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P. MARKUS

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INFLATABLE SAFETY DEVICE

Filed Feb. 17, 1930

Fig. 1.

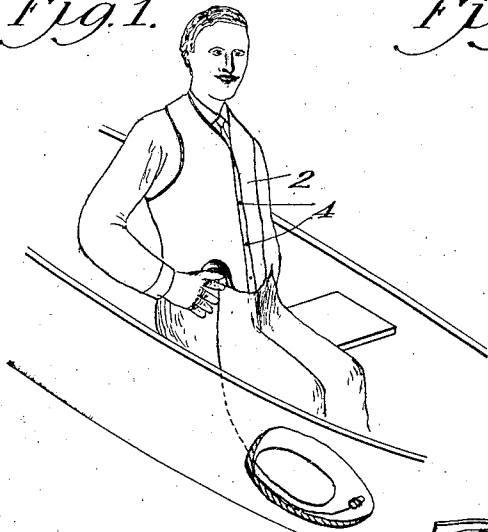


Fig. 2.



Fig. 3.

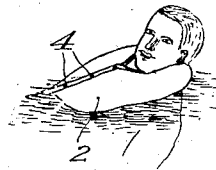


Fig. 4.

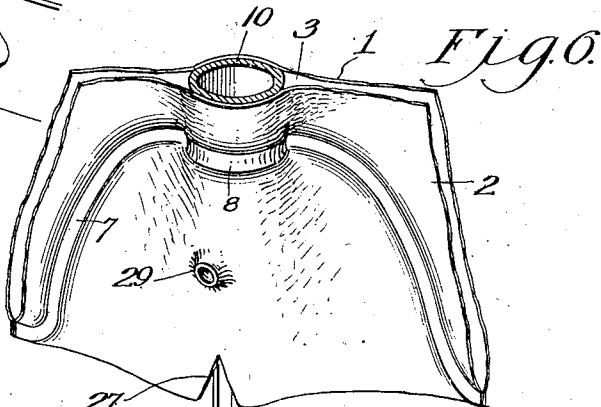
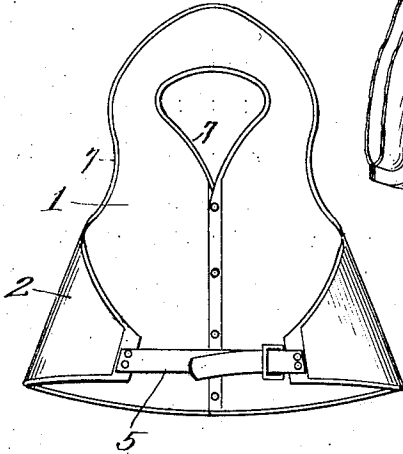


Fig. 5.

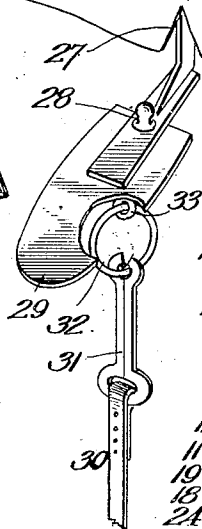
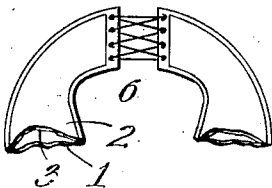
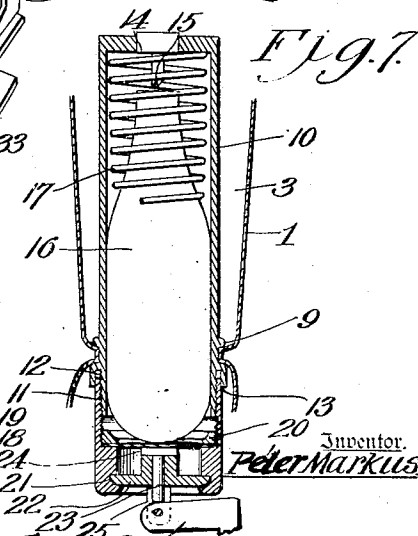


Fig. 7.



