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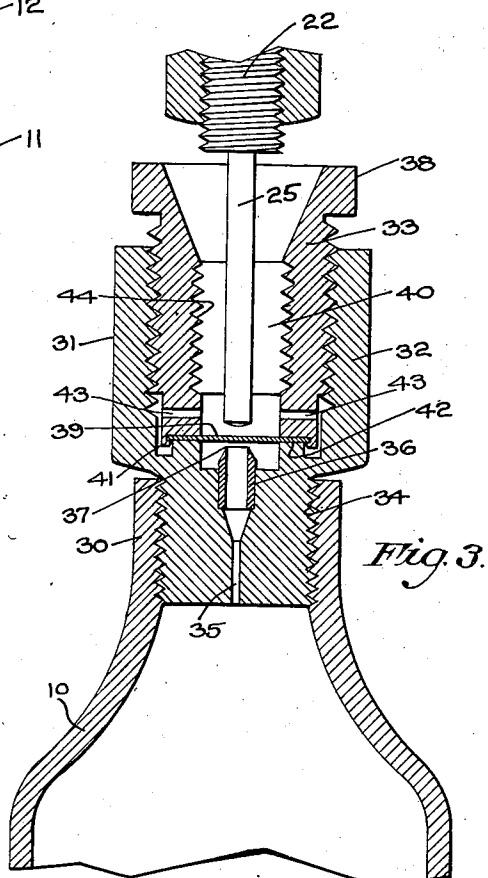
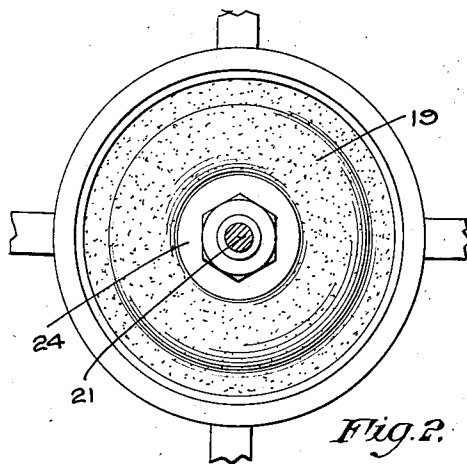
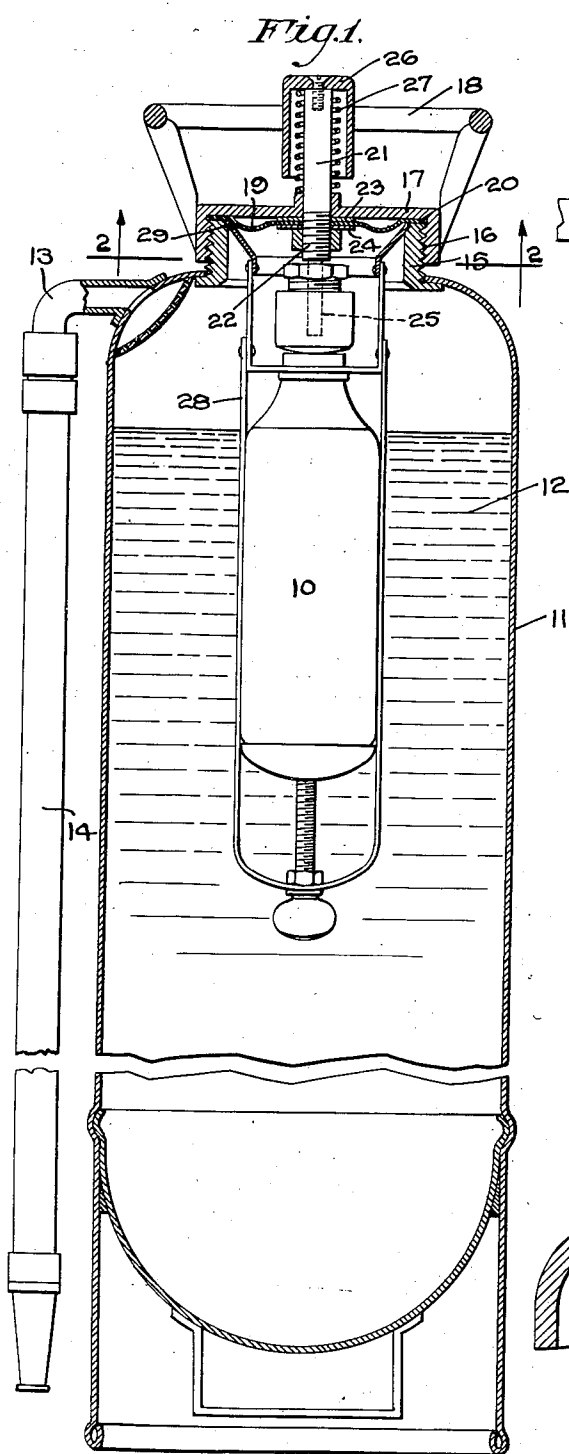
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CARTRIDGE VALVE

