Oct. 9, 1962 F. E. HOLLADAY 3,056,979

INFLATABLE FLOATS

Filed May 19, 1958

Fig. 1.

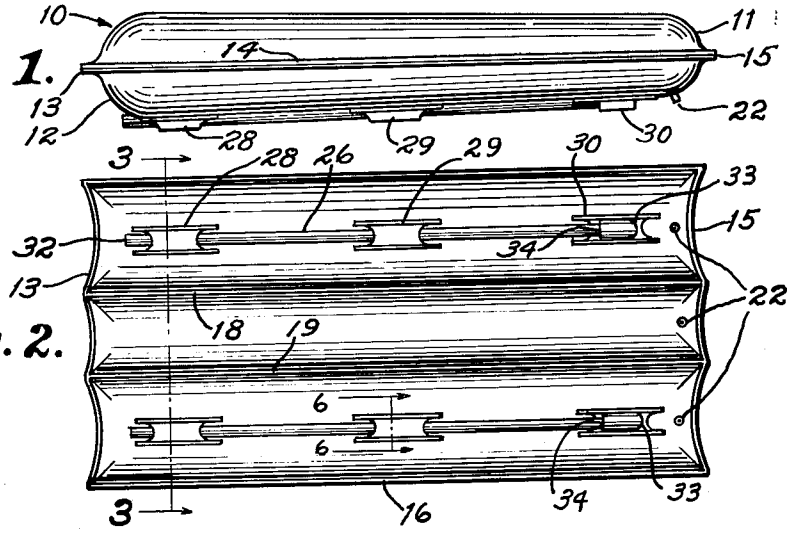


Fig. 2.

Fig. 3.

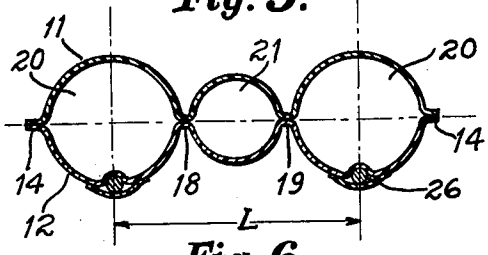


Fig. 4.

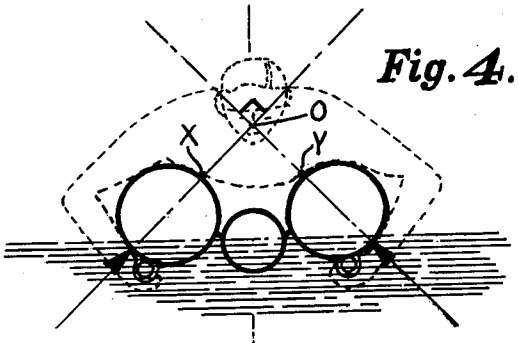


Fig. 6.

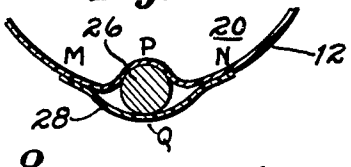


Fig. 5.

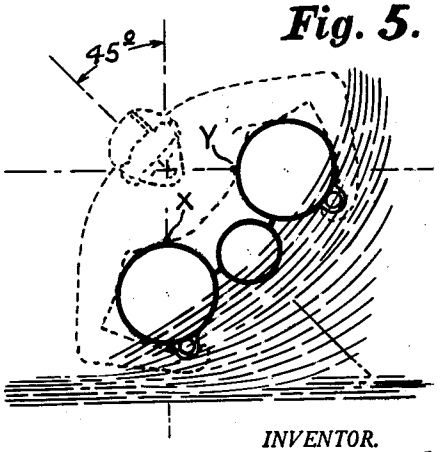


Fig. 8.

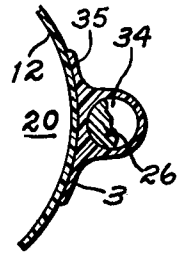
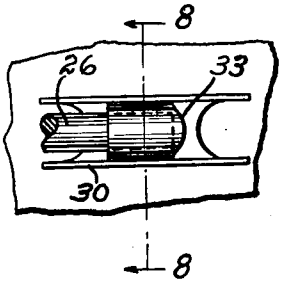


Fig. 7.



