W. E. PRALL.

Apparatus for Propelling Street-Cars.

No. 217,956. Patented July 29, 1879.

Fig: 1,

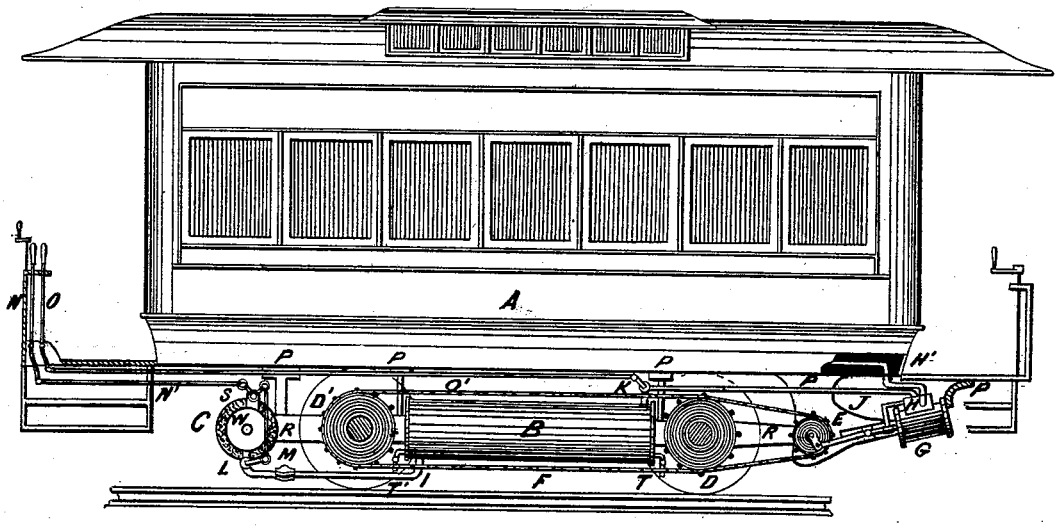
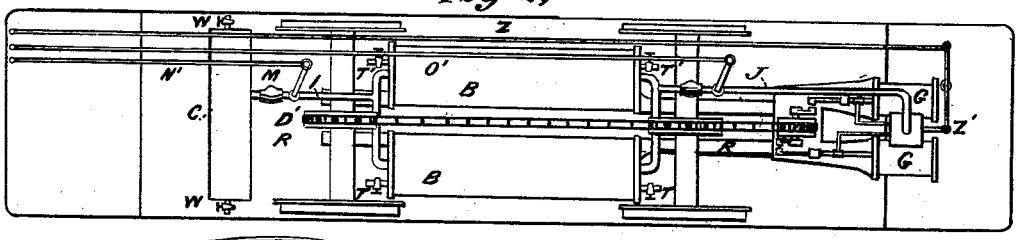


Fig: 2,



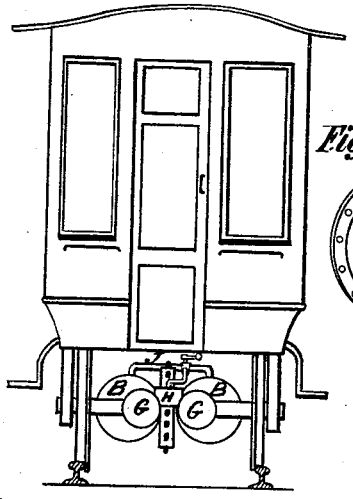
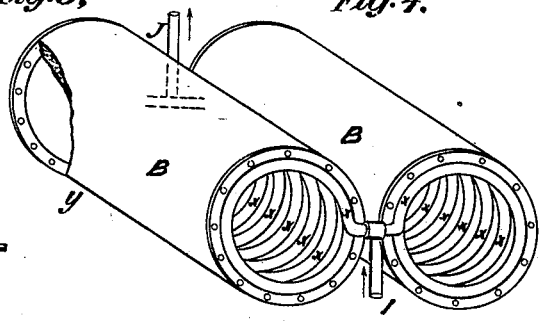


Fig: 3,

Fig: 4.



Witnesses:

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UNITED STATES PATENT OFFICE

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IMPROVEMENT IN APPARATUS FOR PROPELLING STREET-CARS.

Specification forming part of Letters Patent No. **217,956**, dated July 29, 1879; application filed May 27, 1879.

To all whom it may concern:

Be it known that I, WM. E. PRALL, of New York, county and State of New York, have invented a new and useful Improvement in Apparatus for Propelling Street-Cars, of which the following is a specification.

My invention relates to an improved method of propelling street-cars; and it is designed to accomplish the object without the use of fire and the many objectionable features which result from the employment of a system which requires a direct generating apparatus to be carried with each car.

I have endeavored to achieve this result in a manner which will be simple and compact in construction, and which will supply the necessary power in a uniform and unvarying degree, without necessitating a heavy burden or extreme pressure to be carried at any time.

Figure 1 of the drawings shows a side view of a car fitted up with this apparatus.