Filed Nov. 13, 1935

3 Sheets-Sheet 1



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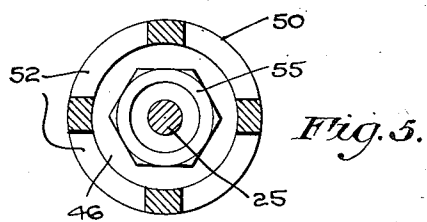
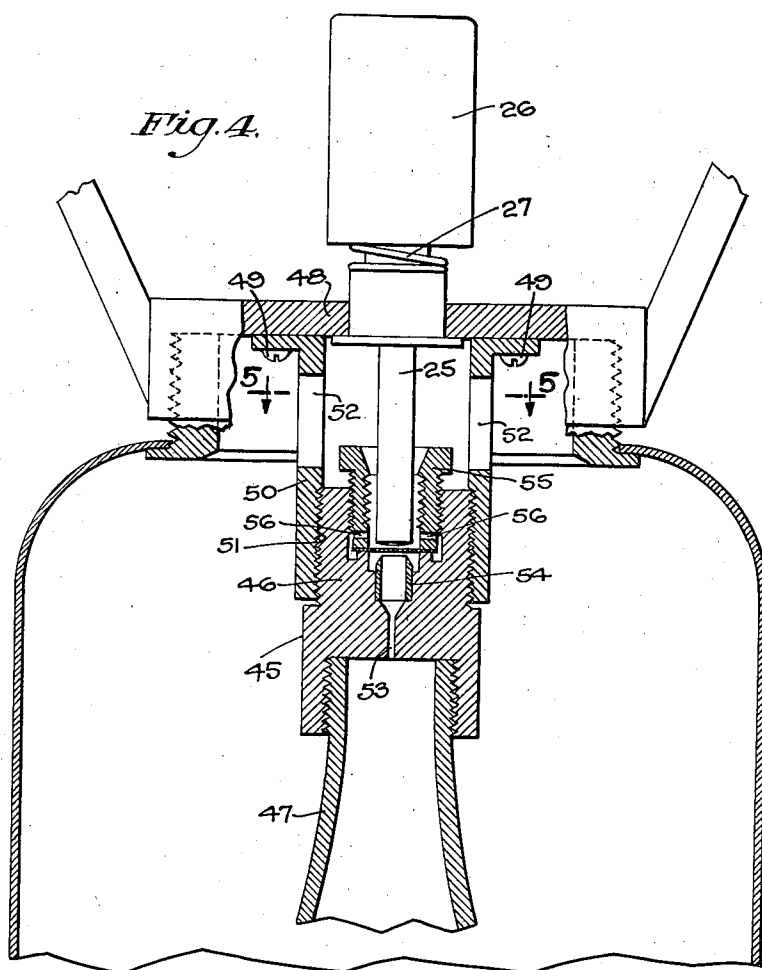
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3 Sheets-Sheet 2



