

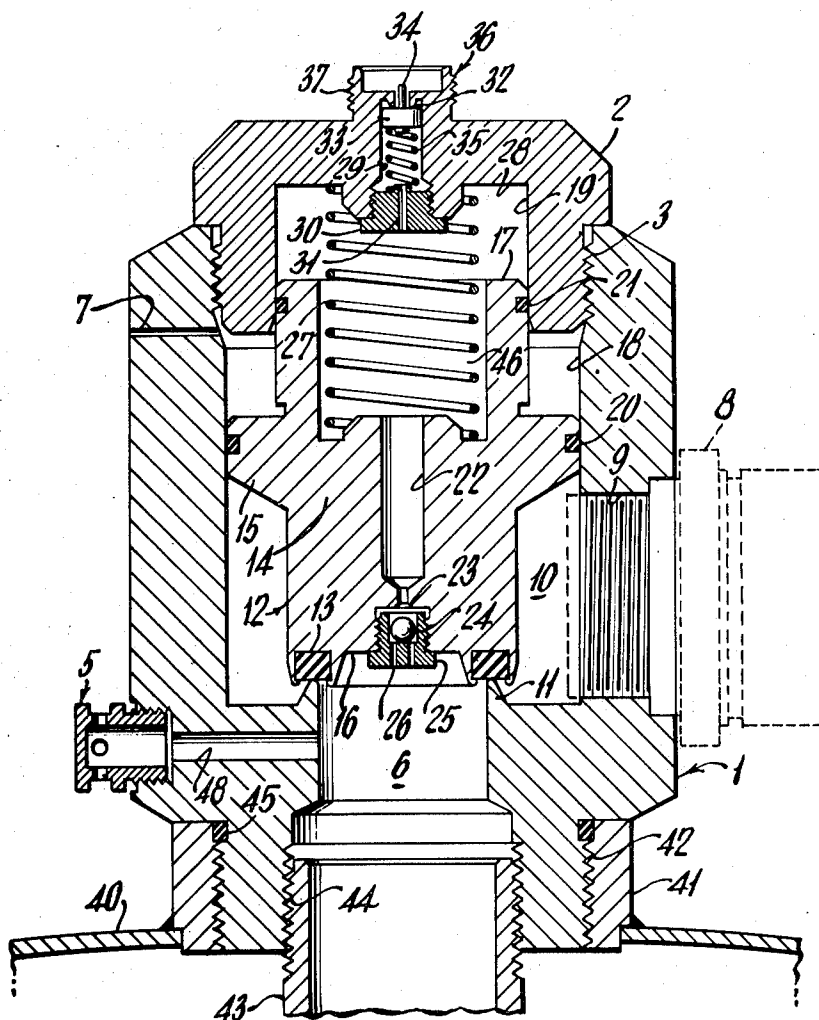
- [54] **FIRE EXTINGUISHER DISCHARGE VALVE**
[75] Inventor: **Charles F. Willms**, Rutherford, N.J.
[73] Assignee: **Norris Industries, Inc.**, Los Angeles, Calif.
[22] Filed: **Jan. 25, 1974**
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- [52] U.S. Cl. **169/20, 251/43**
[51] Int. Cl. **F16k 31/12**
[58] Field of Search **169/19, 20, 30, 5; 251/43**

