(No Model.) 3 Sheets—Sheet 1.

P. HICHBORN.

LIFE BUOY.

No. 388,971. Patented Sept. 4, 1888.

Fig. 2.

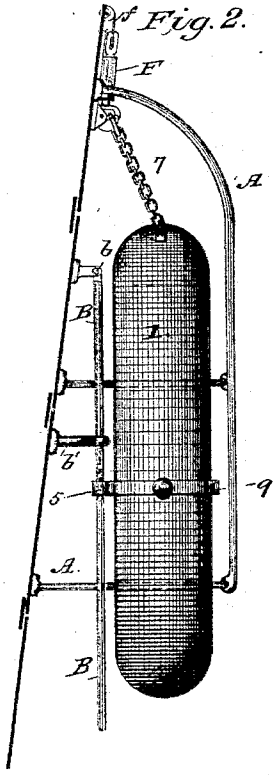


Fig. 1.

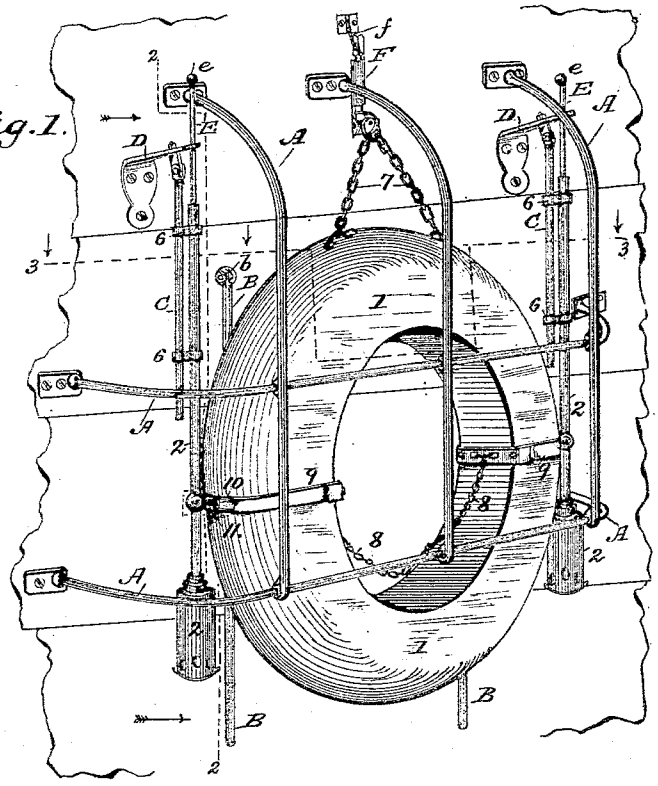
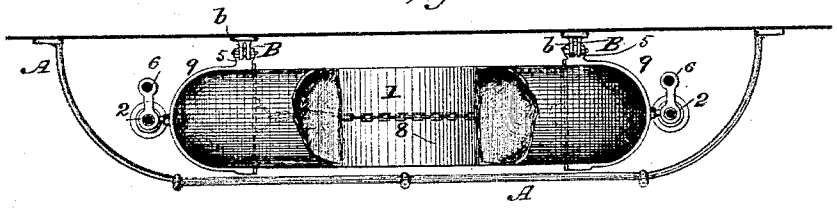


Fig. 3.



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(No Model.)

3 Sheets—Sheet 2.

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Fig. 4.

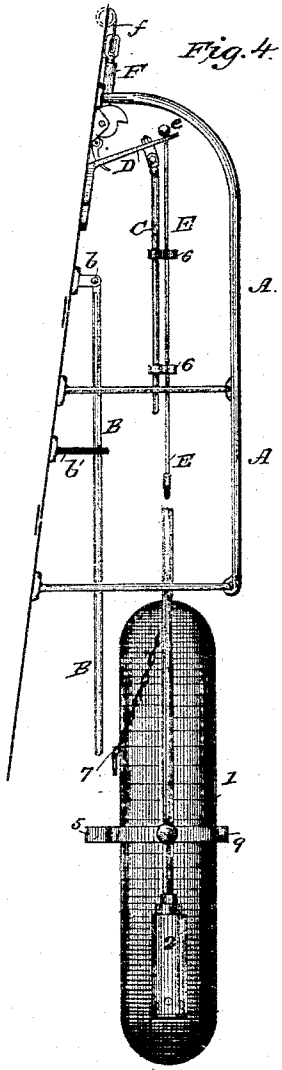


Fig. 5.

