March 15, 1949. N. H. SIEBENS 2,464,268

DISCHARGE VALVE FOR FIRE EXTINGUISHERS

Filed July 26, 1946

Fig. 3

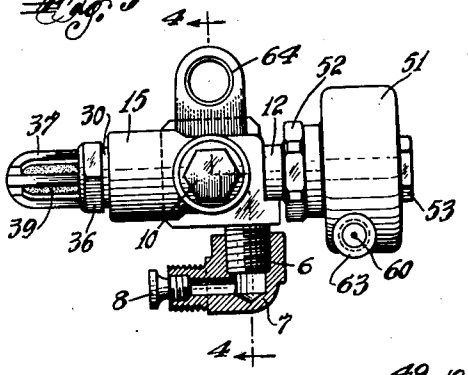


Fig. 2

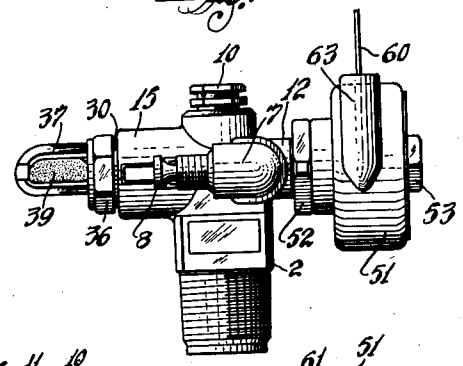


Fig. 1

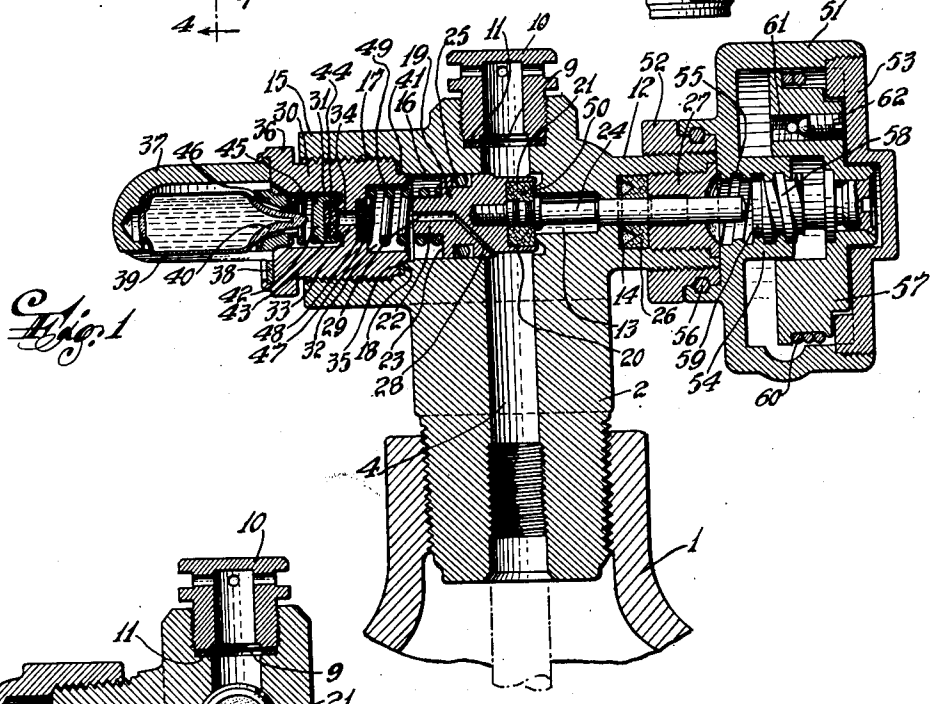
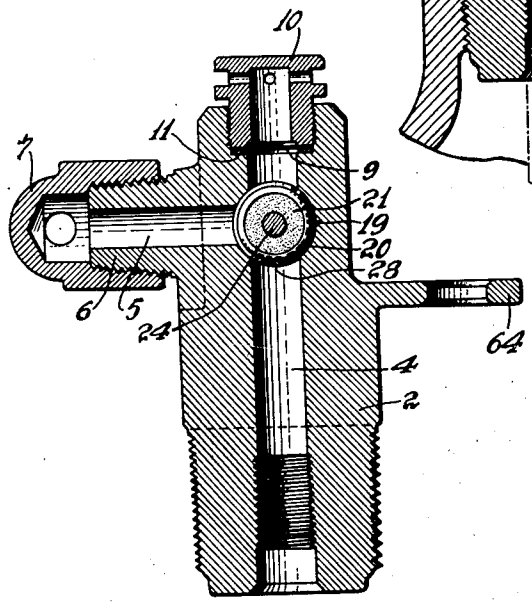


