(Model.)

A. P. MASSEY.

ENGINEER'S VALVE.

No. 475,695. Patented May 24, 1892.

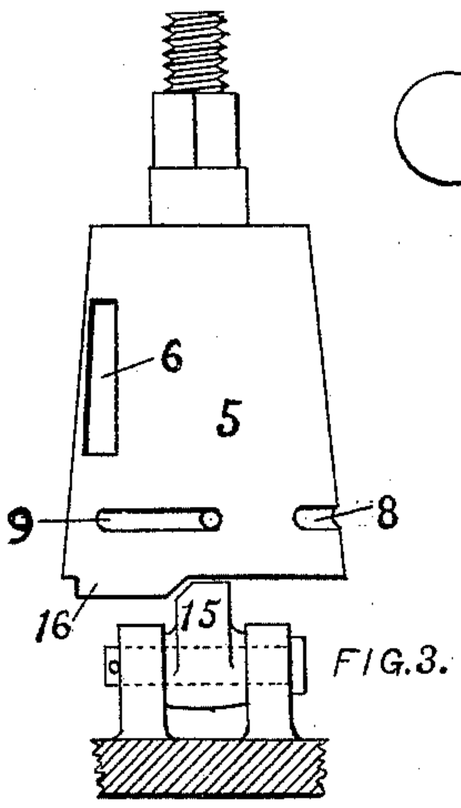


FIG. 3.

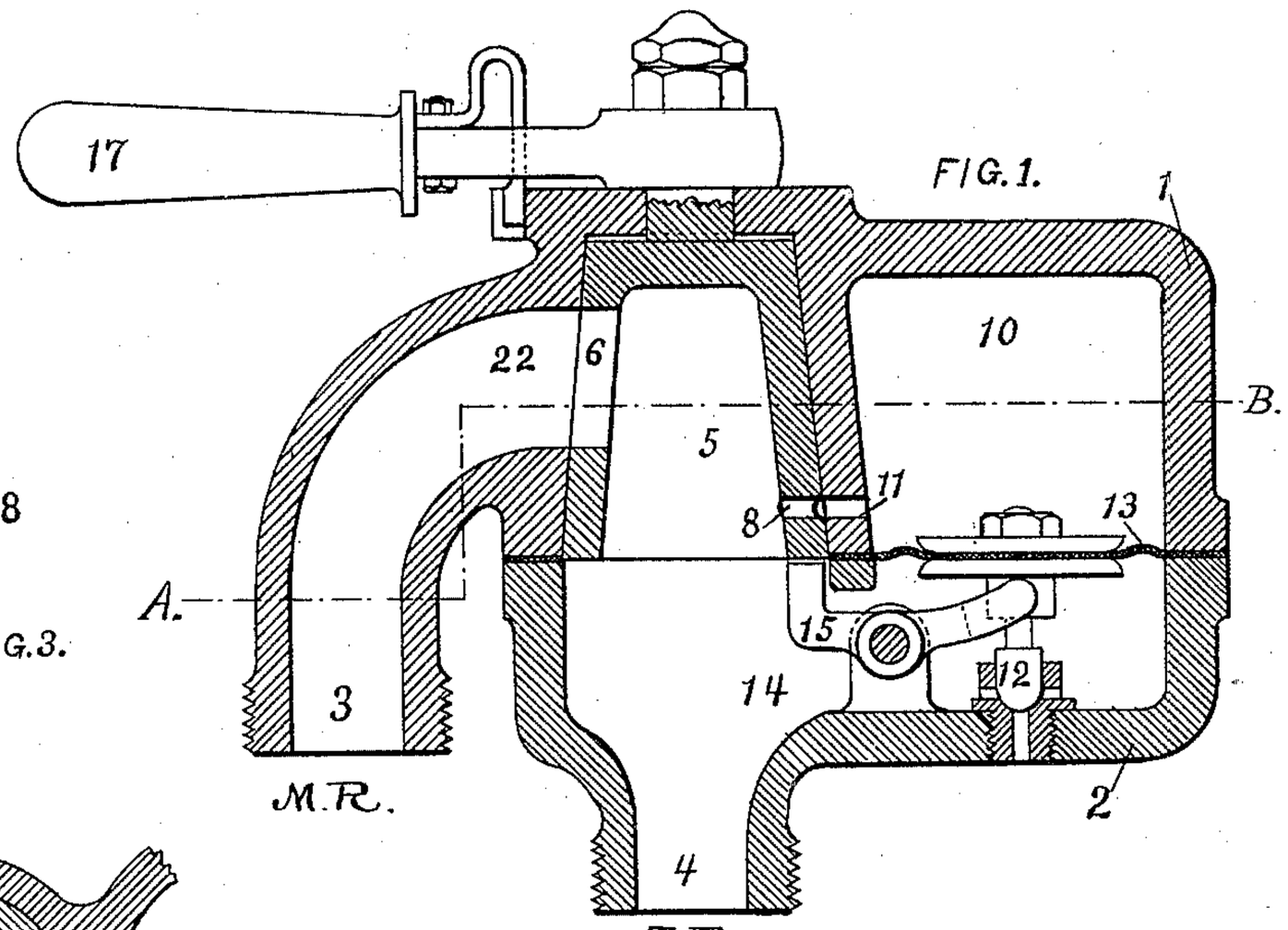
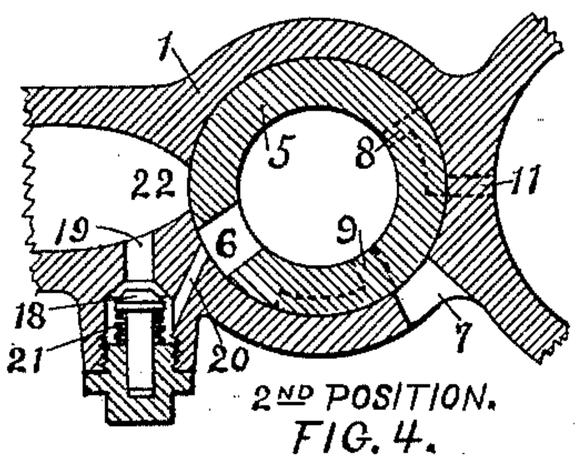


