G. D. HORST.

MEANS FOR AUTOMATICALLY INFLATING LIFE PRESERVERS.

APPLICATION FILED MAY 20, 1913.

1,118,420. Patented Nov. 24, 1914.

Fig. 1.

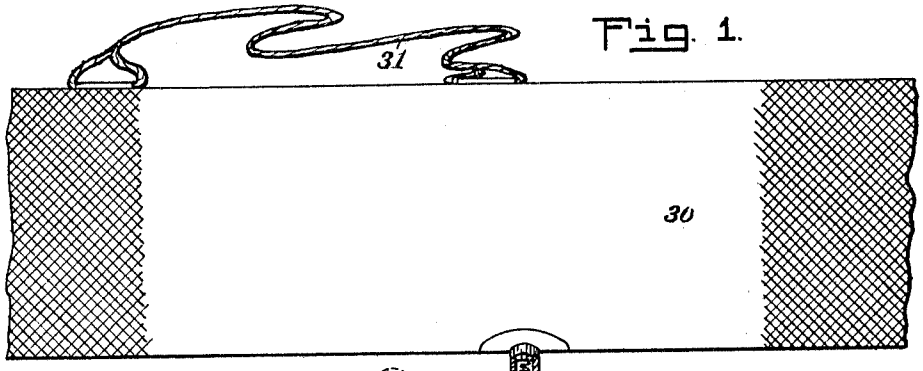
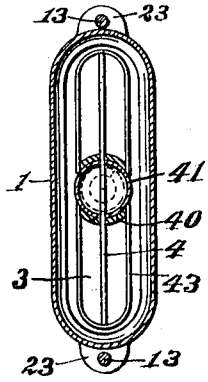


Fig. 4



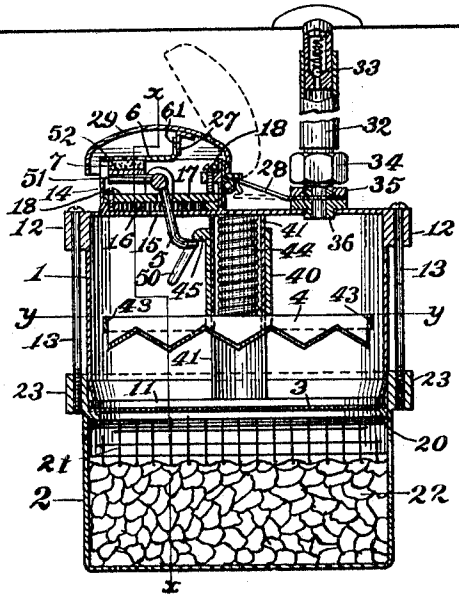


Fig. 3.

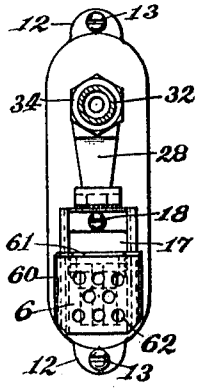


Fig. 2.

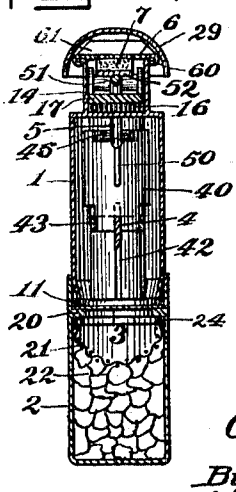
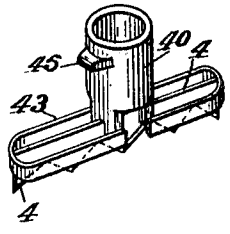


Fig. 5.



Witnesses.

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MEANS FOR AUTOMATICALLY INFLATING LIFE-PRESERVERS.

1,118,420. Specification of Letters Patent. Patented Nov. 24, 1914.

Application filed May 20, 1913. Serial No. 768,865.

To all whom it may concern:

Be it known that I, GEORGE D. HORST, a citizen of the United States, and resident of the city of Seattle, county of King, and State of Washington, have invented certain new and useful Improvements in Means for Automatically Inflating Life-Preservers, of which the following is a specification.

My invention relates to life preservers and means whereby they may be automatically inflated when immersed in water, and consists of an improvement in means for automatically inflating life preservers.

