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FIRE EXTINGUISHER TANKS
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FIG. 1

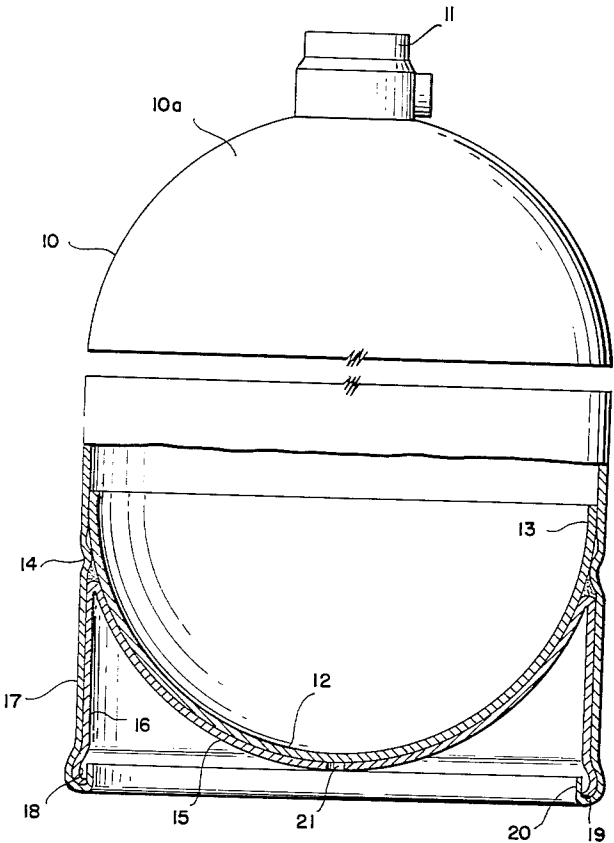
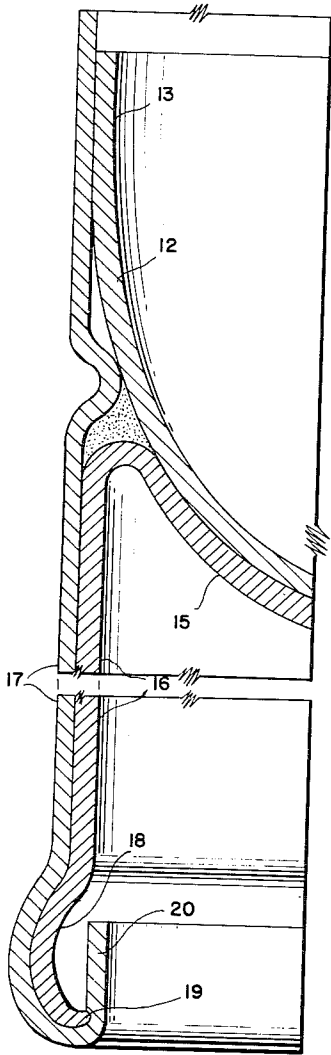


FIG. 2



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FIRE EXTINGUISHER TANKS

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6 Claims. (Cl. 220-3)

The present invention is a continuation-in-part of the copending patent application by the same named inventor filed on November 7, 1958, and having Serial No. 772,481.

The present invention relates to fire extinguishers containing pressurized contents, more particularly, to an outer shell and bottom construction thereof capable of withstanding relatively high pressures for long periods of time without any leakage.

This type of a fire extinguisher is generally mounted on a wall or other supporting structure in a building. The contents of the fire extinguisher container are maintained under pressure until used. Since in most cases the fire extinguishers are unused for long periods of time, it is of prime importance that the fire extinguisher container be constructed so that there is no loss of pressure during these periods of inactivity. Any loss of pressure of the contents could result in malfunction of the fire extinguisher in an emergency.

Fire extinguishers of the type disclosed herein are charged with a suitable composition and then pressurized by gas or compressed air to a pressure from 80 to 120 p.s.i. Such fire extinguishers must operate effectively within a temperature range of -40 to 120° F.

While the container must withstand operating pressures of up to 120 p.s.i., it is of extreme importance that the container be able to withstand pressure several times the operating pressure since during recharging personnel may inadvertently subject the container to a considerably greater pressure than the operative pressure of about 120 p.s.i. In those cases where a sufficient safety factor was not present, the bottom was blown out of the container shell and serious injuries and even fatalities have occurred among personnel while engaged in the recharging operation. For these reasons, it was sought to provide a dependable mechanical locking arrangement between the bottom and shell of a container which would withstand high pressures so as to permit a reasonable safety factor.

