Jan. 26, 1954 F. B. ALLEN ET AL 2,667,225

POWDER FIRE EXTINGUISHER

Filed Nov. 21, 1949

3 Sheets-Sheet 1

Fig. 1.

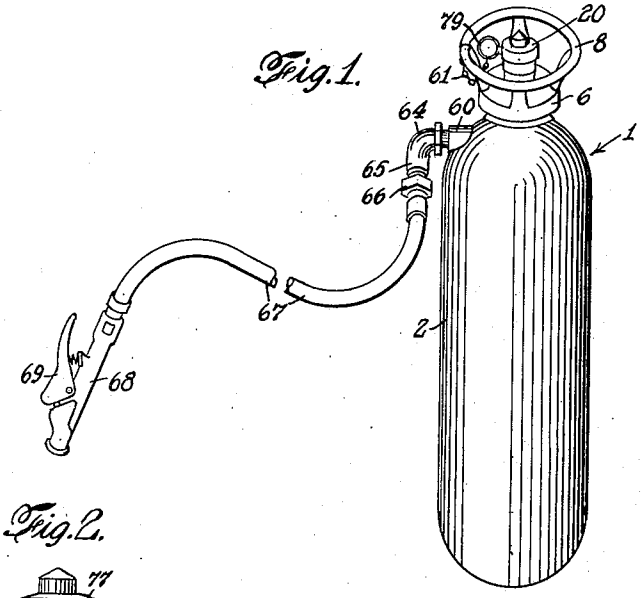


Fig. 2.

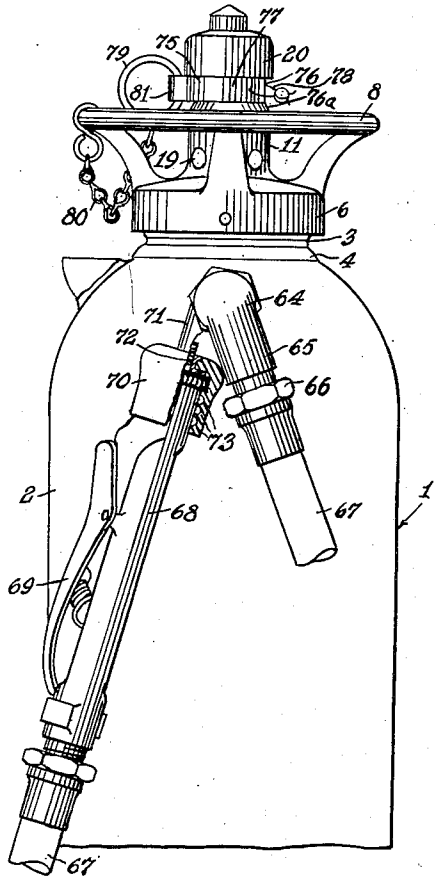
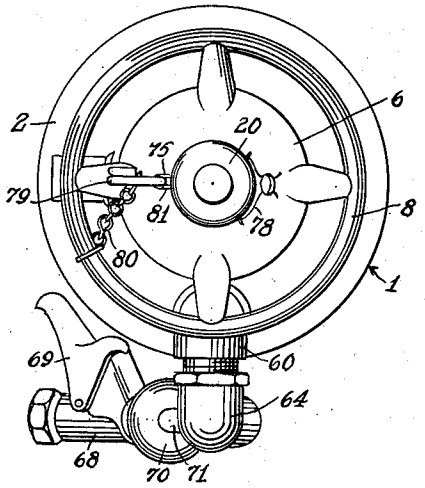


Fig. 3.



