Nov. 14, 1944. G. H. BINGHAM, JR 2,362,962

LIFE SAVING APPARATUS

Filed Sept. 3, 1943

Fig. 1.

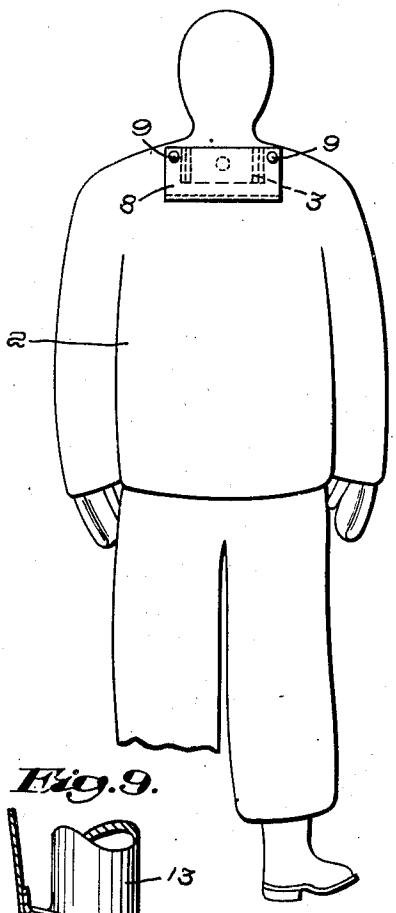


Fig. 2.

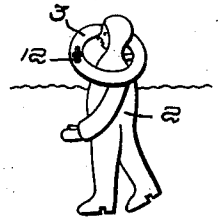


Fig. 3.

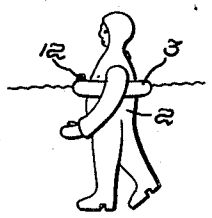


Fig. 4.

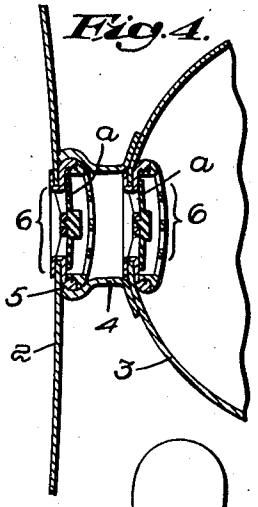


Fig. 5.

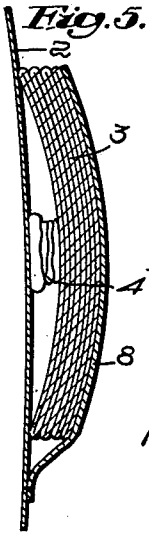


Fig. 10.

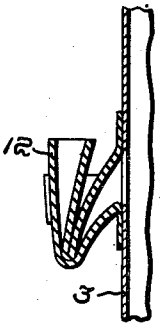


Fig. 9.

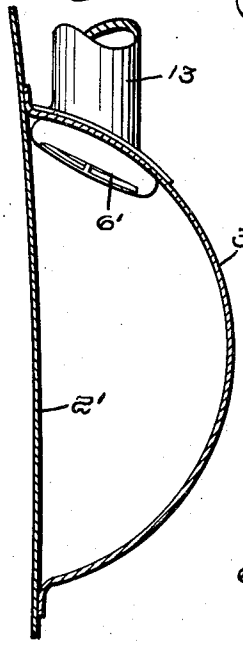


Fig. 8.

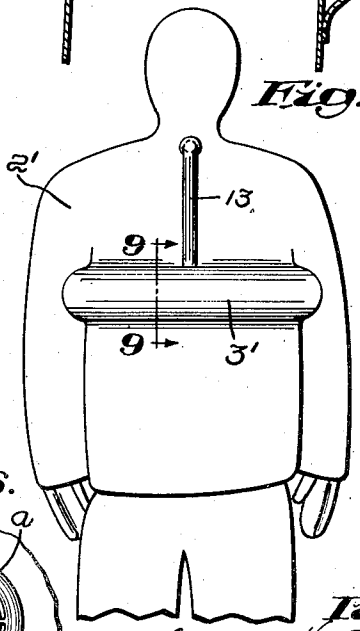


Fig. 7.

