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H. H. WESTINGHOUSE.  
PRESSURE GOVERNOR FOR PUMPS.

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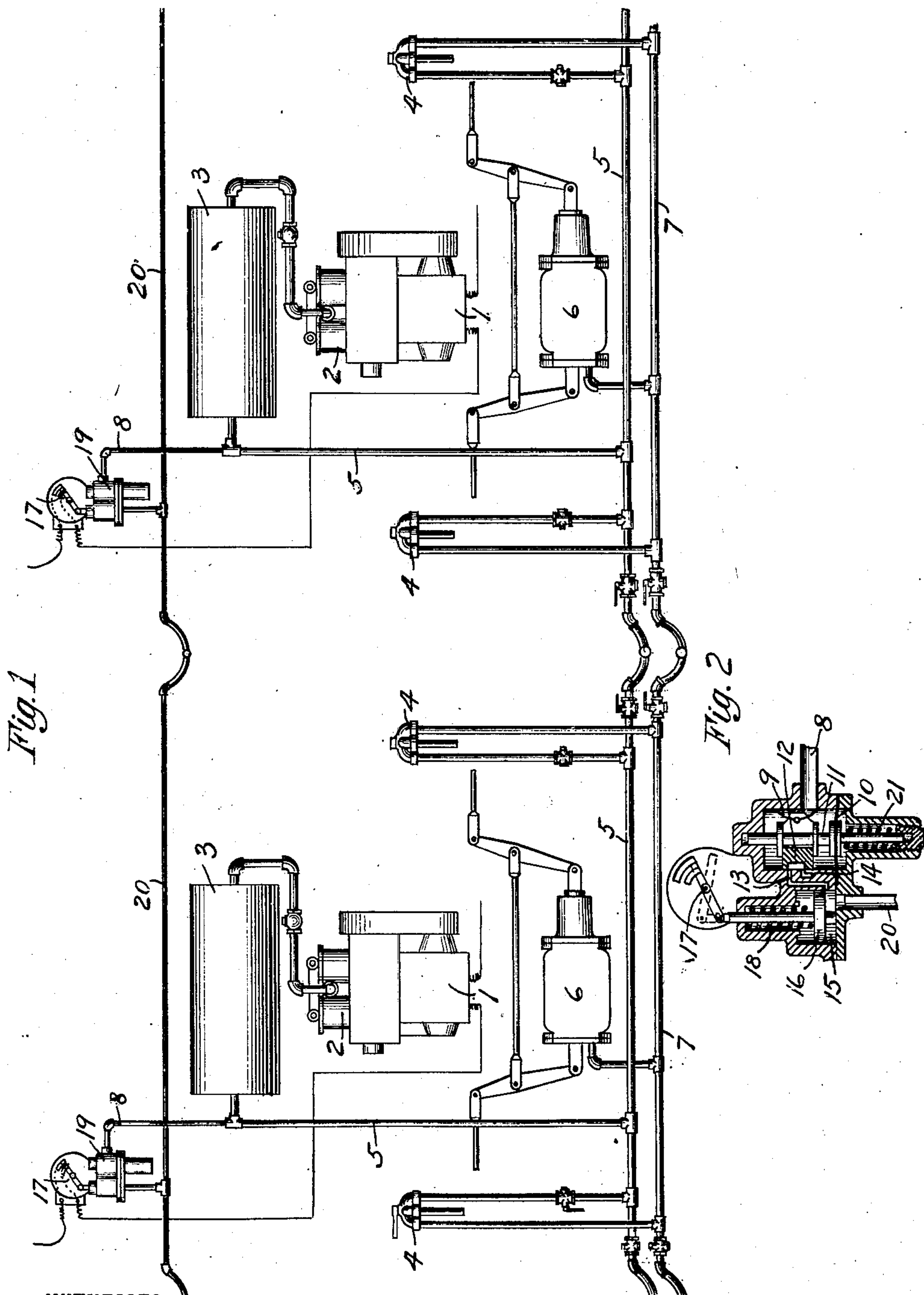


Fig. 1

Fig. 2

WITNESSES

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# UNITED STATES PATENT OFFICE.

