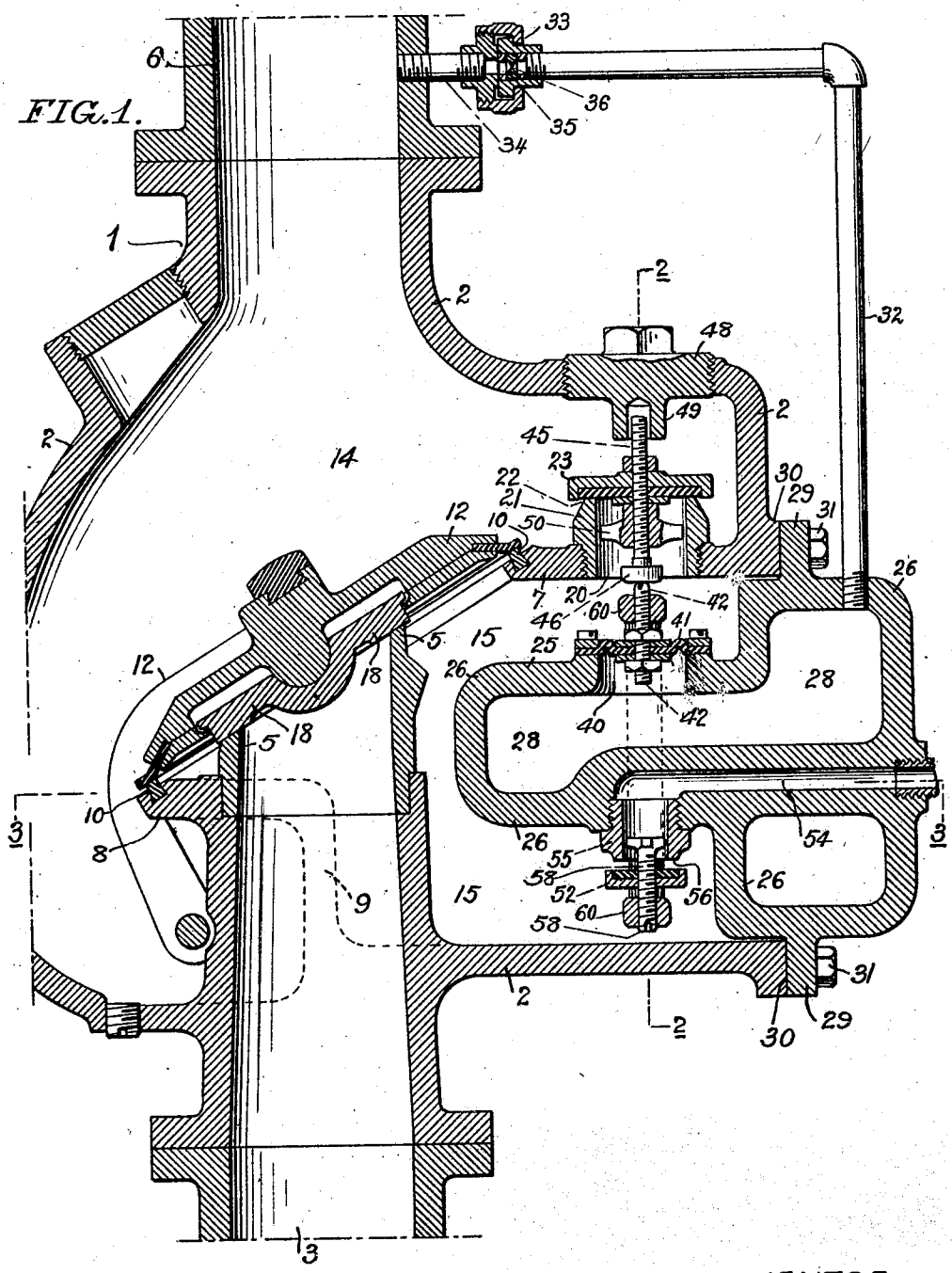
June 24, 1930. W. B. GRIFFITH 1,765,422

ACCELERATED DRY PIPE VALVE

Filed Dec. 13, 1927 2 Sheets-Sheet 1

FIG. 1.



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ACCELERATED DRY PIPE VALVE

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FIG. 2.

