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Description

This invention relates to a powder type fire extinguisher. In such extinguishers, a powder contained in a chamber in the extinguisher is driven out of the chamber by compressed gas when a container holding the gas is opened.

To achieve a satisfactory output, it is necessary to ensure that the compressed gas does not escape directly through the outlet without entraining the powder, and thus that the powder is fully fluidized inside the chamber before any output from the chamber occurs.

In DE—A—1434959 there is disclosed such a fire extinguisher, in which the valve controlling the compressed gas escape is activated by a manual lever operable in two stages. Since the second stage is also under manual control, it cannot be ensured that the powder has been sufficiently fluidized before any output commences.

According to the invention, there is provided a fire extinguisher for discharging powder, having a chamber for holding the powder, a container for compressed gas, a powder outlet from the chamber and means for opening the gas container to allow compressed gas to enter the chamber and drive the powder out of the outlet, wherein a valve is provided in the outlet, the valve having a valve member movable onto and off a seat in a valve housing to close or open the outlet, characterised in that the valve member is movable by pressure on opposed faces of the member, that the area of the valve member face exposed to pressure from the chamber is greater than the area of the other face, and in that a passage is provided from the gas container to the valve housing to allow compressed gas to act on said other face of the valve member directly the container is opened.

In this way, the valve is held closed while the compressed gas brings the powder into a fluidized state and while the pressure in the chamber builds up. Once the pressure in the chamber is equal to the pressure acting on said other face of the valve member, the difference in areas of the valve member faces exposed to pressure will cause the valve to open fully to allow the fluidized powder to pass out.

Preferably, the extinguisher has a head fitting which includes an outlet passage and which supports a cylinder containing the compressed gas and a mechanism for puncturing the cylinder to allow the gas to escape into the chamber and which also contains passages for directing the escaping gas through a tube to the bottom of the mass of powder in the chamber and to said other face of the valve member.

The valve is preferably mounted in the outlet passage in the head fitting.

The valve may be a poppet valve and said other face may be formed by the end of the valve stem. The valve stem may be arranged above the head and the head itself may be acted upon by the pressure in the chamber.

The valve head may present a rounded face to the chamber, to offer minimal resistance to the flow of powder when the valve is open.

The outlet passage may be continued upstream of the valve, into the chamber, by an elongate tube.

The invention also provides a method of controlling the output from a fire extinguisher for discharging powder, characterised in that a valve is placed in the powder outlet from the extinguisher, and, on opening of a source of compressed gas to expel the powder, the gas is introduced to a space where it exerts a force on the valve to hold the valve closed while the pressure in the powder chamber builds up to a level at which satisfactory output can take place, and when this level has been reached, the pressure in the chamber exerts a force on the valve which opens the valve to allow the powder to be expelled.

The invention will now be further described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a cross-sectional view through a head fitting for a fire extinguisher according to the invention, taken on the line I—I from Figure 2;

Figure 2 is an underneath view of the head fitting of Figure 1;

Figure 3 is a cross-section, on a larger scale, through a valve for fitting to the head fitting of Figures 1 and 2; and

Figure 4 is a section through the valve of Figure 3 on the line IV—IV.

The head fitting 10 shown in Figure 1 is for fitting into the neck of a cylindrical powder container in a conventional manner. The container itself is not shown, and can be conventional. Any suitable method of fastening the fitting into the container neck can be used. In Figure 1, a flange 12 limits the insertion of the fitting into the container neck.

The fitting has a socket 14 for receiving a cylinder of compressed gas. A conventional firing mechanism (not shown) will be provided on the outside of the fitting to allow the cylinder to be punctured when the extinguisher is to be used.

An outlet passage 16 extends through the fitting. A conventional nozzle to direct the flow can be attached to the outer end 18 of the passage.

The valve shown in Figures 3 and 4 fits into the lower end 20 of the passage.

Looking now at Figure 2, the socket 14 for the cylinder and the lower end of the outlet passage can be seen. Also visible is a socket 22 for a tube (not shown) which extends from the head fitting to near the bottom of the chamber. A passage 24 for compressed gas leads from the socket 14 to the socket 22, and another passage 26 leads from socket 22 to the lower end 20 of the outlet passage 16.