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## PRESSURE-GOVERNOR FOR PUMPS.

No. 879,709.

Specification of Letters Patent.

Patented Feb. 18, 1908.

Application filed December 13, 1902. Serial No. 135,077.

*To all whom it may concern:*

Be it known that I, HENRY H. WESTINGHOUSE, a citizen of the United States, residing in New York city, county and State of New York, have invented a certain new and useful Improvement in Pressure-Governors for Pumps, of which improvement the following is a specification.

This invention relates to pressure governors for pumps, and more particularly for motor driven air compressors as employed on cars for supplying compressed air to the main reservoir of the air brake system.

Heretofore governing devices have been used to operate controlling means, such as a switch to open and close the circuit of the motor, for the purpose of stopping and starting the pump according to certain maximum and minimum pressures respectively in the main reservoir, said governing devices comprising a spring-pressed diaphragm or piston exposed to reservoir pressure and operating to admit fluid under pressure to a piston or other means for actuating the switch or controlling device.

When two or more cars are coupled together in a train, it is desirable that all the motor-driven compressors be utilized to supply the connected reservoirs of the system and also that these compressors be all stopped and started at substantially the same time. It is found to be impracticable to so adjust all the governors that they will act simultaneously to operate their controlling devices or switches, and the object of this invention is to provide a connecting means between said governors by which they will act substantially together, so that when one governor operates to throw its switch or controlling device a similar action of the other governors occurs practically simultaneously.

In the accompanying drawing, Figure 1 is a view showing an air brake equipment of two cars coupled together with my improvement applied thereto, and Fig. 2 is a section showing one of the governing devices.

As shown in the drawing the air brake system of each car comprises an electric motor for driving a compressor or pump 2 for supplying air to the main reservoir 3, which is connected by pipes 5 with a motorman's

valve 4 at each end of the car. A train pipe 7 connects the motorman's valves with the brake cylinder 6, and both the main reservoir pipe and the train pipe may be provided with the usual valves and couplings for connecting the same with corresponding pipes of adjacent cars.

For the purposes of illustration, I have shown a pressure governing device 19 comprising a casing having a diaphragm chamber 9 connected with the main reservoir or pump by means of pipe 8, and containing a diaphragm 10 having a stem 11 for actuating a slide valve 12 for opening and closing the supply and exhaust ports 13 and 14 leading to and from the cylinder 15. In this cylinder is located a piston 16 for operating the switch 17 of the motor circuit, and a spring 18 acts against the back of the piston for forcing the same to its inner position when the exhaust port is open.

It is obvious that a steam or other form of motor could be used in place of an electric motor for operating the air pump, and also that various forms of controlling devices could be substituted for the electric switch.

According to the present form of my invention an intermediate equalizing pipe 20 is connected to the pressure cylinder 15 and is also adapted to be connected with similar pipes on adjacent cars by means of ordinary valved couplings between the cars.

The operation of the air brake system in applying and releasing brakes is well understood by those familiar with the art and will not therefore be described. When each car is being operated singly the governing device operates in the usual way to cut the motor in or out by closing or opening the circuit according to the predetermined minimum and maximum pressures in the main reservoir, the equalizing pipe 20 at the time being closed. When two or more cars are coupled up in a train the equalizing pipes are also coupled, thus putting all the switch operating cylinders in communication with each other. Suppose all the switches to be closed, as indicated in full lines, and the pumps all working to supply compressed air to their respective reservoirs, then as the pressure increases on the several diaphragms of the governing devices the adjustable