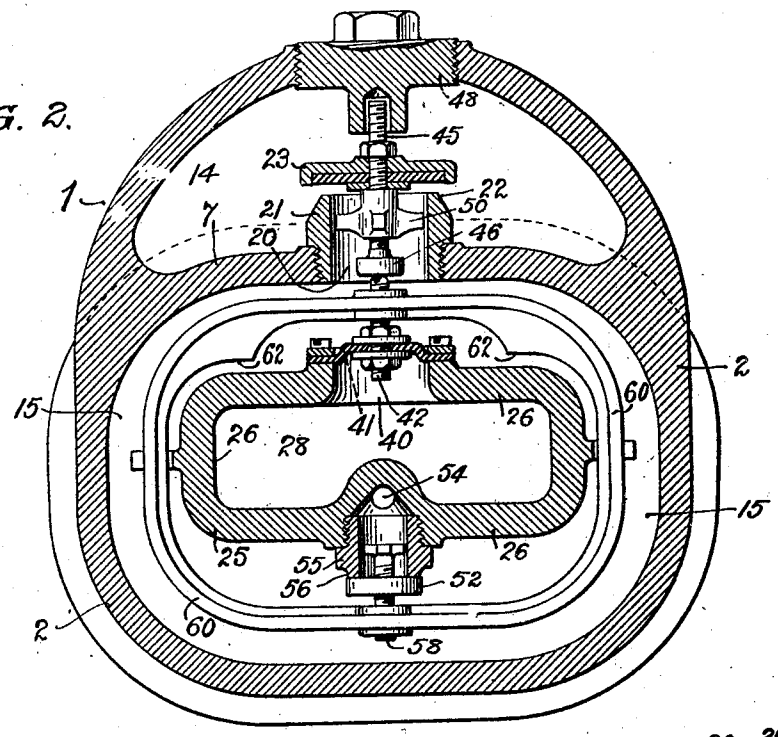
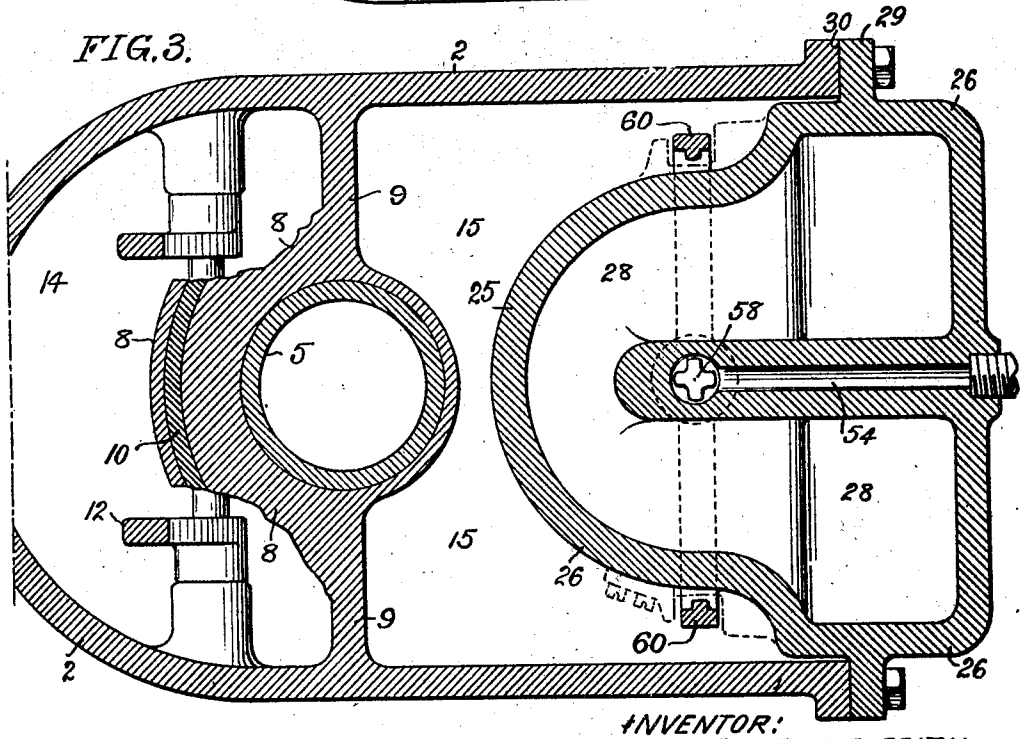


FIG. 3.



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Patented June 24, 1930

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UNITED STATES PATENT OFFICE

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ACCELERATED DRY-PIPE VALVE

Application filed December 13, 1927. Serial No. 239,644.