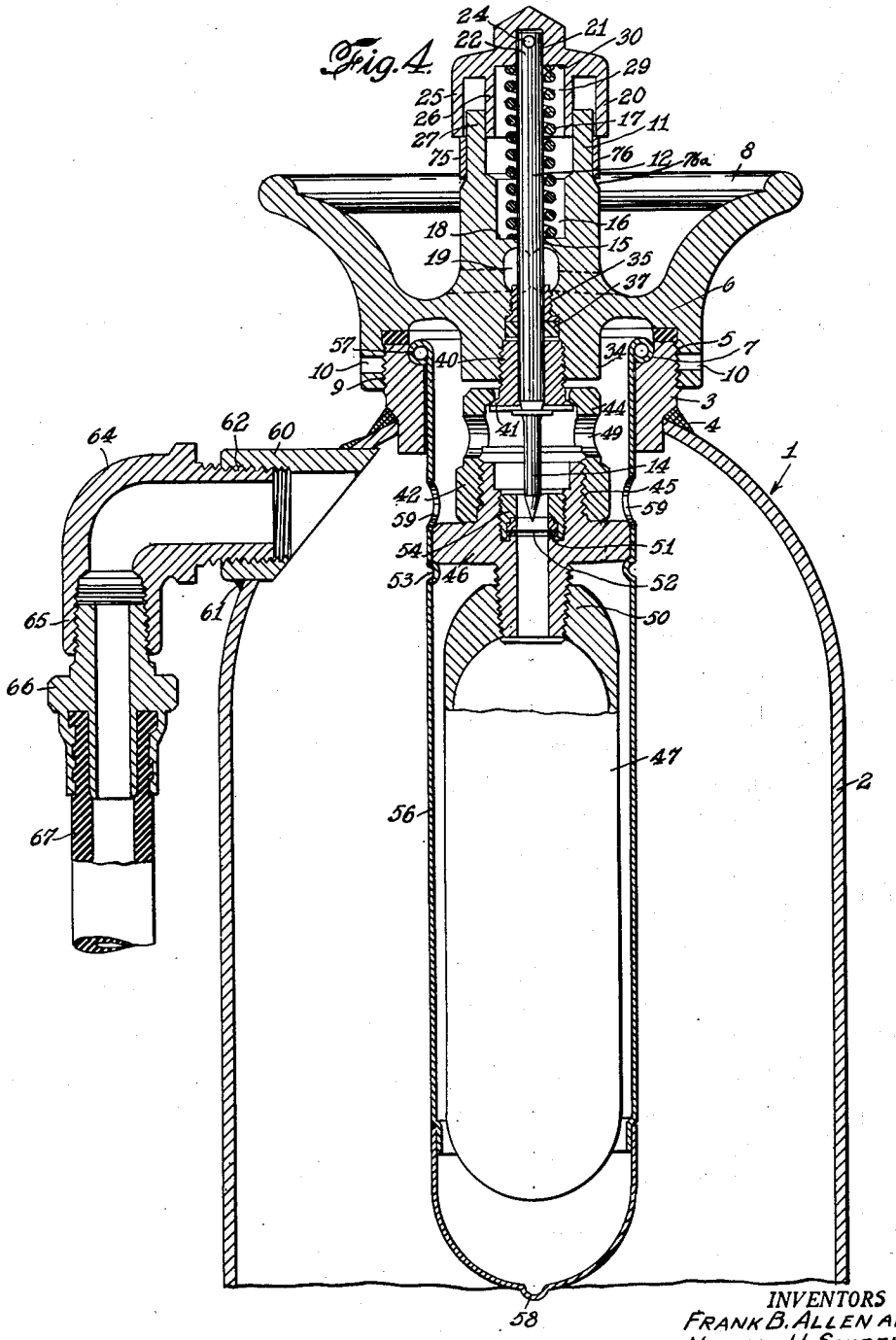
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Fig. 4.



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Fig. 5.

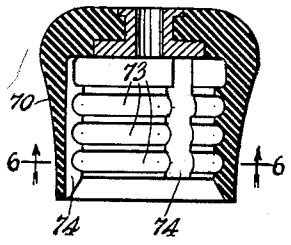


Fig. 6.