Fig. 4



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DISCHARGE VALVE FOR FIRE EXTINGUISHERS

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9 Claims. (Cl. 169—20)

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The present invention relates generally to fire extinguishers and more particularly to a discharge mechanism for containers, cylinders or tanks holding fluid under pressure, such for example as carbon dioxide.

One object of the invention is to provide novel and improved means comprising a heat actuated device or a temperature responsive device and a valve controlled thereby for automatically releasing the fluid from the container upon a certain increase in temperature in the vicinity of said heat actuated device.

Another object of the invention is to provide novel and improved means for releasing the fluid from the container by remote manual control.

Still another object of the invention is to provide a novel and improved fire detecting unit which is quickly and positively responsive to temperature rises, which can be easily and quickly applied to a fire extinguisher, and which can be protected from injury and cannot be loosened by vibration, pulled or knocked from the extinguisher.

Other objects are to minimize the possibility of accidental discharge or release of fluid from the container and to simplify the inspection of the release mechanism and the container.

Another object is to provide a novel and improved automatic, self-contained, compact fire detecting and extinguishing device as one unit.

Still other objects and advantages of the invention will be apparent from the following description thereof taken in connection with the accompanying drawings, in which

Fig. 1 is a vertical sectional view of a fire extinguisher embodying my invention;

Fig. 2 is a front view thereof;

Fig. 3 is a top plan view, parts being shown in section; and

Fig. 4 is a sectional view on an enlarged scale taken on the plane of the line 4—4 of Fig. 3.

Referring to Figure 1, there is shown fragmentarily a cylinder 1 for liquefied carbon dioxide or other highly compressed fluid. An outlet fitting 2 is threaded into the neck of the cylinder in the usual manner.

The fitting 2 has a central vertical delivery passage or inlet 4 communicating with a port 5 which extends laterally therefrom and through an externally screw threaded extension 6 on the fitting to the exterior thereof. An elbow sleeve 7, threaded on to the extension 6, is internally threaded at its free end to receive a baffle or anti-recoil member 8, and is externally screw threaded at said end for connection to a delivery

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line (not shown). The cylinder or container 1 may be but one of a battery of cylinders similarly connected to the same line. The port 5 serves as a discharge port as well as a port for filling the cylinder.

At its upper end, the vertical delivery passage 4 is enlarged to form a seat for a safety disk 9 held in place by a ported baffle or anti-recoil screw plug 10 threaded into said enlarged portion. A washer 11 may be interposed between the disk and its seat. The safety disk is arranged to rupture at a predetermined pressure so as to prevent the building up of excessive pressure in the cylinder. The anti-recoil member distributes the fluid in equal amounts in opposite directions to prevent recoil upon discharge of fluid upon accidental puncturing of the disk 9.

The fitting 2 is formed with a lateral extension 12 having its outer end externally and internally screw threaded and with a port 13 communicating at its inner end with the vertical delivery passage 4 and at its outer end with an enlarged chamber 14 formed in the extension 12. On its opposite side, the fitting is formed with an enlarged extension 15 and with a chamber 16 communicating at its inner end with the delivery passage 4 and at its outer end with an internally screw threaded recess or chamber 17 formed in the extension 15. The chamber 17 is greater in diameter than the chamber 16 thereby forming a shoulder 18 between them.

Slidably mounted in the chamber 16 is a main piston type check valve member 19 having a cup-shaped portion 20 at one end with a gasket or packing washer 21 therein, and having a reduced portion 22 at its other end forming a shoulder 23. The piston is actuated by a stem or rod 24 having one end fastened thereto. The stem extends through the port 13 into and through the chamber 14 in the extension 12. The periphery of the piston type check valve member 19 is sealed with respect to the chamber 16 by means of a gasket 25 carried by the piston. A sealing gasket 26 is located in the chamber 14 and held by a nut 27 screwed into the chamber to prevent the escape of gas around the stem and the walls of the chamber during discharging and recharging of the cylinder, the nut also constituting a close fitting guide for the stem.

