Dec. 24, 1929. C. A. VAN DUSEN 1,740,846

IMPERVIOUS SEAPLANE FLOAT

Filed May 15, 1926

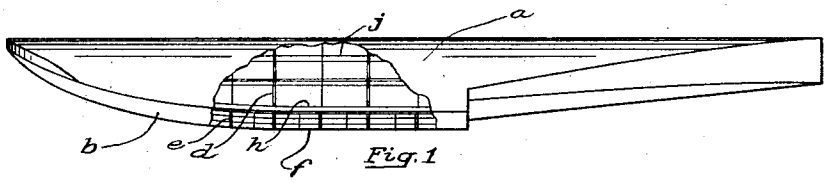


Fig. 1

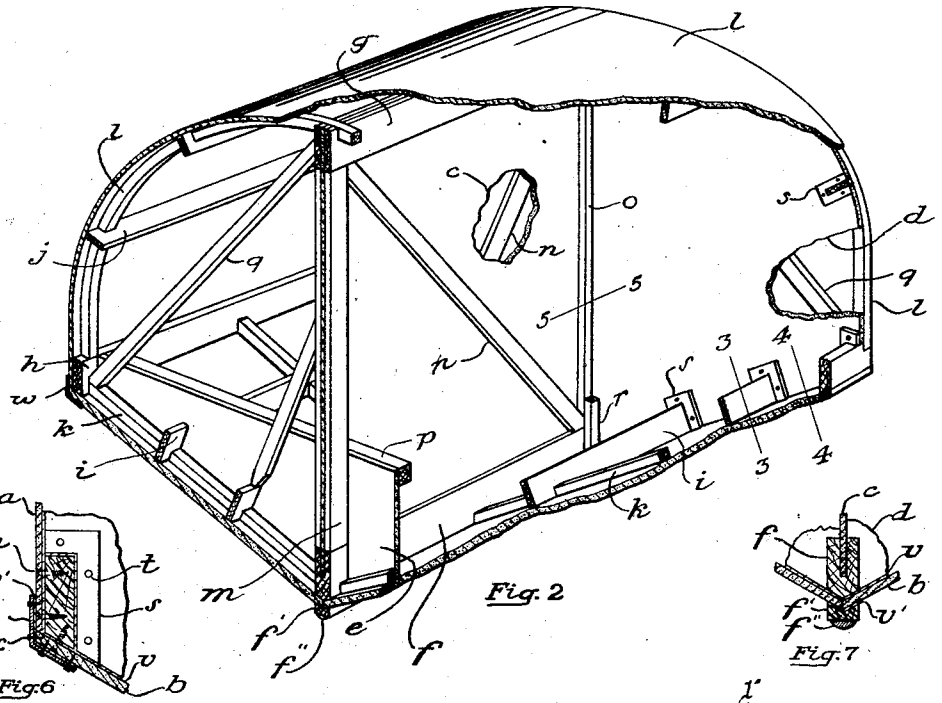


Fig. 2

Fig. 6

Fig. 7

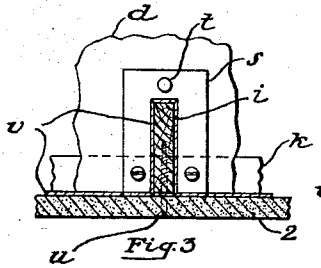


Fig. 3

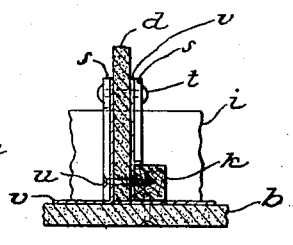


Fig 4

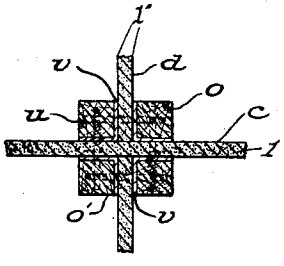


Fig. 5

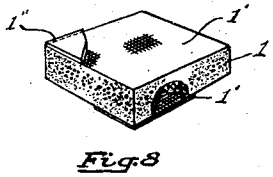


Fig. 8

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UNITED STATES PATENT OFFICE

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IMPERVIOUS SEAPLANE FLOAT

Application filed May 15, 1926. Serial No. 109,397.

My invention relates to improvements in impervious hulls or floats, and has for its object the provision of a watertight structure of this general character possessing the qualities of extremely light weight, imperviousness to moisture, strength and a negligible tendency to warp.

This invention primarily is concerned with the provision of suitable seaplane floats, flying-boat hulls and the like, although it may advantageously be used for speed boats, row boats and other marine craft.