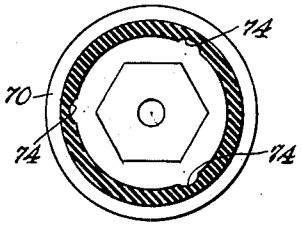
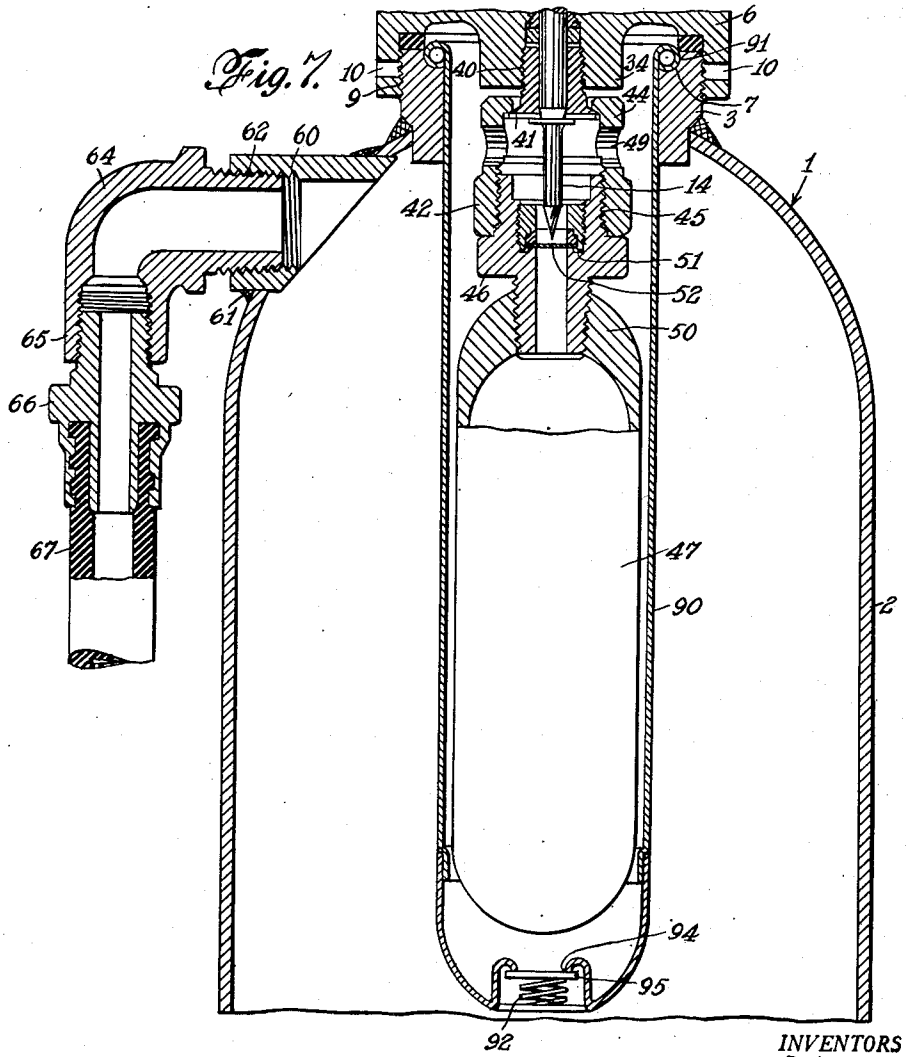


Fig. 7.



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UNITED STATES PATENT OFFICE

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POWDER FIRE EXTINGUISHER

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Application November 21, 1949, Serial No. 128,513

9 Claims. (Cl. 169—31)

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The present invention relates to fire extinguishers, and more particularly to fire extinguishers in which the extinguishing agent is a dry powder.

In an extinguisher of this type the powder may be expelled by the release of a compressed charge of a suitable gas such as carbon dioxide, which is also a fire extinguishing agent. It is important that there be a free flow of the powder during the entire discharge of the extinguisher. It has been found, in some cases, that during periods of non-use of the extinguisher the dry powder gradually tends to become less free-flowing, and difficulty has been had in that the powder has become so caked as to produce an uneven discharge.

In some prior constructions the structure of the extinguisher has been complex and expensive to manufacture and, in many cases, has failed to operate when needed for extinguishing a fire.

Generally these difficulties have been overcome by an extinguisher according to the present invention which is discharged when inverted and struck against a surface such as the ground, the impact accomplishing the double purpose of loosening the powder and releasing the charge of compressed gas to discharge the powder.

The present invention aims to overcome the difficulties and disadvantages of prior devices by providing an improved fire extinguisher which is simple and economical in manufacture and which is rugged in use.

Another object of the invention is to provide an extinguisher in which the cartridge of compressed gas may be readily positioned in the extinguisher after it has been charged with the dry powder extinguishing agent.

A further object of the invention is to provide a dry powder fire extinguisher using a cartridge of compressed gas as the expelling agent in which the gas cartridge is readily removable for weighing to ascertain if it has retained its charge and thus is fit for service.

Another object of the invention is to provide improved safety locking means for a fire extinguisher.

Other objects and advantages of the invention will be apparent from the following description and from the accompanying drawings which show, by way of examples, embodiments of the invention.