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INFLATABLE FLOATS

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This invention relates to improvements in inflatable buoyant devices such as surf floats used for surf riding and water floats.

Such devices may be constructed of two or more sheets of heat weldable or vulcanizable material formed into a plurality of longitudinal inflatable compartments. For purposes of increasing their lateral rigidity and providing a substantially flat surface or platform for supporting the body of the user lying prone thereon, truss-like or cellular constructions are customarily employed in which the interiors of the compartments are formed or bounded by longitudinal webs or partitions attached to and extending vertically between the top and bottom sheets at intervals spaced laterally of the float. Longitudinal rigidity, especially for structures of considerable length, may be secured by the use of rigid reinforcing poles or rods extending lengthwise of and secured to the underside edges of the float as provided on some forms of surfer and float devices.

When used as surfers or in turbulent or rough bodies of water, inflatables of the above character exhibit some instability and tendency to capsize sidewise, overturning on or spilling the user therefrom where the float assumes a position parallel to the breaker, wave or surf. Users of these devices also have experienced severe discomfort caused by abrasion from the upper surface of the float with bare facing portions of, and particularly the upper extremities of, the body of the user due to continual rubbing and sliding thereon. While the reinforcing rods on the underside of some forms of floats provide a hand hold for holding the float against the body of the user to reduce slipping, these structures present a storage and transportation problem upon deflection of the float, since the poles or rods may be of considerable length and are not readily removable or detachable therefrom, but firmly secured to the bottom of the float so that they cannot become loose therefrom and/or puncture the float.

Accordingly, the present invention has among its general objects to provide structural improvements in inflatable devices of the above character from the standpoint of increasing their stability and decreasing their capsizing moment and rendering them more comfortable and convenient to use, carry and store.

A specific object is to provide a surfer or float construction which conforms to and securely grips the body of the user to prevent overturning of the float and slipping or relative movement of the body of the user lying thereon.

Another object is to provide an improved float or surfer construction, in which the aforesaid reinforcing poles or rods are secured to the float in the inflated condition thereof and are releasable or may be readily inserted in place and removed from the float upon deflation thereof.

The above and other objects of the invention, together with the advantages and features thereof, will appear more fully from the following description and drawings: wherein

FIG. 1 is a side elevation view of a pneumatic float article in accordance with the present invention;

FIG. 2 is a bottom plan view of the article of FIG. 1;

FIG. 3 is a slightly enlarged transverse sectional view taken on the line 3—3 of FIG. 2;

FIGS. 4 and 5 are transverse sectional views similar

to FIG. 3 illustrating the conformation of the float construction of the present invention to the body of the user thereon as used in the water;

FIG. 6 is an enlarged fragmentary transverse sectional view taken in the direction 6—6 of FIG. 2 illustrating an improved form of pole attachment means in accordance with the present invention;

FIG. 7 is a bottom plan view of another form of pole attachment means in accordance with the present invention; and

FIG. 8 is a transverse sectional view taken in the direction 8—8 of FIG. 7.

Referring to the drawings, FIGS. 1, 2 and 3 illustrate a form of inflatable float **10** formed of a rectangular top sheet **11** and bottom sheet **12** of impervious synthetic plastic material, such as polyvinyl chloride. The sheets are sealed together around their peripheral edges **13, 14** and **15** and **16**, and along spaced, narrow seam portions **18, 19** inwardly of and parallel to the longitudinally extending edges **14** and **16** to form between the sheets three longitudinally extending, generally circular cells or compartments including two transversely spaced outer compartments **20** and a single central compartment **21** into which pressured air is admitted though separate air valves shown at **22**. Secured to the bottom sheet **12** is a transversely spaced pair of rigid poles or rods **26**, which, in addition to increasing the longitudinal rigidity of the structure, serve as handles or gripping means to assist holding the float to the body of the user lying prone thereon. The poles also may be used for attachment of anchor or load binding ropes, a solid bottom or other appurtenances not otherwise supportable from fragile plastic structures of this character.

