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[21] Appl. No. 735,093
[22] Filed June 6, 1968
[45] Patented Jan. 5, 1971
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[54] FIRE EXTINGUISHER
26 Claims, 10 Drawing Figs.
[52] U.S. Cl. 169/28,
169/9, 169/31, 169/36
[51] Int. Cl. A62c 35/02
[50] Field of Search 169/9, 11,
28, 31, 26, 6

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ABSTRACT: This covers a fire extinguisher having a container which is to be filled with fire-extinguishing liquid or gas or both, along with a gas or gasses for supercharging the contents of the container. One of the gases may be inert and may be used to detect leakage from the container. The equipment also includes a discharge valve having a rupturable disc which, in response to a space wave or waves, becomes ruptured to discharge the contents of the container. The equipment includes a filler valve through which the contents are supplied to the container, the filler valve also including a rupturable disc which, in response to pressure within the container exceeding a predetermined value, releases the contents of the container. The rupturable disc may be replaced by a temperature sensitive material which, in response to an elevated temperature of predetermined value, releases the contents of the container.

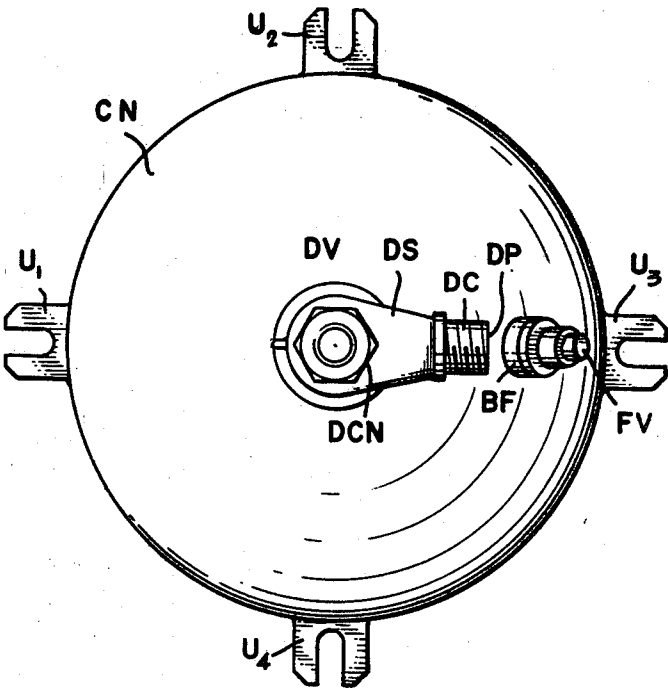


FIG. 1

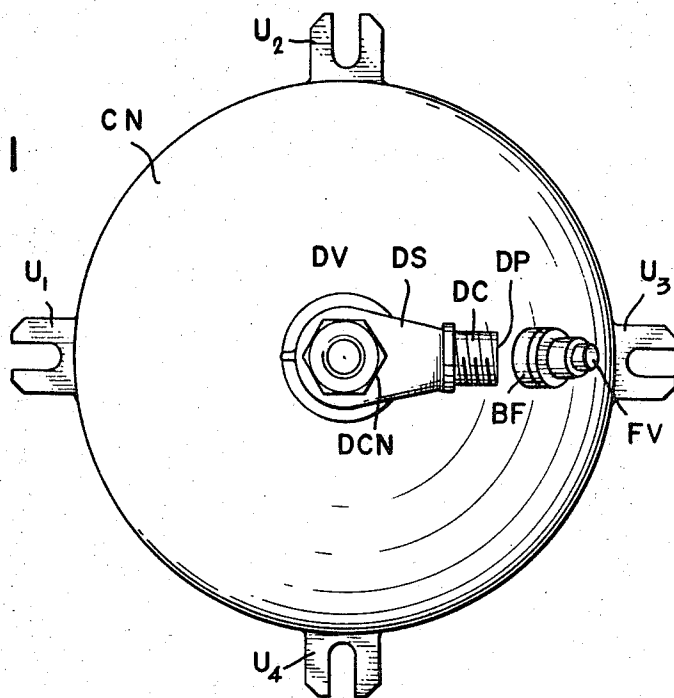
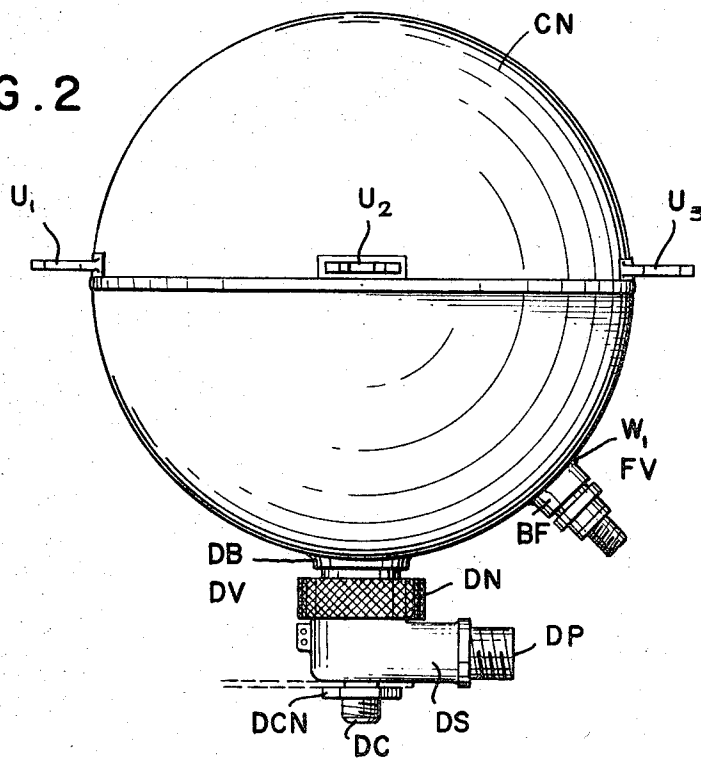


