United States Patent [19]

Glenn, Jr.

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[54] **FLUID SYSTEM**

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[51] **Int. Cl.** **A62c 35/30**; F16k 17/04

[58] **Field of Search** 137/460; 169/16–18; 239/569–572, 586

[56] **References Cited**

UNITED STATES PATENTS

820,598	5/1906	Petersen	137/460
1,171,610	2/1916	Hauer	137/460 X
1,633,108	6/1927	Knight	169/17 X
3,401,751	9/1968	Loftin et al.	169/17

FOREIGN PATENTS OR APPLICATIONS

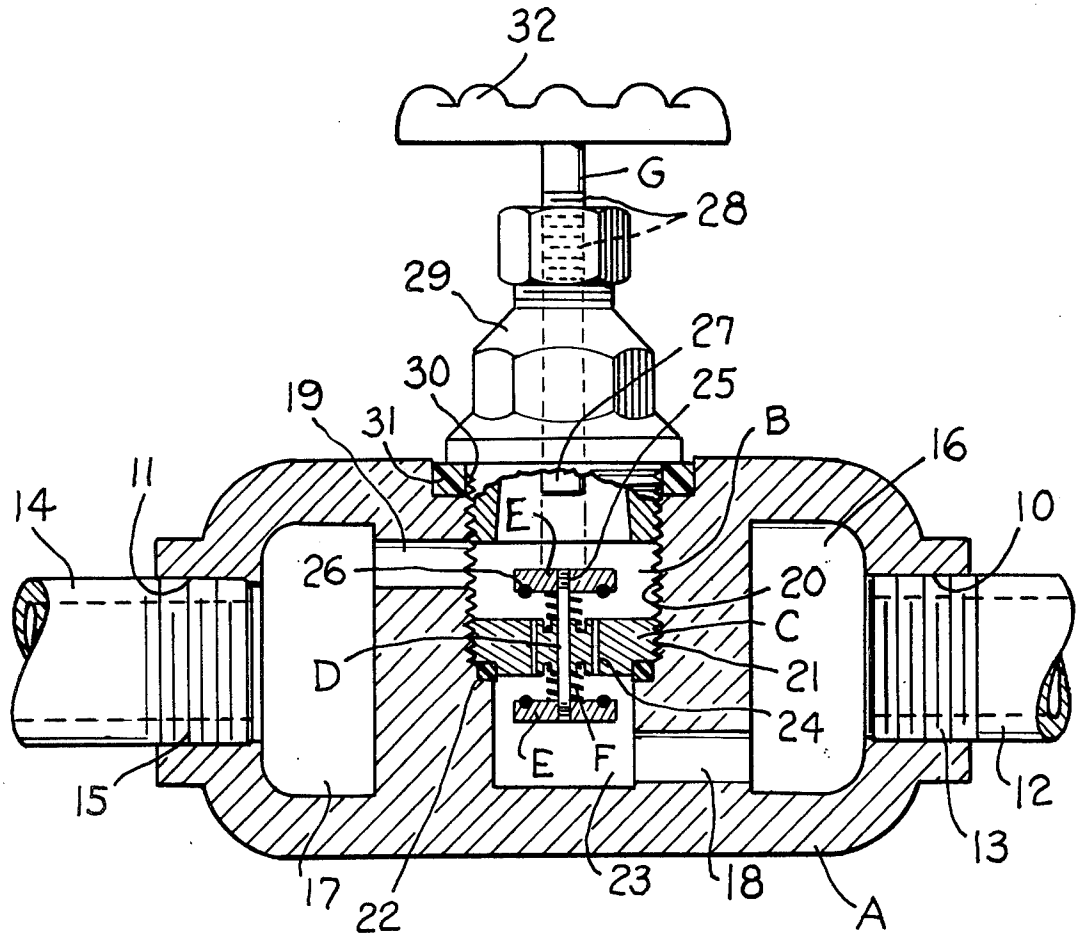
174,840	1886	France	137/460
11,196	1904	United Kingdom	137/460

Primary Examiner—Robert S. Ward, Jr.
Attorney, Agent, or Firm—Bailey & Dority

[57] **ABSTRACT**

A fluid system incorporating a dry pipe fire sprinkler system is illustrated wherein a valve has a housing with a flow path between inlet and outlet ports, a chamber being interposed in the flow path with a sealing member extending across the chamber in the flow path, a plunger extending through the sealing member at right angles thereto with resilient means normally urging closure members carried by the plunger towards open position and a manually adjustable operator carried by the housing in alignment with the plunger for maintaining the closure members in open position when moved to a position to overcome the force of the resilient means and opposing pressure of fluid delivered by the compressor permitting fluid to flow freely through the valve, the force of the fluid delivered by compressor means being sufficient to overcome the spring in the absence of a back pressure forward of the valve.

