W. C. BRYCE.

AUTOMATIC VALVE FOR FIRE SPRINKLER SYSTEMS.

APPLICATION FILED FEB. 17, 1914.

1,115,896.

Patented Nov. 3, 1914

2 SHEETS—SHEET 1.

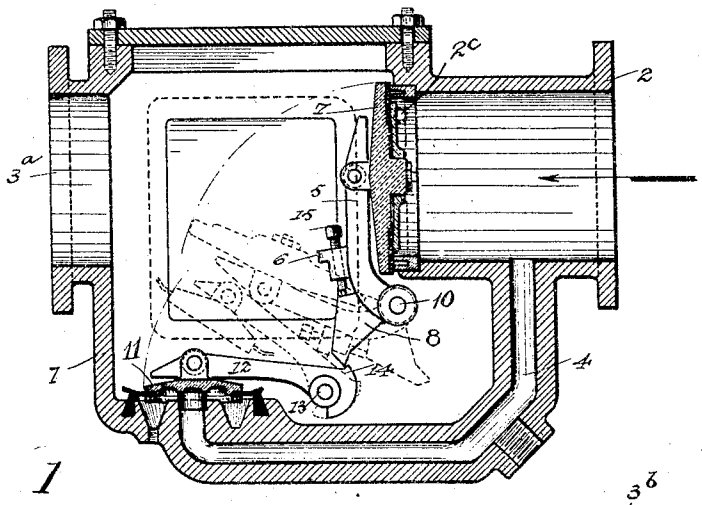

Fig. 1

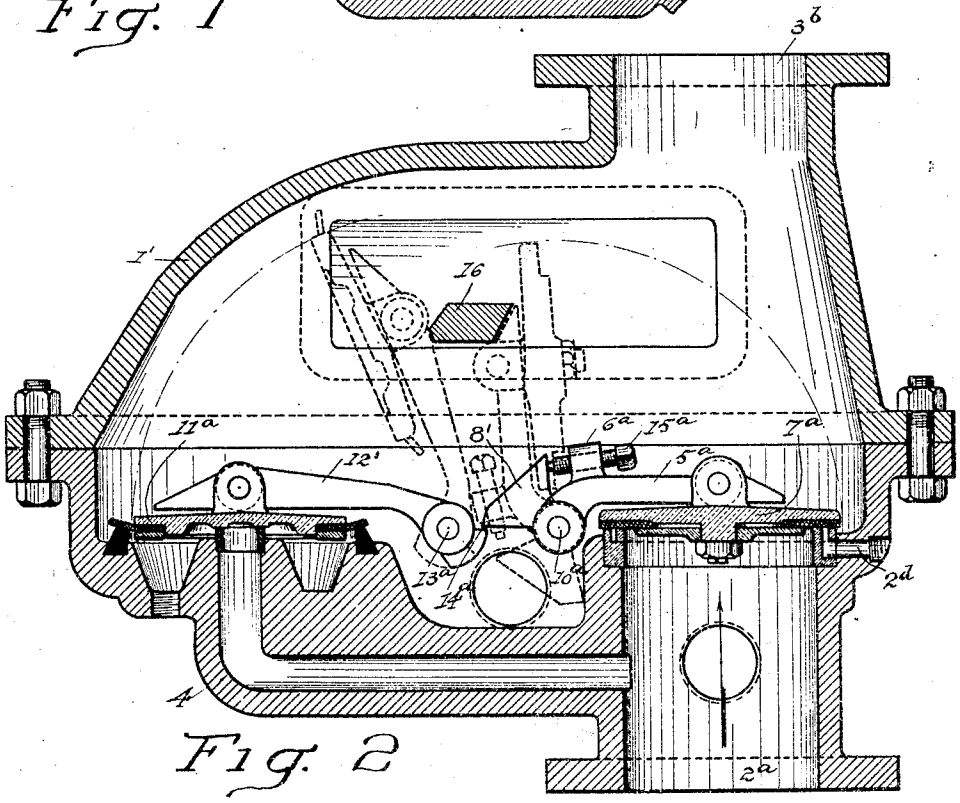

Fig. 2

WILLIAM C. BRYCE Inventor

Witnesses:

