No. 740,467. PATENTED OCT. 6, 1903.

F. H. RICE.

DRY PIPE VALVE.

APPLICATION FILED APR. 17, 1901.

NO MODEL.

Fig. 1.

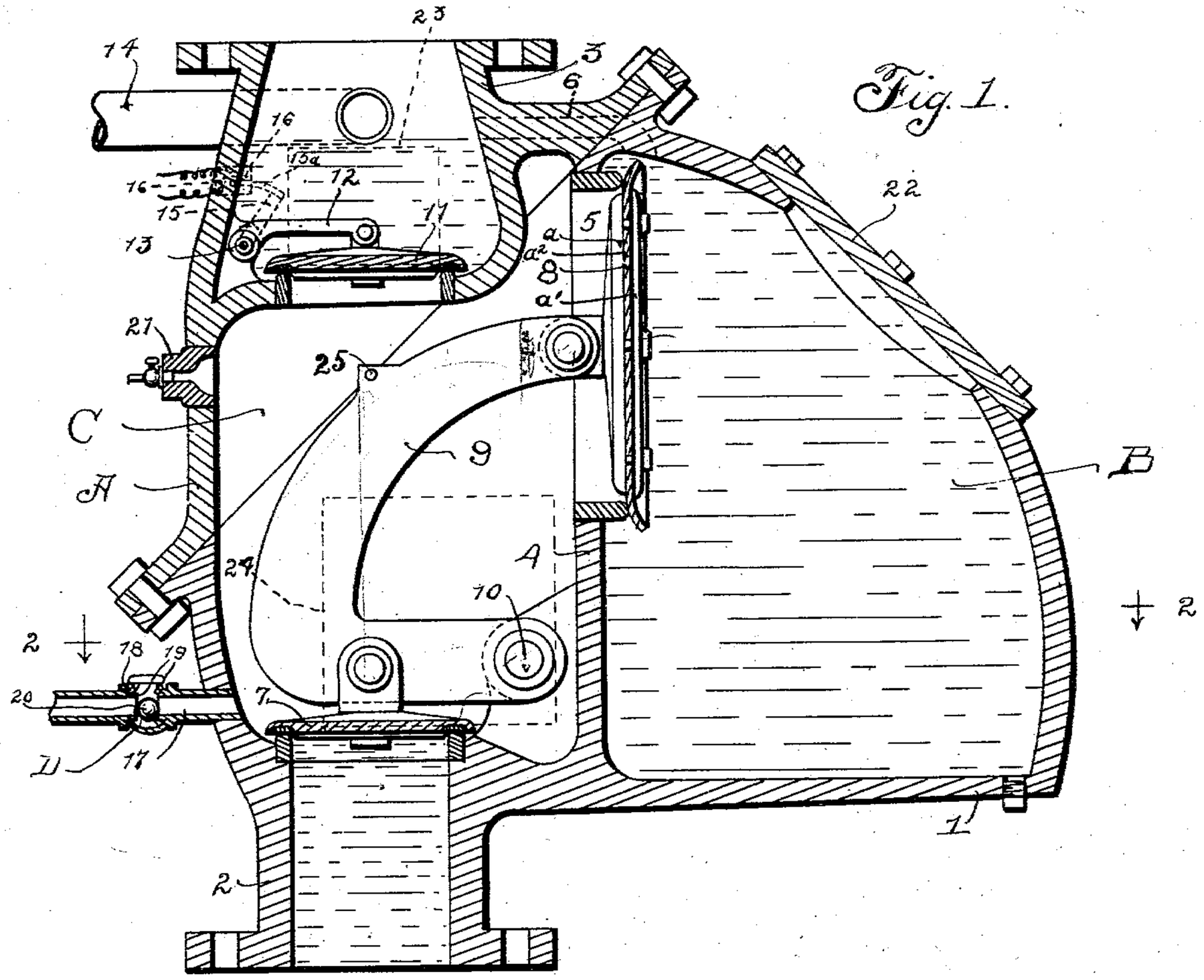
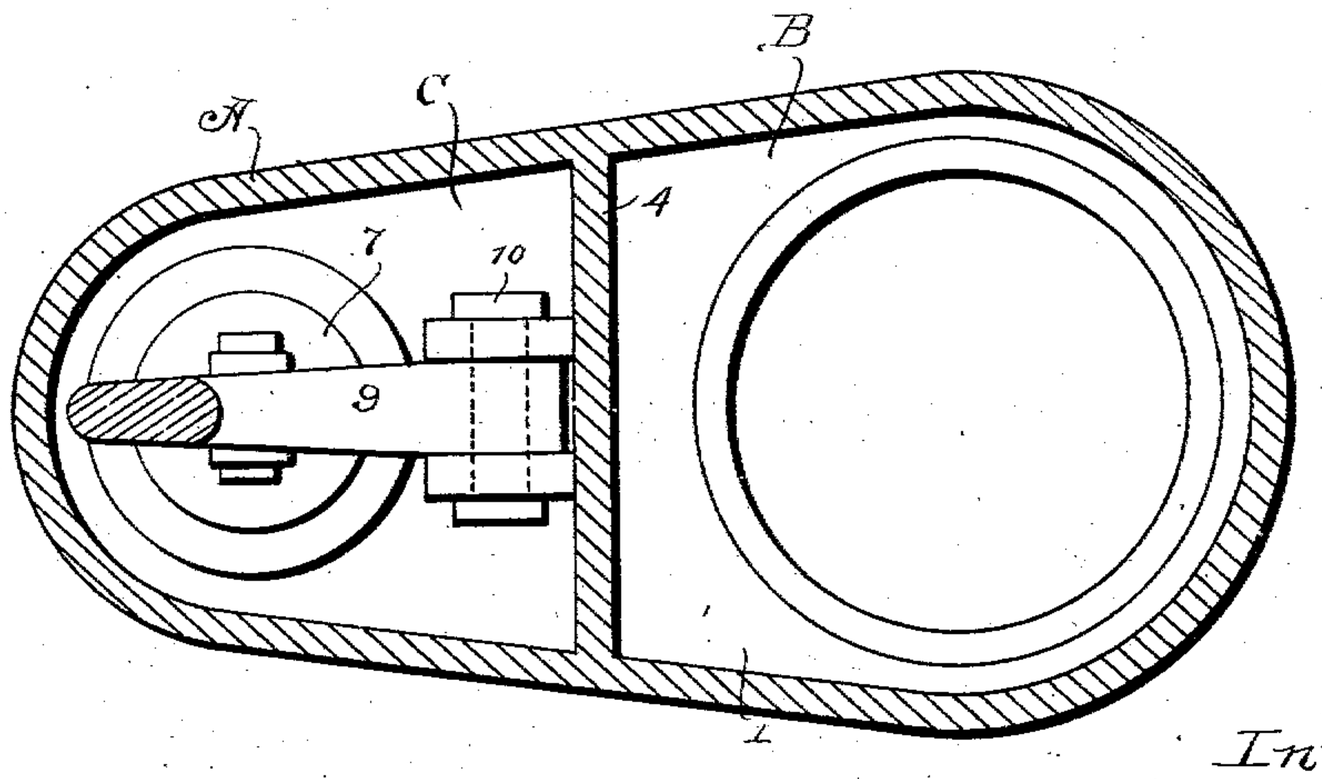


