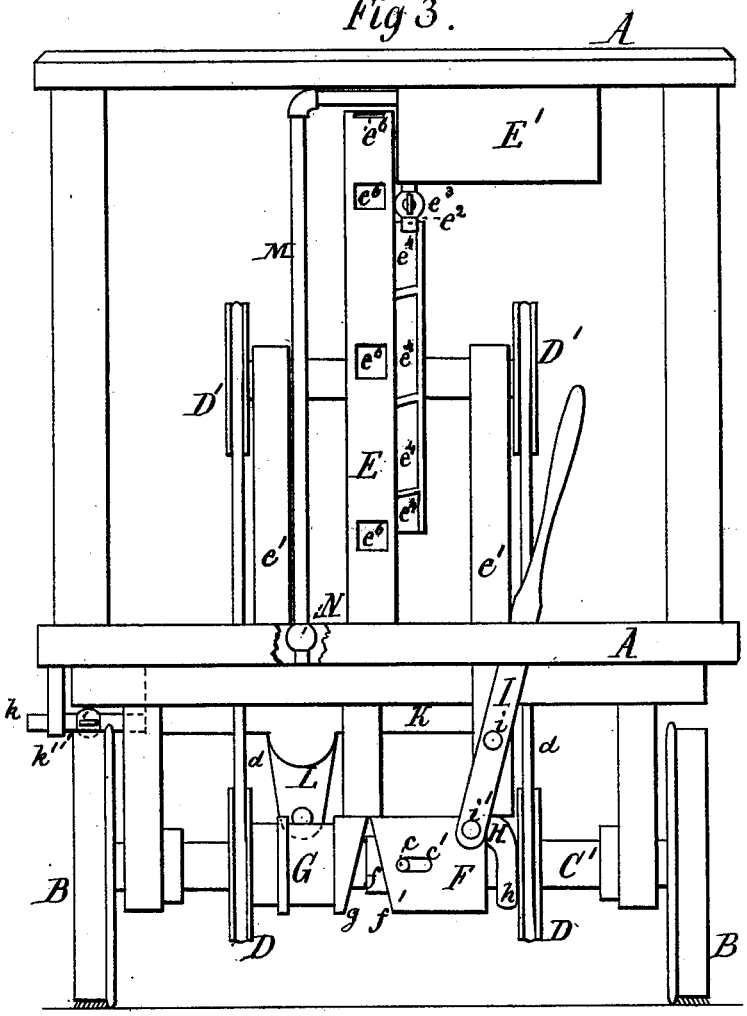


Fig 4.

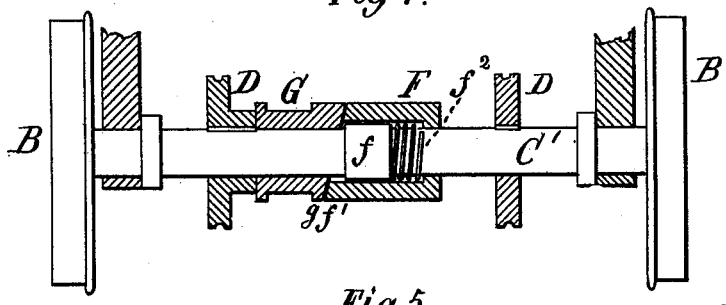
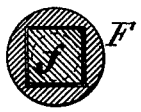


Fig 5.



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3 Sheets—Sheet 3

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Street-Car Propellers.

No. 205,991. **Patented July 16, 1878.**

Fig 6.

