

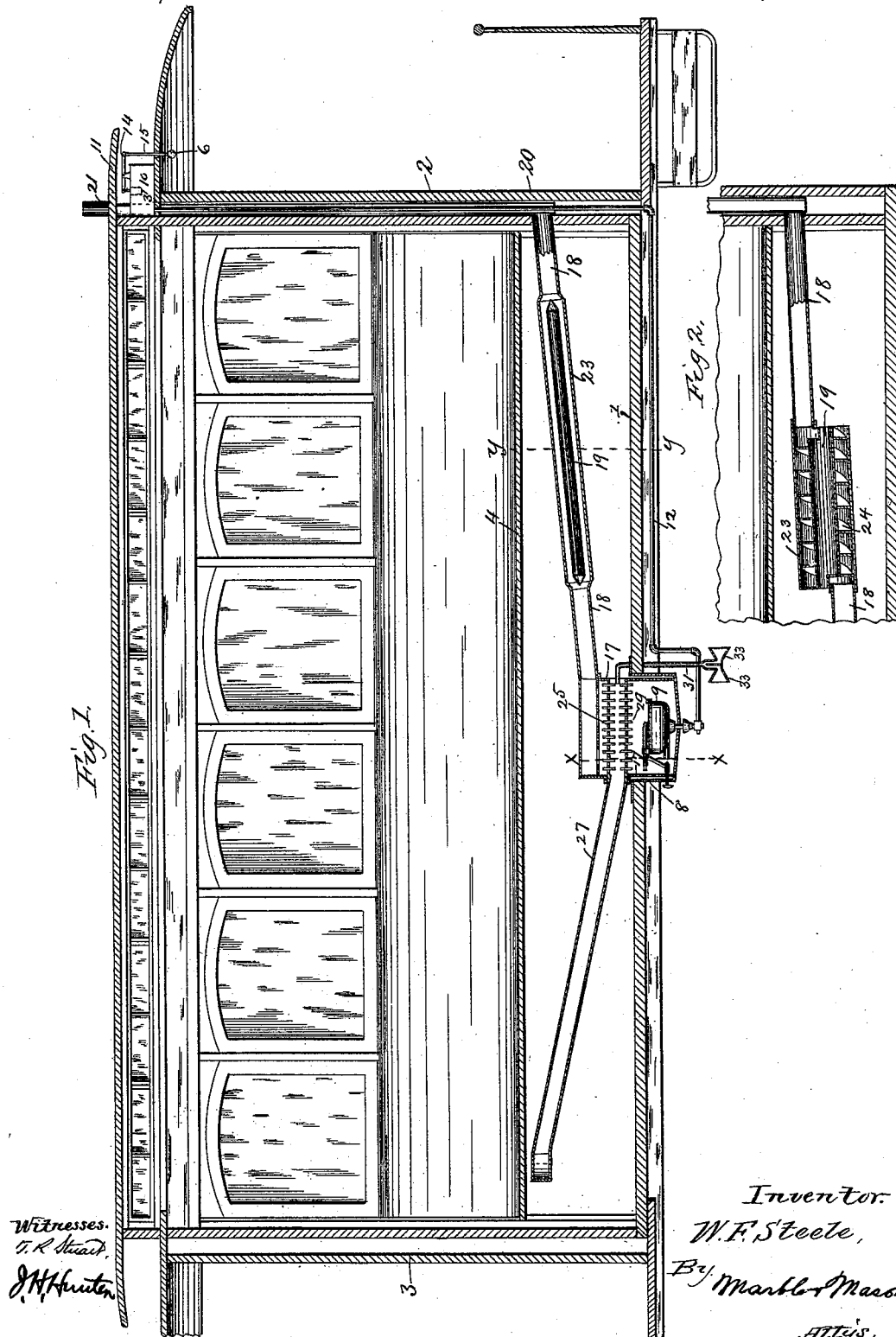
(No Model.)

2 Sheets—Sheet 1.

W. F. STEELE.
CAR HEATING APPARATUS.

No. 384,401.

