

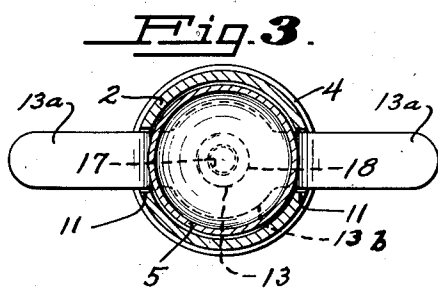
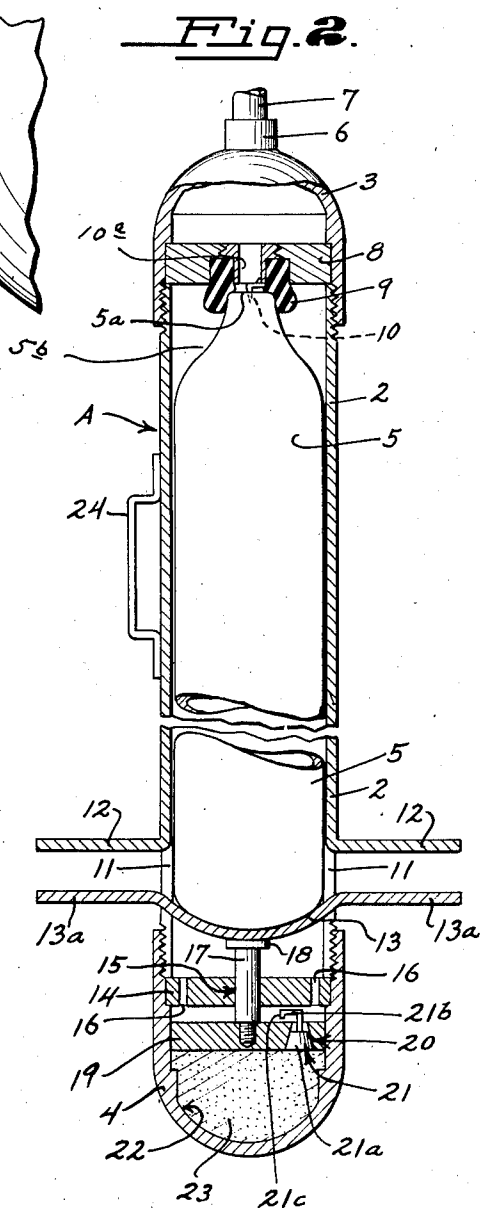
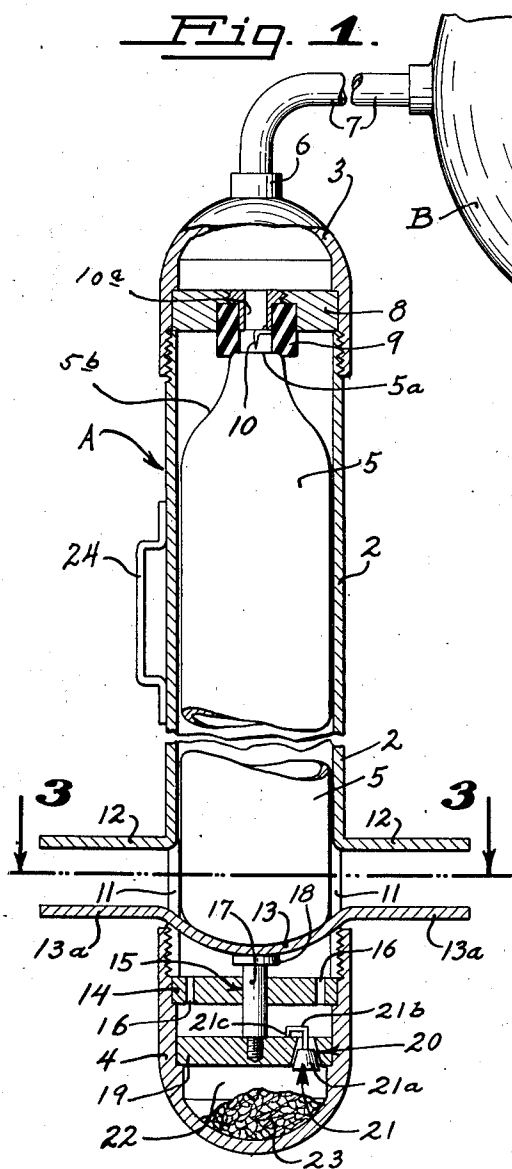
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INFLATING DEVICE

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INFLATING DEVICE

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6 Claims. (Cl. 222-5)

This invention relates to inflation devices and more particularly to a combination fully automatic and manual inflating device for inflating life belts, rafts, and the like.