The valve shown in Figures 3 and 4 has a housing 30 with a valve seat 31 and a valve member 32 movable in the housing. The valve member has a head 34 and a stem 36 and the

stem is guided in a bore 38 in the housing. The top of the housing 30 is a tight fit in the lower end 20 of the outlet passage, and a key portion 40 fits in a keyway 42 in the head fitting. The engagement between the key 40 and the keyway 42 ensures that the passage 26 lines up with a passage 44 in the valve housing, so that gas pressure can pass from the cylinder socket 14 to the bore 38 in which the valve stem 36 slides.

O-ring seals 46 and 48 respectively seal the valve housing in the outlet passage 16 and the valve stem 36 in the bore 38.

In operation, puncturing of the compressed gas cylinder by the firing mechanism causes gas to be forced through passages 24 and 26, typically at a pressure of 50—75 daN/cm^2 (750—1000 psi). Gas passes down a tube fitted in socket 22 to fluidise the powder and to build up the pressure inside the chamber. Gas also passes into passage 44 to act on the top of the valve stem 36. As a result, the valve member 32 is forced downwards against the seat 31 to close the valve. The pressure acting on the lower side of the valve head 34 is gradually building up as the powder is becoming fully fluidized, but initially is substantially lower than the pressure above the valve.

At a certain stage, once the powder is fully fluidized, and is ready to be driven out of the chamber, the pressure on the bottom of the valve will become equal to that above. Since the area of the valve head presented to pressure from below is greater than the area of the stem presented to pressure from above there will be a net opening force acting on the valve member, and the valve will open to allow the fluidized powder to flow through the pipe 50 and out. This stage is typically reached about 2 seconds after operation of the firing mechanism.

Figure 4 shows that the cross-sectional area occupied by the part of the housing containing the bore 18 is kept small, so as not to unduly reduce the cross-sectional area of the outlet passage in this region.

Claims

1. A fire extinguisher for discharging powder, having a chamber for holding the powder, a container for compressed gas, a powder outlet from the chamber and means for opening the gas container to allow compressed gas to enter the chamber and drive the powder out of the outlet, wherein a valve is provided in the outlet (16), the valve having a valve member (32) movable onto and off a seat (31) in a valve housing (30) to close or open the outlet characterised in that the valve member (32) is movable by pressure on opposed faces of the member, the area of the valve member face (34) exposed to pressure from the chamber is greater than the area of the other face (36), and in that a passage (44) is provided from the gas container to the valve housing (30) to allow compressed gas to act on said other face (36) of the valve member (32) directly the container is opened.

2. A fire extinguisher as claimed in Claim 1, characterised by a head fitting (10) which includes an outlet passage (16), the head fitting supporting a cylinder containing the compressed gas and a mechanism for puncturing the cylinder to allow the gas to escape into the chamber and also containing passages (24, 26) for directing the escaping gas through a tube (22) to the bottom of the mass of powder in the chamber and to said other face (36) of the valve member (32).

3. A fire extinguisher as claimed in Claim 2, characterised in that the valve (32) is mounted in the outlet passage (16) in the head fitting.

4. A fire extinguisher as claimed in any preceding claim, characterised in that the valve (32) is a poppet valve (34) and said other face is formed by the end of a valve stem (36) of the valve.

5. A fire extinguisher as claimed in Claim 4, characterised in that the valve stem (36) is arranged above a valve head (34) and the head itself is, in use, acted upon by the pressure in the chamber.

6. A fire extinguisher as claimed in Claim 5, characterised in that the valve head (34) presents a rounded face to the chamber, to offer minimal resistance to the flow of powder when the valve (32) is open.

7. A fire extinguisher as claimed in any one of Claims 2 to 6, characterised in that the outlet passage (16) is continued upstream of the valve (32), into the chamber, by an elongate tube (50).

8. A method of controlling the output from a fire extinguisher for discharging powder, characterised in that a valve (32) is placed in the powder outlet from the extinguisher, and, on opening of a source of compressed gas to expel the powder, the gas is introduced to a space (38, 44) where it exerts a force on the valve to hold the valve closed while the pressure in the powder chamber builds up to a level at which satisfactory output can take place, and when this level has been reached, the pressure in the chamber exerts a force on the valve (32) which opens the valve to allow the powder to be expelled.

9. A method of controlling the output from a fire extinguisher for discharging powder, characterised in that a valve is provided in the powder outlet (16) having a valve member (32) movable by pressure on opposed surfaces onto and off a seat (31) in a valve housing (30) to close or open the outlet, the area of the valve member face (34) exposed to pressure from the chamber being greater than the area of the other face (36), the method further comprising applying compressed gas to the said other face (36) of the valve member (32) directly the container is opened to hold the valve closed while the pressure in the powder chamber builds up to a satisfactory level.

