Jan. 16, 1962

R. F. JOHNSON

3,016,860

SAIL BOAT SAFETY DEVICE

Filed Dec. 6, 1960

2 Sheets-Sheet 1

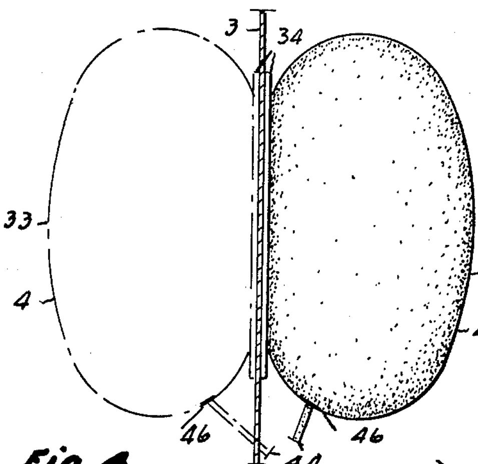

Fig. 4.

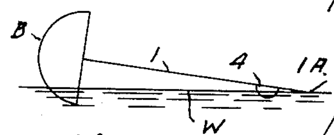

Fig. 10.

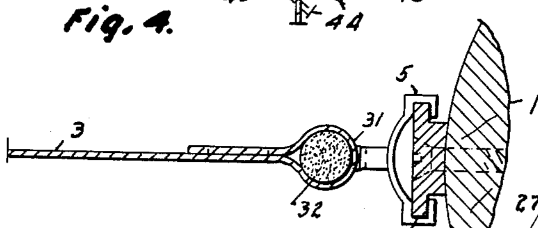

Fig. 3.

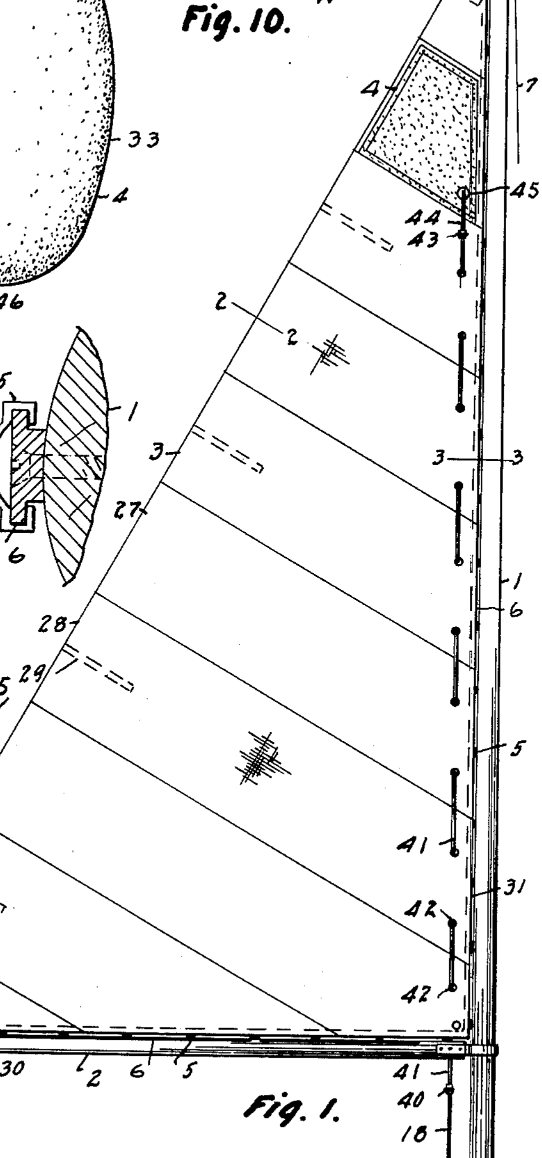

Fig. 1.

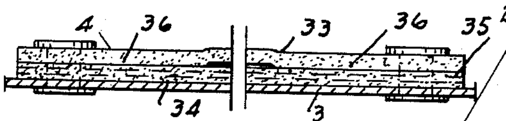

Fig. 5.

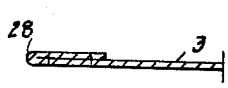

Fig. 2

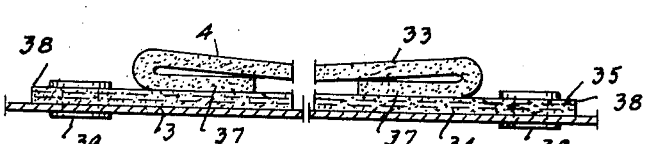

Fig. 6.

