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FIRE EXTINGUISHING APPARATUS

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Fig. 3

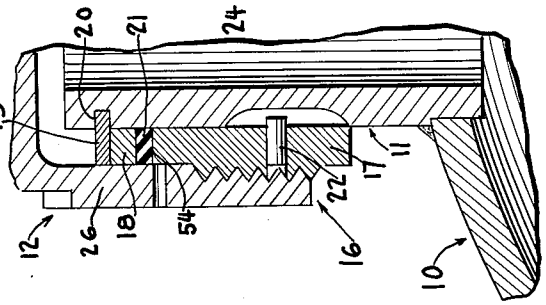


Fig. 2

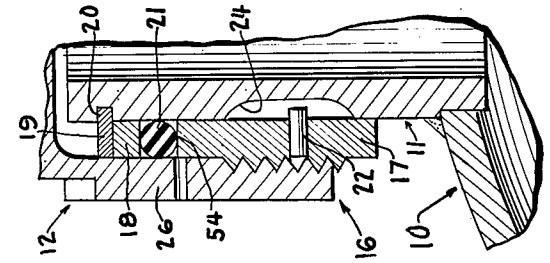
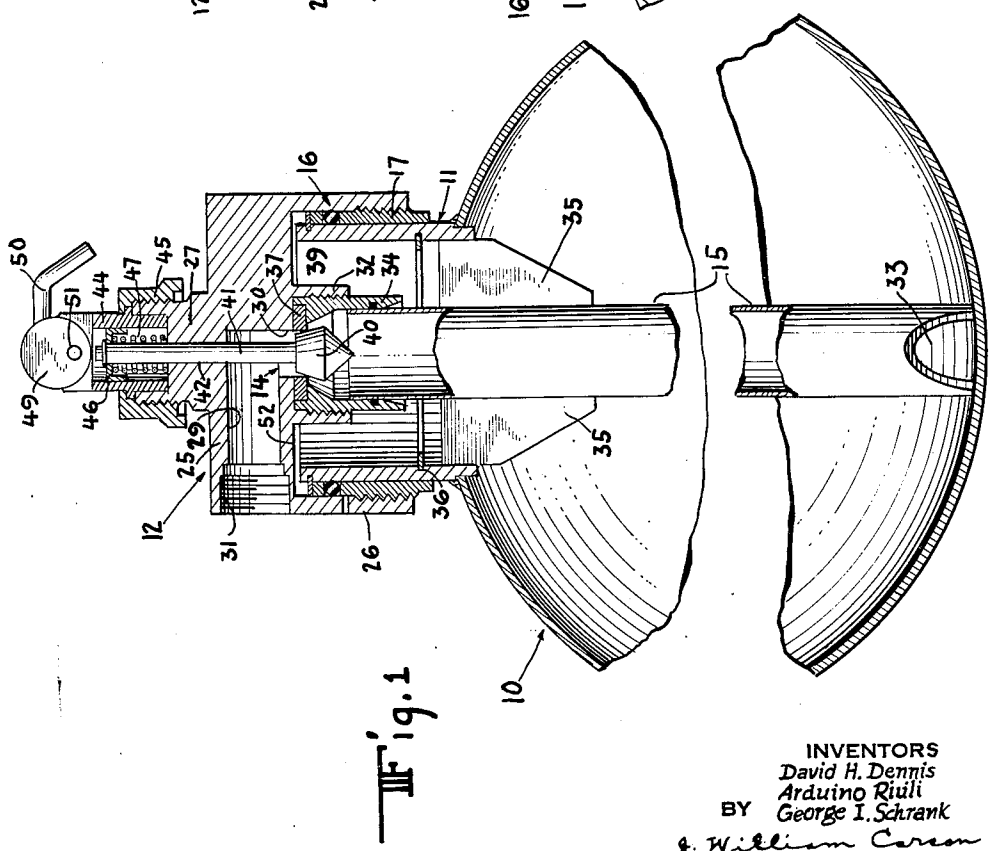


Fig. 1



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FIRE EXTINGUISHING APPARATUS

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The present invention relates to fire extinguishers, and, more particularly, to fire extinguishers utilizing a fluid dry powder fire extinguishing agent which is pressurized to expel the same.

