

July 2, 1957

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2,797,701

DRY CHEMICAL FIRE EXTINGUISHER VALVE

Filed April 20, 1954

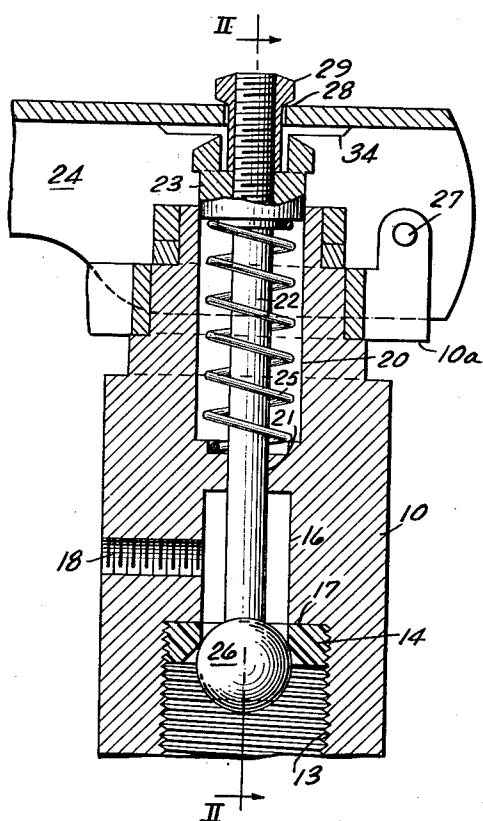


Fig. 1

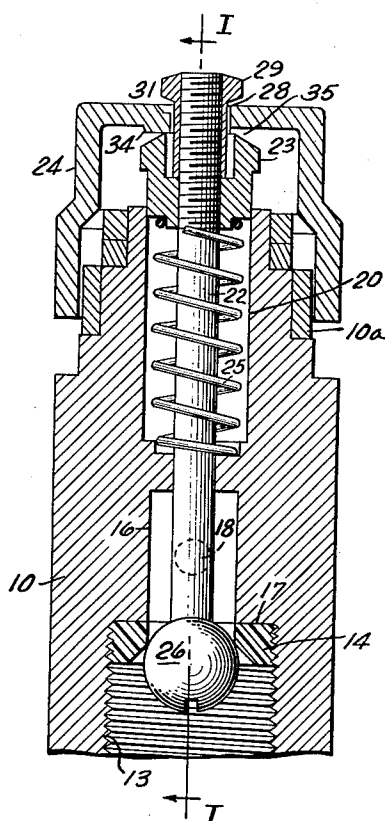


Fig. 2

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DRY CHEMICAL FIRE EXTINGUISHER VALVE

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Application April 20, 1954, Serial No. 425,017

2 Claims. (Cl. 137—243.2)

This invention relates to a dry chemical fire extinguisher valve.

This application is a continuation-in-part of an application filed by applicant on July 15, 1953, Serial Number 368,131, now abandoned.

An effective type of fire extinguishers employs a fine dry powder, such as a carbonate of soda, which is propelled onto a fire by compressed gas. Ordinarily, the powder is carried in a container in which the gas is held under heavy pressure. The outlet tube has its intake end submerged in the powder so that when the discharge valve is opened a stream of gas issues from the device, carrying with it the extinguishing powder.

In such a fire extinguisher, the gas and powder are usually under the control of a hand operated valve, and normally only enough of the charge is released to put out the fire. Difficulty is experienced, however, with the present valves in that when the valve is closed again, after the initial discharge, the valves may not seat themselves tight enough to prevent leakage of the gas pressure. Even a very slow leakage, during a long period of non-use, may make the device inoperative, when the next emergency arises, for lack of gas pressure.

Such extinguishers are provided with a pressure gage, which will normally be examined after each interval of use. If the pressure is too low, the extinguisher will be refilled before it is hung up. It is, however, an object of this invention to insure that after a period of long disuse that the extinguisher will still retain the degree of pressure it had when it was last used or inspected. That is, it is an object of this invention, to provide a valve which will completely seal the extinguisher, after every operation.

The principal cause of the failure of the present valves to reseal the closure, is the adhesion of small grains of the powder to the co-operating parts, so that the valve and the valve seat may be held apart by them.

Experiments indicate that there are several factors contributing to this end. One of which is that where the powder laden gas stream is caused to make sudden changes in direction, as it passes through the valve, the impingement of the particles upon each other, or on the parts of the device, causes them to become electrostatically charged, to such an extent that they are attracted to the valve elements.

Moreover, as the air streams change direction, eddies are formed in the gas stream which facilitates the particles falling out of the stream and depositing on adjacent surfaces.

It is an object of this invention to provide a valve in which the powder particles do not collect on the valve parts, so that the valve may be repeatedly opened and closed and in which each closing will provide a hermetically tight closure.

It is a further object to provide a device of the character described, in which the valve comes to its seat with a rotary motion, thereby assisting in dislodging any pow-

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der that might be stuck to either part, as they come in contact.

The invention accordingly comprises the device hereinafter described, and which is shown in the accompanying drawings, in which Fig. 1 is a central longitudinal section through the device and Fig. 2 is a fragmentary view on the line II—II of Fig. 1.

In the drawings, the numeral 10 represents a valve body provided at its bottom with suitable connections for attachment to the body of the fire extinguisher container, including the usual syphon tube connecting the body with the lower portion of the container below the powder level, in the usual manner.

