(No Model.) 2 Sheets—Sheet 1.

G. A. HOUSTON.

CAR HEATER.

No. 432,238. Patented July 15, 1890.

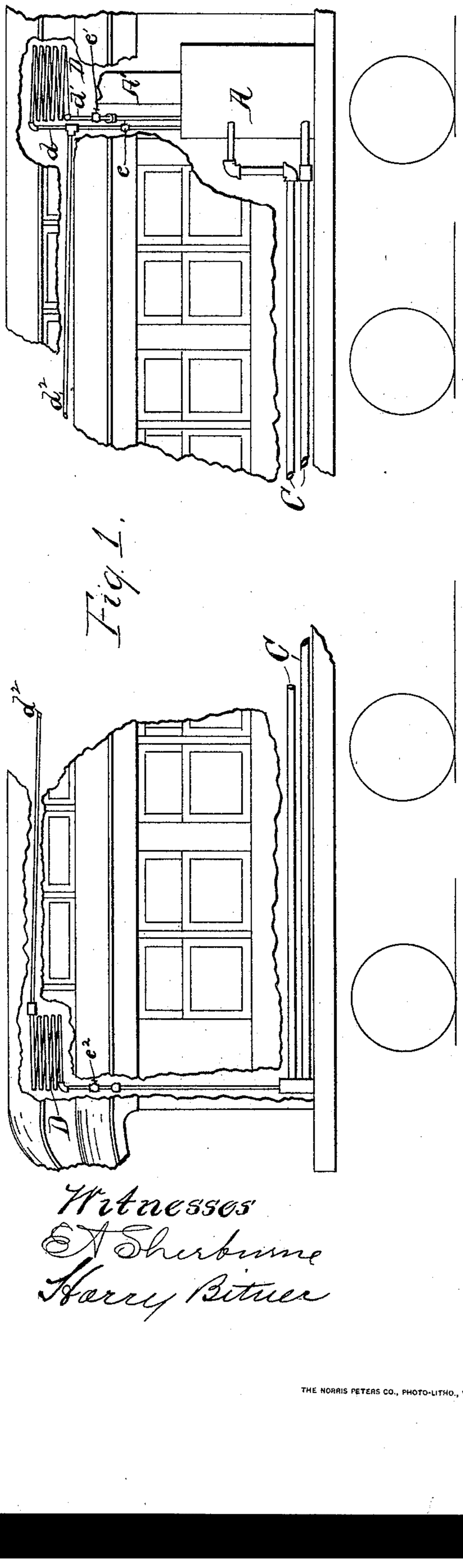

Fig. 1.