A. Zappolo

A. Bastien

By Marion & Marion

Attorneys

W. C. BRYCE.

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Fig. 3

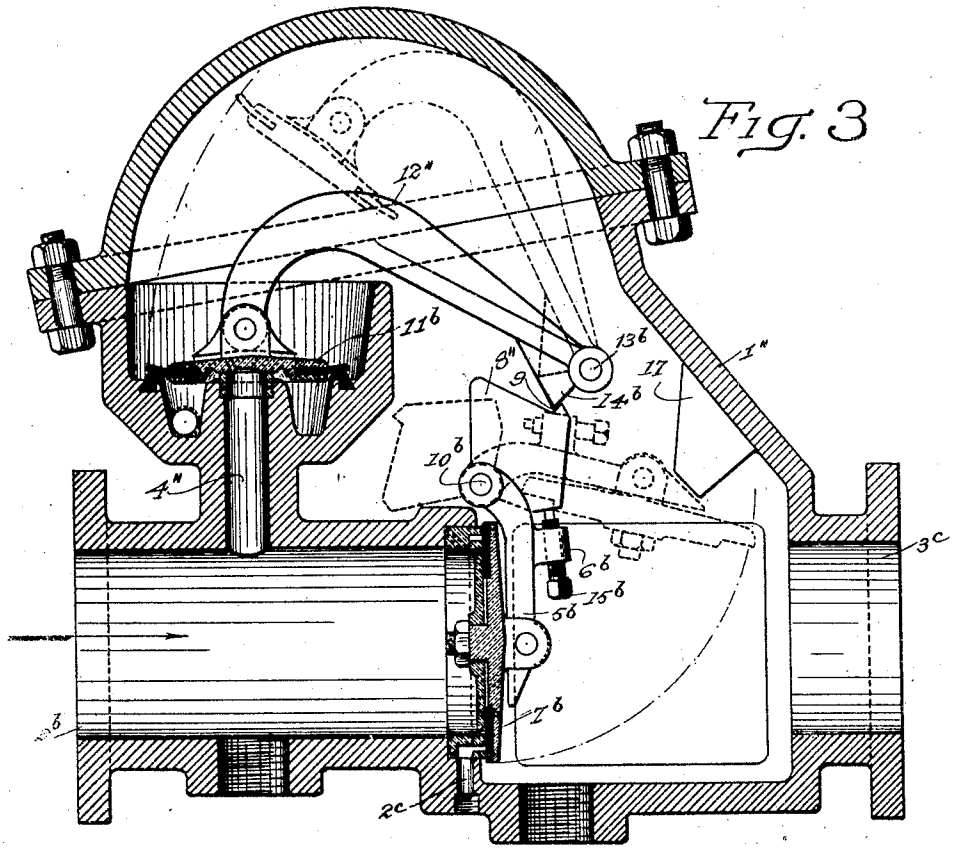


Fig. 4

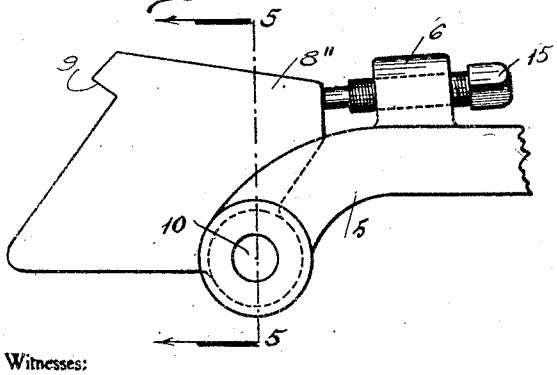
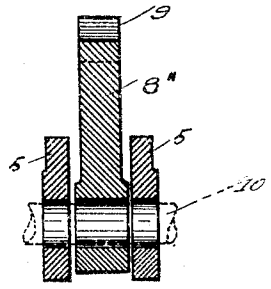


Fig. 5



Witnesses:

A. Pizzoccolo

A. Bastien.

WILLIAM C. BRYCE Inventor

By Marion & Marion

Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM C. BRYCE, OF MONTREAL, QUEBEC, CANADA.

AUTOMATIC VALVE FOR FIRE-SPRINKLER SYSTEMS.

1,115,896. Specification of Letters Patent. Patented Nov. 3, 1914.

Application filed February 17, 1914. Serial No. 819,171.

To all whom it may concern:

Be it known that I, WILLIAM C. BRYCE, a subject of the King of Great Britain, residing at No. 250 Peel street, Montreal, Province of Quebec, Canada, have invented certain new and useful Improvements in Automatic Valves for Fire-Sprinkler Systems; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention to be hereinafter described relates to automatic valves for fire sprinkler systems.

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.

Throughout the several figures of the drawings like reference characters designate the same parts.

