

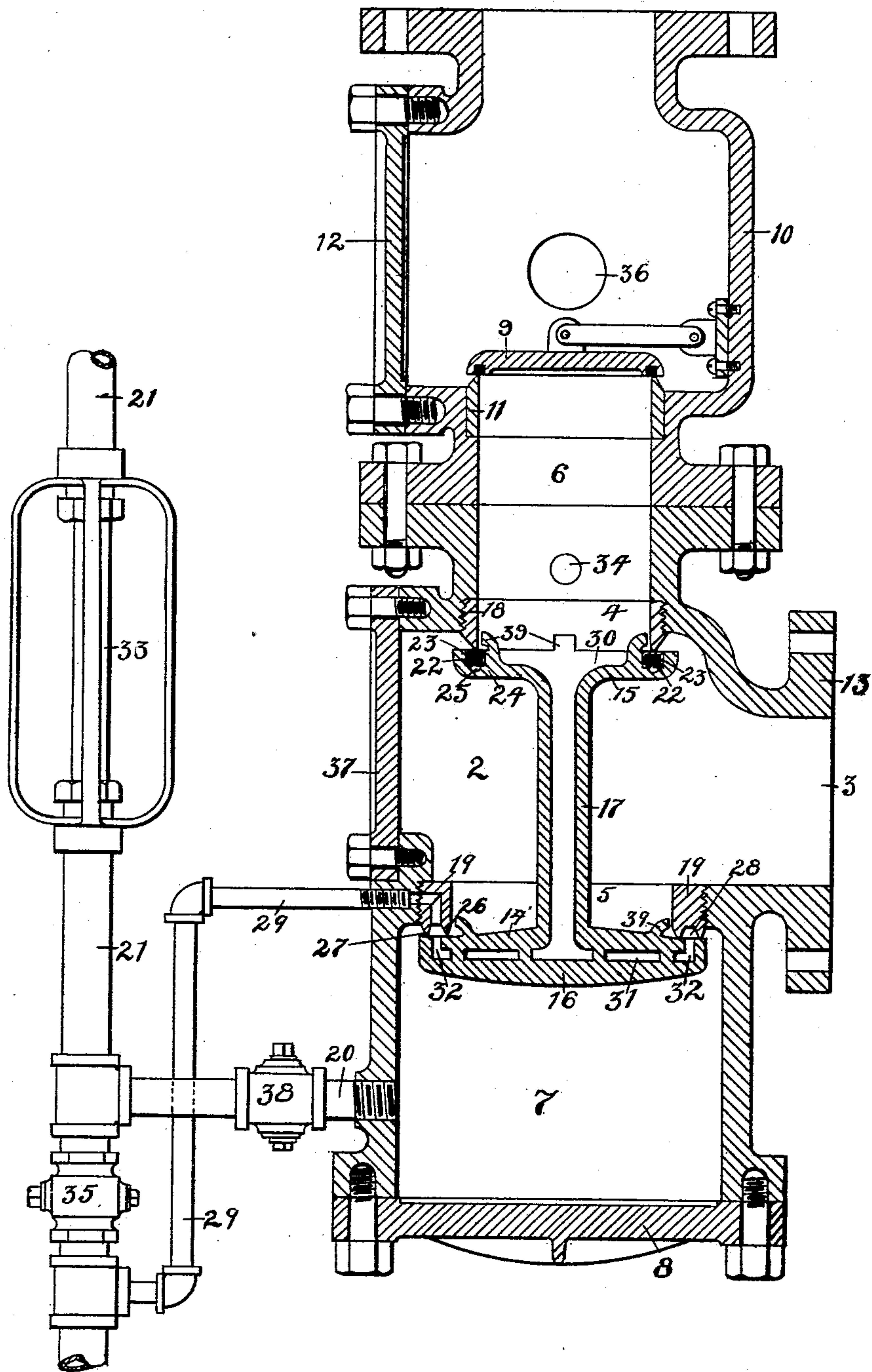
No. 684,352.

Patented Oct. 8, 1901.

J. H. DERBY.
DRY PIPE VALVE.

(Application filed Apr. 24, 1900.)

