Feb. 24, 1953

L. P. FRIEDER ET AL

2,629,117

LIFE JACKET HAVING ECCENTRICALLY POSITIONED FLOTATION MATERIAL

Filed May 6, 1950

2 SHEETS—SHEET 1

Fig 1

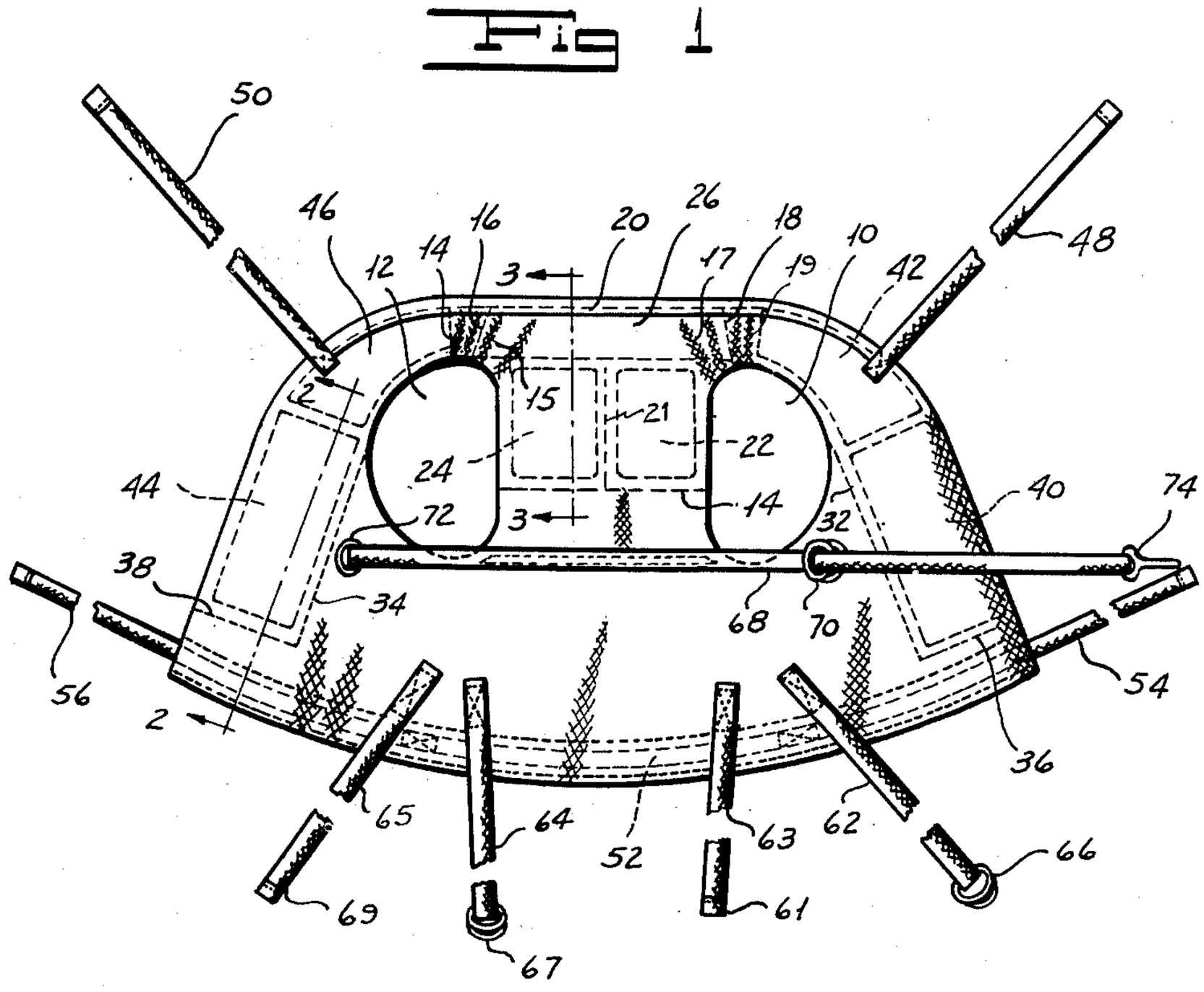
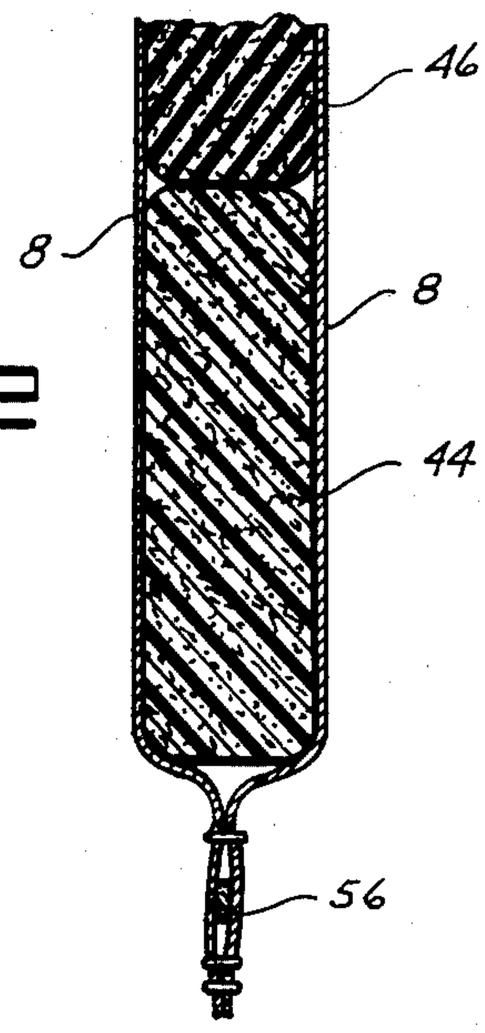