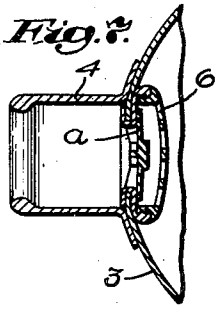
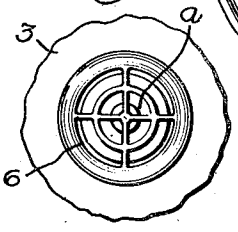


Fig. 6.



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LIFESAVING APPARATUS

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Application September 3, 1943, Serial No. 501,100

11 Claims. (Cl. 9—20)

This invention relates to so-called "over-board" suits and similar garments. A typical suit of this character is adapted to envelope the wearer completely, except for his face. It is intended to exclude water at all other points, and for this reason it is equipped with a hood so constructed that it can be fastened tightly around the face. While these suits vary considerably in construction, they are all intended to give the wearer protection for a substantial period of time in the event that he is blown over-board or is compelled to go over-board for any reason.

The sailors and others who wear these suits also wear under them continuously a life preserver of some approved type, and in order to assist the man, when he is thrown into the water, in remaining approximately upright, his boots usually are weighted with lead, or some equivalent material. This is important for the reason that when a man is thrown over-board he may either be knocked unconscious when he strikes the water or he may be in that condition before he hits the water. In either event, the life preserver alone may not keep his face above the water so that he is likely to drown unless some precautions are taken to float him sufficiently high to keep his head out of water. The weighting of his boots assists materially in accomplishing this object.

While equipment of this character has been the means of saving innumerable lives, it is obvious that the weighting of the feet is a disadvantage of this kind of equipment so far as ordinary activities are concerned, and it also adds to the dead weight that must be floated. In addition, if the sea is rough when a man goes over-board, the buoyancy afforded by the life preserver acting against the weighted body may not float the man high enough to enable him to take care of himself effectively for any great length of time.

The present invention aims to devise a combined overboard suit and life preserver which will supplement the action of the ordinary life preserver sufficiently to give the user the added height above the water necessary for his safety and which will reduce and, in many cases avoid, the necessity for weighting his boots. It is also an object of the invention to devise an apparatus of this character which will automatically inflate itself when the wearer goes into the water, whether he is unconscious or not, and without any action on his part.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawing, and the novel features will be particularly pointed out in the appended claims.

In the drawing,

Fig. 1 is a rear elevation of an over-board suit and life preserver combination embodying this invention;

Figs. 2 and 3 are small views illustrating this combination in actual use;

Fig. 4 is a vertical, sectional view of a portion of the inflated life preserver illustrated in the latter figures, showing details of the connecting means between this member and the suit whereby the life preserver is automatically inflated when the wearer goes over-board;

Fig. 5 is a view similar to Fig. 4 but showing the life preserver in its folded or normal position where it is releasably fastened to the back of the suit;

Fig. 6 is a plan view of one of the check valves used in this combination;

Fig. 7 is a sectional view through the part of this connection which is permanently secured to the life preserver;

Fig. 8 is a rear elevation of a modified form which the invention may take;

Fig. 9 is a vertical, sectional view on the line 9—9, Fig. 8; and

Fig. 10 is a sectional view of an auxiliary inflating valve with which the life preserver may optionally be equipped.

Preliminary to a detailed description of the construction shown, it may be pointed out that in any over-board suit a sizeable body of air is continuously trapped when the suit is fastened tightly around the wearer's neck or around his face, if the suit is equipped with a hood. If the wearer goes over-board and into the water, the hydrostatic pressure forces out this trapped air through such restricted paths of escape as it may find in the upper part of the suit. This invention utilizes the air expelled from the suit to inflate the life preserver automatically.

Referring first to Figs. 1, 2 and 3, an over-board suit is there illustrated at 2 as customarily worn. As above indicated, it is designed to enclose the body completely and includes boots, mittens and a hood, the face only being exposed when the suit is fastened up tightly. According to this invention a life preserver 3, which may be of any suitable type but, as here shown, is of the ordinary ring form, is connected to the back of the suit at the neck portion thereof by a nipple 4 and a cooperating fixture of a button-type se-

cured permanently to the jacket section 2 of the suit.

