Jan. 24, 1950 H. E. HEIGIS 2,495,254

INFLATION DEVICE

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Fig. 1.

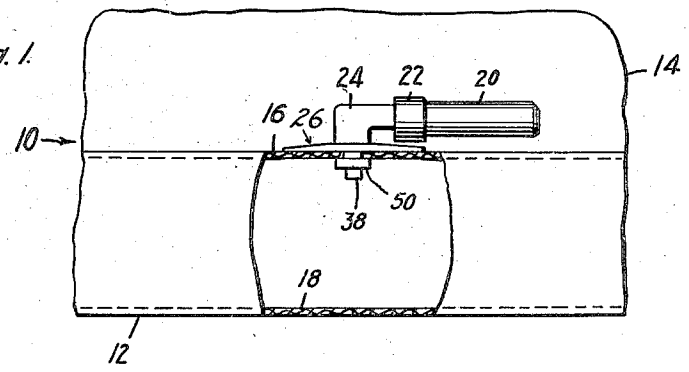


Fig. 2.

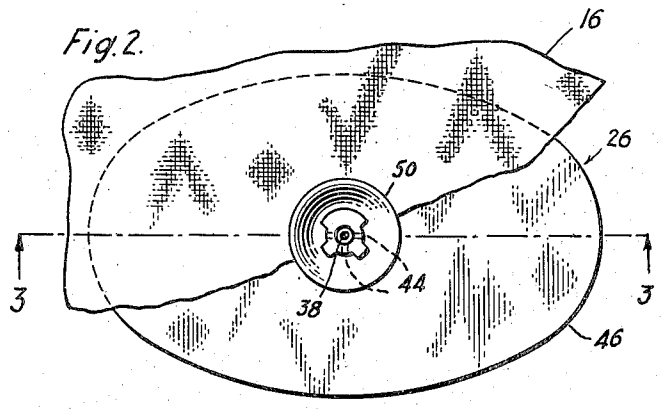
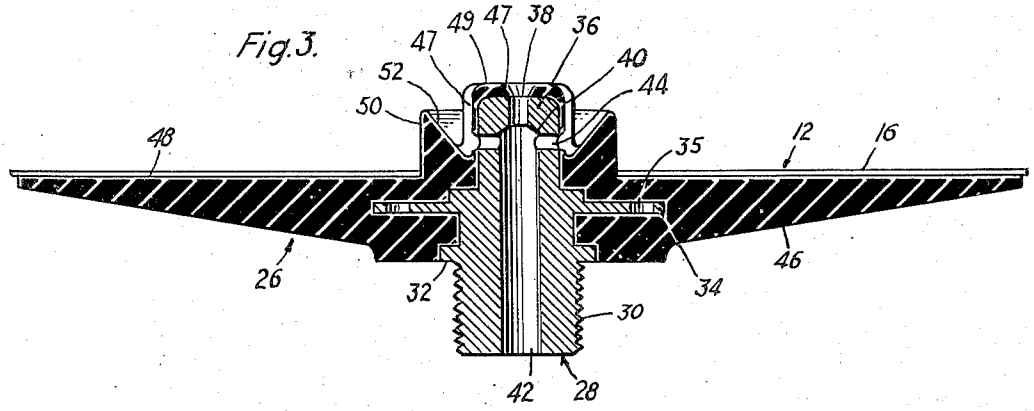


Fig. 3.



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INFLATION DEVICE

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7 Claims. (Cl. 9—2)

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This invention relates generally to inflatable devices, and particularly to protective means for such devices.

In an inflatable device, such as a life raft or belt, it has been usual to provide for the introduction of the inflating fluid through an inlet means known as a patch. This patch comprises a flexible disc-like body for bonding to the raft or belt, and a metal conduit extending through the patch. The conduit has an outer end nipple for attachment to a supply conduit or container, and an inner end discharge head which divides the flow into one axial stream and several radial streams.

The inflatable device for which the present invention is adapted is of a type which, in connection with a patch as formerly constructed, is affected by the radial streams to cause a suction effect on a flexible wall of the device to draw a portion of such wall toward the patch. When the inflating fluid is carbon dioxide, during the early stages of inflation, a small area of the wall portion drawn toward the discharge head becomes extremely cold from carbon dioxide snow formed or from the expansion of gas thus rendering such area subject to injury because of brittleness. Also, when the inflatable device or raft is deflated and packed in a compact manner, a portion of the wall of the device opposite the patch engages the discharge head which, when hard, or of bare metal as in the former constructions, subjects the device to possible injury.

