No. 865,880. PATENTED SEPT. 10, 1907.

C. B. GARRETT.

DRY PIPE VALVE.

APPLICATION FILED JAN. 24, 1905.

2 SHEETS—SHEET 1

Fig. 1.

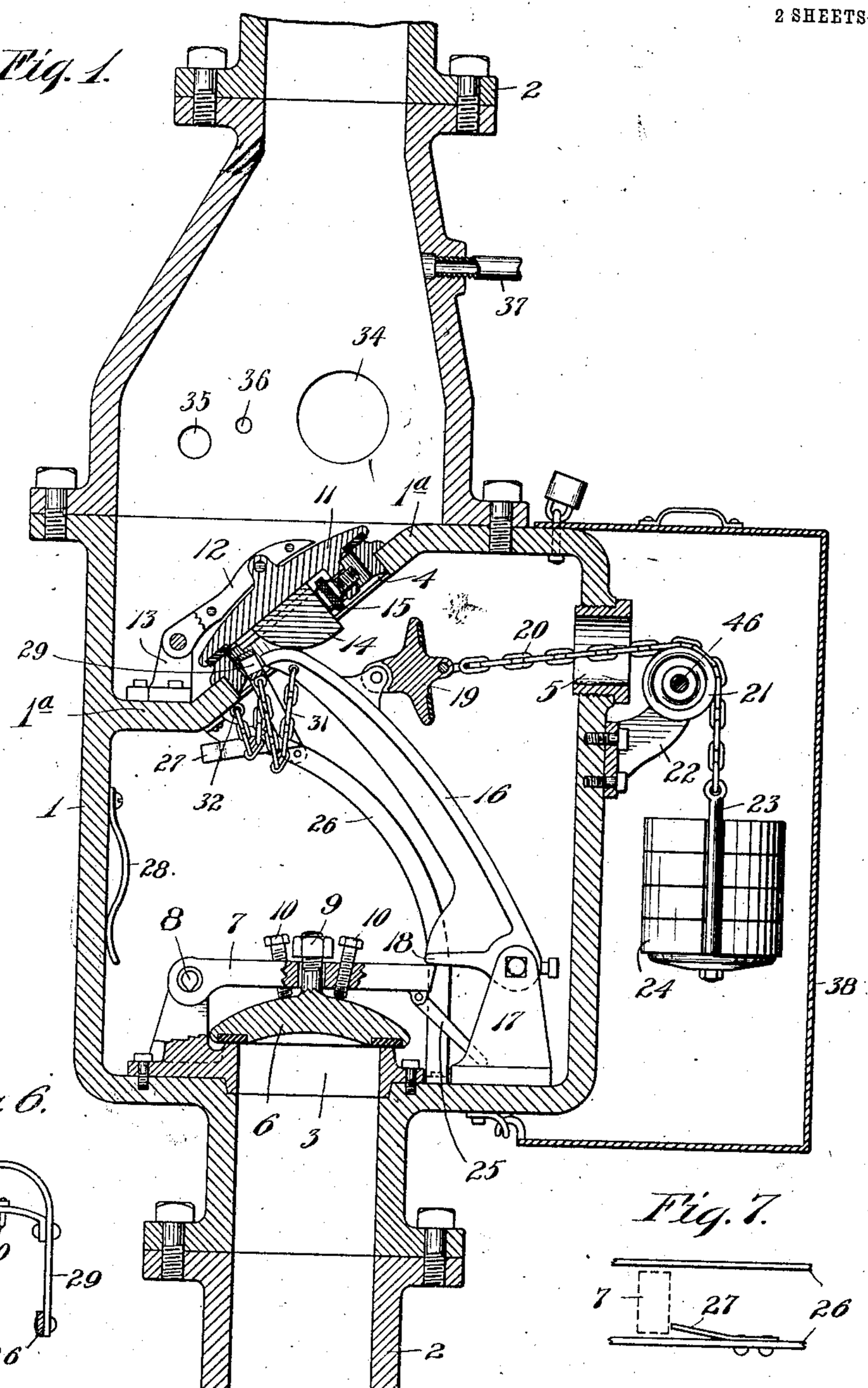


Fig. 6.