The object of my invention is to provide a device of small size and little weight, which may be attached to an inflatable life preserver or buoy, which, when in use, will normally be uninflated, but which attachment will act immediately to inflate the preserver or buoy, as soon as it becomes immersed in water.

My invention comprises certain novel features of construction which will be hereinafter described and particularly pointed out in the claims which terminate this specification.

In the accompanying drawings I have shown my invention embodied in the form which is now preferred by me. It is, however well known to me that the construction of many of the parts may be varied in detatil without essentially changing the character of my invention.

Figure 1 shows a small portion of an inflatable buoy or life preserver and a section through the device with which the same is inflated when it is immersed. Fig. 2 is a section through the device upon the line x, x, of Fig. 1. Fig. 3 is an exterior or plan view of the upper end of the charging device, except that the cover for the tripping mechanism has been raised and removed. Fig. 4 is a section on the line y, y, of Fig. 1. Fig. 5 is a perspective of the diaphragm-rupturing member.

My device consists of two separate but connected parts, one consisting of an inflatable life preserver or floating member, which is adapted to be worn in its uninflated condition and the other of a small retort or gas generator, which is to be carried in a pocket, or in any other convenient manner, which retort is charged with gas producing materials which are normally separated, but are combined by a mechanism which is set in action by the action of water when the device is immersed.

I have shown a small section of a float at 30, which float may be of any form and construction which is desired and found suitable. I have shown this as provided with straps or cords 31 by which it may be secured to the body. The manner of construction of the float is immaterial, except that it should be capable of being worn in deflated condition and be capable of swelling to a suitable size when charged with gas. This float is charged through a tube 32 which has a check valve 33 therein and connects with the retort or gas producer. The length of this tube may be made whatever is necessary, although I prefer to keep it as short as possible. By mounting the retort directly upon the float 30 the tube might be dispensed with. I do not, however, consider this a desirable construction. The retort is made in two parts, 1 and 2, the lower end of the upper part 1, entering and fitting snugly within the upper end of the lower part 2. The lower part 2 has a ledge 20, extending about it just below its upper edge, which supports a ring 11, of packing material, as rubber. The lower edge of the upper section 1, fits down upon this ring, thus making a tight closure when they are held firmly together. These parts are held together by means of two bolts 13, which pass through lugs 12 carried by the upper section and screw into lugs 23 carried by the lower section.

Between the gasket ring 11 and the ledge 20, is placed a diaphragm 3 of some easily ruptured material. The material which I prefer to use for this purpose is a thin sheet of metal, say of lead foil. This should be of a material which is impervious to water. Within the lower chamber formed by the lead foil, is placed a charge of mineral, 22, say of carbid, which is capable of quickly generating a considerable volume of gas. Within the upper chamber is placed a charge of a liquid suited to coact with the mineral in the lower chamber to produce the gas. This would be water, if carbid were used to charge the lower chamber. As this is the material which I

prefer to use, I will hereafter refer to this, without intending to exclude the use of other materials. To hold the carbid away from the lead diaphragm, I provide a screen 21, which is loose and is sprung into place beneath the ledge 20, after the carbid is put in place. Within the upper chamber is a diaphragm-rupturing mechanism. This consists of a knife 4 which is acted upon by a spring 44 to depress it against the diaphragm. Normally this is held in raised position with the spring compressed.

The upper section 1 of the retort, has a guiding sleeve or tube 41, secured to its upper end centrally thereof and opening downward. Within this is the spring 44, while outside it is a sleeve 40 to which the knife is secured. The guide sleeve 41, has a slot 42 extending upward from the lower end, in which the knife slides. The knife-carrying sleeve 40 has a lug 45 on one side, to furnish means for the engagement of a trigger or holding mechanism. This last consists of the arm 5 which is pivoted outside of the upper end of the retort, its lower end being shaped to engage under the lug 45 and hold the knife carrying sleeve 40 raised, an inclined extension 50 facilitating setting.

Upon the upper surface of the retort, I provide a mechanism by which the knife may be retained in elevated position, the same containing a member which is very quickly soluble in water, whereby it may be relied upon to restrain the device from action as long as this restraining member is kept dry, but will immediately release the knife as soon as it gets wet. I have provided a rim 14, within which is a hole 15 in the upper wall of the retort. This hole is normally closed by an elastic diaphragm 16, of rubber. Upon this is a plate 17, upon which is pivoted the trip lever or trigger 5. This lever passes through the rubber diaphragm, which permits all the movement necessary to release and set the knife carrying sleeve 40, without permitting escape of gas.

