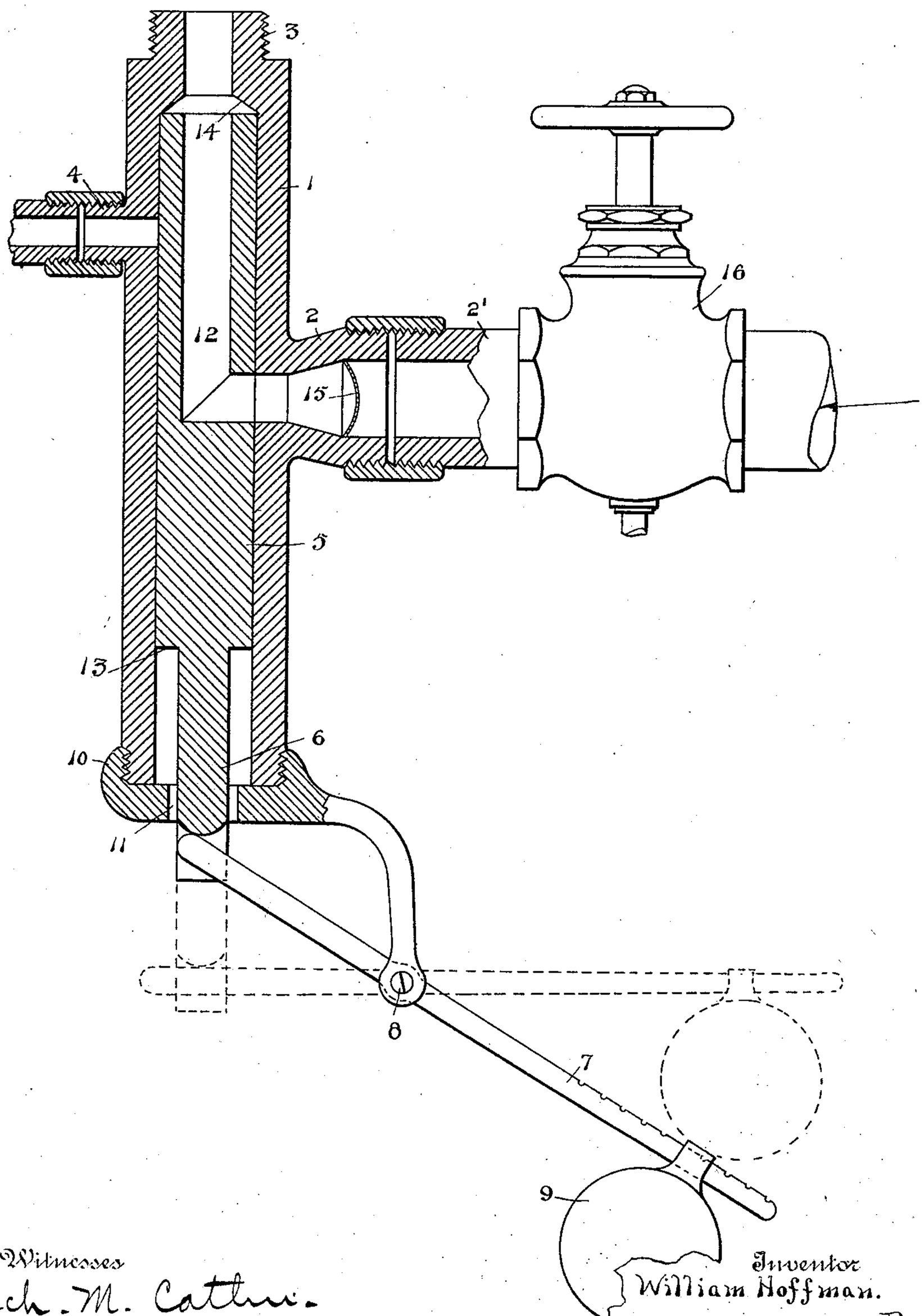
(No Model.)

W. HOFFMAN.

PRESSURE GOVERNOR FOR FLUIDS.