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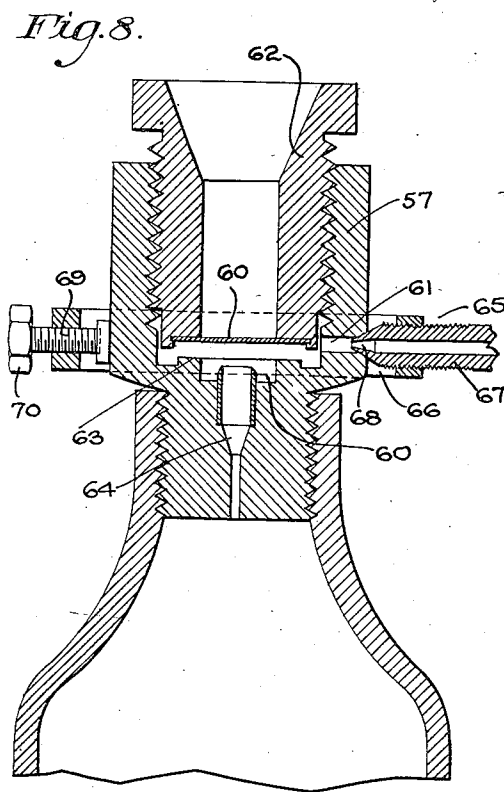
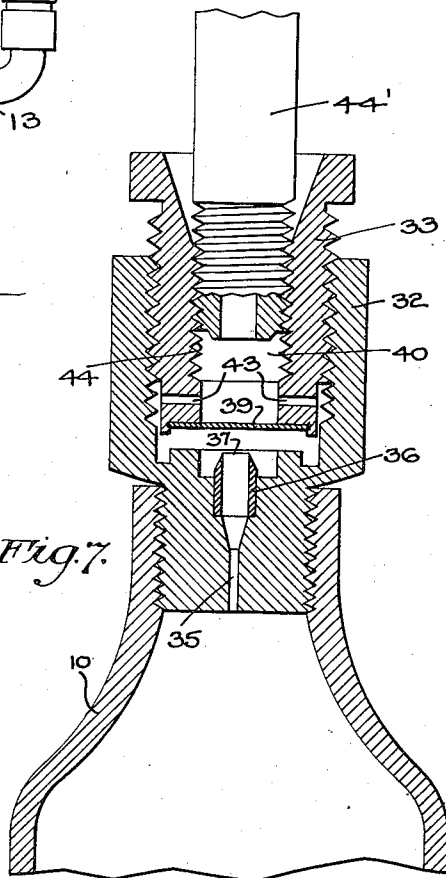
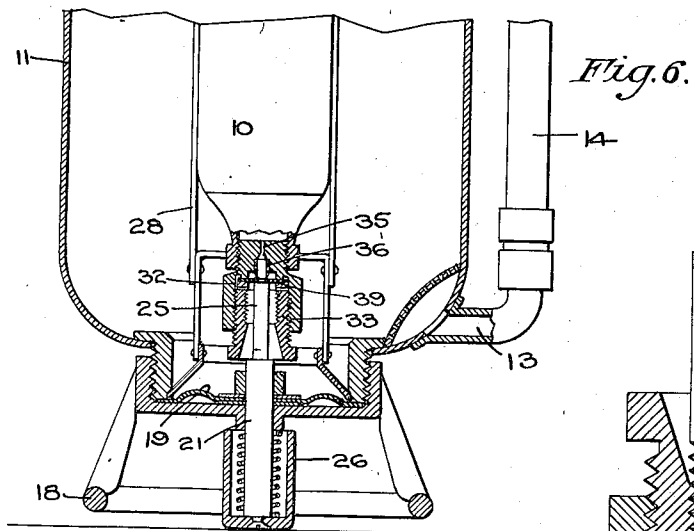
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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CARTRIDGE VALVE

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6 Claims. (Cl. 169—31)

This invention relates generally to fire extinguishing apparatus of the type in which a medium stored under pressure in a cartridge or other container is employed to expel a fire extinguishing liquid, and more particularly to improvements in the means employed for effecting the release of the pressure medium from the cartridge in which it is contained.