Patentansprüche

1. Ein Feuerlöscher zur Abgabe von Pulver mit einer Kammer zu dessen Aufnahme, einem Behälter für Druckgas, einem Pulverauslaß aus der Kammer und mit Mitteln zum Öffnen des Gasbe-

hälters zum Ermöglichen eines Eintritts des Druckgases in die Kammer und zum Austreiben des Pulvers aus dem Auslaß, wobei ein Ventil in dem Auslaß (16) vorgesehen ist, das Ventil zum Schließen oder Öffnen des Auslasses ein auf einen Sitz (31) in einem Ventilgehäuse (30) zu- und von diesem wegbewegbares Ventilglied (32) aufweist, dadurch gekennzeichnet, daß das Ventilglied (32) durch Druck auf seinen beiden Seiten verschiebbar ist, daß die Fläche der dem Druck aus der Kammer ausgesetzten Ventilgliedseite (34) größer als die Fläche der anderen Seite (36) ist und daß ein Kanal (44) vom Gasbehälter zum Ventilgehäuse (30) vorgesehen ist, damit das Druckgas unmittelbar bei Öffnen des Behälters auf die andere Seite (36) des Ventilgliedes (32) einwirken kann.

2. Ein Feuerlöscher nach Anspruch 1, gekennzeichnet durch eine Kopfarmatur (10), die einen Auslaßkanal (16) enthält, wobei die Kopfarmatur einen das Druckgas enthaltenden Zylinder und einen Mechanismus zum Punktieren des Zylinders enthält, damit das Gas in die Kammer entweichen kann, und auch Kanäle (24, 26) enthält, um das entweichende Gas durch ein Rohr (22) auf den Boden der Masse des Pulvers in der Kammer und auf die andere Seite (36) des Ventilgliedes (32) zu richten.

3. Ein Feuerlöscher nach Anspruch 2, dadurch gekennzeichnet, daß das Ventil (32) in dem Auslaßkanal (16) in der Kopfarmatur angeordnet ist.

4. Ein Feuerlöscher nach irgendeinem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das Ventil (32) ein Tellerventil (34) ist und die andere Seite durch das Ende eines Ventilstößels (36) des Ventiles gebildet ist.

5. Ein Feuerlöscher nach Anspruch 4, dadurch gekennzeichnet, daß der Ventilstößel (36) oberhalb eines Ventilkopfes (34) angeordnet ist und der Kopf selbst im Betrieb unter der Einwirkung des Druckes in der Kammer steht.

6. Ein Feuerlöscher nach Anspruch 5, dadurch gekennzeichnet, daß der Ventilkopf (34) zum Erreichen eines minimalen Widerstandes gegenüber dem Strom des Pulvers bei offenem Ventil (32) gegenüber der Kammer eine abgerundete Fläche darstellt.

7. Ein Feuerlöscher nach irgendeinem der Ansprüche 2 bis 6, dadurch gekennzeichnet, daß sich der Auslaßkanal (16) über ein langgestrecktes Rohr (50) strömungsoberhalb des Ventiles (32) in die Kammer fortsetzt.

8. Ein Verfahren zum Steuern des Auslasses eines Feuerlöschers zum Abgeben von Pulver, dadurch gekennzeichnet, daß ein Ventil (32) im Pulverauslaß des Löschers angeordnet ist und bei Öffnen einer Druckgasquelle zum Austreiben des Pulvers das Gas in einen Raum (38, 44) eingeführt wird, wo es einen Druck auf das Ventil zu dessen Halten in Schließstellung ausübt, während sich der Druck in der Pulverkammer bis auf eine höhe aufbaut, auf der eine zufriedenstellende Abgabe stattfinden kann, und der Druck in der Kammer bei Erreichen dieser Höhe eine Kraft auf das Ventil (32) ausübt, die dieses zum Ermöglichen eines Austreibens des Pulvers öffnet.

9. Ein Verfahren zum Steuern des Auslasses eines Feuerlöschers zum Abgeben von Pulver, dadurch gekennzeichnet, daß ein Ventil in dem Pulverauslaß (16) mit einem Ventilglied (32) vorgesehen ist, das zum Öffnen oder Schließen des Auslasses durch Druck auf beide Seiten auf einen Sitz (31) in einem Ventilgehäuse (30) zu und von diesem weg bewegbar ist, die dem Druck aus der Kammer ausgesetzte Fläche der Ventilgliedseite (34) größer als die Fläche der anderen Seite (36) ist und das Verfahren weiter die Einwirkung des Druckgases auf die andere Seite (36) des Ventilgliedes (32) unmittelbar bei Öffnen des Behälters einschließt, um das Ventil, während sich der Druck in der Pulverkammer bis auf eine zufriedenstellende Höhe aufbaut, geschlossen zu halten.