Robert F. Johnson
Inventor
Emmett [illegible]
Atty.

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SAIL BOAT SAFETY DEVICE

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2 Sheets-Sheet 2

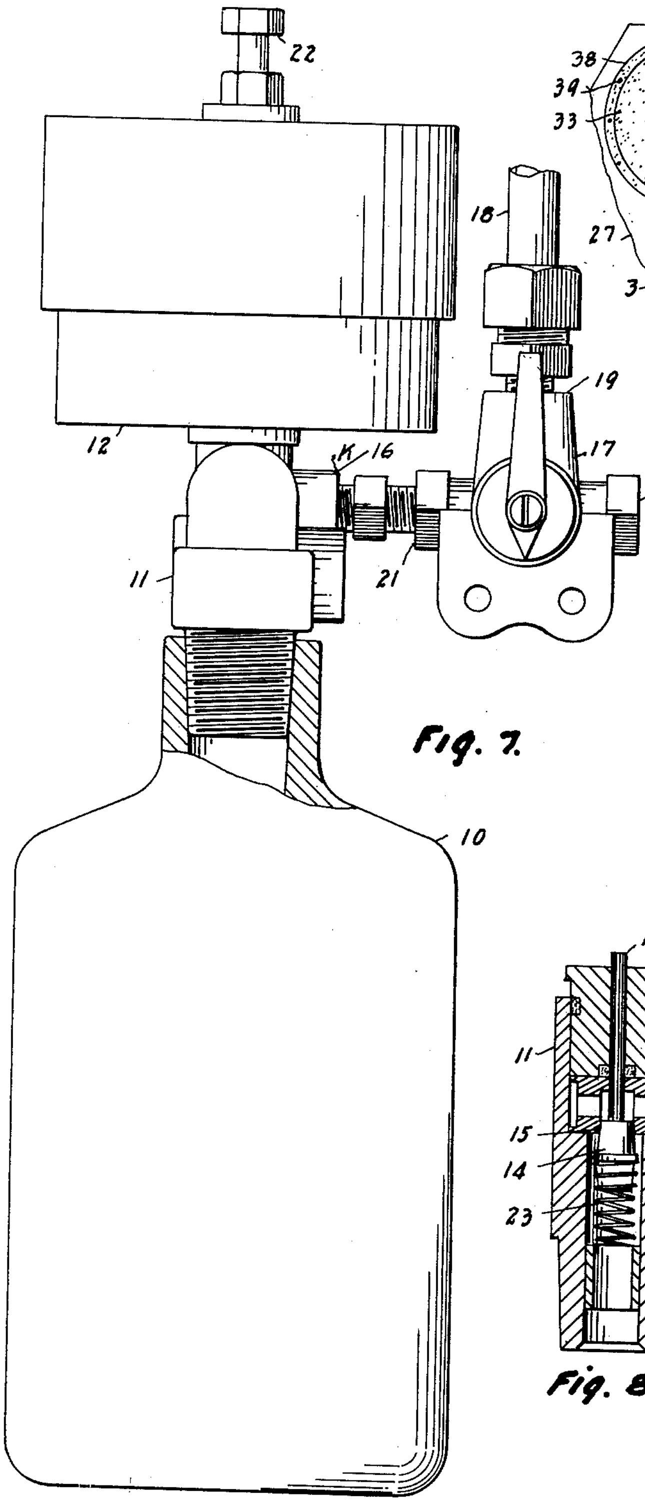


Fig. 7.

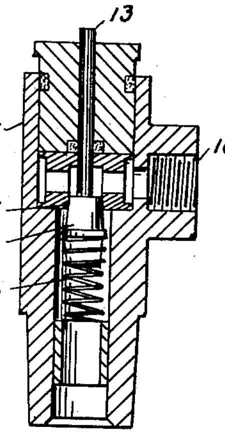


Fig. 8.