My invention relates to improvements in dry pipe valves for use in sprinkler systems for fire protection, and particularly relates to improvements in an accelerator for increasing the speed of operation of the dry pipe valve when the sprinkler system is to be brought into operation.

The object of my invention is to combine the accelerator mechanism into a single unit enclosed within the dry pipe valve casing; a further object is to locate the accelerator valve in the pressure chamber of the dry pipe valve and arrange the accelerator valve so that it will normally rest in the closed position, thus eliminating the use of springs for holding it closed against the pressure within said pressure chamber; a further object is to mount the container for actuating the accelerator valve within the intermediate chamber of the dry pipe valve; a still further object is to mount the drip valve upon the container casing; a still further object is to make said accelerator valve and said container readily removable from the dry pipe valve casing for inspecting and repairing the same; and a still further object is to detachably associate the accelerator valve and the container when in the operative position, so that either may be removed independently of the other. These together with various other novel features of construction and arrangement of the parts, which will be more fully hereinafter described and claimed, constitute my invention.

Referring to the accompanying drawing, Fig. 1 is a vertical central sectional view of a dry pipe valve embodying my invention, showing the accelerator valve in the closed position; Fig. 2 is a transverse section on line 2—2, Fig. 1, showing the accelerator valve in the open position; and Fig. 3 is a horizontal section on line 3—3, Fig. 1.

In the drawings, in which like reference characters refer to like parts, 1 represents a dry pipe valve comprising a casing 2 having the usual inlet pipe 3 with a water valve seat 5 surrounding the same, and an outlet pipe 6, thus forming a passageway through the casing 2.

The casing 2 is provided with webs 7, 8 and 9, upon which is formed the air valve seat 10, upon which an air clapper 12 is adapted to close, as shown in Fig. 1, thus forming an air pressure chamber 14 above the clapper and said webs. An intermediate or neutral chamber 15 is formed below the clapper 12, which is separated from the chamber 14 by said webs.

The air clapper 12 carries a water clapper 18 and holds the latter upon the seat 5 against a relatively higher water pressure in the inlet pipe 3, by the action of a lower air pressure in the pressure chamber 14, which is maintained throughout the sprinkler system in a manner well known in the art. When the air pressure in the system is reduced by the opening of a sprinkler head (not shown in the drawings) the air slowly escapes through the sprinkler head until the pressure above the air clapper 12 is reduced sufficiently to allow the water in the inlet pipe 3 to force said clappers open, allowing the water to pass through the system.

The present invention consists of improvements in the mechanism for reducing the time required for the air and water clappers to open when the system is opened and the air pressure reduced below a certain point. The horizontal web 7 of the casing is provided with an opening or passageway 20 which is surrounded by a sleeve 21, forming a valve seat 22 which is located in the pressure chamber 14. An accelerator valve 23 is also located within the chamber 14 and normally rests upon said seat 22 by gravity, and the pressure in the chamber 14 tends to force it closed upon the seat 22. Means, more fully hereinafter described, are provided for opening the valve 23 upon a sudden reduction of pressure in the chamber 14, allowing the pressure to pass into the intermediate chamber 15 and act upon the under side of the clapper 12, thus assisting in opening the latter.

Located within the intermediate chamber 15 is the container 25 formed by a casing 26 which extends into the intermediate chamber 15 and is secured by a flange 29, upon the outer portion of the container casing 26, which flange overlaps the facing surface 30

formed upon the outside of the casing 2, to which facing 30 the flange 29 is detachably secured by fastening devices 31.

The container casing 26 forms a pressure retaining chamber 28, communicating with the system at a point above the air clapper 12, by a pipe 32. Said pipe 32 connects the chamber 28 with a slow leak device 33, which in turn is connected through a pipe 34 with the pressure chamber 14. Said slow leak device 33 consists of a part 35 having a minute aperture 36, through which the air pressure slowly passes to normally maintain an equal pressure in chambers 14 and 28. Upon a sudden reduction of pressure in chamber 14 said device 33 will retain the pressure in the container chamber 28 a sufficient length of time for the pressure in chamber 28 to open the accelerator valve 23, thus allowing the pressure in chamber 14 to rapidly pass through the accelerator valve passageway 20 into the intermediate chamber 15 and act upon the under side of the air clapper 12, thus assisting in the initial opening movement of the clappers 12 and 18.