An object of the present invention is to provide a device adapted to overcome the above mentioned objectionable features, which is simple and durable in construction, economical to manufacture and effective in its operation.

Other objects are to provide means for preventing suction flexure effects on and avoiding injury to a wall portion of an inflatable device.

A further object is to avoid injury to the fabric or wall of an inflatable device by the injector when the device is in deflated condition.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying

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drawing, forming a part of the specification, wherein:

Figure 1 is a schematic view of a portion of a life raft equipped with a patch embodying the invention.

Figure 2 is a plan view of the inner side of the patch illustrated in Figure 1.

Figure 3 is an enlarged sectional view taken substantially along the line 3—3 of Figure 2.

Referring to Figure 1, the device therein shown comprises a portion of a life raft 10 having an inflatable hull 12 and a bottom 14. The hull 12 is of substantially tubular formation when inflated and has opposite flexible inner and outer wall portions 16 and 18, respectively, of rubberized fabric or other waterproof material.

A storage container or source 20 of inflating pressure fluid medium, which in this instance is carbon dioxide, has a discharge valve 22 which is connected by a supply line or conduit 24 to a patch 26 on the exterior of the inner wall portion 16 adjacent the bottom 14.

Referring to Figures 2 and 3, the patch 26 is shown as comprising a substantially central portion, constituting a conduit 28 of hard material which in this case is metal, but which may be of Bakelite or the like, or treated or constructed as a combination of materials or parts. The conduit 28 comprises an inlet portion or nipple 30 at its outer end for the supply line 24, an annular shoulder or flange 32 extending laterally from the conduit 28 adjacent to the inner end of the nipple 30, a flange-like mold anchor 34 having circumferentially spaced apertures 35 and spaced axially inwardly from the shoulder 32, and an inner discharge head 36 spaced axially from the anchor 34. The conduit 28 has an axial aperture 38 of small diameter through the discharge head 36 extending from an annular substantially conical surface 40 opposite sides of which diverge axially outwardly to a bore portion 42 of larger diameter.

The head 36 has a plurality of apertures 44 disposed axially outwardly of the surface 40 closely adjacent thereto and spaced from each other peripherally about the conduit 28.

These apertures extend radially at right angles to the axis of the conduit 28, as shown, but may be inclined along axially inwardly diverging lines or may be otherwise directed.

The patch 26 further comprises a portion 46 constituting the patch body portion proper, which, as shown is constructed of flexible molded material, such as soft rubber or the like. The portion 46 is molded in position about the con-

duit 28 to cover and lie between all of the conduit portions disposed axially inwardly from the axially outer transverse surface of the shoulder 32. That is, the material of the patch body portion 46 is disposed between the shoulder 32 and the anchor 34, in the apertures 35 and in the form of a layer or cover 49 over and around the discharge head 36 everywhere, except over and in the bore portion 38 and the apertures 44. At the bore portion 38, the patch body material is formed to provide an inlet port surface 47 of inverted substantially frusto-conical shape diverging inwardly of the raft from the aperture 38 at an included angle of about thirty degrees.

The patch which, as shown in Figure 2, is of generally oval plan, is, as seen in Figure 3, of generally outwardly converging radial section having initially a substantially flat inner side 48 which may fit, or be flexed to fit, the wall 16 or other part according to the inflated contour of the wall or part for bonding to the latter, as by vulcanizing. The patch portion 46 is further molded to form a deflection or diffusion cup-like element 50 around the discharge head 36, and is provided with a substantially conical inner surface 52 opposite the apertures 44 and diverging axially inwardly of the conduit 28 at an included angle of about eighty degrees.

In a former device, in which apertures similar to the apertures 44 were disposed radially, but without any deflecting or diffusing means such as the cup 50, the carbon dioxide gas and snow were directed in more concentrated flow substantially parallel, and close to a wall, such as the wall 16. This former structure causes a suction flexing effect on the raft fabric, as on a portion of the wall 18 opposite the patch so that, in the early stages of inflation, such portion is sucked or drawn toward the patch causing a small area of the fabric to become extremely cold and subject to damage from brittleness.

By the present invention, the above mentioned effect is prevented by the cup 50 against which the streams of inflating fluid are directed by the radial apertures 44 for deflection and diffusion by the inner surfaces of the cup. The angle of deflection of the streams from the apertures 44 between the stream from the aperture 38 and the wall 16, is such as to destroy the vacuum or suction causing the flexure effect or drawing on the wall 18, so that the area formerly becoming cold and brittle is no longer so affected.