The particular connecting means illustrated in Fig. 4 is designed to permit the removal of the life preserver, when desired, and both the nipple section and the button therefore are equipped with a check valve 6 of a common construction, better illustrated in Fig. 6. The form here shown is that used in gas masks, and it consists of a reticulated body of metal, or other rigid material, made in top and bottom spider sections screwed together. Between them a circular disk *a*, Fig. 6, of rubber, either natural or synthetic, is mounted, with its center anchored to the bottom spider and its margin resting on the valve seat in the spider. These parts in both valves are so related that the disks can open toward the right, Fig. 4, to permit air to flow freely through the valves from the suit into the life preserver, but each will prevent any such flow in the opposite direction.

Such a valve and the nipple 4 may both be readily vulcanized or otherwise secured permanently to the rubber body of the life preserver 3. The nipple is made of rubber, or equivalent elastic material, so that it can be stretched over the button, as shown in Fig. 4, and upon being released will grip the button sufficiently to hold the life preserver to the suit firmly; but it can, nevertheless, be pulled off, when desired. After the parts have been separated the check valve in the life preserver prevents the escape of air from it, and that on the jacket prevents the entrance of water into it.

Normally the life preserver is folded into a compact form, as illustrated in Fig. 5, and it is held in place on the wearer's back by a flap or patch 8, Fig. 1, the lower edge of which is secured permanently to the suit while the upper edge is releasably fastened to the suit by two or more snap fasteners 9 of the type which hold quite securely against lateral strains, but are released readily by pressure exerted in the direction of their own height.

Assuming the apparatus to be folded under the flap 8, as above described, and that the wearer jumps, or is thrown, over-board, the air trapped in his suit will be expelled by the hydrostatic pressure of the surrounding water, and naturally will be forced into the upper part of the suit where it will flow through the valves 6—6, Fig. 4, into the life preserver 3. As the latter becomes inflated and expands, the pressure so brought to bear on the fasteners 9—9 will unfasten them, thus automatically releasing the life preserver. As inflation continues, part of the life preserver will be thrown up above the wearer's head, and if the nipple is attached to the inner surface of the life preserver, as shown in Figs. 2 and 4, and its volume is so proportioned to that of the trapped air in the suit that it becomes blown up fairly tightly, then it will flip over the wearer's head into approximately the position illustrated in Fig. 2. This action comes about because of the fact that in this position the rubber is least distorted. That is, if the life preserver shown in Fig. 2 is bent backwardly over the head, it obviously will return, when released, to the position there illustrated due to the inherent resiliency of the parts.

When the life preserver is completely inflated the wearer can pull it down around his waist, as shown in Fig. 3, if he wishes, and he can reach around at his back and pull it free from the suit whenever he desires.

This life preserver does, however, add very materially to the buoyancy available to the wearer; it becomes inflated automatically without any action on his part; and it preferably is attached to the suit in the neighborhood of the back of the neck where it is normally out of the way. Because of the fact that its buoyancy is exerted upon a much higher part of the body than is that of the ordinary life preserver, it tends to keep the wearer upright in the water and therefore reduces the amount of weight required in the shoes.

The life preserver may be deflated, when desired, by disconnecting it from the suit and pressing the valve disk *a* inwardly. I prefer, however, to equip it with a kink valve of the type disclosed in a pending application of mine which can be conveniently used for deflating or for producing a higher degree of pressure in the life preserver. This valve is shown somewhat diagrammatically in Fig. 10. It comprises a rubber tube 12 vulcanized in the bent position there illustrated with one end free and open and the opposite end secured to the life preserver. In its normal position, as illustrated, the collapsed section at the bend prevents any flow of air through the tube, but if it is pulled out into a more or less straightened position, the collapsed section then opens and permits the relatively free flow of air through it in either direction. Normally it is locked in its closed condition by a strap, vulcanized to the life preserver and under which the free end of the valve is tucked. But when the wearer goes into the water and his life preserver is inflated, he can produce a greater degree of inflation or pressure in it by straightening out the tube 12 and blowing through it. This ability to top off the inflation often is very important. When he releases it, the tube automatically closes.