In such fire extinguishers, it is preferable that the container for the agent and the pressurizing gas has only one opening so that the points of possible leakage are reduced to a minimum. Dry powder extinguishers, as conventionally manufactured, of small and medium sizes, that is up to 30 pounds of agent, comprise a container having a neck providing the sole opening therein, a control head screw threaded onto the neck, and a syphon tube fixed to the control head and extending downwardly into the container adapted to conduct the agent from the bottom of the container up to the control head.

The seal between the control head and the neck of the container is normally provided by a sealing member, such as an O ring, which is positioned between the neck and the control head and is squeezed into tight sealing relationship with the neck and the head when the head is screwed down tightly.

Such fire extinguishers are charged by removing the control head and the syphon tube, pouring the dry powder into the container, replacing the control head and the syphon tube, and pressurizing the container by connecting a source of gas under pressure to a port in the control head.

Although this type of construction is most satisfactory, it has been generally abandoned in the manufacture of large size dry powder extinguishers which contain up to several hundred pounds of agent because (1) the length of the container and the syphon tube would be such that the control head could be removed to refill the container only if the operation were conducted outdoors or in a room with a high ceiling, (2) after filling the container, it would be very nearly impossible to push the long syphon tube straight down through the powder so that the control head could be replaced properly, and (3) the large size neck necessary for practical refilling of the container would greatly increase the torque necessary to place the required squeeze on the sealing member, thus making it impossible to effectively seal the container without the use of special tools.

To avoid the above problems, large size dry powder extinguishers manufactured heretofore generally are equipped with a valved receptacle for gas under pressure connected to the container for the agent, thereby eliminating the necessity of a perfect seal at the filling port of the container, and have a valved outlet at the bottom of the container to which a discharge hose is connected, whereby the need for a syphon tube is eliminated. These extinguishers, however, are bulky and costly to manufacture due to the addition of the separate receptacle for the gas and the extra fittings on the container for the agent; and also are relatively slow acting since pressure must build up in the container for the agent before an effective discharge rate can be achieved.

Accordingly, an object of the present invention is to provide an improved dry powder fire extinguisher having a single large opening and utilizing a syphon tube.

Another object is to provide such a fire extinguisher which is compact, relatively inexpensive to manfacture,

fast acting, easily recharged, and has a minimum number of leakage points.

Another object is to provide such a fire extinguisher which is particularly adapted to be made in large sizes.

Another object is to provide such a fire extinguisher having an improved seal for the opening.

A further object is to provide such a fire extinguisher which is adapted to be filled with dry powder without removing the syphon tube.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a fragmentary longitudinal sectional view of a fire extinguisher in accordance with the present invention.

FIG. 2 is an enlarged sectional view of a portion of FIG. 1 illustrating in detail the arrangement of the seal before the extinguisher is pressurized.

FIG. 3 is an enlarged sectional view similar to FIG. 2 illustrating in detail the arrangement of the seal when the extinguisher is pressurized.

Referring to the drawings in detail, and more particularly to FIG. 1 thereof, a fire extinguisher is shown which generally comprises a container 10 for storing a fire extinguishing agent such as dry powder under gaseous pressure and having a neck 11 at its upper end providing an opening; a control head 12 mounted on the neck 11 serving as a closure for the opening and including a valve 14 for controlling the discharge of agent from the extinguisher; and a syphon tube 15 positioned within the container and adapted to be detachably secured to the control head.

As shown in FIG. 2, a seal 16 is interposed between the control head 12 and the neck 11 which comprises a collar 17 slidably mounted on the neck 11, a ring 18 positioned on the neck above the collar 17, a retaining ring 19 mounted in a recess 20 provided in the neck 11 above the ring 18, and a sealing ring 21 positioned between the collar 17 and the ring 18. The rings 18 and 19 serve as stop means for backing up the sealing ring 21 and preventing upward movement thereof. The collar 17 is restrained against rotary motion by a pin 22 extending radially therethrough and into a vertical slot 24 provided in the neck 11.

