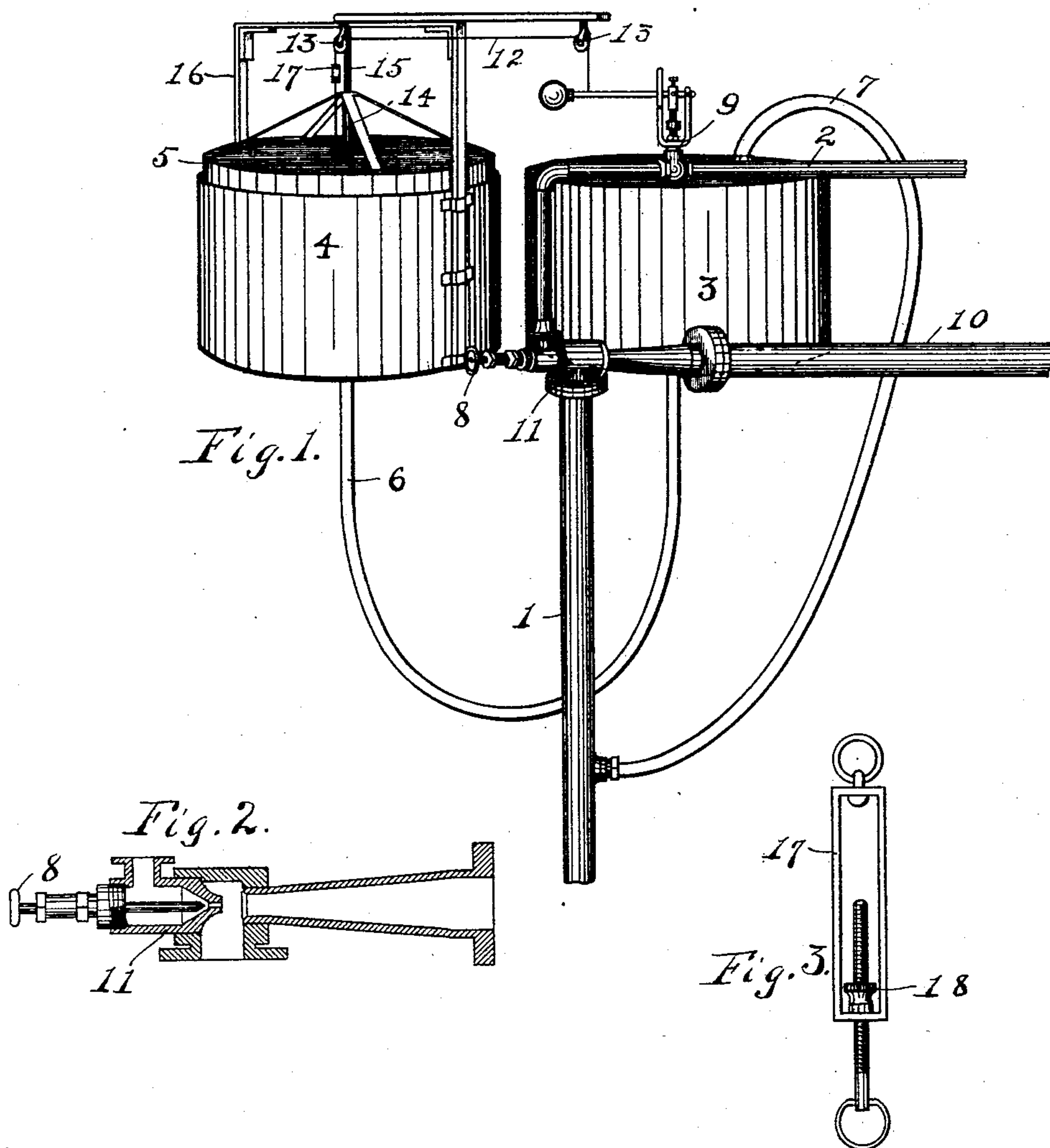


No. 713,496.

Patented Nov. 11, 1902.

F. J. ROOT.
GAS PRESSURE REGULATOR.
(Application filed June 24, 1901.)

(No Model.)



Witnesses:

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UNITED STATES PATENT OFFICE.

FRANK JARED ROOT, OF BINGHAMTON, NEW YORK.

GAS-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 713,496, dated November 11, 1902.

Application filed June 24, 1901. Serial No. 65,745. (No model.)

To all whom it may concern:

Be it known that I, FRANK JARED ROOT, a citizen of the United States, residing at Binghamton, New York, have made certain new and useful Improvements in Gas-Pressure Regulators, of which the following is a full, clear, and exact description.

My invention relates to fluid-pressure regulators, and more particularly to gas-pressure regulators for regulating and controlling the tension of gases.

My invention further relates to a gas-tension regulator operated by steam, compressed air, or other gas or vapor, wherein the automaticity applies to the control of the tension of the gas and also to any variation of pressure in the operating medium, whether the same is steam or other gas or vapor. Furthermore, my invention operates as an automatic regulation of the admixture of gases or vapors where the gas to be controlled is mixed with the gas the pressure of which is employed to control the gas-tension.

A specified adaptation of my invention is shown in a joint application of myself and W. S. Brandt, filed June 24, 1901, Serial No. 62,755, wherein this device is employed in the production of pyroligneous acid. The process therein shown would lack in effectiveness were not a device of this character employed.

In the following description of my invention I shall show a typical adaptation of the same wherein a gas is to be controlled as to tension and is to be mixed as drawn off with a specified amount of steam. Such description will illustrate the operation of my invention, and at the same time serve to indicate its adaptation to analogous uses.