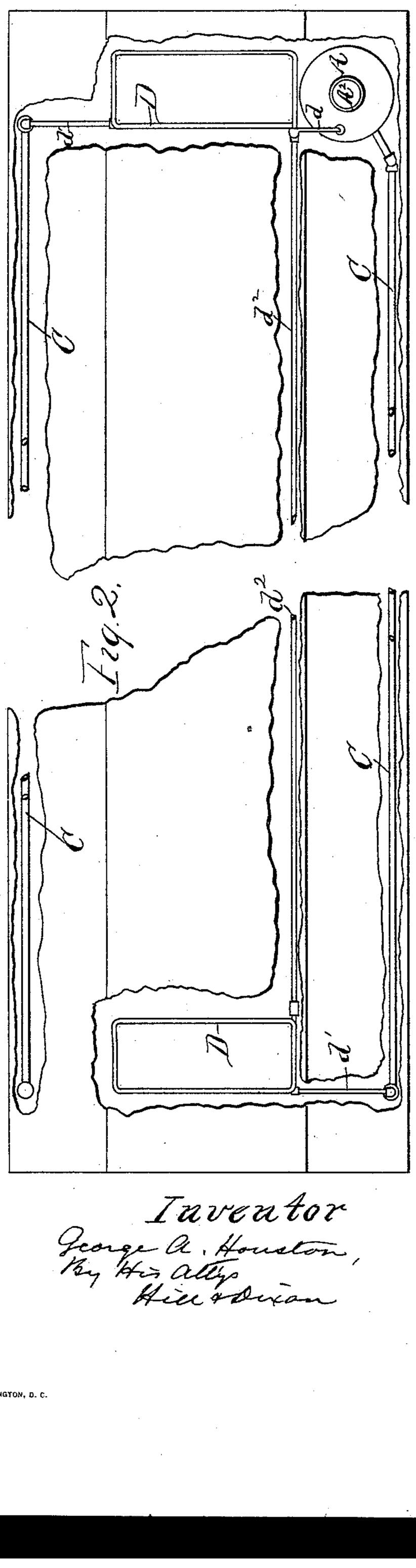

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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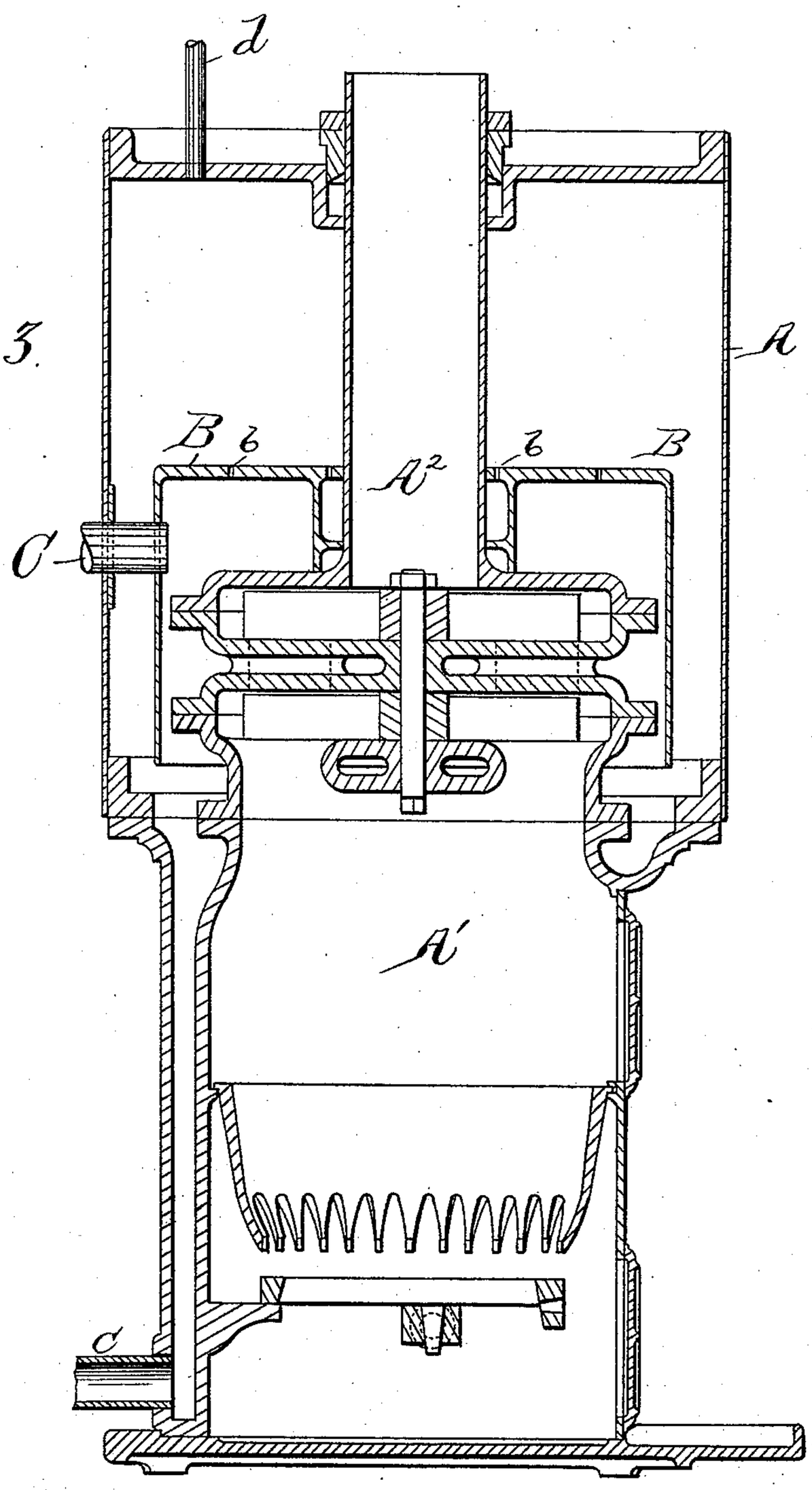
Fig. 3.



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Hill & Dixon

UNITED STATES PATENT OFFICE.

GEORGE A. HOUSTON, OF BELOIT, WISCONSIN.

CAR-HEATER.

SPECIFICATION forming part of Letters Patent No. 432,238, dated July 15, 1890.

Application filed June 20, 1889. Serial No. 314,975. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. HOUSTON, a citizen of the United States of America, residing at Beloit, in the county of Rock and State of Wisconsin, have invented certain new and useful Improvements in Car-Heaters, of which the following is a specification.

Referring to the accompanying drawings, wherein similar reference-letters indicate the same or corresponding parts, Figure 1 is a side elevation of a car with portions broken away to show my improvements. Fig. 2 is a top plan view of a car having the improvements similarly exposed and having the pipe from the lower end of the elevated coil leading into the circulation-pipes. Fig. 3 is a vertical section of the boiler used with my present system.

