

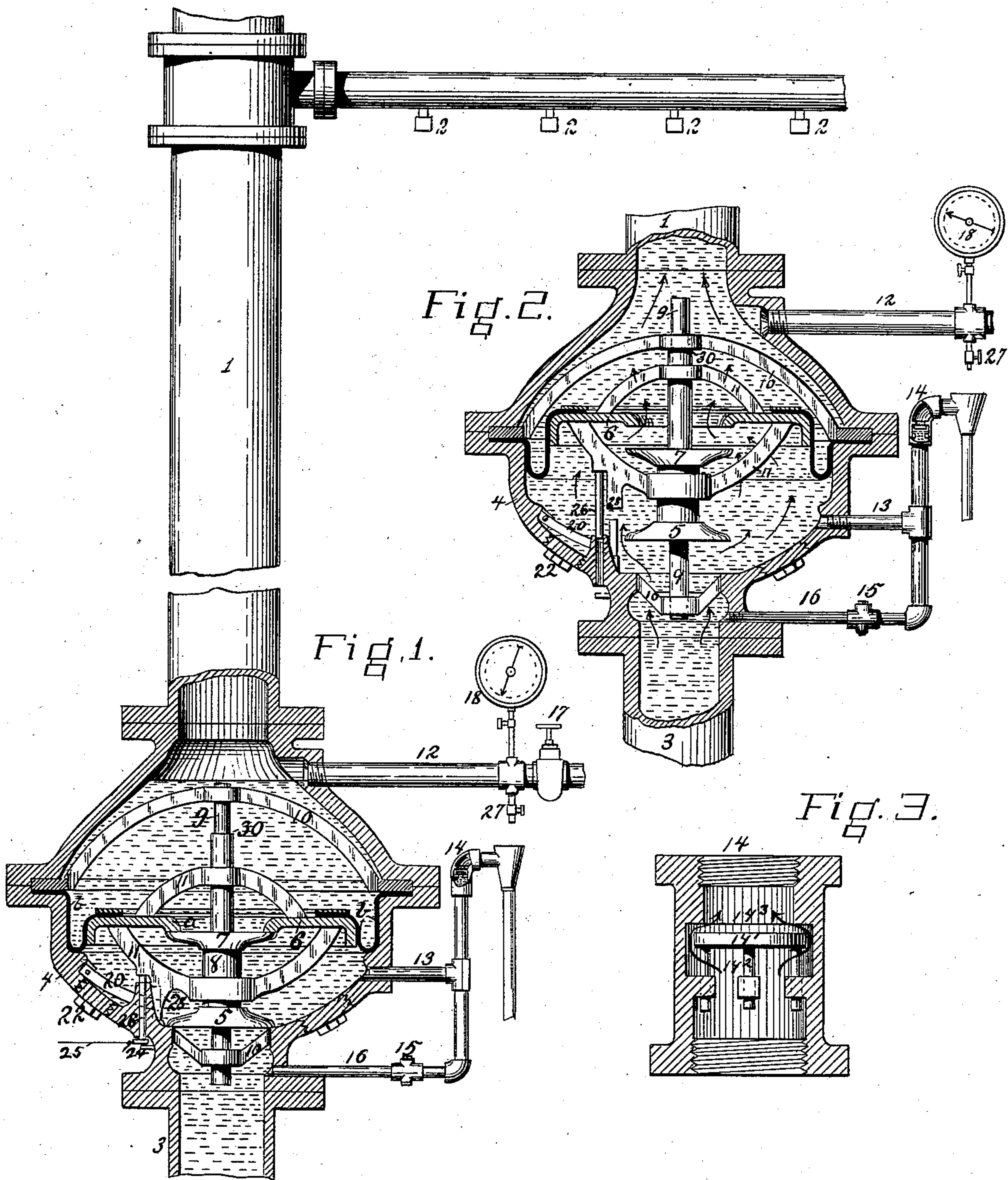
(No Model.)

F. GRINNELL.

DUPLEX VALVE.

No. 372,218.

Patented Oct. 25, 1887.



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DUPLEX VALVE.

SPECIFICATION forming part of Letters Patent No. 372,218, dated October 25, 1887.

Application filed December 30, 1886. Serial No. 922,983. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK GRINNELL, of the city and county of Providence, and State of Rhode Island, have invented a new and useful Improvement in Duplex Check-Valves, of which the following is a specification.

My invention relates to means for controlling the flow of fluid in a series of three chambers or pipes where the first and third chambers are charged with fluid-pressures independent of each other and of the intermediate chamber, and where it is desired to have the fluid from the first chamber flow through the second or intermediate chamber into the third chamber upon the release of pressure from said third chamber; and my invention more particularly relates to such a system where the pressure in the third chamber, though less than that in the first, is made to directly control the flow from the latter.

It is often desirable, for instance, to have a less pressure in the working or distributing pipes of a fluid-pressure system than in the supply pipes or mains, or to have air-pressure in the former and water-pressure in the latter, or to have, normally, both of these conditions, and yet have the release of pressure from the working-pipes automatically open a connection to them from the supply-pipe. To do this effectively it is necessary to provide an intermediate chamber having a less pressure than either of the pipes and opening into both pipes through valve-ports, the valves of which are both held closed by means acted upon by the pressure in the working or distributing pipes.

My present invention consists of a peculiar construction of duplex check-valve for performing this function, and its construction and operation will be best understood from a description of the accompanying drawings, in which—

Figure 1 represents a view, partly in section, of my improvement applied to a system of automatic fire extinguishers. Fig. 2 shows the device in its operative or open position. Fig. 3 shows a detail, hereinafter described.