The outer compartments **20** are attached to the central compartment **21** by the laterally extending flexible seam or web portions **18, 19** constituting a hingeable connection between the inner compartment and each of the outer compartments and permitting arcuate inward movement of the outer compartments when supporting the body of the user incumbent on the float in the water. Since the webs **18** and **19** extend laterally of the float, the structure is thus intentionally made lacking in lateral rigidity in order that the compartments can be displaced from the position they normally occupy in their unloaded condition of FIG. 3 and assume the position shown in FIG. 4 when supporting the body of the user thereon. The central compartment **21** serves primarily to space the outer compartments a distance L, which, in accordance with the present invention, measured between the centers of the outer compartments, is approximately equal to the chest span of the body of the average intended user or intended class of user, so that the inwardly facing quadrant sections of the outer compartments can snugly grip the anterior sides of the rib cage at approximately the points X and Y and firmly hold the body of the user therebetween against relative movement thereon. The weight of the body of the user will be supported and distributed between the centers of the outer compartments, which will be slightly inwardly and upwardly displaced from their positions occupied in FIG. 3 to form an included angle of approximately 90 degrees between a pair of lines passing through the centers of the outer compartments, the body bearing points X and Y, and the longitudinal axial center of the body of the user thereon. Under such conditions, the float can be tipped by as much as 45 degrees by the surf or breaker before becoming unstable and subject to possible capsizing without tipping or spilling the user therefrom as indicated in FIG. 5 in which the load is supported substantially entirely by the buoyancy derived from one of the outer compartments.

As previously stated, the central compartment serves

primarily as a lateral spacing member, which, if desired, also could be a flat board member, loose web section or a plurality of smaller compartments to provide the desired spacing so that the major portion of the buoyant forces is supplied by the outer compartments against the body of the user at the points X and Y. The equal sized outer compartments should be of greater inflated dimension and volumetric displacement than the center compartment or spacing member, although it is contemplated that the central compartment could be of the same dimensions as the outer compartments to contact the body of the user and be inflated to a lesser itnernal pressure than the outer compartments to secure the desired differential displacement and buoyant lift of the outer compartments relative to the inner compartment with the outer compartments bearing against the sides of the body of the user and the central compartment limiting or preventing downward displacement of the body of the user below the centers of the outer compartments to keep the body of the user out of the water. The major diameter or lateral dimensions of the outer compartments are selected with respect to aforesaid spacing distance L for the intended class of user and the overall width of the float to permit the arms of the user to rest comfortably on and hang freely over the rounded sides of the float for padding, propelling or maneuvering the float and still enable him to grasp the poles on the underside of the float and secure a firm hand hold thereon.

Satisfactory dimensions for the major diameters or lateral dimensions of the outer compartments and the inner compartment of an adult sized float constructed in accordance with the principles of the invention are 9 inches and 6½ inches, respectively, with a ¼ inch laterally extending web between each outer compartment and the inner compartment, providing a distance measured between the centers of the outer compartments of approximately 16 inches.

It is contemplated that the float can be made in several different sizes, say large, medium and small in conformity with the average anatomical dimensions of different classes and sizes of users.

The poles **26** are removably attached to the bottom of the float by supporting means which longitudinally secured the poles in the inflated condition of the float and permit ready insertion or removal of the poles in the deflated condition of the float, enabling transportation and storage of the float in a small space when it is in its deflated condition.

The pole supporting means illustrated in FIG. 2 comprises several supports **28**, **29** and **30** spaced longitudinally of the pole **26**. The supports **28** and **29** are similar, each comprising a flat strip of material weldably attached along its longitudinal edges to the underside or bottom sheet **12** of the float and forming a pole loop therewith as indicated in FIG. 6. By adjusting the lateral width MQN of the strip in relation to the distance MPN between the points of attachment M and N of the strip to the bottom surface of the float, the strip will be placed under tension upon inflation of the float and will support the pole at Q against the internal inflation thrust of the inflated float compartment exerted at P. Deflation of the float removes the inflation thrust against the pole and the tensile forces applied to the strip to free the pole and permit it to be withdrawn and separated from the float. Placing the strip in flat intimate surface contact with the bottom of the float, so that the distances MPN and MQN will be equal, results in optimum gripping of the pole and the most facile manner of construction.

