Aug. 30, 1960 R. W. AUSTIN 2,950,762

FIRE EXTINGUISHER

Filed June 9, 1958

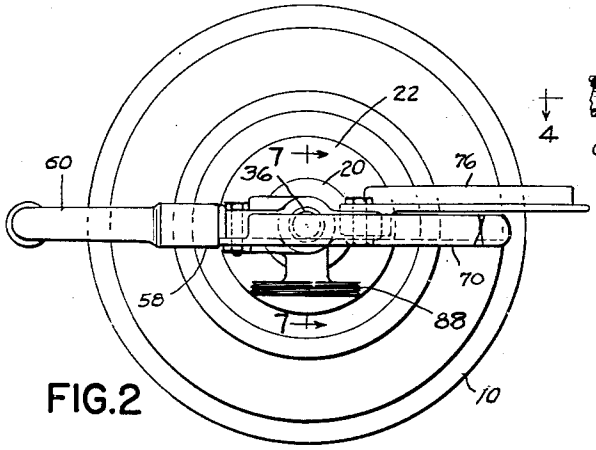


FIG.2

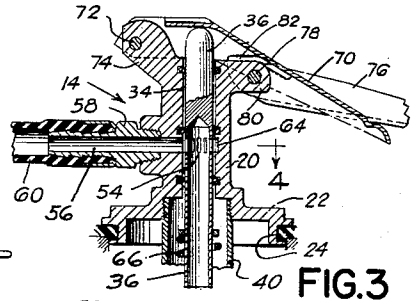


FIG.3

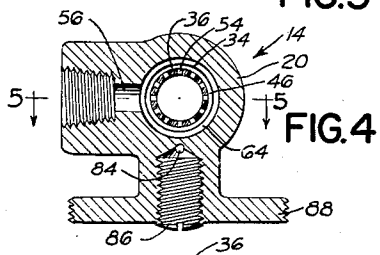


FIG.4

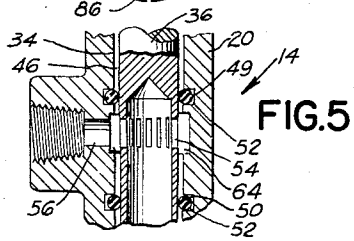


FIG.5

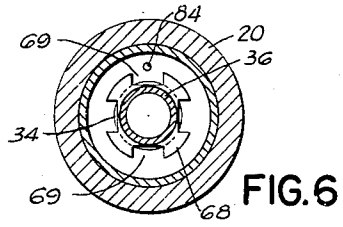


FIG.6

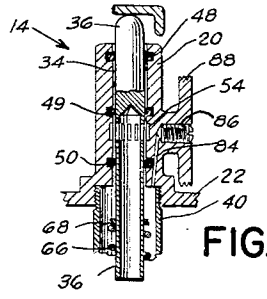


FIG.7

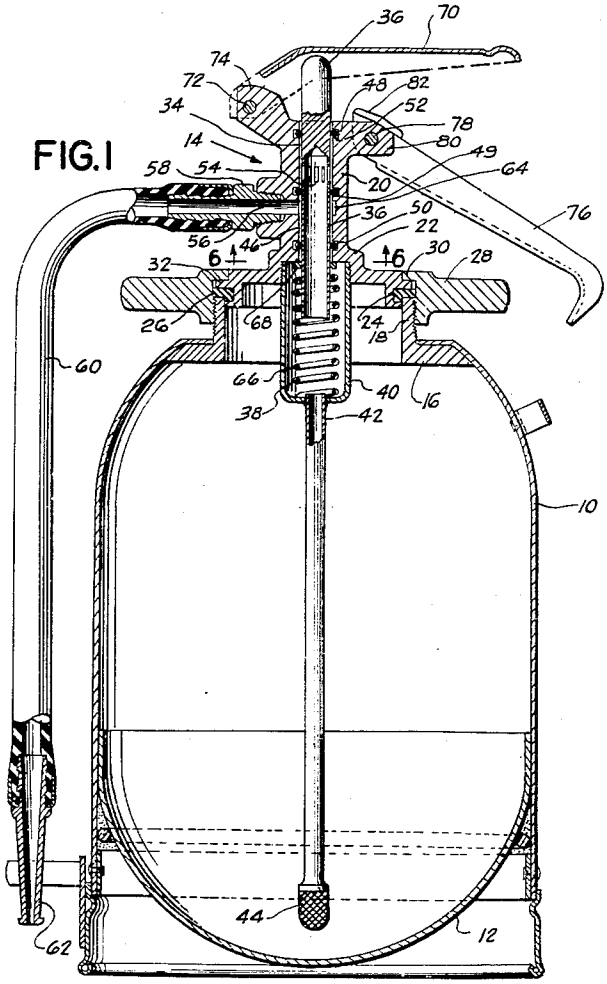


FIG.1

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FIRE EXTINGUISHER

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This invention relates to a fire extinguisher.

The invention has for an object to provide a novel and improved fire extinguisher of the type containing a pressurized fire extinguishing medium and which is characterized by novel valve means adapted to provide an even and uniform flow of the fire extinguishing medium therethrough, and wherein provision is made for self-cleaning of the valve in a novel and efficient manner.

With this general object in view and such others as may hereinafter appear, the invention consists in the fire extinguisher as hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention:

Fig. 1 is a vertical cross sectional view of a fire extinguisher embodying the present invention and showing the valve unit in its closed position;

Fig. 2 is a plan view of the fire extinguisher;

Fig. 3 is a cross sectional detail view showing the valve unit in its open position;

Fig. 4 is an enlarged detail view in horizontal cross section taken on the line 4—4 of Fig. 3;

Fig. 5 is an enlarged cross sectional view taken on the line 5—5 of Fig. 4;

Fig. 6 is a horizontal cross section taken on the line 6—6 of Fig. 1 as viewed from the underside; and

Fig. 7 is a vertical section taken on the line 7—7 of Fig. 2.

In general the present invention contemplates a novel fire extinguisher adapted for use with various types of pressurized free-flowing fire extinguishing mediums, including liquid, gas or dry chemicals, such as dry carbon dioxide, which is provided with a novel and improved valve and with manually operated means for opening and closing the valve to control the release of the pressurized medium. Prior valve controlled pressurized fire extinguishers of which I am aware are usually provided with conventional valve structures having flat or beveled cooperating surfaces so that when certain types of fire extinguishing mediums are used, particularly those