Fig. 7.




Witnesses.
E. W. Jeppesen.
A. H. Ospahl.

Inventor.
Charles B. Garrett.
By his Attorneys
Williamson & Merchant

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2 SHEETS—SHEET 2.

Fig. 2.

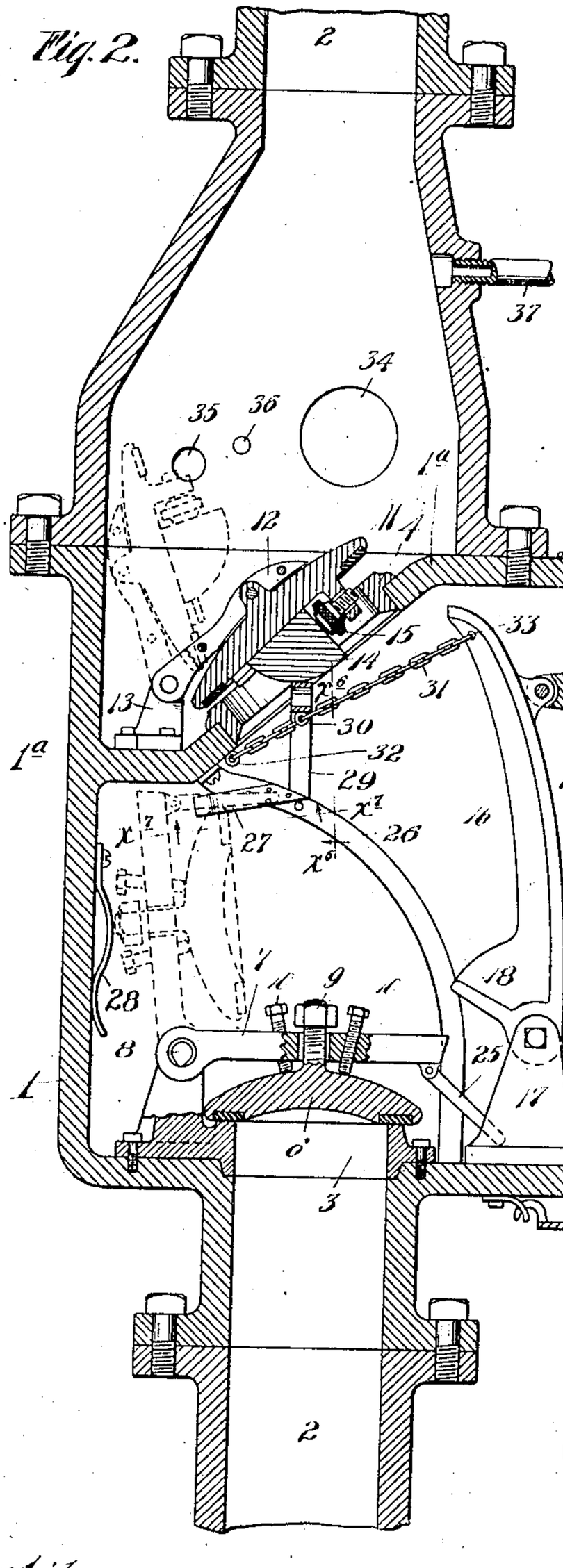



Fig. 3.