It will be noted that the ends of the pole loop strips are cut back or relieved as at **32** to prevent tearing at the ends of their attachment seams, as could otherwise occur in the absence of the cut-back due to the tensile stresses applied to and concentrated at the weld ends of the strips in the inflated condition of the float.

The pole support **30** shown near the rearward end of the float device of FIG. 2 is of somewhat different construction and is designed to withstand rearward axial thrust of the pole when the user launches himself on the float in advance of a breaker as used for surf riding. The support **30** is constructed in the form of a socket having a closed end **33** adjacent the rear of the float and an open end **34** facing in the forward direction of the float for receiving the rearward end of the pole **26** therein.

Extending outwardly from the body of the socket is a pair of integrally formed flaps **35** by means of which the socket may be securely attached as by a heat sealing welding process to the bottom side of the float. The socket support may be formed of cast plastic material with the pole compartment vacuum formed therein and of substantial wall thickness and the flaps **35** feathered to a light thin edge to impart flexibility thereto for ease of attachment to the float.

In some constructions, it may be desired to provide a socket-like support at each end of the float for receiving the ends of a pole therebetween, in which case the distance between the facing open ends of the spaced sockets should be less than the length of the pole to be longitudinally secured therebetween. The pole can be readily inserted endwise in the respective socket openings in the deflated condition of the float and will be securely impounded therebetween in the inflated condition thereof.

It is apparent that the principles of the invention can be applied to float constructions and devices other than parallel sided structures shown herein, such as floats shaped and constructed in accordance with applicant's copending U.S. patent application S.N. 730,429 filed April 23, 1958, containing related subject matter herewith.

What is claimed is:

1. A triple-tube, body forming pneumatic float comprising an elongated inflatable body including two parallel, longitudinally extending and laterally spaced inflatable outboard compartments each of uniform dimensions throughout the entire length of the float body and of sufficient volumetric displacement to support the weight of the body of a user lying thereon and one smaller inflatable inboard central compartment located between said outboard compartments extending longitudinally the length of the float body, said inboard central compartment being hingeably joined to both of and being of lesser volumetric displacement and transverse lateral dimension than either of said outboard compartments, said central compartment limiting downward displacement of the body of the user below the centers of the outboard compartments and uniformly spacing said outer compartments laterally a distance within the limits of the span of the chest of the user bearing on the inwardly facing quadrant sections of and above the centers of the outer compartments and the overall width of the float body being within the limits affording unobstructed and entire use of the arms of the user hanging freely over the sides of the outer compartments, under which conditions a pair of lines through the centers of the respective outer compartments and the longitudinal axial center of the body of the user define an included angle of approximately 90 degrees therebetween and the float may be tipped about its sides up to approximately 45 degrees to the vertical while supporting the weight of the user substantially entirely by one of the outer compartments without capsizing.

2. A triple-tube, body forming pneumatic float comprising an elongated inflated body including two parallel, longitudinally extending and laterally spaced inflatable outboard compartments each of uniform dimensions throughout the entire length of the float body and of sufficient volumetric displacement to support the weight of the body of a user lying thereon, one smaller inflatable inboard central compartment located between said outboard compartments extending longitudinally the length of the float body, said inboard central compartment being hingeably joined to both of and being of lesser

volumetric displacement and transverse lateral dimension than either of said outboard compartments, and a pair of laterally spaced rigid poles extending longitudinally of and on the underside of the outboard compartments, said central compartment limiting downward displacement of the body of the user below the centers of the outer compartments and uniformly spacing said outer compartments laterally a distance within the limits of the span of the chest of the user bearing on the inwardly facing quadrant sections of and above the centers of the outer compartments and the overall width of the float being within the limits affording unobstructed and entire use of the arms of the user hanging freely over the sides of the outer compartments to grasp the poles and hold the float body against the user, under which conditions a pair of lines through the centers of the respective outer compartments and the longitudinal axial center of the body of the user define an included angle of approximately 90 degrees therebetween and the float may be tipped about its sides up to approximately 45 degrees to the vertical while supporting the weight of the user substantially entirely by one of the outer compartments without capsizing.