(No Model.)



Witnesses:

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UNITED STATES PATENT OFFICE.

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DRY-PIPE VALVE.

SPECIFICATION forming part of Letters Patent No. 684,352, dated October 8, 1901.

Application filed April 24, 1900. Serial No. 14,110. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. DERBY, a citizen of the United States, residing at Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Dry-Pipe Valves, of which the following is a specification.

My invention relates to dry-pipe valves, such as are commonly used in connection with automatic fire-extinguishing systems, and more particularly to valves of that type in which the water-pressure tending to open the valve is partly or wholly self-balanced by being caused to act on two or more opposed portions of the valve, thereby making it possible to hold the valve in its normally-closed position by the use of a pressure in the sprinkling-pipes as much less than the water-pressure as may be desired.

My invention is intended to improve upon prior valves of the kind above referred to in certain particulars, which will hereinafter appear.

A preferred form of my invention is illustrated in the accompanying drawing, in which the figure represents a dry-pipe valve embodying my improvements shown in central vertical section.

The casing for my valve may be of any desired construction and arrangement so long as it provides for the proper operation of the valve; but I prefer to employ a casing substantially such as is shown in the drawing, comprising a vertical portion 2, provided at one side with a lateral aperture 3, which forms the water-inlet, and also provided with openings or passages 4 and 5, of which the former leads to the sprinkling-pipe system through an intermediate chamber 6, and the latter opens into a chamber 7, formed by the lower portion of the pipe 2, and a plate 8, closing its bottom end.

The chamber 6 is normally closed at its top by a check-valve 9, which may conveniently be contained in an extension 10 of the casing 2, to the upper end of which extension the system of sprinkling-pipes is bolted or otherwise secured. The check-valve 9 is arranged to open upward and may be of any desired construction so long as it is adapted to make an air-tight contact with its seat 11. The ex-

tension 10 should be provided with a removable hand-plate 12 in order to give ready access to the check-valve 9 when desired.

The casing 2 is adapted to be secured to a water-supply pipe by means of a flange 13 or otherwise, and the central part of said casing is thus kept at all times full of water having the supply-pressure, which is normally prevented from entering the chambers 6 and 7 by means of the valve proper, 14. This valve opens downward or away from the sprinkling-pipe system, as shown, and comprises two end portions or heads 15 and 16, connected by a stem 17 and adapted to close tightly against their respective seats 18 and 19 simultaneously. Since the pressure of the water in the casing 2 will act in opposite directions on the heads 15 and 16, the pressure on the head 16, tending to open the valve, will be balanced by the pressure on the head 15 in whole or in part, according as the effective area of the head 15 is equal to or less than that of the head 16. In the former case the weight of the valve 14 will be the only effective force tending to open it, and in the latter case there will be, in addition to the weight of the valve, a differential pressure which may be given any desired amount by properly proportioning the areas of the said heads. In the valve shown in the drawing the head 15 is somewhat smaller than the head 16, and this is my preferred construction, chiefly because I am thereby enabled to withdraw the valve 14 through the valve-seat 19 and the bottom of the casing 2 without disturbing the arrangement of the parts otherwise than by removing the plate 8. In order to hold the valve in its normally-closed position, I connect the chamber 7 with the sprinkling-pipe system by means of pipes 20 and 21, so that the pressure in said system will act on the bottom face of the head 16, and as the resultant force tending to open the valve 14 will be comparatively small a correspondingly light pressure in the sprinkling-pipe system will suffice to hold said valve closed.

A yielding contact should be provided between one of the heads of the valve 14 and the corresponding seat, so that said heads may be seated tightly at the same time, and

I have shown such a construction in the drawing, wherein 22 represents a ring of soft rubber enveloped within a very thin sheet 23 of some soft metal, such as copper, and held
 5 within an annular groove 24, formed in the head 15 in such manner that the knife-edge seat 18 will be everywhere in contact with said ring when the valve is closed. I prefer to provide a groove 25 in the head 15 beneath
 10 the ring 22 to accommodate the expansion of said ring when compressed at its top. The construction of the yielding contact just described is not herein claimed, as it is embodied in a prior application, Serial No.
 15 741,714, filed by me on December 27, 1899, for improvements in dry-pipe valves.