The container casing 26 is provided with an opening 40 which is closed by a flexible diaphragm 41. Upon the diaphragm 41 is adjustably mounted a rod 42. Said rod 42 is positioned immediately below the valve stem 45 carried by the accelerator valve 23. Said rod 42 is adapted to lift the valve 23 when the pressure in the chamber 14 is suddenly reduced below the pressure in the container chamber 28, thus causing the diaphragm 41 to be forced outwardly by the greater pressure in the chamber 28.

The valve stem 45 is provided with an enlarged head 46, against the under surface of which the rod 42 is adapted to press for lifting the valve 23. By providing said enlarged head 46 upon the stem 45, the necessity of maintaining the rods 42 and the stem 45 in exact vertical alignment is avoided.

The casing 2 is provided with a removable plug 48, having a depending sleeve 49 in which the upper end of the stem 45 is loosely guided. The lower end of said stem is provided with a spider 50 adapted to slide loosely in the sleeve 21. The accelerator valve 23 may be readily inserted or removed through the opening formed in the casing for the plug 48.

By detachably associating the rods 42 and 45, either the accelerator valve 23 or the container 25 may be removed independently of the other, thus greatly facilitating in the repairing and adjusting of the parts.

Dry pipe valves are provided with a normally open drip valve through which water is free to drain from the intermediate chamber 15. In the present invention a novel form and arrangement of drip valve 52 is provided. Said drip valve 52 is mounted upon and removable with the container casing 26. Said casing 26 is provided with an outlet passageway 54 forming a communication between the intermediate chamber 15 and the atmosphere. A sleeve 55 surrounds the entrance to said passageway 54 and forms a valve seat 56, against which the drip valve 52 is adapted to close. Said valve 52 is adjustably mounted upon a rod 58, which in turn is mounted in a yoke 60, which surrounds the container casing 26 and is mounted upon the rod 42, which latter is adapted to be lifted by the diaphragm 41 when the pressure in the chamber 28 is greater than the pressure in chamber 14. Fig. 2 shows the yoke 60 lifted by pressure in the chamber 28, which action closes the drip valve 52 and simultaneously opens the accelerator valve 23. When there is no pressure in the chamber 28 the yoke 60 will rest upon the container casing 26, the shoulders 62 on the yoke being provided for that purpose, thus relieving the diaphragm 41 of the weight of the yoke and also carrying the yoke when inserting or removing the container 25 from the casing 2.

The diaphragm 41 is equal in area to the area of the accelerator valve 23, so that when the pressures are equalized in chambers 14 and 28, the weight of the accelerator valve 23 will hold it closed as shown in Fig. 1. The pressure in chamber 28 will force the diaphragm 41 up until the rod 42 takes against the valve stem 45, which latter prevents further upward movement of the rod 42 and yoke 60 so long as the pressures in chambers 14 and 28 are equal, thus holding the drip valve 52 normally open, as shown in Fig. 1.

The operation of my invention is as follows: When the system is charged the air pressure in chamber 14 holds the clappers 12 and 18 closed and also the accelerator valve 23 closed. The accelerator valve 23 holds the drip valve open, as shown in Fig. 1. The pressure from chamber 14 slowly passes through pipe 32 into chamber 28, but will not lift the accelerator valve 23 against its weight and the equal pressure in the chamber 14. When the system is opened by the opening of a sprinkler head, the pressure in chamber 14 will be suddenly reduced but the pressure in chamber 28 is maintained by the slow leak device 33 sufficiently to cause the air pressure in chamber 28 to lift the diaphragm 41 and open the valve 23 and close the drip valve 52, thus allowing the pressure from chamber 14 to pass through the passageway 20 into the intermediate chamber 15 and assist in opening the air clapper 12, and thus bringing the system into operation when there is still high air pressure in chambers 14 and 15, and avoiding the loss of time otherwise required for the pressure to exhaust through a sprinkler head.

I claim:—

1. A dry pipe valve comprising a casing having an inlet and an outlet passage, a water

clapper for closing said inlet passage, an air pressure chamber within said casing, an air clapper held in the closed position by air pressure within said pressure chamber adapted for holding the water clapper closed, an intermediate chamber within said casing separated from said pressure chamber by the air clapper, said casing having a passageway formed therein communicating between said pressure and intermediate chambers located adjacent to said air clapper, an accelerator valve located within said pressure chamber positioned for closing said passageway arranged so that its opening movement is opposed by the pressure within the pressure chamber, and means actuated by a sudden reduction of pressure in the pressure chamber for opening said accelerator valve.