Fig. 2.



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No. 740,467. Patented October 6, 1903.

UNITED STATES PATENT OFFICE.

FRANK H. RICE, OF CHICAGO, ILLINOIS.

DRY-PIPE VALVE.

SPECIFICATION forming part of Letters Patent No. 740,467, dated October 6, 1903.

Application filed April 17, 1901. Serial No. 56,252. (No model.)

To all whom it may concern:

Be it known that I, FRANK H. RICE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Dry-Pipe Valves, (Case No. 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to dry-pipe valves for use in connection with automatic sprinkler systems, stand-pipes, &c.

Prominent objects of the invention are to provide a simple and inexpensive construction of dry-pipe valve and to combine a maximum efficiency with a simplicity of construction and operation.

In the accompanying drawings, Figure 1 is a vertical section of a dry-pipe valve embodying my invention. Fig. 2 is a horizontal section of the same, taken on line 2 2 in Fig. 1.

The dry-pipe valve illustrated in the drawings for carrying out my invention involves a casing A, desirably constructed with a side portion or extension 1. The casing A is provided with an inlet 2 and an outlet 3, which are understood to be connected, the inlet 2 with the water-supply and the outlet 3 with the compressed-air pipes of the system. The inlet 2 and outlet 3 are arranged opposite to or in alinement with one another and at the side of the extension or enlargement 1. The casing is also provided with a partition 4, which forms the interior of the enlargement 1 into a supplemental chamber B at one side of the waterway C. The partition 4 is provided with a port 5, affording communication between the chamber B and waterway C. A duct 6 extends between the interior of the outlet 3 and the chamber B, thereby affording communication between said chamber and the system. The inlet 2 is provided with a valve 7, which I shall term the "inlet" or "water-supply" valve, and the port 5 is provided with a valve 8, which I shall term the "system" or "pressure" valve.

The valves 7 and 8 are carried by a swinging lever-arm 9, which is pivoted at 10 to the casing, the valve 7 being pivotally connected to the horizontal portion of the arm 9 and the valve 8 being pivotally connected to the outer end of the same. The valve 7 thus controls the water-supply, and the valve 8 receives the pressure of the system by reason of the communication which the duct 6 establishes between the system and the chamber B, the pressure of the system upon the valve 8 thus serving to retain the valve 7 closed and maintain the device in its normal condition. The valve 7 is desirably smaller than the valve 8, and the distance between the pivot 10 and the point of connection of the valve 7 is desirably less than the distance between the pivot 10 and the point of connection of the valve 8 with the lever-arm 9. In the arrangement shown in the drawings the valve 7 is half the diameter of the valve 8 and the lever-arm of the valve 7 is half the length of the lever-arm of the valve 8. By this arrangement the forces exerted upon the valves 8 and 7 to balance them are as eight to one, or, as is commonly said, the dry-pipe valve has a differential of eight to one.

The outlet 3 is provided with a valve 11, carried by a swinging arm 12, pivoted to the casing A at 13. The valve 11 thus closes the chamber C from the system. The outlet 3 is also provided with a drain-pipe 14. In the employment of my dry-pipe valve I preferably fill the chamber B with water and also pour water into the outlet 3 until it flows out of the drain 14. In the operation of the valve the pressure of the system exerted upon the water in the chamber B by way of the port or passage 6 serves to retain the valve 8 against its seat, and thus maintain the valve 7 in a closed condition. At the same time the valve 11 is maintained in a closed condition by the pressure of the system upon the water in the outlet 3. When the pressure in the system is reduced, the pressure upon the water in the chamber B will be correspondingly reduced, whereupon the pressure of the water-supply in the inlet 2 will become sufficient to force the valve 8 into the chamber B, thereby opening the valve 7 and permitting the water from the water-supply to rush into the waterway C. From the waterway it passes into the outlet 3, forcing the valve 11 open in its onward rush, and from the outlet 3 into the system. The small aperture 25 in the lever 9 is to allow the insertion of the point of a tool, which is introduced into the water-