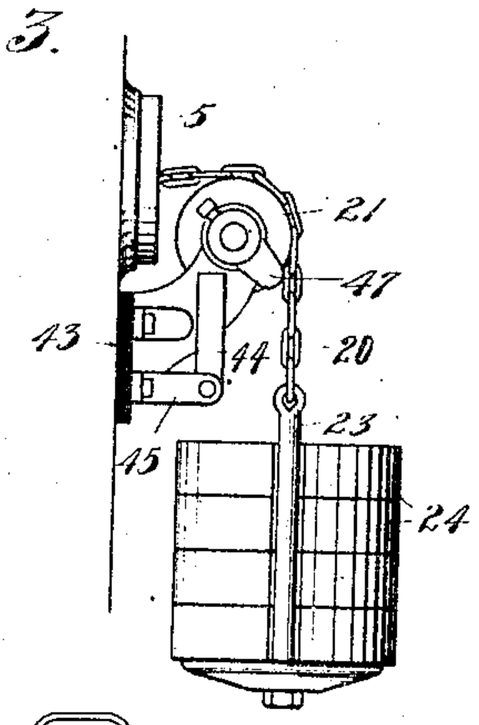
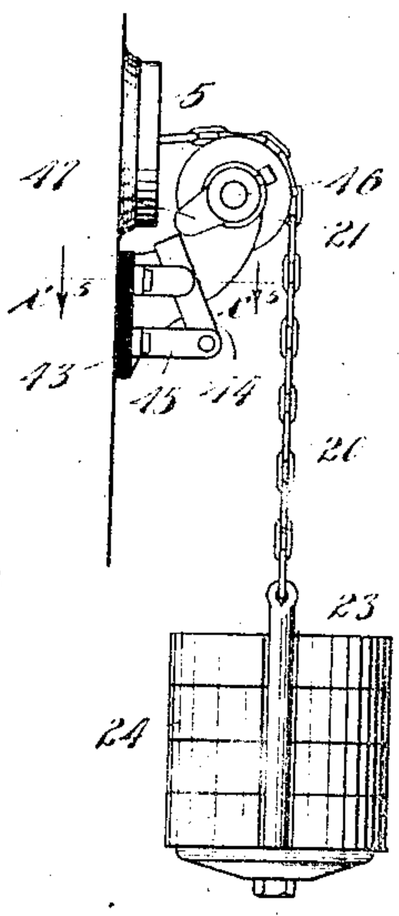



Fig. 4.



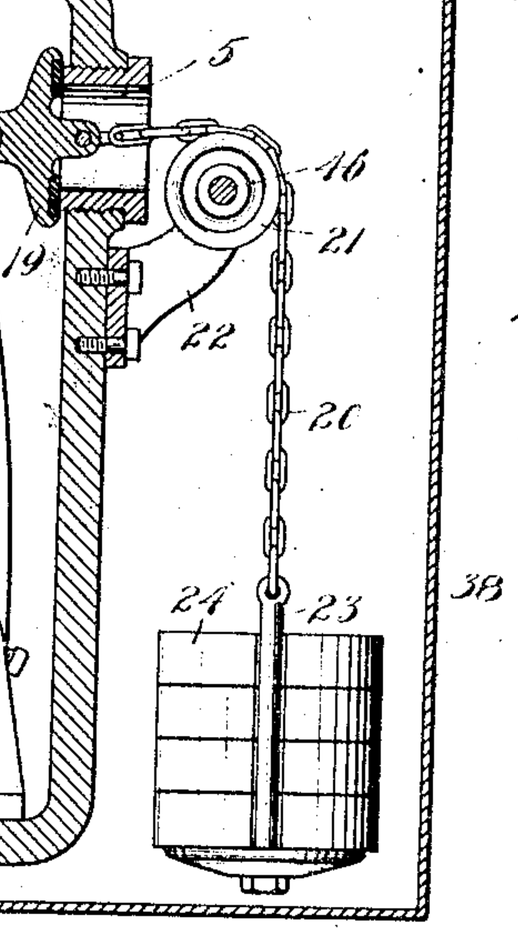




Fig. 5.




Witnesses.

E. W. Jeppesen.

A. H. Ofsahl.

Inventor.

