Aug. 7, 1945. H. P. BEACH, JR 2,381,394

MOORING BUOY

Filed June 5, 1943 2 Sheets-Sheet 1

Fig. 1.

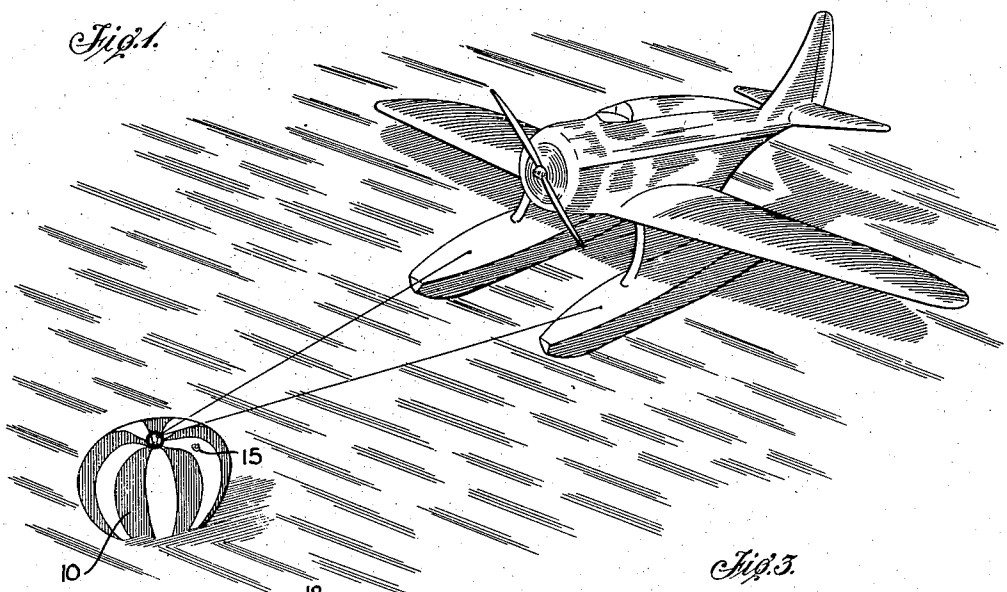


Fig. 2.

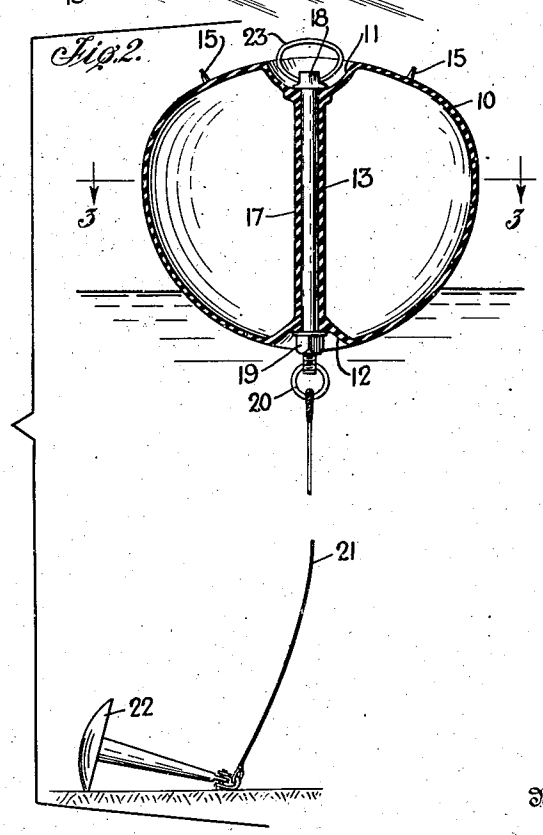
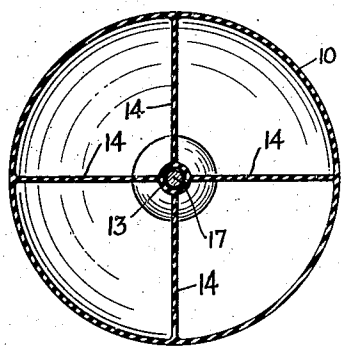


Fig. 3.



Inventor

HOWARD P. BEACH, JR.

By Ely & Frye

Attorneys

Aug. 7, 1945. H. P. BEACH, JR 2,381,394

MOORING BUOY

Filed June 5, 1943 2 Sheets-Sheet 2

Fig. 4.