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INFLATABLE SAFETY DEVICE

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This invention relates to inflatable appliances designed for sustaining a person safely in water, and consisting essentially of a chambered vest or equivalent article or garment, a compressed air cartridge, and means for effecting the discharge of the compressed air from the cartridge into the chamber of the garment so that it shall safely sustain the wearer in water.

10 In practically all of the devices of this class, a pin is employed to puncture the cartridge, and it has been found in practice that the pin after puncturing the cartridge, usually closes the puncture to such extent
15 that there is no substantially instantaneous inflation of the garment, belt or the like, and it is very desirable that a practically instantaneous inflation shall occur, as with devices which make no provision for supporting the
20 head with the nose and mouth above the water, a wearer who cannot swim, may become strangled before the garment, belt or the like becomes sufficiently buoyant to function properly.

25 In speed boat racing it is a requirement that each operator and assistant or passenger, shall wear a life belt or an equivalent safety device so that in the event of an upset or the projection of the operator from the boat into
30 the water, from a collision or other cause, the wearer of the device shall be sustained until picked up. With my appliance, a person in the predicament mentioned will find himself safely supported, and this is true even though
35 through the shock of the collision or any other cause, he be unconscious, it being understood that one wearing an inflatable safety device, might not have the presence of mind to effect the discharge of the cartridge
40 in the face of imminent danger.

With the object therefore of providing a garment or the like, which will inflate instantaneously and dispose the head in the position mentioned to guard against strangulation, and is provided with means for effecting, if necessary, the automatic puncturing of the cartridge, the invention consists in certain novel and useful features of construction and combinations of parts as hereinafter described and claimed; and in order that it may

be fully understood, reference is to be had to the accompanying drawing, in which:

Figure 1 is a perspective view of a man sitting in a boat and wearing a deflated safety garment embodying the invention and arranged for either manual operation or automatic operation in the event the man falls or is projected from the boat for any cause.

Figure 2 is a perspective view of the garment as it appears in inflated condition upon a wearer.

Figure 3 is a view indicating generally how the garment when inflated, sustains an unconscious or disabled person upon his back and with his head tilted upward so that his mouth and nose are above the water level.

Figure 4 is a rear view of the garment.

Figure 5 is a fragmentary view of an inflatable garment as composed of two independent sections adjustably connected at the top for accommodating a person of any breadth of shoulder.

Figure 6 is a fragmentary perspective as viewed from the front of the garment.

Figure 7 is a vertical section of the cartridge container, the device whereby the cartridge is punctured, and means for disassociating the punctured cartridge from the puncturing device after the force effecting the puncturing action is released.

Referring now to the drawing in detail, a hollow inflatable article is preferably of the vest type or form, and consists of similar inner and outer members 1 and 2, seamed together marginally so as to form an intervening air chamber 3, which chamber corresponds substantially in area to the article or garment except along the margins hereinbefore mentioned and at another point hereinafter referred to, and the vest is to be secured in position by any suitable disengageable means, such as buttons 4, snaps or the equivalent thereof, the back portions of the garment near its lower end being adjustably connected by a strap and buckle or equivalent connection 5, the adjustability of the strap connection accommodating the vest to suit wearers of different girth.

The vest is preferably of one chamber construction so that the chamber shall be un-

broken along the neck portion as well as at other points. It is to be understood however that the garment may be in two chambered type, preferably separated at the middle of the neck portion at the back thereof and adjustably connected at such point by a lacing 6 or otherwise (Figure 5), as by this construction a single garment may be made applicable to wearers of any breadth of shoulder, it being understood however that the chambers of the last-mentioned type should terminate sufficiently close together to insure such engagement with the back portion of the head that the latter shall be pressed upwardly by the neck portions when the garment is inflated, and the wearer is on his back in the water.