No. 521,315. Patented June 12, 1894.



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PRESSURE-GOVERNOR FOR FLUIDS.

SPECIFICATION forming part of Letters Patent No. 521,315, dated June 12, 1894.

Application filed January 13, 1894. Serial No. 496,791. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HOFFMAN, a resident of Salt Lake City, in the county of Salt Lake and Territory of Utah, have invented certain new and useful Improvements in Pressure-Governors for Fluids; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to devices for maintaining in one part of a system of pipes, or of apparatus, or of an engine and communicating pipes or engines, an approximately constant fluid pressure less than that existing in another part of the same, as for example less than that of the supply pipe, main or engine; and its object is to provide a fluid pressure governor and safety valve of simple construction that will act efficiently, safely and automatically to prevent an injurious rise of pressure upon the delivery side of the governor and under all circumstances to maintain on said delivery side any desired predetermined pressure; and the invention consists in the construction hereinafter described and particularly pointed out.

In the accompanying drawing the figure is a vertical longitudinal section.

Numeral 1 denotes a tube or cylinder having screw threaded nipples 2, 3 and 4 which are adapted to be connected respectively with a conduit or vessel 2′ arranged to supply a fluid under pressure, with a distributing or other conduit or vessel, and with an escape pipe.

5 denotes a piston having as near an air tight connection with tube 1 as practicable and adapted to move freely in said tube. It is provided with a rod 6 pivotally connected to a weighted lever 7 having a fulcrum at 8, the weight 9 being adjustable on said lever.

The tube may be provided with a removable cap or thimble 10 having an opening 11 for the free passage of the piston rod and for the escape of any water or other fluid that may leak past the piston. This leakage escape as well as the safety vent 4 may communicate with any suitable conduit or receptacle, as for example with a sewer.

The piston 5 has a passage 12 the lower end of which is bent at an angle to the main part thereof, and is adapted to register with the inlet passage of the nipple 2 when the piston is suitably situated. The shoulder or end 13 of the piston is adapted in its extreme lower position to bear on the screw cap 10. Its upper end will bear against the interior shoulder 14 formed at the lower end of the outlet 3 when the lower and bent end of its passage 12 registers with inlet 2. This shoulder 14 is made sloping or inclined as shown to freely expose at all times the upper end of the piston to pressure in the pipes or apparatus on the low pressure side of the governor.

15 denotes a strainer to prevent the entrance of obstructions. This may if desired be situated in the space or chamber just beneath the shoulder 14 and will be made of non-corrosive material as also preferably will be the entire governor and its immediate connections.

The entire circulating system is or may be adapted to be drained by a three way cock or a waste cock in the ordinary manner, a cock for such purpose being indicated at 16.

I regard my exit 4 and its working as an important feature of my improvement and its advantages will be understood when it is considered that the device is intended, among various other uses for which it is adapted, to be employed as the connecting link between a high pressure water main or sub-main and a relatively low pressure distributing system to which the existence of the high pressure would be injurious. In such a system or construction it is desirable that an immediate relief or vent be afforded when from leakage from the high to the low pressure side of the valve or any other cause too high a pressure is approached in the distributing pipes. This is afforded by the prompt action of such pressure to cut off the liquid supply by the automatic lowering of the piston whereby communication with the main is closed. Normally this cutting off action will be just sufficient to maintain a suitable supply in the distributing system at the desired and predetermined pressure. But under exceptional cases the piston will be promptly forced down, pressure from the main entirely cut off and a relief or vent afforded through the safety out

let 4. But ordinarily the increase above the normal of the back pressure, meaning thereby, the pressure on the delivery or low pressure side of the governor, will not uncover the outlet 4 but will expend itself in moving the piston a short distance, thereby elevating the weight correspondingly and increasing the leverage of the weighted arm so as to suitably open the inlet 2 after the temporary excess of pressure is expended. This obviates the hammering so common in fluid circulating and discharging apparatus. It will also in some measure guard against bursting pipes or vessels by the expansion of liquids that precedes congelation or that may in some apparatus be caused by heat or by fermentation, and also in a liquid circulating apparatus such as a domestic hot and cold water distributing system including stand boilers and range water backs considerable variation of pressure may in some cases be caused by unusually hot fires with little or no drafts from the hot water pipes and particularly if such a system communicates with hot water circulating pipes and radiators which can be thrown into and out of circuit at will.