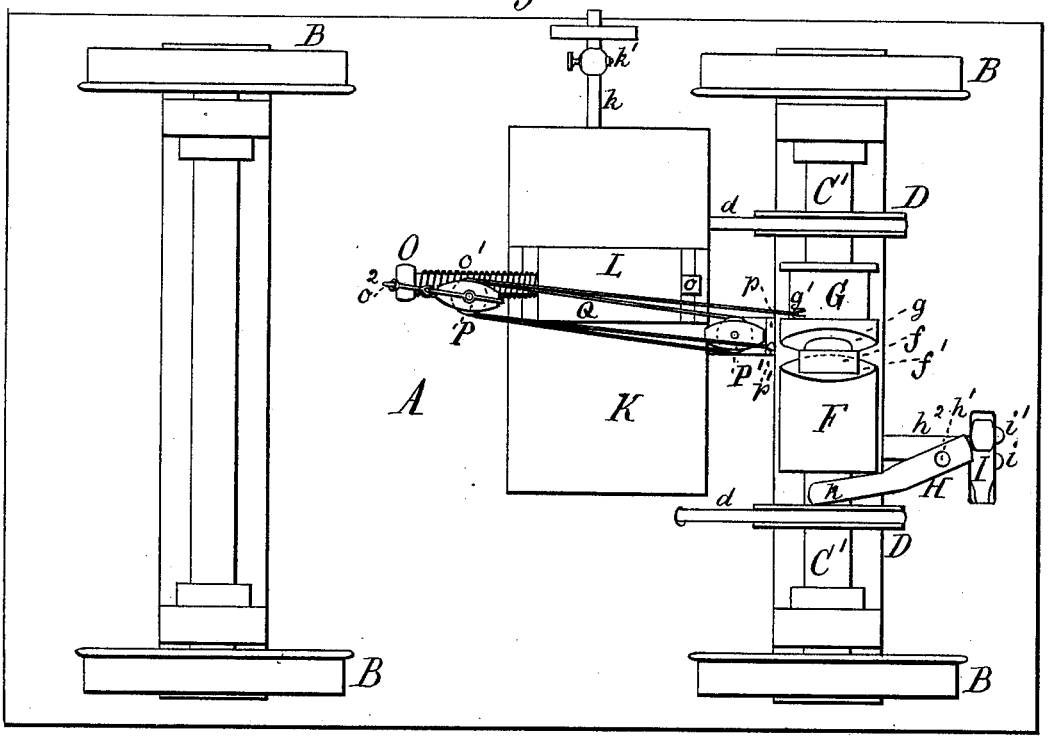


Fig 7.

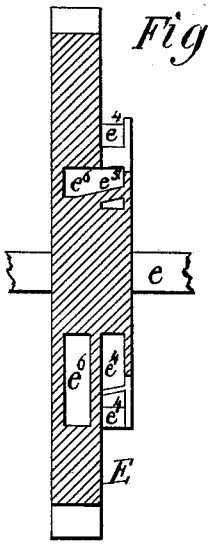


Fig 8.

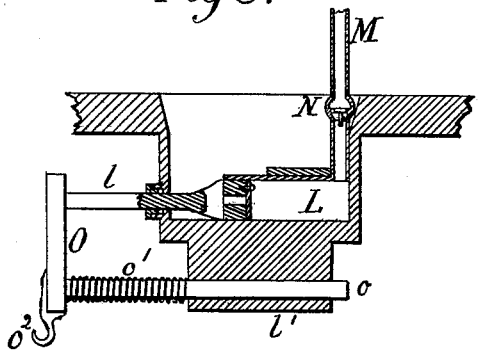
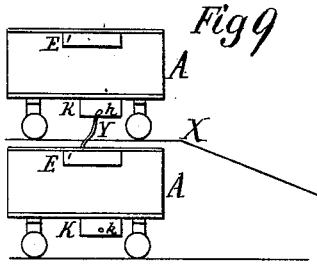


Fig 9



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J. Russell Barr

Inventor:

John B. Atwater

by

Mason, Fenwick & Lawrence

UNITED STATES PATENT OFFICE.

JOHN B. ATWATER, OF GENEVA, ILLINOIS.

IMPROVEMENT IN STREET-CAR PROPELLERS.

Specification forming part of Letters Patent No. **205,991**, dated July 16, 1878; application filed June 25, 1878.