In some cases it will be found preferable to make the life preserver as an integral part of the suit itself, and such a construction is illustrated in Figs. 8 and 9 where the suit is indicated at 2' and the life preserver 3' is made by vulcanizing an annular section of rubber, or other waterproof sheet material, around a part, or all, of the body section of the garment. A tube 13 permanently connects the life preserver with the neck portion of the garment so as to conduct air from the latter into the former and a check valve 6' is located at one end or the other of this tube—usually at the lower end. This construction has the advantage of being relatively compact and less bulky when it is deflated than that above described. Also, it cannot be detached from the suit, which sometimes is an advantage but not desirable at other times.

Some of the benefits of this invention may be obtained in suits which do not have all of the characteristics of overboard suits, but which, nevertheless, are capable of trapping and holding for a substantial period of time a sufficient body of air to inflate the life preserver automatically if the wearer is thrown into the water. While such garments may not answer the technical definition of "suits," they are herein included in that term. Consequently, while I have herein shown and described a preferred embodiment of my invention, it will be evident that the invention may be embodied in other forms without departing from the spirit or scope thereof.

Having thus described my invention, what I desire to claim as new is:

1. The combination of a suit adapted to trap a body of air and to hold it for a substantial period of time, an inflatable life preserver, and means connecting said life preserver with said suit for conducting air displaced from the suit into said life preserver to inflate the latter, said connecting means including a check valve permitting a substantially free flow of air from the suit into the life preserver but preventing a reverse flow.

2. The combination of a substantially watertight suit, an inflatable life preserver, and means connecting said life preserver with said suit to conduct air displaced from the suit into said life preserver, said connecting means being so associated with said life preserver and said suit that the inflation of the life preserver will result in throwing part of it upwardly above the wearer's head.

3. The combination of a suit adapted to trap a body of air and to hold it for a substantial period of time, an inflatable life preserver, means connecting said life preserver with said suit for conducting air displaced from the suit into said life preserver to inflate the latter, means for releasably fastening the life preserver in a folded condition to said suit, the connections between said suit and said life preserver including a check valve permitting a relatively free flow of air from the suit into the life preserver but preventing such flow in the opposite direction, and means associated with said valve for preventing the folding of the life preserver from obstructing the flow of air through the valve.

4. A combination according to preceding claim 1, in which said life preserver is equipped with an extensible elastic valve through which the wearer may further inflate the life preserver by blowing, said valve being automatically collapsible when released, due to its inherent resiliency, and when collapsed being self-closing.

5. The combination of a suit adapted to trap a body of air and to hold it for a substantial period of time, and an inflatable life preserver removably connected with said suit so that it will be inflated automatically by the displacement of air from the suit.

6. The combination of a substantially watertight suit, an inflatable life preserver, and means connecting said life preserver with said suit to conduit air displaced from the suit into said life preserver, said means releasably fastening said life preserver to the back of said suit.

7. The combination of a substantially watertight suit, an inflatable life preserver, and means connecting said life preserver with said suit to conduct air displaced from the suit into said life preserver, said conducting means being releasable, and additional means for releasably fastening said life preserver to said suit.

8. The combination of a substantially watertight suit, an inflatable life preserver, and means connecting said life preserver with said suit to conduct air displaced from the suit into said life preserver, said means being constructed to prevent a reverse flow of said air out of said life preserver.

9. The combination of a substantially watertight suit, an inflatable life preserver, a tube connecting said life preserver with said suit to conduct air displaced from the suit into said life preserver, and means cooperating with said tube to seal the air in said life preserver against escape therefrom.

10. The combination of a suit adapted to trap a body of air and to hold it for a substantial period of time, an inflatable life preserver fastened to said suit and extending around the body portion thereof, and means connecting said life preserver with said suit to conduct air displaced from the suit into the life preserver, said means including a valve preventing a reverse flow of air out of said life preserver.

11. The combination of a substantially watertight suit, an inflatable life preserver releasably connected with said suit, and means connecting said life preserver with said suit to conduct air displaced from the suit into said life preserver; said air conducting means including a check valve permanently connected to the suit and another check valve permanently connected to the life preserver, and said means including parts disconnectable at a point between said valves, whereby said valves remain with the respective articles to which they are secured after the removal of the life preserver.

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