Oct. 24, 1961 A. J. FRUENDT 3,005,214

FLOTATION BLADDER ASSEMBLY UNIT

Filed April 28, 1959 2 Sheets-Sheet 1

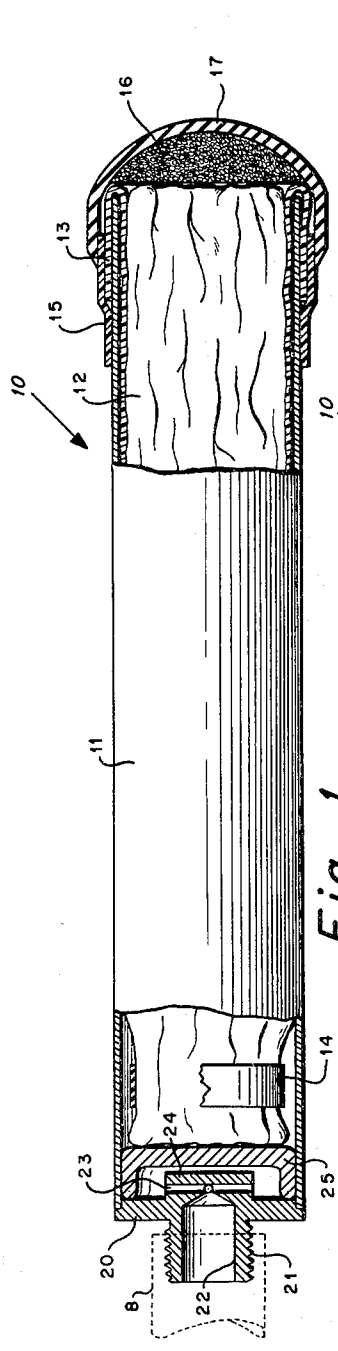


Fig. 1

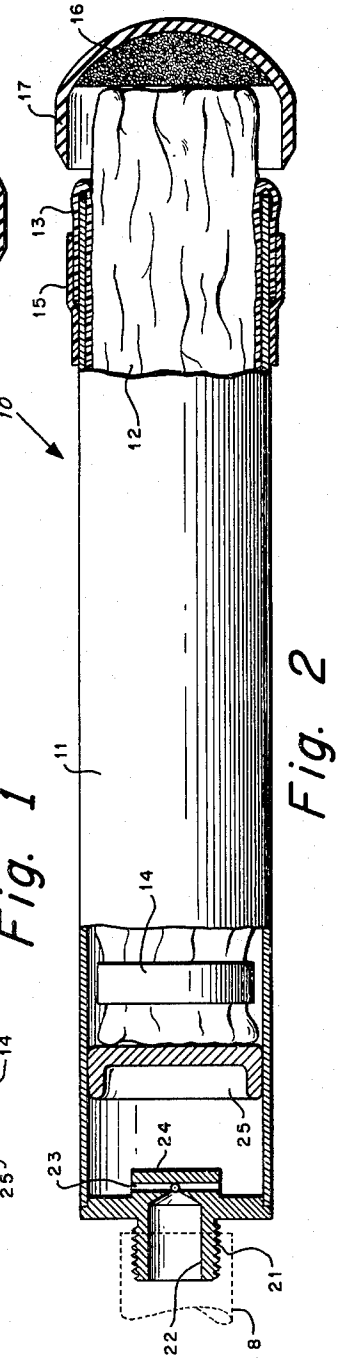


Fig. 2

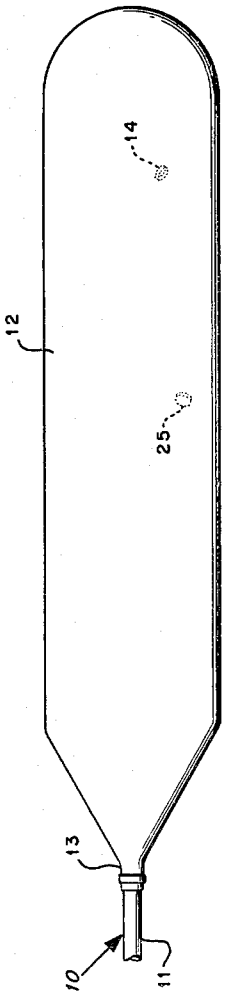


Fig. 3

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FLOTATION BLADDER ASSEMBLY UNIT