Referring to the drawings herewith, in which like characters of reference indicate like parts, Figure 1 is an elevation in perspective. Fig. 2 is a detail section of my steam-injector. Fig. 3 is a detail elevation of my chain-adjuster.

The principal parts of my device are as follows:

- 1 is a gas-supply pipe.
- 2 is a steam-supply pipe.
- 3 is a closed tank.
- 4 is a tank open at the top, carrying a float 5.
- 6 is a pipe connecting the bottoms of the tanks 3 and 4.

7 is a pipe connecting the gas-supply pipe 1 with the top of the tank 3.

8 is a hand-valve in the steam-supply pipe 2.

9 is a balanced-valve on the steam-pipe 2.

10 is an exit-pipe for the gas and steam.

11 is a steam-jet exhauster interposed between the gas-supply pipe 1 and the exit-pipe 10.

12 is a chain or cable provided with an adjuster 17, connecting the balanced-valve 9 with the float 5.

The operation of the device is as follows: Vent having been given to the tank 3 by uncoupling the pipe 7, sufficient water or other liquid is poured into the tank 4 to half fill the tanks 3 and 4. The two tanks being set upon the same plane, the liquid will come to a common level by flowing through the pipe 6, so that each tank is filled half full. The vent of the pipe 7 is then closed, the float 5 put in place, the chain or cable 12 properly adjusted, and the device is ready for operation. The hand-valve 8 is opened to give the maximum supply of steam. The exhauster 11 at once reduces the gas-tension in the pipe 1, which brings the tension of the air in the top of the tank 3 to the same as that in pipe 1 through the pipe 7. This causes the water to rise in tank 3 and fall in tank 4 by passing through the pipe 6, due to atmospheric pressure, until the difference of level is, say, six inches—that is, the water rising three inches above the common level in tank 3 and falling three inches below the common level in tank 4. This results in the float 5 falling and drawing the cable 12 over the pulleys 13, thus raising the weighted arm of the balanced valve 9 and throttling the steam in the pipe 10. The float 5 is held in position and rendered easy in action by having a tubular guide 14, which takes over a fixed central rod 15, and the cable 12 has its pulleys mounted upon a bracket 16, which is secured to the tank 4. This throttling of the steam-supply tends to allow the gas-tension in the pipe 1 (and consequently in the tank 3) to rise, with the result that water is driven back by gravity into tank 4, thus raising the float 5 and giving the balanced valve freedom to supply a greater volume of steam to the exhauster 11, which will result in a reverse condition of flow, and thus the balance will after a few oscillations settle

down to the predetermined regulation, a regulation attained in the ordinary way by regulation of the hand-valve 8.

In Fig. 2 I have shown the ordinary steam-jet 5 exhauster which I employ, which I find well adapted to the requirements of this apparatus.

In Fig. 3 I have shown my chain-adjuster, which consists of an ordinary turnbuckle 10 provided with a milled nut 18, by means of which the chain or cable may be adjusted. The use of this adjuster makes it possible to make a proper adjustment of the balanced valve action without a change of level of water 15 in the tanks. From this it is evident that the balance is most delicate. The water-level acts as a differential between the gas-tension and the outside air and responds quickly and automatically to any change of gas-tension 20 or any change of steam-pressure. Hence any increase or decrease of gas-supply creating the tension is not only met with reference to the tension, but also with reference to the quantity of steam mixed with it, thus automatically regulating the gas-tension and the admixture. On the other hand, any variation 25 of steam-pressure is met both with reference to the gas-tension produced and the admixture.

It will be evident that any desired vapor or gas may be used in place of the steam, and it will also be evident that in place of a steam-jet exhaust where the steam is mixed with the gas I may use the steam or other supply 35 of pressure to operate any well-known device—such, for example, as a pump or exhaust-fan—to control the gas-tension, and I therefore do not desire to limit myself to the specific form of exhauster shown or to a device where the steam or other supply of pressure is mixed with the gas. 40

Having thus described my invention and its method of operation, what I claim is—

1. In combination with a gas-supply and a 45 steam-supply, an exhauster, a balanced valve, or other valve, governing said ex-

hauster, a closed tank for holding a body of water connected above its water-line with the gas-supply, an open tank, a float therein, a pipe connecting the two tanks below the 50 water-line, and means for connecting said float and said balanced valve whereby variations in the gas-pressure cause variations in the water-levels in said tanks and thereby said float operates said valve, substantially 55 as shown and described.

2. A gas-pressure regulator comprising a gas-supply, an exit-pipe and a steam-supply, an exhauster and a balanced, or other, valve governing the same, a closed tank and an open 60 tank partially filled with water and connected below their water-line, a pipe connecting the air-space of the closed tank with the gas-supply, a float in said open tank, a chain or cable connecting it with the balanced valve, 65 said water in said tanks acting as a differential between the gas-tension and the steam-pressure and governed by the pressure of the atmosphere, substantially as and for the purposes set forth. 70

3. A pressure-regulator comprising a gas-supply and a steam-supply, an exit-pipe for the steam and gas, an exhauster discharging into same, a balanced valve on the steam-supply, a closed tank connected above its 75 water-line with the gas-supply, an open tank, a float therein, a pipe connecting said tanks below the water-line, said tanks being set at a common level and partially filled with water, or other liquid, and means for connecting 80 said float and said balanced valve whereby variations in the gas-pressure cause variations in the water-levels in said tanks and thereby said float operates said valve, substantially as and for the purposes set forth. 85

In witness whereof I have hereunto set my hand, in the presence of two witnesses, this 19th day of June, 1901.

FRANK JARED ROOT.

Witnesses:

W. S. MONETT,
H. C. COLLIER.