Among the principal objects of the present invention is the provision of a combined charging and discharging unit of such operating characteristics as to insure the positive and quick release of the pressure medium for the purpose of effecting the discharge of the fire extinguishing liquid, the unit including means for effectively perforating a sealing disk which is normally employed to seal the pressure medium within its cartridge.

A further object of the invention is the provision of a unit of the character above described which is adapted for use in connection with standard forms of shells or containers for holding liquid fire extinguishing mediums, such as water, carbon tetra-chloride or calcium chloride solutions and the like, the unit of the present invention being of such design and construction as to require no substantial changes in the constructional details of the fire-extinguisher shell.

Still another object of the present invention is the provision of a combined charging and discharging fixture for pressure mediums, such as CO₂ and other compressible gases, wherein a sealing disk is so arranged between a pair of relatively movable members that upon movement of one of the latter members under suitable impact the disk is effectively perforated to permit the free discharge of the pressure medium from the cartridge in which it is stored, an important feature of the arrangement being that the pressure medium cartridge is immovably and rigidly supported within the fire extinguisher shell in consequence of which the sealing disk is at all times maintained in a position assuring its definite and complete perforation when and as required. In other words, this invention contemplates the provision of a pressure medium discharging fixture wherein is eliminated the possibility of the sealing disk perforating elements becoming jammed or otherwise inoperative to effect their intended function.

Other and important objects and advantages will appear more fully hereinafter, such as the provision of a combined charging and discharging fixture of exceedingly simple and inexpensive construction and of such compact form that it

does not add materially to the overall length of the cartridge equipped therewith in consequence of which the cartridge body is supported in such an elevated position within the extinguisher shell as to provide the latter with an increased storage capacity for the fire extinguishing liquid.

The invention consists substantially in the combination, construction, location and relative arrangement of parts, all as will appear in the detailed description thereof which follows, as shown in the accompanying drawings, and as finally pointed out in the appended claims. For purposes of illustration solely and to exemplify in definite form the principles of the present invention, several preferred embodiments of the invention are shown in the accompanying drawings wherein:

Figure 1 is a vertical cross-sectional view of a fire-extinguisher in which is incorporated a pressure medium cartridge equipped with the charging and discharging fixture of the present invention;

Figure 2 is a horizontal sectional view, on an enlarged scale, taken along the line 2—2 of Figure 1;

Figure 3 is an enlarged vertical sectional view of the combined charging and discharging fixture shown attached to the pressure medium cartridge and in operative relation to the sealing-disk perforating member;

Figure 4 is a partial vertical sectional view of a modified form of fire extinguisher in which is incorporated the pressure medium cartridge equipped with the fixture of the present invention;

Figure 5 is a view taken on the line 5—5 of Figure 4;

Figure 6 is a view showing the extinguisher in inverted position for effecting the perforation of the sealing disk and the consequent discharge of the pressure medium;

Figure 7 is a cross-sectional view showing the fixture of the present invention adjusted for charging the cartridge with the pressure medium; and

Figure 8 is a vertical sectional view of a modified form of the fixture, showing additional features of construction which may be readily incorporated in either of the units shown in Figures 1 and 4, said view showing a charging unit affixed to the fixture for charging the device.

