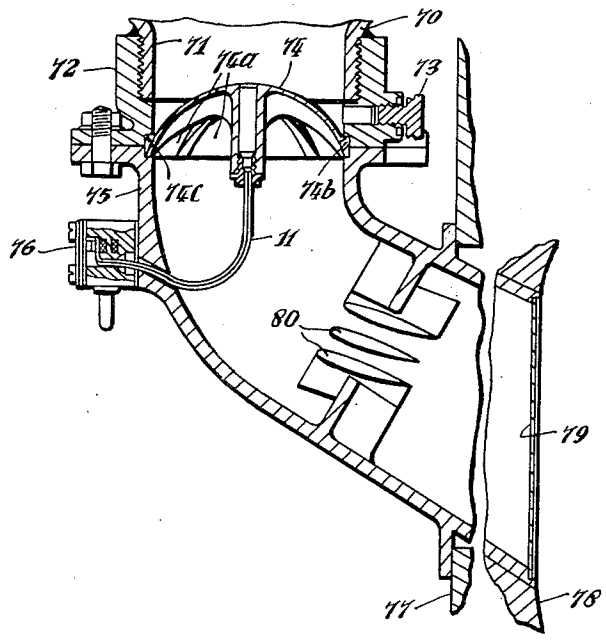
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STOPPERING AND OPENING DEVICES FOR FLUID CONTAINERS

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STOPPERING AND OPENING DEVICES FOR FLUID CONTAINERS

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5 Claims. (Cl. 169—9)

This application is a division of application No. 227,839, filed May 23, 1951, on which Patent No. 2,712,881 issued July 12, 1955.

This invention relates to improvements in stoppering and opening devices for fluid containers and more particularly to frangible stoppering and opening devices for fire extinguisher fluid containers and the like.

Frangible diaphragm or disc type of stoppering and opening devices are known, and in one particular form a stem integral with a head portion of a fluid container is arranged to be severed by an explosive charge to effect discharge of fire extinguishing liquid or other fluids from the container.

In the known construction the explosive charge is enclosed in a circular groove around the stem and is confined by a nut secured upon the stem. The blown-out stoppering device forms an obstruction to the discharge of the fluid which is an objection when extremely rapid discharge is required under high pressure and through short outlet pipes or ducts.

In accordance with the present invention there is provided a stoppering and opening device for a fluid container having a discharge outlet, comprising a frangible hemispherical diaphragm extending across said discharge outlet so as normally to close said outlet, said diaphragm having a centrally disposed hub portion, an explosive charge mounted in said hub portion, and means for exploding said charge to produce an explosive force which acts against the diaphragm and the pressure of the fluid in the container to sever said diaphragm, thereby opening said container.

More broadly speaking the invention provides a frangible hemispherical closure member for disposition within the discharge outlet of a fluid container so as normally to close said outlet, and an explosive charge disposed within the confines of said hemispherical member in proximity thereto for producing upon ignition a force which acts substantially uniformly against the walls of said member to substantially completely shatter said member thereby opening fully said outlet.

The invention further provides a closure member of the above general type having the shape of a cap of a sphere and being disposed with its convex surface facing towards the fluid contents, and an explosive charge mounted adjacent the concave surface of the closure member for operation in the aforesaid manner.

In the preferred form the explosive charge is of the kind known as a detonator, the explosive effect of which is of extreme rapidity and of great force but of short range.

In one construction the container may be in the form of a metal bottle capable of withstanding a high internal pressure, the bottle outlet or neck being of about three to five inches in diameter.

The invention will best be understood and appreciated

from a perusal of the following description of a preferred embodiment of the invention, reference being made to the accompanying drawing in which:

The figure shows in sectional side elevation the novel closure member as applied to a fire extinguisher liquid container head.

Referring now to the drawing, **70** denotes a large bore fluid container having a neck **71** of about three to five inches diameter. To this a flanged neck fitting **72** is secured and soldered or brazed, this being provided with a known form of charging plug **73**.

A plastic material or cast metal diaphragm **74** provided with strengthening ribs **74***a* and a circular rim or flange **74***b* is clamped between fitting **72** and an outlet duct or junction box fitting **75** by means of a compression ring **74***c*, the diaphragm also being made so as to retain detonator **10** in the position shown, so that upon ignition diaphragm **74** will shatter into fragments permitting discharge of the container contents.

