(No Model.)

H. HAUPT.

PNEUMATIC RAILWAY.

No. 576,975. Patented Feb. 9, 1897.

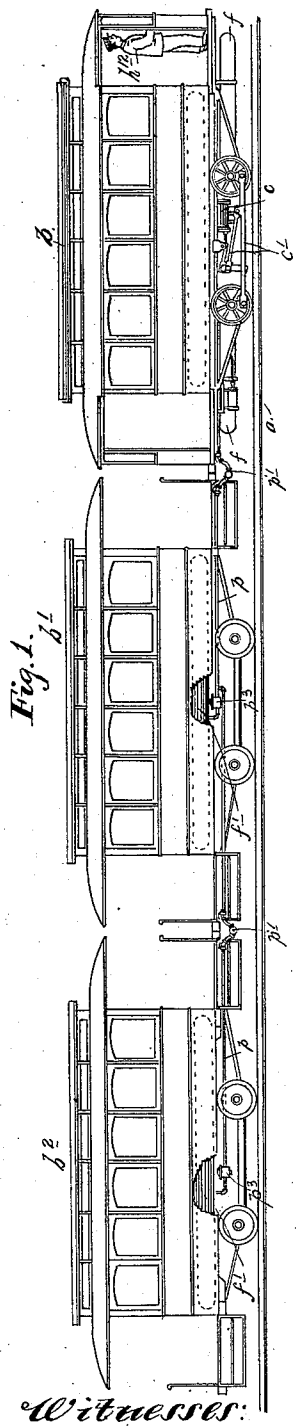

Fig. 1.

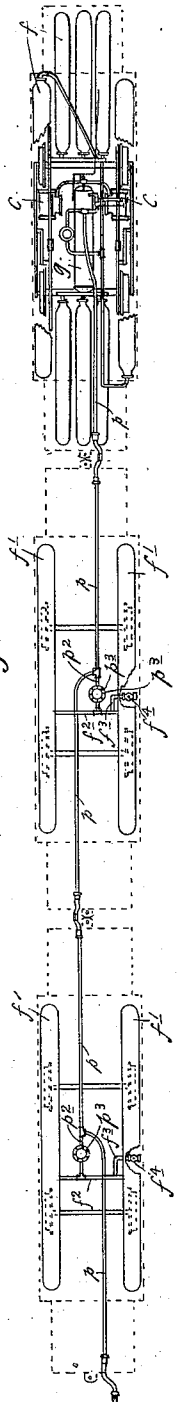

Fig. 2.

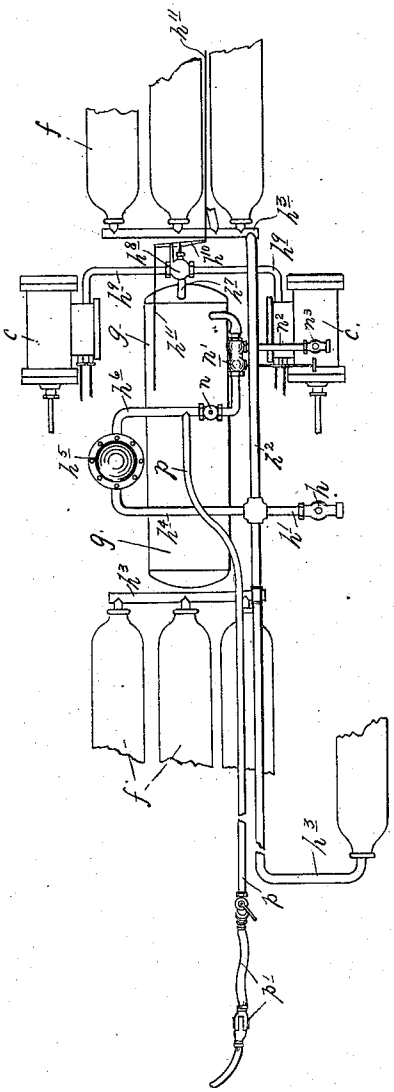

Fig. 3.

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UNITED STATES PATENT OFFICE.

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PNEUMATIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 576,975, dated February 9, 1897.

Application filed May 23, 1895. Serial No. 550,306. (No model.)

To all whom it may concern:

Be it known that I, HERMAN HAUPT, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Pneumatic Railways; 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 pneumatic street-railways, and has for its object to provide a construction whereby large storage capacity is rendered available for moving a train of two or more cars without interfering with the seating capacity of the train.

To this end my invention consists of the novel features hereinafter described, and defined in the claim.

The invention is illustrated in the accompanying drawings, wherein, like letters referring to like parts—

Figure 1 is a side elevation of a train equipped with my improvement, some parts being broken away. Fig. 2 is a plan view of the car-trucks of the frame in diagram-lines, with the positions of the car-bodies shown in dotted lines and with some parts broken away; and Fig. 3 is a plan view of some of the parts carried on the motor-car detached for showing the relation of the fluid-supply connections to the motor or engine cylinders, &c.