In order to prevent any leakage in either direction past the valve-seat 19, I prefer to make said seat double by providing it with
 20 two concentric knife-edges 26 and 27, thus forming a groove or channel 28 between said knife-edges, which channel is connected through the edge of the seat with a pipe 29, as shown, through which any leakage from
 25 either side of the head 16 will be carried off without disturbing the valve. I also prefer to make the valve-stem 17 hollow, and thereby to connect a recess 30, formed in the top face of the head 15, with passages 31, formed
 30 in the head 16 and communicating with a circumferential channel 32, cut in the top face of said head between the knife-edges 26 and 27, whereby any leakage of water past the top of the valve 14 and any leakage of air past
 35 the check-valve 9 will be carried off through the same pipe 29. The construction just described by preventing any increase of pressure in the chamber 6 above that of the atmosphere will also serve to prevent false
 40 alarms from being given in case a pressure-operated alarm attachment be connected with said chamber 6, as hereinafter explained. As it may sometimes be desirable to keep the chamber 7 full of water when the valve 14 is
 45 closed, in order to provide a water seal for the lower end of said valve, I have shown the pipe 21 as provided with a water-gage 33, of the usual construction, whereby the amount of water below the valve may readily be de-
 50 termined by inspection.

The mode of operation of the valve above described is as follows: Under normal conditions the parts are in the position shown in the drawing, the valve 14 being held tightly
 55 closed against the seats 18 and 19 by the pressure in the sprinkling-pipe system and pipe 21 acting against the lower face of the head 16, either directly or through an intervening body of water, which pressure is of course
 60 kept sufficient to overbalance the weight of the valve 14 plus the differential pressure (if any) exerted thereon by the water in the casing 2 and is prevented from acting on the top face of the head 15 by means of the check-
 65 valve 9, the chamber 6 thus being kept full of air under atmospheric pressure only. Any

leakage past either of the heads 15 16 is removed through the pipe 29, as above described. Upon a sufficient reduction of pressure in the sprinkling-pipe system from any
 70 cause, such as the opening of a sprinkler-head, the valve 14 will fall or be forced downward into the chamber 7, thereby permitting water from the supply system to flow upward through the opening 4 and chamber 6
 75 into the system of sprinkling-pipes. Provision may be made for causing the opening of the valve to give an alarm by attaching a suitable alarm device, such as an electric alarm adapted to be operated by pressure, to
 80 a pipe 34, leading from the chamber 6. To set the valve, the water-supply is shut off and the sprinkling-pipe system is drained either by opening a cock 35 in the pipe 21 or through
 85 an independent pipe 36, leading from above the check-valve 9 and normally kept closed. Said check-valve is properly closed against its seat 11, a hand-plate 37, forming one side of the casing 2, is removed, and the valve 14
 90 is lifted and seated against the seats 18 and 19. Meanwhile the sprinkling-pipe system will have been filled with compressed air, which is kept out of the chamber 7 for the time being by means of a cock 38, so that as
 95 soon as the valve 14 has been seated by opening said cock 38 the compressed-air pressure will immediately be made operative in the chamber 7, thereby holding the valve 14 in place. The plate 37 is then replaced and the
 100 water is turned on. To assist in seating the valve 14, it may be provided with guiding-fingers 39, adapted to engage with the inner faces of the seats 18 and 19, as shown, and thereby center the heads 15 and 16 on said
 105 seats.

It will be seen that my invention provides a valve which opens in a direction opposite to that of the flow of water entering the sprinkling-pipe system and in opening falls
 110 or is withdrawn wholly beyond the path of such flow, thus leaving an unobstructed path for the water as it enters the sprinkling-pipes and also making it impossible to water-column the valve.