way C through the aperture normally occupied by the removable plug 21, this plug being removed for this purpose when desired. The tool engaging the lever 9 is used to draw the valve 8 to its seat 5, and then strain is put upon it to cause it to hold the valve tightly against its seat while the water and air systems are being properly filled and put under pressure. This permits the use of the valve in a vertical manner, as shown in Fig. 1, by which arrangement the water can pass directly from the vertical water-pipe to the vertical system-pipe without any deflection of its course. It will be seen that by my invention I provide a straight waterway, so that the water in passing through the valve moves in a straight line from the inlet to the outlet. It will also be seen that the invention makes it possible to have a differential-valve arrangement as well as a straight waterway and that in such differential arrangement the air or pressure valve is outside of the waterway, being desirably at right angles to the water-valve and in a supplemental chamber situated at one side of the waterway It will be further seen that both the water and differential valves are water-sealed, which is very desirable in valves of this class, because a less tight joint is required in a water-sealed valve than for one intended to keep out air. It will furthermore be seen that the device can be used interchangeably as either a wet or dry pipe valve upon wet or dry systems and also that in case of a water-hammer being formed in the system the valve will not be closed, but will be held open by such water-hammer.

As to further points of construction means are provided whereby when the device operates an alarm will be given. As a simple arrangement the spindle 13 of the arm 12, carrying the valve 11, is extended out of the far side of the casing A and provided with an arm 15, carrying a contact 15^a. Contact-jaws 16 16 are provided on the side of the casing A, so that when the valve 11 is swung upwardly an alarm-circuit will be closed. As a desired arrangement the valve is provided with a drain 17, communicating with the lower end of the waterway C. This drain is provided with a check-valve D, which is desirably constructed as shown in the drawings. This construction involves a valve-casing 18, having a concave bottom, a pair of oppositely-arranged valve-seats 19 19 at the ends of the concave bottom 18, and a ball-valve 20, arranged within the valve-casing. A small amount of liquid can flow from the waterway C through the valve, the ball 20 at such times remaining upon its concave bottom. When, however, the amount of liquid tending to pass through the valve becomes large, the ball 20 is forced against one of the valve-seats 19 19, thereby closing the valve against such large quantity of liquid. This valve, it will be seen, operates with equal efficiency no matter which way the liquid tends to flow—that is to say, whether the large discharge tends to come from the waterway C of the dry-pipe valve or whether it tends to come from some external source through the drain-pipe 17.

It will be seen that by having the valve D constructed so as to permit its being closed in both directions backward flow into the waterway C is prevented. It will be understood that the outlet or drain pipe 17 is usually connected with a sewer, and any rising in this is likely to cause a backflow into the dry-pipe valve. This, it will be seen, will be prevented by the valve D shown, this valve permitting the closure of the drain-pipe when any external pressure or liquid finds its way into that pipe.

A test-faucet 21 is desirably provided, being conveniently attached to the casing A near the top of the waterway C, this test-faucet being for the purpose of ascertaining whether or not water-pressure exists within the waterway C. The casing A is desirably provided with hand-hole plates 22, 23, and 24, opening, respectively, into the chamber B, the outlet 3, and the waterway C. As a preferred construction for the valve 8 this valve is composed of metal portions a a' and an intermediate layer or portion a^2 of packing or other flexible material, which extends beyond the edges of the portions $a\,a'$, by which construction a flexible rim is provided for seating the valve more tightly and effectively against its seat.

What I claim as my invention is—

1. In a device of the class specified, the combination of a straight waterway, an inlet-valve controlling the inlet to the waterway, a pressure-valve subject to the pressure of the system on one side and to the pressure of the waterway on the other side, the inlet and pressure valves being of different size, and a pivotally-supported lever carrying the said valves and arranged to open the inlet-valve when the pressure of the system is reduced, substantially as set forth.

2. In a device of the class specified, the combination with a straight waterway, of an inlet-valve controlling the inlet to the waterway, a chamber arranged at one side of the waterway and communicating with the system, a valve controlling the port affording communication between the chamber and the waterway, the inlet-valve being smaller than the pressure-valve, and a pivotally-supported bent lever carrying the pressure-valve at the end of its bent portion and the inlet-valve at the end of its straight portion, the straight and bent portions being of unequal length, substantially as described.