3 Claims, 5 Drawing Figures



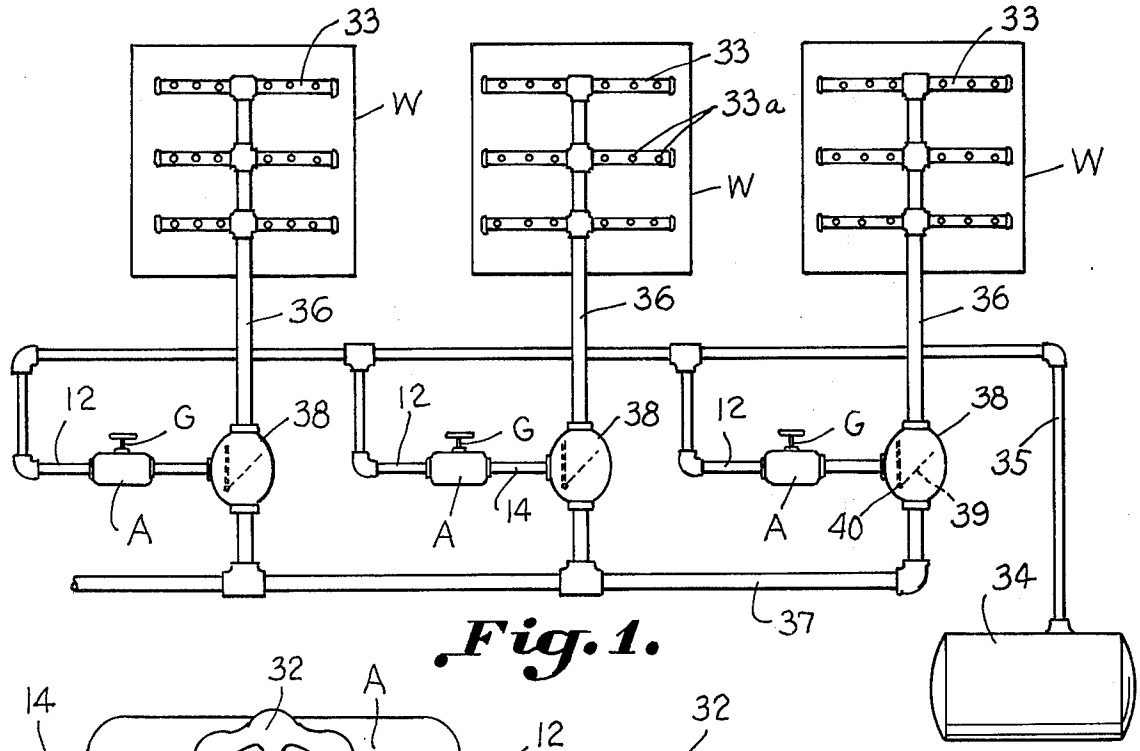


Fig. 1.

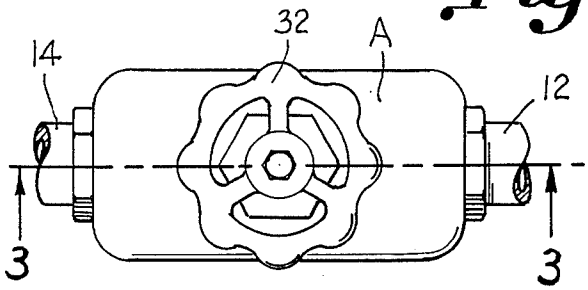


Fig. 2.