Diaphragm **74** is shown of hemispherical shape, this shape providing a fragile construction, whilst still being capable of resisting the high hydraulic pressure of the container contents.

Detonator **10** is connected by leads **11** to an electrical plug-in-socket **76** to which an ignition current supply source may be connected.

The container may be of considerable capacity and fitting **75** is shown suitable for mounting on a wall or casing **77** extending into a fire risk zone such as a ship's hold or petrol tank, or into an inflammable gas duct **78**, a thin plate **79** being secured in the end of fitting **75** to prevent entry of substances from duct **78** into fitting **75**, which plate **79** is blown out upon discharge of the container.

To impart a twist to the liquid stream or jet from container **70**, vanes **80** may be provided in the fitting **75**, these vanes being disposed at an angle similarly to impellor blades, the twist imparted to the high velocity liquid stream or jet causing this to spread out and form mist or fog of large volume.

One advantage of the diaphragm **74** having the shape of a cap of a sphere, for example being hemispherical, is that the explosive charge can be disposed within its confines in proximity to its walls so that upon ignition of the explosive charge the resultant force acts substantially uniformly against the walls to substantially completely shatter the diaphragm **74** thereby ensuring substantially complete opening of the discharge outlet. If the diaphragm **74** was a flat disc there would be a strong possibility of the explosive force simply making a central hole in the disc and not effecting complete shattering.

A further advantage of the hemispherical or like shape is due to the fact that the plastic or cast metal materials, which are used because of their frangible nature, are inherently stronger in compression than in tension. By employing a hemispherical or like shape and mounting the diaphragm so that its convex surface faces towards the fluid contents, it is ensured that the fluid pressure applies a compressive stress and not a tensile stress to the diaphragm. Thus the diaphragm may be made thinner and therefore more readily frangible than would otherwise be the case.

What I claim is:

1. A stoppering and opening device for a fluid container having a discharge outlet, comprising a frangible hemispherical diaphragm extending across said discharge outlet so as normally to close said outlet, said diaphragm being disposed with its convex surface facing towards the fluid content and having a centrally disposed hub portion projecting from a concave surface of said diaphragm, an explosive charge mounted in said hub portion, said charge being disposed within the confines of said hemispherical

diaphragm, and means for exploding said charge to produce an explosive force which acts against the diaphragm and the pressure of the fluid in the container to shatter said diaphragm into fragments, thereby opening said container.

2. A stoppering and opening device according to claim 1 in which said diaphragm is provided with a peripheral rim or flanges said device further comprising a cup-shaped fitting adapted to be secured to said discharge outlet, and a junction box fitting adapted to be secured to said cup-shaped fitting for clamping said rim or flange between said cup-shaped fitting and said junction box fitting.

3. A stoppering and opening device according to claim 2, further comprising angularly disposed vanes mounted in said junction box for imparting a twisting motion to the fluid discharged from the container.

4. A stoppering and opening device for a fluid container provided with at least one discharge outlet of circular cross section, comprising a frangible closure member, said closure member having a hemispherical portion disposed within said outlet so as normally to close said outlet, said hemispherical portion defining a hemispherical space on the concave side of the hemispherical portion and being disposed with its convex surface facing towards the fluid contents, and an explosive charge mounted in said hemispherical space for producing upon ignition a force which acts substantially uniformly against the concave surface of said hemispherical portion of said closure member to substantially completely shatter said hemispherical portion thereby opening fully said outlet.

5. A stoppering and opening device for a fluid container having a discharge outlet of circular cross-section, comprising a frangible diaphragm of cast metal, said diaphragm having a hemispherical portion for disposition within said outlet so as normally to close said outlet, said hemispherical portion defining a hemispherical space on the concave side of the hemispherical portion and being disposed with its convex surface facing towards the fluid contents, said diaphragm further having a hollow stem portion coaxially disposed relative to said discharge outlet and lying on the concave side of said hemispherical portion, and an explosive charge disposed within said hollow stem portion and lying within said hemispherical space for producing upon ignition a force which acts substantially uniformly against the concave surface of said hemispherical portion to substantially completely shatter said hemispherical portion thereby fully opening said outlet.

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