Referring now to the drawings and more particularly to Figures 1 to 3, it will be observed that the cartridge 10 within which is stored under suitable pressure a pressure medium, such as carbon dioxide or other compressible gas, is dis-

posed interiorly of a standard type of shell 11 filled or partially filled with a suitable liquid fire extinguishing medium 12, such as water, carbon tetra-chloride, calcium chloride solution or the like, it being understood that when the pressure medium stored within the cartridge 10 is released it serves to expel from the shell 11 by way of the outlet elbow 13 and the hose 14 the fire extinguishing liquid 12.

In the form of fire extinguisher illustrated in Figure 1, the shell 11 thereof is open at its upper end, this opening being fitted with an axially projecting annulus 15 which is exteriorly threaded, as at 16, for threadedly receiving thereon a sealing cap 17. This cap 17 is provided with an annular hand grip 18 for effecting the threaded connection between the cap and the neck 15 of the shell and is further provided upon its under surface with a gasket 19 of rubber or other such flexible material suitable for effecting a seal between the immediately adjoining portions of the cap 17 and the neck 15 of the shell, as at 20. The marginal edge of this gasket 19 is tightly clamped between the end of the neck 15 and the inner surface of the cap member 17.

Both the cap member 17 and the gasket 19 are centrally apertured to permit the axial projection therethrough of a stud 21, the intermediate portion of which is threaded, as at 22, to threadedly receive a pair of washers 23—24 between which the gasket 19 is firmly clamped, it being thus observed that as the stud 21 is depressed relatively to the cap 17 the gasket 19 is free to move with the stud, thereby insuring at all times a leakage-tight closure at the upper end of the extinguisher shell. The stud 22 is of reduced diameter in its lower extremity to provide a punch-like projection 25, while the opposite outwardly projecting portion of the stud is provided with a socketed member 26 which serves as the outer abutment for a coiled compression spring 27 embracing the said outwardly projecting portion of the stud, the socketed member 26 serving also as a protective covering for this coil spring. It will be apparent that the compression spring 27 tends normally to maintain the stud 21 in the retracted position shown in Figure 1, in which position the stud is inoperative to effect the release of the pressure medium which is stored within the cartridge 10.

In the arrangement shown in Figure 1, the cartridge 10 is supported in substantially rigid position within the interior of the extinguisher shell 11 by means of a supporting cage 28 of standard construction and forming no part of the present invention, this cage being maintained in its suspended position by clamping the upper rim 29 thereof between the neck 15 of the extinguisher shell and its cap member 17. The cage 28 thus serves as a support for maintaining the pressure medium cartridge 10 in axially aligned relation with respect to the axially movable stud 21 in the cap member 17.

This cartridge 10 is provided at its upper end with an interiorly threaded neck portion 30, see Figure 3, in which is adapted to be threadedly secured the combined charging and discharging fixture of the present invention. This latter fixture is designated generally by the reference numeral 31 and will now be described. Essentially, the fixture 31 comprises a main body member 32 which is interiorly chambered in its upper portion for threadedly receiving an axially bored plug member 33. The lower extremity of the chambered main body 32 is of reduced diameter and is exteriorly threaded, as at 34, whereby to adapt it

to be threaded within the neck 30 of the cartridge. The lower section of the said main body member 32 is axially bored, as at 35, to provide a passage communicating between the interior of the cartridge 10 and the chambered portion of the member 32, this bore 35 being of enlarged diameter in its upper extremity to provide a seat for a tubular insert 36 of suitably hardened metal, this insert 36 being provided with a sharpened edge 37 elevated somewhat above the bottom of the chambered recess in the main body 32.

The plug member 33 is provided at its upper end with an operating head 38 adapted for the application of a wrench thereto and at its lower end is provided with a sealing disc 39 of rupturable metal which normally seals the axial bore 40 of the plug member. Preferably, the sealing disc 39 is permanently secured in place by beading over, as at 41, the lower extremity of the plug member 33, although it will be understood that said sealing disc may be positionally secured by any other suitable means, as, for example, by the use of a suitable adhesive, such as shellac, between the contacting surfaces of the sealing disc and its supporting plug member. At this point, it will be observed that the chambered main body member 32 is preferably provided in the bottom of its chamber with a raised annular section affording a substantially flat seating surface 42 circumferentially embracing the tubular insert 36 for substantial registry with the lower end of the plug member 33, it being observed in this connection that as the plug member is threaded into the chambered body 32 it serves to clamp the sealing disc 39 firmly against the annular surface 42 to afford an effective seal against the escape of the pressure medium from within the cartridge 10 through the bore 35 and the tubular insert 36.

