(No Model.) 2 Sheets—Sheet 1.

C. UPTON.

CONDENSER.

No. 418,428. Patented Dec. 31, 1889.

Fig. 1.

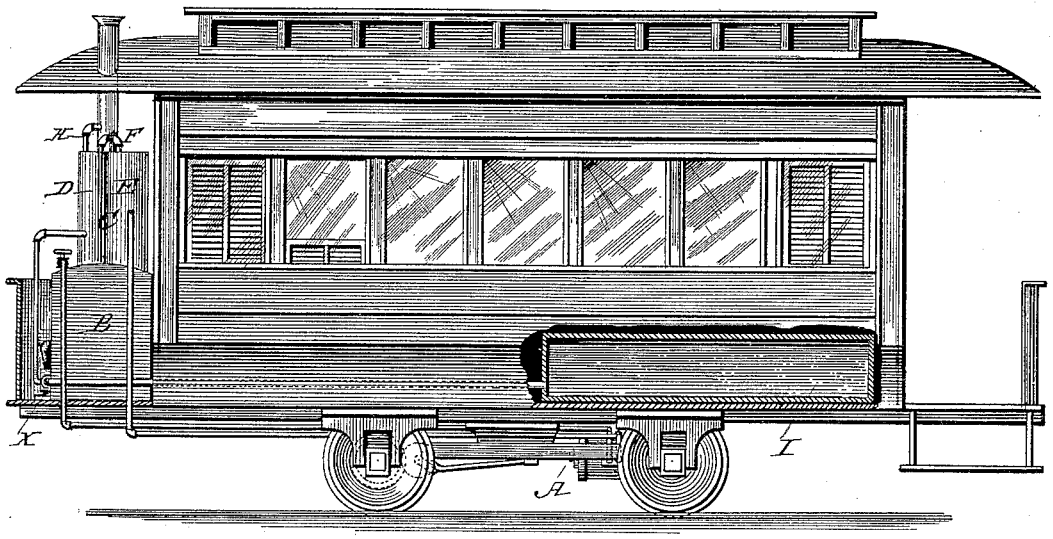
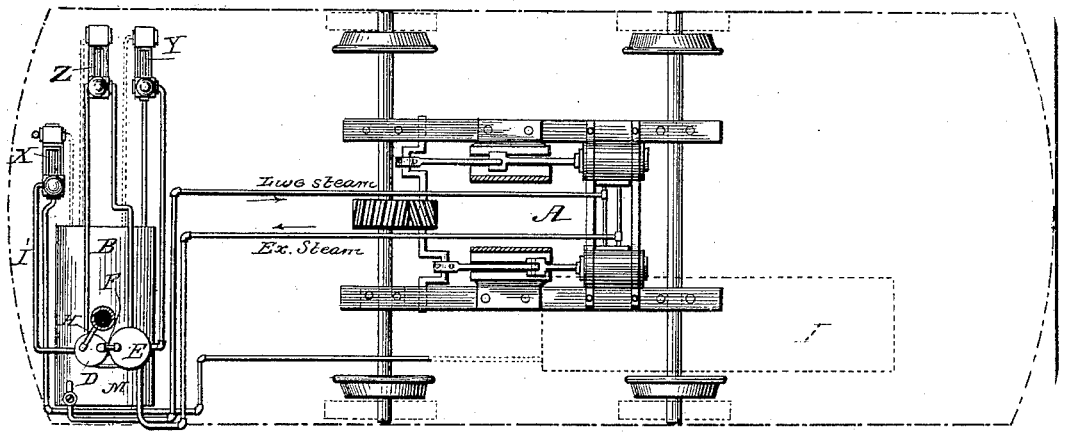