Charles B. Garrett.

By his Attorneys

Williamson & Merchant

# UNITED STATES PATENT OFFICE.

CHARLES B. GARRETT, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE GLOBE AUTOMATIC SPRINKLER COMPANY, OF MINNEAPOLIS, MINNESOTA, A CORPORATION OF MINNESOTA.

## DRY-PIPE VALVE.

No. 865,880. Specification of Letters Patent. Patented Sept. 10, 1907.

Application filed January 24, 1905. Serial No. 242,501.

*To all whom it may concern:*

Be it known that I, CHARLES B. GARRETT, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Dry-Pipe Valves; and I do hereby declare the following to be 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.

My present invention relates to dry pipe fire extinguishing systems, and has for its especial object to improve the construction of that type of dry pipe valves set forth and claimed in my U. S. Letters Patent No. 831,054 issued of date Sept. 18th, 1906, dry pipe valve.

The invention is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Referring to the drawings, Figure 1 is a vertical section, taken centrally through a dry pipe valve embodying the several features of my invention. Fig. 2 is a view corresponding to Fig. 1, but illustrating different positions of the parts; Figs. 3 and 4 are detail views in side elevation, showing a circuit closer of an electrical alarm device, and also associated parts for operating the same; Fig. 5 is a section on the line $x^5$ $x^5$ of Fig. 4, showing also, in diagram, the alarm circuit. Fig. 6 is a section on the line $x^6$ $x^6$ of Fig. 2; and Fig. 7 is a section on a line $x^7$ $x^7$ of Fig. 2.

The body 1 of the valve casing or shell is interposed in, and forms part of a vertical conduit or riser 2 of the fire extinguishing system, and is formed with three valve-seat-equipped openings 3, 4 and 5. The valve seat 3 constitutes the water inlet passage, and is located in the bottom of the said casing or shell 1. The valve seat 4 affords the water outlet in the casing, and is located in an inclined upper wall $1^a$, which divides the casing into two compartments. The valve seat 5 is located in one side of the casing, and serves a purpose which will hereinafter appear. The valve seats 3, 4 and 5 are adapted to be closed by valves, which may be treated respectively as the water inlet valve, the water outlet valve, and the intermediate or vent valve. The water inlet valve 6 is carried by an arm 7, fulcrumed to a bearing 8 secured to, and within, the casing 1, at one side of the valve seat 3. As shown, said valve 6 is provided with a nutted stem 9 that works loosely through the arm 7, said arm 7 is provided with a plurality of set screws 10 that press upon said valve, and hold the same firmly seated when the free end of said arm 7 is pressed downward. The water outlet valve 11 is carried by, and has a slight pivotal movement on an arm 12, pivoted to a bearing 13 rigidly secured on top of the wall or partition $1^a$. On its under face, the valve 11 is provided with a slidable block or cam abutment 14 that is adapted to be set and held in different positions, by an adjusting screw 15, seated in a lug on said valve.

A tripping lever 16 is pivoted at its lower end, to a bearing 17. Near its pivoted end, the lever 16 is provided with a projecting heel or lug 18 that normally presses against the free end of the valve arm 7, to hold said valve closed. The free upper end of this tripping lever terminates at such point that it will engage the cam block or abutment 14 of the valve 11, when the two valves 6 and 11 are in closed positions, as shown in Fig. 1. The intermediate or vent valve 19 is carried by the tripping lever 16 and, as shown, is pivoted thereto at such point that when the tripping arm moves into the position shown in Fig. 2, it will close the vent afforded by the valve seat 5. A suitable connection, such as a chain 20, is attached to the vent valve 19, is passed outward through the vent or valve seat 5, runs over a guide sheave 21 on a bracket 22, rigidly secured to the casing 1, and, as shown, is attached, at its outer end, to a headed bolt 23. A plurality of weights 24, placed on the head of the bolt 23, put the trip arm 16 under a strain which tends to open the water outlet valve 11, and to close the vent valve 19, all as will hereinafter more fully appear.