Variations of pressure in the distributing pipes tend to throw any automatically acting valve situated therein and if such valve has too short a range of movement it will be forced to and from its seat, upon slight variations, unnecessarily frequent, and in a manner to pound and make an objectionable noise. For this reason I prefer to provide for some movement of my piston valve between the closing of the valve and the opening of the safety outlet whereby small increments of pressure may expend themselves upon the counterbalance, whether weighted lever or equivalent, and without opening the safety outlet to waste the fluid. If however the increase of pressure fully reaches the predetermined limit of safety the piston will be moved sufficiently to open the safety outlet even though the inlet be closed before the opening occurs. The precise situation of the safety outlet is not essential, provided only that it is arranged to communicate, at the proper time, by movement of the piston, with the distributing system. That is: the situation of the safety outlet 4 may be varied; it being only necessary that it communicate freely with the passage 12 when the piston 5 is at its lowest position.

I am aware that a drainage has been provided for water leaking into a space between rubber or leather packings in a governor but such a device is not of my invention. It is characteristic of my improvement that it provides, when desired or necessary, a free and unobstructed communication between the low pressure of circulating pipes and a safety vent. I am also able to dispense with leather or rubber packings if desired as in the case of apparatus circulating corrosive fluids, when the entire apparatus will need to be made of glass or other suitable material; and I provide a distinct drainage for leakage at the lower end of the valve piston. It may be noted that when the inlet 2 is closed the pressure from the main has no tendency to move said valve and that when it is open the only portion of the valve surface adapted to receive said pressure in manner to move it in the upward direction is that on the upper side of the short limb of passage 12 adjacent to the inlet, a much larger surface consisting of that on the opposite side of said limb, and that at the top of the piston being subject to said pressure in manner to move the piston down and close the valve which action is normally counteracted by the weighted lever as above stated.

I am aware that a spring held piston valve has been proposed in a pressure governor, said valve having an inlet port transverse through its whole extent to the piston and therefore providing for a balanced pressure therein. Said spring was inconveniently situated as respects its adjustment and the governor has no means for draining the same, nor have any prior governors, of which I have any knowledge, a safety overflow. All such prior devices therefore would fail to guard against the bursting of the low pressure pipes which according to my improvement are made lighter and cheaper than otherwise practicable.

Having thus described my invention, what I claim is—

1. In a fluid pressure governor the tube 1 provided with suitable nipples 2 and 3 and a safety outlet 4, and the piston 5 having the bent passage 12, and the weighted lever pivoted to the piston rod to counterbalance a part of the downward pressure in the valve, the power arm of the said lever being lowest when the valve inlet is open and horizontal when the safety outlet is open whereby the leverage increases as the valve closes and reaches a maximum when the safety valve is open, substantially as set forth.

2. In a fluid pressure governor the tube 1 provided with suitable nipples 2 and 3 and a safety outlet 4, and the piston 5 having the bent passage 12, and means for counterbalancing part of the downward pressure on the valve, said means exerting a minimum effect when the inlet is fully open and a maximum when the safety outlet is open and the inlet closed, and said valve having greater surface exposed to the downward than to the upward pressure of the fluid, substantially as set forth.

3. In a fluid pressure governor the tube 1 provided with suitable nipples 2 and 3 and a safety outlet 4, and the piston 5 having a bent passage 12 whereby the passages through the nipples may communicate, said piston exposing more surface to downward pressure than to upward pressure, and when the inlet is closed exposing no surface to pressure

from the main in either direction of its (the piston's) path; and having means distinct from said upward pressure for moving it to open the inlet, said means having a maximum effect when the inlet is closed, all substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM HOFFMAN.

Witnesses:
M. E. HOFFMAN,
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