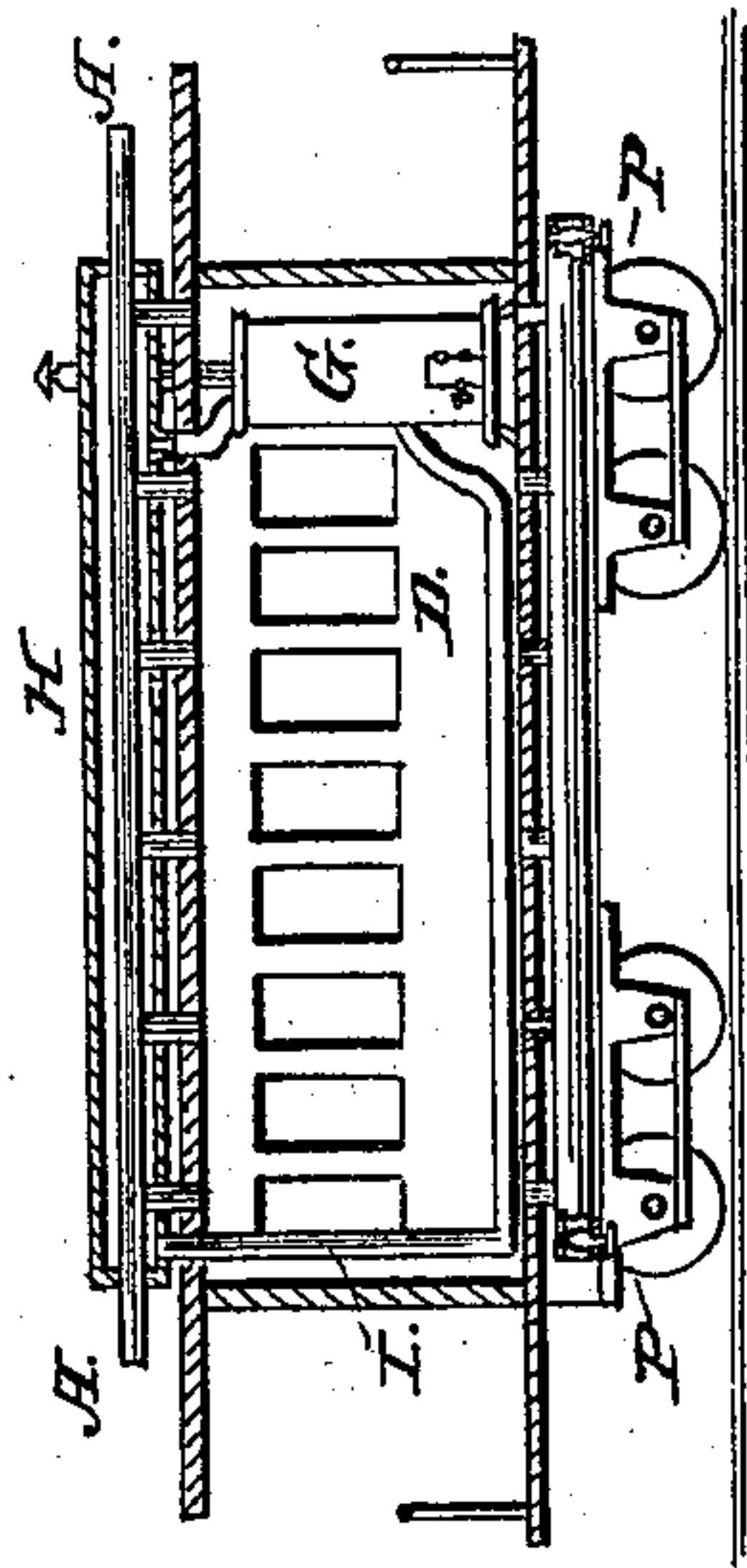
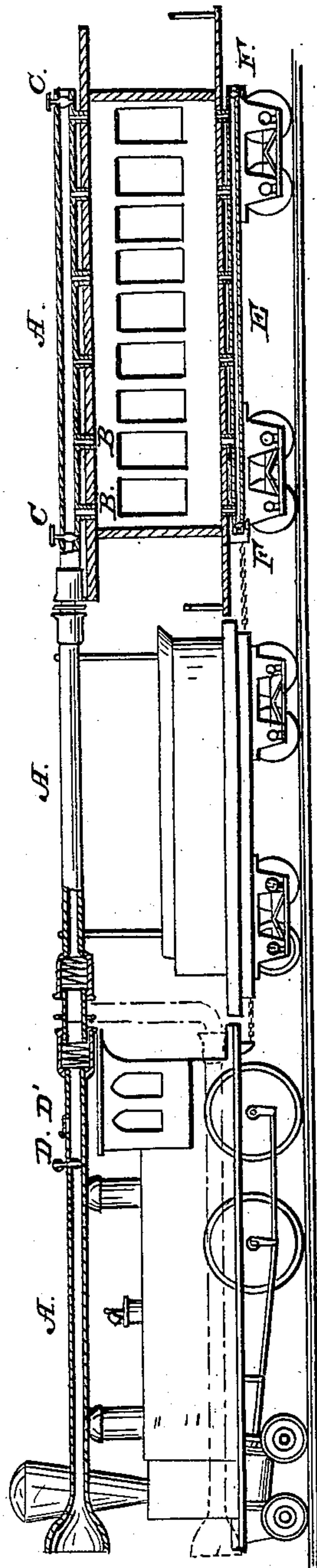


