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DUPLEX PRESSURE CONTROL APPARATUS.

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1,012,758.

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Fig. 1.

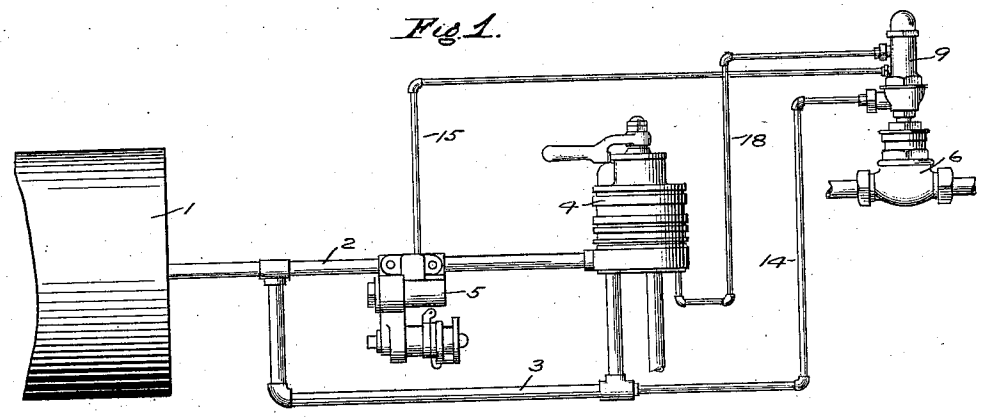


Fig. 2.

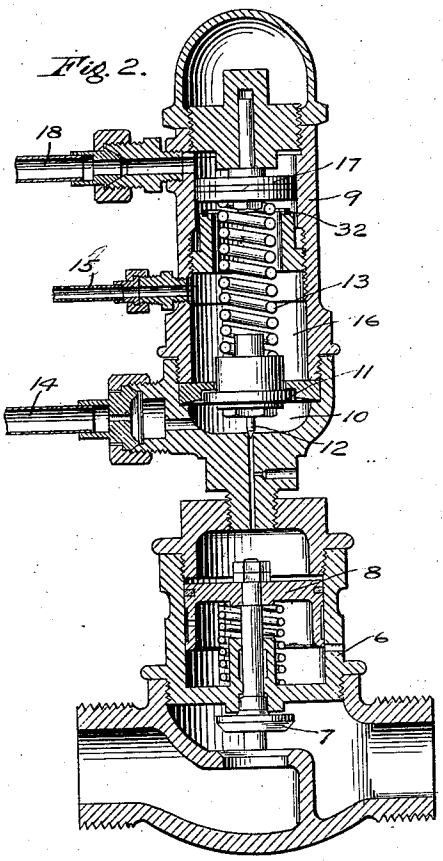
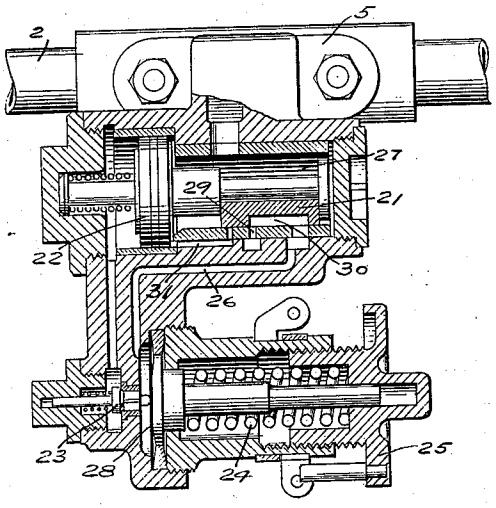


Fig. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

WALTER V. TURNER AND WILLIAM M. CADY, OF EDGEWOOD, PENNSYLVANIA, ASSIGNORS TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

DUPLEX PRESSURE-CONTROL APPARATUS.

1,012,758. Specification of Letters Patent. **Patented Dec. 26, 1911.**

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To all whom it may concern:

Be it known that we, WALTER V. TURNER and WILLIAM M. CADY, citizens of the United States, residents of Edgewood, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Duplex Pressure-Control Apparatus, of which the following is a specification.