As shown, the bottom of the body has a bore 13 into which there is fitted a washer 14 comprising a valve seat of anti-friction material. The bore 13 communicates through the washer with a smaller diameter bore 16, thereby providing a shoulder 17 against which the washer 14 is tightly pressed. The bore 16 communicates with a discharge opening 18, adapted to be connected with a discharge tube, not shown.

Coaxial with bores 13 and 16 is another bore 20 separated from the bore 16 by an annular flange 21 in which there slides a valve stem 22 which extends upwardly to screw into a hollow stud 23, sliding in bore 20, and which carries at its lower end a valve head, or ball, 26.

The essential feature of this invention centers around the cooperation of the ball 26 and the washer 14 and the surrounding parts, and means for preventing the entrapping of powder between them and the dislodging of powder that might otherwise interfere. These parts are so designed that the powder-laden gas stream, moving upwardly in the bore 13, may move past the valve head 26 into the bore 16 with a minimum of change in direction, and in such a manner that the gas stream moves as nearly parallel to the valve surface as it is practical to make it, so that the tendency is to sweep those surfaces clean of dust without depositing any upon it. The under surfaces of washer 14 is a truncated cone of such size and pitch that the surface of the ball will be substantially tangent to the cone surface at the inner edge of the washer. In this way, the gas stream, at the point of greatest constriction, flows with the minimum of turbulence. And, moreover, it is led to that point of constriction by a gradually converging pathway and it moves from that constriction point into an expanding passage. The angle of the elements of the cone is here shown at substantially 45°.

The ball 26 is preferably made of chrome plated brass to resist corrosion and abrasion, while the washer is made of a resistant plastic, such as Kel F, or nylon, or, preferably, Teflon, which possesses a very low-coefficient of friction.

The washer, itself, is replaceable. To this end it is threaded to screw into the bore 13 until it is tight against the shoulder 17. It is convenient to screw the washer into place as a flat washer, having a slot in the lower face, so that it may be secured into place by a screw driver, and then to bore out the exposed end of the washer to cone shape, after it is in place. If, in any way, the washer becomes worn, it may be screwed out, or cut out, and a new washer inserted and bored, as described.

The operating mechanism for the device is designed to give to the ball 26 a slight rotation during its vertical movement. This rotation is for the purpose of dislodging any minute powder grains that otherwise stick to the surface, and to dislodge them while they are being swept away by the gas stream, as it washes over the valve surface just before the valve closes. This action, for the purpose of this invention, must be done simultaneously with the end of the closing action. If done before that

time the gases may deposit more powder. The movement must, therefore, be an automatic portion of the closing movement.

The construction here shown, to accomplish this purpose is as follows: Handle 24 is pivoted at 27 to a bracket 10a upon the body 10. This handle is slotted at 28 to pass over the upper end of the stem 22 in position to engage the upper face of the stud 23. The engagement of the handle 24 with the stud 23, however, is on one side only of the stud and of that plane containing the axis of the stem which is transverse to the pivot of the handle. This is accomplished by providing a rib 34 on the under side of the handle on one side only of the stud. As shown in Fig. 1, the rib 34 is at the back side of the stud and in Fig. 2 it is on the left hand side.

The engagement between the rib 34 and the stud 23 is, moreover, above the level of the pivot 27 so that as the handle is depressed it gives a lateral component to the motion, and with it the valve stem and ball are thus slightly rotated whenever the lever is depressed or released.

With this construction, it will be clear that as the valve is closed the maximum velocity of the jet will be at the inner edge of the conical surface of the washer 14, thereby creating the maximum tendency to prevent the collection of powder upon the surfaces. At the same time, however, any powder which might tend to adhere to the valve due to electrostatic attraction or otherwise, will be rubbed off by the rotary motion of the valve as it closes, and is blown away.

What I claim:

1. A valve for gas-borne powders comprising a valve body having a vertical bore therein, and having an inlet in its lower end and an outlet at its upper end, a valve stem extending thru said bore terminating at its inlet end in a valve head, said body having a valve seat above said head in position to be engaged thereby, a spring for moving said valve in a direction to engage said valve seat, and hand controlled mechanism for engaging said stem to move said head away from said valve seat comprising a lever pivoted to said body, said valve stem extending upwardly and engaging said lever at a point above the pivot of said lever, the engagement between said lever and valve stem being on one side only of the center plane of said lever and of said valve stem, whereby the horizontal components of the motion of the lever about

its pivot will rotate the valve stem slightly as it is depressed and as it is raised.

2. A valve for gas-borne powders comprising a valve body having a vertical bore therein, and having an inlet in its lower end and an outlet at its upper end, a valve stem extending thru said bore terminating at its inlet end in a ball, said body having a washer providing a frustro-conical valve seat above said ball in position to be engaged thereby, at its inner edge, a spring for moving said stem in a direction to engage said ball and seat, and hand control mechanism for engaging said stem to move said ball away from said seat comprising a lever pivoted to said body, said valve stem extending upwardly and having thereon a head engaging said lever at a point above the pivot of said lever, the engagement between said lever and valve stem being on one side only of the center plane of said lever and of said valve stem, whereby the horizontal components of the motion of the lever about its pivot will rotate the valve stem slightly as it is depressed and as it is raised.

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