FIG. 2



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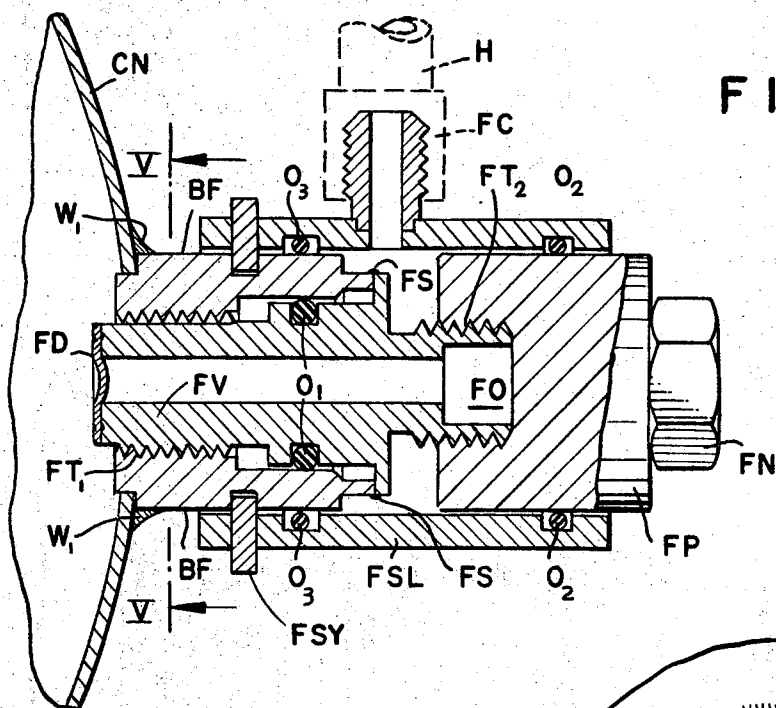