To all whom it may concern:

Be it known that I, JOHN B. ATWATER, of Geneva, in the county of Kane and State of Illinois, have invented a new and Improved Mode of Propelling Street-Railroad Cars, which improvement is fully set forth in the following specification and accompanying drawings, in which latter—

Figure 1 is a side elevation of my improved propelling mechanism applied to a street-car, one of the wheels of the rear axle of the car being removed to better exhibit the working parts. Fig. 2 shows the motor-wheel and quicksilver-tank of my propelling mechanism, parts being broken away in order to show a portion of the motor-wheel in section. Fig. 3 is a rear elevation of the car with the propelling mechanism applied to it. Fig. 4 is a vertical longitudinal section of the parts connected with the driving-axle. Fig. 5 is a transverse section of a sliding clutch used upon said axle. Fig. 6 is a bottom view of the car with propelling mechanism applied to it. Fig. 7 is a section of the motor-wheel in the line *x x* of Fig. 2. Fig. 8 is a central vertical section of a pump used in connection with the propelling mechanism of the car; and Fig. 9 is a diagram, illustrating a mode of emptying the operating-fluid from the well of one car into the tank of another car.

The nature of my invention consists in certain constructions, combinations, and arrangements of parts, hereinafter described and specifically claimed, whereby an improved mode of propelling street-railroad cars is effected.

In the drawings, A represents a car-body; B, its wheels, and C C′ the axles. The car-axle C′ is provided with one or more pulleys, D, which are driven by means of chains, ropes, or belts *d* of one or more driving-pulleys, D′, on a shaft, *e*, which shaft *e* is properly hung by means of pedestals e^1 to the car-body A, and is provided with a motor-wheel, E.

A windlass, G, is loosely fitted on the car-axle C′, and is, by preference, placed between one of the pulleys D, which serves as a collar, and a square formation, *f*, on the axle C′, which also serves as a collar, said windlass being provided with an inclined surface, *g*, at one of its ends.

The square formation *f* has a sliding-clutch device, F, fitted upon it, which has an inclined surface, f^1, opposite and similar to the surface *g*, with which it is made to clutch by aid of a swinging forked lever, H, and a hand-lever, I. The lever H has a forked head, *h*, between which the axle C′ is located, and it has a suitable fulcrum, h^1, on a block or hanger, h^2. The same hanger may also contain the fulcrum *i* of the hand-lever I, the upper part of which lever projects a suitable distance above the car-floor. A pin, *i*′, connects the adjacent ends of the hand-lever I and lever H. The forked head *h* of the lever H bears against the straight end of the clutch F.

Behind the square formation *f* a spiral spring, f^2, is inserted between the axle C′ and the clutch F, bearing against the end of the square formation *f* and the inner end f^3 of the clutching device F, and thereby keeping this clutching device away from the windlass G. A pin, *c*, in the square formation *f* and a slot, *c*′, in the clutch F serve to limit the stroke of the clutching device.

The motor-wheel E is provided with curved buckets e^6, and is driven by a heavy fluid, such as quicksilver, which is stored up in a reservoir, E′, at the top of the car, and discharged therefrom by means of an outlet-pipe, e^2, with a cock, e^3.

The quicksilver flows from the pipe e^2 into a number of open guides, e^4, the bottoms e^5 of which are inclined toward and connected with an equal number of main buckets, e^6. By this construction the quicksilver, upon entering the guides e^4, will leave the same instantly and occupy the buckets e^6. The formation of the buckets e^6, as represented by Fig. 2, is such as to prevent the quicksilver from leaving them and the wheel E before the said buckets are on, or nearly on, a level with a well or lower reservoir, K, fastened to the bottom of the car.

At the bottom of the reservoir K a force-pump, L, is placed, and a pipe, M, with check-valve N, connects the pump-cylinder with the quicksilver-tank K. By means of this pump the quicksilver can be elevated, in part, from the lower to the upper reservoir. The piston-rod *l* of the pump extends a suitable length outside the lower reservoir, and is, by means of a cross-head, O, connected with a guide-

rod, o. The guide-rod o is provided with a tension-spring, o^1, between the cross-head O and a lower extension, l', of the pump, into which extension the guide-rod is fitted.