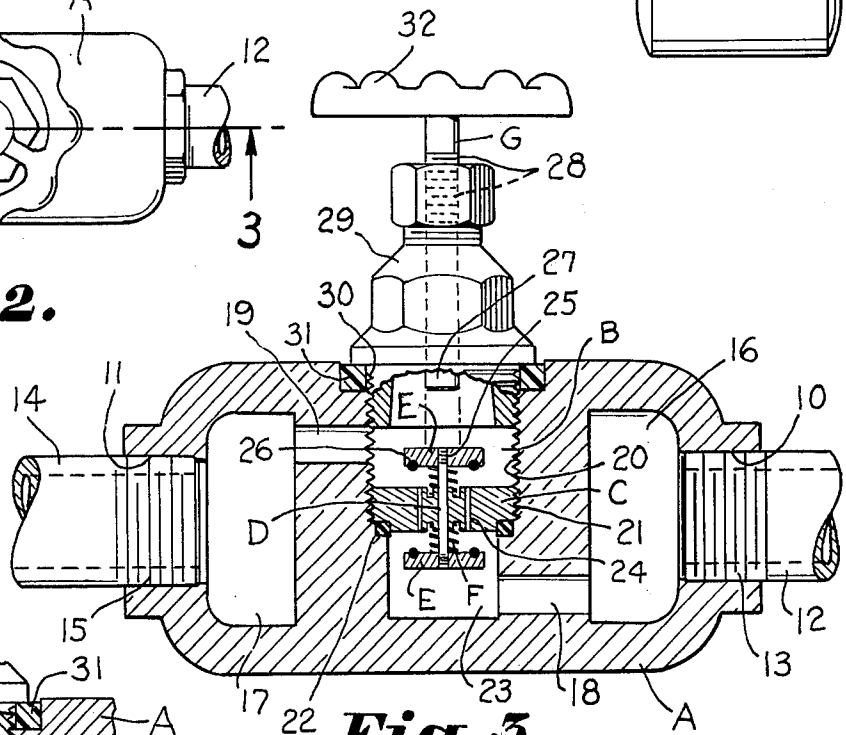


Fig. 3.

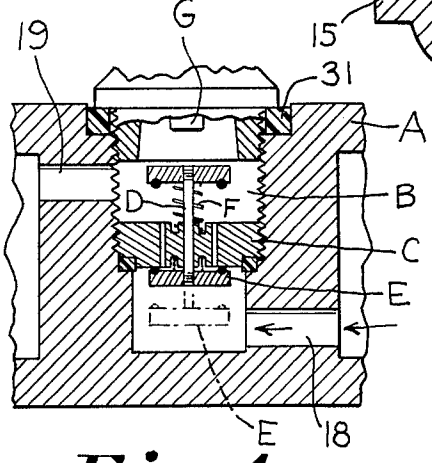


Fig. 4.

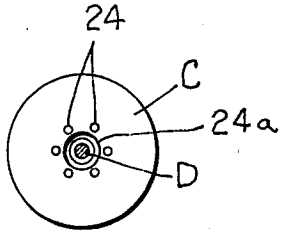


Fig. 5.

FLUID SYSTEM

BACKGROUND OF THE INVENTION

This invention relates especially to a dry pipe sprinkler system wherein a valve is provided permitting replacement of escaped air due to seepage of air in the sprinkler system within a warehouse and the like but which will shut off the supply of air automatically upon a break or opening of a sprinkler, as for example from a fire, as would cause a sufficient pressure drop forwardly of the valve.

In a dry pipe sprinkler system such as described in U.S. Pat. No. 3,401,751, the fire underwriters will not permit the sprinkler system to be filled with water except in a wet system where antifreeze is used. This is because such water would freeze during freezing weather causing damage to the system. When a sprinkler head opens due to a fire, the compressed air excapes permitting water pressure to open a trip valve. Water then enters the sprinkler system to spray the fire area. In a system for multiple warehouses a single compressor supplies air to the sprinkler systems of respective warehouses. If a break occurs in a sprinkler system of one warehouse, then one or more of the trip valves associated with other warehouses may open due to reduced air pressure. If no one was on hand, as at night, freeze damage could occur.

Accordingly, it is an important object of this invention to provide a valve for use as in a dry pipe sprinkler system for automatically shutting off the air supply to the trip valve if a leak occurs in one of the warehouses sprinkler pipes.

Another important object of this invention is to provide a valve for maintaining air pressure in the warehouse system if a leak occurs in the air supply line of a dry pipe system.

Still another important object of this invention is to keep constant air pressure in dry pipe systems when there are no pronounced leaks by permitting replacement of air as might normally be lost through seepage.

BRIEF DESCRIPTION OF THE INVENTION

It has been found that a valve having a spring biased closure member carried in a sealing member extending across a chamber interposed in the flow path, with a manual operator for overcoming the force of the spring and air back pressure to permit fluid flow into the system up to the desired operating pressure while the manual operator is in inoperative position.