The piston is formed with a pressure equalizer channel or passage 28 leading from the delivery passage 4 to a central port 29 in the reduced end portion of the piston. Port 29 communicates with chamber 16 at the rear of the piston.

An externally screw-threaded plug member 30

is threaded into the threaded recess 17 of the extension 15. The plug member is formed with an outer recess 31 and an inner recess 32 with a transverse wall 33 therebetween. The wall 33 is formed with a central opening 34 connecting the outer and inner recesses 31 and 32. On its inner end, the plug member 30 is formed with a reduced portion forming a shoulder 35, and on its outer end it is formed with an annular flange 36. A guard in the form of a spider member 37 has an annular base 38 suitably fastened to the flange portion of the plug member and supports heat responsive device, which preferably comprises a bulb 39 having a reduced neck portion 40 extending into the recess 31 of the plug member. The bulb is formed of quartz or quartzoid or other suitable material capable of withstanding high temperatures and is filled with a liquid having a low freezing point. A washer 41 may be interposed between the inner shoulder 35 on the plug member and the shoulder 18 of the recess 17, for sealing the parts at such point.

A cup-shaped auxiliary valve member 42 carrying a gasket 43 is positioned in the outer recess 31 of the plug member 30 and is normally held on its seat 44 formed on the bottom wall of said recess by a spring 45, one end of which is seated against said valve member while its other end is seated against a thrust ring 46 encircling the reduced neck portion of the bulb. The inner end of the opening 34 in the wall 33 of the plug member is covered by a screen 47 seated in a countersunk portion 48 formed in the bottom wall of the inner recess 32 of the plug member. The screen member 47 prevents foreign matter, such as grit and moisture, from entering or clogging opening 34 during automatic operation of the discharge mechanism. The spring 45 maintains a sealing force on the valve member 42 and gasket 43 independently of the tendency of the gasket 43 to take a set.

The gas from the cylinder which passes through the by-pass 28 and port 29 builds up a pressure in the inner recess 32 of the plug member and in the chamber 16 behind the piston type check 19. This pressure forces the piston type check into its forward home position, that is, toward the right as viewed in Fig. 1, against its seat 50 formed on the bottom wall of chamber 16. Due to the pressure equalizing ports 28 and 29, equalization of gas pressure exists in chamber 16 and in the container 1 under normal charged conditions of the container. The piston type check 19 blocks the passage of gas from the delivery passage 4 to and through delivery port 5. A spring 49 is provided to urge the piston check against its seat 50 when no gas pressure is present. The cross-sectional area of the portion of the piston type check valve member 30 sliding in the chamber 16 is made such with respect to the area of the seat 30 that for the desired working pressure of the fluid in the container 1, and with the fluid pressure released behind the valve member, the valve member will be urged to the left against the restraining actions of the spring 49 and against the frictional resistance of the gasket 25.

The apparatus for actuating the piston manually from a remote point includes a housing 51 mounted on the outer end of the extension 12 of the fitting by a swivel coupling nut 52 threadedly engaged therewith. The housing 51 has an open outer end internally screw threaded to receive a cover 53. The housing is also formed with a central hub portion 54 extending inwardly thereof and having an internally screw threaded opening 55. A retainer wire ring 56 retains the swivel coupling nut 52 and the housing 51 together and provides means for varying the position of a cable outlet.

Rotatably mounted in the housing on the hub portion is a pulley 57 carrying a screw member 58 which extends into the screw threaded opening 55 in threaded engagement therewith. A disc member 59 is carried on the inner end of the screw member in alignment with the outer free end of the stem 24 of the piston and is adapted to abut against the end of the stem for moving the piston. The pulley is actuated by a cable 60 wound around its outer periphery and which has one end anchored in an internally screw threaded opening 61 in the pulley by means of a headless slotted screw or bolt 62. The cable passes outwardly of the housing through an integral guide sleeve or cable outlet 63 formed on said housing to apparatus (not shown) for pulling said cable.

In operating the apparatus from a remote point or manually at the site of the apparatus, when it is desired to release fluid from the cylinder, the cable is pulled to rotate the pulley 57 in such a direction as to feed the screw member 58 inwardly or toward the left, as viewed in Fig. 1. This results in moving the stem 24 of the piston to the left forcing the piston off of its seat in chamber 16, permitting the release of fluid from the container 1 through the delivery passage 4, the delivery port 5 and into the delivery line.