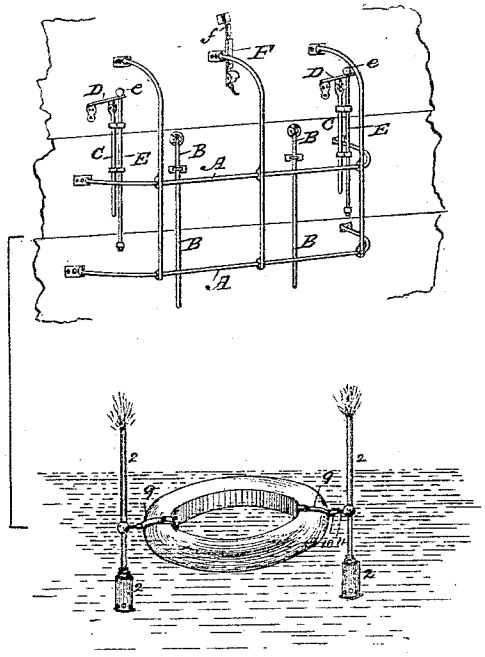
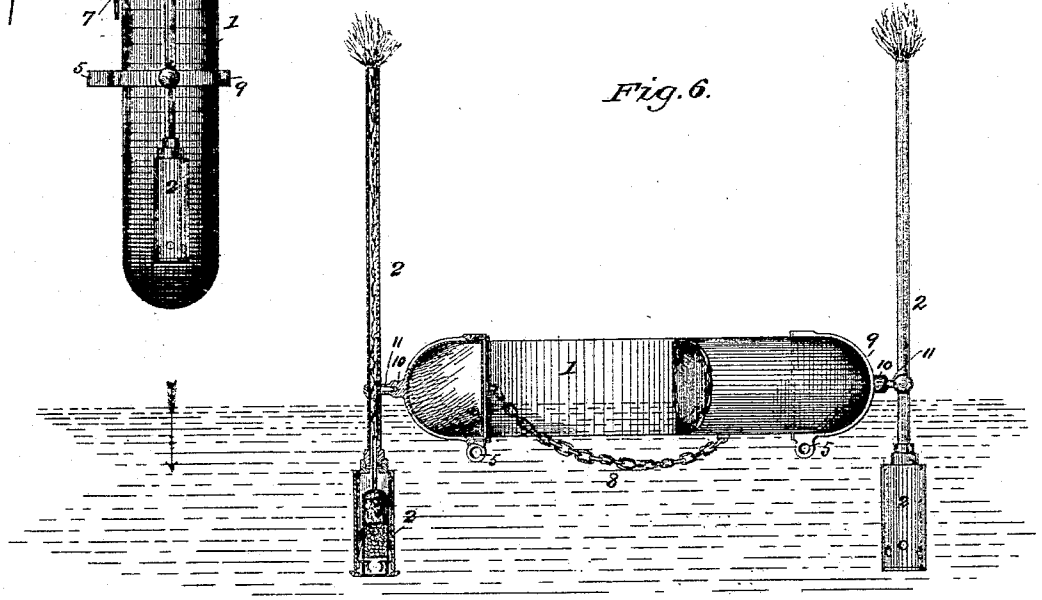


Fig. 6.



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LIFE BUOY.

No. 388,971. Patented Sept. 4, 1888.

