June 21, 1938. D. ROBERTS ET AL 2,121,052

PONTOON, FLOAT, AND THE LIKE

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Fig. 1

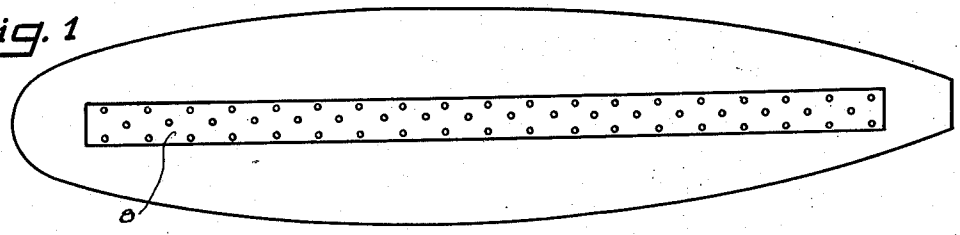


Fig. 2

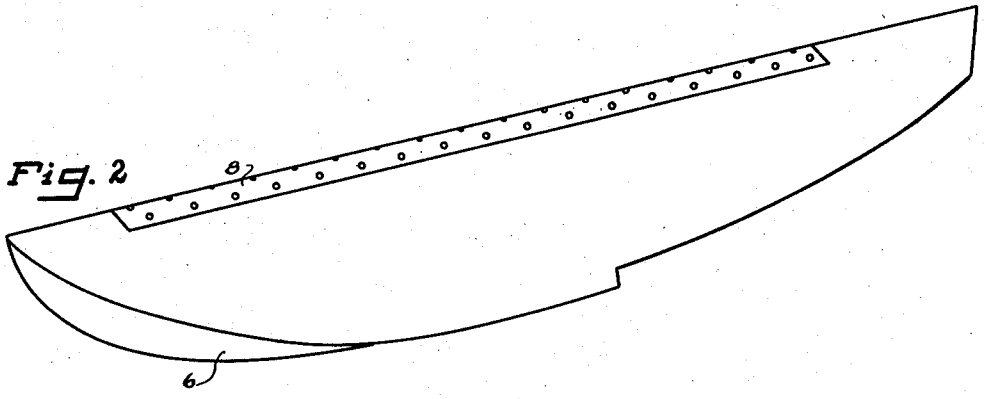


Fig. 3

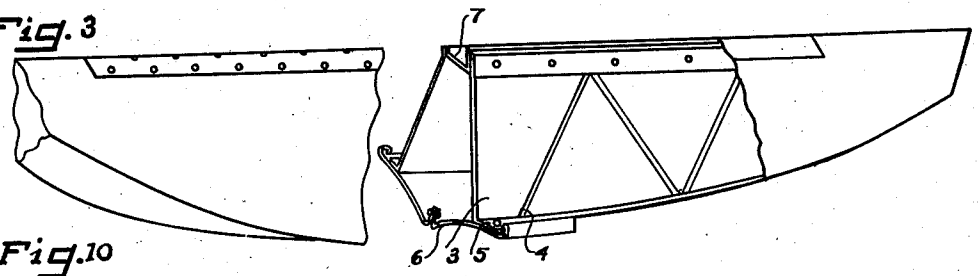


Fig. 10

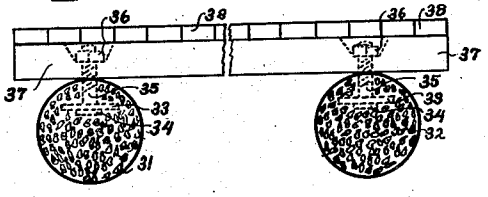


Fig. 4

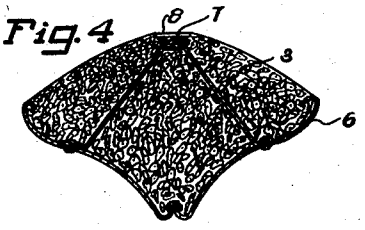
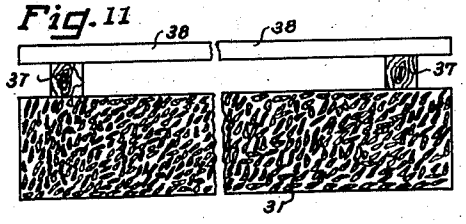


Fig. 11



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PONTOON, FLOAT, AND THE LIKE