embodying dry chemicals such as dry powder, the medium may collect between the cooperating valve surfaces and hamper the seating efficiency of the valve. As a result, to provide for efficient operation of such extinguishers, such prior valve units must be disassembled and cleaned after use before the extinguisher is recharged. Furthermore, it has been found that with some fire extinguishing mediums, such prior valve structures cause, due to clogging, intermittent release and sputtering of the discharge flow of the pressurized medium rather than an efficient, uniformly flowing discharge.

In accordance with one feature of the present invention the fire extinguisher is provided with a novel valve unit designed for self-cleaning of the cooperating valve members when being moved from an inoperative to an operative position and return whereby to prevent accumulation of the fire extinguishing medium on and about the valve parts, consequently clogging the valve. In accordance with another feature of the invention the present valve is designed to permit controlled expansion and release of the pressurized medium when the valve is opened so as to provide a substantially uniform discharge flow of the fire extinguishing medium, free of sputtering.

Referring now to the drawings, the illustrated fire extinguisher includes a container 10 sealed at its lower end in a conventional manner, as indicated at 12, and provided at its upper end with a closure arranged to detachably support a novel valve unit indicated generally at 14. As herein shown, the upper end of the container 10 is provided with an annular flanged member 16 sealed thereto, the flanged member being provided with an upstanding, exteriorly threaded rim 18 defining the mouth of the container 10. The valve unit 14 includes an upstanding hollow casing 20 having an outwardly flanged lower portion 22 provided with an annular groove 24 for the reception of a sealing gasket 26. The sealing gasket 26 bears against the upper edge of the rim 18, and an extension of the casing below the groove 24 is fitted into the interior of the rim to center the unit. An interiorly threaded clamp member 28 fitted over the lower portion 22 of the casing 20 is threadedly engaged with the rim 18, an inwardly extended flange 30 of the clamp member 28 cooperating with an outwardly extended flange 32 of the casing to clamp the gasket 26 into sealing relation with the mouth of the container.