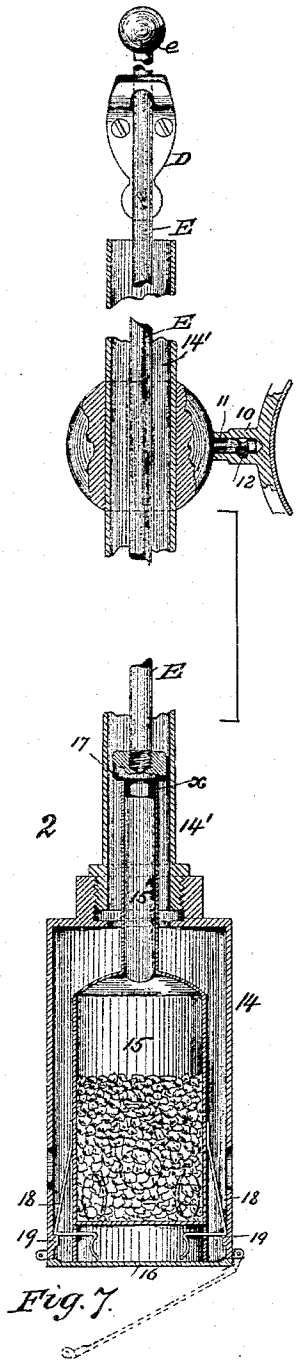


Fig. 7.

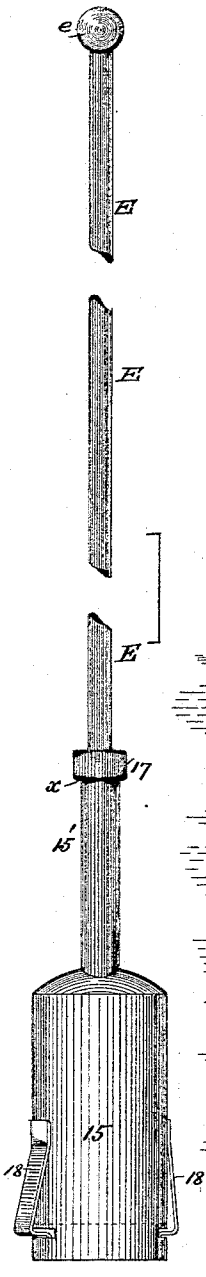


Fig. 8.

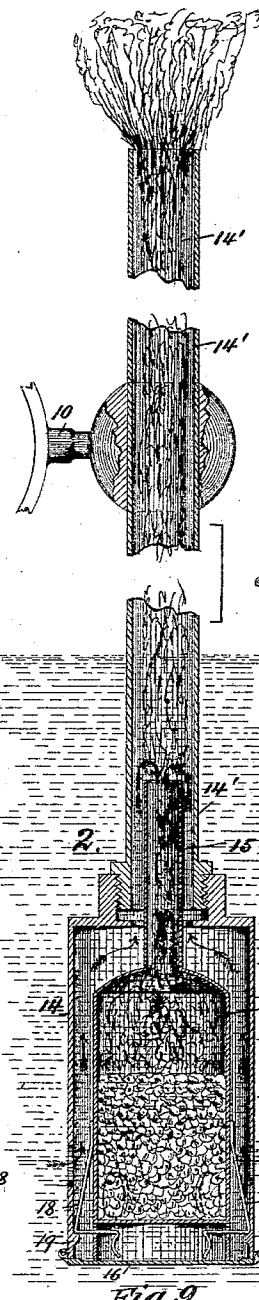


Fig. 9.

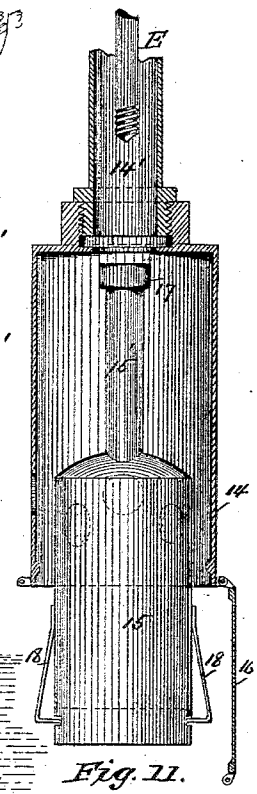


Fig. 11.