FIG. 4

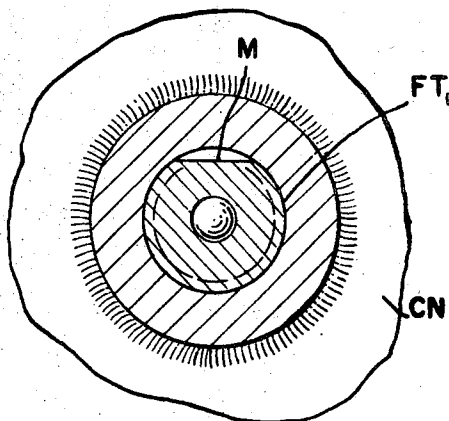


FIG. 5

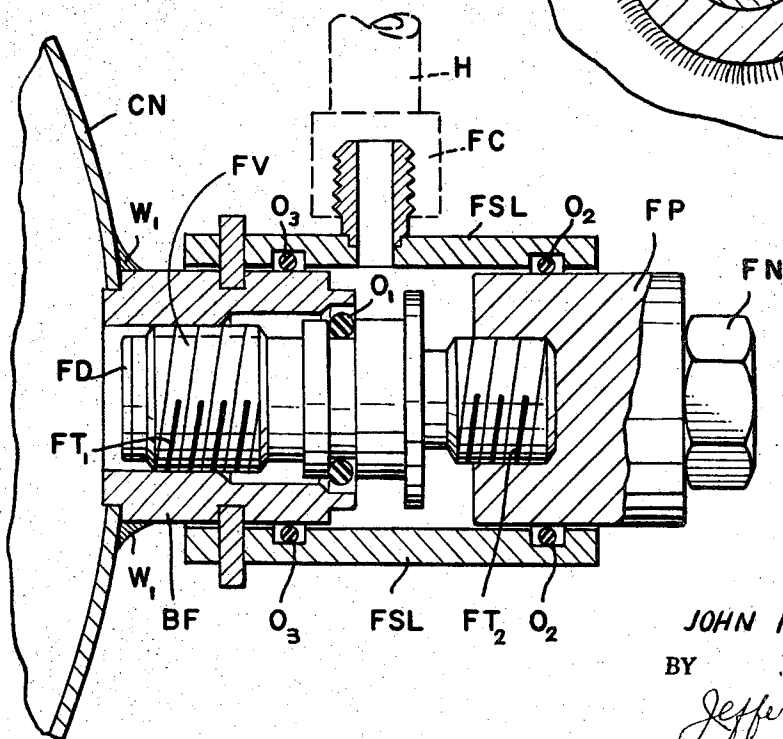
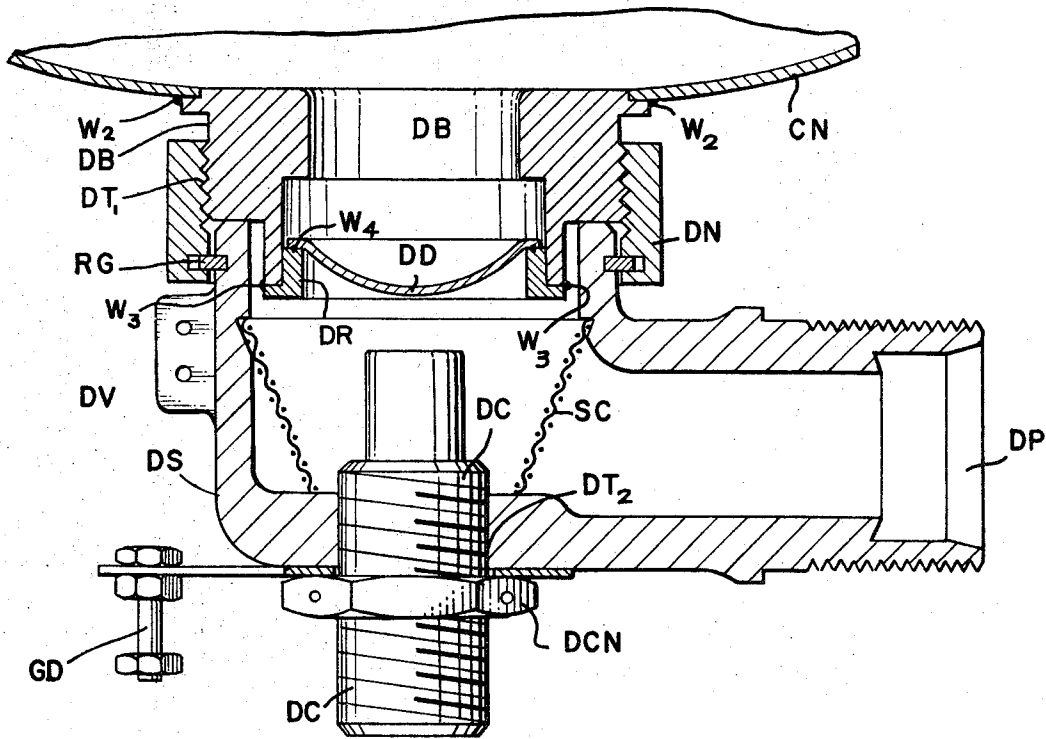


FIG. 3

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FIG. 7.



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FIG. 6.

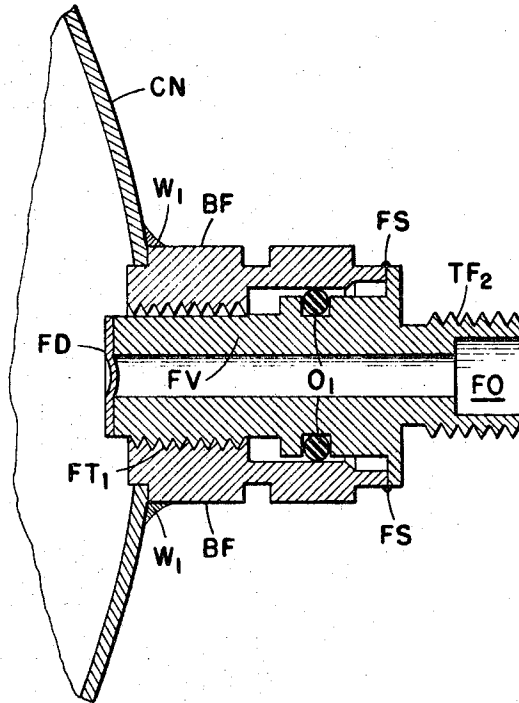


FIG. 8a.

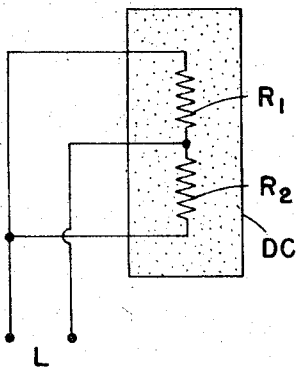


FIG. 8b.

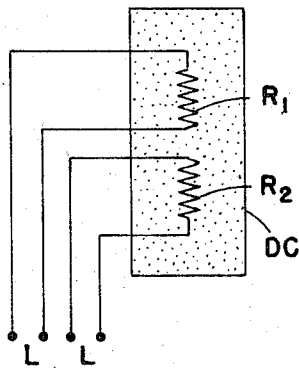
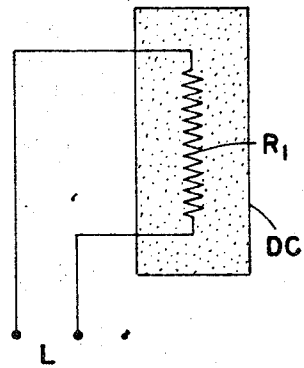


FIG. 8c.