3. In a device of the class specified, a casing having an inlet and an outlet arranged opposite the inlet, and also having a partition separating one part of the interior of the casing from the other part so as to form a supplemental chamber, a passage connecting said supplemental chamber with the system, valves controlling the inlet and outlet, a valve

controlling a port in the said partition, and a lever-arm pivoted at one side of the inlet and carrying the inlet-valve and the valve controlling the port of the supplemental chamber, substantially as described.

4. In a device of the class specified, the combination of a casing having an inlet and an outlet arranged opposite one another, and also having a partition forming a supplemental chamber in the casing at one side of the inlet and outlet, a passage connecting said chamber with the interior of the outlet, valves controlling the inlet and outlet, a valve controlling a port in said partition, a bent lever pivoted at one side of the inlet, said lever carrying the inlet-valve, and the valve of the supplemental chamber, substantially as described.

5. A device of the class specified, comprising a casing A having an inlet 2 and an outlet 3, and also having a partition 4 provided with a port 5, and furthermore having a passage 6 connected with the interior of the outlet 3 and the chamber B formed by the partition 4, a valve 7 controlling the inlet-opening, a valve 8 controlling port 5, a bent lever-arm 9 pivoted at one side of the inlet and carrying the valves 7 and 8 and a valve 11 controlling the outlet-opening, substantially as set forth.

6. In a device of the class specified, the combination with the inlet and the supplemental chamber having ports arranged at an angle to one another, of valves 7 and 8 controlling said ports, and a bent lever 9 carrying said valves, substantially as described.

7. In a device of the class specified, the combination of a casing having a straight waterway and a pressure-chamber at one side of the waterway, and also having an aperture affording communication between the waterway and the exterior of the casing, valves controlling the waterway and pressure-chamber ports, mechanism controlling said valves, and means for engaging an instrument introduced into the waterway through said aperture, to hold the valves in position when the waterway is arranged vertically, substantially as described.

8. In a device of the class specified, the combination with a straight waterway, of an inlet-valve opening into the same, a pressure-valve subject to the pressure of the system, said pressure-valve being located at one side of the waterway and arranged to open in a direction away from the same, and a lever connected with said valves, substantially as described.

9. In a device of the class specified, the combination with a straight waterway, of a pressure-chamber located at one side of said waterway and communicating with the system, an inlet-valve controlling the inlet to the waterway, a pressure-valve located in said pressure-chamber and arranged to open by movement into the same and away from the waterway, and a bent lever connected with said valves and adapted to move the pressure-valve into the pressure-chamber in a direction away from the waterway when the inlet-valve is allowed to open by a reduction of the pressure of the system, substantially as described.

10. In a device of the class specified, the combination of a casing having a straight waterway and a pressure-chamber at one side of the waterway, and also having an aperture affording communication between the waterway and the exterior of the casing, valves controlling the waterway and pressure-chamber ports, mechanism controlling said valves, and means on said mechanism for engaging an instrument introduced into the waterway through said aperture, to hold the valves in position when the waterway is arranged vertically, substantially as described.

11. In a device of the class specified, the combination of a casing having a straight waterway and a pressure-chamber at one side of the waterway, and also having a side opening for the insertion of an instrument into the interior of the casing, valves controlling the waterway and pressure-chamber ports, and mechanism controlling said valves, substantially as described.

12. A device of the class specified, having a straight waterway, and also having a side aperture opening to the exterior, a valve controlling the water-inlet to the waterway, a pressure-valve, a lever carrying and controlling said valves and having an aperture opposite the said exterior opening, whereby the lever can be engaged from the outside to hold the valves upon their seats when the waterway is in a vertical condition, substantially as described.

In witness whereof I hereunto subscribe my name this 12th day of April, A. D. 1901.

FRANK H. RICE.

Witnesses:

A. M. BELFIELD,

HERBERT T. OBERGFELL.