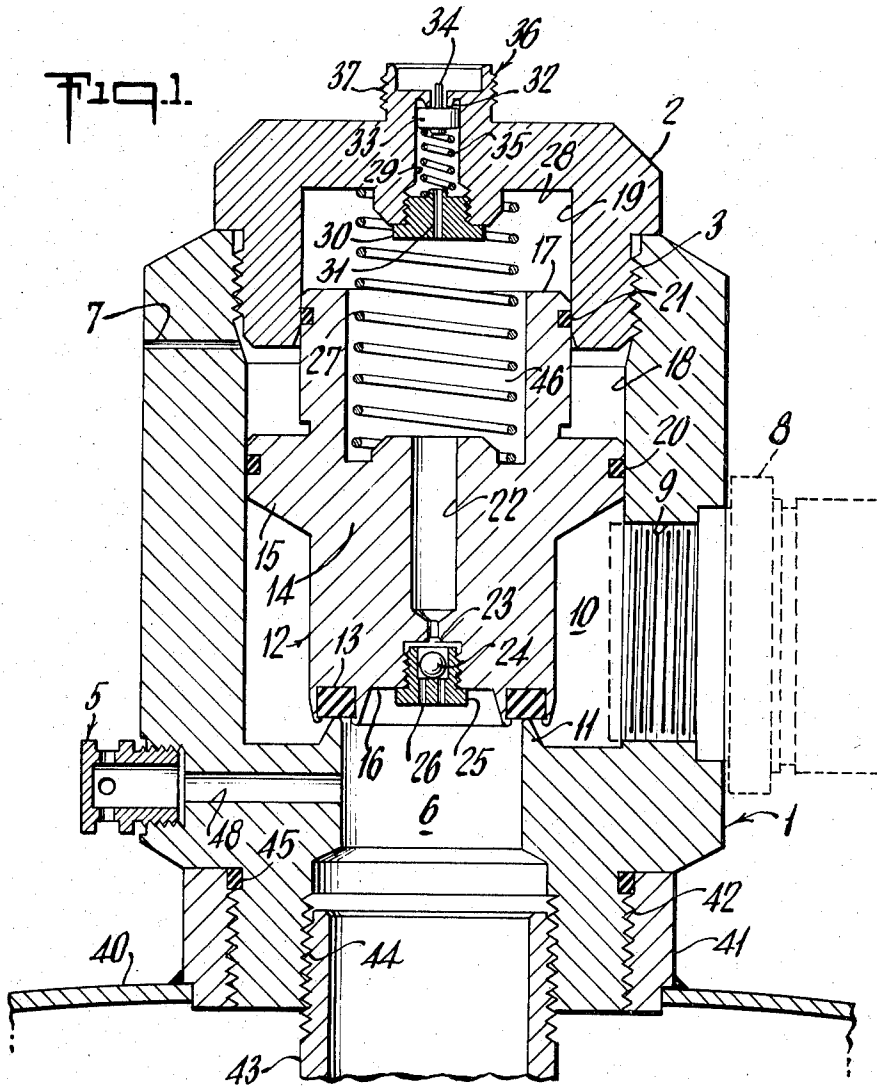
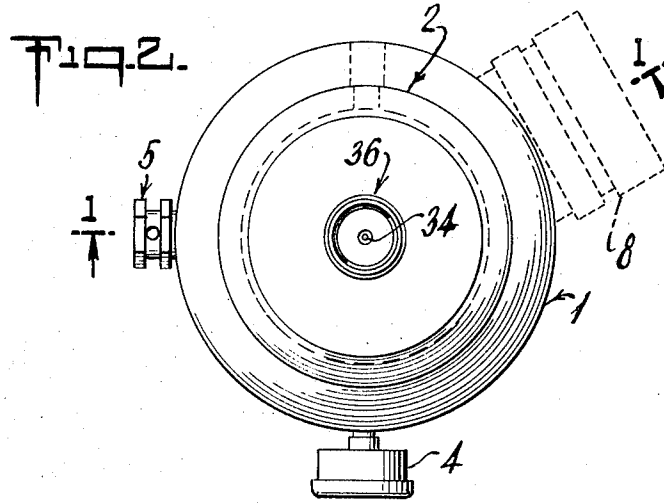
- [56] **References Cited**
UNITED STATES PATENTS
- | | | | |
|-----------|---------|-------|----------|
| 3,610,571 | 10/1971 | Cisco | 251/43 X |
| 3,674,237 | 7/1972 | Heyer | 251/43 X |

Primary Examiner—M. Henson Wood, Jr.
Assistant Examiner—Michael Mar
Attorney, Agent, or Firm—Edward T. Connors

[57] **ABSTRACT**
A discharge valve for each of a plurality of manifold connected containers for fire extinguishing fluid, the discharge valve including a main valve pressure seated by fluid in the container to which it is attached and openable by pressure in the valve outlet from the manifold. This action is achieved by use of a double faced two diameter piston integral with the main valve member. A combination filling and pilot valve is included so that each container may be separately filled while connected to the manifold. The pilot valve may be actuated to discharge one container to provide manifold pressure for discharge of the remaining cylinders.