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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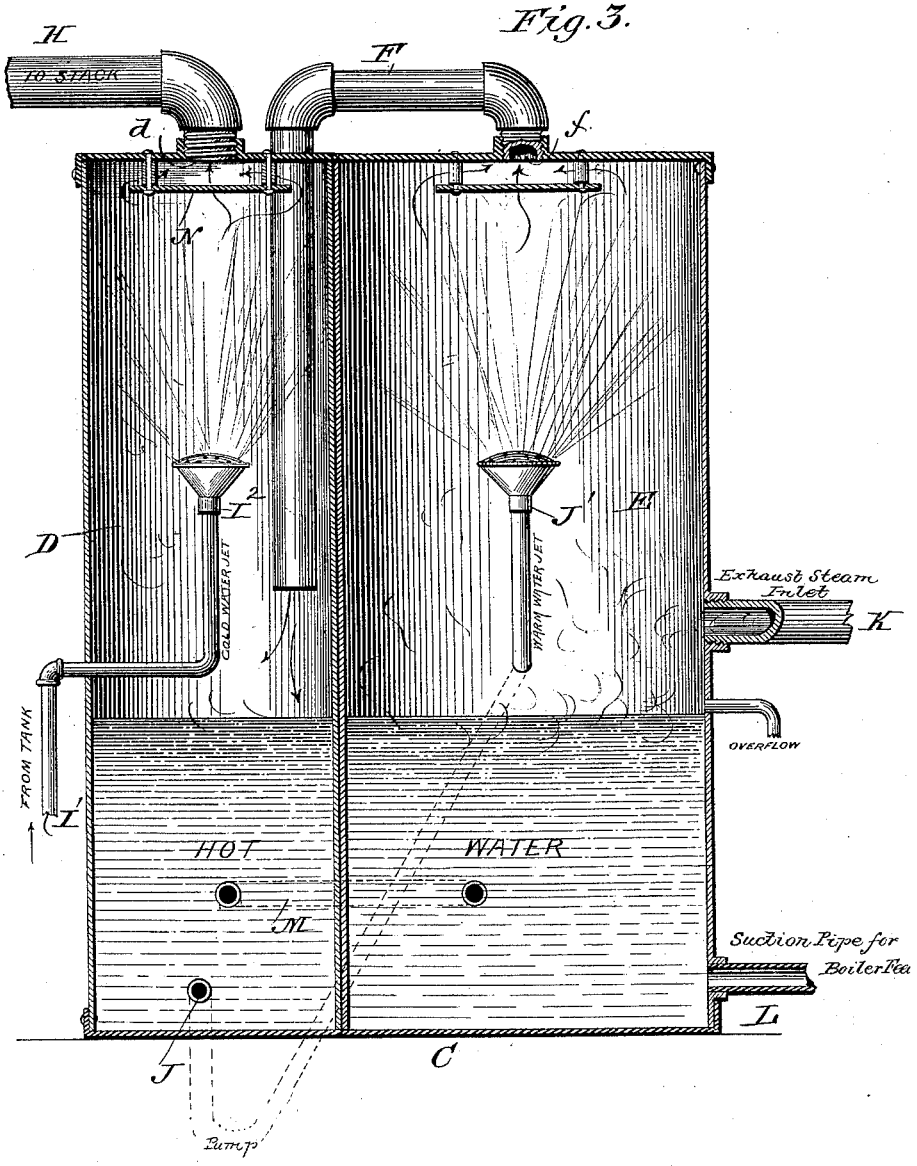
Fig. 3.



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UNITED STATES PATENT OFFICE.

COLCORD UPTON, OF SALEM, MASSACHUSETTS.

CONDENSER.

SPECIFICATION forming part of Letters Patent No. 418,428, dated December 31, 1889.

Application filed April 17, 1889. Serial No. 307,626. (No model.)

To all whom it may concern:

Be it known that I, COLCORD UPTON, residing at Salem, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Condensers, of which the following is a specification.

My invention relates more particularly to condensers for steam-motors used for street-car propulsion; and it has for its object to provide a compound condenser which will be simple in construction and effective in its desired operation.

My invention consists in certain features of construction and peculiar combination of parts, all of which will be hereinafter fully described in the annexed specification, and particularly pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a car provided with a steam-motor, showing my improved condenser in operative position. Fig. 2 is a plan view illustrating the general arrangement of my improvements in connection with a steam-motor, and Fig. 3 is a vertical section of my improved condenser.

The motor A and the boiler B shown in the drawings may be of any desired construction, they forming no part of my invention, they being shown so as to more clearly illustrate the operation of my improved condenser.

The condenser C, which is most clearly illustrated in Fig. 3, consists of two cylinders D E, one of which E is of larger dimensions than the other, and which I will term the "steam-cylinder." These tanks are connected at their upper ends by the pipe F, which connects with an opening *f* in the tank E and projects through an opening in the cylinder D and extends down into the same about one-half its height. *d* denotes an outlet in the upper end of the cylinder D, which is connected with the stack of the boiler B by the connecting-pipe H, as shown.

