Oct. 10, 1967 P. H. MERDINYAN 3,346,051

PILOT OPERATED FIRE PROTECTION DEVICE

Filed Sept. 2, 1965

FIG. 1

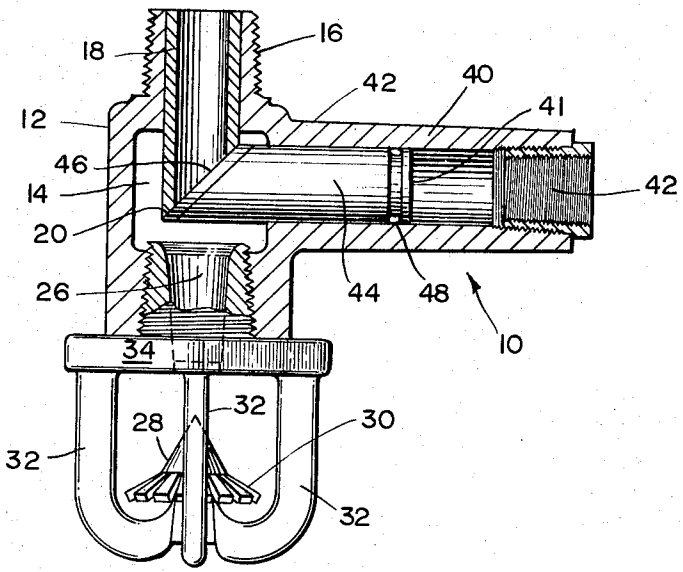
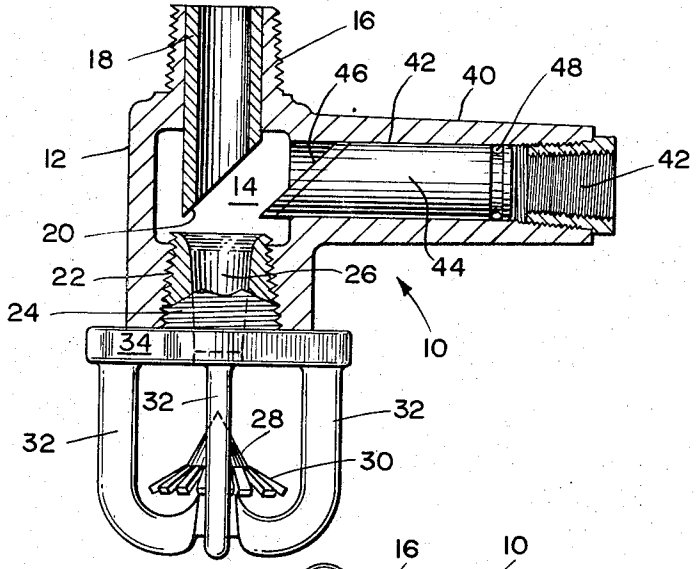


FIG. 2



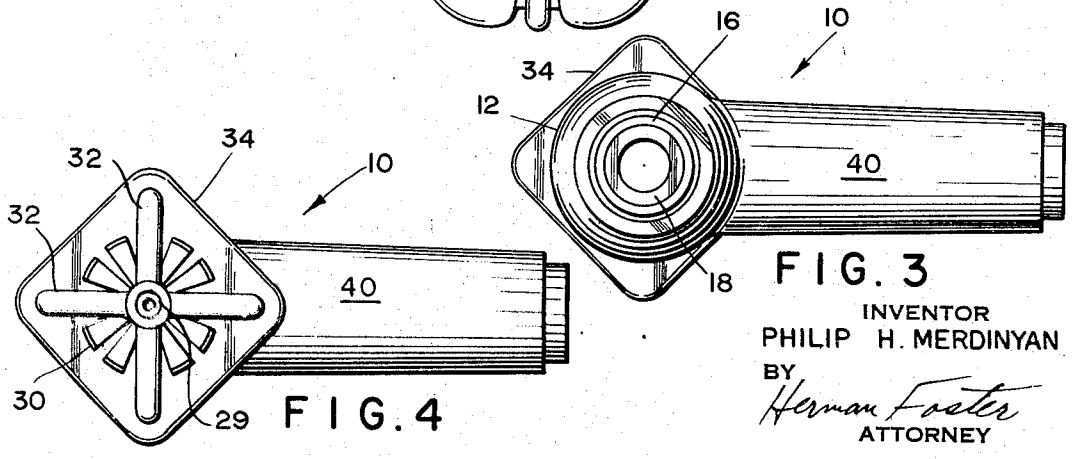


FIG. 3

FIG. 4

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3,346,051

Patented Oct. 10, 1967

3,346,051

PILOT OPERATED FIRE PROTECTION DEVICE

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Filed Sept. 2, 1965, Ser. No. 484,581
7 Claims. (Cl. 169—20)

ABSTRACT OF THE DISCLOSURE

A fire protection valve containing a sealing piston held in closed position on the valve inlet by pilot fluid pressure which when released in response to an alarm condition permits the piston to move out of the way of water flow discharge of the valve.