To the free end of the valve arm 7 is pivoted a gravity actuated arm 25, which operates as an intercepter, to prevent closing of the water inlet valve 6, when it has once been opened. Normally, this arm 25 stands in an inclined position, and is held inoperative, but when the arm 7 is raised slightly it assumes a vertical position and, under a downward movement of said lever and valve 6, it engages the bottom of the casing 1, and prevents the said valve from reaching a seated position.

The numeral 26 indicates a segmental guide which, as shown, follows the path of movement of the free end of the arm 7. The numeral 27 indicates a spring latch which, when the arm 7 and valve 6 are moved into the extreme position indicated by dotted lines in Fig. 2, springs in front of the free end of said lever 7 and prevents the same, and said valve 6, from falling back into or toward their normal positions.

The numeral 28 indicates a spring buffer, secured within, and to one side, of the casing, in position to engage the stem 9 of the valve 6 when the said valve is thrown into its extreme open position. A second valve-intercepting lever or arm 29 is pivoted at one end to the upper portion of the guide 26, and at its other end is attached, at 30, to the intermediate portion of a chain or other flexible connection 31. One end of said chain 31 is anchored at 32 to the web $1^a$ of the casing, and its other end is attached at 33 to the free end of the tripping lever 16. The intercepting arm 29, the chain 31, the tripping lever 16, and the cam abutment 14 of the water outlet valve 11, are so related that when said

tripping arm is moved into the position indicated in Fig. 2, said intercepting arm 29 will engage said abutment and positively hold said valve opened to a considerable extent, thereby preventing reseating of said valve 11 after it has once been opened. The importance of the valve-intercepting devices just described will be fully stated in the description of the operation.

The numerals 34, 35 and 36 indicate, respectively, a hand-hole opening, a primer passage, and a test tube passage, which openings are located in the upper compartment of the casing, and are normally closed. The numeral 37 indicates a small pipe which leads from the upper compartment of the casing to a pressure gage (not shown). The numeral 38 indicates a detachable housing, which is applied to the casing 1 and incloses the guide sheave 21, the weights 24, and other associated parts.

The electrical arm circuit comprises leads 39, a battery 40, an electric bell 41, and contacts 42. The contacts 42 are, as shown, secured to an insulating block 43, which, in turn, is secured to the casing 1 slightly below and slightly to one side of the outer end of the valve seat 5. Normally the circuit is broken between the contacts 42, but is adapted to be closed by a metallic blade 44 pivoted to a bearing 45 on the insulating block 43. The guide sheave 21 is secured on a short shaft 46 which carries, at one end, a tappet 47 which, when moved, from the position shown in Fig. 3 into the position shown in Fig. 4, strikes said blade 44, forces the same between the contacts 42, and closes the alarm circuit, thereby sounding an alarm.

Operation. In valves of the character above described, when the water inlet and outlet valves are suddenly opened, as will be the case when one or more sprinklers are thrown into action, and the air pressure on the water outlet valve is decreased, the water will rush rapidly up into the riser and, by acquired momentum, will increase the air pressure in the riser to such an extent that there will be produced a recession or backward flow of the column of water. Usually there will be several waves or reverse vibrations produced in the riser before the air and the water pressure is equalized, and before the air has been entirely exhausted from the riser. Hence, unless some means be provided for preventing these valves from being again seated, after they are once opened, they will be pounded upon their seats to such an extent that usually they will not form tight joints with their seats after one opening has taken place. Furthermore, unless means be provided for preventing simultaneous reseating of the water inlet and outlet valves after they have once been opened, the recession of the column of water in the riser, due to the reaction of the air, and to the differentials of area of the upper and lower portions of the valves, is liable to result in what is known as water column, a condition familiar to those familiar with fire extinguishing systems. These limitations to the proper action of a fire extinguishing system, I eliminate by the use of what I have chosen to call "valve intercepters", and which operate to prevent reseating of the valves after they have once been opened.