Fig 2



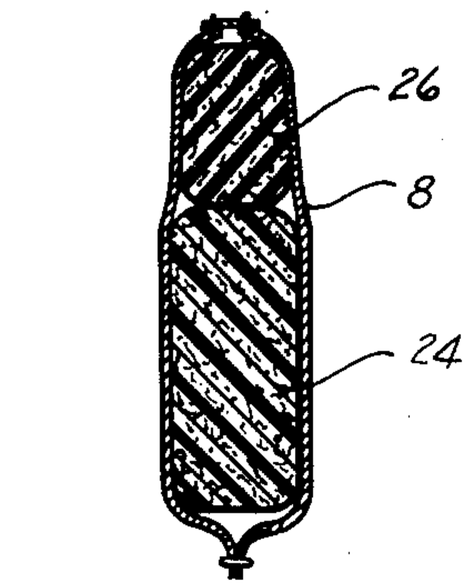


Fig 3

INVENTOR.
LEONARD P. FRIEDER
THOMAS H. GARBER
BY Henry L. Scheier
ATTORNEY

Feb. 24, 1953

L. P. FRIEDER ET AL
LIFE JACKET HAVING ECCENTRICALLY POSITIONED FLOTATION MATERIAL

2,629,117

Filed May 6, 1950

2 SHEETS—SHEET 2

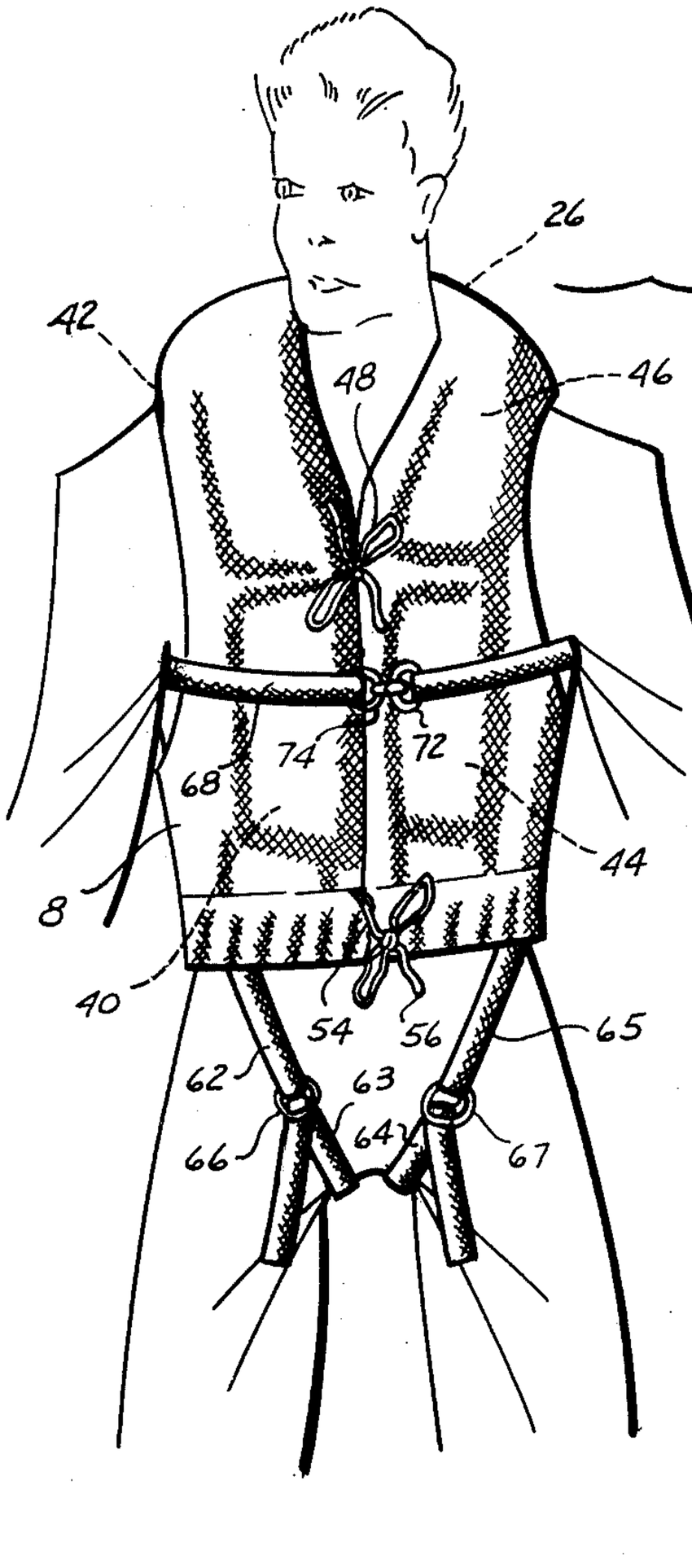


Fig 4

Fig 5

INVENTOR.
LEONARD P. FRIEDER
THOMAS H. GARBER
BY Henry L. Sherier
ATTORNEY

Patented Feb. 24, 1953

2,629,117

UNITED STATES PATENT OFFICE

2,629,117

LIFE JACKET HAVING ECCENTRICALLY POSITIONED FLOTATION MATERIAL

Leonard P. Frieder, Great Neck, N. Y., and Thomas H. Garber, Silver Spring, Md., assignors, by mesne assignments, to Reconstruction Finance Corporation, Philadelphia, Pa., a corporation of the United States

Application May 6, 1950, Serial No. 160,514

2 Claims. (Cl. 9—20)

1

Our invention relates to life jackets having eccentrically positioned flotation material, and more particularly to an improved life jacket in which the buoyant agency is a cellular material, and which is adapted to support a wearer in a position with his head and face out of water for extended periods of time in safety and comfort.

This application is an improvement over copending application of Leonard P. Frieder et al., Serial No. 90,532, filed April 29, 1949.

As pointed out in the copending application it has long been considered that cork is the best buoyant material for life jackets in that it is low in cost, possesses a long life and will not waterlog through extended periods of use. Cork life jackets, however, are uncomfortable so that when they are worn over long periods of time the wearer's skin may become chafed, producing painful injuries in connection with extended exposure in salt water. When it is necessary for wearers of life jackets to jump from the decks of vessels cork jackets have broken wearers' jaws and teeth upon impact with the water. Frequently, jumpers with conventional cork block life jackets have been rendered unconscious by the blow incident to striking the water and have drowned while face down, even though wearing a life jacket.