As the invention is well adapted for use in connection with an automatic fire-extinguishing apparatus, its mode of operation will be better understood by a description in connection therewith. In Patent No. 249,171, granted to

me November 8, 1881, I have shown such a system, and reference is made to such patent for a more complete exposition of what is required in such an apparatus.

In Fig. 1 is shown distributing-pipes 1, provided with sprinklers 2, such as are used in an apparatus of that kind. These pipes and distributors are charged with air under a light pressure by attaching an air-pump to pipe 27, and a gage, 18, serves to show at any time when the pressure is up to the proper point. The water-supply pipe 3 is connected with any suitable source of water-pressure, and between it and the distributing-pipe 1, I place a chamber or casing, 4, separated by a water-valve, 5, from the water-supply pipe, and by a diaphragm, 6, and valve 7 from the distributing-pipe.

The valves 5 and 7 are made integral by means of a connecting-stem, 8, thereby forming what may be called a "duplex valve," and the port of the upper valve, 7, being through the diaphragm 6, the diaphragm, when forced down by pressure from above, has a tendency to hold both valves to their respective seats. Owing to the greater area of the diaphragm 6 and valve 7 over the water-valve 5, the light air-pressure in the distributing-pipes is enabled to more than balance the greater water-pressure in the supply-pipe, and the water-valve is thus held securely to its seat until such time as the pressure in the distributing-pipes is relieved by the opening of one or more of the sprinklers. The valves are guided by a valve-stem, 9, passing through yokes 10, and the diaphragm 6 is similarly guided by yokes 11, attached to it and sliding on the valve-stem.

The fact that the valve 7 seats up against the movable diaphragm 6, instead of against a rigid seat, greatly facilitates the accurate fitting of the valves. It will also be seen that the valve 7 may be as small as desired, compatible with sufficient area of opening, because it is not alone depended upon to hold the water-valve closed.

The fluid in the intermediate chamber, 4, should have a pressure less than that in the distributing-pipes 1, and in order to prevent any leakage that may occur past the valves 5 or 7 from increasing this pressure I provide a drip-pipe, 13, which communicates normally

with the atmosphere. A check-valve, 14, situated in this pipe enables such leakage to freely escape, but closes automatically as soon as the full pressure of water comes on. This check-valve is shown enlarged in Fig. 3, and consists of a plain disk, 14', resting normally in the position shown on the pins 14², so as to allow the water to flow around it in the direction of the arrows, but closing up against the shoulder 14³ when the pressure becomes abnormal.

A spring, 20, is arranged to pass under the lug 28 on the diaphragm-yoke and hold the valve from closing when it has once opened. This device is not claimed herein, as it is claimed in another case of even date herewith. A rod, 26, also attached to the diaphragm-plate, holds a washer, 24, that is connected by wire 25 with any suitable alarm mechanism, so that when the diaphragm lifts an alarm is given as soon as the washer flies off the rod.

The valves 5 and 7 may be inspected at any time through hand-holes in the chamber 4 by the removal of the hand-hole plugs 22.

A pipe, 16, having a stop-cock, 15, forms a by-pass for turning water on to the intermediate chamber, 4, and distributing-pipes, when desired. A cock, 17, in pipe 12, leading from the lower part of the distributing-pipe, is used for drawing off the water above that level.

The valve-stem 9 has a shoulder, 30, that impinges against the yoke 10 when the valves open and prevents their further motion, whereupon the diaphragm, continuing its motion, opens the port closed by valve 7.

The operation of the device may now be readily understood. The pressure being removed from the upper side of the diaphragm by the opening of any of the sprinklers, under the action of the heat of a fire, the water will be unopposed and will lift the valve 5 from its seat, carrying with it, of course, valve 7 and diaphragm 6. The water-pressure thus reaching the under side of the diaphragm will continue to push the same upward, even after the shoulder 30 has reached the yoke 10 and stopped the motion of the valves. The water will thus have a free passage past both valves into the distributing-pipes and through the opened sprinklers.

I do not claim herein, broadly, the combination whereby the light air-pressure is made

to directly control the water-valve, as that forms the subject of another case filed of even date herewith, Serial No. 222,985. I have shown the diaphragm 6 as formed of an annular plate, *a*, connected with the walls of the chamber by means of a flexible rubber sheet, *b*, and this is my preferred construction; but it is evident that there are equivalents that will take the place of the diaphragm and perform the same function.

Having thus described my invention, what I claim as new is—

1. The combination, substantially as hereinbefore set forth, of a double valve with seats facing in opposite directions, a valve seat appropriate to one face of the double valve to close the opening in the supply-pipe, a second valve-seat appropriate to the other face of the double valve and mounted on a movable diaphragm, and a stop to limit the movement of the double valve when the pressure in the supply-pipe is paramount, and to permit under such pressure the movable valve seat to move away from its valve and give entrance for the water into the distributing pipes.

2. The combination, substantially as hereinbefore set forth, of two pipes or chambers, each containing fluid under pressure, an intermediate chamber having ports into both pipes and normally under a pressure less than that in either of the pipes, a movable diaphragm carrying one of the said ports, valves held against both ports by the action of the fluid-pressure on the diaphragm, and a stop for limiting the play of said valves.

3. The combination of pipe 1, charged with light air-pressure, pipe 3, charged with heavier water-pressure, intermediate chamber, 4, under pressure less than either pipe, valve 5, closing a port between said chamber 4 and pipe 3, diaphragm 6, closing pipe 1, and valve 7, closing a port through diaphragm 6, the said valve 7 having a more limited play than the said diaphragm, and the combined area of said valve 7, and diaphragm 6 being more in excess of the area of the valve 5 than the pressure in the pipe 3 is in excess of that in pipe 1.

FREDERICK GRINNELL.

Witnesses:

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