E. L. ROBERTS.  
Car Heater and Ventilator.

No. 81,211.

Patented Aug. 18, 1868.



Witnesses  
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# United States Patent Office.

E. L. ROBERTS, OF NEW YORK, N. Y.

*Letters Patent No. 81,211, dated August 18, 1868.*

## APPARATUS FOR HEATING AND VENTILATING RAILROAD-CARS.

*The Schedule referred to in these Letters Patent and making part of the same.*

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, E. L. ROBERTS, of the city, county, and State of New York, have invented a new and useful Improvement in Means for Ventilating and Heating Railroad-Cars; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

The nature of this invention relates to improvements in means for ventilating and heating railroad-cars, the object of which is to provide ample and thorough automatic ventilation by a supply of pure air received from the external atmosphere in advance of the train, before it has become foul by the smoke discharged from the locomotive, or the dust raised from the bed of the road by the train.

The fresh air so received is designed to be conveyed along the train, from car to car, in tubes suitably arranged, and to be distributed, as it is discharged into the cars at or near the top, by passing through numerous small lateral tubes or openings into the cars, from the main tubes, whereby it may be distributed as much as possible over the whole upper space of the car.

To cause the supply so received and distributed to produce the best possible effects of ventilation within the car, it is designed to provide means for inducing it to flow in a downward direction, in a uniform volume, to the floor, passing out thereat through numerous and evenly-distributed passages, communicating with exhaust-tubes under the car, so arranged as to create a sufficient draught to effect the above-described descending flow of the air, advantage being taken of the facilities for accomplishing the same afforded by the rapid motion of the cars.

It is further designed to provide a means for heating the air so received before discharging it into the car, when the temperature is such as to require it.

For this purpose, the tubes which convey the air from the receiving-apparatus, may be passed through for the distance of one car, larger steam-heating tubes, arranged, by preference, upon the baggage-car, wherein a steam-heater may be placed, and the steam therefrom conveyed to the enveloping heating-tubes, through which the air-tubes pass; or the steam may, if preferred, be taken directly from the locomotive, whereby the air for all the cars may be heated by one heater.

The plan thus above set forth, it is believed, is the most feasible, and presents the best facilities for accomplishing thorough ventilation and safe and economical heating, of all heretofore devised.

It may be carried out by various arrangements of means, governed, however, by the same general principle.

The various plans and devices at present in use afford but very imperfect ventilation, and the same is also true of the heating-facilities as at present used in all or nearly all railroad-cars.

As at present arranged, a few valves or registers are placed in the sides of the cars, near the top, or in the side walls of an elevated recess in the top of the cars, which may be opened or closed by the conductor or passengers, or the windows may be raised, which affords but poor results, as, in consequence of the car being already full of air, more cannot flow in to any material extent, in the absence of any regular means for that which is in to flow out.

As a temporary expedient, the windows on each side may, it is true, be raised, when, if the wind happens to be blowing against the side of the train, a current will blow through, but as it will be in a plane about even with the heads of the passengers, they are greatly endangered thereby.

Moreover, the air so introduced is generally intolerable, in consequence of the smoke and dust which become mixed with it, in consequence of which the windows and ventilators are generally kept closed, and the passengers are compelled to ride in the most intolerably-ventilated and heated cars.

The means which I have adopted for carrying into practical use the before-mentioned plans of ventilating and heating cars, consists in one or more discharging-tubes, arranged to take the air from the cars through passages distributed through the floor of the car, by means of a draught created therein by the partial vacuum arising in the tubes from the rapid motion of the same through the air, having the front ends closed and the rear ends open; both the supply and exhaust-tubes being provided with suitable valves, properly arranged



to open and close the ends of the tubes, as may be required, to admit of the cars being made up into trains or detached therefrom, and to run in either direction, as the various requirements of the service demand; and the supply-tubes being provided with suitable connecting joints, whereby the proper connections will be effected whenever the cars are coupled together.

