

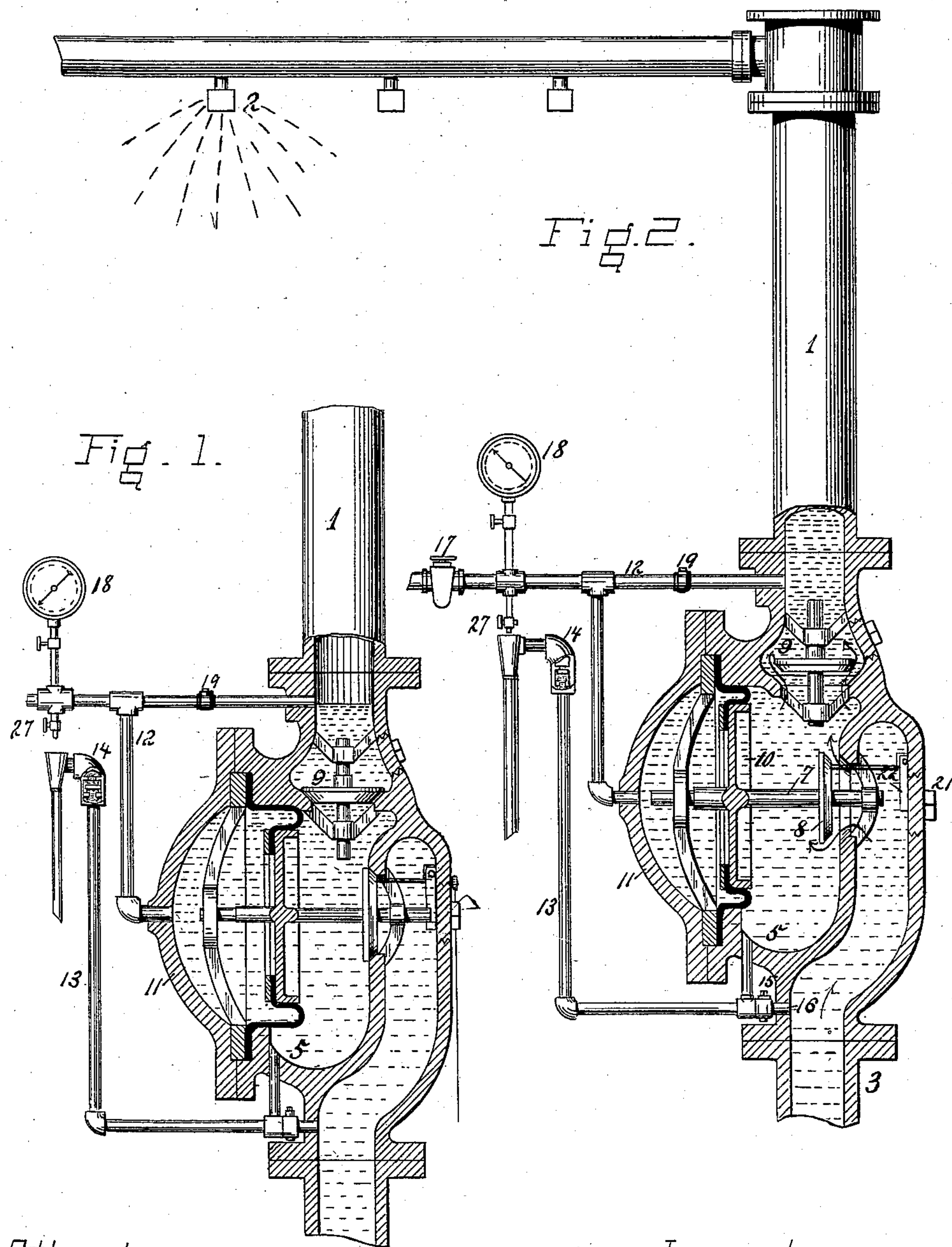
(No Model.)

F. GRINNELL.

AUTOMATIC FIRE EXTINGUISHING APPARATUS.

No. 372,219.

Patented Oct. 25, 1887.



Attest:  
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# UNITED STATES PATENT OFFICE.

FREDERICK GRINNELL, OF PROVIDENCE, RHODE ISLAND.

## AUTOMATIC FIRE-EXTINGUISHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 372,219, dated October 25, 1887.

Application filed December 30, 1886. Serial No. 222,984. (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 Automatic Fire-Extinguishing Apparatus, of which the following is a specification.

My invention relates to an improvement upon a "dry-pipe" system of fire-extinguishing apparatus—such as shown in Patent No. 249,171, granted to me November 8, 1881; and the invention consists of certain combinations of devices whereby the air-pressure in the distributing-pipes extending throughout the building to be protected is brought in direct opposition to the water-pressure in the supply-pipe, so as to keep the water from flowing into the distributing-pipes, except when the air-pressure therein is relieved by the opening of one or more of the automatic sprinklers attached thereto.