For the purpose of charging the cartridge 10 with the pressure medium, such as carbon dioxide gas, the plug member 33 is provided with one or more radially extending apertures 43 in the wall thereof immediately above the sealing disc, and in addition the said plug member is internally threaded, as at 44, for threaded engagement with a suitable coupling member 44' (see Figure 7) through which the pressure medium is supplied from its source to the cartridge. In the operation of charging the cartridge, the plug member 33 is backed out of the main body member 32 sufficiently to unseat the sealing disc 39 from the annular seating surface 41, as is most clearly shown in Figure 7, the pressure medium which is supplied through the coupling member then passing through the radially extending apertures 43 and about the lower extremity of the plug member 33 for final delivery through the tubular insert 37 and the bore 35 into the interior of the cartridge 10. When the cartridge is thus suitably charged with the pressure medium, the plug member 33 is secured tightly into the body to clamp the sealing disc 39 in its sealed position shown in Figure 3. It will be understood, of course, that this operation of charging the cartridge is preferably performed with the cartridge removed from within the interior of the extinguisher shell 11, the charged cartridge being subsequently positioned and supported within the said shell in the manner heretofore described, it being understood, of course, that when the charged cartridge is properly positioned within the shell 11 the punch-like projection 25 which is movably carried by the cap member 17 of the extinguisher is centrally disposed within the bore 40 of the plug member and in

axial alignment with the tubular insert 36. It is to be observed also that the lower extremity of the punch 25 is normally spaced above and out of contact with the sealing disc 39.

To effect the release of the pressure medium and its discharge from the cartridge 10 into the interior of the shell 11, it is merely necessary to sharply strike the member 27 whereby to cause the punch-like projection 25 to impinge against the sealing disc 39 and so drive the latter against the cutting edge of the tubular insert 36, in consequence of which the sealing disc is centrally perforated. This operation is best effected by inverting the extinguisher so that the knob 26 thereof may be struck sharply against the floor whereupon the elements 25 and 36 operate as punch and die elements to perforate the sealing disc. The sealing disc being thus perforated, the pressure medium is then free to pass through the registering bores 35 and 40 for discharge into the interior of the fire extinguisher shell 11, thereby effecting the expulsion of the fire extinguishing liquid through the hose 14 of the extinguisher.

In the modified form of the invention as shown in Figure 4, the fixture of the present invention is designated generally by the reference numeral 45 and it functions in exactly the same manner as the previously described form of the charging and discharging fixture. It differs, however, from the previously described fixture only insofar as the structure of the main body 46 is concerned, it being observed in the arrangement shown in Figure 4 that this main body 46 of the fixture serves as an intermediate adapter for supporting the pressure medium cartridge 47 directly upon the cap member 48 of the extinguisher and so eliminates the necessity of employing a supporting cage as in the previously described form of fire extinguishing unit. In this connection, it will be observed that the cap member 48 has secured to its under surface, preferably by the screws 49, a centrally disposed cylindrical body 50, the lower section of which is internally threaded, as at 51, for threadedly receiving the main body member 45 of the cartridge fixture. The lower section of this main body member is recessed for threadedly receiving the upper end or neck of the cartridge 47. The cylindrical supporting body 50 is provided with a plurality of circumferentially spaced apertures 52 through which the pressure medium when discharged from the cartridge 47 is free to pass into the interior of the fire-extinguishing shell. As in the former instance, the main body member 45 is provided with a bore 53 and the tubular insert 54 which conjointly afford communication between the interior of the cartridge 47 and the axial bore of the plug member 55. In all other respects, the unit of Figure 4 operates exactly in the manner as that illustrated in Figures 1 to 3, it being only necessary to observe that in the extinguisher of Figure 4 suitable means is employed for effecting a gas-tight seal immediately surrounding the punch-like member which is movably mounted within the cap member 48.