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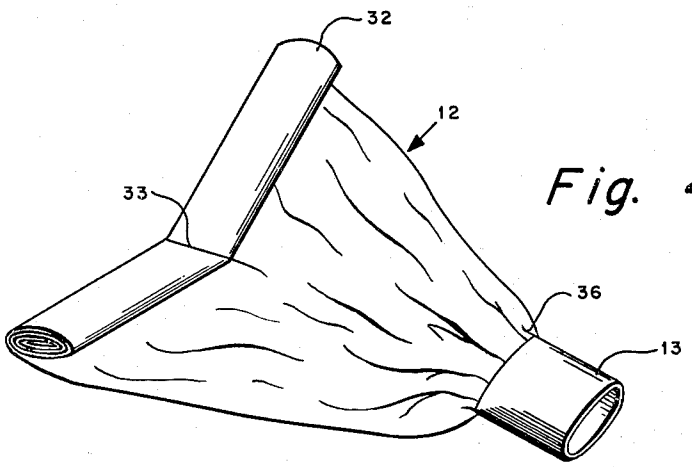


Fig. 4

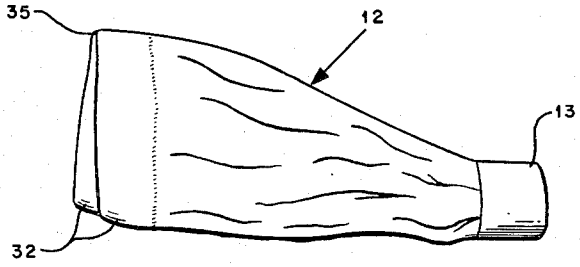


Fig. 5

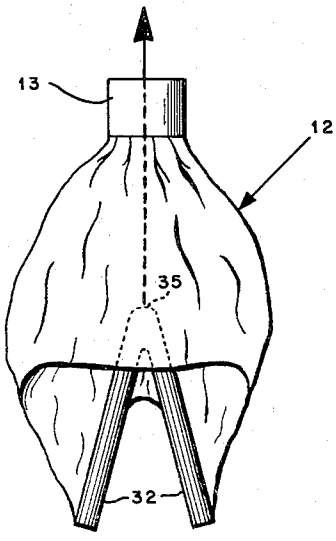


Fig. 6

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3,005,214

FLOTATION BLADDER ASSEMBLY UNIT

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7 Claims. (Cl. 9—8)
(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to signaling and locating devices and more particularly relates to improvements in sea markers of the flotation type.

Heretofore, sea markers of the flotation type were of considerable weight per unit of volume. Furthermore, in addition to the weight disadvantage, the bulk of a deflated sea marker was considered excessive. It is, therefore, desirable to provide a light, compact, and relatively small sea marker assembly unit having a bladder which can be expanded to a relatively large volume which is visible from a considerable distance and can also function as a life preserver. Another disadvantage of prior art sea bladders is that a puncture therein had a tendency to cause a relatively quick and total deflation or collapse of the marker. For example, rubber bladders have a tendency to contract when a leak occurs and the contraction operates to squeeze all of the inflating fluid out of the bladder.

It is contemplated that the present invention will eliminate the above disadvantages commonly found in a bladder type sea marker.

It is, therefore, a principal object of the invention to provide a sea marker free of the disadvantages pointed out hereinabove.

It is a further object of the invention to provide a sea marker which can be packed as a relatively small unit having a flotation bladder capable of being inflated to relatively large dimensions so as to be capable of adequately functioning as a sea marker.

It is also a further object of the invention to provide a sea marker which, in case it develops a small pin hole leak, tends to remain inflated or at least deflates at a relatively slow rate as against other bladder type sea markers which will deflate or collapse rapidly.

A still further object of the invention is the provision of a sea marker which can also be utilized as a life float, the float being capable of supporting the weight of a man.

Still another object of the invention is to provide a means for packing an inflatable flotation bladder inside of a tube or casing in such a manner that the bladder can be automatically ejected therefrom and inflated without the deflated bladder jamming in the casing.

A still further object of the invention is the provision of a marker having a cylindrical casing which houses an inflatable flotation bladder having the shape of and functioning as a piston in the casing, the bladder piston being ejected by pressure fluid and inflated with the same pressure fluid.

