

No. 754,908.

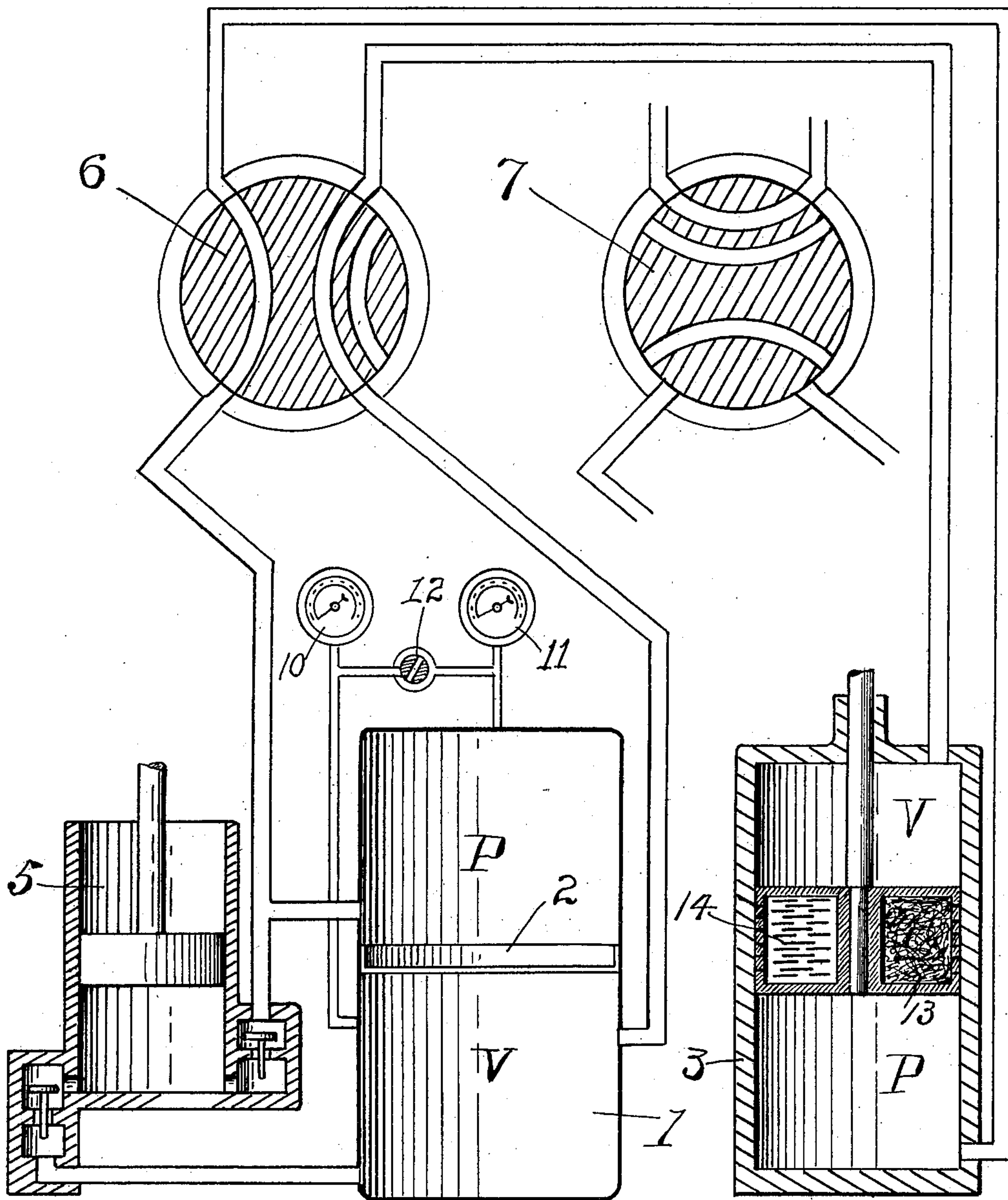
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G. M. SPENCER & C. J. GRELLNER.

FLUID PRESSURE BRAKE.

APPLICATION FILED APR. 8, 1903.

NO MODEL.



Witnesses.

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## UNITED STATES PATENT OFFICE.

GEORGE MACK SPENCER AND CHRISTOPHER JOS. GRELLNER, OF  
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## FLUID-PRESSURE BRAKE.

SPECIFICATION forming part of Letters Patent No. 754,908, dated March 15, 1904.

Application filed April 8, 1903. Serial No. 151,693. (No model.)