springs 21 are compressed and the slide valves drawn down sufficiently to lap the inlet port 13. Since, for various reasons, as before stated, the governors cannot all be set to act at precisely the same pressure, some one of the valves (the one having the weakest spring) will open its port 13 before the others and when this occurs air under pressure immediately flows through port 13 into cylinder 15 and from thence through equalizing pipe 20 to all of the cylinders 15, thus applying sufficient pressure to all the pistons 16 to actuate all of them at substantially the same time to throw their respective switches 17 to open the circuit and stop the pumps. Then as the pressure in the main reservoir system diminishes owing to the application of the brakes or other causes, the springs 21 force the respective valves back until ports 13 are again lapped. As the pressure continues to decrease the valve having the strongest spring will be the first to connect its ports 13 and 14 through the exhaust cavity and thus exhaust its cylinder 15 and, by means of pipe 20, all the cylinders to the atmosphere. The springs 18 then force their respective pistons back to their inner positions, at the same time throwing the switches 17 to closed position and starting the pumps. It will thus be seen that by means of my improvement all the pumps on a connected system such as described will be stopped and started at substantially the same instant, thus securing a safe, smooth and efficient working of the apparatus.

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

1. The combination on a plurality of cars, each having a motor driven air pump, a main reservoir, and a pressure operated device for controlling the pump, of a main reservoir pipe line connecting said reservoirs, and means operated by the main reservoir pressure for supplying compressed air simultaneously to all of said controlling devices.

2. The combination on a plurality of cars, each having a motor driven air pump, a main reservoir, and a pressure operated device for controlling the pump, of a main reservoir pipe line connecting said reservoirs, a governor pipe line for connecting said pressure operated controlling devices, and means operated by the main reservoir pressure for supplying compressed air to said governor pipe line.

3. The combination with a plurality of motor driven pumps, main reservoirs, controlling devices for the motors, and cylinders with pistons for operating said controlling devices, of a main reservoir pipe line connecting said reservoirs, and means operated by the main reservoir pressure for supplying

compressed air simultaneously to all of said pistons.

4. The combination with a plurality of motor driven pumps, main reservoirs, controlling devices for the motors, and cylinders with pistons for operating said controlling devices, of a main reservoir pipe line connecting said reservoirs, a governor pipe line leading to all of said cylinders, and means operated by the main reservoir pressure for supplying compressed air to said governor pipe line.

5. The combination with a plurality of pumps, of a controlling device for each pump, a cylinder and piston for operating each controlling device, an intermediate pipe connecting said cylinders and means actuated by the pressure at each pump for supplying fluid to and exhausting same from said intermediate pipe.

6. A pump governing apparatus comprising a controlling switch or device for stopping and starting the pump, a cylinder and piston for operating the same, means actuated by the pump pressure for admitting fluid to said cylinder, and a pipe connection from said cylinder to a corresponding cylinder of another governor.

7. A governing apparatus for a plurality of motor driven pumps, comprising switches, one for each motor circuit, pistons for operating the switches, a diaphragm exposed to the pump pressure, and means operated by the diaphragm for supplying fluid under pressure to all of said pistons simultaneously.

8. A governing apparatus for motor driven pumps, comprising a switch for controlling the motor circuit, a cylinder and piston for operating said switch, a valve for controlling the supply of fluid under pressure to said cylinder, a diaphragm subject to the pressure of the pump for actuating said valve, and a pipe leading from said cylinder to the corresponding cylinder of another governing device for simultaneously controlling another pump.

9. A governing apparatus for motor driven pumps, comprising a switch for controlling the motor circuit, a cylinder having supply and exhaust ports and piston for operating said switch, a slide valve for controlling said ports, a diaphragm subject to the pressure of the pump for actuating said valve, and an equalizing pipe to connect said cylinder with a corresponding cylinder of another governing device for simultaneously controlling another pump.

10. The combination with an air pump, main reservoir, brake cylinder, and engineer's valve, of a motor for operating said pump, a pressure operated switch for controlling the motor circuit, means actuated by reservoir pressure for supplying fluid under pressure



to operate said switch, and an equalizing pipe connection for simultaneously supplying fluid to a plurality of pressure operated switches, for controlling other pumps.

5 11. A pressure governing apparatus comprising a main switch or controlling device and a piston actuating the same, means

governed by the pump pressure for controlling the pressure acting on said piston and on a corresponding piston of another governor. 10

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Witnesses:

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