In the drawings: Figure 1 is a central, vertical, longitudinal, cross section through a preferred form of the invention; Fig. 2 is a like view of a slightly modified form adapted to act both as a dry pipe valve and as an alarm valve; Fig. 3 is a like view of a further modification, also adapted to be used both as a dry pipe valve and as an alarm valve; Fig. 4 is an enlarged side elevation of a modified form of trip plate; and Fig. 5 is a vertical cross section on line 5—5 of Fig. 4.

The main objects of the invention are to produce a single-chamber straight-way valve for sprinkler systems, which will offer a minimum of resistance to the flow of the water when in use, which will efficiently prevent water columning, will not employ any springs or similarly easily broken parts in its construction, and which will contain all of the operative and adjusting means of the valve within the valve casing or chamber so as to effectually prevent the valves being tampered with.

Referring to the drawings in detail, 1, 1′, 1″ indicate a valve chamber in which all of the operating parts are mounted. It may be made in a single casting, as in Fig. 1, or in two or more castings suitably bolted or otherwise secured together, as in Figs. 2 and 3. Each of these casings has an inlet 2 adapted to be coupled up to the water main or other usual water supply, and an outlet 3^a, 3^b, 3^c, adapted to be similarly connected to the riser of the sprinkler system. Preferably, the inlet and outlet are in line, but this is not necessary. The inner end of each inlet 2, 2^a, 2^b, is counterbored or recessed to receive the usual channeled annular valve seat which communicates with a small passage 2^c, 2^d, 2^e, through the wall of the valve chamber, to which passage any usual and well known alarm may be connected in well known manner. A by-pass 4, 4′, 4″ establishes communication between each of the inlets 2 and the interior of the valve chamber.

Within the chamber and adjacent the channeled annular valve seat is pivotally mounted an arm 5, 5^a, 5^b, provided with a hollow screw threaded lug 6, 6^a, 6^b, for a purpose to be later disclosed, and carrying at one end a pivotally mounted main valve 7, 7^a, 7^b, the inner surface of which is just sufficiently greater than the outer surface to permit of an adequate seating of the valve. The opposite or pivot end of the arm 5 is slotted or forked and between the two parts or branches thus formed is journaled or pivotally mounted a trip plate 8, 8′, for a purpose to be later disclosed. The single pivot rod 10, 10^a, 10^b acts as a pivotal support for both the arm 5 and the trip plate 8. The inner end of the by-pass is closed by a differential valve 11, 11^a, 11^b pivotally mounted on one end of an arm 12, 12′, 12″ which is pivotally mounted on the pivot pin 13, 13^a, 13^b, secured in the chamber close to the pivot rod or pin 10. This differential valve 11 has a much greater inner surface area than outer surface area, the ratio being about six to one, so that ten pounds air pressure within the valve chamber will counter balance 60 pounds water pressure in the by-pass. This arm is provided with a lug or shoulder adapted to be engaged by the tip of the previously mentioned trip plate. In the modification of Figs. 3, 4, and 5,

shoulder 9 is formed on plate 8 for engagement with the shoulder 14, 14^a, 14^b. In the form shown in Fig. 1, the arms 5 and 12 are at substantially right angles, when the valves are seated. The trip plate 8 forms, practically, a continuation of the arm 5 but is inclined slightly toward the left to engage shoulder 14 which is inclined in the opposite direction. In order to take up any wear between the parts, a set screw 15, 15^a, 15^b is threaded through the lug 6 and engages the adjacent edge of the trip plate. By turning this screw, the trip plate 8, 8′, 8″ and shoulder 14, 14′, 14″ may be made to exactly engage, when the valves are both seated. In the modification of Fig. 2, the arms 5 and 12′ are in substantial alinement, so that the shoulder 14′ is in alinement with arms 5 and 12′ and the lower edge of the trip plate 8, when operative, is also in like alinement. In this form, a stop bar 16 is provided to limit the upward swing of the arms, so that the differential valve could not swing over and batter the main valve and its connections. In Fig. 1 this is not possible because the force of gravity, alone, would prevent it; the open position being shown in both figures in dotted lines, from which, the advisability of the stop 16, in the form in Fig. 2, is evident. In the form of Fig. 3, the general idea of Fig. 1 is present, but the arm of the differential valve is reversed in its direction, relatively to the inlet and outlet and it is curved at its valve end to allow a practical position of the shoulder 14′. In this case, a shoulder 9 is formed on plate 8′ for engagement with shoulder 14″. Here, again, there is no possibility of the two valves and valve arms interfering, as will be evident. Therefore, there is no stop necessary for the purpose. However, to prevent any possible jamming of the arm in its chamber, a stop or limit 17 is provided. In this figure, also, the open or inoperative position of these valves is shown in dotted lines.