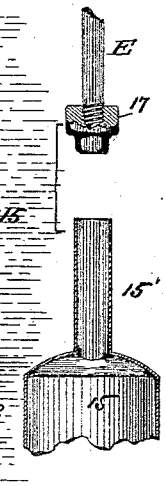


Fig. 10.

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UNITED STATES PATENT OFFICE.

PHILIP HICHBORN, OF THE UNITED STATES NAVY.

LIFE-BUOY.

SPECIFICATION forming part of Letters Patent No. 388,971, dated September 4, 1888.

Application filed June 4, 1888. Serial No. 276,166. (No model.)

To all whom it may concern:

Be it known that I, PHILIP HICHBORN, naval constructor, United States Navy, a citizen of the United States, temporarily residing in Washington, District of Columbia, have invented an Improved Life-Buoy, of which the following is a full description.

My invention is an improvement in that class of life-buoys which are held suspended at the side or stern of a vessel in such a manner that they may be instantly released and allowed to fall into the water when required for use.

The buoy proper is provided with pivoted signal staffs or torches, which are self-righting when in the water, standing then at right angles to the buoy, but in stowing the latter they are turned into a position parallel to it, so as to occupy as little space as practicable. When stowed at the vessel's side, the torches are sealed water-tight, but the seal is broken automatically in the act of launching the buoy. The breaking of the seal may subserve either of two purposes, according to the substance employed in the torches to produce a light. Thus I may charge the torches with "port-fire" such as is now used in buoys on United States vessels, and in such case the breaking of the seal would be made to set free a spring-hammer or some other device by which a fulminate would be exploded and the said port-fire ignited; but I do not prefer this method, but propose to so construct the torches that water is freely admitted when the seal is broken, and to charge the torches with a substance—preferably calcium phosphide—which possesses the chemical property of decomposing with water, the oxygen of the latter going to the calcium and the phosphorus and hydrogen uniting and escaping in bubbles, which ignite as they ascend through the water and reach the air. The combustion is, however, so slow as to involve no danger to the vessel, nor to persons in the vicinity of the buoy, as is the case with buoys in which naphtha or other highly-inflammable liquid hydrocarbon is used.

My invention is embodied in the construction and combination of parts, substantially as hereinafter described and claimed, and shown in the accompanying drawings, three sheets.

In Sheet No. 1 I exhibit the buoy in its normal position—*i. e.*, when stowed at the vessel's side or stern in readiness for use. Sheet No. 2 exhibits the buoy in the act of being launched and also as launched. Sheet No. 3 is restricted to an exhibition of the construction of the torch in detail.

Sheet 1: Figure 1 is a perspective view of the buoy stowed at the vessel's side or stern. Fig. 2 is a vertical section on line 2 2, Fig. 1. Fig. 3 is a horizontal irregular section on line 3 3, Fig. 1.

Sheet 2: Fig 4 is a side view of the buoy in the act of being launched. Fig. 5 is a perspective view of the same launched and the buoy proper afloat on the water. Fig. 6 is an enlarged view of the buoy proper afloat, part of same being in section.

Sheet 3: Fig. 7 is a vertical central section of one of the torches complete. Fig. 8 is a side view of the calcium-phosphide receptacle detached from the outer or inclosing case of the torch. Fig. 9 is a vertical section of a torch, showing the operation of the same in the water. Fig. 10 is a detail vertical section showing the plug or seal of the phosphide can or receptacle detached from it. Fig. 11 is a detail vertical section showing the phosphide can or receptacle partly inserted in the outer case of the torch.

I employ numerals to indicate the detachable parts constituting the buoy proper and letters to indicate those parts which remain attached to the vessel when the buoy proper has been launched.

Referring to Figs. 1, 2, 3, 4, and 5, it will be seen that a strong skeleton iron guard, A, is bolted to the side or stern of a vessel and incloses and protects the parts composing the buoy. (A guard of this kind is not, however, novel.) The buoy proper, 1, is stayed in normal position, and also guided when being launched, by means of vertical parallel rods B, which are fixed on the side of the vessel, as best shown in Figs. 2 and 4, by means of screw-bolts *b* and eyed studs *b'*.