This invention relates to a fire protection device and more particularly to a pilot operated discharge outlet and valve for use in a fire protection system.

On board ships or other seagoing vessels it has been the practice in the past to utilize a fire protection system which is known as a deluge system. In operation such a system utilizes a main valve known as a deluge valve near the source of water with the remainder of the system nearer to the sprinklers being open to atmosphere. Upon actuation the deluge valve is tripped open and the water passes through the system to the sprinklers for discharge.

It was found on some ships, particularly combat vessels, that the time consumed for the water to travel from the deluge valve to the sprinklers, often permitted fires in such highly flammable areas as an ammunition magazine to get out of hand and thus cause considerable damage.

As an answer to this problem wet pipe or primed systems have been utilized to give greater speed of response to the fire protection systems when a fire occurred. These systems gave rise to a new problem in that the rolling and bucking of the seagoing vessels caused momentary high pressure surges in these systems and led to considerable leakage from the discharge outlet closures.

Present practice has therefore led to the adoption of primed systems with pilot operated sealed discharge outlets to neutralize the pressure surges. The line pressure, as it increases, is normally utilized to increase the sealing pressure of the discharge outlet and thus prevent leakage.

A device recently placed on the market utilizes a hollow body separated by a transverse body section to form a secondary chamber in said body with a valve element reciprocably mounted in said secondary chamber and registrable with an exit opening. This device because of the tortuous flow passage between its inlet and exit is subject to a large pressure drop, thus requiring an increased supply pressure to maintain a desirable density of discharge, or the acceptance of a lower discharge density than might normally be considered desirable under accepted fire protection standards.

Moreover, since the major components of the above described device are all linearly oriented, the overall length of the device is greater than prior discharge devices. This imposes a loss of head room. Since space in a ship is limited, the further loss of head room can affect its efficient operation.

The present invention overcomes these problems in that the inlet and exit portions of the discharge outlet have a direct linear open relationship which maintains the greater flow efficiency that such an arrangement offers. In addition the present invention utilizes a pilot operated piston which is movable laterally out of the flow path of the main water flow through the sprinkler, thus precluding the possibility that the sprinkler head might inadvertantly be reclosed by the pilot piston as result of the force of gravity before it is considered desirable to do so. Further, such a lateral orientation makes it possible to hold the total length of the present invention to that of the known prior devices. This provides a greater flexibility in its use since it may be interchanged with older prior devices without a further loss of head room.

Further objects and advantages of the present invention will become apparent from the following description and the accompanying drawing which describe and show for illustrative purposes only a preferred embodiment of the invention.

In the drawing:

FIG. 1 is a vertical partial section of the present invention with its pilot valve retaining the dischrage outlet in a closed position.

FIG. 2 is a vertical partial section view similar to that of FIG. 1 but showing the pilot actuated piston in an open position.

FIG. 3 is a top plan view of the present invention, and

FIG. 4 is a bottom plan view of the present invention.

Referring to the drawing in greater particularity it is seen that the pilot operated discharge outlet generally designated as **10** comprises a body portion **12** which is hollow and contains a junction chamber **14**. At the upper portion of the body is a threaded boss **16** which is joined into the main water line of the fire protection system (not shown). Within the threaded boss **16** a hollow flow tube **18** is fastened either by soldering or other means well known in the art. This tube **18** extends into junction chamber **14** and terminates in a sealing seat **20** which is mitered at approximately 45°, as shown in the drawings. It will be understood that in lieu of tube **18** the seat **20** could be cast as an integral part of the body portion **12**.

The lower portion of the body **12** has an internally threaded opening **22** into which a nozzle **24** is threaded and drawn into sealing relation because of the tapered threads between the opening and the nozzle. The nozzle **24** contains a flow passage **26** which is directly in line with the flow passage of the insert tube **18**. Water leaving the nozzle opening **26** in a stream will impinge on the cone **28** and deflector plate **30** to be dispersed in a desired spray pattern. The cone **28** and the deflector **30** are held together by rivetting at **29** a pin (not shown) which is integral with and extends from cone **28**. These are joined to and maintained in a rigid properly oriented position by passing said pin through the junction of a plurality of arms **32** which are fastened to an upper base portion **34**; the latter being joined to the nozzle **24**.