2. A dry pipe valve comprising a casing having an inlet and an outlet passage, a water clapper for closing said inlet passage, an air pressure chamber within said casing, an air clapper held in the closed position by air pressure within said pressure chamber adapted for holding the water clapper closed, an intermediate chamber within said casing separated from said pressure chamber by the air clapper, said casing having a passageway formed therein communicating between said pressure and intermediate chambers located adjacent to said air clapper, an accelerator valve located within said pressure chamber positioned for closing said passageway by the action of gravity, and means for equalizing the air pressure upon opposite sides of the accelerator valve for normally holding the latter closed and for opening the same upon a sudden reduction of pressure in said pressure chamber.

3. A dry pipe valve comprising a casing having an inlet and an outlet passage, a water clapper for closing said inlet passage, an air pressure chamber within said casing, an air clapper held in the closed position by air pressure within said pressure chamber adapted for holding the water clapper closed, an intermediate chamber within said casing separated from said pressure chamber by the air clapper, said casing having a passageway formed therein communicating between said chambers, an accelerator valve located in the pressure chamber positioned for closing said passageway, a closed container chamber located within said intermediate chamber, a connection between the container chamber and said pressure chamber through which the pressure may slowly equalize, and means actuated by pressure within the container chamber when the pressure in the pressure chamber is suddenly reduced for opening said accelerator valve.

4. A dry pipe valve comprising a casing having an inlet and an outlet passage, a water clapper for closing said inlet passage, an air pressure chamber within said casing, an air clapper held in the closed position by air pressure within said pressure chamber adapted for holding the water clapper closed, an intermediate chamber within said casing separated from said pressure chamber by the air clapper, said casing having a passageway formed therein communicating between said chambers, an accelerator valve controlling said passageway between said chambers, a closed container located within said casing, a connection between the container and said pressure chamber through which the pressure may slowly equalize, and a movable member actuated by pressure within the container for opening the accelerator valve when the pressure in the pressure chamber is suddenly reduced.

5. A dry pipe valve comprising a casing having an inlet and an outlet passage, a water clapper for closing said inlet passage, an air pressure chamber within said casing, an air clapper held in the closed position by air pressure within said pressure chamber adapted for holding the water clapper closed, an intermediate chamber within said casing separated from said pressure chamber by the air clapper, said casing having a passageway formed therein communicating between said chambers, an accelerator valve controlling said passageway between said chambers, a closed container located within said intermediate chamber, a connection between said pressure chamber and the container through which the pressure may slowly equalize, and a movable member actuated by pressure within said container for opening the accelerator valve when the pressure in the pressure chamber is suddenly reduced.

6. A dry pipe valve comprising a casing having an inlet and an outlet passage, a water clapper for closing said inlet passage, an air pressure chamber within said casing, an air clapper held in the closed position by air pressure within said pressure chamber adapted for holding the water clapper closed, an intermediate chamber within said casing separated from said pressure chamber by the air clapper, said casing having a passageway formed therein communicating between said chambers, an accelerator valve controlling said passageway between said chambers, a closed container located within the intermediate chamber of said casing said casing having an opening formed therein adjacent to the intermediate chamber through which the container may be readily inserted or removed, a connection between said pressure chamber and said container through which the pressure may slowly equalize, and a movable member actuated by pressure within the container for opening the accelerator valve when the pressure in the pressure chamber is suddenly reduced.

7. A dry pipe valve comprising a casing having an inlet and an outlet passage, a wa-

ter clapper for closing said inlet passage, an air pressure chamber within said casing, an air clapper held in the closed position by air pressure within said pressure chamber adapted for holding the water clapper closed, an intermediate chamber within said casing separated from said pressure chamber by the air clapper, said casing having a passageway formed therein communicating between said chambers, an accelerator valve controlling said passageway between said chambers, a closed container, a connection between said pressure chamber and said container through which the pressure may slowly equalize, said casing having an opening formed therein through which the container may be inserted into said intermediate chamber, a flange upon the outer portion of the container upon which the latter is supported within the casing, fastening devices for detachably securing said flange to the casing, and a movable member actuated by pressure within the container for opening the accelerator valve when the pressure in the pressure chamber is suddenly reduced.