10 Claims, 2 Drawing Figures





FIRE EXTINGUISHER DISCHARGE VALVE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a fire extinguisher discharge valve for use on each of a plurality of manifolded containers of fire extinguishing fluid piped to convey fire extinguishing fluid to a hazard to be protected against fire.

While the discharge valve is suitable for practically all fire extinguishing agents it is particularly suitable for the agent identified as bromotrifluoromethane which is superpressurized with nitrogen to a total pressure of 360 to 600 lbs/sq. inch to insure discharge of the system. It is believed that this fire extinguishing agent extinguishes by a chemical action. The halogen compound reacts with the transient combustion products which are responsible for rapid and violent flame propagation. This reaction terminates the combustion chain reaction and thereby stops the flame propagation with relatively small quantities of extinguishing agent. However, for most effective extinguishing operation it is important that the fire extinguishing agent be dispersed into the vicinity of a hazard to be protected against fire at a rapid rate normally in about 10 seconds.

2. Description of the Prior Art

The basic patent in this field was probably S. E. Allen et al. U.S. Pat. No. 1,827,723 issued to the predecessor of the assignee hereof. In this patent manifolded fire extinguishing fluid containers are each provided with a disc type seal adapted to be ruptured by a cutter which is piston actuated responsive to manifold pressure. A discharge of the initial cylinder is accomplished by manual action of the piston cutter for one container. As the art progressed the disc type seal was replaced by pressure seated valves such as shown in F. B. Allen et al. U.S. Pat. No. 2,972,466 also issued to the predecessor of the assignee hereof. In this patent a main valve is held closed by a piston pressurized by container pressure. A pilot valve is actuated to release pressure from behind the piston so that the main valve is opened by container pressure. The pilot valve may be piston operated by manifold pressure. U.S. Pat. No. 3,254,870 in which the patentees are Walter M. Haessler and Charles F. Willms, the patentee herein, likewise issued to the predecessor of the assignee hereof, shows a combination piston and discharge valve held against the valve seat by cylinder pressure which may be released by actuation of a pilot valve. The pilot valve may be piston actuated by manifold pressure.

While these discharge valves have performed satisfactorily it has been necessary to use rather complex piping from the manifold to the piston for actuation of the pilot valve. Further, it has been difficult to charge the containers as the practical approach has been to disconnect the outlet connection to the manifold and charge through the outlet. Another disadvantage has been that the main valve, when opened, was not locked open until the container was fully discharged.

SUMMARY OF THE INVENTION

The present invention aims to overcome the difficulties and disadvantages of prior constructions by providing a fire extinguisher discharge valve directly operable by back pressure in the manifold without the use of extraneous fluid passages. Further, a construction is pro-

vided in which the main valve is locked open by its own container pressure until the container has been completely discharged for practical purposes. Still further, the discharge valve may be manually operated by a pilot valve which performs the dual purpose of acting as a check valve so that the container may be filled therethrough without the necessity of disconnecting the outlet connection to the manifold.

The discharge valve may be used on individual containers for the protection of small hazards as well as for slave operation of multiple containers for large hazards.

Other objects and advantages of the invention will be apparent from the following description and from the accompanying drawing which shows, by way of example, an embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an elevational cross-sectional view of a fire extinguisher discharge valve in accordance with the invention.