Because of the disadvantages of cork life jackets other materials have been used, such as kapok and fibrous glass treated with synthetic resins and the like. These materials had the disadvantage of becoming waterlogged after extended periods of submersion.

In the copending application above referred to, the disadvantages of cork life jackets have been minimized while retaining the advantages of cork as a flotation material.

We now propose to employ as a flotation material a cellular rubber or elastomer or a cellular thermoplastic resin, or combination of these materials. The cell structure of cork is peculiar in that each cell is in contact with fourteen neighboring cells and hence does not have capillarity, which accounts for its property of not absorbing moisture. The cellular material which we propose to use is available and comprises a gas expanded closed cellular rubber. This material, unlike sponge rubber in which the air spaces are interconnected, is composed of minute cells each of which is individually encased in a wall of rubber like so many tiny baloons. The cells are filled with nitrogen. Since there is no communication between cells the product is resilient, light in weight, extremely buoyant and has a negligible moisture absorption. A cubic foot of this material weighs approximately six to eight pounds. The actual rubber before expansion has a density of about seventy-four pounds per cubic foot.

2

Another material is also available of a similar structure except that the material is more rigid and is made of a thermoplastic resin.

We propose to use this flotation material in our life jackets, the expanded cellular rubber for the collar providing the wearer comfort, support for his head, and adapted to act as a cushion upon impact with the water when jumping. The entire life jacket may be made of this cellular rubber. The rigid product is more buoyant in that it is lighter per unit of volume and hence can be used for flotation blocks positioned below the collar with the result that a lighter life jacket will be produced. Such a life jacket may be worn with comfort by a wearer performing shipboard duties during an anticipated emergency, as for example, crossing through a submarine zone in war.

In the copending application above referred to we have provided a jacket with a righting moment adapted to turn an unconscious wearer face upward in the water. When the water is calm a wearer may be face downward with the buoyant blocks front and rear in dead center position and the wearer may not be turned. We propose to make one of the front buoyant masses of greater buoyancy and larger than the other so that the dead center position will be avoided.

One object of our invention is to provide a life jacket having two buoyant masses of cellular synthetic material so placed as to provide a righting moment which will support the wearer at a substantially upright, slightly backwardly inclined position in the water irrespective of whether the wearer is unconscious and irrespective of the physical make-up of the wearer.

Another object of our invention is to provide a life jacket in which the jacket is provided with a buoyant collar composed of resilient buoyant material adapted to provide comfort to the wearer, support for his head, and to cushion against shocks upon impact with the water.

Other and further objects of our invention will appear from the following description.

In the accompanying drawings which form part of the instant specification and which are to be read in conjunction therewith, and in which like reference numerals are used to indicate like parts in the various views:

Figure 1 is a rear elevation of a life jacket

showing one embodiment of our invention in a position stretched out on a plane surface.

Figure 2 is a sectional view of the buoyancy masses taken along the line 2—2 of Figure 1.

Figure 3 is a sectional view of the buoyancy masses taken along the line 3—3 of Figure 1.

Figure 4 is a perspective view showing our life jacket in position upon a wearer.

Figure 5 is a perspective view showing our life jacket in use and illustrating the substantially upright, slightly backwardly inclined position in which our life jacket floats a wearer.

In general, our invention contemplates the provision of a jacket comprising a vest made of two thicknesses of cloth sewn to provide three pockets, one in the rear of the vest and two along the front of the vest. In the rear pocket we place a pair of flotation masses made either of cellular rubber material or cellular expanded plastic material, and a separate mass of cellular rubber material. In each of the front pockets we dispose a block of expanded cellular plastic material or a block of cellular rubber material, and another mass above the first mass of cellular rubber material. The three masses of cellular rubber material above each of the front pocket blocks and above the two small blocks in the rear pocket form a collar cushioning the head of the wearer at the back and along the sides. Neck tie tapes and waist tie tapes are provided adjacent the upper and lower portions of the sides of the vest. A pair of crotch straps is provided adjacent the bottom side of the jacket on each side of the center thereof. A lifting strap surrounds the jacket below the armpits. This helps secure the jacket to the wearer and may be used to lift an unconscious wearer from the water. The lifting strap is positioned to extend through the armholes so that if the jacket is worn inside out the lifting strap may still be employed.

