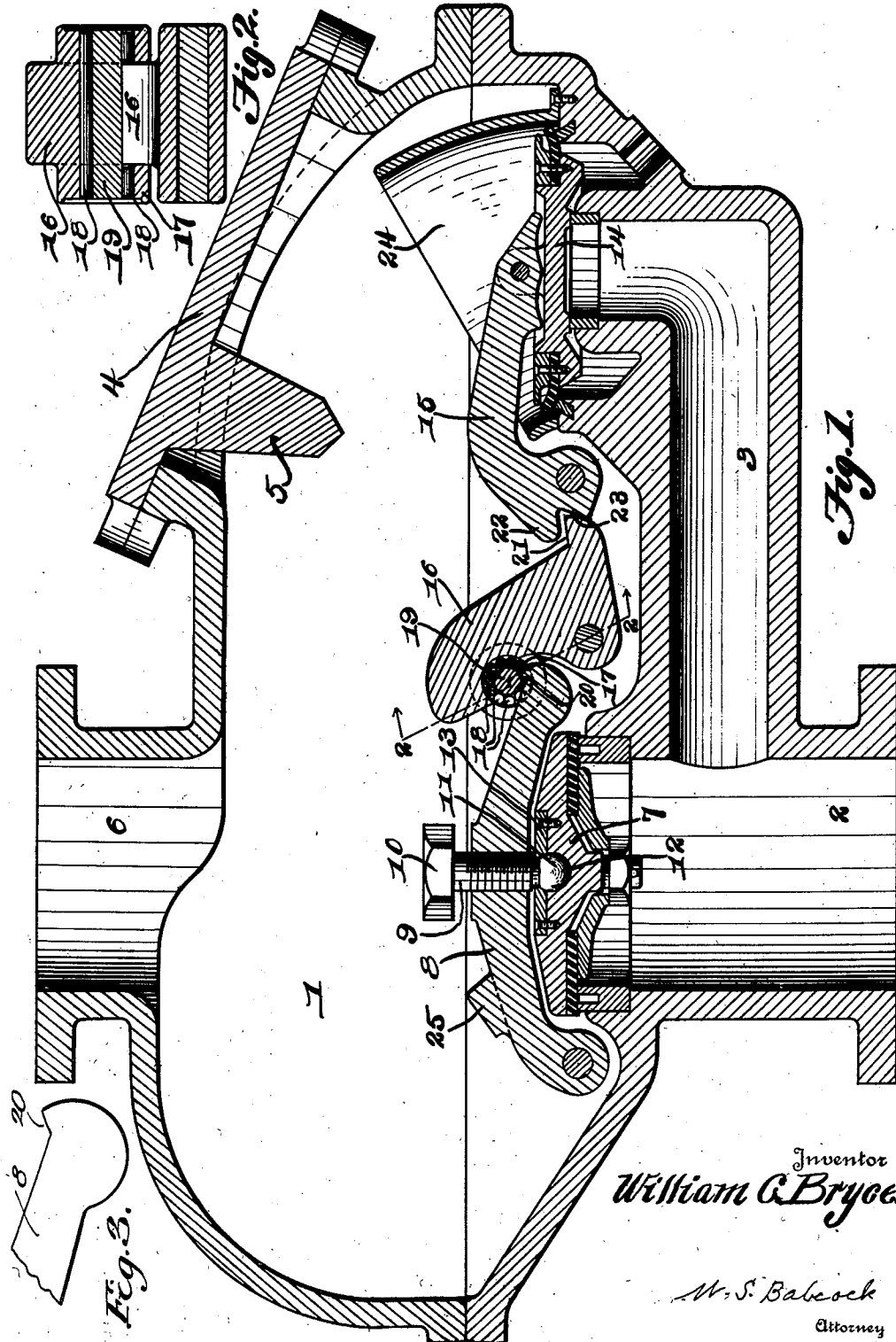


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 DRY PIPE VALVE.
 APPLICATION FILED AUG. 9, 1915.

1,200,306.

Patented Oct. 3, 1916.



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Specification of Letters Patent.

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Application filed August 9, 1915. Serial No. 44,582.

To all whom it may concern:

Be it known that I, WILLIAM C. BRYCE, of Montreal, Quebec, Dominion of Canada, having invented certain new and useful Improvements in Dry-Pipe Valves, do hereby declare that the following is a full, clear, and exact description of the same.

The invention to be hereinafter described relates to dry pipe valves.

In order to more clearly disclose the construction, operation, and use of the invention, reference should be had to the accompanying drawings forming part of the present application.

In the drawings:—Figure 1, is a central, vertical, longitudinal cross section through the invention; Fig. 2, is a lateral vertical cross section on line 2—2 of Fig. 1, omitting the end of the main valve lever or arm and Fig. 3 represents a detail view of the right end of lever 8 and proximate parts.