A still further object of the invention is the provision of a marker as set forth in the preceding object wherein a major portion of the bladder is folded and disposed within the cylindrical casing with the bladder enclosing an open end of the cylindrical casing, the bladder being folded and turned inside out when packed in the casing so that the same pressure fluid which ejects the bladder also inflates the same. When the bladder is inflated, the fluid pressure actuated piston is disposed inside the bladder.

The invention further resides in certain novel features of construction, combinations and arrangements of parts,

and further objects and advantages of the invention will be apparent to those skilled in the art to which it pertains from the following description of the present preferred embodiment thereof described with reference to the accompanying drawings, which form a part of the specification, and wherein the same reference characters represent corresponding parts throughout the several views, and in which:

FIG. 1 is a view of a sea marker flotation unit embodying the invention, a casing of the unit being partially in section to show details of the interior thereof;

FIG. 2 is a view similar to view 1 showing the arrangements of parts of the unit during the initial stage of ejecting and inflating the sea marker immediately after a buoyant expansible fluid has been released for expansion within the casing;

FIG. 3 is an elevational view showing the sea marker in its inflated condition;

FIGS. 4, 5 and 6 pictorially illustrate the folding of the sea marker for packing within the casing during the assembly of the unit.

It is to be understood that the invention is not limited to the details of construction and arrangements of parts shown in the drawings and hereinafter described in detail, but is capable of being otherwise embodied and of being practiced or carried out in various ways. It is to be further understood that the phraseology or terminology employed herein is for the purpose of description and there is no intention to herein limit the invention beyond the requirements of the prior art.

Referring to FIGS. 1 to 3, the reference numeral **10** indicates generally a preferred embodiment of the invention which comprises a cylindrical tubular container or casing **11** having a deflated, folded, expansible flotation bladder **12** packed therein. The bladder **12** is capable of being inflated and of being used as a sea marker. The bladder **12** is shown in FIG. 3 in its inflated condition. The open end or neck portion **13** of the bladder **12** is telescoped over the upper end of the cylinder **11**, as seen in FIGS. 1 and 3 and then the bladder **12** is folded or rolled up from the outer closed end thereof and formed into a piston-like configuration and inserted into the casing **11** in a manner more fully described hereinafter. The bladder **12** is preferably made of a polyethylene or other suitable plastic material and liberally lubricated with talcum powder. The talcum on the bladder **12** lubricates the internal cylindrical wall of the casing **11**.

The inner bight-shaped end of the folded bladder **12** is held with an elastic band **14** and the outer end of the bladder **12**, which is telescoped over the outer end of the container **11**, is sealed with a waterproof masking or sealing tape **15**. It is understood that a conventional clamp can be applied over or substituted for the tape **15** if desired.

A packet **16** of water soluble dye, such as fluorescein, is placed over the outer end of the piston-like folded bladder **12**, and a cup-shaped rubber cap **17** is slipped over the upper end of the casing **11** for enclosing the packet of dye **16** and sealing the casing **11**.

The other end of the tubular casing **11** is closed with a plug **20**. The plug **20** has an externally threaded cylindrical, outer end portion **21** and is thereby adapted to be connected to coupling means **8**, shown in hidden outline, for attachment with an automatic explosively-operated actuating mechanism of the character described in applicant's U.S. Patent 2,801,026, dated July 30, 1957. However, it is to be understood that other actuating mechanisms can be used for supplying a buoyant fluid, such as compressed carbon dioxide, air, or other suitable fluid, for inflating the bladder **12**.

As a matter of operation, when a buoyant pressure fluid capsule is broken, the pressure fluid escapes from the

capsule into a coaxial passage 22 in the threaded end portion 21 of the plug 20 through diffuser means comprising four radial drill holes or passages 23 in a cylindrical embossment 24 of the end plug 20 inside the casing 11. Each of the passages 23 is perpendicular to the adjacent passages 23 and intersect at a common center, which communicates with the central passage 22. Once the pressure fluid passes through the passage 22 and the diffusing passages 23 into the casing 11 between the end plug 20 and a generally cup-shaped nonmetallic piston 25, the piston 25 is urged towards the outer end of the casing 11 and at the same time pushes the piston-like bladder 12 outwardly thereof.

Referring to FIG. 2, as the fluid expands behind the piston 25, the upper or outer end of the bladder 12 reacts against and separates the packet 16 and the rubber cap 17 from the casing 11. The fluid continues to expand behind the piston 25 until the bladder 12 is fully inflated, as shown in FIG. 3. Since the bladder 12 is initially folded inside-out during the assembly of the unit 10, the piston 25 will be stored within the container 12. The weight of the piston 25 is insignificant. The band 14, being burst or forced off of the bladder 12 by the expanding buoyant fluid, is also stored within the bladder 12.