In the drawings:

Figure 1 is a perspective view of a dry powder fire extinguisher in accordance with the invention.

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Figure 2 is a fragmentary side view of the extinguisher shown in Figure 1 with the discharge nozzle secured in retaining means.

Figure 3 is a top view of the extinguisher.

Figure 4 is a fragmentary vertical sectional view of the fire extinguisher. The bottom of the extinguisher and the discharge hose are shown as broken away.

Figure 5 is a vertical sectional view through the nozzle retaining member.

Figure 6 is a horizontal sectional view taken along the line 6—6 of Figure 5.

Figure 7 is a fragmentary sectional view of another embodiment of the invention in which the cartridge casing is made with a one-way valve construction venting into the powder container.

Referring to the drawings, there is illustrated a dry powder extinguisher 1 in accordance with the invention. The extinguisher comprises an outer receptacle or container 2 which may be of the usual type for pressurized fire extinguishers. The top end of the container is provided with a casting 3 fastened to container upper edge by a welded or soldered connection 4. The casting 3 is exteriorly threaded as indicated at 5 and fitted with a cover 6. The top of the inner edge of the casting is recessed to provide a shoulder 7.

The cover or retaining cap 6 is made with a conventional handle ring 8 providing means for the easy removal of the cover as well as to provide means for the carrying of the extinguisher. The cover 6 is made of any suitable metal, such as brass or steel and may be cast for economy of construction. The bottom of the cover 6 has an outer downwardly turned interiorly threaded portion 9 adapted to engage with the threaded casting 3 forming the top of the container 2. The lower edge of the threaded portion 9 is apertured as indicated at 10 to provide venting means for any pressurized gas which may be in the container 2 when the cover 6 is removed. By this means the pressure will be relieved before the cover is completely unscrewed so as to eliminate the possibility of the cover being blown away and causing damage or injury. The cover 6 has an upwardly extending tubular portion 11 acting as a guideway for a plunger 12, preferably made of a non-corrosive material such as stainless steel and which has at its lower end a piercing pin 14. The lower end of the upper tubular portion 11 has an opening 15 of the proper diameter so as to provide a snug fit for the reciprocation of the plunger 12. Above the opening 15 in the tubular portion 11 is a recess 16 provided for a spring 17 adapted to abut against

floor 18 of the recess 16. A pair of intersecting bores 19 are made under the floor 18 of the recess providing vent means to the exterior for any powder which may leak past the plunger 12, the bores preventing the powder from entering the recess 16. A cap member 20 for the plunger 12 is formed with a recessed portion 21 to receive upper end 22 of the plunger 12. A transversely directed opening extends through the end 22 and the cap member 20 to receive a drive pin 24. The cap member 20 has a pair of downwardly turned annular skirts 25 and 26 adapted to receive upper end 27 of the tubular member therebetween, the tubular member 27 thereby providing guiding surfaces for the annular skirts 25 and 26 of the cap member 20 as the plunger 12 is depressed. A recess 29 is provided within the cap member 20 for the upper end of the spring 17 which abuts top surface 30 of the recess.

The cover 6 is also provided with a downwardly turned tubular portion 34 including enlargement of the opening 15 to provide a recess for the threaded engagement of an apertured insert 35 having its upper end extending into the intersecting bores 19 so as to provide a guideway for the plunger 12 of a nature so as to prevent any water which may enter the intersecting bores 19 from flowing between the insert 35 and the wall of plunger 12. At the lower end of the insert 35 is a packing 37 adapted to prevent fluid leakage upwardly along the plunger 12. The downwardly turned tubular portion 34 of the cover has the opening 15 still further enlarged to receive another apertured insert 40 having a flanged end 41.

Means are provided for removably securing a gas cartridge to the inner side of the cover and to provide a swiveling action thereof by a cartridge cap member 42 having an apertured and flanged upper end 44 adapted to receive the apertured insert 40 to loosely hold the cap member to the downwardly turned tubular portion 34 of the cover. The cap member 42 is interiorly threaded at its lower end as indicated at 45 to receive an exteriorly threaded closure fitting 46 for a gas cartridge 47. The cap member 42 is apertured as indicated at 49 to provide for the discharge of the gas from the cartridge 47.