In providing a device adapted to inflate a life belt, raft, or like appliance, it is of utmost importance that it be positive and rapid in function. Many times the person who needs the use of a life saving appliance is injured or confused to such an extent that he is incapable of operating a manually controlled inflating device. However, so-called automatic inflating devices have not proved successful in operation nor are they automatic in the true sense of the word.

It is vital that any inflating device be of sturdy and compact construction in order to be in readiness at all times for operation. Such a device, if adapted for manual control, must be simple and obvious as to the manner of operation.

Chemicals used in inflation devices should produce non-inflammable gases as far as possible; however, if inflammable gases result, they should be sealed entirely within the inflating device and not allowed to escape therefrom except as directed to the life saving appliance sought to be inflated. The danger of fire spreading to inflammable gases escaping from a life saving inflating device when in the neighborhood of a burning ship or aircraft is a real one.

I have provided a device for inflating life saving appliances which meets the above requirements and is adapted for both manual and fully automatic actuation. The manual means of operation is obvious as to its manner of use, requiring no turning or twisting of parts and positive in result. The automatic actuation means works in supplement to the manual release and neither is capable of detrimental interference with the other's positive independent operation.

Therefore, generally stated, an object of my invention is to provide an inflating device which combines positive manual and fully automatic operating means. Specific objects of my invention are:

To provide an inflating device with manual operating means which is simple and obvious as to the manner of operation thereof; to provide an inflating device adapted to be automatically operated upon immersion in water; to provide a compact, sturdy inflating device wherein parts can not become disarranged and thereby make the device inoperative; to provide an inflating device which does not allow gases to escape therefrom except as directed to the appliance sought to be inflated; to provide an inflat-

ing device inexpensive to manufacture and assemble; and to provide an inflating device which is adapted to be recharged after use thereof.

Further objects and advantages will become apparent upon referring to the following specification and drawing annexed hereto.

With reference to the drawing, in which similar characters of reference represent corresponding parts in the several views:

Fig. 1 is a longitudinal sectional view of my device in neutral position taken through the handle slots.

Fig. 2 is a longitudinal sectional view of my device in working position taken through the handle slots.

Fig. 3 is a cross sectional view taken on line 3-3 of Fig. 1.

In the drawing, my inflating device comprises a housing, indicated generally at A, composed of a tubular shell 2 which can be formed from metal or plastic or any other suitable substance and preferably threaded exteriorly at both ends for reception of interiorly threaded cap members 3 and 4. The shell houses a conventional cartridge 5 containing a compressed gas such as carbon dioxide or the like. The cartridge has a slightly smaller outside diameter than the inside diameter of the tubular shell 2 in order that it may have a limited longitudinal movement therein as will hereinafter appear.

Cap member 3 is provided with an outlet 6 communicating with a flexible conduit 7 which leads to the appliance sought to be inflated, generally indicated at B. It is obvious that any suitable connecting means may be employed between my inflating device and the life belt or raft.

Cap member 3 houses a gasket 8 which may be fixed in the said cap portion. It is obvious that the gasket 8 could be provided in the end of the tubular shell rather than in the cap member 3. The gasket is provided with a centrally disposed resilient head 9, preferably rubber or like material, and a piercing element 10 embedded therein. The cartridge has a pre-weakened outlet point 5a as is conventional, at the tapered end 5b thereof, which is adapted to be pierced by the piercing element 10 when the said cartridge is forced thereagainst as will shortly appear. In assembly, the tapered neck of the cartridge having the pre-weakened outlet point abuts against the resilient rubber head 9. When pressure is applied to the opposite end of the cartridge, as will shortly appear, the tapered neck end of the cartridge is forced into the resilient forming a seal to cut off lateral or undesired escape of gas

released when the piercing element has caused the puncture of the cartridge.

The piercing element, above mentioned, is conventional in form. The piercing element 10 is mounted on a tubular base 10a so that when the said piercing element has released the gas in cartridge 5, the gas will flow through the tubular portion 10a and thence to the cap member outlet and connected conduit.