BRIEF DESCRIPTION OF THE DRAWING

The construction designed to carry out the invention will be hereinafter described, together with other features hereof.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawing forming a part thereof, wherein an example of the invention is shown and wherein:

FIG. 1 is a schematic view illustrating a dry pipe fire sprinkler system constructed in accordance with the present invention,

FIG. 2 is a plan view of a valve constructed in accordance with the present invention,

FIG. 3 is a longitudinal sectional elevation taken on the line 3—3 in FIG. 2,

FIG. 4 is a sectional elevation similar to FIG. 3, illustrating the valve in a closed position, and

FIG. 5 is a plan view illustrating a closure member of the sealing member of the valve.

DESCRIPTION OF A PREFERRED EMBODIMENT

The drawing illustrates a fluid system having nozzle means for dispensing fluid and a compressor means supplying fluid under pressure to the nozzle means. A valve, interposed between the compressor means and the nozzle means so as to control the flow of fluid to the nozzle means, includes a housing A having a flow path between inlet and outlet ports therein. The housing has a chamber B interposed in the flow path. A sealing member C extends across the chamber having a passageway for fluid therein for fluid to flow therethrough. A plunger D extends through the sealing member at right angles thereto. A closure member E is carried by the plunger for closing the passageway. Resilient means F normally urge the closure member to open position but is overcome by the force of fluid delivered by the compressor means upon a pressure drop of sufficient magnitude occurring at the outlet of the housing.

In the dry pipe system illustrated, a manually adjustable operator G is threadably carried by the housing in alignment with the plunger for maintaining the closure member in open position when moved to a position to overcome the force of the resilient means and intake air pressure to permit air delivered by the compressor to flow freely through the valve.

The valve housing A is preferably constructed of noncorrosive metal, such as brass or stainless steel. A hole is drilled and threaded in each end of the housing forming inlet and outlet ports **10** and **11** respectively to receive a conduit, such as a water pipe, at each end of the housing.

Inlet pipe **12** is threadably received as at **13** within the inlet port **10** and an outlet pipe **14** is threadably received as at **15** within the outlet port **11.**

A chamber B is carried in said housing interposed in a flow path through the housing. The flow path may include an enlarged inlet portion **16** and an enlarged outlet portion **17** communicating with the inlet pipe **12** and the outlet pipe **14,** respectively. The inlet path further includes passageways **18** and **19,** respectively communicating with the chamber B. The passageway **18** communicates between the inlet area **16** and the chamber B at a lower portion thereof while the passageway communicates between the chamber B and the outlet portion **17** in an upper portion of the housing A.

The chamber B is formed by first drilling a hole at right angles to the housing from the top, as illustrated in the drawing, and then enlarging and threading an upper portion thereof as at **20.** A sealing member C extends across the chamber and has a passageway therein for air to flow therethrough. The sealing member C is threadably received as at **21** within the upper portion of the chamber **20** and is sealed as at **22** against a reduced portion of the lower portion of the chamber **23.** The sealing member has a passageway which includes a plurality of holes **24** disposed centrally therein.

A plunger D extends through the sealing member C at right angles thereto and carries a closure member E at each end thereof. The closure members E are threadably received as at **25** on each end of the plunger of valve stem D. Each of the closure members carries a sealing member such as an "O" ring **26** on the inner

surface thereof to seal against the sealing member C depending upon which surface is in sealing engagement therewith.

Resilient means F include light compression springs carried between the sealing member and respective closure members. The resilient means F normally urges the closure member to open position but such may be overcome by the force delivered as by compressor means through the inlet pipe **12** provided a pressure drop of sufficient magnitude occurs at the outlet end of the housing. Similarily the resilient means may be overcome upon the occurrence of a sufficient pressure drop at the inlet end of the housing.

A manually adjustable operator G is threadably carried by the housing in alignment with the plunger D for maintaining the closure member in open position when moved to a position to overcome the force of the springs F and inlet air pressure to permit air delivered by the compressor to flow freely through the valve. The operator G includes a vertical pusher rod **27** threadably carried as at **28** within the vertical housing **29.** The housing **29** is threadably received as at **30** within the upper portion **20** of the chamber B and is provided with sealing means **31.** A suitable handle **32** is provided to facilitate the relative vertical position of the lowermost end of the pusher rod **27.** The pusher rod **27** may be lowered to dotted line position illustrated in FIG. **3** for maintaining the closure member in open position illustrated to permit the flow of air through the valve as desired.