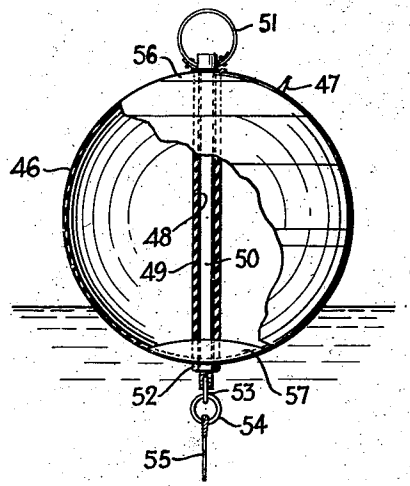


Fig. 5.

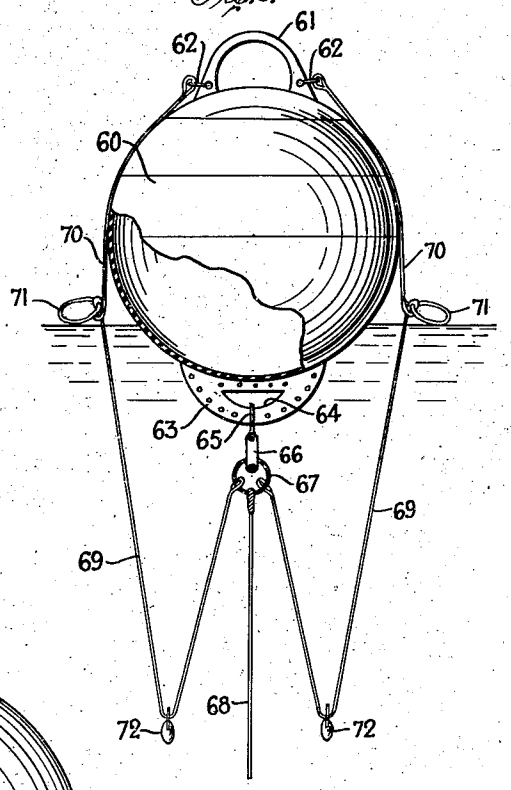
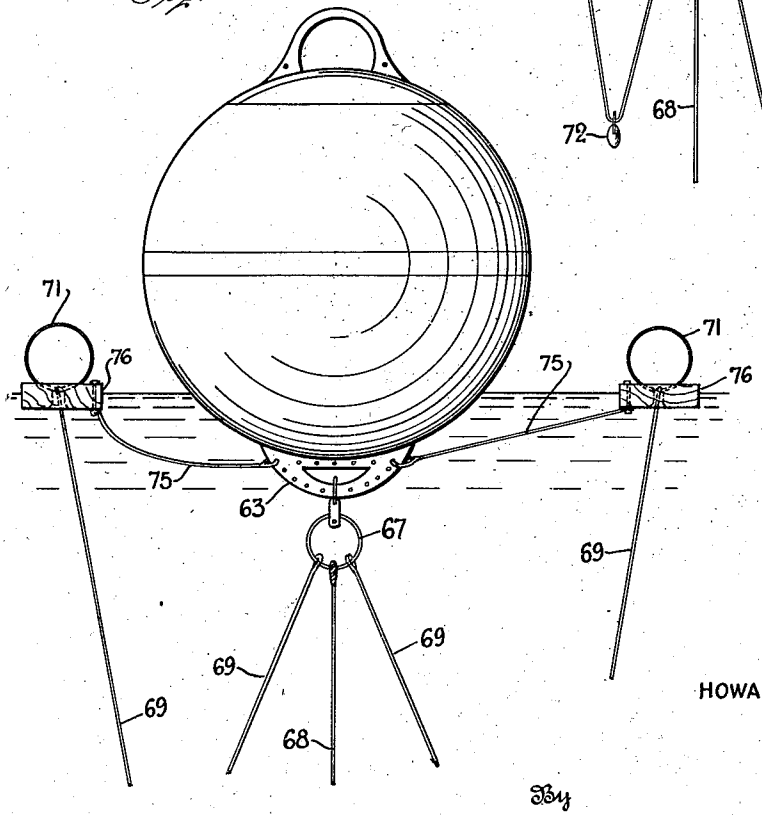


Fig. 6.



Inventor

HOWARD P. BEACH, JR.

By

Attorneys

Patented Aug. 7, 1945

2,381,394

UNITED STATES PATENT OFFICE

2,381,394

MOORING BUOY

Howard P. Beach, Jr., Washington, D. C., assignor to The Firestone Tire & Rubber Company, Akron, Ohio, a corporation of Ohio

Application June 5, 1943, Serial No. 489,846

2 Claims. (Cl. 9—8)

This invention relates to mooring buoys, and more especially it relates to mooring buoys used on the waterways for marine aircraft for the mooring of aircraft, or for defining channels or lanes for day or night use.