Such fire extinguisher containers are normally constructed by being drawn from brass or an equivalent material so as to form the top and side wall of the container in a one-piece outer shell. The container is closed by a bottom disc fastened to the shell and which is usually dished outwardly for added strength.

Many different ways have been employed to fasten the bottom within the shell, including soldering, welding, and various interlocking joints and rivets. However, none of these proposed arrangements have proved satisfactory.

The use of solder to increase the strength of the connection between the bottom and the shell is not acceptable since the solder is susceptible to cold flow which eventually induces leakage. The welding of the bottom to the shell also was unsatisfactory since welding caused the metal to expand and it was difficult to obtain uniformly good welds, particularly when working with stainless steel. Attempts were made to devise a mechanical interlock joint between the bottom and the shell independent of solder and welding, which could withstand high internal pressures over a long period of time without leakage. As far as is known, no successful mechanical lock joint has as yet been devised.

It is therefore the principal object of the present invention to provide a novel and improved container for fire extinguishers in which the contents are maintained under high pressure.

It is another object of the present invention to provide a mechanical lock joint between the bottom and shell of a fire extinguisher container which can withstand high internal pressures over a long period of time without leakage but not relying on solder or welding for any strength.

The fire extinguisher container of the present invention essentially comprises a cylindrical outer shell closed at one end by an integral hemispherical top. A hemispherical bottom member is closely fitted within the other end of the shell and a central supporting member having a central portion concentric to the bottom member is positioned outwardly of the bottom member with its central position contiguous therewith. The bottom supporting member has a downwardly extending flange which is connected to the open end of the container shell by a mechanical lock joint.

There is an inwardly pressed peripheral rib in the outer shell immediately below the point of engagement between the hemispherical bottom member and the inner surface of the shell wall.

By employing a hemispherical bottom member the pressure of the contents within the container push the peripheral side wall of the bottom member outwardly into closer contact with the container shell wall. This frictional engagement between the bottom member and the shell wall assists in retaining the bottom member in position even under the action of high internal pressure.

The mechanical lock joint between the shell wall and the supporting member flange holds the bottom supporting member in position and resists the downward force exerted against the bottom member by the pressurized contents.

Other objects and advantages of the present invention will be apparent upon reference to the accompanying description when taken in conjunction with the following drawings, wherein:

FIGURE 1 is a partial longitudinal sectional view of a fire extinguisher container according to the present invention; and

FIGURE 2 is a sectional view in enlarged scale illustrating the relationship between the bottom supporting member and outer shell.

Proceeding next to the drawings wherein like reference symbols indicate the same parts throughout the various views, the fire extinguisher container comprises a drawn brass cylindrical outer shell 10 which has a hemispherical top 10a integral therewith. A brass collar 11 is silver soldered at the apex of the top and is threaded for attachment of a discharge valve which is not shown in the drawings. The discharge valve is of the type having a manually depressible lever so as to enable the contents of the container to be ejected in a stream. A pressure gauge, not shown in the drawings, may be mounted either on the valve or the top of the outer shell so that the pressure of the container may be checked without removing the fire extinguisher from its mounting.

A hemispherical bottom member 12 is then closely fitted within the cylindrical shell 10 at the lower end thereof with its convex side being directed away from the top. The upper peripheral edge portion 13 of the bottom member 12 fits tightly against the inner surface of the side wall of the shell 10 so as to lie flat thereagainst. The peripheral portion 13 is positioned sufficiently far above the bottom edge of the shell 10 so that the shell may rest on its own lower periphery without having the bottom member 12 contact the supporting surface.

A portion of the cylindrical shell wall 10 is pressed inwardly so as to form a peripheral rib 14 immediately below the upper edge of the bottom member 12 so as to bring the shell wall into intimate contact throughout a considerable area of the convex surface of the bottom member 12. As may be seen in FIGURE 2, the inner

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most portion of the rib 14 contacts the bottom member 12 and thus helps to hold the bottom member 12 in position.

A bottom supporting member 15 has a central portion which is just below the rib 14, the supporting member 15 is bent downwardly to form a downwardly extending cylindrical flange 16 of such a diameter so as to fit closely within the lower portion 17 of the wall of the shell 10. The flange 16 has a length which extends substantially but not quite to the bottom edge of the shell wall.

The bottom edge of the supporting member flange 16 is bowed outwardly at 18 so as to form, in effect, a rounded external rib.

The lower end of the lower portion 17 of the container is then curved outwardly to closely conform to the curvature of the bowed portion 18 and then bent inwardly and backwardly upon itself around the edge 19 of the flange 16. As a result, an inwardly extending flange 20 is formed and the edge 19 is slightly imbedded in the flange, as may be seen in FIGURE 2 of the drawings.