The end of the shell opposite outlet cap 3 is provided with diametrically opposed longitudinal slots 11 which extend toward the middle of the tubular shell from the said end thereof a suitable distance. If the shell is formed of steel tubing or the like, the strip cut from the shell to form the slots is simply bent back at approximately right angles to the tubular shell 2 to form the handle portions 12 integral with the said shell.

A substantially U-shaped member 13 having two extending, oppositely disposed arms or handle members 13a, is loosely slidably positioned in the shell behind the cartridge so that the arms project through the slots and accordingly the said U-shaped member is guided longitudinally of the shell thereby and restrained from rotation relative thereto. The U-portion of the member 13 is centrally enlarged as at 13b in order to abut against the end of the cartridge 5 in order to hold the said cartridge against the resilient head 9, and to force the said cartridge against the piercing element during operation, as will appear.

A partition 14 is fixed in the end of shell 2 or in cap member 4 as desired, a suitable distance behind the cartridge 5. The partition 14 is provided with a centrally disposed guide bore 15 and a plurality of perforations 16 arranged concentrically around the said bore. A piston or plunger stem 17 is slidably inserted through the guide bore 15 and is preferably provided with a radial flange or the like 18 at one end thereof, adapted to abut against the central portion 13b of the U-shaped member 13, or the said piston stem may be rigidly attached directly to the U-shaped member. The opposite end of the piston stem is provided with a head 19 of substantially the same diameter as the inside diameter of the cap 4 so that the said piston head will slide within the said cap against the inside tubular surface thereof.

The parts, including the piston, U-shaped member, cartridge and resilient head, are arranged so that the cartridge is held lightly against the soft head by the U-shaped member and adjoining piston when the inflating device is not in working position. In this manner there can be no unwarranted movement of the cartridge relative to the tubular shell and against the piercing element.

Spring means may be provided to restrain the cartridge from undesired movement in the shell although it is not necessary if the associated parts are assembled as above pointed out and as illustrated in the drawing.

The head 19 of the piston is provided with a tapered bore 20, the minor diameter of the bore being on the cartridge side of the gasket. A tapered floating valve 21 is carried in said bore.

The valve 21 comprises a head portion 21a tapered to correspond with bore 20 and adapted to seat therein in sealing position when depressed thereinto. An L-shaped portion 21b having a depending finger 21c is mounted on the tapered

end of the valve head so that the valve will not become disengaged from the bore and the L-shaped portion cannot seal the bore from the cartridge side because, obviously, the finger 21c spaces the valve from the surface of the gasket.

There are, of course, other valve mechanisms of similar characteristic functions which can be utilized satisfactorily in place of the floating valve herein described and illustrated.

In the chamber 22 in cap 4, defined by plunger head 19, I provide a chemical indicated generally at 23, adapted to rapidly produce gas upon contact with water. I have found that carbide pellets are satisfactory for the purposes herein desired, although other gas forming chemicals can, of course, be utilized. It is desirous to use a chemical which will not react with the normal moisture content of air but which will react almost instantaneously upon contact with a small quantity of water.

Fig. 1 shows the device in neutral position prior to actuation thereof. My plunger head and associated piston stem are behind the U-shaped member and the U-shaped member in turn is not exerting working pressure against the cartridge, but simply holds the cartridge lightly against the resilient head.

To actuate my device, assuming the manual control means are to be utilized, the operator simply grasps rigid handle portion 12 and slidable handle extensions 13a and squeezes the two together. The U-shaped member 13 is squeezed toward handle portions 12 and forces itself against the cartridge 5 causing the cartridge to move longitudinally relative to the shell 2 and brings pre-weakened point 5a against piercing element 10 releasing the gas in said cartridge and inflating the safety appliance B.

Automatic actuation of my device is caused by submersion of the shell into water resulting in water rushing through slits 11 into the interior of tubular shell 2 and through the perforations 16 provided in gasket 14 and thence through bore 20 and open floating valve 21 in piston head 19 to contact the chemical 23 stored behind the said piston head in chamber 22. Gas forms behind the piston head in chamber 22 and the pressure developed therein depresses valve head 21a into sealing position with tapered seating bore 20 closing off any chance of gas escape therethrough. Pressure immediately builds up against plunger head 19, depressing same and causing connected piston stem 17 to be forced against U-shaped member 13, resulting in longitudinal movement of cartridge 5 against piercing element 10 and the resultant feed of gas to the object B. The device is shown in automatically actuated working position in Fig. 2.