3. A pneumatic float comprising an elongated inflatable body, a pair of rigid detachable poles spaced laterally of and extending longitudinally under the body, and at least one pair of longitudinally spaced, open-ended readily releasable pole securing means for each of said poles attached under the body effectively gripping and securing the poles thereto by internal inflation pressure only in the inflated condition of the body while affording ready insertion and removal of the poles in the deflated, collapsed condition of the body.

4. A pneumatic float comprising an elongated inflatable body, a pair of rigid detachable poles spaced laterally of and extending longitudinally under the body, and readily releasable pole securing means for each of said poles attached under the body effectively gripping and securing the poles thereto by internal inflation pressure only in the inflated condition of the body while affording ready insertion and removal of the poles in the deflated, collapsed condition of the body, each of said pole securing means comprising longitudinally extending flat strip of material attached at laterally spaced points along its longitudinal edges to the underside of the body, the flat width of the strip being equal to the flat width of that portion of the underside of the body between the attachment points with the strip in flat intimate surface contact over its entire expanse with the underside of the body in the deflated condition of the body.

5. A pneumatic float in accordance with claim 4 wherein each of said pole securing means comprises a plurality of longitudinally spaced strips of material spaced along the length of a pole freely received between the strips and the underside of the body in the deflated condition thereof.

6. A pneumatic float comprising an elongated inflatable body, a pair of rigid detachable poles spaced laterally of and extending longitudinally under the body, and readily releasable pole securing means for each of said poles attached under the body effectively gripping and securing the poles thereto by internal inflation pressure only in the inflated condition of the body while affording ready insertion and removal of the poles in the deflated, collapsed condition of the body, each of said pole securing means comprising longitudinally spaced pair of supports located respectively near the forward and rearward portions of the underside of the body, the rearwardly located support comprising a socket having a closed rearwardly disposed end and an open forwardly disposed end freely receiving one end of a pole readily insertable therein and removable therefrom, the forwardly located support comprising a longitudinally extending flat strip of material attached at laterally spaced points along its longitudinal edges to the body, the flat width of the strip being equal to the width of that portion of the underside of the body between the strip attachment points with the strip in flat intimate surface contact over its entire expanse with the underside of the body for removably receiving the other end of the pole therein.

7. A pneumatic float comprising an elongated inflatable body, a pair of rigid, detachable poles spaced laterally and extending longitudinally under the body, and readily releasable pole securing means for each of said poles attached under the body effectively gripping and securing the poles thereto by internal inflation pressure only in the inflated condition of the body while affording ready insertion and removal of the poles in the deflated condition of the body, each of said pole securing means comprising a longitudinally extending flat strip of material attached at laterally spaced points along its longitudinal edges to the underside of the body receiving the pole between the strip and the underside of the body, the flat width of the strip being equal to the flat width of that portion of the underside of the body between the attachment points with the strip in flat intimate surface contact over its entire expanse with the underside of the body in the deflated condition of the body, the ends of said strip including a strain relieving cut-back therein directed inwardly and in the direction of the longitudinal extent of the material strip to remove stresses from the ends of the points where the strips are attached to the body.

8. A pneumatic float comprising an elongated inflatable body, a pair of rigid, detachable poles spaced laterally and extending longitudinally under the body and readily releasable pole securing means for each of said poles attached under the body, each of said pole securing means comprising a longitudinally extending flat strip of material attached to the underside of the body, the ends of said strip including a strain relieving cut-back therein directed inwardly and in the direction of the longitudinal extent of the material strip, and a pole socket support forming an integral part of the strip and having an unobstructed opening therein for removably receiving an end of a pole.