Patented June 12, 1888.



Witnesses.
T. R. Stuart,
J. H. Hunter.

Inventor.
W. F. Steele,
By Marshall Mason,
Att'y.

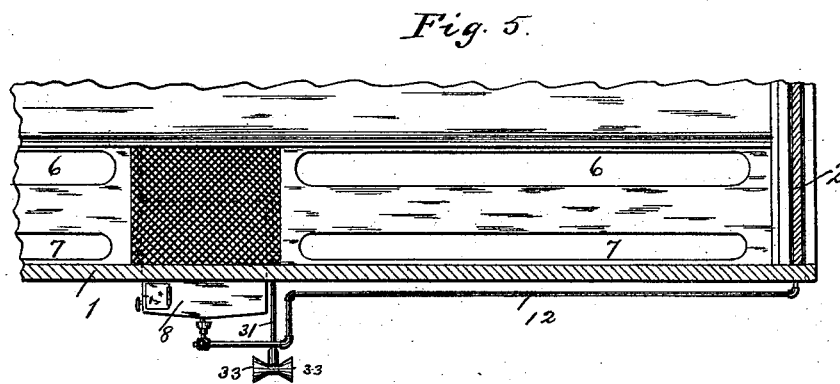
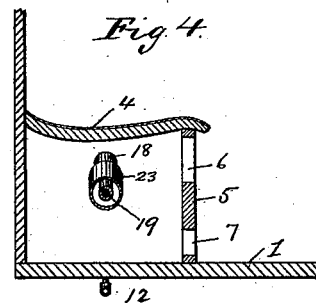
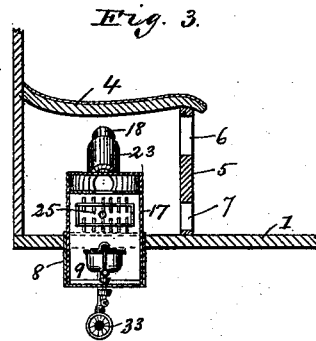
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W. F. STEELE.
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No. 384,401.

Patented June 12, 1888.



Witnesses:
J. R. Stuart,
J. H. Hunter.

Inventor:
W. F. Steele,
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UNITED STATES PATENT OFFICE.

WILBUR F. STEELE, OF MINNEAPOLIS, MINNESOTA.

CAR-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 384,401, dated June 12, 1888.

Application filed May 12, 1888. Serial No. 273,730. (No model.)

To all whom it may concern:

Be it known that I, WILBUR F. STEELE, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Car-Heating Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a car-heating apparatus of the class in which air is heated by means of a suitable burner and discharged through a flue into a space inclosed by and beneath the seat of the car or into the body of the car itself, and in which the radiating heat from the pipe carrying off the smoke and products of combustion from the burner is also employed for heating the air.

The invention consists, generally, in the construction and combination of parts hereinafter described, and particularly pointed out in the claims.

The object of my invention is to provide simple, inexpensive, and durably-constructed car-heating apparatus, which is not only adaptable to new cars, but to those of the present ordinary construction, which is capable of being taken apart and removed, and which is arranged beneath only one car-seat and only on one side of the car, thus avoiding the employment of heating apparatus under each car-seat and on both sides of cars.

In the accompanying drawings, forming a part of this specification, and in which the same reference-numerals indicate the same parts, Figure 1 represents a longitudinal vertical section of a street-car and a heating apparatus therefor, the front of the seat being removed. Fig 2 is a detail showing a modified construction of the drum and core in the smoke-pipe. Fig. 3 is a vertical transverse section on the line *xx* of Fig. 1. Fig. 4 is an enlarged transverse section on the line *yy* of Fig. 1, and Fig. 5 is a broken longitudinal section of the lower portion of the car in front of the seat.

In the drawings, 1 represents the bottom or floor of the car; 2 and 3, the ends of the same; 4, the top of the seat; and 5 the front of the same.