I denotes the water-supply tank, which may be located upon any portion of the car-body, but preferably under the seats, as shown; and I′ denotes the supply-pipe which connects the tank with the condenser-cylinder D. This pipe is extended within the cylinder D, and is provided on its end with a jet-tube I^2, which I term the "cold-water jet."

J denotes a pipe connected with the lower end of the cylinder D, which extends to a pump Z, and from the pump to within the cylinder E, and is provided with a jet-tube J′ at its inner end, which I term the "warm-water jet."

K denotes the inlet-pipe, through which the exhaust-steam from the engines is led to the condenser.

L denotes the suction-pipe, through which water is fed to the boiler from the condenser.

M denotes a pipe connecting the two cylinders, so as to cause a complete circulation of the water.

N N denote deflector-plates arranged beneath the outlets *d* and *f*, the purpose of which will presently appear.

Suitably-constructed force-pumps are employed to force the water through the jet-tubes and to supply the boiler-feed.

The operation of my condenser is as follows: A sufficient supply of water is first pumped by the pump X from the supply-tank into the cylinder D, from which it flows through the connecting-pipe into the steam-cylinder E. The pump Y is then started and the water fed from the condensing-cylinders to the boiler. The pump Z is then put in operation, which draws the water from the cylinder D and forces it through the jet-tube into the cylinder E. The exhaust-steam from the engine or engines A will enter the larger or steam cylinder E and intermingle with the water from the jet J′ therein and rise to escape through the outlet *f;* but before escaping it will be thoroughly saturated by the water-jet from the tube J′ and be thereby partially condensed. The water which is discharged through the jet J′, being drawn from the tank D, will, to a certain extent, be in a somewhat heated condition. Such steam as passes from the cylinder E enters the tank D near the water-line, and, trying to escape from the outlet D, it will be acted upon by the cold-water jet I^2 and be thereby condensed. In case any steam should still remain in the upper portion of the tank, it will escape into the smoke-stack and pass off with the smoke or hot air from the boiler-flues. By arranging the deflectors over the outlets *d f* the water from the jets will be prevented from entering the pipes, and also be thereby scattered back

into the cylinders, this scattering helping the jets.

From the foregoing description, taken in connection with the drawings, the advantages and operation of my invention will be readily understood.

It will be seen that but a very small quantity of water is necessary to run the condensers, that the waste of the jet-water is reduced to a minimum, and that the condensing-water, which becomes the boiler-feed, can be used over and over again, and by the direct intermingling of the water and steam by means of the jets I^2 J′ the exhaust-steam will be thoroughly condensed with least possible weight of water.

Having thus described my invention, what I claim as new is—

1. A condenser for steam-motors, consisting of two cylinders D E, one of said cylinders provided with an inlet for the exhaust-steam, a pipe connecting the lower portions of the two cylinders, a pipe for conveying the steam from the cylinder E to cylinder D, as shown, a feed-pipe connected with the supply-tank leading into the cylinder D and provided with a jet-tube, and a feed-water connection between the condenser and the boiler, substantially as shown and described.

2. A compound condenser for steam-motors, consisting of two cylinders D E, one of which E is connected with the exhaust-steam pipe, a feed-pipe connected with the water-supply tank, extended into the cylinder D, and provided at its inner end with a jet-tube I^2, a pipe connected with the said cylinder near its lower end and extended into the cylinder E and provided with a jet-tube J^2 at its inner end, a steam-pipe connected with the upper end of the cylinder E and extended into the cylinder D, a feed-connection between the said condenser and the boiler, and a pipe-connection between the upper end of said cylinder D and the boiler-stack, substantially as shown and described.

3. The hereinbefore-described improvements in condensers for steam-motors, consisting of the cylinders D E, connected by a pipe M at their lower ends, the cylinder E, provided with an exhaust-steam inlet, the cylinder D provided with a water-supply pipe I′, a jet-tube I^2 within said cylinder D, connected to the supply-pipe, a pipe J, connected to the lower portion of the cylinder D and extended within the cylinder E and provided with a jet-tube J^2 on its inner end, a pipe F, connected to the upper end of the cylinder E and extended within the upper end of the cylinder D, a pipe connected between the upper end of said cylinder D and the smoke-stack, a feed-pipe connection between said cylinder E and the boiler, and means, substantially as shown and described, for forcing the supply through the jets I^2 J′ and the boiler-feed, as and for the purpose described.

COLCORD UPTON.

Witnesses:
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WILLIAM A. STACKPOLE.