The object of my invention is to provide an improved apparatus for heating railroad-cars by hot water and steam in which a low-pressure circulation of the hot water shall be actively forced by a boiler on the car and the condensation-water of the steam shall be automatically returned to the water circulation.

In the drawings, A represents a boiler or tank containing while in use a sufficient supply of water for the purposes of my apparatus, and provided with a fire-pot A′ and smoke-flue A^2 of any approved construction. A hood B is placed around the upper part of the fire-pot or its heating flues or chambers within the water-space of the boiler and open to the water at or in the vicinity of its lower edge, and a system of water-circulation pipes C is connected to the interior of the hood at or near its upper end and to the open water-space in the lower part of the boiler. The object of the hood is to confine a column of water immediately around the heating-surfaces of the combustion-chamber to cause the water to be rapidly heated, and thereby to cause a rapid flow through the circulation-pipes C back to the lower part of the boiler. Practical experience shows that the water circulation thus obtained is very active and efficient, and that this improvement does away with all necessity for connecting the circulation-pipes to a coil within or around the combustion-chamber. With the open water circulation thus established I am able to avail myself of the steam generated in the boiler for the purpose of heating the car by steam-heat in addition to the heat of the water circulation, and to return the condensation-water of the steam-pipes to the water circulation. To this end I arrange a condensing-radiator, preferably in the form of a coil of steam-pipes D, in the upper part of the car, and connect its upper end by a pipe *d* to the steam-space of the boiler and its lower end by a pipe *d′* to the water-space of the boiler, as shown in Fig. 1, or to the water-pipes, as shown in Fig. 2, so that the steam generated in the boiler will flow into and through the coil, and its condensation-water will automatically flow back into the water circulation. In fitting up a car I prefer to arrange one or more of these steam-coils at each end of the car, connect their upper ends by a pipe d^2, and return the condensation-water from their lower ends to the water circulation by means of separate pipes *d′*, and I arrange them, by preference, immediately under the roof and in front of the ventilation-openings, so as to warm the air as it enters the car, and at the same time promote the condensation in the pipes, and thus increase the activity of the steam circulation. These latter arrangements, while beneficial, are not necessary to my invention in its broad sense; but it is necessary that the steam-pipes be arranged at a higher elevation than the water-pipes in order that they may not fill with water and that their condensation water may escape by gravity into the water circulation. The low-pressure circulation keeps the pipes C free from steam and air, while the steam-pipes and condensation-coils keep down the steam-pressure, utilize the steam for heating purposes, and return the condensation-water to the water circulation. Small perforations *b* through the upper part of the hood permit any steam that may form therein to escape into the steam-space of the boiler, but are not sufficient in extent to relieve the water within the hood from the constraint which tends to direct it into the circulating-pipes.

Cocks *e e′* e^2 are provided to enable the pipes to be cleared of air and to control the flow of steam or cut it off when desired.

The steam-space above the water in the

boiler will act as an expansion-chamber and enable me to dispense with the ordinary expansion-tank.

With suitable connections to a train-pipe for supplying steam from the locomotive (not necessary to be here described) this apparatus may be used for steam-heating alone, water-heating alone, or combined steam and water heating.

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

1. The combination of a water-heater containing a fire-pot or combustion-chamber with a hood B, arranged within the water-space around the fire-surfaces, substantially closed at its upper end and open at or in the neighborhood of its lower end, and with a system of water-circulation pipes extending from the upper part of the space inclosed by the hood to the car or building to be warmed, and thence to the lower part of the water-space of the heater, substantially as described.

2. The combination of the heater, hood, and water-circulation pipes, as described, with a steam-radiator arranged above the water-space of the heater and provided with a pipe for admitting steam from the heater and a pipe for returning the condensation-water to the water circulation, substantially as described.

3. The combination of the heater, hood, and water-circulation pipes, as described, with a series of elevated steam-radiators connected together by a pipe d^2 and to the steam-space of the boiler by a pipe d, and provided with separate pipes d' to return their water of condensation to the water circulation, substantially as described.

4. The combination of the heater, hood, and water-circulation pipes, as described, with steam-radiators arranged at each end of the car, immediately under the roof and close in front of the ventilator-opening, and provided with a pipe d^2, connecting the steam-spaces of said two radiators, a pipe d, for supplying them with steam from the boiler, and a pipe or pipes d', for returning their condensation-water to the water circulation, substantially as described.

5. The combination of a system of water-circulating pipes provided with means for heating the water therein, with a system of steam-radiating pipes arranged above the level of the circulating water and open thereto, and a steam coil or radiator arranged at each end of the car, immediately under the roof and close in front of the ventilator-openings of the car, as and for the purpose stated.

GEO. A. HOUSTON.

Witnesses:
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WILLIAM LEMPHUE.