The gas cartridge 47 is provided with the usual interiorly threaded neck 50 having its opening closed by the fitting 46. At the upper end of the fitting 46 there is provided a closure disc recess 51 adapted to receive a frangible disc 52 secured in position by a retaining ring 54. The cartridge fitting 46 and the cap member 42 are formed with hexagonal outer surfaces to facilitate the attachment of these parts together.

The casing 2 is adapted to be substantially filled with any suitable dry powder composition, such as is generally principally comprised of sodium bicarbonate with other compounds which add to the non-caking and fire extinguishing qualities of the powder. In order that the gas cartridge 47 may be readily removed and replaced in the container without disturbing the powder charge, a cartridge casing 56 is provided which may be made of a stamping and should be of a diameter and shape so as to readily receive the gas cartridge 47. The upper end of the casing 56 is preferably formed with a rolled edge 57 so that the inner casing may be supported within the outer receptacle 2 by engagement of the rolled edge 57 against the shoulder 7 of the casting 3. An annular inwardly extending collar 53 is spun or otherwise formed in the upper end of the casing 56. The fitting 46 is made with a hexagonal shape and its diameter across the corners of the hexagon is such that it will not drop below the collar 53. Thus if the fitting 46 is insecurely attached to the cap member 42, and should be shaken free by vibration, the gas cartridge 47 is maintained in proper position for the piercing of its frangible disc 52. The casing 56 is formed with a plurality of apertures 59 near its upper edge but below the casting 3 so as to permit the passage of gas from the cartridge 47 into the body of the casing 2. The casing 56 has formed therein on its bottom end a downwardly directed transversely extending ridge 58. The ridge 58 is for use in aiding the insertion of the casing 56 into the powder charge. By turning the casing as it is urged downwardly, the powder is moved away from the end of the casing without causing the packing or caking of the powder. This construction is advantageous as a discharge of the extinguisher results in a chilling of the cartridge which thus tends to condense moisture on its outer surface, the casing 56 acts as a receiver for the moisture preventing it from getting into the powder and thus causing caking thereof.

A discharge outlet for the container 2 may be formed from a tubular fitting 60 soldered or welded in an aperture in the container 2 as indicated at 61. It should be noted that the outlet fitting 60 is positioned adjacent the top of the container 2 so as to provide an outlet and hose which will be free of the powder during normal storage of the extinguisher. The fitting 60 may be interiorly threaded to receive end 62 of the elbow 64 which has its lower end 65 threaded to receive the connection 66 of a conventional outlet hose 67. A discharge nozzle valve 68 of any suitable type may be attached to the end of the hose 67, the nozzle valve being preferably provided with a squeeze-grip actuated shutoff valve lever 69 so that the extinguisher may be intermittently operated.

The nozzle valve 68 is held in position during storage of the extinguisher by a flexible retaining cap 70 attached to a boss 71 on the elbow 64 by a screw 72. The inside surface of the retaining cap 70 is formed with a plurality of annular ridges 73 so that the nozzle is easily inserted and removed therefrom. A plurality of longitudinally extending passages 74 are made across the corrugations to permit any leaking gas to escape without building up a pressure to force the nozzle away from the retaining cap. The retaining cap is claimed in our co-pending application for Fire Extinguisher Nozzle Retaining Means, Serial No. 349,908, filed April 20, 1953.

Locking means are provided to prevent the accidental discharge of the pressurized container 47, as during transportation, by a locking clip 75 extending partially about a reduced or grooved portion 76 of the upwardly extending tubular portion 11 of the cover. The grooved portion 76 has an inclined or beveled lower edge 76a formed at an angle of approximately 30 degrees from the outer surface of the tubular portion 11. The inner ends of the locking clip 75 are apertured as indicated at 77 to receive a breakable sealing wire 78. A pull ring 79 attached by a chain 80 to the handle ring 8 is retained in a pinched portion 81 of the locking clip 75 to facilitate the pulling away of the locking clip and the breaking of the sealing wire 78. The locking means is important as it readily gives a visual indication as

to whether or not the extinguisher has been operated or that tampering has occurred. A disadvantage of some locking means is that they are not easily and quickly removable in case of emergency such as in the event of a fire. A feature of the present construction is the means whereby the extinguisher may be operated without separately removing the locking ring **75** to rupture the sealing wire **78**. By reason of the use of the inclined edge **76***a* on the grooved portion **76**, the locking clip **75** may be displaced and the cap member **20** depressed to operate the extinguisher by using slightly more force than usual in operating the extinguisher. In such operation the beveled edge **76***a* spreads the clip **75** so as to permit the operating movement of the cap member **20**. The tension of the clip member **75** and the breaking strength of the sealing wire **78** preferably are so proportioned that by using a 30 degree angle for the beveled edge **76***a* a steady pressure or about 200 pounds will not operate the extinguisher, while if the extinguisher is inverted and dropped against a hard surface from a height of one to two inches the extinguisher will be operated.