The front 5 of the seat is preferably provided with a comparatively wide slot or opening, 6, near its upper edge, and with a narrower slot or opening, 7, near its lower edge. These slots or openings preferably extend the entire length of the seat, and they may be left entirely open or have perforated or register plates secured thereover. An aperture or opening is preferably formed in the bottom of the car at a point about midway of its length, and in this is arranged a suitable casing, 8, which may be secured to the bottom of the car in any suitable manner. Within this casing is arranged a suitable hydrocarbon burner, 9, which may be of any preferred construction.

A tank or reservoir, 10, is preferably arranged at one end of the car beneath the projecting hood 11, and a supply-pipe, 12, extends from the tank 10 to the burner 9. Through this pipe liquid hydrocarbon is supplied to the burner 9, where it is vaporized and burned in the usual manner. I may provide the tank 10 with an indicating-float, 13, connected to a pivoted lever, 14, the other end of which is connected to a rod, 15, extending downward through the part of the roof that projects over the platform of the car. This rod is provided with a button, 16, at its lower end, the position of which will show the amount of oil in the tank.

A casing, 17, having preferably an open bottom and a closed top, is arranged within the casing 8, and constitutes the main part of the heater. The upper portion of this casing communicates with a smoke-pipe, 18, extending to one end of the car. This smoke-pipe is preferably formed with a drum, 23, arranged in it between the heater and the end of the car, and having a drum or core, 19, supported longitudinally within this drum 23. The ends of the core 19 are preferably made pointed or conical in shape, so as to not retard the passage of the smoke and products of combustion. The end of the pipe 18 is connected to a pipe, 20, which extends upward through the inclosed space in the end of the car and passes out through the top of the car; or, if preferred, said pipe 20 may be extended backward beneath the seat and pass out at the top of the other end of the car. In either event it may be provided with a pipe, 21, at its discharge

end projecting above the roof of the car for the more ready escape of the products of combustion. In some instances the core 19 may be made hollow, and may project through the ends of the drum 23, and a plate, 24, may be arranged spirally in the annular space between the core 19 and the drum 23. A flue, 25, open at each end, extends through the casing 17 of the heater directly above the burner 9. One end of this flue communicates with the open space beneath the seat of the car, and the other end is connected to a flue, 27, which extends in the space beneath the seat nearly to the end of the car, and opens into this space, or is carried out to the front of the seat and communicates directly with the interior of the car. The smoke-flue 18 and the hot-air flue 25 extend in opposite directions from the heater to the opposite ends of the car through the space beneath the seat. I may also provide the flue 25 with a series of pins, 29, projecting into the interior flue, and projecting also from the exterior thereof. These projecting pins may be inserted through the flue or they may be cast integrally therewith. These pins increase the heating capacity of the flue, causing it to more readily become heated and increasing its radiating-surface. I also prefer to provide in some instances a pipe, 31, of less diameter than the flue 25, having its open end projecting into the open end of the flue 25, as shown in Fig. 1. This pipe extends down through the bottom of the car, and is provided at its lower end with two funnel-shaped mouths, 33, each communicating with the pipe 31, and opening in opposite directions—one toward the front and the other toward the rear of the car. A similar pipe may, if preferred, be arranged in connection with the core 19 and drum 23.

When the burner is lighted, the heat from said burner will cause the colder air, which enters the space beneath the seat through the lower slot or opening, 7, to pass through the flue 25 and be heated by the flame from the burner, which is immediately below said flue. The heated air then ascends through the hot-air flue 27 and is discharged into the space beneath the seat, whence it escapes through the upper opening, 6, into the car and heats the same, or it is discharged directly into the space between the seats. The products of combustion which arise from the burner and pass around the flue 25, within the casing 17, first heat said casing and the surrounding air by radiation and then pass into the smoke-pipe 18 and pass toward the end of the car which is opposite to that toward which the heated air is conducted by the flue 27. When the smoke and products of combustion arrive at the drum 23 and core 19, they will be spread out and distributed over the entire inner surface of said drum and impart their heat throughout the same, which will cause a greater radiation of heat to take place from said pipe than would occur were it wholly unobstructed; also, the smoke and products of combustion thus come in contact