FIG. 2 is a reduced size top view of the valve shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings there is shown in FIG. 1 a fire extinguisher discharge valve in accordance with the invention. The discharge valve is formed in two parts, lower portion 1 and upper portion 2 threadedly engaged as indicated at 3. As may be seen from FIGS. 1 and 2 the discharge valve is fitted with a conventional pressure gauge 4 and safety disc outlet 5 both in fluid communication with the inlet portion of the discharge valve 6. Also provided is a vent 7 described more fully later herein. An outlet fitting 8 of conventional construction may be connected in the usual manner to a manifold connected to piping leading to a hazard to be protected against fire. All parts of the discharge valve may be advantageously made from bar stock using high speed machinery.

Referring to FIG. 2 the outlet fitting 8 is threadedly engaged as indicated at 9 in the wall of the lower portion 2 of the valve body. A main valve seat 11 defines the inlet portion 6 and outlet portion 10 of the fluid passage through the discharge valve and is arranged to face the outlet portion 10. A main valve member 12 is adapted to engage the main valve seat 11 from the outlet portion 10 of the valve body. As is usual the main valve 12 is provided with a seating surface 13. A front and rear faced two diameter piston member 14 is made integral with the main valve member 12. The front face at the larger end of the piston member 14 is made in two portions, the outer portion being indicated by the numeral 15 and the center portion within the area contacted by the valve seat 11 being indicated by the numeral 16. The rear face at the smaller end of the piston member 14 is generally indicated by the numeral 17.

The lower portion of the housing 1 is formed to provide a cylinder 18 of a diameter to receive the larger end of the piston member 14. The upper portion 2 of the housing is formed to provide a cylinder 19 of a diameter to receive the smaller end of the piston member 14. Thus the cylinder 14 has two diameters, that of the upper portion 19 and that of the lower portion 18. Correspondingly, the piston member 14 has two diameters that of the upper portion 17 and of the lower portion

15. The piston member 14 is sealingly and slideably mounted in the cylinders by O-rings 20 and 21.

Pressure equalizing fluid passage means 22 leads from the central portion 16 of the piston member 14 to the rear face 17 thereof. Fluid passage valve seat means 23 is formed at the lower end of the fluid passage 22. A ball check valve member 24 is adapted to be maintained in valve engaging relationship with the valve seat 23 by a retainer member 25 threadedly engaged with the wall of the fluid passage, the retainer member 25 being apertured as indicated at 26. The ball valve member 24 is normally in the open position so as to readily permit the passage of fluid downwardly from the back face of the piston member. However, pressure inwardly through the aperture 26 urges the ball member 24 against its seat 23 to seal the fluid passage 22.

The piston valve member 12 is urged downwardly against the main valve seat 11 by a spring 27 abutting between the base of a recess in the rear face 17 of the piston member 14 at one end and against the inner surface of end 28 of the cylinder. In order to provide for a combination filling and pilot valve member the end 28 is apertured to provide a fluid passage 29 which has at its lower end a piston stop member 30 apertured as indicated at 31. A valve seat 32 is positioned about the upper end of the fluid passage 29 to receive a valve member 33 having an operating stem 34. The valve member 33 is urged against its seat 32 by a spring 35. The cap member 28 is fitted with a boss 36 which may have a threaded outer surface as indicated at 37 to receive a conventional filling attachment member, not shown, and, alternatively, to receive a suitable actuating head not shown and, as is usual in the art, for the actuation of the pilot valve member 33.

The discharge valve is adapted to be mounted on a container 40 having a boss 41 positioned about the discharge opening for the container, the boss 41 being threaded as indicated at 42 to receive a correspondingly threaded end of the lower portion of the valve body. A siphon tube 43 is threadedly engaged or press-fitted into an enlarged portion 44 of the lower portion 1 of the valve body in fluid communication with the inlet portion 6. A seal between the valve body and the boss 41 is achieved by the use of a gasket 45. The recoil device 5 is in fluid communication with the inlet portion 6 by fluid passage 46. Another fluid passage, not shown, provides fluid communication with the inlet portion 6 for the pressure gauge 4.