By having the trip plate mounted and disposed as shown and described, there is no possibility of the shoulders becoming reengaged and the valves closed, after the differential valve has once raised far enough to permit the tip of the plate to slip from the tip of the shoulder. At this instant, the plate 8 drops by gravity to such position that its tip can not again become accidentally reëngaged. If the plate were rigid with the valve arm, such reëngagement might be possible by a sudden check in the pressure of the water main at the instant that the main valve began its opening swing. This would jerk the valve quickly back and raise the plate, so that it would again fall above the shoulder (still in lowered position). If the air leak in the systems were very small, the device might thus become reset. With the pivotal trip plate, there is absolutely no chance of this.

By having the trip plate pivotally mounted, it is possible to use the invention both as a dry pipe valve and as an alarm valve— that is, in coöperation with the differential valve controlled by an air pressure in the sprinkler system; or, in warm enough weather, without the coöperation of the differential valve, and with the sprinkler system filled with water—as in the well known wet system. To change from the dry pipe system to the wet system, it is only necessary to trip the plate and allow it to hang in its inoperative position, as in Figs. 2 and 3. Then, the water from the main will not pass through the inlet 2 and into the riser until the pressure of the water in the system has been reduced below that of the pressure in the main, by a leakage in the sprinkler pipes. At such times, the valve 7 and its arm 5 will be swung upward and the alarm sounded, as usual. On account of the inner and outer surface of the valve 7 being approximately the same, there is no possibility of water columning. A suitable hand hole is provided in each form, of course, for access to the interior of the valve chamber. Thus, this device is equally applicable to both the wet and the dry pipe systems.

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

Changes may be made in the construction, arrangement, and disposition of the 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 within this application wherein only a preferred form has been disclosed.

Having thus fully described my invention, 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 arm 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 second valve arm pivotally mounted within said chamber and all times completely out of the path of the incoming current of water, a differential valve carried thereby and adapted to close the aforesaid by-pass, and connections between said valve arms whereby the last named arm controls the operation of the first named arm.

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 the valve chamber, a valve arm 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 second valve arm pivotally mounted within said chamber and at all times completely out of the path of the incoming current of water, a differential valve carried thereby and adapted to close the aforesaid by-pass, a shoulder carried by the last named arm, and a trip actuated by the first named arm and adapted to engage said shoulder.

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 the valve chamber, a valve arm 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 second valve arm pivotally mounted within said chamber and at all times completely out of the path of the incoming current of water, a differential valve carried thereby and adapted to close the aforesaid by-pass, a shoulder carried by the last named arm, a trip actuated by the first named arm and adapted to engage said shoulder, and means for adjusting said trip.

4. 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 arm 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 second valve arm pivotally mounted within said chamber and at all times completely out of the path of the incoming current of water, a differential valve carried thereby and adapted to close the aforesaid by-pass, a shoulder carried by the last named valve arm, and a trip plate pivotally mounted on the pivot pin of the first mentioned valve arm and adapted to engage the shoulder of the last named valve arm.

5. 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 arm 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 second valve arm pivotally mounted within said chamber and at all times completely out of the path of the incoming current of water, a differential valve carried thereby and adapted to close the aforesaid by-pass, a shoulder carried by the last named valve arm, and a trip plate pivotally mounted on the pivot pin of the first mentioned valve arm and adapted to engage the shoulder of the last named valve arm, said trip plate being adapted to drop by gravity to inoperative position immediately after tripping.

6. 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 arm 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 second valve arm pivotally mounted within said chamber and at all times completely out of the path of the incoming current of water, a differential valve carried thereby and adapted to close the aforesaid by-pass, and trip connections between said arms whereby the last named arm controls the operation of the first named arm, said trip being adapted to drop to inoperative position immediately upon completion of the tripping action.

7. 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 arm 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 second valve arm pivotally mounted within said chamber and at all times completely out of the path of the incoming current of water, a differential valve carried thereby and adapted to close the aforesaid by-pass, trip connections between said arms whereby the last named arm controls the operation of the first named arm, said trip being adapted to drop to inoperative position immediately upon completion of the tripping action, and means for adjusting said trip.

8. 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 arm 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 second valve arm pivotally mounted within said chamber and at all times completely out of the path of the incoming current of water, a differential valve carried thereby and adapted to close the aforesaid by-pass, a shoulder carried by the last named valve arm, a trip plate pivotally mounted on the pivot pin of the first mentioned valve arm and adapted to engage the shoulder of the last named valve arm, and means for adjusting said trip plate.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

WILLIAM C. BRYCE.

Witnesses:
W. S. BABCOCK
A. BASTIEN