The particular fluid system illustrated is in the form of a fire sprinkler system as for a warehouse and includes nozzle means **33** in the form of pipe headders carrying spaced nozzles **33a.** A suitable compressor and the like is illustrated at **34** supplying fluid, in this case, air and the like, through a supply pipe or service line **35** to the various inlet pipes **12.** The air flows through the valves described above into the outlet pipes **14** for supplying air or other fluid under pressure to the respective trip valves **38.** Water is supplied through the line **37** to the trip valve **38.** Supply pipes **36** are provided in connection with each trip valve for supplying the several nozzle systems **33** located as in respective warehouses W. The trip valves have a closure member **39** hinged as at **40** which may be raised from lowered position as illustrated in FIG. **1** to the vertical position also shown in broken lines in FIG. **1** as when a break or fire occurs in the nozzle system of a warehouse.

The valves are installed in the air service line **35,** just outside of the respective trip valve **38.** The wheel stem or pusher rod **27** is run in against the plunger D. This holds both closure members E open until the desired system pressure is reached. The wheel stem is then run all the way out to allow the two valve heads to be free to function. Unless a leak occurs in the system, the two closure members E will remain open. This allows a small, but continuous air flow into the system, to replace any seepage that might exist and thereby maintain the year around desired system pressure.

A break or opening in one warehouse system will cause the intake closure member E valve to close, as no opposing pressure is retained in the exhaused associated system. This shuts off the air supply from the sprinkler of the disabled building. This allows the other building systems to continue receiving air and consequently not to trip. When the intake closure member E closes due to a break, water is not impeded, going to a fire, as no compressed air is mixed with the water. In reverse to the above, should a break occur in the service line, all exhaust closure members in all warehouses would seal, thus holding the compressed air in all of the buildings, until repairs can be made.

This same valve, by substituting a stronger resilient means could be used by filling stations and possibly others to shut off the air at a compressor tank in the event of a break in the service line. This would cut off the compressor, and prevent it from running continuously all night which could cause severe damage. The several functions of this valve, when installed in a fire protection sprinkler system, will greatly improve the efficiency of any system, including wet pipe systems.

While a preferred embodiment of the invention has been described using specific terms, such description is for illustrative purposes only, and it is to be understood that changes and variations may be made without departing from the spirit or scope of the following claims.

What is claimed is:

1. For use in a dry pipe fire sprinkler system having several sprinkler nozzle systems for dispensing water and a compressor supplying air under pressure to the sprinkler nozzle systems, a valve interposed between said compressor and each of said nozzle systems so as to control the flow of air to said nozzle systems comprising:

A. a housing having a flow path between inlet and outlet ports in said housing;

B. said housing having a chamber interposed in said flow path;

C. a sealing member extending across said chamber having a passageway for air to flow therethrough;

D. a plunger extending through said sealing member at right angles thereto;

E. a closure member carried by said plunger for closing said passageway;

F. resilient means normally urging said closure member to open position but which is overcome by the force of air delivered by said compressor means upon a pressure drop of sufficient magnitude occurring at the outlet of said housing; and

G. a manually adjustable operator threadably carried by said housing in alignment with said plunger being operable to maintain said closure member in open position when moved to a position to overcome the force of said resilient means and the force of air delivered by said compressor to permit air delivered by said compressor to flow freely through the valve to build up air pressure in the nozzle system associated therewith.

2. The structure set forth in claim **1** including: a second closure member carried by said plunger on a side of said sealing member opposite said first mentioned closure member, and second resilient means normally urging said second closure member to open position but which is overcome by the force of air in the nozzle system associated therewith should air pressure be reduced on the compressor side of the valve.

3. For use in a fluid system having nozzle means for dispensing fluid from a source and a supply means for supplying fluid under pressure to said nozzle means, a valve interposed between said supply means and said nozzle means so as to control the flow of fluid to said nozzle means comprising:

A. a housing having a flow path between inlet and outlet ports in said housing;

B. said housing having a chamber interposed in said flor path;

C. a sealing member extending across said chamber having a passageway therein for fluid to flow therethrough;

D. a plunger extending through said sealing member at right angles thereto;

E. a closure member carried by said plunger for closing said passageway;

F. resilient means normally urging said closure member to open position but which is overcome by the force of fluid delivered by said supply means upon a pressure drop of sufficient magnitude occurring at the outlet of said housing;

G. a manually adjustable operator threadably carried by said housing in alignment with said plunger for maintaining said closure member in open position when moved to a first position to overcome the force of said resilient means and intake fluid pressure to permit fluid delivered by said compressor to flow freely through the valve; and

H. said manually adjustable operator being moved to a second position during normal operation of said valve permitting said closure member to freely open and close depending on a pressure drop in said housing.

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