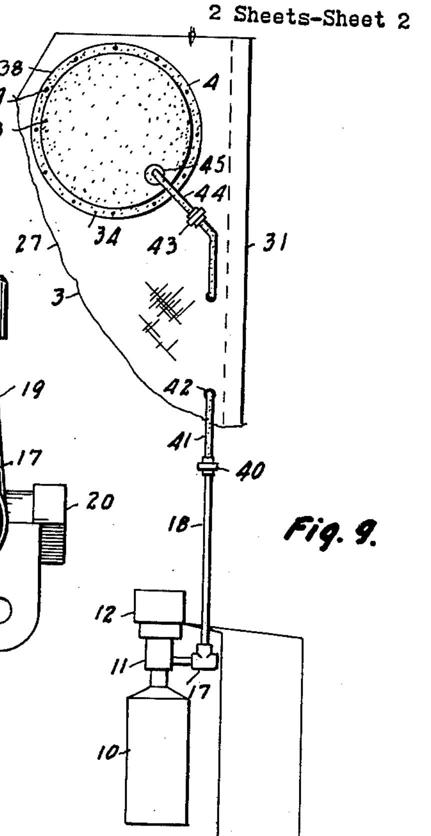
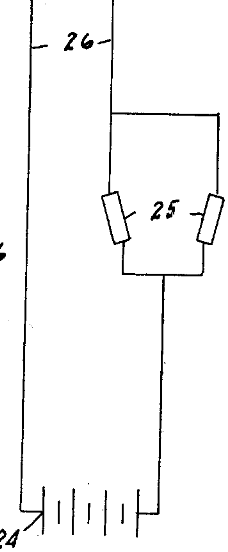


Fig. 9.



Robert F. Johnson

Inventor

Atty.

United States Patent Office

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3,016,860

SAIL BOAT SAFETY DEVICE

Robert F. Johnson, Las Vegas, Nev., assignor to Robert Mark Johnson, Las Vegas, Nev.

Filed Dec. 6, 1960, Ser. No. 74,049
5 Claims. (Cl. 114—39)

This application relates to my application for Letters Patent for a Sail Boat Safety Device, filed December 7, 1959, Ser. No. 857,756.

My invention relates to safety devices for sail boats. The principal objective is to resist the capsizing of the sail boat. Other objectives will appear as the specification is proceeded with.

Sail boats require wind for their operation. However, too much wind can cause them to capsize. This is especially true of the catamaran type.

In 1912 Pat. No. 1,026,336, was issued to one William H. Williams which shows the use of floatation tanks mounted on the mast head, the idea being that the tanks would provide buoyancy when the mast head hit the water and thus prevent the boat from turning upside down.

Today sail boats are sailed for pleasure and everything possible is usually done to take advantage of any wind. Speed appears to be of the essence and floatation tanks of any useful size mounted on the mast head would greatly retard the movement of the boat, although they might fulfill the objectives should the mast head hit the water.

In my device the objective of Williams' floatation tanks is met without creating any additional resistance to the movement of the boator catamaran or concentrating as much weight at the mast head. Weight is a great disadvantage concentrated at the mast head especially when the boat heels over beyond 30 degrees. One of the objectives of this invention is to lessen the concentration of weight at the mast head.

In the arrangement set forth in the above mentioned application, Ser. No. 857,756, now abandoned, and in my co-pending continuation in part application Ser. No. 18,007, filed March 28, 1960, a hollow core is mounted at the mast head to provide support for the inflatable bag used when the same is not inflated.

In my co-pending continuation in part application Ser. No. 74,048, filed December 6, 1960, the core was dispensed with and a shallow cylindrical shell attached to the rigging support into which the bag had to be tucked after every deflation. However, 90% of the weight at the mast head was dispensed with on the elimination of the core.

In this application not only has the balance of the weight been dispensed with but also the inconvenience of tucking in the bag.

How this is accomplished is illustrated in the accompanying drawings of which FIG. 1 is an elevation showing the general arrangement of the mast, boom, and sail of a small sail boat; FIG. 2 is a horizontal section on the line 2—2 of FIG. 1; FIG. 3 is a horizontal section on the line 3—3 of FIG. 1; FIG. 4 shows a circular bag attached to the sail and inflated; FIG. 5 shows a full size broken section through a bag; FIG. 6 shows a different full size broken section through a bag; FIG. 7 shows a pressure vessel with a solenoid-operated dispensing valve; FIG. 8 is a vertical section through the valve of FIG. 7; FIG. 9 is a diagrammatic arrangement for the means for inflating the bag; FIG. 10 shows a boat heeled over with the mast head in the water.

Throughout the drawings and the specification similar numerals refer to similar parts.

FIG. 1 shows the general relation of a sail boat mast

1, boom 2, and sail 3, to which is attached the inflatable bag 4.