*To all whom it may concern:*

Be it known that we, GEORGE MACK SPENCER and CHRISTOPHER JOSEPH GRELLNER, citizens of the United States, residing in the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Fluid-Pressure Brakes, of which the following is a specification.

Our invention relates to the application of fluid under pressure acting on an intermediate medium, which in turn operates or controls the mechanism of a car or vehicle brake, together with such arrangements as will permit of the utilization of a negative pressure or vacuum acting on one side of the brake-cylinder piston while the pressure is applied on the opposite side.

The objects of our improvements are to overcome the destruction of the pump and brake cylinder by dust and destructive substances being taken into the system during the charging of the reservoirs; and we accomplish these results by means of the appliances and arrangements described in the following specification and illustrated in the accompanying drawing, in which there is shown a diagrammatic arrangement of the tank or reservoir, alternative views of a method of valve control, both on and off, and an operative double-acting brake-cylinder.

The principal features of our invention consist of a reservoir or tank 1, having a partition 2 near its center, a double-acting brake-cylinder 3, and piston 4 and pump 5. As there are many ways in which the pipes or connections may be arranged without changing the novel features of our improvement, we illustrate and describe only one system.

As shown, the valve 6 is open and the brakes would be applied. In 7 the valve is closed, in which case the brake is off and the pump is in active connection.

The letters V and P when added to any part of the illustration or description will designate "vacuum" and "pressure," respectively.

Describing the methods of valve arrange-

ment shown, the operation of the system is as follows: The two ends or opposite sides of the piston 4 are connected together, in which case the pressure on each side of 7 is equalized 50 and the brake-springs will force the piston to the position shown. When the valve is turned, as at 6, the forward or vacuum end of the cylinder 3 will be in communication with V of the reservoir 1, and the back end of 3 will 55 be connected to P of the reservoir 1, in which case the piston 4 will be forced away from P and toward V, thus setting the brake with a force equal to the power expressed by the pressure in P plus the vacuum in V. During 60 release the valve is returned to position 7 and the pressure on each side of 4 equalized, as before explained. It should be mentioned that there is a constant or regulated action of the pump 5 to keep the fluid out of V and com- 65 pressed into P. As a means of providing an initial pressure of sufficient volume there is a valve 12. It is calculated that the leakage, which is mostly inward, will keep up the pressure when once provided. There also may 70 be provided vacuum and pressure gages 11 and 10 for convenience of determining the condition of fluid in the reservoir 1.

It will be seen that by the method of construction and arrangement described and 75 shown one of the most serious obstacles to the use of fluid-pressure brakes on street-cars and other vehicles—the destruction of the brake and pump cylinders—is entirely overcome, as no fluid is drawn into the system 80 during the operation of the brakes or pumps, all the fluid being retained or simply transferred from one position to another without allowing any to escape outwardly.

As a means of lubrication of the brake-piston we prefer the method shown, in which the piston 4 is provided with chambers 13 and 14, filled with some absorbent material which may retain any lubricant which may be allowed to flow into the system. The outer surface of 90 the piston, or that portion which comes in contact with the cylinder, is provided with



perforations or openings, as illustrated in 14, where the absorbent material is not shown. This method allows the lubricant to be distributed uniformly over the moving surfaces  
5 at all times.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a fluid-pressure brake system, the combination of a pressure-chamber, a vacuum-  
10 chamber, an operative piston and cylinder, means to connect opposite ends of the cylinder with each other, means to connect the vacuum-chamber with one end of the cylinder, and suitable means or appliances to withdraw the fluid from the vacuum-chamber and  
15 compress it into the pressure-chamber.

2. In a fluid-pressure brake system, an operative brake-cylinder controlled by a valve or valves communicating with a vacuum-chamber at one end and a pressure-chamber at the  
20 opposite end with means to connect the two ends of the brake-cylinder; means to connect the vacuum and pressure chamber independently with each other, and means to withdraw

the fluid from the vacuum-chamber and force  
25 it into the pressure-chamber.

3. In a fluid-pressure brake system, an independent vacuum and pressure chamber with means to control the fluid, between opposite  
30 ends of a brake-cylinder, between the vacuum and pressure chambers and between the vacuum-chamber and one end of the brake-cylinder simultaneously with the opening of the communication between the opposite end  
35 of the brake-cylinder and the pressure-chamber.

4. In the operating of fluid-pressure brakes, means to equalize opposite sides of a brake-piston during release and means to release the  
40 pressure from one side only, during application of brakes, either into the open air or into a vacuum-chamber.

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Witnesses:

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