In Fig. 1, a represents the track of a street-railway, on which is moving a train composed of a motor-car b and a pair of trailers b' b^2. On the truck of the motor-car b are mounted a pair of engines c, with suitable connections c' to the truck-wheels, a series of air-storage reservoirs f, and a hot-water reservoir g. The air-storage reservoirs f on the motor-car b are shown as arranged in a way most convenient for large storage capacity on the motor-car and a desirable distribution of the weight therefrom, a part of the reservoirs f being under the end of the truck-frame and part of the same under the car-body seats, but all supported from the truck-frame, while the engines c and the hot-water reservoir g are located on the truck-frame between the truck-axles, with the hot-water reservoir g at the center. The several air-reservoirs f on the motor-car b are connected by suitable piping comprising the main pipe h^2 and the branch pipes h^3. The main pipe h^2 is provided with a supply-section h', having at its outer end a charging-nozzle h, fitted with a suitable outwardly-closing check-valve, for charging the reservoirs f with air under pressure from a local charging-station at the end of the run or at other suitable locations. Supposing the reservoirs f to be charged with air under pressure and the heater g to be filled with hot water, the air will pass, when running the motor, from the main pipe h^2, through the branch pipe h^4, to the reducing-valve h^5, and thence through the pipe h^6 into the heater g to a perforated pipe (not shown) at the bottom thereof, and after rising through the hot water will pass together with more or less steam through the pipe h^7 to the throttle-valve h^8 and thence through the pipes h^9 to the valve-chests of the engines c. The throttle-valve lever h^{10} is provided with operating connections h^{11}, extending to a point within reach of an operator h^{12}, located on either end of the motor-car b. The pipe h^6 is provided with a backwardly-closing check-valve at n, with a stop-valve at n', and with a branch n^2, fitted with an outwardly-closing check-valve, at n^3, for filling the water-reservoir g with hot water when the shut-off valve n' is closed. The function of the backwardly-closing check-valve n is to keep the water from the heater g from backing up into the pipe h^6 on the reducing-valve side of the check n and the parts connected therewith.

From the foregoing it is obvious that the air from the high-pressure reservoirs f is reduced to a working pressure at the reducing-valve h^5 before it enters the heater g through what, for distinction, may be called the "working-pressure" pipe h^6.

The details above given in respect to the arrangement of the parts on the motor-truck are such as are employed in what is known as the "Robert Hardie street-car motor;" but it will be understood that for the purposes of this case any other arrangement might be employed wherein the high-pressure air-reservoirs on the motor-car discharge through a

reducing-valve into a working-pressure pipe, such as h^6, leading directly or indirectly to the throttle-valve for the motor-cylinders.

A pipe p taps the working-pressure pipe h^6 on the motor-car and extends rearward the entire length of the train, and is provided with flexible couplings p', of any suitable kind, between the cars. For convenience the pipe p may be called the "train-pipe." The several trailer-cars b' b^2 of the train are provided with high-pressure air-storage reservoirs f', located thereon, as shown, under the seats of the cars, but which may be disposed in any way most convenient for economy of space. The said storage-reservoirs f' on the several trailer-cars connect with the train-pipe p through branch pipes p^2. As shown, the several reservoirs f' on each of the trailers are connected by pipes f^2, which connect with the branch pipes p^2, leading to the train-pipe p. In the branch pipes p^2 are located reducing-valves p^3, which operate to reduce the pressure of the air, which is permitted to escape from the said reservoirs f' into the train-pipe p. The reducing-valve h^5 on the motor and the several reducing-valves p^3 on the trailers are of course automatic in their actions. With this arrangement it is obvious that the train-pipe p will be subject only to working pressure, and hence the flexible sections necessary for the couplings between the cars can readily be made to stand the strain. Without such an arrangement it is impossible to carry air at high pressure in local reservoirs on the car and conduct the same through flexible couplings between the cars. For the service intended, for example, storage-reservoirs on the several cars are intended to receive an initial charge of about two thousand pounds per square inch. The hose necessary for flexible couplings between the cars will not stand any such pressure; but by the above-described combination the train-pipe is only subjected to the air at the desired working pressure of, say, one hundred and forty pounds.

The pipes f^2, connecting the reservoirs f' on the several trailer-cars, are provided with sections f^3, having charging-nozzles f^4, fitted with outwardly-closing check-valves, for charging the said reservoirs f' from the local station in the same way as the reservoirs f on the motor-car are charged.

It is obvious that under the arrangement described, wherein air-reservoirs are carried not only on the motor-car but on the several trailer-cars of the train, which connect through branch pipes having reducing-valves with a train-pipe leading to the working service-pipe on the motor, the motor draws its supply from all the air-reservoirs of the train. Hence sufficient storage capacity is readily available without interfering with the seat capacity of the motor-car or any of the other cars of the train. Hence, inasmuch as reservoirs are now readily securable which will stand pressures exceeding three thousand five hundred pounds to the square inch, it is perfectly practicable under my arrangement to obtain storage capacity sufficient for the longest run under the greatest load which is ever required on a street-railway. My improvement is therefore of great importance toward the success of pneumatic street-railways.

It will be noted that quite a number of the details pertaining to the engines and their connections have not been shown. It was not necessary to do so for the purpose of this case, as the said parts may be of well-known standard construction. For the same reason it was not deemed necessary to illustrate the details of the reducing-valves or of the couplings for the flexible sections of the train-pipe.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

The combination with a train of cars, of a compressed-air motor on one of said cars, applied to propel the train, a train-pipe with flexible couplings between cars, for supplying said motor, branch pipes connecting the local reservoirs on the several cars with said train-pipe, and automatic reducing-valves in said branch pipes, substantially as and for the purposes set forth.

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

HERMAN HAUPT.

Witnesses:
JOHN E. MITCHELL,
CHAS. C. HELMICK.