The fabric of the jacket is preshrunk and may be formed of rip-stop material, that is, material having predetermined threads of the warp and woof of larger gauge to prevent a tear from travelling. If desired, the jacket may be dyed a bright color such as Indian orange, and may be treated with a mildew inhibitor, such as dihydroxy-dichloro-diphenylmethane, or copper 8 quinolinolate in quantities varying from 0.5% to 2.0% by dry weight of fabric treated.

More particularly, referring now to the drawings, the jacket comprises two thicknesses of fabric 8 which may be of any desirable material such as cotton drill, cotton twill, rayon drill, rayon twill, nylon drill, nylon twill, and the like. A pair of armholes 10 and 12 are provided. The section between the armholes is sewn along a seam 14 and along seams 16 and 18 and along an upper seam 20 to provide a pocket positioned at the rear of the jacket. In this pocket we dispose a pair of blocks 22 and 24 of cellular flotation material which may be either of rubber or of expanded cellular thermoplastic resin. The pocket is divided into two compartments by the seam 21 to prevent the blocks 22 and 24 from turning in the pocket. Within the pocket above the blocks 22 and 24 we dispose another block 26 of resilient cellular expanded rubber.

On each side of the rear pocket just described we provide a pair of marginal pockets formed by the edges of the jacket seams 32 and 34 extending parallel to the respective edges of the jacket and by bottom seams 36 and 38. It will be observed that the lateral pockets are substantially

continuous with the upper portion of the central back pocket.

In the right-hand front pocket, as viewed in Figure 1, we dispose a lower block 40 made of either expanded rubber of cellular construction or of expanded thermoplastic resin of cellular construction. Above the block 40 we position a mass 42 of cellular rubber shaped generally to the configuration of the upper portion of the pocket. Similarly, in the left-hand front pocket we position a block 44 similar to block 40 and a mass of cellular rubber 46 similar to mass 42.

To the upper right-hand side of the jacket we secure a tying tape 48 made of any suitable material. A corresponding tying tape 50 is attached to the upper left-hand side of the jacket. A bottom tape or strap 52 is sewn along the bottom of the jacket adjacent its lower edge and has a right-hand portion 54 and a left-hand portion 56 which may be tied together. On either side of the upper seam 18 we provide areas 17 and 19 formed with pleats or with a fullness adapted to permit the back block 22 to adjust itself to the configuration of the back of a wearer. Similarly, on each side of seam 16 we provide a pleated or full area 14 and 15. These areas make the jacket comfortable to a user when worn, inasmuch as they permit the adjustment of the substantially more rigid blocks 22 and 24. The blocks 22 and 24, as well as the blocks 40 and 44 may be made of cork if desired, the important feature being the use of cellular rubber for the masses 46, 26 and 42 over the blocks 44, 24, 22 and 40. The cellular rubber masses line up along the upper edge of the jacket and are adapted to form a collar surrounding the neck of the wearer in the back and along the sides and coming together in front of the wearer under the chin. The cellular rubber structure acts as a cushion, supports the wearer's head in the water, provides a modicum of comfort to the wearer and prevents accidents to the wearer's jaw and teeth due to impact in event of jumping into the water wearing the jacket.

The front blocks 40 and 44 displace a much larger volume than do the rear blocks 22 and 24. When the jacket is worn the greater buoyancy of the front blocks with respect to the rear blocks provides a turning moment righting the wearer to float with his face out of the water. The arrangement is such that approximately 73% of the buoyancy is provided by the two front blocks 40 and 44, as compared with 27% of the buoyancy for the rear blocks. When the jacket is worn the center of buoyancy of the system is above the center of gravity of the wearer, providing a metacentric height furnishing a righting moment tending to float the wearer in a generally upright position. Since the buoyancy in the front of the jacket is greater than the buoyancy in the back of the jacket, the floating position is inclined to the rear and there is a righting moment produced which will rotate the wearer to float face upwardly. The resilient expanded cellular rubber masses positioned around the collar produce a greater additional buoyancy around the head area lifting the wearer out of the water in a position for easy breathing.