The sail 3 remains "as is" whether a bag is used or not and its shape or dimensions are not effected by the bag. In other words, the sail 3 is guided up and down the mast 1 and along the boom 2 by the slides 5 which run on the track 6 on the mast (FIG. 3) and on the boom. The sail is raised and lowered in the usual manner by the halyard line 7 which runs over the sheave 8 on the mast head 1A and is attached to the headboard 9.

A bag 4 may be attached to one or both sides of the sail 3 and its shape is not limited to that shown in FIGS. 1 and 9. FIG. 4 shows by solid lines an inflated bag 4 attached to one side of a sail 3 and by broken lines how a similar bag 4 may be attached to the opposite side of said sail 3. Its size or cubic content of an expandable medium, as CO_2, depends upon the reaction or buoyancy desired at the mast head when the same is in the water as shown in FIG. 10. How the size of the bag and the pressure vessel may be arrived at will now be discussed.

The bag 4 may be made of "neoprene" since sunlight has a deleterious effect on natural rubber. However, natural rubber has a better elongation and when treated with "Hypalon" its life is greatly increased.

It is the practice of commercial companies to fill their containers or pressure vessels two-thirds full of liquid CO_2 thus leaving the rest of the container to be occupied with gas which creates a pressure of 838# p.s.i. at 70 degrees F.

This practice has been followed in determining the size of the pressure vessel 10 and in its charging. 8.7 cubic feet of gas will be provided by 1# of liquid CO_2 at 70 degrees F. and atmospheric pressure.

It follows that an inflated bag of one cubic foot will displace one cubic foot of water, and each cubic foot of water displaced will provide an upward reaction, so to speak, of 62.4#.

When inflated the pressure within the bag 4 will vary from 0.5 to 1.5# above atmospheric pressure depending upon the type and thickness of rubber used—usually ⅛".

At this point note is made that only sufficient CO_2 is provided in the pressure vessel 10 used to produce the gas required to inflate the size bag required, taking into consideration besides temperature and pressure, the bag size, material, and thickness. In proportioning the bag 4 it is advisable to keep the elongation to five at the most.

From the above information one skilled in the art should be able to determine the size of the pressure vessel and the size of the bag sufficient to provide the desired reaction or buoyancy at the mast head 1A when the boat B is heeled over with the mast head 1A adjacent the water W as shown in FIG. 10.

Since CO_2 and other expansive mediums are used for many purposes, standard containers or pressure vessels of various sizes have been developed for them. One of these, as 10, is shown in FIG. 7 to which a standard solenoid-operated "Kidde" CO_2 dispensing valve K is attached which comprises the valve proper 11 and the solenoid 12 for its operation. A section through the valve 11 is shown in FIG. 8. Incidentally the valve 11 may be operated mechanically in many ways. However, whether operated by a solenoid or mechanically the stem 13 is depressed thus lowering the plug 14 thereon from its seat 15 to permit CO_2 from the pressure vessel 10 to pass between the plug 14 and its seat 15 to the valve opening 16. The opening 16 is connected to a standard "Imperial" 3-way valve 17 in which the flow is from any one side of the line to the branch. In other words, CO_2 from the pressure vessel 10 may pass directly to the bag 4 through the copper tubing 18 connected to the branch 19 of the 3-way valve 17, or an inflated bag 4 may be deflated through the branch 19 and the valve line opening 20. The pressure vessel 10 may be charged through the branch 19 and the line opening 21. When charging the pressure vessel 10 the solenoid core (not shown) is held down by the set screw 22 so that the plug 14 is removed from its seat 15 to permit CO_2 to flow between the seat and plug into the pressure vessel 10. When the plug 14 is free from pressure applied downwardly the plug 14 is held tight against its seat 15 by the pressure applied by the spring 23 beneath it.

The solenoid comes into action when the boat B has heeled over more than 90 degrees. However, the boat owner might desire that the bag 4 of the safety device be inflated when the mast 1 is at an inclination of say 80 degrees. His desire may be fulfilled when the solenoid-operated valve is used. Since the solenoid is energized by an electric current as the battery 24, only at a predetermined time, "Honeywell" mercury switches 25 are employed in the circuit 26 as shown in FIG. 9. These switches 25 are set at an angle from the centerline of the pressure vessel 10, which incidentally co-incides with the center line of the mast 1, so that they close the circuit 26 when the mast head 1A is at an angle of 80 degrees either to starboard or to port. It is deemed un-necessary to show or describe these well known switches other than to say that a pool of mercury connects or dis-connects the terminals upon the tilting of the switch.