In operating the fire extinguisher in the usual manner the locking clip **75** is removed and the extinguisher is inverted so that the cap member **20** may be struck against a surface such as the ground to loosen the powder charge and to move the plunger **12** inwardly to cause the piercing pin **14** to penetrate the disc **52** of the cartridge **47**. The released gas charge cooperates with the spring **17** to return the piercing pin **14** to its normal position and the released gas passes through the apertures **49** and **59** into the body of the outer receptacle or casing **2**. As the gas passes through the charge the powder is loosened still further and agitated so that it will be expelled through the discharge fitting **60**, the outlet hose **67**, and out the nozzle **68** as the squeeze grip valve is actuated. In the event intermittent operation is desired, the squeeze-grip valve may be released to shut off the discharge.

Referring to Figure 7 there is shown a cartridge casing **90** having a rolled top edge **91** to engage with the shoulder **7**. The lower end of the casing **90** is apertured to receive a one-way valve assembly which may be threaded, welded or otherwise secured in position. The valve assembly comprises a valve seat **94**, a valve member **95**, and a spring **92** tending to urge the valve member **95** on its seat **94**. It will be observed the valve member **95** is readily moved from its seat to allow the passage of fluid from the gas cartridge to the outer casing **2**. The valve member **95** is held against its seat by the spring **92** as the casing **90** is moved into a powder charge in the outer casing **2**. This construction is not only advantageous in keeping powder out of the casing but it provides an outlet for the pressurizing fluid to add to the impact shock as the extinguisher is inverted to be discharged thus completely dislodging and pressurizing the powder charge and urging it towards the outlet **60**.

While the invention has been described and illustrated with reference to a specific embodiment thereof, it will be understood that other embodiments may be resorted to without departing from the invention. For example, while the gas cartridge has been described as being of the disc-sealed type openable by a piercing pin, an equivalent construction may utilize a gas cartridge closed by a valve member openable by a valve operating member in lieu of the piercing pin. Therefore, the form of the invention set out above should be considered as illustrative and not as limiting the scope of the following claims.

We claim:

1. A dry powder fire extinguisher adapted to be discharged while inverted, the extinguisher comprising a container, means providing an outlet adjacent the top of the container above the normal powder level, means providing a charging opening at the top of the container, a gas cartridge to expel the powder from the container through the outlet, a discharge head unitary assembly including cartridge opening means, and universal joint means on the under surface of the discharge head carrying the cartridge and supporting it in operative position with respect to the cartridge opening means, whereby the insertion of the cartridge into the powder charge is facilitated.

2. A dry powder fire extinguisher comprising a container, a discharge head for the container including a piercing pin, a cartridge for compressed gas adapted to be penetrated by the piercing pin to release the gas, the discharge head having a chamber about the upper end of the piercing pin for a spring chamber, and a spring in the spring chamber to normally urge the piercing pin away from the cartridge, the discharge head having an intermediate chamber vented to the atmosphere and positioned about the piercing pin between the spring chamber and the container whereby powder leaking along the piercing pin is exhausted to the atmosphere.

3. A fire extinguisher comprising a container for an extinguishing agent, a discharge head for the container including an upwardly directed extension a piercing pin slidably carried by the extension, a cap to actuate the piercing pin, a cartridge for compressed gas adapted to be penetrated by the piercing pin to expel the extinguishing agent from the container, and a removable safety clip to releasably restrain the piercing pin from penetrating the cartridge, the upwardly directed extension having an annular groove to receive the safety clip, the lower edge of the groove inclined downwardly and outwardly so that when the safety clip is compressed between the inclined surface and the cap member the clip is spread to allow the piercing pin to operate the extinguisher.