The torches 2 are pivoted to the sides of the buoy proper, 1, and are stayed in normal vertical position alongside the latter, and also guided in launching, by means of rods C C, which are pivoted to and pendent from brackets D D, fixed on the side of the vessel. Besides supporting the rods C, the said brackets D have another more important function in that

they coact with small rods E, Figs. 1, 4, 7, and 10, to break the seals of the receptacle 15 for the calcium phosphide when the buoy is in the act of launching—that is to say, the said rods E have enlarged heads *e* and slide through the brackets D, and are also connected with the seals. When the buoy slides downward, these rods E go with it until suddenly arrested by contact of their heads *e* with the brackets D, which results in detaching the seals Figs. 4, 10.

In the case of both the buoy proper, 1, and the torches 2 they are detachably connected with their respective guide-rods B C by means of eyes or rings 5 6, Figs. 1 and 2. The buoy 1, with its attached torches 2, is suspended within the guard A by means of a chain, 7, from a detaching device, F. In practice the latter is tripped (in the usual way) by means of a pull-cord, *f*, and instantly releases the buoy, which then slides down and off the fixed rods B B, Fig. 4, while the torches 2 slide through their guides 6, attached to the swinging rods C. As the buoy 1 enters the water, it instantly assumes a horizontal position, while the torches 2 take a vertical position by the effect of gravity, as shown in Figs. 5 and 6, Sheet 2. The water finds instant admission to the torches and the desired illumination is quickly obtained.

Having now set forth the general construction and operation of the buoy, I will proceed to details, which are requisite to a fuller and more minute understanding of the same.

The buoy proper, 1, is a flat annular air-tight chamber, made preferably of light sheet-copper. When stowed, Figs. 1, 2, and 3, it is in vertical position, and thus has less lateral projection than buoys of cylindrical, spherical, or oval form; but when afloat on the water, Figs. 5 and 6, it maintains a horizontal position, thus covering a larger area and affording proportionally greater facilities for being seized by and for supporting the person requiring its aid. It is provided with a loose chain, 8, which connects its inner sides, and may be bestridden by the succored party, thus affording him a measurably secure and comfortable support until human aid can reach him. The said chain is attached to metal bands 9, Figs. 1 and 6, that encircle the buoy transversely at opposite points on its circumference.

The eyes or rings 5, that connect the buoy to rods B, form integral parts of or are else firmly secured to the bands 9 on the inside of the buoy, (when stowed.) These bands are further provided with laterally-projecting sockets 10, (see especially Figs. 6 and 7,) which serve as bearings for gudgeons or journals 11, that project inward from the torches 2, and are permanent rigid attachments of the latter. Accidental disconnection of the journals and bearings is prevented by cross-pins 12, Fig. 7, Sheet 3, lying in circumferential grooves in the journals, and they allow the torches to rotate freely, so that they always assume and maintain a vertical position by their own gravity when the buoy is in the water.

As best shown in Figs. 7 and 8, Sheet 3, the torches 2 are each made of two main parts, an outer cylindrical case, 14, constituting the body and having a reduced tubular extension, 14′, to which the journals 11 are attached, and an inner cylindrical can, 15, also having a tubular extension, 15′, but shorter than the corresponding part, 14′, of the outer case, 14. This can is the receptacle for the calcium phosphide or other chemical substance relied on to produce the light. The two parts of the case 14 are detachably connected by a screw-joint, Fig. 7, mainly for convenience of construction. The lower portion of the case 14 has perforations, as shown, Figs. 1 and 7, to allow free admission of water when submerged, Fig. 9. Its bottom is closed by a hinged cover, 16, which may be held normally closed by a safety or toggle pin or any other suitable fastening. Normally—that is to say, when the buoy is stowed at the vessel's side—the mouth of the can 15 is closed air and water tight by means of a seal or plug, 17, which is lightly soldered in place. The solder is indicated in an exaggerated manner at *x* in Fig. 7, Sheet 3. A rod, E, having head *e*, screws into this sealing-plug 17 and extends upward through the extension 14′ of case 14 and slides through the fixed bracket B, Figs. 1, 4, and 5. This screw-joint allows the rod E and plug 17 to be easily connected and disconnected, as required, Fig. 11. The extensions 14′ of torches 2 slide easily in the guide-eyes 5, Fig. 1, that are permanent attachments of rods C, pendent from the brackets D. These rods are pivoted to the latter to permit such slight movement as may be required to facilitate the rapid descent of the buoy when released from device F.