The operation of the discharge valve in accordance with the invention will be described first with reference to the filling operation for the container 40. A suitable filling head incorporating a valve depressor is threadedly engaged with said threaded boss 36. The valve 33 is opened and filling fluid is passed through the fluid passage 29 into the space 46 in front of the rear face 17 of the piston member 14 which has normally been urged downwardly by the spring 27 so that the main valve member 12 is closed against its seat 11. Filling fluid is then passed through the passage 22 past the ball check 24 into the inlet portion 6 of the valve body and thence through the siphon tube 43 into the container 40. As the pressure builds up in the container 40 it will be noted that the valve member 12 is increasingly urged against its seat by pressure on the rear face 17 of the piston inasmuch as its diameter is greater than the diameter of the valve seat 11. Accordingly no fluid is lost into the outlet 10. The filling head is removed from

the threaded boss 34 and replaced by the usual discharge head having operating means adapted to engage stem 34 of the valve 33 for the unseating thereof.

A discharge operation of the discharge valve may be achieved by depressing the valve stem 34 which allows pressure to drop in the area 46 at the rear of the piston member 14. The pressure of the container 40 against the central portion 16 of the face of the piston then causes the valve 12 to become unseated. As the piston member 14 moves upwardly fluid pressure from the container 40 bears against the outer portion 15 of the front surface of the piston member urging it upwardly. A build-up of pressure in the space 46 is vented back through the fluid passage 22. As the pressure is released from the space 46 by said opening of the pilot check valve 33 the pressure of fluid from the cylinder entering through the apertures 26 urges the ball check 24 against its seat thereby preventing further passage of fluid from the container 40 from entering into the space behind the piston 46. By reason of the pressure on the greater area of the front face of the piston 14, including the area of its outer portion 15 and the area of its center portion 16 defined by the area of the valve seat 11, the valve member 12 is locked in the open position. Thus, there is no change of a reclosing of the main valve 12 as long as there is pressure in the container 40.

Any fluid trapped in the upper end of the cylinder 18 is vented through the passage 7 into the atmosphere. It should be noted that the piston member 12 is held in the fully open position and will remain so against the action of the spring 27 until the cylinder 40 has been substantially emptied. Inasmuch as the fluid in the container is super-pressurized by a gas such as nitrogen, substantially all of the fire extinguishing fluid will be evicted before the main valve 12 becomes closed as the pressure in the cylinder 40 is reduced and the spring 27 returns the piston member into its main valve seat closing position.

In the event the discharge of the filled container is to be achieved by a built up of pressure in the manifold from the discharge of an adjoining cylinder the back pressure through the outlet bears against the outermost portion 15 of the piston valve member which, by reason of its greater area, overcomes the cylinder pressure bearing against the rear piston face 17 so that the valve member 12 is moved upwardly away from its seat 11. Any pressure developing in the rear of the piston 46 is equalized with the cylinder pressure through the pressure equalizing passage 22.

From the preceding description it will be seen that the present invention provides a fire extinguishing valve which may be readily charged through the combination filling and pilot check valve without the necessity of disconnecting the outlet connection to the manifold. Further, the main valve when once opened is locked open until the container is fully discharged. The main valve may be actuated by back pressure in the manifold and is as before fully locked open until the container has been emptied. The construction is such that a fast discharge is possible because the main valve is moved away from the discharge fluid so that there is a clear unimpeded flow from the inlet portion of the valve member through to the outlet, thus providing a desired high discharge rate.

While the invention has been described and illustrated with reference to a specific embodiment thereof,

it will be understood that other embodiments may be resorted to without departing from the invention. Therefore, the form of the invention set out above should be considered as illustrative and not as limiting the scope of the following claims.