In both of the previously described forms of the invention, reference has been made to the radially extending apertures in the plug members, such as the apertures 43 of Figure 3 and 56 of Figure 4 through which the pressure medium is passed during the operation of charging the cartridges. These radially extending apertures are necessary only in the event that the cartridges 10 and 47 are being filled with a pressure medium delivered in gaseous form from a suitable source of supply

exteriorly of the cartridge. It is, of course, possible to charge the cartridges by placing therein a suitable quantity of solidified carbon dioxide which may be done by removing the cartridge itself from the charging and discharging fixture. Subsequent sublimation of the solidified carbon dioxide converts it into a gas of suitable pressure and when the cartridge is so filled the plug member 33 (or 55) need not be provided with the radial apertures, such as 43, nor need the axial bore of the plug members be internally threaded, as at 44 (see Figure 3).

In Figure 8 there is illustrated still another desirable means for charging the cartridge with the pressure medium, this arrangement being, of course, applicable to all forms of the present invention. In this Figure 8 it will be observed that the chambered main body 57 is provided in the wall thereof with a radially extending aperture 61, this aperture being located slightly above the plane of the sealing disc 60 when the latter is in its sealing position. In order to charge the cartridge the plug member 62 is withdrawn slightly from the main body 57 so as to raise the sealing disc above its seating surface 63, whereupon the pressure medium may be supplied by way of the aperture 61 and through the space around the lower end of the plug into the cartridge by way of the port 64. When such an arrangement is employed for charging the cartridge, it is obviously unnecessary to interiorly thread the axial bore of the plug member 62, thus effecting a considerable saving in manufacturing cost of the unit. Preferably, when filling the cartridge by way of the radial aperture 61, a charging fixture such as is designated generally by the reference numeral 65, may be employed, this latter fixture essentially comprising an annulus 66 through one point of which is radially projected a charging nipple 67 the inner end of which is pointed, as at 68, to afford a snug fit within the outer extremity of the bore 61. At a point diametrically opposed to the charging nipple 67 is a stud 69 threadedly carried by the annulus, this stud being provided with an operating head 70 which is adapted for engagement by an ordinary wrench to effect the rotation of the stud. The inner end of the stud is adapted to engage the body 57 at a point diametrically opposed to the port 61 so that when the stud is properly rotated it draws the annulus 66 into such position with respect to the main body member 57 as to seat the pointed extremity 68 of the charging nipple firmly in charging relation with respect to the charging port 61. It will be understood, of course, that the arrangement for charging the cartridge in the manner illustrated in Figure 8 is as well adapted to the form of the charging fixtures shown in Figure 4 as it is to the form shown in Figure 3 and it is likewise applicable to either form regardless of which of the hereinbefore described means is employed for effecting the perforation of the sealing disc.

It will be understood, of course, that the invention is susceptible of various changes from time to time without departing from the real spirit or general principles thereof and it is accordingly intended to claim the same broadly, as well as specifically, as indicated by the appended claims.

What is claimed as new and useful is:—

1. In combination, a container for a liquid fire extinguishing medium having a filling opening, a closure member for sealing said opening and a spring-pressed plunger movable axially of said

closure member, and a storage vessel for a pressure medium immovably suspended within said container immediately beneath said closure member, said vessel being provided in its upper end with a combination charging and discharging fixture comprising a chambered main body member axially bored to provide a communicating passage between the chamber in said body member and the interior of said vessel, an axially bored plug adapted to be threaded into and out of said chamber, a sealing disc carried by said plug for normally sealing the bore of the latter against the passage of the pressure medium there-through, and a tubular die disposed within the bottom of said chamber co-axially with respect to the bore of the latter and the plunger carried by the closure member, said die and plunger being arranged to either side of the sealing disk so that upon striking the latter the die operates to pierce the disk and so permit the escape of the pressure medium from the vessel into the container.