The calcium-phosphide receptacle 15, Figs. 7 and 9, Sheet 3, has considerably less diameter than the interior of the inclosing-case 14, and the annular space between them admits water to the can, as shown by arrows, Fig. 9, when the plug 17 is detached. For supporting the can 15 within the case 14 when first placed therein, and for preventing free lateral movement in the case when the buoy is stowed, I employ angular plate-springs 18, which are attached to the sides of the can and extend downward and outward, their angular shoulders resting on an annular rib, 19, formed integrally with or else rigidly secured to the inner side of the case 14. The free ends of said springs serve as thumb-pieces, by which the springs may be pressed inward to disengage them from the rib 19 when it is desired to remove the can 15 from the case 14.

I will now give a brief résumé of the manner of using the buoy, and also briefly indicate the manner of replenishing the supply of chemical illuminant.

When the buoy proper, 1, is released from the device F, Fig. 4, Sheet 2, the rings 5 slide on rods B, and the torches 2, being connected with it, also slide downward in rings 6, at-

tached to pendent rods C. The rods E, attached to the seals 17, descend with the torches proper until arrested by contact of their heads *e* with brackets D, as shown in Fig. 4, when the sudden shock breaks the solder joint at *x* (see Fig. 7, Sheet 3) between the plug 17 and can-tube 15′, so that the rods E are left suspended, Figs. 4, 5, from the brackets D, while the torches proper, 2, continue their descent along with the buoy proper, both maintaining a vertical position, as shown in Fig. 4, Sheet 2, until they strike the water, when the buoy 1 instantly floats horizontally, Figs. 5 and 6, the torches remaining vertical. As soon as the lower ends of the torches 2 enter the water, the latter rushes through the openings in case 14 and pours over the top of tube 14′ into the can 15. Mutual chemical decomposition of the water and phosphides at once ensues, and a bright glow is emitted from the top of tubes 14′, as shown in Figs. 5, 6, and 9. It will be seen that the tube 15′ extends into the tube 14′ of the outer case far enough to insure the required upward direction to the gas evolved. The duration of the illumination may be regulated by the amount of the phosphide with which the can is charged and the diameter of the tube 15′, forming part of the can. In practice, the can 15 is usually filled with the phosphide to about two-thirds of its capacity. It is of course resupplied after each occasion of use. To do this the hinged bottom 16 of case 14 is unfastened, the springs 18 compressed, and the can 15 removed, Fig. 11. The new charge of phosphide is poured in through the tube 15′. The plugs 17, having been unscrewed from the rods E, are then soldered in place, as before, and the cans 15 then replaced in the case 14, Fig. 11. Upon hoisting the buoy and torches 2 to the normal position, Figs. 1 and 2, the tubes 14′ are guided into rings 6, and the rods E into torch-tubes 15′ and screwed into the plugs 17. The rings 5 on the buoy-bands 9 also slide up on the fixed rods D, and the chain 7 being again connected with the detaching device F, the operation is completed, and the buoy is stored and ready for use as before.

In the preliminary statement indicating the main features of my invention I have referred to the fact that port-fire may be used in the torches in place of a chemical capable of decomposition with water. I do not propose to describe or illustrate herein any special means or devices for causing ignition of such port-fire, but will state that a device may be arranged in the tube 15′ so as to be operated by sealing-plug 17 when the latter is broken from the tube, and thus caused to explode a percussion-cap or other fulminate, which will ignite the port-fire. All the parts composing the buoy would therefore be employed in precisely the same manner when port fire is used as when the calcium phosphide is used, the only change made being the addition of some automatic firing device of the character above indicated.

