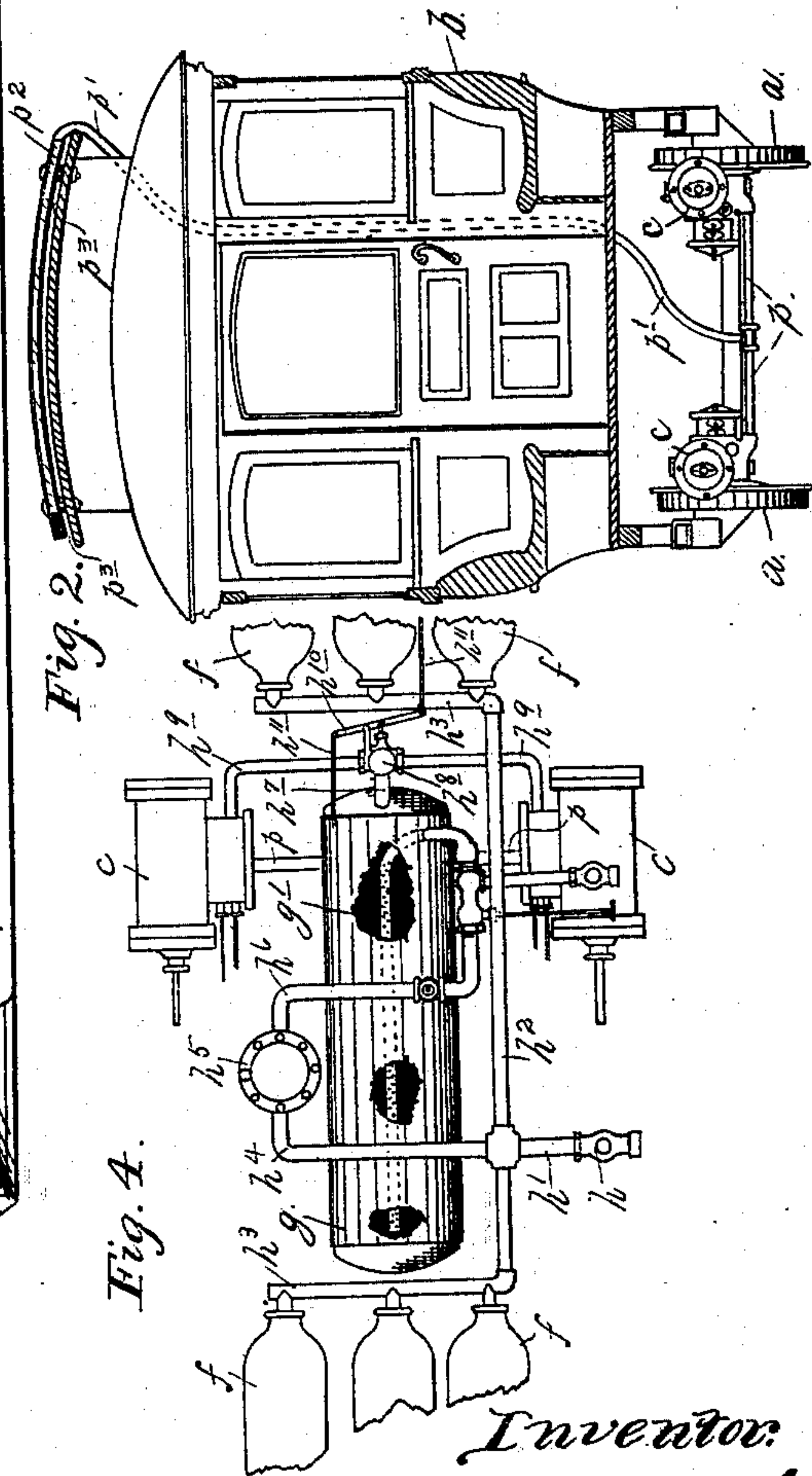