The plate 17 is held down by screws 18. This plate has a small hole for the passage of the trigger arm 5. The outer end 51 of the trigger lever, extends substantially parallel with the plate 17, when the device is in set position, and is broadened out to form a small plate 52. The upper side margins of the rim 14, are flanged over to form a sliding guide for a plate 6, which has its edges 60 bent under so as to embrace the flange on the rim 14, thereby permitting sliding back of the plate 6. This plate 6 is opposed to the plate carried by the outer end of the trigger lever, these being separated by a short distance when the device is set. Between these and serving as the restraining member for the trigger, is a tablet 7, which is composed of some material which is quickly soluble in water, or which softens up and quickly loses its resisting quality as soon as it gets wet. When this occurs the trigger is released from the ledge 45, carried by the sleeve which is secured to the knife. The result is that the knife is thrown downward and ruptures the lead foil, thus discharging the water contained in the upper chamber, into the carbid contained in the lower chamber. This causes a rapid development of gas, which is discharged, through the tube 32, into the preserver or float 30, which distends it and adds a very considerable floating capacity. The plate 6 is preferably perforated, thus providing channels through which the softened materials of the tablet 7 may be forced when it becomes wet, thus insuring a more thorough and prompt removal of the resistance which it before offered. At the inner end of the small chamber which contains this restraining tablet, is hinged a cover 29, this being acted upon by a spring 28 to normally hold it down over the tablet. This cover is so shaped as to protect the tablet from getting wet by rain, or by water which may be splashed about.

The slide 6 has a flange 61 turned up at one end and the cover 29 has a lug 27 projecting inward in position to lie just back of the flange 61 on the slide, to prevent the slide from being pushed back accidentally. Should it be desired to trip the retort mechanism and charge the float, the cover 29 may be raised and the slide 6 pushed back by hand. This will release the knife and cause the development of gas.

To insure a thorough rupture of the diaphragm and a complete and sudden discharge of the water into the carbid, I secure to the knife 4, a band 43, in position to engage the diaphragm immediately after it has been cut by the knife. This band will spread the sides of the cut so as to thoroughly rupture and expand the opening in the diaphragm.

The tube 32 is detachable from the retort by unscrewing the nut 34. The nipple 36, in connection with the nut 34 and the nipple which receives the tube 32, forms a union coupling. The retort may be charged with water through this opening.

I have shown a reinforcement, in the shape of a fillet, 24, extending about and beneath the ledge 20, which helps resist the strain caused by clamping the two parts together. The spring 28 is held in place by a nut 35 screwed upon the base of the tube holding nipple.

What I claim as my invention and desire to patent is;

1. In a device of the character described, a diaphragm-rupturing mechanism comprising a reciprocating plunger, a spring acting

to reciprocate the plunger, a knife secured by its middle to an end of the plunger and extending transversely thereof, and a hole-enlarging yoke carried by the plunger alongside of the knife at a short distance therefrom.

2. A buoy inflating mechanism comprising a retort containing gas supplying means, a movable restraining member therefor extending through a wall of the retort and carrying a plate, an opposed plate mounted to slide in guides and being perforated, and a thrust member insertible between said plates and composed of a quickly soluble material.

3. A buoy inflating mechanism comprising a retort, a metal-foil diaphragm separating said retort into two chambers, a diaphragm-rupturing knife having a serrated cutting edge mounted to reciprocate within one of said chambers in a direction transverse its length, a spring acting upon said knife to force it against the diaphragm, a controlling member restraining the movement of said knife and extending through the wall of the retort, and a water-soluble stop member restraining the outer end thereof.

4. A buoy inflating mechanism comprising a retort, a diaphragm dividing said retort into two chambers, a knife and actuating spring therefor adapted when released to rupture said diaphragm, and a frame secured to said knife and adapted to enlarge the opening made in the diaphragm by said knife.