The upstanding valve casing 20 is provided with a central vertical bore 34 for the reception of a hollow valve stem 36 open at its lower end and which extends into a chamber 38 defined by a cup-shaped member 40 threadedly secured in the lower end of the casing 20. The bottom wall of the member 40 communicates with the upper end of an elongated pipe 42 provided with a screen 44 at its lower end and which extends to a position adjacent the bottom of the container 10 in communication with a pressurized fire extinguishing medium of any desired type.

The central bore 34 is of a diameter slightly greater than the diameter of the valve stem 36 providing an annular clearance space 46 thereabout, and the valve stem is fitted within and movable vertically relative to a plurality of annular sealing rings 48, 49 and 50 which are fitted into grooves 52 formed in the interior walls of the central bore 34. The upper end of the hollow portion of the valve stem 36 is provided with a plurality of spaced, vertically extended radial slots defining outlet ports 54. The central bore 34 communicates with a lateral bore or discharge outlet 56 formed in the casing 20 which is connected by a threaded adapter 58 to a discharge hose 60 having a nozzle 62. It will be observed that the bore is enlarged to provide an annular expansion chamber 64 adjacent the point of intersection of the lateral bore 56 and the vertical bore 34.

The hollow valve stem 36 is normally maintained in an upwardly extended closed position, as shown in Fig. 1, by a spring 66 extending between the bottom wall of the cup-shaped member 40 and the underside of a shouldered portion of collar 68 formed integrally with the valve stem 36. The upper face of the collar 68 bears against a portion of the casing 20 to serve as a stop limiting the upward movement of the valve stem. When the valve stem is in its upwardly extended position the outlet ports 54 are disposed between the upper sealing ring 48 and the intermediate sealing ring 49 and out of communication with the discharge outlet 56. The upper sealing ring 48 prevents escape of the pressurized medium through the upper end of the casing 20, and the intermediate sealing ring 49 prevents escape of the pressurized medium downwardly to the discharge outlet. Likewise, the lower sealing ring 50 prevents the pressurized contents from leaking upwardly to the outlet 56.

Provision is made for manaully depressing the valve stem 36 to present the outlet ports 54 in alignment with the expansion chamber 64 and in operative relation to the discharge outlet 56. As herein shown, the upper end of the casing 20 is provided with a depressible handle 70 pivotally mounted at 72 in a lug 74 extending from one side of the casing. The underside of the handle 70 is shaped to engage and depress the valve stem into the operative position shown in Fig. 3 when the handle is rocked downwardly. A second handle 76 pivotally mounted at 78 in a second lug 80 extended from the opposite side of the casing is provided to serve as a resistance arm, which when rocked upwardly to a substantially horizontal position to engage the underside of a cross bar 82 with the upper edge of the lug 80 enables the operator to manually squeeze the overlying handle 70 downwardly toward the handle 76 by placing the thumb on the free end of the handle 70 to control the depressing operation. The handle 76 may also serve as a carrying handle if desired. In operation the clamp member 28 may be unscrewed and the entire valve structure removed as a unit in order to introduce the fire extinguishing medium into the mouth of the container whereupon the valve unit may be reassembled with the mouth of the container. Thereafter, the container may be pressurized through a passageway 84 formed in the casing 20 and which communicates with the interior of the container as shown in Fig. 6. The upper end of the passageway 84 terminates in an interiorly threaded chamber provided with a plug 86, the chamber being formed in an exteriorly threaded flange portion 88 for connection to pressurizing apparatus, not shown.