Revendications

1. Extincteur servant à délivrer une poudre et comportant une chambre retenant cette poudre, un récipient contenant un gaz comprimé, une sortie permettant d'évacuer la poudre hors de la chambre et des moyens pour ouvrir le récipient contenant le gaz afin de permettre au gaz comprimé de pénétrer dans la chambre et d'entraîner la poudre à l'extérieur de la sortie, et dans lequel une soupape est prévue dans la sortie (16), cette soupape possédant un élément de soupape (32) pouvant être rapproché et écarté d'un siège (31) dans un boîtier de soupape (30) de manière à fermer et ouvrir la sortie, caractérisé en ce que l'élément de soupape (32) est déplaçable sous l'action d'une pression applicable sur ses faces opposées, lorsque la surace de la face (34) de l'élément de soupape, soumise à la pression arrivant de la chambre est supérieure à la surface de l'autre face (36), et en ce qu'il est prévu un passage (44) reliant le récipient contenant le gaz au boîtier de soupape (30) de manière à permettre au gaz comprimé d'agir directement sur ladite autre face (36) de l'élément de soupape (32) lorsque le récipient est ouvert.

2. Extincteur selon la revendication 1, caractérisé par un embout de tête (10) comportant un passage de sortie (16) et supportant une bouteille contenant le gaz comprimé, et un mécanisme servant à perforer la bouteille pour permettre au gaz de pénétrer dans la chambre, et contenant également des passages (24, 26) servant à diriger le gaz sortant, dans un tube (22), en direction de la base de la masse de poudre située dans la chambre et en direction de l'autre face (36) de l'élément de soupape (32).

3. Extincteur selon la revendication 2, caractérisé en ce que la soupape (32) est montée dans le passage de sortie (16) situé dans l'embout de tête.

4. Extincteur selon l'une quelconque des revendications précédentes, caractérisé en ce que la soupape (32) est une soupape à clapet

(34) et que ladite autre face est formée par l'extrémité d'une tige (36) de la soupape.

5. Extincteur selon la revendication 4, caractérisé en ce que la tige de soupape (36) est disposée au-dessus d'une tête (34) de la soupape et que, en fonctionnement, cette tête elle-même est soumise à l'action de la pression régnant dans la chambre.

6. Extincteur selon la revendication 5, caractérisé en ce que la tête (34) de la soupape possède une face arrondie tournée vers la chambre de manière à présenter une résistance minimale à l'écoulement de poudre lorsque la soupape (32) est ouverte.

7. Extincteur selon l'une quelconque des revendications 2 à 6, caractérisé en ce que le passage de sortie (16) se poursuit en amont de la soupape (32), à l'intérieur de la chambre, sous la forme d'un tube allongé (50).

8. Procédé pour commander l'éjection de sortie d'un extincteur servant à délivrer une poudre, caractérisé en ce qu'une soupape (32) possédant la sortie permettant l'évacuation de la poudre hors de l'extincteur et que, lors de l'ouverture d'une source de gaz comprimé visant à éjecter la poudre, le gaz est introduit dans un espace (38, 44), où il applique une force à la soupape de manière à maintenir cette dernière fermée alors que la pression régnant dans la chambre contenant la poudre s'établit à un niveau pour lequel on peut obtenir une sortie satisfaisante, et que, lorsque ce niveau a été atteint, la pression régnant dans la chambre applique à la soupape (32) une force qui ouvre cette dernière en permettant l'éjection de la poudre.

9. Procédé pour commander l'éjection de sortie d'un extincteur servant à délivrer une poudre, caractérisé en ce qu'il est prévu dans la sortie (16) d'éjection de la poudre une soupape comportant un élément de soupape (32) pouvant, sous la pression appliquée à des surfaces opposées, se rapprocher et s'écarter d'un siège (31) situé dans un boîtier de soupape (30) pour fermer et ouvrer la sortie, que la surface de la face (34) de l'élément de soupape, soumise à une pression provenant de la chambre est supérieure à la surface de l'autre face (36), le procédé consistant en outre à appliquer un gaz comprimé à ladite autre face (36) de l'élément de soupape (22) et ce directement lorsque le récipient est ouvert, de manière à maintenir la soupape fermée lorsque la pression dans la chambre contenant la poudre s'établit à un niveau satisfaisant.

