

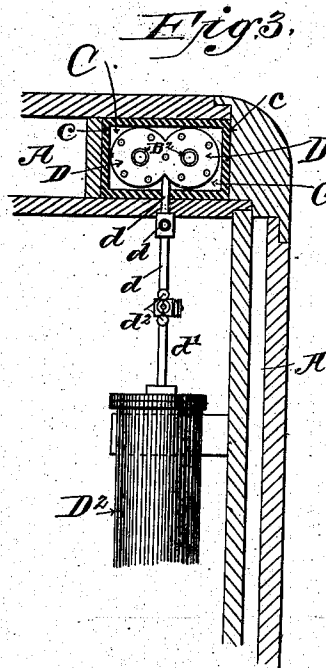
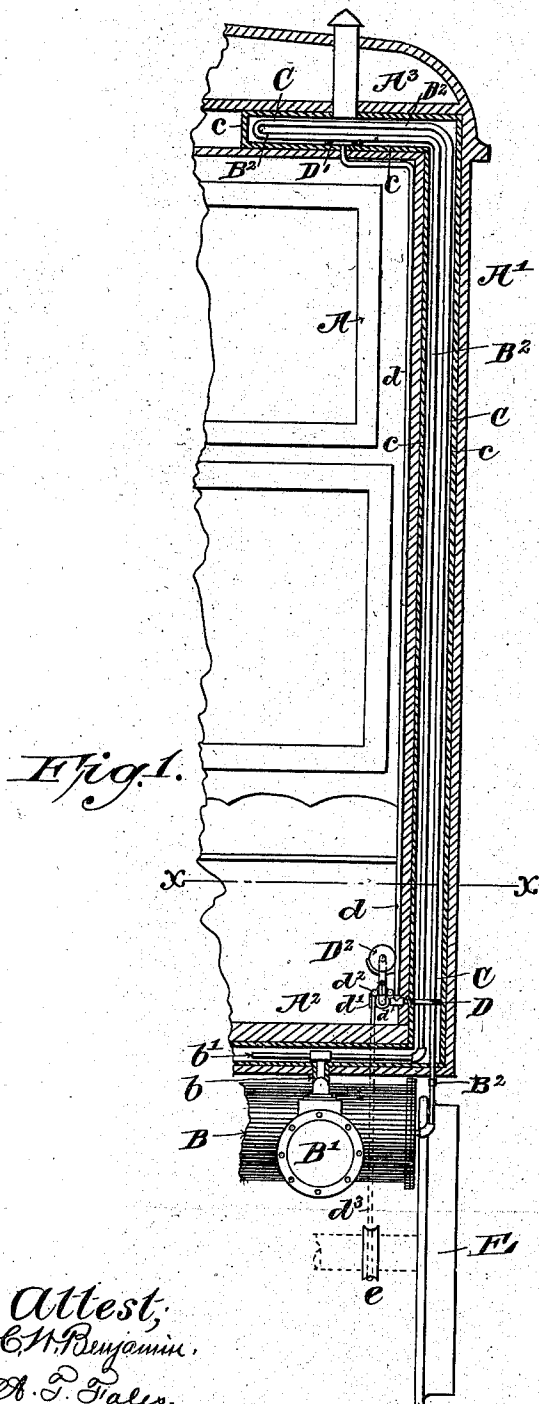
(No Model.)

2 Sheets—Sheet 1.

A. C. RAND.  
PNEUMATIC VEHICLE.

No. 530,550.

Patented Dec. 11, 1894.



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C. W. Benjamin,  
A. T. Fales.