Extending laterally from a side of the body portion **12** is an elongated tube **40** which is hollow, and internally threaded at its outer portion only, as shown at **42**. The elongated tube **40** is shown here as containing a smooth cylindrical bore **42**. Within the bore is a slidable cylindrical piston **44** which has a sealing seat **46** at its internal end properly mitered to meet the mitered seat **20** on tube **18** and thus maintain the inlet tube in a sealed relationship. An O-ring **48** set in a groove adjacent the outer end of piston **44** acts as a seal to prevent leakage from the pilot system.

In operation a plurality of discharge outlets such as is shown in FIG. 1 is disposed about the hazard to be protected. The pilot tube **40** is connected at **42** to a liquid supply (in the usual case, a water supply) which is not shown. Because the inner diameter of the tube **40** is preferably larger than the inner diameter of the inlet passageway of inlet tube **18**, the force imposed by the main line water pressure is greater on the rear face **41** than it is on seating face **46**. Thus the piston **44** is urged to a closed position into a sealing relationship with seat **20**. Any pressure surges in the main line water will act

equally on the face **41** and face **46** thus holding the piston **44** in its sealing position.

Should an alarm be initiated the alarm device (not shown) normally will act to vent the pilot circuit from tube **40** (circuit not shown) to atmosphere, thus releasing the retaining pressure on face **41**. Without any counteracting force, the liquid in the main line under pressure will impinge on the slanted face **46** and will force the piston **44** to an open position as shown in FIG. 2 thus permitting unobstructed flow from tube **18** to the flow passage **26** of nozzle **24**.

Almost instantaneous flow will occur as the piston **44** moves to its open position. The water passing through the nozzle **24** will then be dispersed by the cone **28** and deflector plate **30** and impinge in a predetermined pattern on the protected area.

It is to be understood that the above description and accompanying drawings are to be deemed primarily as illustrative of the preferred mode presently contemplated of carrying out the principles of the invention, and that the device described and illustrated may be modified or altered in its form, proportions, detail of construction and arrangement of parts without departing from the spirit and scope of the invention as defined in the appended claims.

What I claim and desire to secure by Letters Patent is:

1. A discharge outlet and valve for a fire protection system comprising:

(a) a hollow body containing an unobstructed junction chamber therein,

(b) an inlet passageway extending through a wall of said body and terminating at a seating lip defined by the end of the wall of said inlet passageway within said junction chamber,

(c) an outlet passageway colinearly oriented with respect to said inlet passageway, and spaced therefrom, extending from said junction chamber through an opposite second wall of said body,

(d) a pilot passageway extending from said junction chamber through a third wall of said body intermediate said inlet and outlet passageways, said pilot passageway:

(i) being oriented laterally to said inlet and outlet passageways,

(ii) containing a reciprocably slidable fluid pressure actuated piston sealingly engaging the walls of said pilot passageway, said piston:

(A) having a seating face at its end extending toward said junction chamber, adapted to sealingly engage said seating lip,

(e) at least one of said seating lip and said seating face being angled substantially less than 90° and substantially more than 0° to the axis of its related passageway.

2. A discharge outlet and valve for a fire protection system comprising:

(a) a hollow body containing an unobstructed junction chamber therein,

(b) two aligned, spaced, separate passageways through opposed walls of said body, communicating with said junction chamber:

(i) one of said passageways being an inlet and having a seating lip defined by the end of the inlet wall in said junction chamber slantedly oriented with respect to the axis of said inlet passageway at an angle substantially less than 90° and substantially more than 0°,

(ii) the other of said passageways being an outlet nozzle,

(c) a pilot bore communicating with said junction chamber, through a third wall of said body, at a place intermediate said two passageways, and adapted to be connected to a pilot line, said pilot bore:

(i) being oriented laterally to said two passageways,

(ii) containing a reciprocably slidable fluid pressure actuated piston sealingly engaging the walls of said bore, said piston:

(A) having a seating face at its end closest to said junction chamber:

(i) said seating face being slanted to correspond to said seating lip and adapted to engage said seating lip in sealing relation.