From the above description it will be seen that in operation when the valve stem 36 is pressed downwardly to align the radially slotted outlet ports 54 with the expansion chamber 64 and in operative relation to the discharge outlet 56, the pressurized contents of the container may escape through the ports 54 and the discharge outlet 56 to be discharged through the hose 60. The radially arranged elongated slots 54, together with the enlarged chamber 64, permits uniform expansion and release of the pressurized contents to provide a substantially uniform flow of the fire extinguishing medium through the hose 60 and the discharge nozzle 62. The uniform flow of the extinguishing medium is effected and maintained by the self-cleaning action of the valve during its operation. The sealing rings 48, 49 and 50 effect a wiping and cleaning action on the surfaces of the valve stem 36, and particularly the slotted ports 54, during the upward or downward movement of the stem as the valve is opened or closed in the manner herein described. It will be observed that the chamber 64 also serves to provide a clearance space adjacent the slots 54 when the valve is in an open position to assist in preventing the valve from becoming clogged. It will be observed that the annular space 46 between the stem 36 and the bore 34 is open to the pressurized fire extinguishing medium between the lowermost sealing ring 50 and the inner end of the bore when the valve stem is depressed and the collar 68 is spaced therefrom. In order to prevent the material from being packed into this annular space by the collar 68 when the stem is returned to its closed position, the collar is provided with a plurality of cutouts 69 which comprise openings through which the medium cleaned from the valve stem by the cleaning action of the ring 50 may pass and clogging of the valve prevented when the collar is moved into engagement with the lower end of the bore as shown in Fig. 5. In operation any material wiped from the stem by said lowermost sealing ring during the movement of the stem is returned to the container. It will also be observed that any fire extinguishing material accumulated in the annular space between the intermediate sealing ring 49 and the lower ring 50 during movement of the stem may pass into the chamber 64 and the discharge outlet 56 to be expelled by the pressurized medium when the valve is opened. Also any material which may be wiped into the annular space 46 between the sealing rings 48 and 49 finds relief through the ports 54 when the stem is in its closed position.

The resilient sealing rings 48, 49, 50 may and preferably will comprise a synthetic rubber material, such as neoprene, of the type which may be subjected to extremes of high and low temperatures without harmful effect. It will also be observed that the sealing rings present a smooth line seal with the stem 36 to provide an efficient wiping action.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. A fire extinguisher comprising a container for holda pressurized fire extinguishing medium, and a valve unit removably connected thereto for controlling the release of said pressurized medium, said valve unit comprising a valve casing having an elongated bore and a discharge outlet communicating with said bore, a hollow valve stem mounted for longitudinal movement within said bore, said valve stem being open at its lower end in direct communication with the interior of the pressurized container and having a plurality of relatively narrow, closely spaced, elongated radial ports, said bore being slightly larger in diameter than the diameter of the stem and provided with a plurality of spaced annular resilient sealing rings in sealing engagement with the bore and the valve stem and providing an annular space between the bore and the stem, said sealing rings separating said annular space to provide upper and lower annular spaces said bore being increased in diameter adjacent the discharge outlet to provide an annular expansion chamber, spring means for maintaining said valve stem in an extended position to present the radial ports out of alignment with said chamber and between two of said spaced sealing rings defining the upper annular space to close the valve, and manually operated means engageable with the upper closed end of said stem for depressing the same to present the radial ports in said lower annular space and in alignment with said expansion chamber and said discharge outlet to open the valve and release the pressurized medium, said sealing rings effecting a wiping action on the stem during movement of the latter from a closed to an open position and return whereby to maintain the valve stem in a clean condition.

2. A fire extinguisher as defined in claim 1 wherein the material wiped from the stem into the lower annular space is discharged when the valve is in its open position, and wherein the material wiped from the stem into the upper annular space finds relief through the ports when the valve is in its closed position.

3. A fire extinguisher as defined in claim 2 wherein the valve stem is provided with a stop collar formed integrally therewith engageable with a portion of the valve casing defining the inner end of the bore to limit the upward movement of the stem, said collar having a plurality of peripheral cutouts providing passageways between the interior of the container and the annular space defined by the bore and the stem below the lowermost sealing ring whereby to provide relief for any material wiped from the stem into said last-named annular space and to prevent packing of the material into said space by said collar.

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