The operation of the valve mechanism given more in detail, is substantially as follows: Normally the parts stand as indicated in Fig. 1, and the water outlet valve 11 is held closed by air pressure within the upper compartment of the casing 1 and in the upper portion of the riser. When the said valve 11 is held closed, its abutment 14 holds the tripping lever 16 in the position indicated in Fig. 1, and the said lever, in turn, holds the vent valve 19 in an open position, and holds the water inlet valve 6 in a closed position. Whenever the air pressure on the valve 11 is reduced below a predetermined point, depending on the number of weights applied to the outer end of the chain 20, the strain produced by the applied weights 24, acting through the chain 20, and on the tripping lever 16, causes the said lever to force the water outlet valve 11 open, with a camming action, and to move into the position indicated in Fig. 2, and thereby cause the vent valve 19 to close the vent 5 and release the water inlet valve 6. This movement of the tripping lever 16 straightens out the chain 31 and moves the intercepting arm or stop 29 into a position to engage the abutment 14 and positively prevent the water outlet valve 11 from again being closed.

In Fig. 2, the water admission valve 6 is, by full lines, shown as having been released, but as not having yet been opened by the upward pressure of water in the lower portion of the riser. As a matter of fact, the water pressure being applied to the said inlet valve, and the said valve being released, it would be thrown immediately into the extreme open position, and will usually be caught and held in the position indicated by dotted lines in Fig. 2, by the spring latch 27. In case the said valve is not thrown far enough to be caught by the said latch, the intercepting arm 25 will, as already described, prevent reseating or closing of the said valve.

As is evident, when the tripping lever 16 is moved from its normal position indicated in Fig. 1, into the position indicated in Fig. 2, the chain 20 travels on the sheave 21, and will rotate said sheave, and cause its tappet 47 to move the contact blade 44 into the position indicated in Figs. 4 and 5, thereby closing the alarm circuit, and actuating the alarm.

From what has been said, it will be understood that the valve mechanism described is capable of modification within the scope of my invention as herein set forth and claimed.

What I claim and desire to secure by Letters Patent of the United States is as follows:

1. In a dry pipe valve, a casing forming part of the conduit of a fire extinguishing system, and having three openings, three separate and independent valves adapted to open and close said three openings, means for opening one of said valves and closing another, and means for preventing the re-closing of the opened valve substantially as described.

2. In a dry pipe valve, a casing forming part of a conduit of a fire extinguishing system and having three openings, three valves separate and independent for opening and closing said three openings, two thereof being normally closed, and the third being normally open, means controlling the opening of said two normally closed valves and for closing said normally open valve, and an intercepting device for preventing the re-closing of one of the said two valves, after it has been opened, substantially as described.

3. In a dry pipe valve, a casing forming part of a conduit of a fire extinguishing system and having three openings, inlet and outlet valves normally closing two of said openings, and independent normally open vent valve coöperating with said third opening, means for closing said vent valve and for controlling the opening of said inlet and outlet valves, and intercepting devices for preventing

reclosing of said inlet and outlet valves, substantially as described.

4. In a dry pipe valve, a casing formiug part of a water conduit of a fire extinguishing system and having inlet and outlet openings, and inlet and outlet valves normally closing the same, and intercepting devices coöperating with said valves, to prevent reclosing thereof, substantially as described.

5. In a dry pipe valve, the combination with an inlet valve normally holding back the water supply, of an air seated outlet valve normally closing the water outlet, an oscillating tripping lever for opening said secondary valve, and for normally holding said inlet valve closed, means tending to move said lever, and an intercepting arm mounted on a fixed support, connected to said tripping lever, and movable thereby into a position to prevent reclosing of said outlet valve, substantially as described.