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Fig. 5

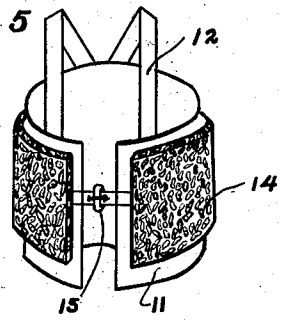


Fig. 9

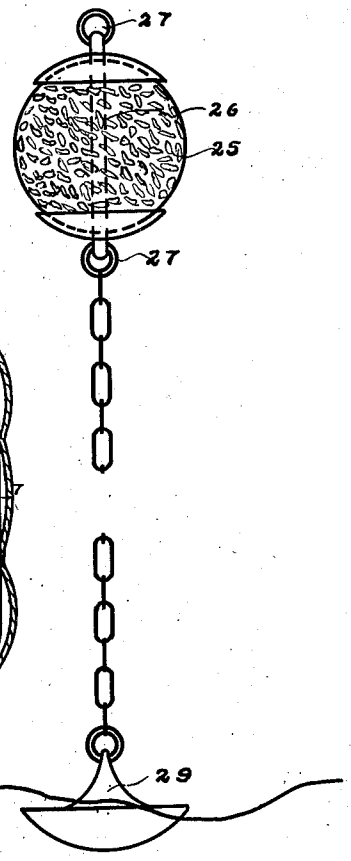


Fig. 6

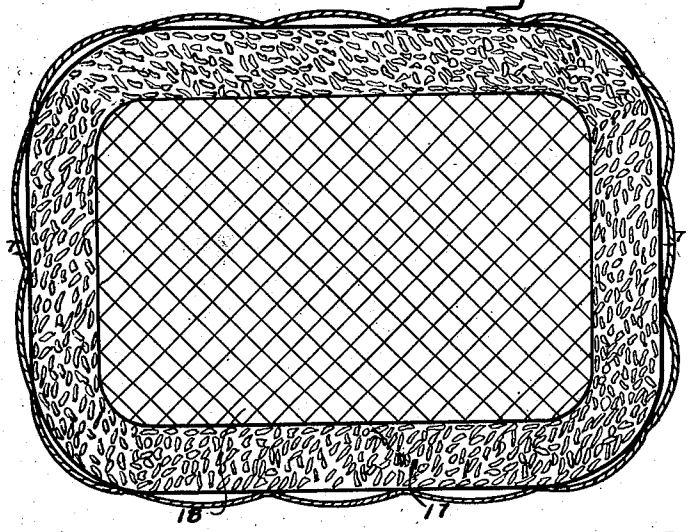


Fig. 7

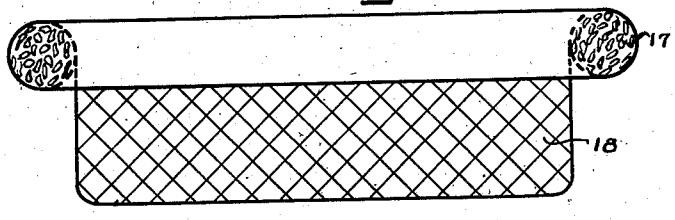
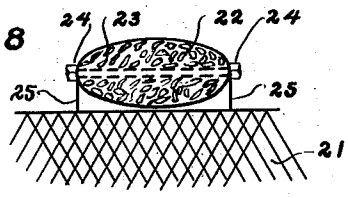


Fig 8



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UNITED STATES PATENT OFFICE

2,121,052

PONTOON, FLOAT, AND THE LIKE

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Application January 15, 1934, Serial No. 706,771
Renewed November 10, 1936

3 Claims. (Cl. 114—66.5)

Our invention relates to floating members such as pontoons, life belts, buoys and the like.

As is well known, these members are made of light, durable material not readily affected by water, and having little or no water-absorbing property.

One simple means for producing sufficient displacement of water to obtain the overall specific gravity necessary to insure floating with applied loads is to inflate water-sealed members or to otherwise produce a water-sealed chamber.

In the case of hydroplane pontoons, it has been the practice to construct a plurality of individual sections suitably sealed from each other to prevent any water leakage, occurring in one, from being transmitted to another section. When, however, the pontoon is subjected to a cross fire from a machine gun, each individual section can be rapidly punctured, thus sinking the pontoon and its plane.

Accordingly, an object of our invention is to provide a novel construction of pontoon.

A further object of our invention is to provide a pontoon for hydroplanes constructed of our novel expanded rubber.

Still a further object of our invention is to provide novel life buoys constructed of our novel expanded rubber.

Still another object of our invention is to provide life belts and the like of our novel expanded rubber.