Such floats or hulls most commonly are constructed with skins or deckings and bottoms of veneered wood, suitably protected by paint or varnish, despite the fact that the wood is known to absorb water up to 50% of its weight upon continued immersion, resulting in the expansion thereof, and subsequent contraction and warping when dried or subjected to natural heat.

With the necessarily light construction employed for seaplane floats and hulls for flying-boats, and even speed boats, there is encountered marked difficulty in excluding the water from the seams regardless of the care with which they have been constructed. Accordingly, it is a secondary object of my invention to provide means, present in the use of soft rubber at the joints, seams, bulkheads, and the like, of marine hulls, whereby water may be more effectively excluded while retaining an essentially light type of construction.

For the skins, deck coverings or bottoms of such marine structures, I employ segments cut from sheets of a structural material in sheet form which I may term reinforced cellular hard rubber, possessing inherently the qualities of imperviousness, low density and marked structural strength. The body of this material is formed of "blown" hard rubber compound subjected to the hard vulcanization process.

I may explain my invention in connection with an embodiment thereof present in a seaplane float wherein the general structural features are well known but the joints and seams are constructed in accordance with my improvements, better to exclude water from the interior of the float, while its skin and bulkheads are constructed from impervious reinforced cellular hard rubber sheathing. A float of this character is exceptionally well adapted for use upon seaplanes wherein its particular advantages are especially realized.

The features of my improvement may best be explained in connection with the accompanying drawings illustrating a preferred embodiment of my invention, wherein:

Figure 1 is a view in side elevation, somewhat diagrammatic in character and partially broken away, illustrating a seaplane float with a portion of the deck and bottom skins removed for showing the frame structure.

Fig. 2 is a fragmentary perspective view of a section of the float irregularly broken away better to illustrate the frame structure upon an enlarged scale.

Fig. 3 is an enlarged detail in section on line 3—3, Fig. 2.

Fig. 4 is an enlarged detail in section on line 4—4, Fig. 2.

Fig. 5 is an enlarged detail in section on line 5—5, Fig. 2.

Fig. 6 is an enlarged fragmentary sectional view of the chine from the extreme left of Fig. 2.

Fig. 7 is an enlarged fragmentary sectional view of the keel shown at the bottom of Fig. 2, and

Fig. 8 is an enlarged perspective view of a section of cellular reinforced rubber, such as preferably used in the construction of the float.

Throughout the several figures of the drawings I have employed the same character of reference to indicate similar parts.

Explanatory of the preferred material from which the skin of the float is constructed, I may say that the same preferably comprises segments of reinforced cellular hard rubber consisting of a body portion of vulcanized cellular hard rubber "blown" approximately 140% in the heating and hard vulcanizing process to form a minutely cellular structure. Upon or interiorly of faces thereof is vulcanized frictioned airplane cotton 1′, grade A, for the deck, or U. S. Army

specification cotton duck for the bottom of the float, respectively. A vulcanized exterior covering 1″ of rubber, preferably is provided for the surface protection of the material and its reinforcement. This material is more fully explained, described in variant form, and claimed in my copending application, Ser. No. 108,279, to which reference may be made for further particulars. I shall hereinafter generally term this novel material as reinforced cellular hard rubber without reference to the details of disclosure, supra, in the present application.

Fig. 1 of the drawings discloses in diagrammatic form a typical seaplane float, selected as a structure characteristically embodying my instant improvement, for the purpose of explaining my invention. Therein the reinforced rubber sheathing *a* forms the upper or outer skin of the float, while the segments *b*, suitably jointed or united at the seams, form the bottom skin thereof. These skins and the bulkheads, hereinafter mentioned, all are formed of reinforced cellular hard rubber which is practically impervious to moisture and affords a better and more uniform structural material for the purpose in hand than any other natural, treated or fabricated product with which I am acquainted. Within limits, the density of the product and its strength may be modified to suit the needs of the desired hull or float; a preferred specification adapted for seaplane floats being set forth above.

Thus the fore-and-aft, or central bulkhead *c*, Fig. 2, the watertight bulkhead *d* and the transverse or partial bulkhead *e*, shown sectionally or partially broken away to illustrate frame structure, are formed of this highly adaptable impervious material, to the end that the weight of the float will not be subject to material increase by reason of the absorption of moisture, as occurs with other structural materials.

The wooden frame structure may now be described, comprising the keel *f* with which the bottom skin plates *b* form a longitudinal joint, the false keel *f′* and the keel rubbing strip *f″*. Details of the watertight joint at the keel, chine and bulkhead will be later explained.