4. A dry powder fire extinguisher adapted to be discharged while inverted, the extinguisher comprising a container, means providng an outlet adjacent the top of the container above the normal powder level, means providing a charging opening at the top of the container, a gas cartridge to expel the powder from the container through the outlet, a discharge head unitary assembly including means on its under surface to carry the cartridge and means to release the gas from the cartridge, an open-top casing manipulatable from the exterior of the container into the dry powder to provide space for the gas cartridge, means within the container adjacent the charging opening to support the casing with its top edge practically at the outer edge of the filling opening, and fluid passage means positioned wholly within the container to lead the gas discharge into the dry powder.

5. A dry powder fire extinguisher adapted to be discharged while inverted, the extinguisher comprising a container, means providing an outlet adjacent the top of the container, means providing a charging opening at the top of the

container, a gas cartridge to expel the powder from the container through the outlet, a discharge head including means on its under surface to carry the cartridge and means to release the gas from the cartridge, an open-top casing having an enlarged upper end and manipulatable from the exterior of the container, a rib projecting from the bottom of the casing to facilitate the insertion of the casing into the dry powder to provide space for the gas cartridge, means within the container adjacent the charging opening forming a shoulder to support the casing, and fluid passage means positioned wholly within the container to lead the gas discharge into the dry powder.

6. A dry powder fire extinguisher adapted to be discharged while inverted, the extinguisher comprising a container, means providing an outlet adjacent the top of the container above the normal powder level, a gas cartridge to expel the powder from the container through the outlet, a discharge head unitary assembly including means on its under surface to carry the cartridge and means to release the gas from the cartridge, an open-top casing having a rolled-top edge and manipulatable from the exterior of the container into the dry powder to provide space for the gas cartridge, means within the container adjacent the charging opening forming a shoulder to support the casing by its rolled-top edge practically at the outer edge of the filling opening, and means providing an aperture in the wall of the casing positioned wholly within the container to lead the gas discharge into the dry powder.

7. A dry powder fire extinguisher adapted to be discharged while inverted, the extinguisher comprising a container, means providing an outlet adjacent the top of the container above the normal powder level, a gas cartridge to expel the powder from the container through the outlet, a discharge head unitary assembly including universal joint means on its under surface to carry the cartridge, a piercing pin in the discharge head to penetrate the cartridge, a cap to actuate the piercing pin to release the gas from the cartridge, an open-top casing manipulatable from the exterior of the container to be forced into the dry powder to provide space for the gas cartridge, the casing having a rolled-top edge, a shoulder within the container adjacent the charging opening to support the rolled edge of the casing practically at the outer edge of the filling opening, the casing apertured to provide fluid passage means wholly within the container to lead the gas discharge into the dry powder, and a removable safety clip to releasably restrain the piercing pin from penetrating the cartridge, the piercing pin having an annular groove to receive the safety clip, the lower edge of the groove inclined so that when the safety clip is compressed between the inclined surface and the discharge head the clip is spread to allow the piercing pin to release the gas from the cartridge to expel the powder.

8. A dry powder fire extinguisher adapted to be discharged while inverted, the extinguisher comprising a container, means providing an outlet adjacent the top of the container above the normal powder level, means providing a charging opening at the top of the container, a gas cartridge to expel the powder from the container through the outlet, a discharge head unitary assembly including universal joint means on its under surface to carry the cartridge, means to release the gas from the cartridge carried by the discharge head, an open-top casing manipulatable from the exterior of the container into the dry powder to provide space for the gas cartridge, means within the container adjacent the charging opening to support the casing with the casing top edge practically at the top edge of the filling opening, and fluid passage means positioned wholly within the container to lead the gas discharge into the powder.

9. A dry powder fire extinguisher adapted to be discharged while inverted, the extinguisher comprising a container, means providing an outlet adjacent the top of the container above the normal powder level, means providing a charging opening at the top of the container, a gas cartridge to expel the powder from the container through the outlet, a discharge head unitary assembly including means on its under surface to carry the cartridge and means to release the gas from the cartridge, an open-top casing manipulatable from the exterior of the container into the dry powder to provide space for the gas cartridge, means within the container adjacent the charging opening to support the casing with its top edge practically at the outer edge of the filling opening, and fluid passage means positioned wholly within the container to lead the gas discharge into the dry powder, the fluid passage means including a check valve positioned at the closed end of the open top casing and adapted to permit flow of gas outwardly from the casing and to block flow of powder into the casing.

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