6. In a dry pipe valve, a combination with an inlet valve normally holding back the water supply, of an air seated outlet valve normally closing the water outlet, an oscillating tripping-lever opening said secondary valve and for normally holding said inlet valve closed, means tending to move said lever, and an intercepting arm pivotally mounted on a fixed support, connected to said tripping-lever by a flexible connection one end of which is anchored, said intercepting arm coöperating with a cam abutment on said outlet valve to prevent reclosing of said valve, substantially as described.

7. In a dry pipe valve, the combination with a water inlet valve normally holding back the water supply, of an air seated water outlet valve, an air vent in the casing of said dry pipe valve, an oscillating tripping lever for opening said outlet valve, and for holding said inlet valve closed, a vent closing valve carried by said tripping lever, the movement of which said tripping lever serves to open said outlet valve and close said vent valve, and intercepting device coöperating with one of the two normally closed valves to prevent reclosing thereof, substantially as described.

8. In a dry pipe valve, the combination with a water inlet valve normally holding back the water supply, of an air seated water outlet valve, an air vent in the casing of said dry pipe valve, an oscillating tripping lever for opening said outlet valve and for holding said inlet valve closed, a vent valve carried by said tripping lever, the movement of which tripping lever serves to open said outlet valve and close said vent valve, and intercepting devices coöperating with said inlet and outlet valves, to prevent reclosing thereof, substantially as described.

9. In a dry pipe valve, the combination with an inlet valve normally holding back the water supply, of a pivoted lever to which said valve is applied, and an intercepting arm pivoted to said lever and having such length when swung downward, upon opening said valve, a predetermined amount, it will hold said valve against reclosing, substantially as described.

10. In a dry pipe valve the combination with a valve normally holding back the water supply, of a pivoted lever to which said valve is applied, means operative on said lever for holding said valve closed and for releasing the same, and a yielding latch in the path of movement of the free end of said lever, operative thereon to hold said valve in a "wide open" position, substantially as described.

11. In a dry pipe valve, a casing forming part of a conduit of a fire extinguishing system and having three openings, two valves normally closing two of said openings, a normally open vent valve for closing the third opening, a lever to which said vent valve is applied, normally operating to hold said inlet valve closed, and itself normally held against movement by said inlet valve, a sheave mounted outside of said casing, a weighted connection running over said sheave and attached to said lever, for moving the same when released, and an electric alarm device having the circuit closer directly connected to said sheave and arranged to be operated by movement of said sheave, and when said lever is released, substantially as described.

12. The combination with a casing forming part of a conduit, of an inlet valve normally holding back the water supply, a pivoted arm, to the intermediate portion of which said inlet valve is applied, and a segmental guide following the path of movement of the free end of said arm and limiting the lateral movements of said arm, substantially as described.

13. The combination with a casing forming part of a conduit of a fire extinguishing system, of an inlet valve normally holding back the water supply, an arm pivoted at one end within said casing, and to the intermediate portion of which said inlet valve is applied, a segmental guide following the path of movement of the free end of said arm and limiting the lateral movements thereof, a latch applied at the upper extremity of said guide, for operation on the free end of said arm, to hold said inlet valve open, and an intercepting arm pivoted to the free end of said valve-carrying arm, substantially as described.

14. The combination with a casing forming part of the conduit of a fire extinguishing system, and having inlet and outlet passages, inlet and outlet valves normally closing said passages, a pivoted arm, to the intermediate portion of which said inlet valve is applied, a segmental guide for the free end of said arm, a latch in the upper portion of said guide, operative on the end of said arm to hold said inlet valve open, an intercepting device pivotally supported by said guide and operative on said outlet valve, to hold the same open, and a tripping lever, under strain to move, but normally held against movement by said outlet valve, and normally operative to hold said inlet valve closed, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES B. GARRETT.

Witnesses:
R. C. MABEY,
F. D. MERCHANT.