It is obvious that the torches may serve equally well as signal-staffs by day for indicating the position of the buoy, since they always stand erect and are visible at a considerable distance. When it is desired to use the buoy without the light, (as, for instance, in practice at sea or in port,) it is only necessary to screw the rods E out of the sealing-plugs 17.

I desire it understood that I do not confine myself to the precise details of construction and arrangement of parts, as the same may be varied. For example, instead of two staffs or torches, I may use one only, which would be attached to the middle of a rotating axis extending across the central opening of the buoy proper and journaled in its sides, so that the staff would project up from the center of the buoy when the latter is launched, but would fold flat, or as nearly as practicable in the same plane with the buoy, when the same is stowed. To enable it to fold thus, the buoy proper might have depressions or transverse grooves on opposite sides to receive the body of the staff or torch, extending across the buoy. Thus, as in the case of two staffs, the symmetry and balance of the parts composing the buoy would be maintained and (what is more important) its adaptability to fold into the most compact form for stowing. In respect to this latter feature I will add that it is not indispensable that the staffs or torches should be pivoted about their center of gravity, although such arrangement is greatly to be preferred, since they may be rendered self-righting by adjunctive means or devices attached to the buoy proper. They may also fold toward and into the center of the buoy, instead of alongside the same.

It is obvious that chains may be used in place of the rods E for unsealing the cans 15, and the lower ends of the rods themselves may be made to seal the cans instead of the plugs 17; but of course, if such changes be adopted, certain disadvantages would attend them and the practical effectiveness of the buoy be seriously impaired.

I propose in practice to identify this buoy by the name "Franklin."

What I claim is—

1. A life-buoy consisting of a float or buoy proper, a torch attached thereto and provided with a chamber for containing a combustible substance, and a breakable or detachable seal which normally closes the mouth of such chamber water-tight and is permanently connected with the vessel, substantially as specified.

2. The combination, with the buoy proper and a torch having a chamber for containing a substance capable of such combustion as to produce light, of a detachable or breakable seal applied to the mouth of the torch and a rod permanently connected with the vessel and extending down to and permanently attached to said seal for use in detaching the latter when the buoy is launched, as shown and described.

3. The combination of the buoy and torches

connected with it, a combustible substance contained within the torches, seals or sealing-plugs for closing the mouths of the receptacles for such substance, but which are easily detachable therefrom, rods connected with such plugs, and a detent for detaining said rods when the buoy is launched, whereby the seals are broken, as specified.

4. The combination of the buoy and torches connected with it and having a chamber for containing a combustible substance for producing light, seals or sealing-plugs which normally close the mouths of the receptacles for such substance, but are detachably applied thereto, rods which connect with the said seals, and the fixed brackets D, attached to the side of the vessel for arresting the descent of said rods, and thus breaking the seals, when the buoy is being launched, substantially as specified.

5. The combination of the buoy and torches having a receptacle for containing a combustible substance, plugs for sealing the mouths of the receptacles for such substance, and rods which are connected with the plugs by a detachable joint, whereby said rods may be disconnected when required, as and for the purposes hereinbefore specified.

6. The combination of the buoy proper, torches attached thereto, and rods arranged vertically on the side of the vessel for staying and guiding the torches, substantially as shown and described.

7. The combination of the buoy proper, torches attached to it; guide-rods pivoted to fixed supports and hanging freely therefrom, and rings or eyes for detachably connecting the said torches and rods, substantially as specified.

8. The combination of the buoy proper and guide-rods B B, the torches pivoted to the sides of the buoy, and the vertical pivoted swinging guide-rods C C, and rings or eyes for connecting the buoy and torches to such respective rods, as shown and described.

9. The combination of the buoy proper, having guide-rings 5 attached to its sides, the stay-rods D, fixed parallel on the side of the vessel and passing through said guide-rings, the torches pivoted to the buoy, and rings 6, which are permanently connected with the vessel and serve as guides for the torches, substantially as shown and described.

10. The combination, with the buoy proper and the outer torch-case having an internal rib and the cover which may be opened, of the can 15, having springs attached, substantially as and for the purposes specified.

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