Inventor,  
Addison C. Rand  
by Arden S. Fitch  
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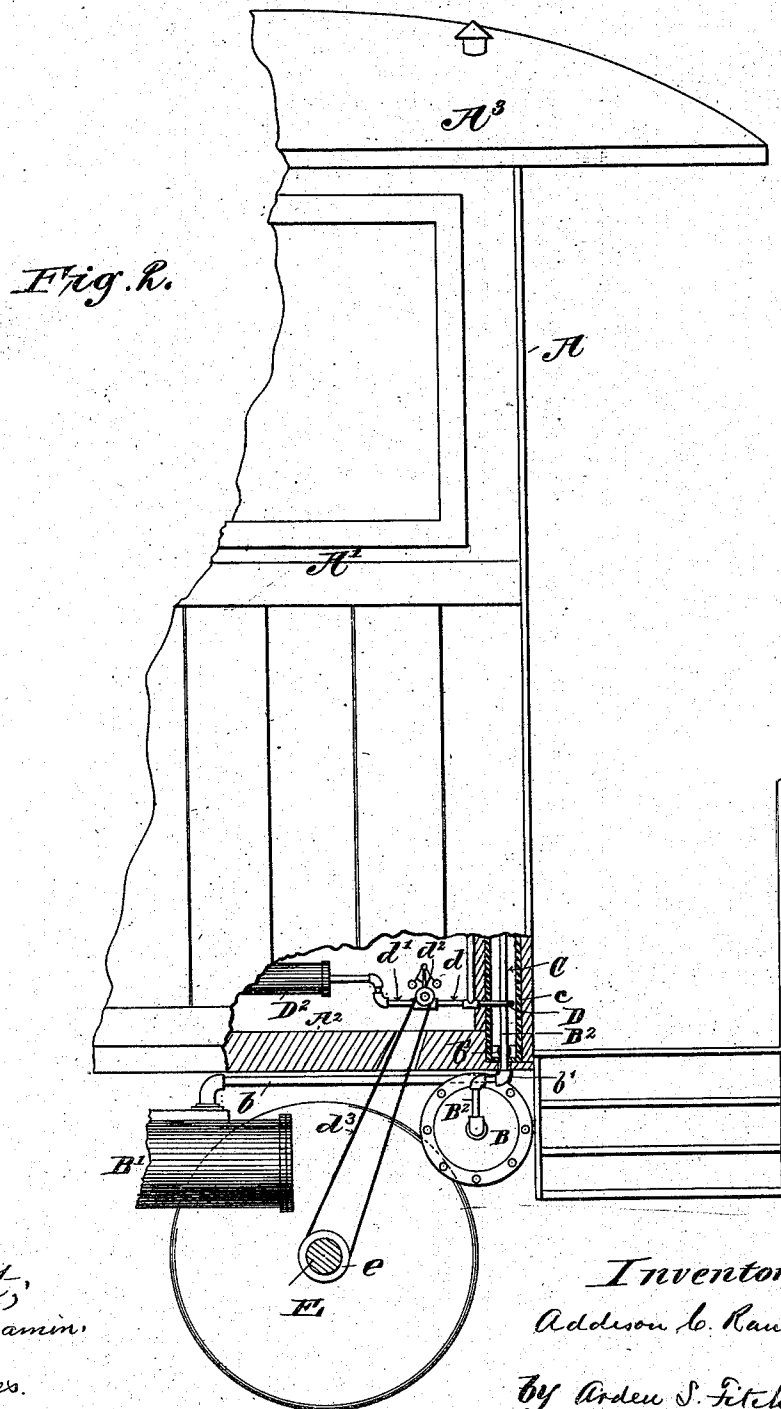
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# UNITED STATES PATENT OFFICE.

ADDISON C. RAND, OF NEW YORK, N. Y., ASSIGNOR TO JAMES F. LEWIS, OF SAME PLACE.

## PNEUMATIC VEHICLE.

SPECIFICATION forming part of Letters Patent No. 530,550, dated December 11, 1894.

Application filed September 19, 1894. Serial No. 523,467. (No model.)

*To all whom it may concern:*

Be it known that I, ADDISON C. RAND, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Pneumatic Vehicles, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to pneumatically driven vehicles, such as railway-cars, which carry their propelling pneumatic motor and a compressed-air storage reservoir, one or more, for supplying air to the motor-cylinder, or cylinders; and my invention consists in the combination therein, with the pipe which connects the air-storage reservoir to the motor-cylinder, for the supply of air thereto, of an insulated chamber constituted in a wall of the vehicle, through which chamber said connecting pipe, on its way from the reservoir to the cylinder, extends, and a heat-generator, one or more, within said chamber and adapted to apply heat generated thereby to the external surface of the pipe; and preferably with a valve governing the said heat-generator and connected to the running-gear of the vehicle and adapted to permit the maximum generation of heat while the vehicle is in motion and to decrease such generation when the vehicle is at rest; substantially as hereinafter described and as more at length recited in the claims.

Figure 1 is a sectional elevation of a portion of the end-wall and side-wall of a pneumatic railway car containing my invention. Fig. 2 is a side elevation of one end of said car, a portion of the wall being cut away to disclose features of my invention; and Fig. 3 is an enlarged lateral section of the end and side walls of the car at their junction, on the line *x, x*, Fig. 1.

It is well known that better results in developing power from compressed-air are attained when the compressed-air is raised in temperature before it is supplied to the cylinder of a motor; and the object of my invention is to provide means, or apparatus, in combination with the walls of a pneumatic vehicle, such as a railway car, for heating the air as it passes from the storage reservoirs

carried by the car, to the cylinder of the car-motor.

In the drawings I have represented only such parts of a pneumatic-car as are essential to the understanding of my invention, omitting such details of the number and arrangement of the air storage reservoirs, and of the motor itself, as well as the devices which govern the operation thereof, as not being necessary to a comprehension of the devices constituting my invention.

A and A' represent respectively the end and side walls of a railway-car, A<sup>2</sup> a portion of the car-floor, and A<sup>3</sup> a portion of the car-roof.