In automatic operation, when the temperature in the protected space where the extinguisher is positioned reaches a predetermined degree due to a fire or the like, the bulb 39 will burst due to the expansion of the liquid therein. When this happens, the resistance against the outer end of the spring 45 will cease and the pressure of the gas in the chamber 16 and recess 32 of the plug member will force the auxiliary valve member 42 off of its seat 44 permitting the gas in chamber 16 and recess 32 to escape through opening 34 in the transverse wall 33 of the plug member and through the outer recess 31 in the plug member to the atmosphere. Due to the larger cross-sectional area of the opening 34 as compared with that of the pressure equalizer channel 28, a lower gas pressure will exist in chamber 16 against the rear of the piston type check than exists in chamber 16 ahead of the piston type check valve member 19. The valve member will be automatically moved to the left as viewed in Fig. 1, against the action of the spring 49, thereby permitting the compressed fluid to pass from the delivery passage 4 to and out through the delivery port 5 to the delivery line.

The discharge head and attached cylinder may be mounted on a support by means of an integral perforated bracket 64 on the fitting 2.

Changes in details of construction and arrangement of parts may be resorted to, and parts of the invention may be used without other parts without departing from the principle or scope of the invention.

What I claim is:

1. In combination, a container adapted to hold fluid under pressure, an outlet fitting secured thereto and having a central delivery passage, a delivery port communicating with said passage and extending to the exterior of the fitting, a chamber formed in the fitting and communicating with said passage, a piston movable in said chamber and normally closing communication between said passage and said delivery port, an

extension formed on said fitting and having a recess communicating with said chamber, a plug member in said recess and communicating with said chamber, a spring interposed between said plug and said piston for urging said piston to port closing position, said piston having means for by-passing fluid from the delivery passage to the rear thereof for building up pressure behind said piston for holding the piston in port closing position, and means for releasing said fluid pressure behind said piston whereby fluid from the container is adapted to move the piston away from port closing position against the action of said spring thereby permitting fluid to flow through said delivery port.

2. In combination, a container adapted to hold fluid under pressure, an outlet fitting secured thereto and having a central delivery passage, a delivery port communicating with said passage and extending to the exterior of the fitting, a chamber formed in the fitting and communicating with said passage, a piston movable in said chamber and normally closing communication between said passage and said delivery port, an extension formed on said fitting and having a recess communicating with said chamber, a plug member in said recess and communicating with said chamber, said plug member having an inner recess and an outer recess with a wall between said recesses, said wall having an opening therethrough connecting said outer and inner recesses, a spring interposed between said plug and said piston, a valve member in said outer recess of the plug member for closing the opening through the wall of said plug member, said piston having means for by-passing fluid from the delivery passage to the rear of the piston for holding the piston in port closing position by the fluid pressure behind the piston, means including a spring for holding the valve member in position for closing said opening, and means including a fracturable bulb for releasing the fluid pressure behind said piston whereby fluid from the container is adapted to move the piston away from port closing position to permit fluid to flow through the delivery port.

3. In combination, a container adapted to hold fluid under pressure, an outlet fitting secured thereto and having a central delivery passage, a delivery port communicating with said passage, a chamber formed in the fitting and communicating with said passage, a piston movable in said chamber and normally closing communication between said passage and said delivery port, an extension formed on said fitting and having a recess communicating with said chamber, a plug member in said recess, said plug member having an inner recess communicating with said chamber and an outer recess with a wall between said recesses, said wall having an opening therethrough connecting said outer and inner recesses, a spring interposed between said plug and said piston, a spring-pressed valve in the outer recess of said plug member for closing the opening in the wall of said plug member, said piston having means for by-passing fluid from the delivery passage to the rear of the piston for building up pressure at said point for holding the piston in port closing position, means for holding the valve in the closing position and means including a fracturable bulb for releasing the fluid pressure behind said piston whereby fluid from the container is adapted to permit fluid to flow through the delivery port by moving said piston away from its port closing position.