With both types of vest, the seam where the pieces of material are marginally secured together with an air tight relation, is arched upward from the lower margin of the front portion of the vest as indicated most clearly in Figures 2 and 6, thus leaving the inner and outer pieces of the fabric below and within the arch, capable of being spread apart, which construction will be duplicated in a vest provided with two chambers. At the top of the arch or each arch, the seam as indicated at 8, extends across and completely around a metal cartridge container between a pair of circumferential beads 9 thereof (see Figure 7), so that the chamber 3 shall be dependably sealed at this point. The container, which extends up into the chamber 3 and depends into the space between the separable parts of the fabric—within the arched portion of the seam 7—consists of a body portion 10 and a cap portion 11 screwed together, and the upper edge of the cap is screwed firmly against a rubber or equivalent gasket 12 within a groove 13 formed in the under face of the lower bead 9 of the container. This provides a water tight joint to guard against the escape of air from the container. The container member 10 is closed at its upper end by a screw plug 14 carrying a preferably tubular puncturing pin 15 for breaking a conventional seal in the upper end of a compressed air cartridge 16 disposed within the container. With the device arranged as explained, the gravitative force of the cartridge tends to prevent it pressing forcibly against the puncturing pin. This gravitative force however is preferably augmented by a spring 17 fitting around the upper or reduced end of the cartridge and exerting pressure at its upper end against the top portion of the container and at its lower end upon the cartridge. The function of this spring primarily is to force the cartridge downward and thus withdraw it completely from the puncturing pin, after the former has been forced upward as hereinafter explained, and punctured by the pin. It has been found in practice that there is a tend-

ency for the cartridge when advanced against and punctured by the pin, to cling or adhere to the latter, and as a result the escape of the air from the cartridge is materially retarded. This is objectionable, as in some cases the wearer of the garment may be unconscious or otherwise unable to maintain himself with his head out of the water and might perhaps strangle before the rather slowly escaping air would sufficiently inflate the garment to properly raise the wearer's head high enough to guard against the inhalation or swallowing of water.

The cap is formed internally with an upwardly facing annular shoulder 18 upon which is seated a rubber or equivalent diaphragm or partition 19 held in place by a screw ring or collar 20 engaging the internal threads of the cap. Near the extreme lower end the cap is provided with an internal annular groove 21 wherein fits a centrally perforated swivelled plate 22, and engaging the perforation is a plunger 23, having an enlargement or head 24 to hold it in place, the plunger head engaging the outer face of the diaphragm, and its stem projecting beyond the swivelled plate and between a pair of spaced ears 25 depending from said plate. An angle lever 26 is pivoted to and between said ears and formed with a cam or eccentric end so that when the lever is turned it will force the plunger upward and therefore impart like movement to the diaphragm and advance the cartridge until it is punctured by the puncturing pin, and as soon as the force applied to operate the lever is relaxed or removed, the spring 17 will reverse the movement of the cartridge, diaphragm and plunger, and hence withdraw the former from engagement with the fixed puncturing pin so that the compressed air may freely escape and by passing through the tubular pin or an equivalent opening, instantaneously inflate the garment. In actual practice it has been found that the garment is fully inflated by the time the wearer has struck the water in jumping or falling from a boat, it being understood of course that the puncturing of the cartridge is effected in the initial part of the jumping or falling movement.

As shown, the cap occurs between the inner end and outer sections of the fabric of the vest below the arched portion 7 of the seam, so that when the vest is in place the container is hidden. One arm of the angle lever at such time extends from the ears 25, horizontally outward through a notch 27 in the lower edge of the outer portion of the fabric, and riveted to the other or handle arm of the lever, is a button 28 for engagement with a socket 29 secured to the fabric. This connection is of the ordinary spring clasp type such as common as a fastening for gloves and other articles, and holds the lever against accidental operation, the lever preferably having a fab-

ric tab 29 so that it may be readily grasped between the thumb and forefinger for the purpose of unfastening the clasp last mentioned and imparting the lever action necessary to effect the movement of the cartridge and the release of the air thereof.