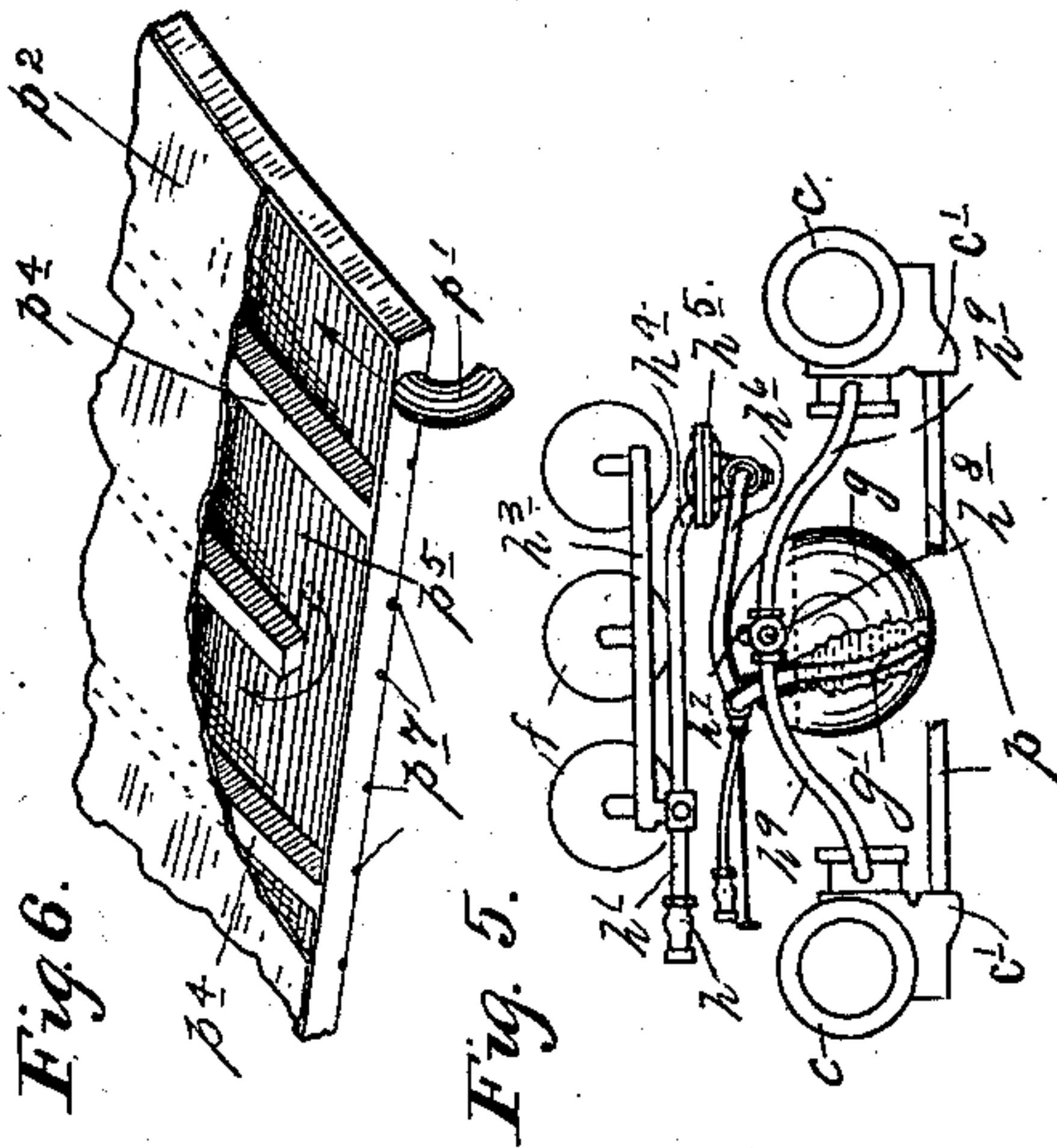