The main objects of the invention are, to produce a single-chamber, straight-way valve for sprinkler systems, which will give unobstructed flow to the incoming current, which will effectively prevent water columning, will not employ any springs or similar easily broken parts in its construction, which will contain all of the operative and adjusting means of the valve within the valve casing so as to effectually prevent the valves being tampered with, and in which the main valve may be firmly adjusted upon its seat without in any way affecting the differential valve.

Other objects will appear from the detailed description and claims hereinafter.

Referring to the drawings in detail, 1 indicates the chamber for containing the several parts of the mechanism. It may be made of either a single casting or as two or more castings, as most convenient. As shown in the drawings, it consists of two castings. When made in several parts, any suitable means may be used for securing these parts together. The lower part of the casing is provided with an inlet passage 2, leading from the water main, and has a by-pass 3, leading laterally from this inlet toward the opposite side of the casing, for a purpose to be later described. Within this chamber are mounted all of the operative parts, thus insuring alinement of the parts and, also, insuring no outside levers etc., to be tampered with. The chamber is provided with a hand hole arranged to give

ready access to all of the operating parts and adapted to be closed by a suitable hand hole cover 4, provided with a stop lug 5, for a purpose to be later disclosed. In the upper part of the chamber is the passage 6, for flow of water into the riser from the chamber 1, as usual.

One result of the construction thus far described is, that the hand hold cover must be securely fastened in place before the air pump is started to raise the pressure in the riser, its branches, and the chamber 1. Otherwise, the air would escape as fast as it is pumped in. Consequently, no water damage can result from defective fastening or misplacement of the cover plate.

The inlet 2, is provided with the usual valve seat, having an annular channel opening upwardly into the chamber, when its valve is unseated. Thus, if the valve is not tightly seated, water will leak into the channel and drip out through this passage, the drip acting as an indicator.

A main valve 7, of well known construction, closes the inlet. This valve is connected to its lever 8, by a ball and socket or universal coupling, as will hereafter appear. Lever 8, is pivoted by one end at one side of the inlet and extends across the same to a short distance beyond the opposite side. About mid-way of its length, a bolt 9, is threaded through it. This bolt is provided with a nut end 10, for operating it, and a ball end 11, for connection to the main valve 7. This ball end is adapted to be seated in a socket 12, formed in the valve. A cover plate 13, bolted into the valve engages the upper part of the ball and keeps it in the co-operating socket, thus providing a universal or ball and socket connection between the valve and lever. By turning the bolt 9, in one direction or the other, the valve may be adjusted, bodily, toward or from its seat, while the ball and socket joint enables it to adapt itself accurately to its seat, at all times.

The inlet end of the by-pass 3, is closed by a differential valve 14, pivotally mounted on the free end of a lever 15, which is fulcrumed on the same side of the inlet as in the case of the lever of the main valve. This differential valve is of usual and well known construction with its inner and outer operative surfaces in the proportion of about 7 to 1—so that ten pounds air pressure per square inch on the inner surface will counter

balance seventy pounds water pressure per square inch in the by-pass on the outer surface. Around the inlet opening of the by-pass and covered by the valve, is a channel
5 which communicates through a suitable bore with the atmosphere.

It should be noted that the levers 8 and 15, are fulcrumed at corresponding sides of the main and by-pass inlets. Between the
10 adjacent ends of the levers 8 and 15, is fulcrumed a bell-crank trigger 16, its fulcrum being almost directly below the free end of the lever 8. The vertical branch of this trigger is forwardly curved at its upper
15 end and provided with journals 17. Within these journals and supported on cylinder bearings 18, is an anti-friction roller 19. This roller is adapted to engage the upper surface of the free end of lever 8, which
20 at this point, is cut on an incline 20, forming an arc of a circle struck from the center of the fulcrum of the trigger. The consequence of this arrangement is that the movement of roller 19, as the trigger is
25 rocked, is concentric to the surface 20. Thus, the upward force of lever 8, is purely a pressure force, without any binding or friction. The mounting of roller 19, avoids any possible friction as the trigger is rocked
30 or tripped, as will later appear. Where the free end of lever 8, extends beneath the forwardly curved end of the trigger and between its journals, the cylinder bearings are shortened so that they lie only in the
35 journals, but throughout the curvature of the intermediate portion the bearings extend the full width of the vertical branch of the trigger, as will be clear on reference to Fig. 2. The horizontal arm of the trigger
40 terminates in a shoulder 21, which, when the parts are in operative position, lies directly beneath, and is very slightly spaced from a rib 22, projecting from an extended portion of lever 15. This rib is formed by
45 grooving or cutting out the end of the lever, leaving a shoulder 23, parallel with the rib, but spaced therefrom. The parts are so proportioned that the shoulder 23, just engages the under surface of the shoulder
50 21, when all parts are in operative position. This engagement is merely a contact. No pressure whatever is exerted on the shoulder 23. Shoulder 23 could be slightly spaced from the under face of shoulder 21. It operates as a safety stop to engage shoulder
55 21 in case the trigger should accidentally start to trip.