8. A dry pipe valve comprising a casing having an inlet and an outlet passage, a water clapper for closing said inlet passage, an air pressure chamber within said casing, an air clapper held in the closed position by air pressure within said pressure chamber adapted for holding the water clapper closed, an intermediate chamber within said casing separated from said pressure chamber by the air clapper, said casing having a passageway formed therein communicating between said chambers, an accelerator valve controlling said passageway between said chambers, a valve stem adjustably mounted upon the accelerator valve, a closed container removably mounted within said intermediate chamber, a connection between the container and the pressure chamber through which the pressure may slowly equalize, a movable member upon the container actuated by pressure within the latter, and a part upon said member adapted to abut against said valve stem for opening the accelerator valve when the pressure in the pressure chamber is reduced, whereby said container may be readily removed from said valve stem.

9. A dry pipe valve comprising a casing having an inlet and an outlet passage, a water clapper for closing said inlet passage, an air pressure chamber within said casing, an air clapper held in the closed position by air pressure within said pressure chamber adapted for holding the water clapper closed, an intermediate chamber within said casing separated from said pressure chamber by the air clapper, said casing having a passageway formed therein communicating between said chambers, an accelerator valve controlling said passageway between said chambers, a closed container located within said intermediate chamber, a connection between the container and said pressure chamber through which the pressure may slowly equalize, a movable member upon said container actuated by pressure within the latter for opening the accelerator valve, a drip valve seat upon the outer surface of said container, a drip valve located within said intermediate chamber adapted to close upon said drip valve seat upon said container, said container having an outlet passageway formed therein communicating between the drip valve seat and the atmosphere, and means operatively associated with said movable member for closing the drip valve when the accelerator valve is opened when the pressure in the pressure chamber is suddenly reduced.

10. A dry pipe valve comprising a casing having an inlet and an outlet passage, a water clapper for closing said inlet passage, an air pressure chamber within said casing, an air clapper held in the closed position by air pressure within said pressure chamber adapted for holding the water clapper closed, an intermediate chamber within said casing separated from said pressure chamber by the air clapper, said casing having a passageway formed therein communicating between said chambers, an accelerator valve controlling said passageway between said chambers, a closed container removably mounted within said casing, a connection between the container and said pressure chamber through which the pressure may slowly equalize, a movable member upon said container actuated by pressure in the latter for opening the accelerator valve, said container having a passageway forming a drip outlet from said intermediate chamber to a point without the casing, a wall upon said container separating said drip outlet from the chamber formed within said container, a drip valve adapted for controlling said drip outlet and a yoke operatively mounted upon said movable member and embracing the container for closing the drip valve when the movable member is actuated to open the accelerator valve when the pressure in the pressure chamber is suddenly reduced.

11. A dry pipe valve comprising a casing having an inlet and an outlet passage, a water clapper for closing said inlet passage, an air pressure chamber within said casing, an air clapper held in the closed position by air pressure within said pressure chamber adapted for holding the water clapper closed, an intermediate chamber within said casing separated from said pressure chamber by the air clapper, a web in said casing separating said pressure and intermediate chambers and having a passageway therethrough, an accelerator valve located in said pressure chamber normally closing the passageway in said web, a closed container located below said web, a connection between said container and said

pressure chamber through which the pressure may slowly equalize, a movable member upon said container actuated by pressure in the latter, a rod upon said member for opening the accelerator valve, a yoke upon said rod embracing the container, a drip valve located below the container mounted upon said yoke, and a drip valve outlet pipe forming a passageway between the intermediate chamber and the atmosphere adapted to be closed by said drip valve when the yoke is moved to open the accelerator valve.

12. A dry pipe valve comprising a casing having an inlet and an outlet passage, a water clapper for closing said inlet passage, an air pressure chamber within said casing, an air clapper held in the closed position by air pressure within said pressure chamber adapted for holding the water clapper closed, an intermediate chamber within said casing separated from said pressure chamber by the air clapper, said casing having a passageway formed therein communicating between said chambers, an accelerator valve controlling said passageway between said chambers, a closed container located within said intermediate chamber, a connection between the container and said pressure chamber through which the pressure may slowly equalize, a movable diaphragm upon said container, a part upon said diaphragm associated with the accelerator valve for holding the diaphragm against outward movement by the pressure in the container when the pressures in the pressure chamber and the container are equal, and said diaphragm adapted for opening the accelerator valve by the pressure remaining in the container when the pressure in the pressure chamber is suddenly reduced below the pressure in the container.

In testimony whereof I affix my signature.

WILLIAM B. GRIFFITH.