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FIRE EXTINGUISHER

This invention relates to fire extinguishers and, more particularly, to fire extinguishers in which the contents of the fire extinguishers are hermetically sealed within containers.

This invention also relates to fire extinguishers employing a container having one or more discs which are to be ruptured whenever the contents of the container are to be discharged.

This invention relates, still more particularly, to such fire extinguishers in which the rupture of the container or a disc of the container is effected by a wave or a series of waves which impinge upon the container or upon the disc and directly produce a rupture therein to discharge the contents of the container.

This invention also relates to fire extinguishers in which fire-extinguishing materials, whether liquid or gaseous or both, may be inserted into a container and brought to a substantial or superatmospheric internal pressure and then hermetically sealed so as to prevent the leakage of the pressurized materials after they are encased therein.

Still more particularly, this invention relates to fire extinguishers having containers which are filled with fire-extinguishing materials to which a gas, for example, helium, or any other gas or liquid whether or not inert, may be added thereto so that, when the contents are hermetically sealed, leakage from the containers may be readily detectable by well known devices, such as a spectrograph, for example.

Various forms of fire extinguishers have been proposed over the years, and some types of such fire extinguishers, which were filled with fire-extinguishing materials, were filled at sufficiently high pressures. They inevitably involved substantial leakage of the pressurized contents of the extinguishers so that, after a period of time, the pressure of the contents was substantially reduced. Such leakage adversely affected the effectiveness and operativeness of the extinguishers. Indeed many such extinguishing devices, when subjected to considerable leakage, have been valueless in extinguishing fires and the fires raged on uncontrollably notwithstanding the ready availability of the fire extinguishers.

In accordance with this invention, there will be shown and described a form of fire extinguisher which is filled with materials under substantially high pressure and the extinguisher will be maintained at substantially the same high pressure for a very long, if not almost infinite interval of time. Such a construction will have great superiority over extinguishers which were incapable of avoiding leakage and loss of consequent effectiveness.

Moreover, a fire extinguisher has been previously suggested which was designed to house or encase a fire-extinguishing substance which rises in pressure when the housing or casing is broken, and the housing or casing embodied a disc or other rupturable device which was broken down or pierced by a mechanical element designed to break or rupture the disc or other device. Such extinguishers obviously depend upon the physical movement and appropriate action of one or more mechanical elements, such as a piston, slug or cutter, which usually required a very high mechanical force to effectuate the breakage of the disc or like device to discharge the fire-extinguishing materials. As was sometimes the case, the mechanical elements failed to operate properly or did not operate at all, whereupon the extinguisher failed to perform its intended function.

In accordance with this invention, a fire-extinguishing structural arrangement will be shown and described which is entirely free of any mechanical moving element designed to rupture the container or a disc of the container bearing fire-extinguishing materials. In accordance with a form of this invention, a cartridge carrying an explosive substance will be positioned in proximity to the container bearing the fire-extinguishing materials so that when the cartridge is supplied with a current, an explosive charge or force will be released to create a shock wave or a series of shock waves of such great intensity as to positively rupture the disc and promptly release the contents of the container.

In its general aspects, the fire extinguisher of this invention embodies a container, preferably made of metal, into which the fire-extinguishing materials are to be inserted. The fire extinguisher may include, in a preferred embodiment, two distinct valves to be generally referred to hereinafter as a filler valve and a discharge valve. The filler valve, which will be a part of the container, will be employed as a port through which the fire-extinguishing materials will be inserted into the container. An auxiliary and severable filling fixture will be employed to feed the fire-extinguishing materials under superatmospheric pressure through the filler valve to the container and maintain the pressure substantially constant. The discharge valve will also be associated with the same container and it will contain another port which will serve to discharge the fire-extinguishing materials and direct them, by means of a swivel device, to a particular area which is to be treated against fire or where a fire is to be extinguished. In addition, the arrangement will include a cartridge containing an explosive material which, when electrically actuated, will produce a shock wave or waves of high intensity and such shock waves or detonations will be pointed at a particular spot or area of the container in which a rupturable disc is located so that the disc may be adequately pierced. When the disc is pierced or ruptured, the contents of the container will be promptly released through the port of the discharge valve and directed to the point or area in the vicinity requiring fire neutralization or suppression.

The fire extinguisher of this invention and its objects and features will be better and more completely understood from the more detailed description hereinafter following when read in connection with the accompanying drawing in which: FIG. 1 shows a bottom plan view of the fire extinguisher of this invention; FIG. 2 shows a side plan view of the fire extinguisher; FIG. 3 illustrates a view of the fill valve, partly in cross section, showing the filling fixture mechanism in position for use in filling the container of the fire extinguisher; FIG. 4 shows the fill valve and the filling fixture mechanism after the filling operation has been completed; FIG. 5 shows a plan view of the fill valve when viewed along a line directed at the container of the fire extinguisher; FIG. 6 shows the fill valve after the filling fixture mechanism has been removed; FIG. 7 presents a cross-sectional view of the discharge valve mechanism; and FIGS. 8a, 8b and 8c illustrate the electrically-controlled mechanism employed to initiate the wave generation. Throughout the drawing, the same or similar parts will be represented by the same reference characters.