I claim:

1. A fire extinguisher discharge valve adapted to be attached to the outlet of a container for fire extinguisher fluid, said discharge valve comprising a housing having an inlet and an outlet with a main fluid passage therebetween, a main valve seat defining inlet and outlet portions of said main fluid passage and facing said outlet portion, a main valve member adapted to engage said main valve seat from the outlet portion, a front and rear faced two diameter piston member integral with said main valve member, said front face having outer and central portions, said main valve member forming said central portion, two diameter cylinder means in said housing on the outlet side of said main valve seat, said two diameter piston sealingly and slideably mounted in said two diameter cylinder for movement of said main valve member against and away from its seat, the area of the rear face of said piston member greater than the area of said main valve seat, the area of said front face outer portion of greater area than said area of said rear face, pressure equalizing fluid passage means leading from the front face of said piston member to the rear face thereof so that said piston member is normally urged into main valve closing position by the pressure of fluid in said inlet passage, fluid passage valve seat means about said pressure equalizing fluid passage means directed towards said inlet passage, and a normally open valve member for said fluid passage valve seat, said main valve member adapted to be held against its seat by fluid pressure on the inlet applied through said pressure equalizing fluid passage against said rear face of said piston, said main valve member adapted to be opened by fluid pressure introduced into said outlet portion of said main fluid passage and acting against said front face of said piston member outwardly of said main valve member for the unseating thereof.

2. A fire extinguishing discharge valve according to claim 1 in which said piston valve member is in alignment with the inlet portion of said valve housing.

3. A fire extinguishing discharge valve according to claim 1 in which outlet fitting connection means is positioned at right angles to said inlet portion of said valve housing.

4. A fire extinguishing discharge valve according to claim 1 in which said normally open valve member is a ball valve member adapted to be closed by differ-

tial pressure thereacross in which the greater pressure is outwardly of the ball valve member.

5. A fire extinguishing discharge valve according to claim 1 in which said two diameter cylinder is formed in two sections threadedly engaged together.

6. A fire extinguishing discharge valve according to claim 1 in which said piston valve member is in alignment with the inlet portion of said valve housing, outlet fitting connection means is positioned at right angles to said inlet portion of said valve housing, and said normally open valve member is a ball valve member.

7. A fire extinguishing discharge valve according to claim 1 in which said piston valve member is in alignment with the inlet portion of said valve housing, outlet fitting connection means is positioned at right angles to said inlet portion of said valve housing, said normally open valve member is a ball valve member, and said two diameter cylinder is formed in two sections threadedly engaged together.

8. A fire extinguishing discharge valve according to claim 1 in which is included means defining a combination filling fluid and pilot valve discharge fluid passage at the end of said cylinder, a valve seat about said last mentioned fluid passage, and a normally closed combination filling fluid and pilot discharge valve member within said cylinder engaging said last mentioned valve seat and adapted to be opened to admit fire extinguishing fluid to be charged through said discharge valve into a container.

9. A fire extinguishing discharge valve according to claim 8 in which said combination filling and pilot valve is spring urged against its seat.

10. A fire extinguishing discharge valve according to claim 1 in which said piston valve member is in alignment with the inlet portion of said valve housing, outlet fitting connection means is positioned at right angles to said inlet portion of said valve housing, said normally open valve member is a ball valve member, said two diameter cylinder is formed in two sections threadedly engaged together, means defining a combination filling fluid and pilot valve discharge fluid passage at the end of said cylinder, a valve seat about said last mentioned fluid passage, a normally closed combination filling fluid and pilot discharge valve member within said cylinder engaging said last mentioned valve seat and adapted to be opened to admit fire extinguishing fluid to be charged through said discharge valve into a container, and said combination filling and pilot valve is spring urged against its seat.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3 860 073 Dated January 14, 1975

Inventor(s) Charles F. Willms

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 25, change "change" to --chance--.

Column 6, line 10, change "aid" to --said--.

Column 6, line 28, change "aid" to --said--.

Signed and sealed this 20th day of May 1975.

(SEAL)

Attest:

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