The cross-head O is provided with a hook, o^2, to which a block, P, with two pulleys, P^2, is attached. At the other side of the pump L a block, P^1, with a single pulley, P^3, is fastened to a hanger-arm, p, of the bottom of the car.

A rope, Q, double reeved, is attached at g' to the windlass G, and at p' to the arm p, and between the two attachments it is passed over the pulley P^2 P^3 of the blocks P P^1.

A drain-pipe, k, with a cock, k', attached to the lower reservoir K, serves to draw off the surplus quicksilver which accumulates in the lower reservoir during the operation of the car.

Operation: Before the car is started the cock e^3 of the pipe e^2 is closed and the reservoir E′ is filled with quicksilver. The clutching device F stands off from the windlass G, and the piston l of the pump L stands at the beginning of its forward stroke, in which position it is kept by the tension-spring o^1 whenever the windlass is disconnected from the clutching device.

When the car is to be started, the cock e^3 is opened, and the quicksilver of the reservoir E′ begins to descend into the buckets e^4, and therefrom into the buckets e^6, of the wheel E, which is thereby revolved. Its revolutions are communicated to the axle C′ and wheels B, and thus the car moves ahead.

The buckets e^6, on arriving at the lower reservoir K, discharge their contents of quicksilver into the same and around the pump L.

When the car is to be stopped, the cock e^3 is closed and the lever I swung to the other side, whereby the clutching device F is moved in contact with the windlass G. By this operation the oblique sides g and f^1, constituting the clutch, are engaged, the windlass revolved by the friction induced, and the rope Q wound upon it until the momentum of the car is spent. The power of the windlass is multiplied by the mechanical action of the rope Q and blocks P P^1 to such a degree that the pump-piston l (which is constructed, as shown, to work with a short quick stroke,) is easily moved to the end of its forward stroke by the momentum of the car after the clutching device has been operated for stopping the car, and the quicksilver in front of it is at once forced into the pipe M, and through it into the upper reservoir E′.

It is proposed to stop the car at the end of each square of a street, and have the quicksilver which has been discharged into the reservoir K (or so much thereof as will be pumped back by one stroke of the piston)returned to the reservoir E′.

When the car is to be started again the lever I is swung back to its original position, whereupon the windlass becomes disengaged from the clutch F, and the rope Q becomes unwound from the windlass by the tension of the spring o^1. The piston of the pump L is thereby drawn back again to its former position, and the pump is charged again with a fresh amount of quicksilver, which enters through the perforated piston of the pump.

As the amount of quicksilver pumped into the reservoir E′ is less on account of friction and resistance to be overcome than the amount discharged into the lower reservoir, there is a liability of the lower reservoir becoming filled and the upper one emptied. To avoid this the respective cars are periodically elevated on a platform, X, (shown in Fig. 9,) and the contents of the lower reservoir K emptied into the upper reservoir of another similar car stationed on a plane below the platform X, as indicated in the figure. This transfer of the quicksilver is effected through a hose-pipe, Y, as indicated, which leads into tank E′ through the roof of the lowest car.

What I claim as new and my invention is—

1. In a street-car, the combination of an upper reservoir, E′, having an outlet-pipe, e^2, and cock e^3, a motor-wheel, E, on a shaft having a pulley or pulleys, D′, and the car-axle C′, having a pulley or pulleys, D, and a chain or chains, d, substantially as and for the purpose set forth.

2. The combination of the car-axle C′, having a square formation, f, the clutching device F, having a tension-spring, f^2, and oblique face f^1, the windlass G, having an oblique face, g, and the pumping mechanism, substantially as and for the purpose set forth.

3. The combination, in a street-car, of the quicksilver-reservoir E′, the motor-wheel E, the reservoir K, pumping mechanism, clutching mechanism, and car-axle C′, substantially as and for the purpose described.

Witness my hand this 22d day of June, A. D. 1878.

JOHN B. ATWATER.

Witnesses:
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