4. In combination, a container adapted to hold fluid under pressure, an outlet fitting secured thereto and having a central delivery passage, a delivery port communicating with said passage, a chamber formed in the fitting and communicating with said passage, a piston movable in said chamber and normally closing communication between said passage and said delivery port, an extension formed on said fitting and having a recess communicating with said chamber, a plug member in said recess, said plug member having an inner recess communicating with said chamber and an outer recess with a wall between said recesses, said wall having an opening therethrough connecting said outer and inner recesses, a spring interposed between said plug and said piston, a valve in the outer recess of the plug member for closing the opening in the wall of said plug member, said piston having means for by-passing fluid from the delivery passage to the rear of the piston for building up pressure at said point for holding the piston in port closing position, and means in common for holding the piston in port closing position and for releasing the pressure behind said piston including a heat fracturable bulb carried by the plug member and a spring between said bulb and said valve whereby upon fracture of the bulb the fluid behind said piston escapes through the opening in said wall thereby permitting the fluid from the container to move said piston away from its port closing position against the action of the spring between the plug and piston.

5. In a fire extinguishing apparatus, a container adapted to hold fluid under pressure, an outlet fitting secured thereto and having a delivery passage and a delivery port communicating therewith, a chamber in said fitting, means for closing communication between said passage and port including a piston member movable in said chamber, means for holding said piston member in port closing position and a detachable heat actuated assembly for automatically releasing said piston holding means to permit fluid to flow through said delivery port, said assembly including a plug member adapted to be detachably mounted on said fitting and having an opening communicating with said chamber, a heat fracturable bulb supported by said plug member, a valve in the plug member normally closing the opening in said plug member, a spring between said bulb and valve member and a guard surrounding said bulb.

6. A container adapted to hold fluid under pressure, an outlet fitting secured thereto and having a delivery passage, a delivery port communicating with the delivery passage, a chamber formed in the fitting and communicating with the delivery passage, a piston valve member movable in the chamber and normally closing communication between the delivery passage and the delivery port, the fitting having a recess, a plug member in the recess, resilient means interposed between the plug member and the piston valve member for urging the piston valve member to port closing position, the piston having means for by-passing fluid from the delivery passage to the rear thereof for normally holding the piston valve member in port closing position, and means for releasing the fluid pressure behind the piston valve member whereby fluid from the container is adapted to move the piston away from port closing position, permitting fluid to flow from the container through the delivery port.

7. A container adapted to hold fluid under

pressure, an outlet fitting secured thereto and having a delivery passage, and a delivery port communicating with the delivery passage, the fitting having a chamber formed therein and communicating with the delivery passage, a piston valve member movable in the chamber and normally closing communication between the delivery passage and the delivery port, the piston valve member having a passage extending to the rear thereof and in fluid communication with the delivery passage, and thermo-responsive means for releasing the fluid pressure from behind the piston valve member whereby fluid from the container is adapted to move the piston away from port closing position permitting fluid to flow from the container through the delivery port.

8. In a fire extinguishing apparatus, a container adapted to hold fluid under pressure, an outlet fitting secured thereto and having a delivery passage and a delivery port communicating therewith and a valve chamber, valve means in the chamber for closing fluid communication between the passage and the port, fluid pressure operable means for holding said valve member in port closing position, a heat responsive means assembly for automatically releasing the fluid pressure operable means to permit fluid to flow through the delivery port, the assembly including a plug member adapted to be detachably mounted on the fitting and having a passage communicating with the chamber, a heat fracturable bulb supported by the plug member, and plug member passage closing means normally held in the closed position by the heat fracturable bulb.

9. A container adapted to hold fluid under pressure, an outlet fitting secured thereto and having a delivery passage, a delivery port communicating with the delivery passage, a chamber formed in the fitting and communicating with the delivery passage, a piston valve member movable in the chamber and normally closing communication between the delivery passage and the delivery port, the fitting having an opening leading to the chamber for the insertion of the piston valve member, means closing the opening, the piston having means for by-passing fluid from the delivery passage to the rear thereof for normally holding the piston valve member in port closing position, and means for releasing the fluid pressure from behind the piston valve member whereby fluid from the container is adapted to move the piston valve member away from port closing position, permitting fluid to flow from the container through the delivery port.

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Disclaimer

2,464,268.—*Norman H. Siebens*, East Orange, N. J. DISCHARGE VALVE FOR FIRE EXTINGUISHERS. Patent dated Mar. 15, 1949. Disclaimer filed Dec. 30, 1949, by the assignee, *C-O-Two Fire Equipment Company.*

Hereby enters this disclaimer to claims 1, 6 and 9 of said patent.

[*Official Gazette January 31, 1950.*]