My invention also consists in the arrangement of a heating-device in combination with the supply-pipe, whereby the air may be properly heated before being discharged into the cars.

In the accompanying drawings—

Figure 1 represents a train of cars with my improved ventilating-apparatus attached thereto, and partly shown in section, and

Figure 2 represents the application of my improved heating-device.

Similar letters of reference indicate corresponding parts.

A represents a receiving-pipe, provided with a bell-mouth, and which may be arranged upon the train, as shown in the drawings, upon the top of the locomotive, with the mouth projecting beyond the smoke-pipe, or, as shown in red lines, with the mouth protected by the "cow-catcher," or it may be that the bell-mouth need not be carried forward farther than the front end of the tender, the essential feature being that it be so arranged as to receive a supply of fresh air, from the direction in which the train is advancing, before it becomes mixed with the smoke and dust of the train.

The said supply-tube may be continued along the train from car to car by suitable yielding connections between each car, either upon the top, or along the sides near the top, or they may be within the car near the top.

B represents lateral tubes, opening from the supply-tubes A into the cars at the top.

These tubes or openings should be very numerous and of small size, whereby the air may be thoroughly distributed over the space of the top of the car.

They should, however, be of sufficient area to admit a copious supply for thorough ventilation.

The tubes may, if preferred, be flattened on their lower sides, or made in a form to spread considerably over the surface, and the flattened part numerously perforated.

They should also be provided with valves, C, at each end, so arranged as to be kept open at all parts of the tubes, except at the rear end, which may be closed by the conductor previous to starting his train.

An automatic valve, D, should also be arranged in the supply-tube, for regulating the supply.

Another valve, D', may also be arranged behind the valve D, so as to raise and allow the air to escape, in case of too much pressure in the supply-tube.

E represents an exhaust-tube, which may be arranged under or on the floor of the car, having numerous passages opening into it from the interior of the car, through or near the floor, and of a length about equal to the car.

It is provided with valves, F, at each end, so arranged as to be automatically closed at the front end and opened at the rear end of the car by the action of the current of air when the car is in motion.

The partial vacuum created at the open rear end of these tubes by the rapid motion of the car, creates a draught through them, having for its supply the volume of air within the car, whereby a draught is created, sufficient to cause the inflowing air to flow downward to the exhaust-passages into the said tube, carrying with it the impurities emitted from the occupants of the car.

Maintaining, as it does, a flow throughout the whole space of the car, there can be no stagnant strata of impure air, or of a different temperature from that of the strata in other portions of the car, as is the case in the present mode of heating and ventilating.

G represents a heater, which I prefer to locate in the baggage-car, which is supplied with water for generating steam in a suitable manner, and pipes for conducting the steam to the heating-tubes H, through which the air-supply tubes are conveyed, whereby the air may be suitably heated in cold weather, before it is discharged into the cars.

The supply-tube, where it passes through the heating-tube H, may be corrugated longitudinally, or provided with deep narrow grooves, for the purpose of affording a greater radiating-surface.

I represents a return-tube, by which the water of condensation may be returned to the heater again.

The air so heated may be regulated to any desired degree of temperature, and governed by one attendant in the car where the heater is arranged for the whole train, whereby the expense of heating will be very much economized, and the room now occupied in each car by stoves saved for the occupancy of passengers, and the danger to which the cars are exposed from fire in cases of accident very materially lessened, while the cars will be much more thoroughly and uniformly heated, as, when the cars are heated by stoves in the usual manner, the heated air immediately rises to the highest part of the car, while the bottom remains very cold, causing a great difference of temperature between the top and bottom of the car, exposing the different parts of the body to these different temperatures, whereas, by my improved plan, as above described, the car must be heated and supplied with fresh air in all parts alike.

Instead of generating the steam in a separate heater, it may, if preferred, be taken from the locomotive, and conveyed by suitable pipes to the heating-tube H.

Air may also be used for heating the supply-pipes, instead of water, if preferred.

Two or any other convenient number of supply and exhaust-tubes may be used.

I prefer, however, to use two of each, one on each side of the car.

I claim as new, and desire to secure by Letters Patent—

1. The combination, with railroad-cars, of the exhaust-tubes E, provided with valves, arranged substantially as and for the purpose described.

2. The combination, with the supply-tubes A, of the steam or air-heater G, and heating-tube H, and the pipe connecting the heater to the heating-tube, substantially as and for the purpose described.

The above specification of my invention signed by me, this 24th day of April, 1868.

E. L. ROBERTS.

Witnesses:

ALEX. F. ROBERTS,

J. M. COVINGTON.