3. A discharge outlet and valve for a fire protection system comprising:

(a) a hollow body containing an unobstructed junction chamber therein,

(b) an inlet passageway extending through a wall of said body and terminating at a seating lip defined by the end of the wall of said inlet pasageway within said junction chamber:

(i) said seating lip being slantedly oriented with respect to the axis of said passageway at an angle substantially less than 90° and substantially more than 0°,

(c) an outlet passageway colinearly oriented with respect to said inlet passageway, and spaced therefrom, extending from said junction chamber through an opposite second wall of said body,

(d) a pilot passageway extending from said junction chamber through a third wall of said body intermediate said inlet and outlet passageway and laterallyto said inlet and outlet passageways, said pilot passageway:

(i) being of a larger cross-sectional area than the cross-sectional area of said inlet passageway,

(ii) containing a reciprocably slidable fluid pressure actuated piston sealingly engaging the walls of said pilot passageway, said piston:

(A) having an angled seating face at its inner end adapted to sealingly engage said seating lip.

4. A discharge outlet and valve for a fire protection system comprising:

(a) a hollow body containing an unobstructed junction chamber therein,

(b) an inlet passageway through a wall of said body having:

(i) an outer end exteriorly of said body,

(ii) an inner end within said body:

(A) said inner end terminating at and defining a seating lip within said junction chamber;

(i) said seating lip being slantedly oriented with respect to the axis of said passageway at an angle substantially less than 90° and substantially more than 0°,

(c) an outlet nozzle in a side of said body opposite to the side containing said inlet passageway, said nozzle:

(i) being linearly oriented with respect to said inlet passageway,

(ii) being spaced from said inner end of said inlet passageway,

(iii) extending from said junction chamber to the exterior of said body,

(d) a pilot tube extending laterally outwardly of said body and having a smooth passageway therein, said passageway:

(i) extending from said junction chamber to the outer end of said tube,

(ii) being of a larger cross-sectional area than the cross-sectional area of said inlet passageway,

(iii) containing a reciprocably slidable fluid pressure actuated piston sealinglyl engaging the walls of said passageway, said piston:

(A) having an angled seating face at its inner

end adapted to sealingly engage said seating lip,

(e) means joined to said body exteriorly of said nozzle and in spaced relation to said nozzle to uniformly disperse any liquid discharge from said nozzle.

5. A discharge outlet and valve for a fire protection system comprising:

(a) a hollow body containing an unobstructed junction chamber therein,

(b) two aligned spaced separate passageways, through opposed walls of said body, communicating with said junction chamber as an inlet and an outlet:

(i) one of said passageways having a seating lip defined by the end of the inlet wall in said junction chamber slantedly oriented with respect to the axis of said one passageway at an angle substantially less than 90° and substantially more than 0°,

(c) a third passageway communicating with said junction chamber at a place intermediate said two aligned passageways, and adapted to be connected to a pilot line, said third passageway:

(i) being oriented substantially perpendicular to said two passageways,

(ii) containing a reciprocably slidable fluid pressure actuated piston sealingly engaging the walls of said third passageway, said piston:

(A) having a seating face at its end closest to said junction chamber:

(i) said seating face being slanted to face said inlet and to correspond to said seating lip and adapted to engage said seating lip in sealing relation.

6. A discharge outlet and valve for a fire protection system comprising:

(a) a hollow body containing an unobstructed junction chamber therein,

(b) two straight aligned spaced separate passageways, through opposed walls of said body, communicating with said junction chamber:

(i) one of said passageways being an inlet and having a seating lip defined by the end of the inlet wall in said junction chamber slantedly

oriented with respect to the axis of said inlet passageway at an angle of substantially 45°,

(ii) the other of said passageways being an outlet,

(c) a straight pilot bore communicating with said junction chamber, through a third wall of said body, at place intermediate said two passageways, and adapted to be connected to a pilot line, said pilot bore:

(i) being oriented perpendicular to said two passageways:

(A) the axes of said passageways, the axis of said bore, and the axis of said seating lip perpendicular thereto, all lying in a single plane,

(ii) containing a reciprocably slidable elongated fluid pressure actuated piston sealingly engaging the walls of said bore, said piston:

(A) having a seating face at its end closest to said junction chamber:

(i) said seating face being slanted to face said inlet and to correspond to said seating lip and adapted to engage said seating lip in sealing relation,

(d) deflector means joined to said body exteriorly of said outlet and in spaced relation to said outlet for uniformly dispersing a liquid discharge from said outlet.

7. A sprinkler head and valve as called for in claim **6** wherein: said pilot bore and piston contained therein are of a larger cross-sectional area than said inlet passageway.

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