9. A pneumatic float comprising an elongated inflatable body, a pair of rigid detachable poles spaced laterally of and extending longitudinally under the body, and readily releasable pole securing means for each of said poles attached under the body affording ready insertion and removal of the poles only in the deflated, collapsed condition of the body, the pole securing means for each of said poles comprising a longitudinally spaced and aligned pair of pole supports located respectively near the forward and rearward portions of the underside of the float body, the rearwardly located support comprising a socket having a closed rearwardly disposed end and an open forwardly disposed end for receiving one end of a pole therein, the forwardly disposed support comprising a socket having a closed forwardly disposed end and an open rearwardly disposed end for receiving the other end of the pole therein, the forwardly disposed end of the first mentioned support and the rearwardly disposed end of the second mentioned support being spaced apart longitudinally of the float body a distance less than the length of the pole received therebetween in the deflated condition of the float body and effectively secured therebetween in the inflated condition thereof.

10. A pneumatic float comprising an elongated inflatable body, a pair of rigid detachable poles spaced laterally of and extending longitudinally under the body, and readily releasable pole securing means for each of said poles attached under the body effectively gripping and securing the poles thereto by internal inflation pressure only in the inflated condition of the body while affording ready insertion and removal of the poles in the deflated, collapsed condition of the body, the attached pole securing means for each of said poles providing at least one unobstructed opening for removably receiving a pole.

11. A triple tube, body forming pneumatic float com-

prising two parallel, longitudinally extending and laterally spaced outboard compartments each of uniform dimensions throughout and extending the entire length of the float body and of sufficient volumetric displacement to provide a buoyant lift to support the weight of the body of a user incumbent thereon and one smaller, central inboard compartment extending longitudinally the entire length of the float body and hingeably joined to both of said outboard compartments, the overall width of the float body being within the limits affording unobstructed and entire use of the arms of the incumbent user hanging freely over the sides of the outboard compartments, said central compartment measuring approximately two thirds the lateral dimension of an outboard compartment and uniformly spacing the outboard compartments laterally a distance within the limits of the span of the chest of the user with the inwardly facing quadrant sections of the outboard compartments grippingly engaging the anterior sides of the chest of the user.

12. A triple tube, body forming pneumatic float comprising two parallel, longitudinally extending and laterally spaced outboard compartments each of uniform dimensions throughout and extending the entire length of the float body and of sufficient volumetric displacement to provide a buoyant lift to support the weight of the body of a user incumbent thereon, one smaller, central inboard compartment extending longitudinally the entire length of the float body and hingeably joined to both of said outboard compartments, and a pair of laterally spaced rigid poles extending longitudinally of and attached to the underside of the outboard compartments, the overall width of the float body being within the limits affording unobstructed and entire use of the arms of the user hanging freely over the sides of the outboard compartments to grasp the poles and hold the float body against the user, said central compartment measuring approximately two thirds the lateral dimension of an outboard compartment and uniformly spacing the outboard compartments laterally a distance within the limits of the span of the chest of the user with the inwardly facing quadrant sections of the outboard compartments grippingly engaging the anterior sides of the chest of the user.

13. A triple tube, body forming pneumatic float comprising two parallel, longitudinally extending and laterally spaced outboard compartments each of uniform dimensions throughout and extending the entire length of the float body and of sufficient volumetric displacement to provide a buoyant lift to support the weight of the body of a user incumbent thereon and one smaller central inboard compartment extending longitudinally the entire length of the float body and hingeably joined to both of said outboard compartments, the overall width of the float body being within the limits affording unobstructed and entire use of the arms of the user hanging freely over the sides of the outboard compartments, said central compartment measuring approximately two-thirds the lateral dimension of an outboard compartment and approximately one-fourth of the overall width of the float body and uniformly spacing the outboard compartments laterally a distance within the limits of the span of the chest of the user with the inwardly facing quadrant sections of the outboard compartments grippingly engaging the anterior sides of the chest of the user.

14. A triple tube, body forming pneumatic float comprising two parallel, longitudinally extending and laterally spaced outboard compartments each of uniform dimensions throughout and extending the entire length of the float body and of sufficient volumetric displacement to provide a buoyant lift to support the weight of the body of a user incumbent thereon and one smaller, central inboard compartment extending longitudinally the entire length of the float body and hingeably joined to both of said outward compartments, the overall width of the float body being within the limits affording unobstructed and entire use of the arms of the user hanging freely over the sides of the outboard compartments and the relative lateral dimensions of the outboard and inboard compartments bearing the approximate ratio of 3:2:3.

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