This invention relates to fluid pressure brakes, and more particularly to a duplex pressure control apparatus for operating the brakes, at one time at an ordinary low degree of maximum train pipe pressure and at another time at a higher degree of pressure. For this purpose it has heretofore been proposed to employ a duplex feed valve mechanism or other means for obtaining as desired either one of two different degrees of normal train pipe pressure, for example, an ordinary low train pipe pressure of 70 pounds and a higher degree of 110 pounds, and two pressure governors for the pump and main reservoir, one of which, called the excess pressure head, is adapted to be supplied with fluid at the existing degree of train pipe pressure on the spring chamber side of its regulating diaphragm, so that the spring being adjusted to a pressure corresponding with the excess pressure desired in the main reservoir above the train pipe pressure, say 20 pounds, the governor top operates the pump to compress fluid into the main reservoir up to a maximum pressure of 90 pounds when the train pipe pressure is 70 pounds, or 130 pounds when the train pipe pressure is 110 pounds. The other or maximum pressure head is provided for the purpose of limiting the ultimate maximum degree of main reservoir pressure at certain times when it is desired that the pump shall operate for a time fully and freely to insure the rapid accumulation of pressure in the main reservoir, as for instance, upon applying the brakes, in order to provide an ample supply of air in readiness for releasing the brakes, and also when the brake valve is turned to running position to release the brakes in case the train pipe pressure happens to be low. This maximum pressure head may be adjusted to about 110 pounds in connection with a maximum train pipe pressure of 70 pounds and at about 150 pounds when the maximum train pipe pressure is 110 pounds.

One feature of our invention contemplates employing a single governor pressure head for accomplishing the above purposes in connection with means for automatically adjusting the head for the various pressures enumerated.

Another object of the invention is to provide a pump pressure governor having a spring actuated regulating diaphragm and means operated by fluid under pressure for varying the adjustment of the spring, and thereby the load on the regulating diaphragm.

In the accompanying drawing; Figure 1 is a diagrammatic view of a standard engine brake equipment with our improvements applied thereto; Fig. 2 a vertical sectional view of the improved pressure governor; and Fig. 3 a similar view of the duplex feed valve mechanism employed in the construction illustrated in Fig. 1.

According to the apparatus shown in Fig. 1, the main reservoir 1 is connected by pipes 2 and 3 with the engineer's brake valve 4, the pipe 2 being provided with a duplex feed valve mechanism 5 and the pipe 3 leading to the rotary valve chamber of the brake valve.

A preferred construction of the pump pressure governor is shown in Fig. 2 of the drawing, and comprises a steam valve casing 6 containing a steam valve 7 and operating piston 8 and a governor pressure head 9 having a diaphragm chamber 10, a diaphragm 11, regulating valve 12, and spring 13 acting on the diaphragm 11. Pipe 14 leads from the main reservoir pipe 3 and opens into the diaphragm chamber 10 for supplying air to operate the steam valve piston 8, and a pipe 15, connected to port 29 in the feed valve 5, opens into the chamber 16 of the governor pressure head, so that the spring chamber side of the diaphragm

11 may be subjected to the maximum degree of train pipe pressure as supplied by the duplex feed valve mechanism 5.

The upper end of the diaphragm spring 13 is in engagement with a movable abutment 17, the chamber above which communicates with a pipe 18 leading to a port opening in the seat of the engineer's brake valve 4.

Ports in the engineer's brake valve are so located as to supply fluid from the main reservoir in service application, lap, and emergency application positions of the engineer's brake valve, to the pipe 18 and thence to the upper side of the movable abutment 17.