It should be borne in mind that even though the manual control is to be operated and the device is submerged in water, no detrimental interference of parts will result. As a matter of fact, the automatic release simply supplements and makes sure of the continued operation of the manual control.

The amount of chemical 23 to be used, is, of course, dependent on the size of the inflating device and other factors of like character. The size of the cartridge 5 is likewise dependent on the type of article to be inflated.

For convenience in use and storage, I have provided a bracket 24 on the shell surface for insertion of web belting or strapping in order to fasten my device against undesired movement thereof.

While I have described my invention in more or less specific detail of embodiment for purposes of illustration, it is not intended that the invention be limited thereto but that modifications and changes in details of construction may be incorporated within the spirit and scope of the appended claims.

I claim:

1. In an inflating device, the combination of a housing, a gas cartridge slidably arranged therein, a piercing element fixed in one end of said housing, manually controlled means for forcing the cartridge against the piercing element, said means including a handle rigidly attached to said housing, a slidable handle member spaced from said rigid handle and adjacent to the end of said cartridge opposite the end sought to be punctured; automatic means for forcing said cartridge against said piercing element upon immersion of the device in water including a piston adapted to abut against said slidable handle member, said piston having a piston head, a chemical adapted to produce gas upon contact with water stored behind said piston head, means to convey water to said chemical upon immersion of the device, and means to prevent escape of gas through said water conveying means.

2. In an inflating device, the combination of a housing having an opening at one end thereof, a gas cartridge arranged for limited slidable longitudinal movement therein, a piercing element fixed in one end of said housing, manual means including a slidable handle member to force the cartridge against the piercing element, and automatic means to force the cartridge against the piercing element, the manual and the automatic means being independent of one another in actuation.

3. An inflating device adapted to be actuated automatically and manually, comprising the combination of a housing, a gas cartridge slidably carried in said housing, a piercing element therein, a rigid handle fixed to said housing, a movable handle member spaced from said rigid handle member, and means including a piston adapted to force said movable handle toward said rigid handle and to force said cartridge against said piercing element upon immersion of the device in water.

4. An inflating device adapted to be actuated automatically and manually comprising the combination of a housing, a gas cartridge slidably arranged in said housing for limited longitudinal

movement therein, a piercing element provided in said housing, a U-shaped member disposed slidably behind said cartridge, a perforated partition spaced from said U-shaped member, a piston slidably inserted through a guide bore provided centrally in said partition, said piston having a piston head, a valve provided in said head, a chemical adapted to produce gas upon contact with water stored behind said head, water inlet means in said housing whereby upon immersion thereof, water will enter therein and be conveyed to said chemical, and means to prevent escape of gas through said water inlet means.

5. An inflating device adapted to be actuated automatically and manually comprising the combination of a housing, a gas cartridge slidably arranged in said housing for limited longitudinal movement therein, a piercing element provided in said housing, a resilient head associated with said piercing element to cut off undesired escape of gas from the cartridge when punctured, a U-shaped member disposed slidably behind said cartridge, a perforated partition spaced from said U-shaped member, a piston slidably inserted through a guide bore provided centrally in said partition, said piston having a piston head, a valve provided in said head, a chemical adapted to produce gas upon contact with water stored behind said head, water inlet means in said housing whereby upon immersion thereof, water will enter therein and be conveyed to said chemical, and means in said head to prevent escape of gas through said water inlet means.

6. An inflating device adapted to be actuated automatically and manually comprising the combination of a housing, a gas cartridge slidably arranged in said housing for limited longitudinal movement therein, a piercing element provided in said housing, a U-shaped member disposed slidably behind said cartridge, a perforated partition spaced from said U-shaped member, a piston slidably inserted through a guide bore provided centrally in said partition, said piston having a piston head, a valve in said piston head adapted to allow entry of liquid therethrough from the cartridge side of said head and adapted to close upon exertion of pressure against said piston head on the opposite side thereof, water inlet means provided in said housing for entry of water thereinto upon immersion thereof, and means in said head to prevent escape of gas therefrom.

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