I am aware that dry-pipe valves have heretofore been constructed in which the water-pressure is partly or wholly balanced by being
 115 caused to act on opposed portions of the valve proper, and I do not claim such a construction broadly; but I am not aware that any
 120 such prior valve has been provided with connections between the sprinkling-pipe system and the valve-casing on both sides of the valve proper and with a check-valve arranged normally to cut off the air-pressure from the
 125 valve-outlet, the valve being thereby adapted to be held closed by the pressure in said system acting on one side only of said valve and to open in a direction opposite to that of the
 130 flow of water into the sprinkling-pipes, with the results above described. I consider the provision of said connection between the

sprinkling-pipe system and both sides of the valve proper, in combination with the check-valve normally cutting off the pressure in said system from the valve-outlet, to be a
 5 main feature of my invention, as I am thereby enabled to provide for the opening of the valve in the desired direction and also to hold the valve closed in the simplest possible manner without the assistance of any means for
 10 obtaining a differential air-pressure or of any intermediate mechanism or moving parts, which might corrode or stick in use.

Another feature of my invention is found in the means whereby leakage past either
 15 end of the valve proper is taken care of without affecting the condition of the system as a whole.

It will be noticed that by shutting off the water-supply the plate 37 may be removed
 20 and the valve inspected and cleaned without changing the pressure in the sprinkling-pipe system or disturbing the normal condition of the valve.

I claim as my invention—

25 1. In a dry-pipe valve, the combination of a casing provided with an inlet and with two openings one of which forms an outlet, a valve proper opening away from said outlet and provided with two opposed heads adapted to
 30 close said openings simultaneously, a check-valve located between said outlet and the sprinkling-pipe system, and pipe connections between said system and the valve-casing on that side of the valve which is opposite to said
 35 outlet.

2. In a dry-pipe valve, the combination of a casing provided with an inlet and with two openings, one above the other, pipe connections between the upper opening and the
 40 sprinkling-pipe system, a check-valve contained in said connections, a valve proper provided with two opposed heads adapted to close said openings simultaneously and arranged to open downward, and pipe connections between the sprinkling-pipe system and
 45 said casing below said valve proper.

3. In a dry-pipe valve, the combination of a casing provided with an inlet and with two openings arranged one above the other, the
 50 upper opening forming an outlet, a check-valve located above said outlet, a valve proper opening downward and having two opposed heads adapted to close said opening simultaneously, a chamber below said valve, adapted
 55 to receive the same when open, and pipe con-

nections between said chamber and the sprinkling-pipe system.

4. In a dry-pipe valve, the combination of a casing provided with an inlet and with two openings one of which forms an outlet, a valve
 60 proper comprising two opposed heads having different effective areas and arranged to close said openings simultaneously, said outlet being closed by the head having the less area, a check-valve between said outlet and the
 65 sprinkling-pipe system, a chamber adapted to receive said valve proper when open, and pipe connections between said chamber and the sprinkling-pipe system.

5. In a dry-pipe valve, the combination of
 70 a casing provided with two valve-seats located one above the other, the lower seat comprising two concentric knife-edges providing an annular channel between them, a drainage-pipe leading from said channel out through
 75 said casing, and a valve comprising two heads adapted to close against said valve-seats simultaneously and connected by a hollow stem, the lower head being provided with a groove registering with the channel in its seat,
 80 and with passages connecting said groove and hollow stem.

6. A dry-pipe valve comprising in combination a casing 2 having an inlet 3 and openings 4 and 5, a check-valve located above the
 85 opening 4 and forming an intermediate chamber between it and the sprinkling-pipe system, a valve proper 14 comprising two heads 15 and 16 united by a hollow stem, the head 16 being provided with a circumferential
 90 groove 32 and with passages 31 connecting said groove with said hollow stem, valve-seats 18 and 19 cooperating with said heads, the seat 19 being composed of concentric knife-edges adapted to make contact with the head
 95 16 on opposite sides of the channel 32 and providing a channel 28 between them, a drainage-pipe 29 leading from said channel 28, a chamber 7 adapted to receive the valve 14 when it opens, and pipe connections between
 100 said chamber 7 and the sprinkling-pipe system.

In testimony whereof I have hereunto subscribed my name this 17th day of February, 1900.

JOHN H. DERBY.

Witnesses:

EDWARD SHEEHY,
 E. D. CHADWICK.