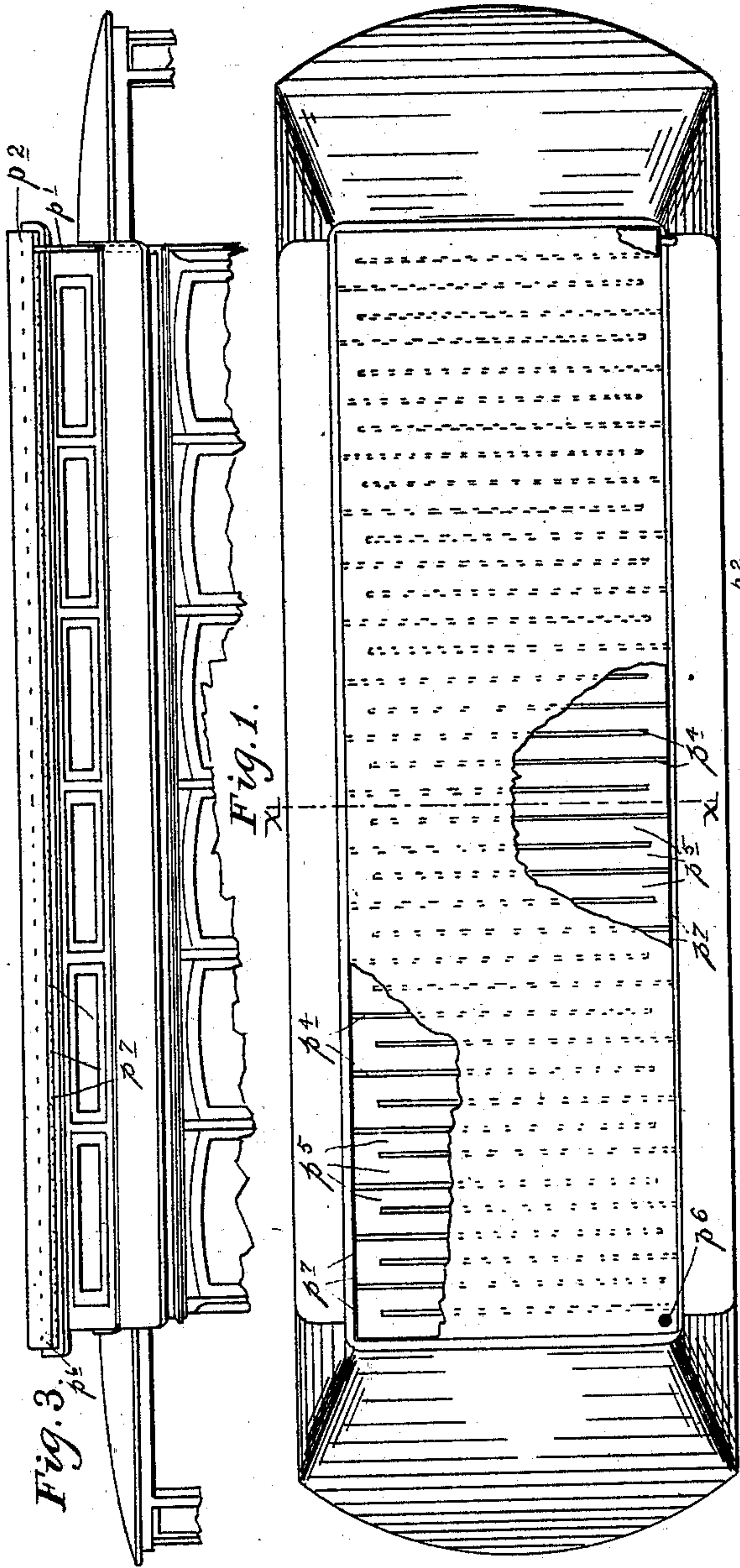