with a larger surface than they would in unobstructed pipes, having necessarily a comparatively smaller diameter, so as to not produce too great a draft upon the burner. When the open core is used, as shown in Fig. 2, a circulation of air will also be obtained through this open core, thus increasing the heating capacity of the drum. The air beneath the seat will thus not only be heated by radiation from the heater itself, but toward one end of the car it will be heated by the heat radiated from the flue 27 and also by the hot air discharged through this flue, and toward the other end of the car by the intensified additional heat radiated from the smoke-pipe 18 and the drum 23. The pipe 31 also creates a current through the flues 25 and 27. The heated air from the space beneath the seat escapes through the upper opening, 6, into the car, while the colder air to be heated enters at the lower opening, 7, at the front of the seat.

It will be obvious from the foregoing that new street-cars or those of the present ordinary construction can be readily provided with this heating apparatus, as it will only be necessary to have an opening in the floor beneath the seat and the slots or openings in the fronts of said seats. Then the inner and outer casings, the burner, the supply-pipe, the hot-air flue and the smoke-pipe are placed in position; also, whenever it is desired, said heating apparatus can be taken apart and removed.

Having thus fully described the construction and arrangement or combination of the parts of my car-heater, its operation, and advantages, what I claim to be new is—

1. In a car-heating apparatus, the combination of a casing and a laterally-extending smoke-pipe at or near the top of said casing, provided with a drum and an interior core, a flue extending through the sides of said casing and having one end open, and a hot-air flue secured to the other end of said flue and extending toward the end of the car, and a burner arranged in the bottom of said casing.

2. The combination, with a car, of a heater arranged in the space beneath the seat, a smoke-pipe connected with said heater and extending beneath the seat to one end of the car, an open heating-flue extending through the heater, and a hot-air flue connected with said heating-flue and extending in the space beneath the seat to the opposite end of the car, substantially as described.

3. The combination, in a car-heating apparatus, with the burner 9, of the casing 17, surrounding said burner, the flue 25, extending through said casing and provided with open ends, the hot-air flue 27, connected with one end of said flue 25 and extending toward the end of the car in the space beneath the seat, and the pipe 31, provided with the open mouths 33, arranged beneath the floor of the car and having its open end extending into the end of the flue 25, substantially as described.

4. The combination, in a car-heating apparatus, with the burner 9, of the casing 17, sur-

rounding said burner, and the heating-flue 25, extending through said casing and provided with open ends, and the pins 29, projecting both from the exterior and the interior surfaces of said flue, substantially as described.

5 5. The combination, in a car-heating apparatus, with the burner 9, of the reservoir 10, arranged above the roof of the car and connected with said burner, the float 13, arranged
10 within said tank, the pivoted lever 14, connected with said float, and the rod 15, connected with said lever and extending through the roof of the car and provided with the indicating-button 16, substantially as described.

15 6. In a car-heating apparatus, the combination of a casing, a laterally-extending hot-air pipe, and a smoke-pipe provided with a drum having an interior core, with a flue extending through the sides of said casing and having an
20 open end, a pipe projecting into said open end and provided with funnel-shaped mouths arranged outside of the car, substantially as described.

7. The combination, with a street-car having the front of the seat provided with slots 25 opening near its upper and lower edges, of a heater located in the space beneath said seat and consisting of a suitable casing and a burner arranged within said casing, a smoke-pipe connected with said casing and extending beneath 30 the seat of the car toward one end of the car and connected with a pipe extending to the top of the car, an open heating-flue extending through said casing, and a hot-air flue connected with said heating-flue and extending 35 beneath the seat of the car in opposite direction from the said smoke pipe toward the end of the car, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILBUR F. STEELE.

Witnesses:

WILLIAM GRIMSHAW,
A. C. PAUL.