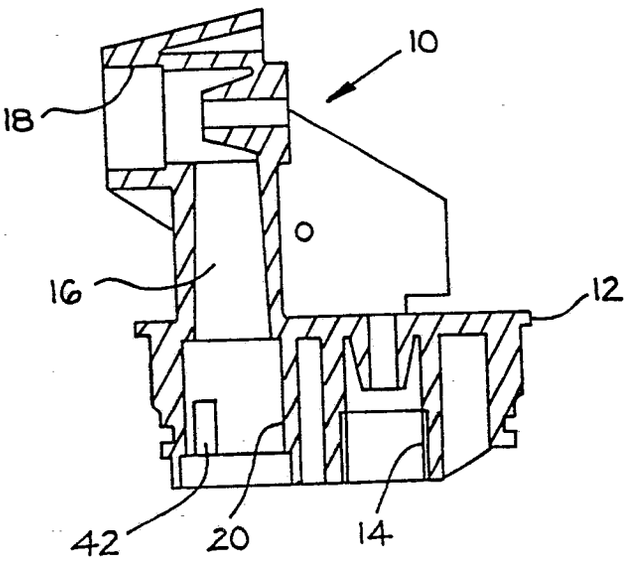


Fig. 1

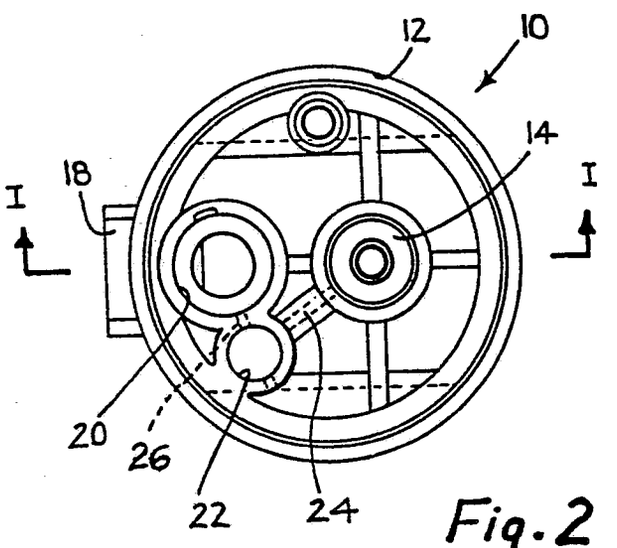


Fig. 2

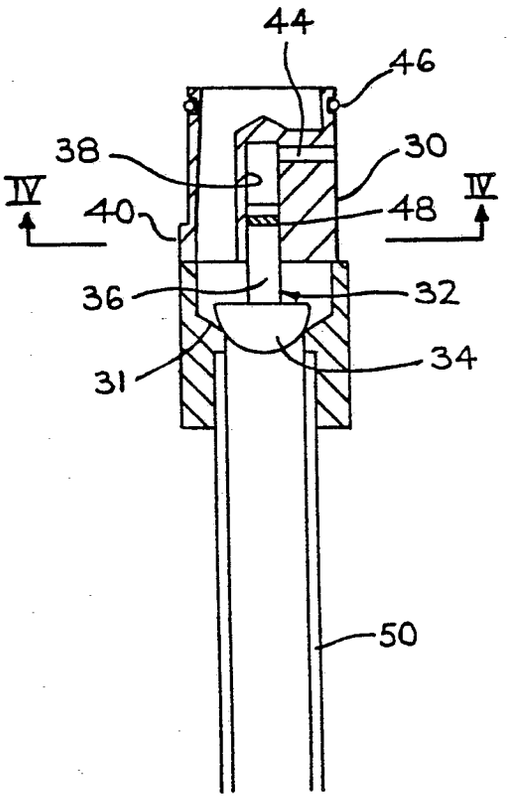


Fig.3

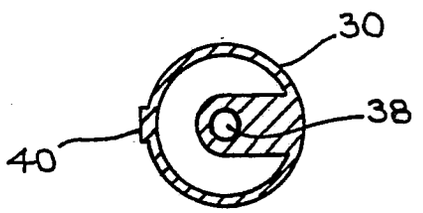


Fig.4