

B. JANSE & J. DE WITTE.
GAS HEATER FOR CARRIAGES, &c.

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GAS-HEATER FOR CARRIAGES, &c.

SPECIFICATION forming part of Letters Patent No. 569,286, dated October 13, 1896.

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To all whom it may concern:

Be it known that we, BAREND JANSE and JAKOB DE WITTE, of Damlust, Utrecht, Netherlands, have invented a certain new and useful Improvement in Gas-Heaters for Carriages and the Like, of which the following is a specification.

This invention relates to an apparatus for heating vehicles by means of gas, being specially suitable for railway and tramway cars.

The drawings form a part of this specification and represent what we consider the best means of carrying out the invention.

Figure 1 illustrates the construction of a heating apparatus of this kind for railway-cars in longitudinal section. Fig. 2 is a cross-section of the same, the left side on the line 1 1 and the right side on the line 2 2 in Fig. 1. Fig. 3 is a plan of the same.

Similar letters of reference indicate corresponding parts in all the figures where they appear.

The drawings show the novel parts with so much of the ordinary parts as is necessary to indicate their relation thereto.

The heating-box *x* is situated below the floor in a space *y* and is surrounded therein on all sides by a layer of air, Fig. 2. As hereinafter described, the top of the heating-box serves chiefly as the heat-radiating or heat-giving surface; but the other walls of the heating-box *x* also become heated, and in order to utilize this heat as well some air-holes *y'* are provided in the bottom of the space *y*, and passages with grates *Z'* are arranged laterally of the floor-plate *Z*, that covers the heating-box. In consequence of this arrangement the side walls of the heating-box are constantly flushed by a current of air, and warm air is continually rising through the grates *Z'* into the space to be heated above. The burner *a*, which is fed from a gas-holder, (not shown,) is arranged at one end of the heating-box *x* below a cross or transverse bottom or heating plate *d*. The heating-box is provided only with a gas-outlet *i*.

The heating-gas-burner is a Bunsen burner, in which air and gas become mixed together before their exit from the burner-nozzle, so as to form a combustible mixture. The draft produced by the outlet *i* carries off the gases

that flow from the heating-box. Preferably the air required for combustion is taken from an air-box *g*, situated under the heating-box.

In front of the heating-burner there is usually arranged at *c* a small igniting-flame which is always kept burning, so that the heating apparatus can be put in or out of operation by simply opening or closing the burner *a*. This may be effected, for instance, from the compartment of the car.

In employing the heating apparatus in tramway-cars the igniting-flame may be dispensed with and the heating-flame be ignited in the usual way.

In consequence of the draft produced by the outlet *i* the heating-gases are drawn along underneath the heating-plate *d*, and the intimate contact of the heating-gases with the heating-plate *d* is also advantageously assisted by arranging the latter at a slight inclination. When the heating-gases have given up their heat to a sufficient extent to the heating-plate *d*, the said gases are led one or more times over inclined walls or baffles, as shown by *h*, for the purpose of storing up the remainder of heat before they escape at the gas-outlet *i*.

There are provided on the upper side of the heating-plate inclined transverse plates *e*, which extend up to near the top *f*. These insure that the heat taken up by the heating-plate *d* shall be transmitted upwardly as rapidly as possible, and thus enable the heating-plate to receive fresh heat from the heating-gases. These also cause the heat which is concentrated in the heating-plate *d* to become uniformly transmitted to or distributed over the crown or top of the heating-box. These plates *e* conduct the heat of the heating-plate *d* directly upward. They also prevent a direct radiation of the heat of the heating-plate *d* in an upward direction, because the transverse plates *e* overlap at their upper ends. This serves to prevent the radiated heat from rising vertically upward and thus producing in parts overheating of the top *f*, whereas now the heat is deflected in such a manner as to become uniformly distributed to the top *f*. By this means there is produced an effective transmission of the heat of the heating-plate *d* in an upward direc-

tion. The transmission of heat in a downward direction is not considerable.

The delivery of heat in an upward direction from the heating-plate is so effective that the gas-outlet *i* does not become heated to any appreciable extent, so that there is a complete utilization of the heat of the heating-flames. With regard to the gas-outlet *i* it may be noted that its outlet-openings should preferably be made larger than the openings for supplying the air to the burner.

The heating-plate *d* may be made of a flat or domed plate of corrugated sheet metal or of any suitably-bent metal sheet.

The top *f* is preferably inclined upwardly in the direction of the draft in order to facilitate the escape of the spent gases. In the case of tram-cars or compartments of great length in carriages two or more gas heating apparatuses of the kind described may be arranged and provided with a common gas-outlet.

We claim as our invention—

1. In a heating apparatus for cars and analogous structures, the burner *a*, the box *x* extended longitudinally under the floor, with provisions for supplying gas and air and for conveying away the gaseous products of combustion after their heat has been mainly removed, in combination with the plate *d*, lying immediately over the flame, and the plate *f* mounted above and out of contact

therewith, the inclined plates *e* adapted to perform the triple functions of conducting the heat upward, distributing it, and arresting radiant heat, and the top plate or floor-plate *z*, all arranged to serve substantially as herein described.

2. In a heating apparatus for cars and analogous structures, the burner *a*, the box *x* extended longitudinally under the floor, with provisions for supplying gas and air and for conveying away the gaseous products of combustion after their heat has been mainly removed, in combination with the plate *d* lying immediately over the flame, and the plate *f* mounted above and out of contact therewith, the plates *e* extending upward from the lower plate *d* inclined as shown, and the provisions for inducting fresh air below and allowing it to flow upward along the sides of the box and thence into the interior of the car, all arranged for joint operation substantially as herein specified.

In testimony whereof we have hereunto set our hands, at Rotterdam, Netherlands, this 23d day of August, 1895, in the presence of two subscribing witnesses.

BAREND JANSE.
JAKOB DE WITTE.

Witnesses:

ADOLF BEUKENHAMP,
PETER FREDRIK THOMSEN.