The inner flange 20 is parallel to the cylindrical wall of the container 10 so as to form an annular pocket which supports the bottom edge of the supporting member flange 16. This annular pocket can withstand a considerable internal pressure, since the inner flange 20 is substantially an inner wall that, as a practical matter, could not be straightened out merely by the internal pressure acting on the bottom member and bottom supporting member.

The supporting member 15 is provided with an opening 21 in the center thereof to facilitate the exit of air from between the parts when solder is being introduced therebetween. The solder is introduced into the spaces between the bottom member 12, bottom supporting member 15, and cylindrical wall 10 so as to form a seal between these parts. The solder is not relied upon for the strength of this connection, but as a practical matter does add to its strength.

The arrangement of the bottom member within the cylindrical shell wall without solder will be leakproof, but after a period of time corrosion may occur between the bottom member peripheral portion 13 and the cylindrical wall which will give rise to leakage.

By forming the bottom member 12 into a hemisphere, the internal pressure of the container assists in retaining the bottom member in position. It is known that the pressure exerted by a fluid against a point on a curved surface will be along the normal to that point. Since the bottom member 12 is hemispherical, and thus uniformly curved, a uniform pressure will be exerted over the entire inner surface of the bottom member by the pressurized contents of the container. Thus, the pressurized contents urge the peripheral portion 13 of the bottom member 12 into frictional engagement with the inner face of the container wall 10. Any tendency to outward axial movement of the bottom member as a result of internal pressure within the container is restrained, both by the mechanical lock joint between the ends of the supporting flange and the container shell and the rib 14.

It is recognized that during the manufacture and assembly of the bottom member 12 its shape may depart from a precise geometrical hemisphere. Such departures are tolerable providing the upper peripheral portion of the bottom member lies flat or substantially so against the inner surface of the outer shell wall so that the pressurized contents urge the peripheral portion into frictional engagement with the outer shell.

Because of the hemispherical shape of the bottom member 12, the pressurized contents within the container do not act to pull the edges 13 of the bottom member 12 away from the side wall of the outer shell 10.

Not only does the lock joint between the end of the outer shell and the supporting member help the supporting member and bottom member to resist internal pressure of the contents, but also strengthens the bottom of the container against any lateral blows that may result from careless handling.

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The superiority of the present arrangement for fastening a bottom in a shell of a container independent of solder or welding is clearly evident from tests carried out by an independent testing organization.

Two sample extinguishers were subjected to a hydrostatic test to determine their rupture pressure. The rupture pressure of the two extinguishers was 1050 p.s.i. and 1075 p.s.i., respectively. In both cases the rupture occurred in the side of the shell.

Eight sample extinguishers were subjected to hydrostatic pressure for two months, four of the units being subjected to 350 p.s.i. and the remaining four to 400 p.s.i. There was no indication of rupture or leakage in the samples subjected to hydrostatic pressure for two months.

Two sample extinguishers were subjected to hydrostatic test to determine the strength of the bottom joint. In these tests, no solder was used in or around this joint. In the hydrostatic tests on the sample extinguishers in which no solder was used in or around the bottom joint, rupture occurred at pressures of from 580 to 600 p.s.i. In both cases, the bottom was forced either partially or completely out of the shell at these pressures.

The stated conclusion of this independent testing laboratory was that the results of the above tests indicate that the samples submitted utilized a bottom joint construction which substantially increased the strength of the extinguisher over that previously used, and that the mechanical lock provided a reasonable factor of safety over the working pressure of the unit, without any dependence on solder.

Thus, it can be seen that the present invention provides a fire extinguisher container wherein the bottom is secured to the outer shell by a mechanical lock joint in such a manner that the container has a safety factor of about six times the normal operating pressure of the container. This capability of the container to withstand high internal pressures for long periods of time without dependence upon solder or welding is achieved by cooperation between the following features—

- (a) A hemispherically shaped bottom member tightly fitted within the outer shell.
- (b) A bottom supporting member having a curved portion concentric to the hemispherical bottom and engaged therewith.
- (c) A mechanical lock joint between the lower edges of the bottom supporting member flange and the outer shell of the container.

Not only can the container of the present invention withstand high internal pressures for long periods of time without leakage, but also eliminates many dangers heretofore attendant to the pressurized recharging of such fire extinguishers.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions and, accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

What is claimed is:

1. A container for storing pressurized contents particularly adapted for a fire extinguisher, and comprising an outer shell having a cylindrical wall closed at one end by a hemispherical top, a hemispherical bottom member closely fitted within said cylindrical shell wall at the other end thereof with its convex side directed away from said top, a bottom supporting member having a central portion concentric with said bottom member and contiguous with said bottom member convex side, said bottom supporting member having a flange extending from the periphery of said central portion in a direction away from said top with said flange having such a diameter so as to fit closely within said cylindrical shell wall, the bottom edge of said shell at said other end thereof extending below the bottom edge of said supporting member flange and being bent backwardly upon itself around said sup-

porting member flange bottom edge to form an inner flange which is parallel to said cylindrical shell wall.