The sail 3 is shown triangular in shape built up of strips 27 of canvas arranged on the bias and sewed together. The leech side 28 of the sail 3 is hemmed as shown in FIG. 2 and stiffened with battens 29 pocketed in. The foot and luff side, 30 and 31 respectively, have a manila rope 32 hemmed in as shown in FIG. 3. It is to these sides 30 and 31 that the sail slides 5 are attached. The head-board 9 is positioned adjacent the apex of the sail 3 and is pocketed in. It is to the head-board 9 that the halyard 7 is attached.

The bag 4 is attached as close as possible to the head-board on either or both sides of the sail 3 (FIG. 4) depending upon the uplift or buoyancy required and the room available. While the shape of the bag is not fixed the circular shape shown in FIG. 9 is preferable because of cost for instance.

The bag 4 of this invention is formed to lie flat against the sail until inflated. Both FIGS. 5 and 6 show the bag 4 to have a top sheet or portion 33 and a bottom sheet or portion 34 bonded (vulcanized) to each other. Both figures show the bottom sheet re-inforced with two courses of fabric 35. FIG. 5 shows both sheets to be of the same size and bonded together at their periphery 36. In FIG. 6 the top sheet 33 is doubled under short of the periphery of the bottom sheet 34 and the turned under portion 37 bonded to the bottom sheet 34. This makes the strongest joint especially where the top sheet takes the elongation under pressure. That portion of the bottom sheet 34 which extends beyond the periphery of the top sheet 33 (FIG. 6) constitutes a flange 38. Around this flange portion 38 are spaced the means, indicated by the numeral 39, by which the bag 4 is attached to the sail 3. There are many suitable fasteners on the market such as the "DOT." The separable type are to be preferred so that the bag 4 may be removed from the sail 3 if desired. In FIG. 5 the fasteners 39 pass through both sheets while in FIG. 6 the fasteners 39 pass through the flange portion 38 only. The fasteners should be of a size and number sufficient to prevent the bag 4 from being separated from the sail 3 accidentally.

The copper tubing 18 from the branch 19 of the 3-way valve 17 on the pressure vessel 10 is brought up through the boat deck (not shown) adjacent the mast 1 to the proximity of the boom 2 where it is provided with a fitting 40 adapted to be connected to a length of flexible rubber tubing 41 which is woven up the sail 3 (FIG. 1) through a plurality of spaced grommets 42 in said sail to the proximity of the inflatable bag 4. A fitting 43 connects the tubing 41 to a short piece of similar tubing 44 provided with a flange 45 which is bonded to the inflatable bag 4 (FIG. 1). The above described disposition of the flexible rubber tubing 41 permits the sail 3 to be readily raised and lowered and said tubing to be connected or dis-connected from adjacent tubing.

The safety device of this application admits of many deviations without departing from the basic idea of attaching the inflatable bag to the sail of a boat therefore I do not limit my invention to the exact device shown and described but extend it to all that comes fairly within the scope of the appended claims.

I claim:

1. In a sail boat safety device in combination with a sail of said boat, an inflatable bag attached to the sail adjacent the top thereof and adapted to lie flat against the sail when not inflated, a pressure vessel, means connecting the pressure vessel to the bag, an expansive medium normally confined within the pressure vessel, means to automatically release the expansive medium from the pressure vessel into the bag to inflate it when the boat heels over to a predetermined degree, and means to deflate the bag.

2. The structure of claim 1 in which the inflatable bag is formed of two sheets of rubber the sheet adjacent the sail being reinforced.

3. The structure of claim1 in which the bag is detachably connected to the sail.

4. The structure of claim 1 in which the connecting means between the pressure vessel and the bag includes a length of rubber tubing woven through grommets spaced apart along the luff side of the sail.

5. In a sail boat safety device having an inflatable bag mounted adjacent the top of a sail of said boat, means to automatically release an expansive medium from a pressure vessel into said bag to inflate it when the boat heels over to a predetermined degree to starboard or a predetermined degree to port which includes a solenoid-operated pressure vessel valve, a source of electric current, an electric circuit from the source of supply to the solenoid, a pair of mercury switches in said circuit one adapted to close the circuit when the boat heels to starboard to a predetermined degree and the other when the boat heels to a predetermined degree to port.

References Cited in the file of this patent

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2,444,526	Pawley	July 6, 1948
2,752,615	Parker	July 3, 1956