The duplex feed valve mechanism, as shown in Fig. 3, may comprise a main valve 21, an operating piston 22, regulating diaphragm 28 for operating the regulating valve 23 and an adjustable spring 24, adapted to be adjusted to different degrees of pressures by means of hand wheel 25. The diaphragm 28 is open on one side to fluid at train pipe pressure admitted thereto by way of passage 26, when the brake valve 4 is in running position, and valve 23 is operated by the diaphragm to vent air from piston 22 so as to actuate same and open the train pipe passage 26 to the valve chamber 27 and thus charge the train pipe from the main reservoir when the train pipe pressure falls below the predetermined pressure at which the regulating spring 24 may be adjusted, this operation being the same as that of the standard duplex feed valve. The seat of the main valve 21 is also provided with a port 29 which communicates with pipe 15, and valve 21 is provided with a cavity 30 adapted to connect passage 26 with port 29 in the inner non-feeding position of the valve. A passage 31 opening into the valve chamber 27 also leads to the seat of the main valve 21.

In operation, when the brake valve 4 is turned to running position, the diaphragm 28 being open to train pipe pressure the feed valve mechanism operates to maintain the train pipe pressure at a pressure corresponding with the adjustment of the spring 24, and ordinarily, the main valve moves over to partly open the port 26 according to flow of air necessary to maintain the train pipe pressure constant at the predetermined pressure. Under such conditions the valve 21 does not move far enough to connect the port 31 with port 29 and only fluid at train pipe pressure is admitted to the spring chamber 16 of the diaphragm 11. The total load on the diaphragm 11 is therefore equal to the pressure of the spring 13, say 20 pounds, plus the train pipe pressure, or if the normal train pipe pressure is 70 pounds, the governor operates the pump to a maximum main reservoir pressure of 90 pounds and similarly if the normal train pipe pressure is 110 pounds a maximum main reservoir pressure of 130 pounds is produced. Should the train pipe pressure be low when the brake valve is turned to running position, however, then the feed valve parts will be shifted clear over and the port 26 is opened wide, to supply fluid to the train pipe at a greater rate. In so doing, the valve 21 also moves far enough to connect the passage 31 with port 29, by means of the cavity 30, and consequently fluid at main reservoir pressure is then admitted to the spring chamber of the diaphragm 11. As there is always main reservoir pressure below the diaphragm, it is evident that the fluid pressures on the opposite sides thereof are now equal and consequently the spring 13 maintains the valve 12 closed and the governor then permits the pump to fully operate for a time, until the train pipe pressure has increased sufficiently to cause the feed valve parts to move back and restrict the train pipe feed opening. In moving back, the valve 21 also cuts off the main reservoir port 31 and connects port 26, through cavity 30, with port 29, so that train pipe pressure is again admitted to the spring chamber of the diaphragm, and the governor regulates the pump in the normal manner according to the main reservoir pressure. Upon movement of the brake valve handle to an application position, air at main reservoir pressure is admitted to the chamber above abutment 17 and said abutment is thereby shifted to engage its seat 32. The spring 13 is thus compressed and the load on the regulating diaphragm 11 is correspondingly increased, so that the limiting maximum main reservoir pressure is raised a like degree. For example, if the movement of the abutment 17 compresses the spring so as to increase the spring load 20 pounds, then the total load on the diaphragm at 70 pounds train pipe pressure would be 20 pounds normal spring pressure plus 20 pounds increase in spring pressure plus 70 pounds train pipe pressure or 110 pounds, while for a train pipe pressure of 110 pounds added to the total spring pressure of 40 pounds, a maximum pressure of 150 pounds is the limiting pressure of the main reservoir.

It will thus be evident that with our improvements the results heretofore obtained only by the employment of two governor tops are secured with a single governor top.

Having now described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. In a fluid pressure brake, the combination with a main reservoir, engineer's

brake valve, and train pipe, of a pressure governor having a regulating diaphragm subject on one side to main reservoir pressure and on the opposite side to the load of a spring and fluid at train pipe pressure and means for automatically increasing the load on the diaphragm.

2. In a fluid pressure brake, the combination with a main reservoir, engineer's brake valve, and train pipe, of a pressure governor having a regulating diaphragm subject on one side to main reservoir pressure and on the opposite side to the load of a spring and fluid at train pipe pressure and a movable abutment operated by fluid pressure for augmenting the load of the spring.

3. In a fluid pressure brake, the combination with a main reservoir, engineer's brake valve, and train pipe, of a pressure governor having a regulating diaphragm subject to the opposing pressures of the train pipe and main reservoir, a spring acting on the train pipe side of said diaphragm, and means for automatically regulating the tension of the spring.