The chief objects of the invention are to provide mooring buoys of the character mentioned that will not damage the thin hulls or pontoons of marine aircraft that may collide therewith; to provide mooring buoys that will continue to float and function even though punctured; to provide a mooring buoy wherein the strain imparted by the moored aircraft will be transmitted directly to the anchor of the buoy; and to provide a construction that maintains the mooring ring at the top of the buoy substantially upright at all times. Other objects will be manifest as the description proceeds.

Of the accompanying drawings:

Fig. 1 is a perspective view of a mooring buoy embodying the invention, as it appears in service, and a seaplane moored thereto;

Fig. 2 is a vertical diametric section, on a larger scale, of the buoy shown in Fig. 1, and an anchor attached thereto;

Fig. 3 is a section on the line 3—3 of Fig. 2;

Fig. 4 is an elevation of another embodiment of the invention, a part thereof being broken away and in section;

Fig. 5 is an elevation of still another embodiment of the invention, a part thereof being broken away and in section; and

Fig. 6 is an elevation of yet another embodiment of the invention.

Referring now to Figs. 1 to 3 of the drawings, there is shown a buoy structure comprising a hollow bulbous body 10 composed of impervious, flexible rubber or rubber-like composition, and preferably reinforced with rubberized fabric. In shape the buoy body is an oblate spheroid, and at the poles thereof is formed with respective concavities or re-entrant regions 11 and 12 respectively. The body 10 floats on a vertical axis, the concavity 11 being at the top of the body and being of hemispherical shape. The concavity 12 is located at the bottom of the body and is frustoconical in shape. Extending axially through the buoy body 10 is a tubular stay 13 that is composed of the same material as the buoy body and is integrally attached at its opposite ends to the re-entrants 11, 12. The interior of the body 10 is divided into a plurality of separate compartments, herein shown as four in number, by radially disposed walls or partitions 14, 14, which partitions are united with the stay 13 and with the wall of said body. Valve stems 15 in the wall of the buoy, at the top thereof, are provided for inflating the several compartments of the buoy, an internal pressure of about 15 pounds being found to give satisfactory results. Because the internal pressure holds the buoy body to its normal bulbous shape, and the partitions 14 constitute supplemental means for the same purpose, the wall of the buoy body may be relatively thin, that is, of the order of $\frac{5}{16}$ inch to $\frac{3}{8}$ inch.

Mounted within the bore of the tubular stay 13 is a rod or bolt 17, the upper end of which is formed with an integral, transversely apertured cap or head 18, the latter being located in the concavity 11. The lower end of the rod is threaded to receive a nut 19 that retains the rod in assembled relation with the body 10, said nut being located in the concavity 12, the lower end of the rod projecting somewhat below said nut and having a bore or aperture extending transversely therethrough. A suitable ring 20 is attached to the rod through the agency of said aperture, to which ring may be connected a chain or cable 21, the other end of the latter being connected to an anchor 22. Pivotally connected to the rod-cap 18, through the agency of the aperture therein, is a ring 23 to which the tow rope or hawser of a marine aircraft may be connected, to moor the craft. The ring 23 is located partly in the concavity 11, but projects above the same for easy accessibility, the arrangement being such that the ring, when not in use, will be supported by the margin of the concavity and thus be maintained in partly upright position.

The low inflation pressure employed in the buoy serves to hold it in distended condition without rendering it hard and unyielding. The buoy is extremely buoyant and floats high in the water, thus assuring good visibility, which may be enhanced by any suitable design painted upon its exterior. The buoyancy is such that the buoy will float and perform its normal functions even though three of its four compartments are punctured and deflated. The construction obviates the application of strains upon the resilient structure of the buoy, and achieves the other advantages set out in the foregoing statement of objects.