Referring especially to FIGS. 1 and 2 of the drawing, there is shown a spherical container CN which is preferably made of metal and constructed of two semispherical sections, but the container CN may be made of plastic or other materials of sufficient strength. The container CN constitutes the housing for receiving and encasing the fire-extinguishing and other materials, usually in the form of either liquids or gases or both, which are to be inserted therein. The container CN may employ, for example, several U-shaped supporting elements such as U₁, U₂, U₃ and U₄, along with appropriate hardware, such as bolts and nuts (not shown), to retain the container CN on properly spaced brackets (not shown) in the structure of an airplane or in the compartment of a car or train or elsewhere where the container CN will be held in a fixed position.

The container CN has two main valves or ports, one a filler valve FV and the other a discharge valve DV. The filler valve FV will be employed, as will be more fully described hereinafter, for the purpose of receiving, through an opening therein, the liquids or gases, or both liquids and gases, which are to be inserted into the container CN and maintained therein at a substantially high pressure as, for example, 600 p.s.i. Predetermined pressures of between about 600 to 2,700 p.s.i. have been found satisfactory. The pumping apparatus and methods required to elevate the pressure of the products within container CN would be apparent to mechanics and technicians and, therefore, need not be described or illustrated herein. The discharge valve DV, on the other hand, will

be employed, as will be explained more fully later, for releasing the contents of the container CN in response to the breakage of a discharge disc DD. The details of these valves and their properties and operating features will be further described hereinafter.

Referring to the filler valve FV and especially to FIGS. 3, 4, and 6, the filler valve FV is removably affixed to the container CN through a so-called boss-fill device BF. The boss-fill device BF is preferably of a generally cylindrical shape and is fitted into an appropriate opening in the container CN as shown. The boss-fill device BF may be peripherally welded, as shown by W_1 , so as to be permanently fastened to container CN thereby effecting a hermetic seal. The boss-fill device BF is internally threaded to receive the external threads FT_1 of the filler valve FV so that the device FV may be removably held by container CN. The filler valve FV has an opening FO at one end through which the fire-extinguishing liquids or gases may be exhausted in the event of rupture of the safety disc FD. The end of the filler valve FV is also externally threaded, at the region FT_2 , to receive the plug FP of an auxiliary filling fixture mechanism as will be subsequently described.

The overall discharge valve assembly, as shown in FIG. 7, includes a discharge valve DV and a boss device DB which is peripherally welded at W_2 for permanent connection to the container CN. The boss device DB is connected by a peripheral weld W_3 to a circular ring DR which supports a bent or bulged discharge disc DD, sometimes called a rupture disc. The discharge disc DD is seated on and supported by the upper surface of the ring DR, the disc DD being welded to the ring DR at W_4 . The disc DD is bent or bulged as shown and is maintained in this configuration. However, the disc DD may have any other shape and it may be uniformly flat, if so desired.

The discharge valve assembly also includes a swivel assembly DS which includes a normally open discharge port DP. The boss device DB is externally threaded at DT_1 to receive an internally threaded cylindrical retaining nut DN which is knurled so that the swivel assembly DS may be rotated over the threaded portion DT_1 to connect swivel assembly DS to the boss device DB to retain the swivel device DS in permanent contact with the boss device DB. The rotatability of the swivel assembly DS permits the discharge port DP to be pointed in any selected direction and its direction may be changed whenever desired. This gives the fire extinguisher a considerable flexibility as to the adjustability of the direction of the discharge port DP in facing a particularly fire-susceptible region.

The discharge device DV houses a cartridge DC of any well-known type. The cartridge DC is externally threaded in the region DT_2 , so as to mesh with the corresponding internal threads of the swivel device DS. The cartridge DC embodies a multilateral nut DCN designed to facilitate the rotation and insertion of the cartridge device DC into the opening provided by the threaded region DT_2 of the swivel assembly DS.

The nut DCN limits the distance through which the cartridge device DC may be inserted into the swivel assembly DS. The cartridge DC also embodies a pyrotechnic charge which, in response to an electrical signal to be subsequently described, will generate a wave or series of waves of very large amplitude or force to act upon and rupture the disc DD. A screen SC, which is frustoconical in shape but may be of other shapes, is positioned as shown within the swivel assembly DS. The screen SC is designed to receive and hold therein any metal particles or fragments produced by breakage in response to the activation of the explosive charge generated within the cartridge DC. A retaining ring RG is positioned within and between the retaining nut DN and the swivel assembly DS as shown. The function of ring RG is to guide and hold the swivel assembly DS affixed to the boss device DB at any desired circumferential angle, so that the discharge port DP may be pointed in any desired direction as, for example, at an engine that may be positioned in the nacelle and retained in

that direction. A ground terminal GD is connected by a metal spacer to the swivel assembly DS.