In Fig. 1, A represents the street-car; B, a cylindrical tank placed longitudinally between the axles of the car; C, a similar tank placed in front of the axle; D and D′, cogged wheels placed on the axle; E, another cogged wheel, somewhat similar, situated a short distance from the others; R, a strong timber, to which the tanks, cogged wheels, and engine G may all be attached in such a manner as to hold them in their proper position. F represents a linked chain, constructed to form an endless connection over the periphery of all the wheels, being so made as to engage the projections or cogs on each of the wheels in a manner to propel them all at once when the chain is moved. H is the steam or slide valve box of the engine, H′ being the exhaust-pipe of the engine, and it may be extended into the car to form a heater for warming the same when required in cold weather, or it may extend downward and exhaust beneath the car. I represents a supply-pipe extending from the small tank C to the interior coil placed within the tank B. J represents the pipe extending from the interior coil to the engine. K is a cock or valve controlling the pipe J, and L a cock controlling the pipe I. M is the valve placed in pipe I for regulating the pressure within the coil and engine. N is the lever operating the rod N′, which actuates the cock L, and O the lever which actuates the rod O′, which controls the cock K in pipe J. P P P P indicate the supports which may be employed to fasten the apparatus to the body of the car. S is a bell-crank used for changing the direction of the motion of the rod N′. T and T represent the connecting-pipes, provided with cocks, which are used for charging and discharging the tanks B, and W the pipe-connections used for charging and discharging the tanks C.

In the practical operation of my invention the apparatus should be constructed attached together, and may either be supported on the axles of the car or may be attached to the body of the car; but it will be found advisable to have it all supported together by one or the other independent, as the spring movement would interfere with the direct gearing if a part were connected to both at the same time.

The car thus fitted will be charged at the terminus of the road in the manner which I will now proceed to describe. At such terminus-stations I propose to establish two large heating-tanks or boilers, to be kept constantly charged, one with water and the other with linseed-oil or some other which has a capacity for great specific heat, and which boils only at a very high temperature, linseed oil being preferable to all others, as it requires 640° of heat to start vaporization. These boilers will each be provided with the necessary pipe-connections extending from them alongside the track on which the cars are placed for charging, and they will be provided with the necessary cocks for controlling them. There will also be pumps arranged in connection with the pipes, so that when they are connected with the tanks B and C water of a high temperature may be forced from the boiler containing water into the tank C on the car, and oil of a high temperature may be forced from the heater containing oil into the tank or tanks B on the car. As soon as they are both filled the cocks at the tanks are closed and the connections are broken. The conditions are then ready for the generation of steam for propelling the car, which I will now describe.

It is well known that water boils at a much lower temperature than 212° when the atmospheric pressure is removed; and as the water contained in the tank C will be many degrees

above 212°, or about 350°, the specific heat thus contained would cause it to be converted into steam when the pressure was removed until a considerable portion of it was evaporated. By this means a constant pressure would be maintained in tank C, which would act to force the water from said tank into the coil placed within the linseed-oil tank B through the connecting-pipe I whenever the cock L was opened. The intensity of the heat in the oil, which might be 800° or more, would transmit the same degree to the water admitted into the coil; and as the long distance the water would have to travel before it would escape into the engine would subject it to the intense heat transmitted from the oil for a sufficient length of time to be all converted into steam or superheated steam, it is evident that the steam in the coil would acquire a pressure due to the temperature of the surrounding oil; and to provide against such a great pressure as would accumulate therein, the valve M is placed in the pipe which connects the water-tank with the coil in the oil-tank. This valve is weighted, and is thereby made to regulate the pressure by the action of the steam to any limit to which it is desired. In this manner the pressure is not permitted to accumulate in the coil beyond that which the amount of water admitted will permit. So long, however, as the pressure was confined to a pipe of such small diameter as that of the coil there could be no danger from overpressure.

The great advantage of thus maintaining, during the entire trip, a constant and uniform pressure cannot be overestimated, as it precludes all possibility of explosion. The great amount of heat in the oil, which may be stored at a very low pressure, has the double advantage of producing intensity for evaporating water into steam, as well as that of reducing the weight to be carried. It also avoids all dangerous pressure and maintains a regular one, which is under perfect control of the operator.

By means of the lever Z, Fig. 2, the steam may be entirely cut off, or the engine may be reversed when desired.

The operator may also increase or diminish the amount of steam, as required, by admitting more or less water into the coil from the tank C.

By means of the simple and powerful method of driving the car by an endless chain arranged to act on both axles at the same time, a traction is rendered available to the greatest extent, and all the various movements of the wheels in passing over rough and curved roads will have no effect to strain the engine or cause any irregularity in its movement.

In Fig. 4 is shown the manner of placing the coil *x* in the oil-tank, and also the manner of providing against loss by radiation from the tanks by covering them with a non-conductor represented by *y*.

The tanks and other machinery may be located in any position on the car, and may be made of any suitable size proportionate to the distance to be traveled, as it is evident that many modifications in the manner of construction or operation could be made. I do not confine myself to any particular plan. The cars may be turned at each end of the road, so as to have them always move in one manner, or by additional rods the engine can be controlled from either end of the car, and thus avoid the necessity of turning.

After the return of the car to the heating-station the water and the oil may be exchanged for that of a higher temperature, as before described, and it may be forced directly into the heating-tanks from the tanks on the car, or it may be discharged into receiving-tanks, and afterward pumped into the heaters for reheating.

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

1. In an apparatus for propelling street-cars, the arrangement together on the car of a tank or tanks containing water and a tank or tanks containing hot oil, and so constructed that the water from the water-tank will be forced through the pipes within the oil-tank, whereby steam will be generated for running the engine of the car, substantially as and for the purpose set forth.

2. In an apparatus for propelling street-cars, the combination, with a car, of a hot-water tank, the hot-oil tank provided with steam-evaporating pipes, the pipes connecting the water-tank with the evaporating-tank, a valve for regulating and controlling the pressure, and an engine, constructed and operating together substantially as and for the purpose set forth.

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Witnesses:
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