As seen in FIG. 3, the bladder is generally cylindrical and expands to a dimension which is preferably approximately six times the length of the casing 11 and to a diameter preferably approximately seven times the diameter of the casing 11. The total volume of the inflated bladder 12 is accordingly approximately forty-two times the internal volume of the casing 11.

How the bladder 12 is folded within the container is considered an important feature of the invention. Referring to FIG. 4, the bladder 12, in its deflated condition, is generally elongated and is rolled or folded from the outer closed end thereof until the overall length of the bladder is approximately twice the length of the space available therefor in the casing 11. After the folding takes place, as shown in FIG. 4, the folded or rolled portion 32 is folded over along a longitudinal center crease 33 normal to the axis of the fold 32 until the bladder 12 assumes the V-shaped configuration shown in FIG. 5. The rolled portion 32 is then grasped and an apex or bight end 35 of the rolled portion 32 is pivoted 90° to the right, FIG. 5. The bottom view of the newly assumed configuration of the bladder 12 is shown in FIG. 6. The apex 35 of the roll 32 is then threaded through the eye of the neck portion 13. Preferably, the roll 32 is inserted through the neck portion 13 before the neck portion 13 is placed over the outer open end of the casing 11. The roll 32 is squeezed and compressed into a substantially cylindrical configuration and the elastic band 14 is applied thereabout, FIGS. 1 and 2. The roll 32 is then inserted into the casing 11 until the apex end 35 abuts against the juxtaposed face of the piston 25.

The neck portion 13 is then telescoped over the end of the casing 11 after the bladder 12 is packed within the casing 11 and the waterproof tape 15 is applied as pointed out. Preferably, the neck portion 13 is coated with a plastic to reinforce the same and make it more rigid.

It has been discovered that the foregoing manner of packing the inflatable bladder 12 within the casing 11 provides the optimum method of packing the largest bladder in the smallest volume. The preferred form of the casing 11 is very small and light. For example, the casing 11 is preferably of aluminum and is two inches in diameter and ten inches in length. This will accommodate a bladder which can be inflated to approximately fourteen inches in diameter and five feet in length.

Furthermore, not only is the bladder of a sufficiently large size and of a material which can be colored with a fluorescent dye, such as a brilliant orange or other bright color visible in the open water, but also the sea marker 10 has a buoyancy that will support the weight of a man and can, therefore, be used as a life preserver or to float equipment, gear, and the like.

It is the intention to hereby cover not only the above-mentioned preferred construction shown, but to cover all adaptations, modifications, and uses thereof which come within the practical skill in the art to which the invention relates, and the scope of the appended claims.

What is claimed is:

1. In a flotation assembly, cylindrical casing means, means for connecting said casing means to a supply of buoyant pressure fluid, piston means in said casing means and movable throughout the length of said casing, bladder means having an open end connected to and enclosing one end of said casing means, a portion of said bladder means being folded into a piston-like shape with one end disposed within said open end of said bladder means and enclosed by said casing means, said piston means forming a gas tight separation between said bladder means and the supply of pressure fluid so that when the pressure fluid acts against said piston means the latter forces said bladder means out of said piston means whereby said bladder means is inflated.

2. In a flotation assembly, a cylindrical casing, a generally elongated bladder adapted to be inflated with pressure fluid, said bladder having a neck portion with a central passage communicating with the interior of said casing, means for hermetically sealing said neck portion of said bladder to said casing, said bladder being folded from the outer end thereof until the overall length of said bladder is approximately twice the length of the space available for said bladder in said casing, the folded portion of said bladder being creased along a generally longitudinally extending center line and folded over so as to form a bight portion, said bight portion extending through said neck portion into said casing, band means disposed about said bight portion of said bladder, a plug having diffuser means enclosing one end of said casing, a cup-shaped piston disposed between said plug and said bladder in said casing, a rubber cap disposed over the end of said casing opposite to said plug, a packet of water-soluble dye disposed within said cap in juxtaposition with said bladder, said plug being adapted to be connected to a supply of buoyant pressure fluid for ejecting said piston and said bladder out of said casing and separating said dye packet and said cap from said casing and inflating said bladder, said piston and said band means being disposed within said bladder when the same is inflated.