2. A container for storing pressurized contents particularly adapted for a fire extinguisher, and comprising an outer shell having a cylindrical wall closed at one end by a hemispherical top, a hemispherical bottom member closely fitted within said cylindrical shell wall at the other end thereof with its convex side directed away from said top, a bottom supporting member having a central portion concentric with said bottom member and contiguous with said bottom member convex side, said bottom supporting member having a flange extending from the periphery of said central portion in a direction away from said top with said flange having such a diameter so as to fit closely within said cylindrical shell wall, the bottom edge of said supporting member flange being bowed outwardly, the bottom edge of said shell at said other end thereof being bowed outwardly to conform closely to the curvature of said supporting member flange bowed portion and extending below said supporting member flange bottom edge, the extended portion of said bottom edge of said shell being bent backwardly upon itself around the bottom edge of said supporting member flange to form an inner flange which is parallel to said cylindrical shell wall.

3. A container for storing pressurized contents particularly adapted for a fire extinguisher, and comprising an outer shell having a cylindrical wall closed at one end by a hemispherical top, a hemispherical bottom member closely fitted within said cylindrical shell wall at the other end thereof with its convex side directed away from said top, a bottom supporting member having a central portion concentric with said bottom member and contiguous with said bottom member convex side, said bottom supporting member having a flange extending from the periphery of said central portion in a direction away from said top with said flange having such a diameter so as to fit closely within said cylindrical shell wall, the bottom edge of said shell at said other end thereof extending below the bottom edge of said supporting member flange and being bent backwardly upon itself around said supporting member flange bottom edge to form an inner flange which is parallel to said cylindrical shell wall, the lowermost portion of said supporting member central portion being positioned above the bent bottom edge of said shell whereby the container can stand upright on said bent bottom edge of the shell.

4. A container for storing pressurized contents particularly adapted for a fire extinguisher, and comprising an outer shell having a cylindrical wall closed at one end by a hemispherical top, a hemispherical bottom member closely fitted within said cylindrical shell wall at the other end thereof with its convex side directed away from said top, a bottom supporting member having a central portion concentric with said bottom member and contiguous with said bottom member convex side, said bottom supporting member having a flange extending from a periphery of said central portion in a direction away from said top with said flange having such a diameter so as to fit closely within said cylindrical shell wall, said shell having an inwardly extending peripheral rib below the

point of engagement between said shell and said hemispherical bottom member but above the peripheral edge of said bottom supporting member to assist in supporting said bottom member in position, the bottom edge of said shell at said other end thereof extending below the bottom edge of said supporting member flange and being bent backwardly upon itself around said supporting member flange bottom edge to form an inner flange which is parallel to said cylindrical shell wall.

5. A container for storing pressurized contents particularly adapted for a fire extinguisher, and comprising an outer shell having a cylindrical wall closed at one end by a hemispherical top, a hemispherical bottom member closely fitted within said cylindrical shell wall at the other end thereof with its convex side directed away from said top, a bottom supporting member having a central portion concentric with said bottom member and contiguous with said bottom member convex side, said bottom supporting member having a flange extending from the periphery of said central portion in a direction away from said top with said flange having such a diameter so as to fit closely within said cylindrical shell wall, the bottom edge of said shell at said other end extending below the bottom edge of said supporting member flange and being bent backwardly upon itself around said supporting member flange bottom edge to form an inner flange which is parallel to said cylindrical shell wall, and solder in the spaces between said shell, said supporting member and said bottom member to form a seal therebetween.

6. A fire extinguishing container comprising an outer shell having a cylindrical wall closed at one end by a hemispherical top, a hemispherical bottom member having its peripheral side wall lying flat against said shell inner surface adjacent the other end thereof with its convex side directed away from said top, a bottom supporting member having a central portion concentric with said bottom member and contiguous with said bottom member convex side, said bottom supporting member having a flange extending from the periphery of said central portion in a direction away from said top with flange having such a diameter so as to fit closely within said cylindrical shell wall, the bottom edge of said shell at said other end thereof extending below the bottom edge of said supporting member flange and being bent backwardly upon itself around said supporting member flange bottom edge to form an inner flange which is parallel to said cylindrical shell wall.

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