2. In combination, a container for a liquid fire extinguishing medium having a filling opening, a closure member for sealing said opening and a plunger movable axially through said closure member, and a storage vessel for a pressure medium immovably supported within said container immediately beneath said closure member, said vessel being equipped with a combination charging and discharging fixture including rupturable means for normally sealing the pressure medium within the vessel, said means being disposed in intersecting relation to the axis of said movable plunger, and a tubular die carried by said fixture immediately beneath said rupturable sealing means, said die being in axial alinement with said plunger so that upon sharply moving the plunger toward the die the latter punctures the sealing means to thereby permit the discharge of the pressure medium from said storage vessel.

3. In combination, a container for a liquid fire extinguishing medium having a filling opening, a cap for closing said opening and a plunger movable axially through said cap, and a pressure medium cartridge stationarily supported within said container, said cartridge being equipped with a fixture for charging and discharging the same including an assembly which is centrally bored to afford communication between the interior of the cartridge and the interior of the liquid container, the cartridge being so mounted within said container as to present the upper portion of said centrally bored assembly in embracing relation to said plunger, a sealing disk normally sealing the bore of said assembly, and a tubular die carried by said assembly coaxially with respect to the bore thereof, said die and plunger being disposed to either side of the sealing disk whereby upon movement of the plunger relatively to the die the sealing disk is perforated by the die.

4. In combination, a container for a liquid fire extinguishing medium having a filling opening,

a cap for closing said opening and a plunger movable axially through said cap, and a pressure medium cartridge stationarily supported within said container, said cartridge being equipped with a fixture for charging and discharging the same including an assembly which is centrally bored to afford communication between the interior of the cartridge and the interior of the liquid container, the cartridge being so mounted within said container as to present the upper portion of said centrally bored assembly in embracing relation to said plunger, a sealing disk normally sealing the bore of said assembly, and a tubular die carried by said assembly coaxially with respect to the bore thereof, said die and plunger being respectively disposed to either side of the sealing disk whereby upon movement of the plunger relatively to the die the sealing disk is perforated by the die, said die being removably secured in position within said assembly.

5. In combination, a container for a liquid fire extinguishing medium having a filling opening, a cap for closing said opening and an interiorly projecting solid plunger movable axially through said cap, and a pressure medium cartridge stationarily mounted within said container, said cartridge being equipped with a combination charging and discharging fixture through which the cartridge may be charged and discharged, said fixture including an axially bored assembly disposed in embracing relation to said plunger, a frangible disk extending across the assembly bore to seal the cartridge against the escape of the pressure medium, and means immovably fixed in said bore beneath said disk adapted to perforate the disk when the latter is pushed against said means by the axially movable plunger whereby to permit the discharge of the pressure medium from said cartridge.

6. In combination, a container for a liquid fire extinguishing medium having a filling opening, a cap for closing said opening and an interiorly projecting solid plunger movable axially through said cap, and a pressure medium cartridge stationarily mounted within said container, said cartridge being equipped with a combination charging and discharging fixture through which the cartridge may be charged and discharged, said fixture including an axially bored assembly disposed in embracing relation to said plunger, a frangible disk extending across the assembly bore to seal the cartridge against the escape of the pressure medium, and means immovably fixed in said bore beneath said disk adapted to perforate the disk when the latter is pushed against said means by the axially movable plunger whereby to permit the discharge of the pressure medium from said cartridge, said means being tubular and coaxial with said bore to permit the free passage of the pressure medium therethrough.

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