The control head 12 includes a generally cap-shaped body 25 having a depending skirt 26 adapted to be screw threaded to the collar 17, and an upwardly extending boss 27 on which is mounted a mechanism for actuating the valve 14. The sealing ring 21 has a diameter which is slightly less than the radial clearance between the neck 11 and the skirt 26 to eliminate friction between the sealing ring and the flange before the container 10 is pressurized thus enabling the control head to be screwed on or off by hand. An L-shaped passageway 29 is provided in the body 25 having an inlet opening 30 in the surface of the body 25 facing the upper end of the syphon tube and having an outlet opening 31 in the side wall of the body adapted for connecting a discharge hose thereto (not shown). A tubular depending formation 32 is provided about the inlet opening 30, and a tubular adaptor 34 is screw threaded into the formation 32 and extends downwardly into the neck 11.

The lower end of the syphon tube 15 is formed with openings 33 and rests on the bottom of the container 10 and the upper end therof extends upwardly into the

tubular adaptor 34. The syphon tube has a plurality of fins 35 rigidly attached thereto which extend outwardly from the tube and abut the inner wall of the neck 11 to hold the syphon tube centered with respect to the neck 11. An O ring is positioned in a groove in the inner wall of the adaptor 34 to provide a seal between the syphon tube and the adaptor 34, and a retaining ring 36 is positioned in a groove in the inner wall of the neck 11 to engage the upper ends of the fins and prevent the syphon tube from being withdrawn from the container when the control head is removed.

The valve 14 comprises an annular seat 37 positioned in a recess 39 in the adaptor 34, a valve member 40 adapted to abut the seat, and a stem 41 for the valve member extending upwardly through a bore 42 provided in the body 25 and the boss 27 and into a housing 44 secured to the boss 27 by a nut 45. The stem 41 carries an abutment 46 at its upper end, and a spring 47 in the housing 44 acts against the abutment 46 to normally bias the valve member into closed position. The valve member is unseated by a circular cam 49, having a handle 50 attached thereto, which is eccentrically mounted on a shaft 51 carried by the housing 44 and is positioned to engage the upper end of the valve stem.

In order to charge the assembled fire extinguisher, the control head 12 is removed from the container by unscrewing it from the collar 17; and the syphon tube 15, being in frictionally sealed relationship with the adaptor 34, moves upwardly with the control head at it is unscrewed until the fins 35 engage the retaining ring 36 whereby, upon further unscrewing of the control head, the syphon tube is stripped from the adaptor 34. After the head 12 has been removed, dry powder fire extinguishing agent is poured into the annular space between the neck 11 and the syphon tube, and falls between the fins 35 into the container 10. When the container has been filled to the proper level, the control head is replaced and is screwed down tight by hand, the adaptor 34 sliding over the upper end of the syphon tube as the head moves downwardly.

At this point, the pressure inside the container 10 is atmospheric and the seal 16 is in the condition shown in FIG. 2. To pressurize the unit, the outlet 31 is connected to a source of nitrogen or dry air under pressure and the valve member 40 is unseated by operating the handle 50, and, as the pressure in the container 10 builds up, the force exerted by the pressure of the gas against the lower surface 52 of the control head body 25 causes the body to move upwardly, whereby compressing the sealing ring 21 between the back up ring 18, which is held stationary by the retaining ring 19, and the collar 17, which moves with the control head. Since the area of the lower face 52 of the control head body 25 is many times the area of the annular upper edge 54 of the collar 17 which contacts the sealing ring 21, the sealing ring 21 is placed under mechanical pressure which is many times greater than the pressure of the gas in the container. The sealing ring is thereby pressed tightly against the inner wall of the flange 26 and the outer wall of the neck 11 as shown in FIG. 3 to provide an effective seal.

In a practical example of a fire extinguisher in accordance with the present invention, the container 10 has a capacity to hold about 200 pounds of dry powder fire extinguishing agent and is sufficiently strong to be pressurized to about 450 p.s.i. The neck and the syphon tube are dimensioned so that the annular space between the same has an area of about twelve square inches which facilitates pouring the powder into the container. The lower face 52 of the control head and the upper edge 54 of the collar 17 are dimensioned so that the face area is about eight times that of the edge area, whereby, when the container is pressurized at about 450 p.s.i., a mechanical force of about 3600 p.s.i. is exerted on the sealing ring 21 to provide a tight seal capable of confining the pressurizing gas within the container.