The object of the slight space between shoulder 21, and rib 22, is to enable the
60 differential valve to get started on its upward swing and free of its seat before the rib 22, engages shoulder 21, to operate the trigger. Only a very slight pressure is required on shoulder 21, of course, but there
65 is always a slight suction action on the dif-

ferential valve and the two combined, acting at the same time, might retard the opening of the differential valve. But, if the suction is overcome and the valve started before the rib engages the shoulder, this
70 possible difficulty is completely avoided. In this connection, it should be noted that the operation of the differential valve is assured by a dash-pot 24, secured around the inlet
75 of the by-pass and so arranged that no appreciable amount of water may escape beneath the edges of the valve to the interior of the chamber.

The lug 5, on the hand hole cover 4, is adapted to engage and limit the upward
80 swing of the differential valve, so that it can not be thrown over into the path of the main valve—see Fig. 1.

The chamber, adjacent the main inlet opening, is somewhat enlarged to allow the
85 main valve and its lever to swing back beyond the vertical to provide a free unobstructed passage. A stop lug 25, is provided on the back of lever 8, adapted to engage the inner wall of the chamber to limit
90 the swing of the main valve lever and prevent injury thereto—see Fig. 1.

In setting the apparatus, the parts will be in the positions shown in Fig. 1, and the
95 bolt 9, will then be operated to force the main valve 7, snugly onto its seat. The free end of the lever is cut on the arc of a circle struck from the fulcrum of the trigger as a center. Such being the case, the valve 7, may be tightened to practically any desired
100 degree without causing the least movement of the trigger. After the valve has been firmly seated, air is pumped into the system to the predetermined pressure. Then the
105 water is turned on. When the sprinkler heads are opened by fire and the pressure in the system drops, the differential valve first leaves its seat and then, as it swings
110 up, the rib 22, engages shoulder 21, and operates the trigger, instantly releasing the main valve which flies open as the water rushes in.

The main valve may be forced as tightly as desired onto its seat without in the least
115 affecting the seating of the differential valve, and there is no binding action or friction at any point, nor is there any possibility of one part accidentally operating some other part.

It is thought that the construction, operation, and use of the invention will be clear
120 from the preceding detailed description.

Changes may be made in the construction, arrangement, and disposition of the
125 several parts of the invention without in any way departing from the field and scope of the same, and it is meant to include all such in this application wherein only a preferred form has been disclosed.

Having thus fully described my inven- 130

tion what I claim as new, and desire to secure by Letters Patent is:—

1. In a single-chamber straight-way valve, a valve chamber provided with inlet and outlet passages and a by-pass establishing communication between said inlet passage and the interior of the valve chamber, a valve lever pivotally mounted within said chamber and at one side of said inlet passage and adapted to swing completely out of the path of the incoming current of water, a main valve carried thereby, a trigger mounted in said chamber and provided with a forwardly extending part adapted to project above the free end of the aforesaid lever, a roller mounted therein and adapted to engage the free end of the aforesaid lever, a second valve lever pivotally mounted within said chamber and at all times completely out of the path of the incoming current of water, and provided with means for actuating said trigger, and a differential valve carried by said second lever and adapted to close the aforesaid by-pass.
2. In a single-chamber straight-way valve, a valve chamber provided with inlet and outlet passages and a by-pass establishing communication between said inlet passage and the interior of said chamber, a trigger pivotally mounted within said chamber, a valve lever pivotally mounted within said chamber at one side of said inlet passage and adapted to swing completely out of the path of the incoming current of water and provided with an inclined bearing surface on the upper face of its free end, the surface being in the form of an arc of a circle struck from the pivot center of the aforesaid trigger, a roller carried by said trigger and adapted to engage

said surface, a main valve carried by said lever and adapted to close said inlet, means carried by said lever for forcing said valve tightly to its seat, a second valve lever pivotally mounted in said chamber and provided with means adapted to engage and trip said trigger, and a differential valve carried thereby and adapted to close the inlet of said by-pass.

3. In a single-chamber straight-way valve, a valve chamber provided with inlet and outlet passages and a by-pass establishing communication between said inlet passage and the interior of said chamber, a trigger pivotally mounted within said chamber, and provided with a horizontally extending shoulder, a valve lever fulcrumed at one side of said inlet and adapted to swing completely out of the path of the incoming current of water and provided with an inclined bearing surface on the upper face of its free end, the surface being in the form of an arc of a circle struck from the fulcrum of the aforesaid trigger, a main valve carried by said lever, means for adjusting said valve bodily relatively to said lever, a roller carried by said trigger and adapted to engage said inclined surface, a second lever fulcrumed in said chamber and provided with a shoulder adapted to underlie the shoulder of the aforesaid trigger and having a rib overlying the same and adapted to engage it and actuate the trigger immediately after unseating of the differential valve, and a differential valve carried by said second lever.

Signed at Montreal, Quebec, Canada, this 30th day of July 1915.

WILLIAM C. BRYCE.