In another application of even date herewith, Serial No. 222,985, I have shown a device upon which I have made claims covering such a combination broadly. In this case I show a modified form for accomplishing the same result by somewhat different means.

In the accompanying drawings, Figure 1 shows a sectional view of my improved apparatus in its closed or normal position. Fig. 2 is a similar view showing the device in its open or operative position.

The distributing-pipes 1 are provided with automatic fire extinguishers or sprinklers 2, which may be held closed by a piece or a joint of fusible metal that will melt and allow the fluid within the pipe to escape upon the occurrence of a fire in their vicinity. The water-supply pipe 3 connects with the source of water-pressure and communicates, through a port closed by valve 8, with the chamber or casing 5, and from this chamber another port closed by valve 9 leads to the distributing-pipe. This valve 9 is a plain check-valve, and serves to retain the air-pressure that is normally maintained in the distributing-pipe. The valve 8 is also a check-valve, and serves to keep the water from flowing from the supply-pipe. It has an extended stem, 7, supporting a diaphragm, 10, which separates the chamber 5 from another chamber, 11, that communi-

cates through pipe 12 with the distributing-pipe. The diaphragm is made larger in area than the water-valve 8, so as to more than compensate for the greater pressure of the water over that of the air, so that the water-valve is held closed by the direct action of the air-pressure in the distributing-pipes. To assist the diaphragm in performing its function of holding the water-valve closed, the intermediate chamber, 5, is kept under a pressure less than that in the distributing-pipes, and this is done, notwithstanding any leakage that may occur at the valves 8 or 9, by means of a drip-pipe, 13, which communicates normally with the atmosphere. This drip-pipe is provided with a check-valve, 14, which allows the water to slowly leak past but closes up against a seat when the water is fully turned on by the opening of valve 8. No claim is made in this case on this feature however. A cock, 15, in a by-pass, 16, around the valve 8, allows the water to be turned on at will into the intermediate chamber and distributing-pipes. A cock, 17, in pipe 12 allows the water to be drawn off from the distributing-pipes. Air may be pumped into the distributing-pipes by attaching an air-pump to pipe 27, and a pressure-gage, 18, serves to indicate at all times the pressure in the system. A cock, 19, in the pipe 12 is used to disconnect the chamber 11 from the distributing-pipe 1, so as to facilitate operations upon the valves. A plate-spring, 22, is arranged so as to pass under valve-stem 7, when the valve is moved from its seat, so as to hold it open. To replace the valve the hand-hole plug 21 is taken out and the spring pushed to one side. This stop is not claimed herein, it forming an element in the claims of the other case above referred to. The distributing-pipes being charged with air under a light pressure, and the valves and diaphragm being in their closed positions, as shown in Fig. 1, the cock 19 being open and the cocks 15, 17, and 27 being closed, the apparatus will have the water standing in it, as shown, and will be ready for action. Should now a fire occur anywhere in the building, the nearest sprinkler will open, and the pressure in the distributing-pipes being thus released the valve 8, not being held any longer by a pressure back of the diaphragm 10, will be forced



from its seat by the water and held open by stop 22, while the water flowing into chamber 5 will shut the check-valve 14, and opening the valve 9 will fill the distributing-pipe, and  
5 escaping by the open sprinkler will extinguish the fire.

In the other case above referred to I have made claims covering the feature of a water-valve held closed by the direct action of the  
10 air-pressure, and I therefore limit this case to the particular invention described. I do not wish, however, to limit myself to the use of the particular form of diaphragm shown for holding the water-valve closed, as it is evident  
15 that any means closing the opening between chambers 5 and 11 and movable therein may be used to hold the valve. Thus I would consider that a piston sliding in a cylinder would be the equivalent of the diaphragm; and I  
20 therefore wish it to be understood that I use the term "diaphragm" as covering such equivalent means.

The chamber 11 is to be considered as if it were one with the distributing-pipe, the cock  
25 19 performing no function whatever in the ordinary operation of the device.

By the expression "light air-pressure" I mean air or gas under a pressure light as compared with the pressure of the water in the supply-pipe. 30

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

The combination of the water-supply pipe charged with water under pressure, the distributing pipes and sprinklers charged with  
35 light air-pressure, an intermediate chamber or casing communicating normally with the atmosphere, a check-valve preventing the escape of fluid from the distributing-pipes to the intermediate chamber, a water-valve preventing  
40 the flow of water from the supply-pipe to said chamber, and a movable diaphragm, substantially as described, connected directly to the water-valve and closing an opening between  
45 the intermediate chamber and a chamber communicating with the distributing-pipes, so as to oppose and balance the water-pressure by the light air-pressure in the distributing-pipe.

FREDERICK GRINNELL.

Witnesses:

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W. H. KNIGHT.