As is well understood in the art and as shown in FIGS. 8a, 8b and 8c, the cartridge DC may include, and usually does include, one or more resistors such as R_1 and R_2 which are wired in a well-known manner to a control point (not shown) which may be, for example, in the cockpit of an airplane. By actuating a switch or switches (not shown) in the cockpit, current supplied from a battery or other source will be transmitted by interconnecting wires L, as shown extending to the resistor or resistors R_1 and R_2 within the cartridge DC to heat the resistor or resistors R_1 and R_2 to a high or predetermined temperature. The resistor or resistors R_1 and R_2 are imbedded in an appropriate explosive material of any well known type so that, when the resistor or resistors R_1 and R_2 reach a sufficiently high temperature, an explosive charge will be set off to produce or initiate a shock wave or series of shock waves of very high wave front. The energy in the generated wave or waves will be so high as not only to impinge upon the adjacent discharge disc DD but also to unequivocally pierce the disc DD. Hence, the fire-extinguishing contents of the container CN will be discharged through the opening or openings of the ruptured disc DD and then change course and be discharged through the discharge port DP in the direction in which the port DP is pointed. This discharge will diminish or suppress any fire that may be raging in the proximity of, or in the direction of, the discharge port DP.

The filler valve FV, the general structure of which has already been explained with reference to FIGS. 3, 4 and 6, is connected by an appropriate pipe or hose H and a removable filling fixture to a source of fire-extinguishing materials, such as liquids and/or gases and this valve FV transmits the fire-extinguishing materials, whether liquids or gases or both, into the container CN. Such fire-extinguishing materials might include, and have included, a liquid such as freon, preferably Dupont's material designated 1301. In addition to the main fire-extinguishing materials just referred to, a gas such as nitrogen preferably would also be added and applied through the filler valve FV into the container CN. The primary purpose of the gas, such as nitrogen, will be to supercharge the freon material within the container CN so as to establish a substantially higher or superatmospheric pressure within the container CN. Moreover, an inert gas, such as helium, may also be added and inserted into the container CN through the filling fixture to be used with the filler valve FV. The inert gas is primarily intended to serve as a tracer which can be detected, and remain detectable, upon leakage from the container CN by any well-known detecting equipment, such as a mass spectrograph. Any other detecting device may be employed for this purpose. If desired, a pressure gauge may be employed with the equipment, as an alternative to the detecting device, to indicate the internal pressure within the container CN. Moreover a pressure switch for indicating, visually or otherwise, that the internal pressure has fallen below a predetermined value, may also be associated with the equipment. These measuring and indicating devices may be fitted to the container CN if this is desired.

It sealed one of the features of this invention to employ a container such as CN and its filler valve FV and its discharge valve DV in a hermetically sealed state while the container CN remains supercharged at a predetermined or superatmospheric high pressure and poised at all times for efficient fire extinguishing action. The contents of the container CN remain protected over long periods of time, for example, several years, in their hermetically sealed state; that is, the container retains its substantially original contents. Any leakage of the contents of the container CN, however small the leakage may be, will be readily detectable. The continuous availability, therefore, of a highly efficient, fully charged firefighting equipment will be at hand and rendered active merely by the control of an external switch electrically connected to cartridge DC as shown. The switch may be any control device, whether or not manually controlled, which may be activated to furnish current from a

battery or other source to the resistor or resistors R₁ and/or R₂ of the cartridge DC so as to fully activate the wave-producing charge.

No mechanical element, such as a piston or a pointed tool or a knife or other mechanical device, is required to make physical contact with and to penetrate the disc DD of the discharge valve DV to release the supercharged contents of the container CN for firefighting purposes. The penetration of the disc DD is accomplished merely by a space wave or waves which are set in motion by the explosive charge developed within the cartridge DC. The wave or waves travel but a short distance to reach disc DD and hence very little energy is dissipated in the travel path. This space wave phenomenon is an important feature of this invention because it eliminates the dependence of the fire extinguisher upon a physical or mechanical penetration of the container CN by any pointed or sharpened article or device or by a piston or pistonlike actuator. Space wave energy is thus directly employed to unseal the contents of container CN.

Another feature of this invention resides in the sealing of the fire-extinguishing contents of the container CN just after the pressure within the container has been raised to a substantially high level. The seal is achieved first by an O-ring O₁ and then by welding. For example, after the materials are inserted into container CN, the filler valve mechanism FV of this invention may be permanently sealed to the container CN at the region FS by a heliarc tungsten electrode, for example, to retain and maintain the fire-extinguishing materials within the container at a substantially high pressure thereafter. Notwithstanding the volatility of whatever products are enclosed within container CN, their pressure will be maintained substantially constant for a long time.

The filler valve FV has permanently affixed thereto, as one of its components, a curved or bulged disc device FD which is welded to the filler valve FV. The disc device FD will resist any penetration therethrough of the materials confined with container CN when such materials are in their normal states but the disc device FD will be penetrated only when the pressure within the container CN is raised above a relatively high or predetermined level which may be just short of a dangerous level. When the pressure within the container CN has reached the above-noted high predetermined level, the disc FD device, which has predetermined burst characteristics, will then be penetrated or otherwise broken down so as to allow the contents of the container CN to be released promptly. This would occur, for example, when abnormal temperatures have developed in the region where the container CN is housed. Such conditions might be brought about by abnormal temperatures in the vicinity of the container CN, hence raising the pressure of those enclosed gases on the inner wall of the container CN and producing a physical condition which will pierce or break down the disc device FD. Except under such extraordinary conditions, the filler valve FV will remain in contact. Once discharged through the filler valve FV due to the breakage of the disc device FD, the container would need to be refilled (through the auxiliary and severable filler fixture, i.e., essentially the sleeve FSL, the plug FP, the nut FN, the coupler FC and the hose H) with the appropriate fire-extinguishing materials in the manner already explained.