5. A buoy inflating mechanism comprising a retort, a diaphragm dividing the retort into two chambers, a diaphragm-rupturing member, a guide support for said rupturing member permitting movement toward and from the diaphragm, a spring acting upon said rupturing member to force it against the diaphragm, a catch lever extending through the wall of the retort and restraining said spring and rupturing member, a plate secured to the exterior end of said catch lever, a perforated plate in position opposed to the plate carried by the outer part of said catch lever and movable away therefrom, and a water-soluble tablet inserted between said plates to restrain the catch lever.

6. In a buoy inflating mechanism, in combination, a retort, a diaphragm dividing the retort into two chambers, each adapted to contain its respective charge of two gas producing materials, a diaphragm rupturing mechanism comprising a perforating member and an enlarging member secured together and brought successively into action, a spring acting upon said perforating and enlarging members, a tubular frame member secured to said perforating and enlarging members, a guide tube telescoping with said frame tube, and inclosing said spring, a catch lever engaging the knife carrying member to restrain it, and extending to the exterior of the retort, and a restraining member for said catch lever composed of a water-soluble material.

7. In a buoy-inflating member, in combination, a retort, a diaphragm dividing said retort into two chambers, each adapted to contain its respective charge of one of two gas producing materials, means for rupturing said diaphragm, a rupture-controlling member extending through the walls of said retort, and carrying a tablet-receiving plate, a perforated plate mounted to slide into and out of position to oppose said tablet-receiving plate, a water-soluble tablet interposed between said plates, a removable cover for said plates and the tablet between them, said cover and the sliding plate having stops engaging when the cover is down.

8. A buoy inflating mechanism comprising a retort composed of two cells open at one end, the open end of one cell entering the open end of the other cell, the outermost of said cells having an interior ledge surrounding the same inward a short distance from its open end, a metal foil diaphragm bearing against said ledge, a packing ring or gasket resting upon the outer margins of the diaphragm and engaged by the edge of the inner cell when inserted within the other cell, a diaphragm rupturing means within one cell, a restraining means therefor extending through the wall of said cell, a water-soluble stop for said restraining means located exterior the cell, and means for holding said cells together.

9. A buoy inflating mechanism comprising a retort composed of two telescoping cells, open at their telescoping ends, the larger cell having a marginal ledge within it and a short distance from the end, a metal foil diaphragm resting upon said ledge, a packing ring or gasket bearing upon the margin of the diaphragm and engageable by the edge of the inner cell, means for holding said cells in place, a diaphragm rupturing mechanism within one cell, and a restraining mechanism therefor having a member extending without the retort, and a water-soluble member engaging said exterior part of the restraining mechanism to prevent its release until immersed in water.

10. A buoy inflating mechanism comprising a retort composed of two cells open at one end and said ends telescoping, one of said cells having a ledge extending thereabout near its open end in position opposing the edge of the other cell, a packing gasket between said ledge and the opposed cell edge, a diaphragm dividing said retort into two chambers, each designed for holding its respective charge of one of two gas generating materials, diaphragm rupturing means within one chamber, a spring acting upon said diaphragm rupturing means to

make it effective, a restraining member adapted to hold said rupturing means out of action and extending through the retort wall, a water-soluble member exterior the retort engaging and holding said restraining member against movement, and means for protecting said water-soluble member against accidental wetting unless immersed.

11. A buoy inflating mechanism comprising a retort composed of two cells, open at one end, said open ends telescoping, the outer of said telescoping ends having a ledge extending about its interior within its open end, a metal foil diaphragm supported by said ledge, a perforated screen adapted to be inserted within said cell and pushed beyond said ledge to hold the charge for said cell away from the diaphragm, a packing gasket also supported by said ledge, the edge of the inner cell bearing upon said gasket, means for holding said cells securely together, diaphragm rupturing means within the other cell and means for automatically releasing said diaphragm rupturing means when the retort is immersed.

12. A life preserver inflating mechanism comprising a retort containing therein gas generating substances, a frangible diaphragm normally separating said substances, a means for rupturing said diaphragm, a restraining member for said rupturing means having one part extending exterior to the retort, a member coöperating with the exterior part of said restraining member and constituting a thrust abutment therefor and adapted to be manually shifted, and a water-soluble member interposed between said exterior part of the restraining member and its thrust abutment.

In testimony whereof I have hereunto affixed my signature this 10th day of May, 1913.

GEORGE D. HORST.

Witnesses:
G. A. SPENCER,
HENRY L. REYNOLDS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."