4. In a fluid pressure brake, the combination with a main reservoir, engineer's brake valve, and train pipe, of a pressure governor having a regulating diaphragm subject to the opposing pressures of the train pipe and main reservoir, a spring acting on the train pipe side of said diaphragm, and a movable abutment operated by fluid under pressure for varying the tension of said spring.

5. In a fluid pressure brake, the combination with a main reservoir and train pipe, of a pressure governor having a diaphragm subject on one side to main reservoir pressure and on the opposite side to the pressure of a spring, means for admitting fluid at train pipe pressure to the spring side of the diaphragm, an adjustable feed valve mechanism for regulating the train pipe pressure to either one of two different pressures, and means for automatically varying the tension of the spring.

6. In a fluid pressure brake, the combination with a main reservoir, engineer's brake valve, and train pipe, of a pressure governor having a regulating diaphragm subject on one side to main reservoir pressure, a spring acting on the opposite side of the diaphragm, means for admitting fluid at train pipe pressure to the spring side of the diaphragm, an adjustable feed valve mechanism for regulating the train pipe pressure to either one of two different degrees of train pipe pressure, a movable abutment acting on the spring, the engineer's brake valve having ports for supplying fluid under pressure to operate said movable abutment and increase the pressure of the spring on the diaphragm.

7. In a fluid pressure brake, the combination with a main reservoir, engineer's brake valve, and train pipe, of a pressure governor having a regulating diaphragm subject on one side to main reservoir pressure, a spring acting on the opposite side of the diaphragm, means for admitting fluid at train pipe pressure to the spring side of the diaphragm, an adjustable feed valve mechanism for regulating the train pipe pressure to either one of two different degrees of train pipe pressure, a movable abutment operated by fluid under pressure for augmenting the load of the spring on the diaphragm, the engineer's brake valve having ports for supplying fluid to said abutment in a position for applying the brakes.

8. In a fluid pressure brake, the combination with a main reservoir, engineer's brake valve, and train pipe, of a pressure governor having a regulating diaphragm subject on one side to main reservoir pressure, a spring acting on the opposite side of the diaphragm, means for admitting fluid at train pipe pressure to the spring side of the diaphragm, an adjustable feed valve mechanism for regulating the train pipe pressure to either one of two different degrees of train pipe pressure, a movable abutment operated by fluid under pressure for augmenting the load of the spring on the diaphragm, the engineer's brake valve having ports for supplying fluid to said abutment in service application, lap, and emergency application positions.

9. In a fluid pressure brake, the combination with a main reservoir, engineer's brake valve, and train pipe, of a fluid pressure governor comprising a diaphragm subject on one side to main reservoir pressure, a spring acting on the opposite side, and a movable abutment operated by fluid under pressure for varying the load of the spring on said diaphragm, and means for supplying fluid under pressure to the spring side of the diaphragm.

10. In a fluid pressure brake, the combination with a main reservoir, engineer's brake valve and train pipe, of a pressure governor having a regulating diaphragm subject on one side to main reservoir pressure, a spring acting on the opposite side to oppose the main reservoir pressure, and a movable abutment operated by fluid under pressure supplied thereto in one position of the brake valve for increasing the tension of said spring.

11. In a fluid pressure brake, the combination with a main reservoir, of a pressure governor having a regulating diaphragm subject on one side to main reservoir pressure, a spring for opposing the main reservoir pressure on the diaphragm, a movable abutment adapted to compress the spring for increasing the load of the spring on the

diaphragm, and an engineer's brake valve having ports for supplying fluid under pressure to operate said movable abutment.

12. In a fluid pressure brake, the combination with a train pipe, main reservoir, and a pump for compressing air into the main reservoir, of a pressure governor therefor comprising a movable abutment, a spring acting on said abutment, means for automatically varying the load of the spring on said abutment, and means for supplying fluid under pressure to said abutment for also varying the load on said abutment.

In testimony whereof we have hereunto set our hands.

WALTER V. TURNER.
WILLIAM M. CADY.

Witnesses:
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A. M. CLEMENTS.