As already suggested, the auxiliary apparatus for filling the container CN may include, in addition to the filler valve FV, the plug FP (and its nut), a sleeve FSL and the O-rings O₂ and O₃. The hose H will be coupled in the usual way to the sleeve FSL by means of typical pipe or hose coupling elements FC which are threaded and coupled to each other. The external threads FT₁ of the filler valve FV are milled at M, as shown in FIG. 5, to provide a space for the movement therethrough of liquids or gases as will be described. The sleeve FSL is retained by the boss-fill device BF by means of a yoke FS_Y during the filling operation.

When it is desired to insert liquids or gases or both into the container CN for fire-extinguishing purposes and for incidental and simultaneous detecting purposes, it is merely

necessary to turn the nut FN of the auxiliary filling fixture back several turns so as to move the plug FP in a direction away from the filler valve FV to the position shown in FIG. 3.

When the plug FP has been sufficiently separated from the filler valve FV, liquids and gases to be inserted into the container CN may be pumped under pressure through the hose H, the coupling FC and around the periphery of the filler valve FV and then along the milled section M of the threaded member FT₁ of the filler valve FV and into the container CN. Leakage of these materials is prevented by the O-rings O₂ and O₃. When the filling function has been completed, the nut FN will be tightened again. The O-ring O₁ now seals the container, as shown in FIG. 4. It will be important to weld the boss-fill device FV to filler valve FV in the region FS to accomplish a welded hermetical seal to prevent leakage of the contents of the container CN through any of the peripheral openings about the filler valve FV.

A feature of the fill mechanism is the fill plug FP and the O-rings O₂ and O₃, which allow pressurized fluids to be fed to and through the opening or cavity of the filler valve FV into container CN while the fluids are held at high pressure when the filler valve FV is tightened sufficiently (by means of the nut which is integrally mounted on plug FP as shown in FIG. 4). The filling fixture may be removed and the weld then established at FS.

Whenever desired, the filling fixture, which includes the plug FP, the sleeve FSL, the O-rings O₂ and O₃, the coupler elements FC and the hose H, may be removed and dissociated from the filler valve mechanism FV. They may be reassembled and combined with the fill valve FV and employed only when it is desired to insert the fire-extinguishing materials into the container CN.

The fire extinguisher of this invention, as already noted, when filled with suitable fire-extinguishing materials, will remain intact for a long time. Replacement of the contents of the container will be necessary only after the normal use or discharge of the materials to extinguish a fire. The continued availability of the extinguisher in its pressurized status is brought about by its hermetic seal by welding. A reliable and efficient extinguisher is a most desirable product.

The fire extinguisher of this invention, as already explained, is supplied with a gaseous component, such as helium, which is generally inert, and incapable of activating the fire-extinguishing materials. It serves merely as a continually observable gas for the detection of leakage, if any, of the container CN. Indeed, any form of detector may be employed to reveal the leakage factor. The detector or a pressure switch may be incorporated as part of the overall structure if this is desired, or it may be a separately available mechanism in the vicinity of the extinguisher. In the absence of appreciable leakage, the extinguisher would be available for use for a very long time. The detectability of leakage is a most important feature of the extinguisher of this invention and adds greatly to the desirability and salability of the product.

This invention has been broadly disclosed as embodying two separate and distinct valves, a fill valve FV and a discharge valve DV. If desired, and as will be apparent, the two valves may be replaced by a single composite valve embodying the properties of both valves. The replacing valve would also be equipped with a discharge disc to be actuated by a wave or waves of the type already described for the breakage of the disc when this becomes necessary to discharge the contents of the container of the fire extinguishing materials.

Although the filler valve FV has been shown and described as embodying a disc FD, the disc FD may be replaced, if desired, by any temperature sensitive material such, for example, as cerro, which in response to an elevated temperature of predetermined magnitude within container CN, will melt and release the contents of container CN. Moreover, the filling fixture, although shown and described as a separable unit for use essentially only when the container CN is to be filled, may however be built as an integral part of the overall container housing. It will be understood, furthermore, that the container

CN must be maintained hermetically sealed whatever fixtures or instruments are added thereto except during the periods when it is to be filled or refilled.

Although the container CN has been shown as spherical in shape it may, of course, have any other shape, such as cylindrical or cubical or otherwise. The fire extinguishing contents of the container CN were given herein merely for illustration and it will be apparent that any other fire extinguishing materials, whether gaseous or liquid or solid or of other physical composition, may be employed within the container CN with equal effect. Likewise, the cartridge DC may be any well known cartridge which is capable of producing an explosive effect of such magnitude so as to effectuate the rupture of a disc or other device of a sealed container. Sealing of the container under substantial pressure is highly desirable and the seals of the container may be accomplished by means of welding or any other well known process.

While this invention and its features have been disclosed in certain embodiments merely for illustration and explanation, it will be understood that the invention in its various aspects may be practiced by other and widely varied organizations.

I claim:

1. A hermetically sealed container housing a fire-extinguishing fluid, a fluid for raising the pressure of the fire-extinguishing fluid to a superatmospheric pressure above 600 p.s.i., a substantially nonodorous fluid added to and mixed with the other fluids so as to be detectable upon leakage from the container, the pressure maintained within the container being so high that the fluids therein will be rapidly discharged when the container is released, and a common hermetically sealed port through which all of said fluids are rapidly and simultaneously released from the container.