FIG. 1.



2ND POSITION.
FIG. 4.

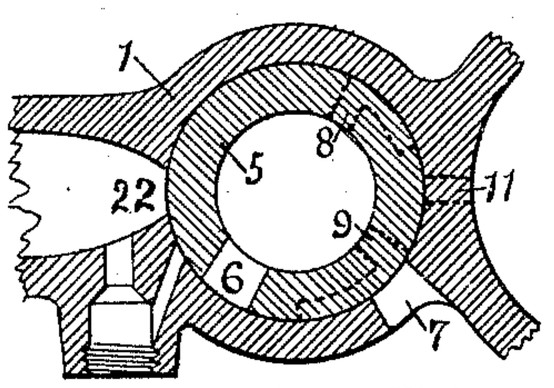


FIG. 5.—3RD POSITION.

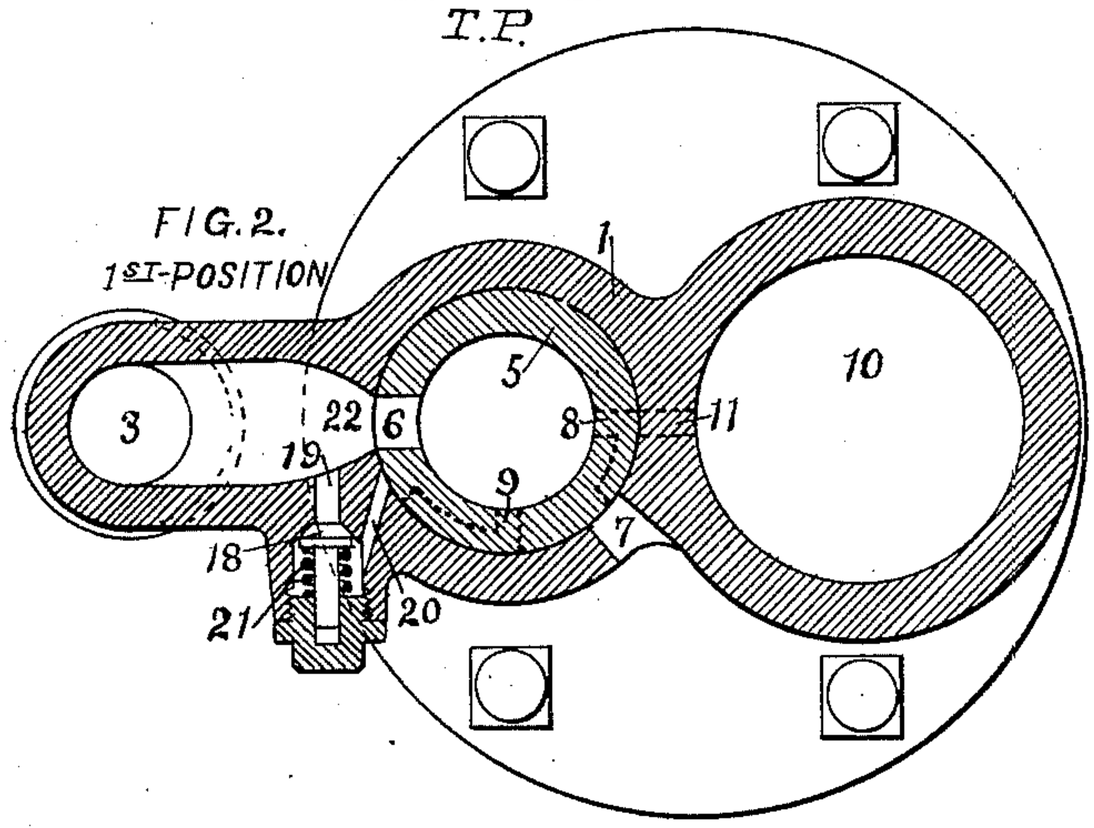


FIG. 2.
1ST POSITION

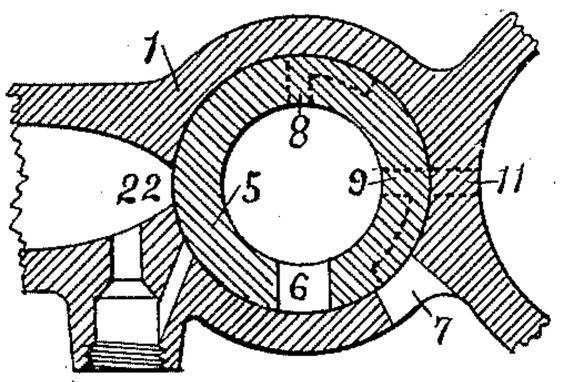


FIG. 6.—4TH POSITION.

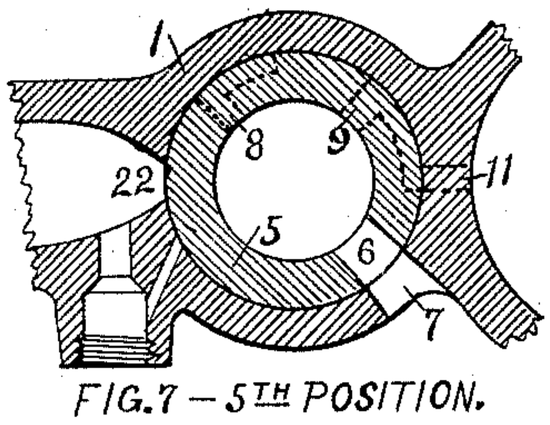


FIG. 7—5TH POSITION.

WITNESSES.
R. C. Augur.
F. A. Foster

INVENTOR
Albert P Massey

UNITED STATES PATENT OFFICE.

ALBERT P. MASSEY, OF WATERTOWN, NEW YORK, ASSIGNOR TO THE NEW YORK AIR BRAKE COMPANY.

ENGINEER'S VALVE.

SPECIFICATION forming part of Letters Patent No. 475,695, dated May 24, 1892.

Application filed April 2, 1891. Serial No. 387,385. (Model.)

To all whom it may concern:

Be it known that I, ALBERT P. MASSEY, a citizen of the United States, residing in the city of Watertown, in the county of Jefferson and State of New York, have invented a new and useful Improvement in Valves for Regulating Fluid-Pressure, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to a valve for regulating the flow of fluid-pressure, such as may be used by an engineer to control the action of air-brakes on a train of cars.

Figure 1 is a sectional view of the valve through the center. Fig. 2 is a sectional view on the line A B. Fig. 3 shows the revolving plug in detail. Figs. 4 to 7 show the relation of the ports in the various positions of the plug on section-line A B.

In the drawings, 1 represents the valve-case, and 2 the lower part of said case.

3 is an inlet which is to be attached to a main air-reservoir.

4 is an outlet to be attached to a train-pipe.

5 is a rotary valve or hollow plug having a large port 6, which may be placed, in connection with the reservoir, through 22 or with the atmosphere through passage 7. The central portion of this plug is open to the train-pipe through 4. Ports 8 and 9 through this plug may connect the train-pipe with an auxiliary chamber 10, through passage 11, in certain positions of the plug, ports 8 and 9 and passage 11 being in a different plane from port 6 and passages 7, 19, and 20.

12 is a small valve for letting air out from the train-pipe, when desired. It is connected to a flexible diaphragm 13, placed between the train-pipe chamber 14 and auxiliary chamber 10. The valve 12 is opened by means of lever 15, one end of which is under diaphragm 13 and the other end is actuated by a cam 16 on the bottom of plug.

17 is a handle for operating the rotary plug.

18 is a valve in a side passage 19 20 between the reservoir-chamber and the train-pipe chamber. It is held on its seat against reservoir-pressure by a spring 21 of some predetermined pressure.