There are other objects of our invention which together with the foregoing will appear in the detailed description to follow in connection with the drawings, in which:

Figure 1 is a top view of one form of pontoon;

Figure 2 is a perspective side view of the pontoon shown in Figure 1;

Figure 3 is a view showing a side open to disclose the interior;

Figure 4 is a cross section of the pontoon shown in Figure 1 with our preferred expanded rubber suitably imbedded in the spaces of the pontoon;

Figure 5 is a perspective view of a life belt made of our preferred rubber product;

Figure 6 is a top plan view of a life boat buoyed by a structure made of our preferred rubber;

Figure 7 is a cross section through 7—7 of Figure 6;

Figure 8 is a net buoy constructed of our preferred rubber;

Figure 9 is a buoy made in accordance with our invention;

Figure 10 is an end view of an army pontoon; and

Figure 11 is a side view of an army pontoon.

We have discovered that these members, particularly pontoons, can be constructed of a specially prepared rubber which is durable, strong, cheap and is extremely buoyant, so that it can support a considerable load floating.

This rubber, the novel process of manufacture of which will be described below, and which contains an inert gas under high pressure, is made with the following constituents:

	Percent
Washed first grade crepe or smoked rubber	40–75
Sulphur	6–30
Light calcined magnesia	3– 5
Ground gilsonite	12
Lower melting bituminous substances	12

In the manufacture of this product, the crepe or smoked rubber is first masticated for a period of time depending on the poundage of rubber desired. To this is added an asphalt product such as bitumin, uniformly distributed over the rubber. In order to fully impregnate the bitumen in the rubber, the mixture is taken to a dark room for a period of twenty-four hours' rest, at the end of which time it is placed on a warm mill and heated to a temperature not to exceed 100 degrees F. to plasticize the product.

With the product in a plastic state, the sulphur, calcined magnesia and gilsonite, in proportion as stated above, are then added and the resultant mixture held inactive for a second rest period of twenty-four hours to permit thorough impregnation. The resulting dough is then taken and manufactured into various articles such as slabs, boards, etc. by means of a warming up mill or forcing machine, and then cut into desired sizes.

These are then well chalked with French chalk and placed in a container for gassing. The rubber containers are placed in an airtight warm gassing chamber or autoclave and the air pumped out from this chamber until a substantial vacuum is produced. All the oxygen in the rubber is thus withdrawn, preventing subsequent deterioration by the action of oxygen on the rubber. This step is exceedingly important for a successful production of inflated rubber, as heretofore the failure to remove the oxygen has resulted in an early deterioration of the rubber.

Carbon dioxide, helium, nitrogen, or any non-combustible gas is then injected at a pressure

which varies from an amount of 2250 pounds per square inch, and up.

With the rubber still in a soft state, the gas is now injected at a high pressure and at the same time a partial vulcanization is effected to retain the injected gas. As will be described in the following, this is carried out in two steps, a partial expansion and vulcanization, followed by a complete expansion and vulcanization. This is accomplished as follows:

The pressure is increased when heat is applied by the admission of steam through a steam jacket surrounding the gassing chamber for the purpose of partially vulcanizing the soft rubber containing the injected gas. This steam jacket, which is a spiral perforated tube, encircles the inner cylinder or gassing chamber to insure uniform distribution of heat. The steam pressure applied in the heating jackets may vary from four to sixteen pounds, and the heat is applied for a period of from two hundred to six hundred minutes, depending on the physical conditions of the rubber product desired, such as the thickness of the material, weight, etc. Only partial vulcanization of the rubber has been accomplished up to this point.

The apparatus is now cooled either by permitting it to normally cool down, or by artificial means to cause more rapid cooling, the latter being preferred to save time.

At this point the gas chamber contains a considerable excess of the gas admitted for inflating the rubber, and this excess is drawn off slowly and stored in ether vats through a chalk separator for subsequent use. When the gas has all been withdrawn, the container with the rubber is removed from the gassing chamber.

At this time, as stated above, the rubber has been only partially vulcanized and has not yet been fully expanded to its maximum possibilities. Complete vulcanization and final expansion of this rubber material must be accomplished within twenty-four hours, in order to prevent loss of gas in the partly vulcanized rubber.

For the final vulcanization of the rubber, it is placed in a mold whose inner dimensions and shape are exactly the same as the external dimensions and shape of the desired article. This is then subjected to a further high temperature of heat, preferably steam, at from sixty to one hundred twenty pounds pressure, the time of application varying, in accordance with the size of the molded material, anywhere from twenty-five minutes to twenty-three hours.

The end product of this process is a rubber which is spongy and inflated with a gas at high pressure and temperature until it expands and assumes a minute cellular structure, the cells of which are filled with the injected gas and a suitable preservative. A seal composition has been added which imprisons the occluded gases in the pores or cells or interstices after the pressure and heat have been removed.