From the foregoing description, it will be seen that the present invention provides an improved fire extinguisher which is compact, relatively inexpensive, fast acting, easily recharged, has a minimum number of leakage points and is particularly adapted to be made in large sizes.

While the invention is described in connection with dry powder extinguishing agents, it may be used with other fluids such as liquid agents, and the various features of the invention may find application generally in fire extinguishers.

As various changes may be made in the form, construction and arrangement of the parts herein, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in any limiting sense.

We claim:

1. In fluid medium dispensing apparatus, the combination of a container for storing a fluid medium under pressure and having a neck providing an opening, a collar slidably mounted on said neck, stop means on said neck above said collar, a sealing member positioned between said collar and said stop means, a control head positioned over said opening, means for removably attaching said control head to said collar, a syphon tube positioned in said container, means for detachably securing said syphon tube to said control head, and means for retaining said syphon tube in said container and detaching the same from its securing means upon removal of said control head from said collar.

2. In fluid medium dispensing apparatus, the combination of a container for storing a fluid medium under pressure and having a neck provided with an opening, a collar slidably mounted on said neck, means for restraining said collar from rotary motion with respect to said neck, a ring mounted on said neck above said collar, stop means fixed to said neck above said ring, a sealing member positioned between said collar and said ring, a control head positioned over said opening and removably attached to said collar, said control head having a valve therein provided with an inlet facing said opening, a syphon tube positioned in said container, means for detachably securing said syphon tube to said control head and in fluid flow communication with said inlet, spacing means attached to said syphon tube and extending outwardly toward the inner wall of said neck, and means provided on the inner wall of said neck for engaging said spacing means to retain said syphon tube in said container and to detach the same from its securing means upon removal of said control head from said collar.

3. In fluid medium dispensing apparatus, the combination of a container for storing a fluid medium and having a neck providing an opening, a head positioned over said opening having an inlet facing said opening and having an annular formation about said inlet, means for removably attaching said head to said container, a syphon tube positioned in said container and adapted to slidably engage said formation, a plurality of spacing elements attached to said syphon tube adjacent said neck and extending from said tube outwardly toward said neck, and an abutment extending inwardly from said neck above said elements and adapted to engage said elements to retain said tube in said container when said head is removed.

4. In fluid medium dispensing apparatus, the combination of a container for holding a pressurized medium and having a neck provided with an opening, a collar slidably mounted on said neck, stop means on said neck above said collar, a sealing member positioned between said collar and said stop menas, a head positioned over said opening in said neck, and means for removably

attaching said head to said collar, whereby said head is acted on by pressure in the container and moves upwardly to compress said sealing member between said collar and said stop means when said container is pressurized.

5. Fluid medium dispensing apparatus according to claim 4, including means restraining said collar from rotary motion with respect to said neck, said head being screw threaded onto said collar.

6. In fluid medium dispensing apparatus, the combination of a container for storing a fluid medium and having a neck providing an opening, a head positioned over said opening having an inlet facing said opening and having an annular formation about said inlet, means for removably attaching said head to said container, a syphon tube positioned in said container and adapted to slidably engage said formation, a plurality of spacing elements attached to said syphon tube adjacent said neck extending from said tube outwardly toward said neck and having a free end adapted to contact said neck to hold said tube in spaced relation with said neck, and an abutment extending inwardly from said neck above said elements to retain said tube in said container when said head is removed.

7. In fluid medium dispensing apparatus, the combination of a container for storing a fluid medium and having a neck provided with an opening, a head positioned over said opening, means for removably attaching said head to said container, a syphon tube of substantially smaller diameter than said neck positioned in said container, means for detachably securing said syphon tube to said head, spacing means attached to said syphon tube and extending outwardly toward said neck providing a passageway between said syphon tube and said neck from said opening into said container for filling said container, and means provided on said neck for engaging said spacing member normally only when said head is being removed to retain said syphon tube in said container.

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