B represents a compressed-air storage reservoir carried by the car, and usually located below the car floor, as shown.

B' represents a motor-cylinder, which is also usually placed underneath the car-floor. The compressed-air is served to the motor-cylinder from the storage reservoir by a pipe B<sup>2</sup>.

In carrying out my invention I constitute a chamber C in a wall of the car, preferably the end-wall A of the car, at or near its juncture with side-wall A', as shown; and it is desirable that this chamber extend from the car-floor to the roof, in said wall, and it may be advantageously extended across the top of the car within the roof, as illustrated. I am enabled by this construction and location of said chamber C in the car-wall to obtain a chamber of very considerable length, and one which may be comparatively narrow in lateral dimensions and hence capable of concealment in the car-wall, as shown, and which does not encroach upon the car-space or add to the devices attached to the exterior of the car. The said chamber C is insulated by means of a lining of asbestos, or its equivalent, as illustrated at *c*, in the drawings. The pipe B<sup>2</sup> which supplies the air from reservoir B to motor-cylinder B', extends through said chamber C, as from beneath the car-floor to and along the extension of said chamber in the roof, and returns within said chamber to and through the car-floor, with an insulated connection or continuation *b* leading to a motor-cylinder. When more than one cylinder is employed, a branch, or continuation *b'* of pipe B<sup>2</sup> may extend across the car, as

shown, for connection to the additional cylinder.

Within the chamber C I locate a heat-generator, which may be in the form of a gas-burner D which encircles the pipe-sections B<sup>2</sup> at or near the lower end of the chamber, the tips of said burner directing the gas-flame toward and around said pipe-sections, as indicated in the drawings. More than a single burner may be employed for the generation of heat in said chamber; and it is desirable to locate a burner near the upper part of the chamber, as, for example in the extension in the car-roof, as shown at D'.

It will be found advantageous to employ gas as the means for generation of heat in the chamber C, in that the gas-supply may be carried in a compressed state in cylindrical reservoirs D<sup>2</sup> which may be hung to the interior face of the car-wall below the line of the car-seats, as indicated in the drawings, and a service-pipe or pipes *d* may connect the reservoir to the burners, as shown.

By means of my invention the requisite devices or apparatus for effecting the heating of the air supplied from the reservoir B to the motor-cylinder, or cylinders, are constructed and arranged in a compact and inexpensive form, and, together with the gas apparatus for supplying the heat-generators, are capable of combination with the car-body without occupying otherwise available space therein.

In connection with the described gas-apparatus, it will be advantageous to employ a valved-connection *d'* between the service-pipes *d* leading to the burners D, D', from the gas-reservoir D<sup>2</sup>, and to have the valve *d'* therein, in the form of the well-known governor-valve, as illustrated in the drawings; and furthermore to have said governor-valve *d'* given operative connection to the running-gear of the car, as, for example by a belt *d'* running from the driving pulley of the valve to a pulley *e* on the car-axle E, as shown. The valve *d'* being adjusted, in the well-known manner, to be opened wide by the revolution of the governor, and to be nearly closed by the cessation of the governor's revolution, it is evident that the valve will be adapted to furnish a full supply of gas to the burners

when the car is moving, and to diminish the supply as the car slows up, and to curtail it to a minimum when the car stops, thereby securing the production of the greatest heat when the car is in most rapid motion and hence is using a maximum of air for its propulsion, and curtailing the heat production when the car is moving slowly or is at rest, and the use of air for propulsion is decreased or ceases.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a pneumatic vehicle provided with a propelling pneumatic-motor and a compressed-air storage reservoir, the combination with the pipe which connects the air storage-reservoir to the motor-cylinder, of an insulated chamber constituted in a wall of the vehicle, through which chamber said connecting pipe extends, on its way from said reservoir to said cylinder, and a heat-generator within said chamber and adapted to apply heat generated thereby to the surface of said connecting-pipe, substantially as and for the purpose specified.

2. In a pneumatic vehicle provided with a propelling pneumatic-motor and a compressed-air storage reservoir, the combination with the pipe which connects the air storage-reservoir to the motor-cylinder, of an insulated chamber constituted in a wall of the vehicle and through which chamber said connecting-pipe extends on its way from said reservoir to said cylinder, and a heat-generator adapted to apply heat generated thereby to the surface of said connecting-pipe within said chamber, together with a valve governing the intensity or degree of heat generated by said generator, and valve-operating gearing connecting said valve to the running-gear of the car, whereby the generation of a maximum of heat when the car is in rapid motion and the generation of a less degree of heat when the car is moving slowly or is at rest, are automatically secured; substantially as and for the purpose specified.

ADDISON C. RAND.

Witnesses:

A. S. FITCH,  
H. T. FALES.