In the embodiment of the invention shown in Fig. 4 the buoyant body consists of a hollow spherical structure 46 that preferably has a wall composed of flexible rubber composition reinforced with fabric. The wall of the structure usually is of sufficient stiffness to withstand the forces to which it normally is subjected without collapse,

but a valve stem 47 may be provided in the wall of the structure if desired to enable inflation of the spherical structure. The valve 47 also may be utilized to maintain the interior of the structure at atmospheric pressure. Extending diametrically through the spherical structure 46 is a tubular brass sleeve 48 and surrounding the latter, and vulcanized to it and to the sphere wall, is a sleeve 49 of rubberized fabric. The ends of the brass sleeve 48 open onto the exterior of the sphere at the respective poles thereof, and mounted in said sleeve is a headed bolt 50 of bronze. The headed portion of the bolt 50, which is at the top of the buoy, is formed with a non-circular transverse aperture in which a ring 51 is received, said ring having its end portions lapped within the aperture, the arrangement being such that the ring is incapable of pivotal movement and is maintained in upright position. Said ring constitutes means by which the mooring line of an aircraft may be secured to the buoy. The other end of the bolt 50, which is at the bottom of the buoy, is threaded to receive a nut 52 by means of which the bolt 50 is retained in assembled relation with the buoyant member 46. The bolt 50 projects beyond the nut 52 and said projecting portion has a clevis 53 pivotally connected thereto, which clevis carries a ring 54 to which the chain 55 of an anchor (not shown) is attached. A concavo-convex cap 56 of thin rust-proof metal is confined between the head of bolt 50 and the surface of buoyant member 46, and a similar cap 57 is confined between the nut 52 and the surface of said buoyant member. The buoy has substantially all the advantageous characteristics of the embodiment shown in Figs. 1 to 3, particularly the feature of transmitting mooring strains directly to the anchor.

The embodiment of the invention shown in Fig. 5 comprises a hollow, spherical, buoyant body 60 composed of flexible rubber composition, preferably with fabric reinforcement. At the top of the buoyant body is an arcuate, handle-shaped member or fixture 61 that preferably is composed of hard rubber, said member being vulcanized to the spherical body 60 or otherwise securely attached thereto. Clevises 62, 62 are pivotally connected to opposite sides of the member 61. On the diametrically opposite side of the buoyant body, which it at the bottom thereof, is attached a crescent shaped member or fixture 63 that is formed with an aperture 64 therein. Said member 63 is composed mainly of hard rubber that is vulcanized to the buoyant body or otherwise securely attached thereto, said member preferably having a facing of stainless steel plate riveted to its exposed surface. Suspended from the member 63 through the agency of the aperture 64 therein is a clevis 65 that carries a swivel 66, and suspended from the latter is a ring 67. Connected to the latter is a cable 68 that is attached to an anchor (not shown). Also connected to ring 67 are two cables 69, 69 that extend through eyes formed in the ends of respective cables 70 that are connected to the clevises 62 aforementioned. The free end of each cable 69 is formed with an eye that carries a ring 71, the latter preventing the cable from being retracted through the eye of the cable 70. The length of the latter is such that the ring 71 is supported just above water level, as is clearly shown in Fig. 5. Between ring 67 and ring 71 each cable 69 has a counterweight 72 slidingly suspended thereon so as normally to create a bight in the cable so that the ring 71 is drawn against the eye in the end of cable 70. The rings 71 constitute the means by which the hawsers of aircraft are moored to the buoy, the arrangement being such that if the cables 69 are pulled taut, any strain thereon will be transmitted therefrom through the cable 68 to the anchor, thus obviating the placing of any strain upon the buoyant body 60.

The embodiment of the invention shown in Fig. 6 is essentially similar to that showin in Fig. 5. It differs from the latter in that the cables 70 are omitted, and in lieu thereof a pair of short cables 75, 75 are connected to the member 63, the free ends of said cables being connected to respective floats 76 of cork or other suitable buoyant material. The floats 76 are centrally apertured, and preferably are somewhat dished on their top faces, the free end portions of the cables 69 extending through said apertures and carrying the rings 71, the latter preventing retraction of the cables through the apertures in the floats. The floats 76 support the rings 71 above the water level, substantially in upright position, so that they are easily accessible when it is desired to moor a seaplane thereto, strains imparted by the latter being transmitted directly to the anchor in the same manner as in the embodiment shown in Fig. 5.

Other modification may be resorted to without departing from the spirit of the invention, or the scope thereof as defined by the appended claims.

What is claimed is:

1. A mooring buoy comprising a hollow bulbous body of resilient material adapted to float on a vertical axis, a tubular stay formed integral with said body, interiorly thereof, and radial partitions within the buoyant body formed integral with the walls of the body and the tubular stay dividing the interior of the body into a plurality of non-communicating compartments.

2. A mooring buoy comprising a hollow bulbous body of resilient material adapted to float on a vertical axis, radial partitions interiorly of the body dividing the same into a plurality of non-communicating compartments, and valve means through the wall of the body, in a region thereof above the water-line, to enable control of the air pressure within said compartments.

HOWARD P. BEACH, JR.