(No Model.)

H. HAUPT.  
PNEUMATIC MOTOR CAR.

No. 578,738.

Patented Mar. 16, 1897.



Witnesses:

E. F. Elmer  
C. F. Kiehn

By his Attorney.

Inventor: Hermann Haupt.  
Jas. P. Williamson.



# UNITED STATES PATENT OFFICE.

HERMAN HAUPT, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO  
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## PNEUMATIC MOTOR-CAR.

SPECIFICATION forming part of Letters Patent No. 578,738, dated March 16, 1897.

Application filed May 23, 1895. Renewed January 22, 1897. Serial No. 620,283. (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 Motor-Cars; 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 motors of that class wherein the compressed air is in some manner charged with more or less moisture before entering the cylinders of the motor, and has for its object to avoid the escape of vapor into the atmosphere as incidental to the exhaust from the motor.

Pneumatic motors using moisture-laden air have hitherto been open to serious objection for street-railway use on account of the vapor at the point of exhaust. I overcome this objection by placing a condenser in the exhaust connections from the motor, which serves to condense the vapor into water before the final discharge into the atmosphere.

The novel features of my improvement will be hereinafter described and be defined in the claim.

The accompanying drawings illustrate the invention, wherein, like letters referring to like parts—

Figure 1 is a plan view of a motor-car equipped with my improvement with some parts broken away. Fig. 2 is a view chiefly in cross-section on the line  $x x$  of Fig. 1, looking from the left toward the right, but with some parts shown in elevation. Fig. 3 is a side elevation of the upper part of the car-body. Fig. 4 is a detail in plan view, showing the relation of the motor-cylinders to the air-reservoirs and the hot-water reservoir on the car-truck. Fig. 5 is a detail in front elevation of some of the parts shown in Fig. 4, and Fig. 6 is a perspective view showing part of the condenser detached.

$a$  represents one of the motor-car trucks, and  $b$  the car-body.

On the truck-frame are mounted a pair of engines  $c$ , a series of air-reservoirs  $f$ , and a hot-water reservoir  $g$ . The air-reservoirs  $f$  are connected by a main pipe  $h^2$  and branches  $h^3$ .

The main pipe  $h^2$  is provided with a supply-section  $h'$ , having a charging-nozzle  $h$ , fitted with an outwardly-closing check-valve, through which the said air-reservoirs are charged from a local station. When running, the air passes from the main pipe  $h^2$  through the pipe  $h^4$  to the reducing-valve  $h^5$ , and thence through the pipe  $h^6$  to a perforated pipe  $g'$  at the bottom of the water-reservoir  $g$ . Thence the air passes up through the hot water in the said reservoir  $g$  to the steam-space above the water-level, thereby becoming heated and charged with steam and moisture, and thence out through the pipe  $h^7$  to the throttle-valve  $h^8$  and through the pipes  $h^9$  to the valve-chests of the engines  $c$ . The throttle-valve lever  $h^{10}$  is provided with connections  $h^{11}$ , which extend to points within reach of an operator on either platform of the car. The exhaust-outlets  $c'$  of the engines  $c$  are connected by a common pipe  $p$ , into which is tapped a pipe  $p'$ , leading to the condenser  $p^2$  in the car-roof.

The condenser  $p^2$  may be conveniently made of sheet-iron and is preferably of a form conforming to that of the upper deck of the car-roof. The condenser when thus made may be applied as a false top to the upper deck of the car-roof and is preferably supported slightly above the said deck in any suitable way so as to afford a clearance-space  $p^3$ , as shown in Fig. 2, for the free circulation of the atmospheric air thereunder. The condenser is divided by a series of cross-partitions  $p^4$  into a series of chambers  $p^5$ . The adjacent members of these partitions  $p^4$  extend from the opposite side walls of the condenser and are of less length than the cross-section of the condenser. Hence the chambers  $p^5$  connect around the ends of the partitions  $p^4$ . The discharge from the pipe  $p'$  enters one end member, as, for example, the head member of the chambers  $p^5$ , and the final escape is from the opposite end or foot member thereof through a suitable opening  $p^6$ . Hence the air and vapor discharged from the engines into the condenser must pursue a tortuous course therethrough and will thereby be exposed to a large area of cooling and condensing surface. The side walls of the condenser are provided with drip-holes  $p^7$  at



the floor-level of the condenser, which permit the escape and waste of the water of condensation from the condenser onto the lower deck of the car. In this way by the time the remaining exhaust reaches the final discharge-opening  $p^6$  of the condenser the vapor will have been condensed either completely or to such an extent as to render the remainder thereof unnoticeable and unobjectionable at the point of the final escape into the atmosphere.

It will also be understood, of course, that the condensers might be otherwise located, but the roof-decks afford the most convenient available space, and are also to be preferred on account of the better atmospheric circulation around the same.

Experience has proven that it is desirable to charge compressed air with more or less steam or moisture before entering the cylinders, and has also shown that the air must be heated between the reservoirs and the cylinders in order to secure economy. The arrangement herein shown with the air passing through a reservoir of hot water has been found most economical for securing the heat and the moisture desirable in the air. With my improvement herein described the most serious objection hitherto existing against

the hot-water heater, applied as described, is removed.

It may also be noted that the condenser, constructed as herein described, will operate to some extent as a muffler for the air-exhaust, although this latter function is not particularly needed with this form of motor.

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

In a motor-car, the combination with the engines, the air-reservoirs, the hot-water reservoir on the car-truck, and the connections for passing the air through the hot water on its way to the engine-cylinders, of a condenser on the car-roof, comprising the expanded receptacle  $p^2$ , divided into compartments  $p^5$  by the partitions  $p^4$  and having the drip-passages  $p^7$  and discharge-outlet  $p^6$ , and suitable piping connecting the exhaust-ports of said engines with the receiving end of said condenser, 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.