As thus far explained, the apparatus is complete for manual operation. It however sometimes occurs that the wearer is thrown forcibly from a boat through collision, overturning or some other cause, and may either through excitement or because unconscious, have no time or opportunity to operate the lever by hand as explained. I have therefore provided a means for effecting the automatic puncturing of the cartridge and the instantaneous inflation of the garment. To accomplish this a flexible connection 30 is arranged between the lever and a fixed part of the boat (see Figure 1), the connection being adapted to exert a pull amply sufficient to disengage the button and socket connection and operate the lever, and thereby effect the puncturing of the cartridge. In the preferred construction, the flexible connection will be equipped with a spring metal catch 31 engaging a link 32 pivotally connected to an eye 33 provided on the outer end of the lever. By this arrangement, if a person is thrown or jumps from the boat the connection will first be drawn taut enough to trip the lever and puncture the cartridge and then the spring catch will be disengaged from the lever, so that the wearer of the garment shall be entirely free of any connection with the boat. This is desirable as otherwise the boat might sink or might settle so low as to effect the complete submergence of the wearer even though equipped with the inflated vest or garment. Of course the flexible connection could be made so that it could be readily broken by the wearer, but it is desirable that this disconnection of the wearer from the boat shall be insured regardless of whether the wearer is conscious or not. The fastening of the lever in normal position by the button and socket or the like, can be overcome by a very slight tug or pull on the handle end of the lever, and the connection between the spring catch and the link should be broken only under a pull sufficient to first insure the operation of the lever, it being understood that any real struggle or movement of a person in the water when the flexible connection is taut, which exerts a few pounds pull, will be sufficient to disengage the spring catch from the link—in fact the catch should open under the resistance offered by the buoyant vest and wearer, to submergence by the sinking of the boat.

From the above description, it will be apparent that I have produced an inflatable safety device embodying the features of advantage set forth as desirable in the statement of the objects of the invention, and

which may be modified in various particulars within the principle of construction and mode of operation involved and within the spirit and scope of the appended claims.

I claim:

1. An inflatable safety device of vest type having an upper neck portion adapted when inflated upon a wearer lying on his back in water, to force the head forwardly and upwardly, and an adjustable connection at the back and lower part of the vest for accommodating it to wearers of different girth; said neck portion consisting of two parts and an adjustable connection between them to accommodate persons of different breadth of shoulder.

2. In an inflatable safety device, a cartridge container secured with an air-tight relation to the device and communicating at one end with a chamber thereof and provided at such end with an internal puncturing pin and a passage connecting the interior of the container with said chamber, a cap detachably secured to the other end of the container with an air-tight relation, a diaphragm forming an air-tight partition for said cap and bearing against one end of a compressed air cartridge fitting in the container and holding the other end adjacent and opposed to said puncturing device, means for moving the diaphragm to cause movement of the cartridge against the puncturing device until punctured by the latter, and a spring for effecting relative withdrawal movement between the cartridge and puncturing device when the force exerted by the diaphragm is removed or sufficiently relaxed.

3. The combination with an inflatable safety device, of a container projecting into the device and bearing an air-tight relation thereto and provided with a passage establishing communication between the chamber of the device and said container, a device within the container for puncturing a compressed air cartridge therein, a diaphragm engaging one end of the cartridge and forming an air-tight partition for the container, means for applying force on the diaphragm to press the cartridge against the puncturing device, and a suitably anchored flexible connection attached to said force-applying means and adapted when subjected to a pulling strain, to first effect operation of the means for moving the diaphragm and then become disconnected from said means.

4. The combination of an inflatable safety device, a container communicating at one end with the chamber of the device and containing a compressed air cartridge, a swivelled plate mounted on the outer end of the container, a lever pivotally connected to said plate, a diaphragm partitioning the container and bearing against the outer end of the cartridge, a reciprocatory plunger mounted in the swivelled plate and engaging

the opposite side of the diaphragm from the cartridge, a boat, and a flexible connection between the boat and said lever and adapted when tensioned sufficiently to operate the lever to cause the same to advance the plunger and hence the cartridge, and a puncturing pin within the container for puncturing the cartridge when thus advanced.

5. In a safety device, a cartridge container having an exit opening and at one end an internal puncturing pin, means for forcing the cartridge against the pin until punctured thereby, and a spring for effecting separation of the pin and puncture of the cartridge instantaneously the pressure of the cartridge forcing means is relaxed.

In testimony whereof I affix my signature.
PETER MARKUS.

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