2. A hermetically sealed container according to claim 1 in which the fluid is raised to a pressure in the range of approximately 600 to 2700 p.s.i.

3. A hermetically sealed container according to claim 1 including, in addition, a diaphragm or seal which is to be ruptured by a space wave to discharge the contents of the container.

4. A hermetically sealed container according to claim 1 including, in addition, a rupturable disc through which the contents of the container are dischargeable upon activation of a space wave or waves.

5. A hermetically sealed container according to claim 3 including, in addition, a cartridge which, when activated, generates a space wave of a magnitude which is sufficient to pierce the diaphragm.

6. A hermetically sealed container according to claim 5 in which the cartridge contains explosive materials.

7. A hermetically sealed container according to claim 6 in which the cartridge includes, in addition to the explosive materials a current carrying conductor which develops heat to explode said materials.

8. A hermetically sealed container according to claim 3 including, in addition, a generator producing a space wave for rupturing the diaphragm, and means for energizing the generator.

9. A fire extinguisher comprising a hermetically sealed container, a filler valve coupled to the container through which fire-extinguishing materials may be inserted and maintained at superatmospheric pressure, and a discharge valve also coupled to the container, said discharge valve including a rupturable disc in contact with said materials within said container which, when ruptured, discharges the materials of the container, the filler valve and the discharge valve both being hermetically sealed and integral with the container for supporting a pressure which substantially exceeds atmospheric pressure so that the materials within the container will be rapidly discharged upon the rupture of said disc.

10. A fire extinguisher according to claim 9 in which the filler valve also includes a rupturable disc which is ruptured only when the pressure within the container exceeds a predetermined value.

11. A fire extinguisher according to claim 10 in which the disc included in the discharge valve is rupturable when the pressure within the container reaches a predetermined value which is different from that which will rupture the disc included in the filler valve.

12. A fire extinguisher comprising a container filled with fire-extinguishing fluid under superatmospheric pressure, two separate valves coupled to the container each having a rupturable disc, one of the discs being rupturable when the pressure within the container exceeds a predetermined value, the other of the discs being rupturable in response to a space wave which is generated by mechanism adjacent the container and which has an amplitude exceeding a predetermined value to release therethrough said fluid, the disc ruptured by the space wave releasing said fluid.

13. A discharge valve structure for a hermetically sealed container housing fire-extinguishing materials under superatmospheric pressure, said discharge valve including a disc which, when activated by a space wave, will be ruptured to discharge the contents of the container through the discharge valve.

14. A discharge valve according to claim 13 which includes, in addition, a screen adjacent to said disc to receive and retain particles of materials severed in response to the rupture of said disc.

15. A discharge valve for a container which hermetically seals fire-extinguishing materials under superatmospheric pressure, said discharge valve including a rupturable disc in physical contact with the materials within the container, and a cartridge containing an explosive powder which is adjacent said discharge valve and which, when activated, produces a space wave to rupture said disc to release said materials from said container.

16. A discharge valve according to claim 15 including, in addition, a screen to block the passage out of the discharge valve of the particles of said cartridge and said disc resulting from the activation of said cartridge.

17. A discharge valve according to claim 16 which includes, in addition, means for pointing the discharge valve in a predetermined direction and for maintaining the discharge valve pointed in said predetermined direction.

18. The method for release of the contents of the container of a fire extinguisher which consists in generating a space wave and piercing the container in response to the space wave.

19. The method of claim 18 including also the step of directing the discharge of the contents of said container in a selected direction.

20. The method of claim 18 including also the step of transmitting a signal to activate the space wave generation.

21. A fire extinguisher comprising a container, a filler valve coupled to said container and having an aperture which is substantially perpendicular to the surface of the container at which the coupling is made, a disc sealed against the aperture immediately adjacent to the container to prevent the normal discharge of the contents of the container, a filling fixture coupled to the filler valve for filling and refilling the container, means for adjusting the filling fixture so that fire-extinguishing materials may be inserted under pressure through the filling fixture and through the aperture of the filler valve to enter said container, and means for hermetically sealing the container and the filler valve whenever said fire-extinguishing materials have been supplied to said container so that the fire-extinguishing materials are substantially continuously maintained at a superatmospheric pressure.

22. A fire extinguisher according to claim 21 including, in addition, means for maintaining the fire-extinguishing materials under pressure while they are being inserted through the filling fixture.

23. A fire extinguisher according to claim 22 in which the pressure-maintaining means includes a dual grooved sleeve and a pair of O-rings retained within the grooves of said sleeve.

24. A fire extinguisher according to claim 23 including, in addition, a discharge valve also coupled to said container and having a rupturable disc which, when ruptured, discharges the contents of said container.

25. A fire extinguisher according to claim 24 in which the discharge valve includes a swivel assembly which may be turned so as to change the axis of the discharge port of said

discharge valve to predetermined directions.

26. A fire extinguisher according to claim 25 in which the discharge valve retains a cartridge which, when activated, produces a space wave to instantly rupture the disc of said discharge valve to allow the materials within the container to be discharged.

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