The resulting product we have found has considerable strength and durability and yet is extremely light, its weight varying from two and one half to five pounds per cubic foot, depending upon the pressure and temperature treatment given as cited above and upon the cellular seal provided in a manner which is now well known in the art.

In Figures 1 to 4, we have disclosed a pontoon to be used in connection with airplanes. As shown in the cut-away portions of Figure 3, the pontoon comprises the longitudinal sectional members 3, having corrugations as shown at 4. At the lower end of the member 3, flattened out as at 5, and secured by rivets or other suitable means to the duralumin, of which member 6 is composed. The upper portions of members 3 are secured to each other by the channel-shaped member 7, to form a cat walk, as well known in the art.

The details of the pontoon are not shown, as these are immaterial in the present invention. The pontoon of any construction, of which the present is one example, is filled with our rubber at the stage described above, at which stage the rubber is molded and completely vulcanized.

Heat is applied and at the completion of the process, expanded rubber of our novel construction fills all of the spaces formed by the metal of the pontoon, as shown in Figure 4.

It will be understood that the pontoon form structure shown in Figure 3 is placed in a mold to produce the shape of pontoon shown in Figure 4. Following the completion of the molding operation, a cat walk 8 is secured to the rubber in the channel 7, as shown in Figure 4. Suitable fittings are provided for securing the pontoon to the plane in any desired manner well known in the art.

There are numerous advantages of this pontoon construction over that using separate water-sealed compartments. It is obviously less costly than the water-sealing. Its safety and durability are considerably greater. A pontoon having a plurality of water-sealed compartments can be readily destroyed by the gunfire spray from a machine gun producing a leak in each compartment.

In the present structure, the destruction of the pontoon by gunfire is practically impossible because of the infinite minute cellular structures of the expanded rubber. In addition, the lightness gives considerable buoyancy for carrying the load of the plane, and its durability and cheapness adds to its desirability for pontoon construction.

In Figure 5, we have disclosed a life belt comprising the fabric body portion 11 with the straps 12 secured thereto and having secured thereto the expanded rubber molded into shape and to the fabric 11 in the manner described in detail hereinbefore. A buckle 15 secures the two fabric sections in any preferred manner.

In Figure 6 we have shown the invention applied to a life boat in which a peripheral rim 17, made of our preferred rubber and molded into shape in the manner described in detail hereinbefore, has secured thereto in any desired manner, the net-like interior 18 of the boat. The advantages in simplicity, durability and floating power of this construction should be obvious.

In Figure 8 we have disclosed nets 21, suitably buoyed by buoy member 22 made of our preferred rubber. A pin 23 extending through the member 22 is bolted in place by nuts 24, from which depend connecting members 25 for securing the net 21 to member 22 of which there are any desired number.

In Figure 9 we have disclosed a signal buoy made of our rubber molded in the desired shape and having an opening extending through it, through which extends a bolt or pin 26 having rings 27 at each end. A chain extending from the ring 27 connects the buoy to the anchor 28.

In carrying out our invention, we contemplate painting these buoys as well as mooring buoys, life rafts, belts and the like with a phosphorescent

substance in order to make them luminescent at night.

In Figures 10 and 11, we have disclosed army pontoons comprising our novel rubber 31 and 32, molded as cylinders. A plate 33, preferably of metal, is molded in the rubber and carries a bolt 35 and 34 protruding from the molded rubber and extending through a plank 37 to which it is suitably secured as by nuts 36. Two such planks 37 are usually provided at the ends of the cylinders of rubber and carry boards 38 extending across from one to the other plank 37 to form a platform, as shown.

It will be obvious that these structures may be modified and are specifically disclosed merely for illustration. Accordingly, we do not wish to be limited except as set forth in the appended claims.

We claim:

1. A flotation member comprising a metal chamber and a hard and rigid closed cell rubber expanded therein to completely fill said chamber, said hard and rigid closed cell expanded rubber having a weight on the order of 2½ to 5 pounds per cubic foot.

2. A flotation member comprising a metal chamber and a hard and rigid closed cell gas expanded rubber contained therein, said closed cell gas expanded rubber being expanded within said metal chamber, said hard and rigid closed cell gas expanded rubber having a weight on the order of 2½ to 5 pounds per cubic foot.

3. A pontoon comprising a metal chamber and a hard and rigid closed cell rubber expanded therein to completely fill said chamber, said hard and rigid closed cell expanded rubber having a weight on the order of 2½ to 5 pounds per cubic foot.

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