The layer or cover 49 and other parts of the patch body operate, particularly when the raft is deflated, as a cushion or protective means between the injector and the fabric avoiding possible injury from friction due to rubbing, tearing or other effects.

It is contemplated further that the patch 26 may be variously constituted for the above purposes, as by a selection of materials according to effects with different fluids or service, or by treating to have one body or part, which may form the entire unit, of different characteristics, such as hardness or flexibility at places where such qualities are of advantage, as in the example given.

From the foregoing description it is apparent that an inflation device has been provided which is extremely simple, durable and economical construction, is readily manufactured and assembled, is dependable and effective in operation, and avoids dangers and injury to those depending upon its use in a field of the utmost importance.

As various changes may be made in the form, construction and arrangement of the parts herein, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in any limiting sense.

It is also to be understood that the following claims are intended to cover all the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

1. A patch for an inflatable device having a wall with an inlet formed therein, comprising a patch portion adapted for securement to the wall of the device about the inlet, and a conduit discharge head partially embedded in said patch portion and provided with a plurality of substantially radial apertures spaced from each other peripherally about said head, said patch portion including a substantially rigid cup-like element around said head having inner surface portions spaced radially opposite said apertures and diverging axially inwardly of said head.

2. A patch for an inflatable device having a wall with an inlet formed therein, comprising a molded flexible patch portion for bonding to the wall about the inlet, and a conduit discharge head molded partially in said portion and provided with a plurality of side apertures spaced from each other peripherally about said head, said patch portion including a cup-like element around said head having inner surface portions spaced radially opposite said apertures and diverging axially inwardly of said head.

3. A patch for an inflatable device having a wall with an inlet formed therein, comprising a molded flexible patch portion for bonding to the wall about the inlet, and a conduit discharge head molded partially in said portion and provided with a plurality of side apertures spaced from each other peripherally about said head, said patch portion covering the inner end of said head and including a cup-like element around said end having inner surface portions spaced radially opposite said apertures and diverging axially inwardly of said head.

4. A patch for an inflatable device and comprising a hard material conduit including a discharge head at its inner end, a receiving portion for a supply line at its outer end, said head having a plurality of peripherally spaced radial apertures, and a patch portion of flexible material molded in position about said conduit covering all of the conduit portions disposed axially inwardly from the axially inner end of said receiving portion and having flow conducting recesses at said apertures, said patch portion forming a cup-like element around said head having an annular surface spaced radially opposite said radial apertures and diverging axially inwardly.

5. A patch for an inflatable device having an inlet, comprising a patch portion having a face for attachment to the device about the inlet, a discharge head having a portion projecting beyond the face of said patch portion, and a covering of soft elastic material bonded to the outer surface of said discharge head portion whereby injury of the walls of said inflatable device from contact of said discharge head portion is prevented, said discharge head portion having a central passage provided with a plurality of circumferentially spaced discharge apertures extending laterally from said passage, said covering having flow conducting recesses at said apertures.

6. A patch for an inflatable device having an inlet, comprising a patch portion having a face for attachment to the device about the inlet, a discharge head having a portion projecting beyond the face of said patch portion, and a covering of soft elastic material bonded to the outer surface of said discharge head portion whereby injury of the walls of said inflatable device from contact of said discharge head portion is prevented, said discharge head portion having a central passage provided with a discharge aperture at its inner end and a plurality of circumferentially spaced discharge apertures extending laterally from said passage, said covering having flow conducting recesses at said apertures.

7. A patch for an inflatable device having an inlet, comprising a patch portion having a face for attachment to the device about the inlet, a discharge head having a portion projecting beyond the face of said patch portion, and a covering of soft elastic material bonded to the outer surface of said discharge head portion whereby injury of the walls of said inflatable device from contact of said discharge head portion is prevented, said discharge head portion having a central passage provided with a plurality of circumferentially spaced discharge apertures extending laterally from said passage, said covering having flow conducting recesses at said apertures and being formed with a cup-like element provided with an annular axially inward diverging surface spaced from and surrounding the recesses at said laterally extending apertures.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,226,857	Brokaw	May 22, 1917
1,518,901	Collins et al.	Dec. 9, 1924
1,805,370	Meyer	May 12, 1931
1,981,720	Crane	Nov. 20, 1934
2,085,369	Kilborn	June 29, 1937
2,124,909	Crowley	July 26, 1938
2,341,618	Humphreys	Feb. 15, 1944
2,353,161	Heigis et al.	July 11, 1944