The different positions of this mechanism are as follows: In the first position of the handle the ports stand as in Fig. 2. In this case the train-pipe chamber 14 is open, through port 6 and passage 22, to the main reservoir-pipe 3 and, through port 8 and passage 11, to auxiliary chamber 10. The fluid-pressure would therefore be the same in all parts of the valve-case. In the second position, Fig. 4, the train-pipe chamber is still open, through port 8 and passage 11, to auxiliary chamber 10; but port 6 is closed from passage 22 and open to passage 20. In this position air from the reservoir can only reach the train-pipe through the passage 20 by compressing the spring 21 on valve 18, and is therefore limited by the amount of pressure required to open the valve. In the third position, Fig. 5, all ports in plug 5 are blanked. In the fourth position, Fig. 6, port 9 is open to passage 11 and the train-pipe chamber is in communication with the chamber 10; also, the cam 16 on the bottom of the plug 5 has pressed down one end of lever 15, causing the other end to rise and raise diaphragm 13 and with it valve 12, thus opening the train-pipe to the atmosphere through valve 12. In the fifth position, Fig. 7, port 9 is still open to passage 11 and chamber 10, and port 6 is open to the atmosphere through the large passage 7. The train-pipe is also open to the atmosphere through port 12.

The operation is as follows: In the first position all parts of the valve-case are open to the same pressure and both outlets to atmosphere are closed. This is the position for charging the train-pipe and releasing the brakes. If the plug is moved to the second position, the only change is in closing the direct passage from the main reservoir to the train-pipe and allowing the pressure in the reservoir to increase until it exceeds that in the train-pipe enough to compress spring 21 and open valve 18. If the plug is moved to the fourth position, the cam 16 will depress one end of lever 15 and open valve 12, thus allowing air to pass from the train-pipe to the atmosphere. In this position the chamber 10 is open to the train-pipe, and consequently the pressure will reduce in chamber 10 as fast as it does in the train-pipe and the diaphragm will be in equilibrium. This is the position for reducing the train-pipe pressure for ser-

vice-stops through valve 12. When the pressure is reduced sufficiently, the plug is moved to the third position, when all passages are blanked and the cam 16 allows 15 to drop away from diaphragm 13, whereupon valve 12 will seat by gravity if diaphragm is in equilibrium, as it will be if the pressure in the train-pipe has reduced equally; but in a long train of cars the pressure in the train-pipe reduces faster near the outlet than at the farther end, and after the outlet is closed the equalization of the pressure in the train-pipe will raise the pressure a little near the outlet and release the forward brakes. With this arrangement the chamber 10 is closed, while the pressure in it is the same as the train-pipe pressure at its outlet, and valve 12 will be held open until the pressure in the train-pipe has equalized and reduced to the pressure locked in the closed chamber 10, when the diaphragm will again be in equilibrium and allow valve 12 to seat by gravity. In the fifth position the train-pipe is open to the atmosphere through the large port 6 and passage 7 and will cause a sudden and large reduction of pressure in the train-pipe for the purpose of applying the brakes in an emergency.

I am aware that Westinghouse and Moore, in Patent No. 401,916, dated April 23, 1889, use an auxiliary chamber with a piston to control a valve for applying the brakes; but in their invention the pressure in the auxiliary chamber is first reduced a certain amount and then the excess of pressure in the train-pipe causes the piston to rise and open the valve connected to it, whereupon the pressure in the train-pipe escapes until it is equal to that in the auxiliary chamber above the piston, when the piston descends and closes the valve. In my invention the valve is opened positively by means of a cam and intermediate lever and is held open until the required reduction in pressure is reached in both the train-pipe and the auxiliary chamber. When a sufficient reduction is reached, the plug is turned to release the lever from the cam and the valve will close by gravity if the pressure is equalized throughout the train-pipe; but if the pressure is not equalized the valve will be held open until the train-pipe pressure is equalized and reduced to the pressure in the auxiliary chamber. By this means the main function of the valve, which is to insure an immediate partial discharge of air from the brake-pipe, is accomplished by positive mechanism and does not depend on the secondary action of a slight difference in air-pressures in two chambers to move a piston, which may require more or less variation to overcome its friction, depending on its condition. The function of the diaphragm is simply to secure equalization of pressure in the train-pipe after the brakes are applied, and no danger would result if it failed to work.

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

In an engineer's valve for regulating the flow of fluid-pressure, the combination of a brake-pipe chamber, a discharge-valve 12, controlling the exhaust of air from the brake-pipe chamber, an auxiliary chamber separated from the brake-pipe chamber by a piston or flexible diaphragm attached to said discharge-valve 12 and adapted to hold valve 12 open when there is an excess of fluid-pressure on the brake-pipe side of the diaphragm and to close said valve when there is an excess in the auxiliary chamber, a valve 5, controlling a port 11 between the brake-pipe chamber and the auxiliary chamber, and a positive mechanical means connecting valve 5 and valve 12 for opening said valve 12 when valve 5 is rotated in one direction, but which will not close valve 12 when valve 5 is rotated in the other direction, substantially as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 31st day of March, A. D. 1891.

ALBERT P. MASSEY.

Witnesses:
MICHAEL J. MORKIN,
CHARLES O. UPHAM.