3. In a flotation assembly, cylindrical casing means having an open end, generally elongated bladder means adapted to be inflated with pressure fluid, said bladder means having a neck portion with a central passage communicating with the interior of said casing means, said neck portion being disposed about the open end of said casing means, means for hermetically sealing and connecting said neck portion of said bladder means to said casing means, said bladder means being folded from the outer end thereof until the overall length of said bladder means is approximately twice the length of the space available for said bladder means in said casing means, the folded portion of said bladder means being creased along a generally longitudinally extending center line and folded over so as to form a bight portion, said bight portion extending through said neck portion into said casing means, band means disposed about said bight portion of said bladder means, plug means having diffuser means disposed in said casing means, cup-shaped piston means disposed between said plug means and said bladder means, rubber cap means disposed over the end of said casing means opposite to said plug means, said plug means being adapted to be connected to a supply of buoyant pressure fluid for ejecting said piston means and said bladder means out of said casing means and inflating said bladder means, said piston means and said band means being disposed within said bladder means when the same is inflated.

4. In a flotation assembly, tubular casing means having an open end, generally elongated bladder means adapted to be inflated with pressure fluid, said bladder means

having a neck portion with a central passage communicating with the interior of said casing means, said neck portion being disposed about the open end of said casing means, means for hermetically sealingly connecting said neck portion of said bladder means to said casing means, said bladder means being folded from the outer end thereof until the overall length of said bladder means is approximately twice the length of the space available for said bladder means in said casing means, the folded portion of said bladder means being creased along a generally longitudinally extending center line and folded over so as to form a bight portion, said bight portion extending through said neck portion into said casing means, means for lubricating said bladder means, plug means having diffuser means disposed in said casing means, cup-shaped piston means disposed between said plug means and said bladder means, said plug means being adapted to be connected to a supply of buoyant pressure fluid for ejecting said piston means and said bladder means out of said casing means and inflating said bladder means, said piston means being disposed within said bladder means when the latter is inflated.

5. In a flotation assembly, tubular casing means having an open end, bladder means adapted to be inflated with pressure fluid, said bladder means having a neck portion disposed about the open end of said casing means and a central passage communicating with the interior of said casing means, means for connecting said neck portion of said bladder means to the exterior of said casing means, said bladder means being folded from the outer end thereof until the overall length of said bladder means is approximately twice the length of the space available for said bladder means in said casing means, the folded portion of said bladder means being creased along a generally longitudinally extending center line and folded over so as to form a bight portion, said bight portion extending through said neck portion into said casing means, an elastic band disposed about said bight portion of said bladder means, plug means in one end of said casing means, piston means disposed between said plug means and said bladder means, said plug means being adapted to be connected to a supply of pressure fluid for ejecting said piston means and said bladder means out of said casing means and inflating said bladder means, said piston means and said

elastic band being disposed within said baldder means when the latter is inflated.

6. In a flotation assembly, casing means having an open end, bladder means having an open end snugly disposed about said open end of said casing means and having a closed end folded into and forming a V-shaped piston portion and enclosed within said casing means, elastic band means disposed about said piston portion of said bladder means, plug means having diffuser means in one end of said casing means, piston means disposed between said plug means and said bladder means and forming a gas tight separation therebetween, and cap means disposed over the end of said casing means opposite to said plug means, said plug means being adapted to be connected to a supply of buoyant pressure fluid for ejecting said piston means and said bladder means out of said casing means and inflating said bladder means, and said piston means and said elastic band means being disposed within said bladder means when the same is inflated.

7. In a flotation assembly, cylindrical casing means, means for connecting said casing means to a supply of buoyant pressure fluid, piston means in said casing means and movable throughout the length of said casing means, bladder means having an open end connected to and enclosing one end of said casing means, a V-shaped piston-like portion of said bladder means being lubricated and enclosed by said casing means, said piston means forming a gas tight separation between said portion of said bladder means and the supply of pressure fluid so that when the pressure fluid acts against said piston means said bladder means is forced out of said casing means and inflates said bladder, said piston means coming to rest inside said bladder means.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,005,214 October 24, 1961

Adel J. Fruendt

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the grant, line 12, for "Adel J. Fruendt, her heirs" read -- Adel J. Fruendt, his heirs --; column 6, line 1, for "baldder" read -- bladder --.

Signed and sealed this 10th day of April 1962.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents