E. R. GREENE.

LIFE RAFT.

APPLICATION FILED SEPT. 10, 1913.

1,089,338.

Patented Mar. 3, 1914.

2 SHEETS—SHEET 1.

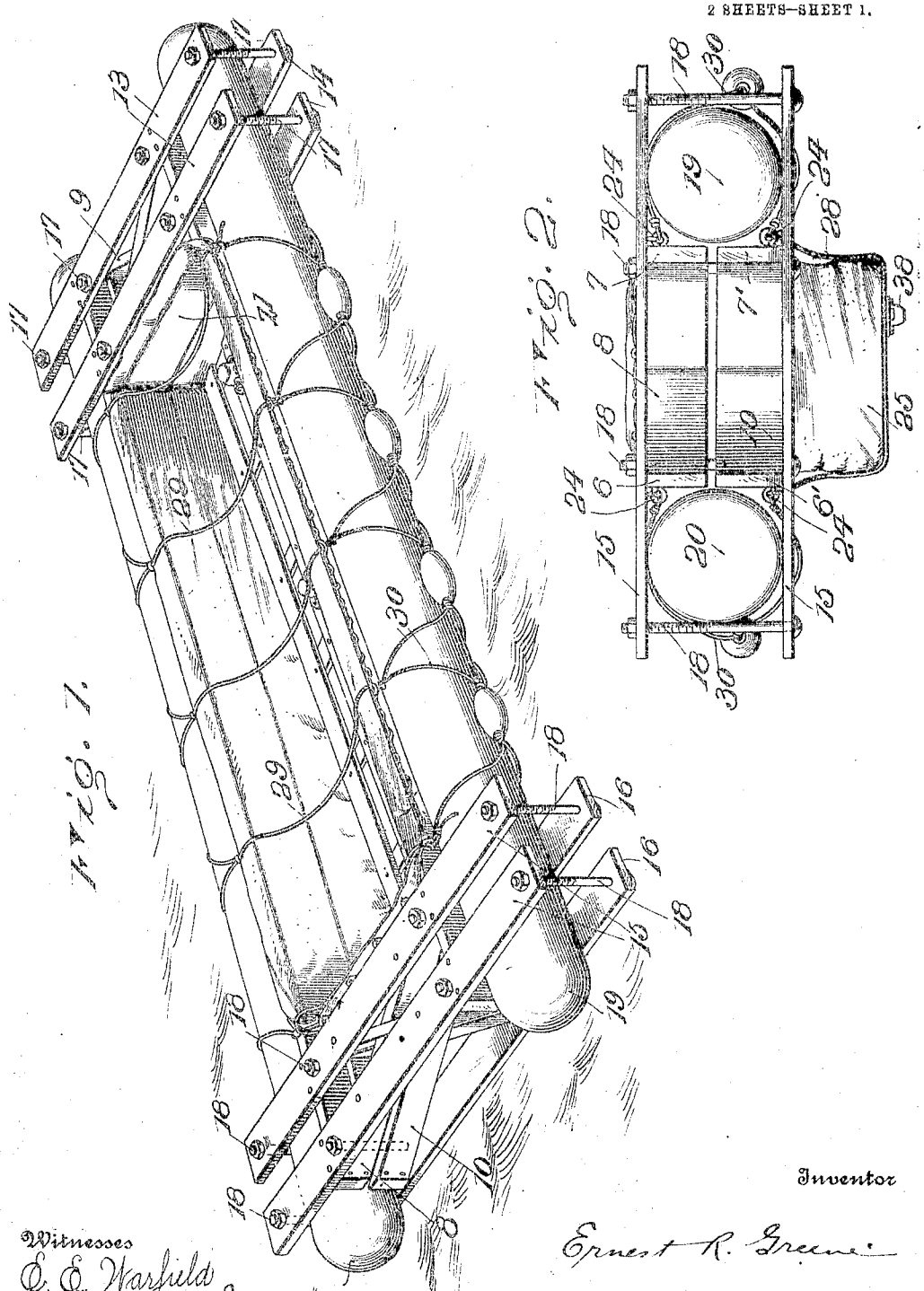


FIG. 1.

FIG. 2.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

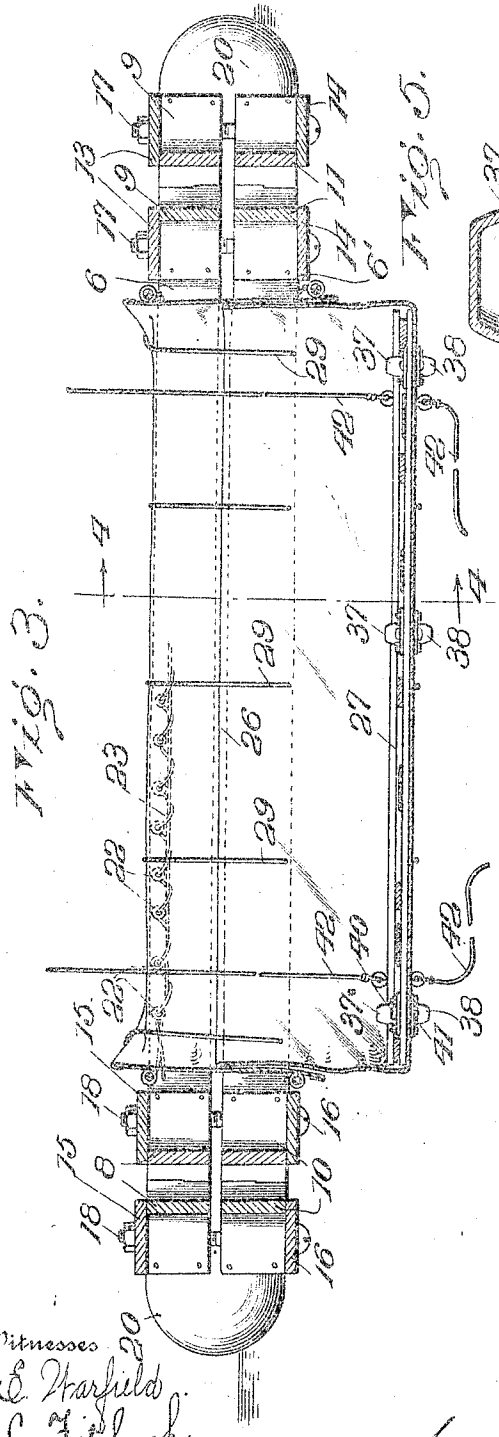


Fig. 5.

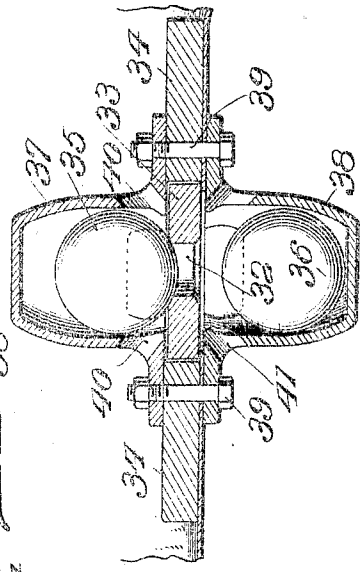
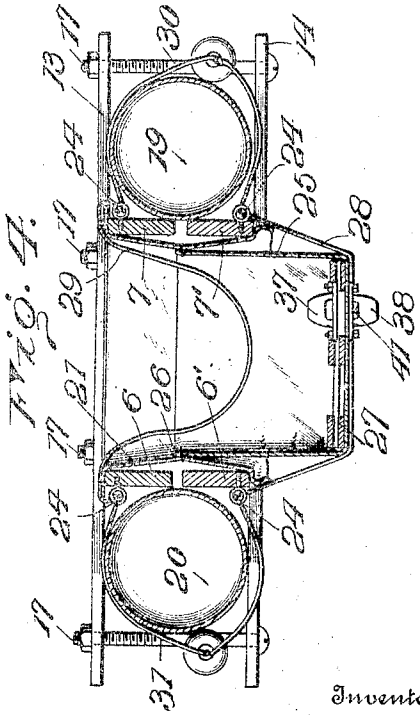


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

ERNEST R. GREENE, OF HANOVER, NEW HAMPSHIRE.

LIFE-RAFT.

1,089,338. Specification of Letters Patent. Patented Mar. 3, 1914.

Application filed September 10, 1913. Serial No. 789,099.

To all whom it may concern:

Be it known that I, ERNEST R. GREENE, a citizen of the United States, and resident of Hanover, Grafton county, New Hampshire, have invented a new and useful Improvement in Life-Rafts, which invention is fully set forth in the following specification.

The present invention is an improvement in life rafts, particularly of the reversible and collapsible type.

Heretofore, it has been proposed to use a life raft composed of an annular buoyant member from which was suspended a netting or hull in which the occupants stood. This structure, while effective to sustain a large number of people, was open to the objection that the occupants when standing therein were half immersed, such a condition in cold weather being attended by serious and even fatal results if such immersion were continued for any length of time.

The objects of the present invention are to provide a collapsible, reversible, non-capsizable life raft in which the occupants may stand and even sit without being immersed, and which device will, even though it fills when thrown into the water, automatically bail itself until it is substantially empty.

A further object of the invention is to so support the body portion or hull as to relieve the buoyant member or members of all strain, the supporting means operating effectively whether one side or the other of the raft is uppermost; and to so connect the body portion or hull to the framework of the raft as to insure its ready reversibility, at the same time insuring that no water shall enter the hull unless it washes over the side of the raft.

Briefly stated, the first-indicated object of the invention is attained by providing in the bottom of any suitable reversible body portion or hull of water-proof material an automatic bailing device which will operate equally well whether the raft is flat on the water in one position or in a reversed position, said device, in the embodiment hereinafter described, consisting of bodies of flotative material, such as rubber or cork, one being arranged on each side of the bottom of the hull in association with a perforation therethrough. These bodies (preferably balls) must be of such size, with relation to the size of the hole or perforation that they obturate, and with relation to the pressure of the water in the raft that the flotative body or ball in the raft will remain out of engagement with the outlet and permit the water in the raft to freely flow through said outlet until the raft is emptied or the level of the water in the raft is the same as that of the supporting body of water. In other words, the buoyancy of the body or ball within the raft must be sufficient to cause the valve to assume discharge position under the action of the head of water in the raft tending to close the valve.

The other objects of the invention are attained by providing a framework to which a buoyant member or members are secured, a hull or body portion being connected to said framework, with a plurality of ropes passing under and supporting said hull, and with a second series of ropes passing over said hull, which latter will engage and support the same if the raft is turned over. The hull or body portion is secured to a continuous strip of water-proof material (which is connected to the framework), said hull being secured to said strip on a line intermediate the top and bottom of said strip, and preferably midway thereof, thus insuring ready reversibility of said hull and preventing water from passing therein except over the sides of the raft.

The invention will be better understood by reference to the accompanying drawings, which illustrate one expression of the inventive idea, and wherein—

Figure 1 is a perspective view of a life raft embodying the invention; Fig. 2 is an end elevation of the same; Fig. 3 is a longitudinal vertical section; Fig. 4 is a cross-section on the line 4—4, Fig. 3; and Fig. 5 is a detail view of the automatic bailing device.

Referring to the drawings, there is shown a framework, two buoyant members connected thereto, and a hull or body portion supported therefrom. In the present embodiment, the framework consists of longitudinal members 6, 6′, and 7, 7′, the members 6 and 7 being securely fastened together by cross braces 8 and 9 at each end thereof and the members 6′ and 7′ are similarly connected by braces 10 and 11. Strips 13 and 14 extend transversely across one end of said longitudinal members and are secured thereto by any suitable means, and similar transverse strips 15 and 16 project across and are secured to the other ends of said longitudinal members. A plurality

of pairs of bolts 17 connect transverse strips 13 and 14 and similar sets of bolts 18 connect strips 15 and 16. The transverse strips at each end of the longitudinal members are nailed or otherwise secured to their associated braces 8, 9, 10 and 11. By this means a framework of great rigidity and strength is provided, whether said framework be of metal or wood.

Any suitable buoyant member is carried by the framework, but as here shown two tube-like members 19 and 20 are provided. These members extend longitudinally of the framework, preferably in engagement with the longitudinal pieces 6, 6′ and 7, 7′, one end of each of said buoyant members being held between transverse strips 13 and 14, and the other ends between transverse pieces 15 and 16, said buoyant members being held fixedly in position by the tightening of bolts 17 and 18.

A continuous strip 21 of water-proof material, such as canvas, covers the inner faces of longitudinal strips 6, 6′ and 7, 7′, said strip of canvas being secured in place in any suitable manner. As here shown, each edge of said continuous strip is provided with eyelets 22 (Fig. 3) through which passes a cord or rope 23 that also passes through eyelets 24 fastened to the longitudinal strips of the framework. The hull or body portion 25, which is of any suitable water-proof material, such as canvas, is open only at its top and at its upper edge is secured at 26, in any suitable manner, to said continuous strip. Preferably the point at which the hull or body portion is secured to said strip is midway between the top and bottom of said strip, so that said hull will project through the framework an equal distance, whether in one position or the other, thus possessing perfect reversibility. The connection between said hull and continuous strip is such as to prevent water from entering at this point.

A large wooden grating 27 is secured to the bottom of the hull or body portion in any suitable manner, said grating having a strong tendency to rise to the surface of the water.

The hull or body portion is supported from the framework by a plurality of ropes 28, which as here shown are connected at their ends to eyelets 24, said ropes engaging and supporting said hull when the parts are in the position shown in the drawings. If the raft should be turned over, the hull would be supported by like ropes 29 also secured at their ends to eyelets 24. It will thus be seen that whenever the hull or body portion is fully extended in one direction or the other, it will be effectively supported by ropes 28 or 29. There are also preferably secured to eyelets 24 a plurality of ropes or cords 30 and 31 that extend around the outside of buoyant members 19 and 20, and to which persons in the water may cling.

It is of prime importance that the occupants of life rafts should remain as dry as possible, for, in severe weather even partial immersion if continued for any length of time usually results seriously and often times fatally. It is almost impossible, under the stress of the excitement incident to a shipwreck to launch even a raft provided with a water-proof hull in such manner that it will ship no water. Indeed life rafts are usually simply thrown or tossed overboard, and with a device such as herein described, it is practically impossible to prevent the hull from filling either wholly or in part. Accordingly, means have been devised whereby the hull will be automatically bailed after the raft rights itself, the bailing continuing until the raft is empty or until the level of the water in the raft is the same as that of the supporting body of water.

As herein shown, the bailing device in question consists of a double valve mechanism associated with, and at the proper time obturating, a perforation 32 provided in a plate 33 carried in an opening in one of the slats 34 of the grating 27. The ends of this opening are preferably beveled, and a body of flotative material, such as cork or rubber, and as here shown a rubber ball 35, is associated with one end of said opening and a similar ball 36 with the other end of said opening. Ball 35 is contained in a cage 37 and ball 36 in a cage 38, said cages being secured together and to slat 34 by bolts 39 passing therethrough. Cage 37 is provided with openings 40 and cage 38 with openings 41, said openings being adjacent to plate 33, and said openings are so positioned that, when water passes through openings 40, it will engage ball 35 below the center thereof, so as to act to elevate ball 35 in its cage 37.

Not every double ball valve will operate to automatically bail the water from the raft, and it has been found necessary to adapt the diameter of the balls with respect to the water pressure and size of the outlet 32, so that the ball in cage 37 will float upward and permit the water in the raft to flow through openings 40, perforation 32 and openings 41. If the balls are too small with respect to the size of perforation 32, the pressure of the superimposed body of water may cause the ball in cage 37 to remain in the position shown in Fig. 5; and if the ball were too small and did not possess sufficient flotative properties, even if it were jarred loose from its seat in the end of perforation 32, the momentum of the water rushing through said perforation 32 would at once cause the ball to again assume the position shown in Fig. 5. For example, it has been found that an ordinary four inch hollow rubber ball, as-

sociated with an outlet 32 one and one-quarter inches in diameter, will rise in nine inches of water. If the size of the outlet 32 is decreased the ball will rise higher.

The operation of the device is as follows: The raft being thrown overboard, usually a quantity of water will be shipped. If we assume that the depth of water in the raft after it rights itself is forty-two inches and that the level of the water in the raft is ten inches above that of the supporting body of water, the valve construction just described will operate automatically to bail out the excess, and as the raft is relieved of the weight of the excess, the flotative effect of the grating 27 in the hull will cause an upward pressure, thus maintaining the level of the water within the raft above that of the supporting body of water and the automatic bailer continues to operate until the raft is substantially emptied. As soon as the raft is emptied, the ball 36 will engage and obturate outlet 32, by flotation. If now the grating 27 is forced downward to the position shown in Fig. 4, the ball 36 will be held in position with added strength by the pressure of the water. It is pointed out that, when the bailing action is taking place, both balls 35 and 36 occupy a position in their respective cages away from the outlet 32, so that the water in the raft may freely flow through the same. Preferably, a plurality of these automatic bailing devices are provided, and as shown in Fig. 3 one is secured in the center of the bottom of the hull and one at each end thereof. Even if the raft were loaded and a wave were to wash over and fill the same the bailing device would remove the excess until the levels were equalized, even though the occupants were standing on the grating; and, if then, they wished to remove the water remaining in the hull, this could be accomplished by removing their weight from the grating as by sitting on the framework and buoyant members, and allowing the grating to float upward. This emptying operation could be facilitated by manually elevating the grating 27 and the bottom of the hull by pulling on ropes 42 connected to the grating. The pressure of the water bearing against the sides of the collapsible hull would act to facilitate the manual raising of said bottom.

While, for the purpose of clearness, one expression of the inventive idea has been herein shown and described in considerable detail, it is to be understood that the inventive idea is not limited to the construction shown, but that it is susceptible of various mechanical embodiments conforming to the appended claims. For example, any suitable framework, and any suitable buoyant body or bodies might be employed. Also the construction of the bailing device might be varied and there might be employed any automatically-operating means which permits the escape of water from the raft in either of its positions. If desired, the flotative bodies 35 and 36 may be connected to levers carrying valve members that act to obturate perforation or outlet 32. It is to be borne in mind, however, that the size of the flotative bodies in such a structure must be large enough with respect to the outlet 32 and the depth of the column of water bearing on the valve, to float against the downward pressure of the water on said valve, and to resist the momentum of the water passing through outlet 32, which momentum tends to seat the valve.

What is claimed is:—

1. In a life raft, a framework, a buoyant member carried by said framework, a continuous flexibly mounted piece of waterproof material secured to said framework, and a waterproof body portion or hull secured to said piece on a line between its top and bottom.

2. In a life raft, a framework composed of two spaced longitudinal strips, transverse strips secured at the ends of said longitudinal strips, a continuous piece of waterproof material arranged over the inner faces of said longitudinal strips, and a hull or body portion of water-proof material secured to said piece on a line between its top and bottom.

3. In a life raft, a framework composed of two spaced longitudinal strips, transverse strips secured at the ends of said longitudinal strips, a continuous piece of waterproof material arranged over the inner faces of said longitudinal strips, and a hull or body portion of water-proof material secured to said piece on a line between the top and bottom of said longitudinal strips.

4. In a life raft, a framework composed of two spaced longitudinal strips, transverse strips secured at the ends of said longitudinal strips, a continuous piece of water-proof material arranged over the inner faces of said longitudinal strips, a hull or body portion of water-proof material secured to said piece on a line between the top and bottom of said longitudinal strips, and ropes carried by said framework and passing under said hull or body.

5. In a life raft, a framework composed of two spaced longitudinal strips, transverse strips secured at the ends of said longitudinal strips, a continuous piece of water-proof material arranged over the inner faces of said longitudinal strips, a hull or body portion of water-proof material secured to said piece on a line between the top and bottom of said longitudinal strips, and two sets of ropes, one passing under and the other over said hull or body portion.

6. In a life raft, a buoyant member, a hull or body portion associated with said buoyant

member, and two sets of loose ropes, one passing under and the other over said hull or body portion and each adapted to engage and support said hull.

7. In a life raft, a framework, a buoyant member carried thereby, a hull or body portion supported by said framework, and two sets of loose ropes, one passing under and the other over said hull or body portion and each adapted to engage and support said hull.

8. In a life raft, a framework, a buoyant member carried thereby, a continuous piece of water-proof material supported by said framework, a hull or body portion of water-proof material secured to said strip along a line intermediate its top and bottom, and a plurality of ropes passing under and supporting said hull.

9. In a life raft, a framework, a buoyant member carried thereby, a continuous piece of water-proof material supported by said framework, a hull or body portion of water-proof material secured to said strip along a line intermediate its top and bottom, a plurality of ropes passing under and supporting said hull, and a second set of ropes passing over said hull, each set of ropes being adapted to engage and support said hull.

10. In a life raft, the combination of a buoyant member, a reversible water-proof body portion provided in its bottom with a plurality of openings, and automatically-operating means permitting the escape of water through said openings in either of the positions of said body portion.

11. In a life raft, the combination of a buoyant member, a reversible body portion, and automatically-operating means permitting the escape of water therefrom in either of its positions.

12. In a life raft, the combination of a buoyant member, a reversible body portion, and automatically-operating means carried by the bottom of said body portion permitting the escape of water therefrom in either of its positions.

13. In a life raft, the combination of a buoyant member, a reversible body portion, and means including a double flotation valve permitting the escape of water therefrom in either of its positions.

14. In a life raft, the combination of a buoyant member, a reversible body portion, and automatically operating means including a double flotation valve permitting the escape of water therefrom in either of its positions.

15. In a life raft, the combination of a buoyant member, a reversible hull having an opening in its bottom, a cage secured on each side of said bottom, and a flotative body in each cage, said cages being provided with openings near said bottom whereby water flowing out of said raft tends to raise the flotative body in the raft.

16. In a life raft, the combination of a buoyant member, a reversible hull having an opening in its bottom, two identical cages one secured on each side of said bottom over said opening, and a flotative ball in each cage, said cages being provided with openings near said bottom, the opening in the cage in the raft being below the center of the ball in said cage.

17. In a life raft, the combination of a buoyant member, a reversible hull or body portion, a flotative body secured to the bottom of said hull or body portion, and automatically-operating means carried by said flotative body permitting the escape of water therefrom in either of its positions.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ERNEST R. GREENE.

Witnesses:
W. B. KERKAM,
E. E. WARFIELD.