The center deck stringer *g*, the chines *h*, the bottom stringers *i*, and the side deck stringers *j* comprise the principal longitudinal members of the frame above the keel. These are transversely united by the bottom ribs *k* and the curved deck ribs *l*. The vertical struts *m* extend from the keel *f* to the center deck stringer *g*, while the diagonal struts *n*, upon the opposite sides of the fore and aft bulkhead, stiffen the panels thus formed, these being attached thereto by screws or rivets.

The vertical struts *o*, *o′*, (Fig. 5), serve intermediately to connect the bulkheads *c*, *d*, while the upper edge of the bulkhead *c* is stiffened by a transverse brace *p*, extending across the frame from chine to chine. The watertight bulkheads are stiffened by diagonal struts *q*, as shown at the right, Fig. 2, while member *r* forms a seal for the keel *f* and bulkhead *d*.

Referring particularly to the enlarged fragmentary sectional views, Figs. 3 to 7, inclusive, I may now explain how the respective members are sealed in watertight relation, preferably by means of two opposing strata of soft rubber placed under compression. Figs. 3 and 4 illustrate the sheets of soft rubber *v* which are placed under compression upon opposite sides of the bulkhead *d* by means of the bifurcated members *s* which embrace between their limbs the continuous bottom stringer *i* and accommodate the bottom rib *k*. Rivets *t* or screws *u* extending through and through these members, as shown, are adapted to place the soft rubber under compression and afford a practically watertight joint for the bulkhead. Fig. 5 illustrates an analogous employment of the soft rubber members *v* which are interposed upon either side of the fore and aft bulkhead *c* contiguous with the transverse bulkheads *d*, these members being compressed by means of screws passing through and through the bodies of the vertical struts *o*, *o′*.

The outer seams are similarly protected by means of the angular chine rubbing strips *w* which cover the continuous soft rubber strips *v′* and are held in place by means of tacks or nails *x* driven partly through the reinforced cellular hard rubber sheathing, Fig. 6. Likewise, inner rubber strips *v* and outer rubber strips *v′* are protectively compressed along the keel seam beneath the false keel *f′* and beneath the keel itself, as shown in Fig. 7, whereby practically watertight construction is insured for the float of my invention.

It will be understood that the details explained in connection with the sectional and fragmentary views are duplicated throughout the float, in accordance with well known practice, but the framing comprises no part of my present improvement as defined and set forth in the succeeding combinations or claims.

Having now described a preferred embodiment of my invention as employed in a float, or more generically, a marine hull structure, I claim as new and desire to secure by Letters Patent, together with such improvements as may be made by one ordinarily skilled in the art, the following:

1. In a marine hull structure, the combination with the watertight hull, of bulkheads built into said hull, and sealing means associated with the abutting peripheries of the latter, comprising soft rubber members

and associated compression elements therefor, substantially as set forth.

2. In a marine hull structure, the combination with the skin-forming members comprising the exterior of said hull, of soft rubber strips co-extensive with the abutting edges or seams of said members, and compression means associated with the soft rubber members adapted to exclude water at the seams, substantially as set forth.

3. In a marine hull structure, the combination with the watertight hull, of bulkheads built into said hull, said hull and bulkheads comprising cellular reinforced rubber structural elements, and sealing means associated with said elements at the joints between the same, substantially as set forth.

4. In a marine hull structure, the combination with a framework comprising in part members fabricated from sheets of cellular hard rubber reinforced by fabric vulcanized to two surfaces of said rubber, of a hull portion comprising segments fabricated from sheets of cellular hard rubber reinforced by fabric vulcanized to two surfaces of said rubber, said segments secured and sealed to said framework at their meeting edges whereby a watertight structure is obtained having a high strength to weight ratio.

5. In a seaplane float, the combination with an interior framework comprising in part longitudinal and transverse bulkheads fabricated from cellular hard rubber reinforced sheet material vulcanized to two surfaces of said rubber, of a closed hull portion attached to said framework and formed of a skin of cellular hard rubber reinforced on two sides by sheet material vulcanized to two surfaces of said rubber, substantially as set forth.

6. In a marine hull structure, the combination with a framework of a watertight hull portion comprising fabricated segments of reinforced cellular hard rubber, said reinforcements consisting of sheet material vulcanized to two surfaces of said rubber, and secured to said framework by compression elements, whereby planking may be omitted, weight reduction and waterproof characteristics may be attained.

In testimony whereof I do now affix my signature.

CHARLES A. VAN DUSEN.