If the surface of the water is calm it is possible to align the centers of buoyancy of the two front blocks 40 and 44 with the center of buoyancy of the two rear blocks 22 and 24 in a position amounting to dead center. This is an undesirable position for an unconscious person. Accordingly, we can make one of the blocks 44 or

40 larger in volume than the other to provide an eccentric buoyancy tending to displace the dead center position from directly face downward and providing for a turning movement in which the wearer will float with his head slightly to one side or the other, depending on which of the two blocks is made larger. This eccentric righting moment may be aided, if desired, by a corresponding change in the rear blocks. For example, if block 44 is made larger than block 40, block 22 will be made larger than block 24. When the jacket is worn the dead center position will be displaced from the center line with respect to the weight distribution of a wearer. This displacement will preclude an unconscious wearer from floating face down in calm water when the centers of buoyancy are in alignment, since even in this case the center of gravity of the wearer will not line up with the centers of buoyancy in dead center position. Accordingly, we have provided means for ensuring that a wearer will be turned around to the desired position with his face out of water in the contingency of a calm sea, and the alignment of the centers of buoyancy and the center of gravity in a dead center position is avoided.

A pair of crotch straps 62 and 63 and 64 and 65 are provided. The front crotch strap 62 on the right-hand side of the jacket is provided with double D-rings 66 adapted to coact with the strap end 61. The rear crotch strap 64 of the left-hand side of the jacket is provided with double D-rings 67 adapted to coact with the end 69 of the strap 65. By reversing the D-rings, that is, by putting one on one of the front straps and the other on one of the rear straps, the chance of confusing the crotch straps is lessened. The straps may be formed of a herringbone cotton tape or the like. The lifting strap 68 is sewed to the body of the jacket adjacent the armholes 10 and 12 so that it may be fastened around the jacket exteriorly thereof, irrespective of whether the jacket is reversed or not. It is made of webbing and is provided with a hook-on ring 70 by which an unconscious wearer may be lifted out of the water. A single D-ring 72 and a snap hook 74 are used to secure the lifting strap around the jacket which may be provided with means for adjusting its length.

Referring now to Figure 4 in which the jacket is shown on a wearer, it will be noted that the outline of the buoyancy block 44 is visible in front through the fabric 8 of the jacket. Similarly, the outline of the buoyancy block 40 is visible in front and this block is shown greater in length and in width than the block 44 to provide the front center of buoyancy to the left of the center line of the jacket. The collar is formed by the rear cellular rubber mass 26 and the two front cellular rubber masses 46 and 42, the outlines of which are indicated in the drawing. The tie straps 48 and 50 are tied at the upper front of the jacket and the tapes 54 and 56 are tied at the lower portion of the jacket. The snap hook 74 at one end of the lifting strap 68 is secured to the single D-ring 72 at its other end. The crotch straps are secured around the thighs by means of the double D-rings.

Referring now to Figure 5, the wearer is shown supported adjacent the surface of the water in the upright, slightly backwardly inclined position, which is desired.

It will be seen that we have accomplished the objects of our invention. We have provided a life jacket having buoyant masses of

cellular rubber material or cellular expanded thermoplastic resin so placed as to provide a righting moment, which will support the wearer in a substantially upright, slightly backwardly inclined position in the water irrespective of whether the wearer is conscious and without regard to the physical make-up of the wearer. We have provided means for placing the buoyant masses eccentrically with respect to the center of gravity of the wearer so that the possibility of the wearer's lying face downwardly in the water when unconscious in smooth water is avoided. The collar of our jacket provides a resilient cushion adapted to protect the wearer against shocks to the head and jaws when jumping from the deck of a ship to the water while wearing our jacket. The collar, furthermore, provides a modicum of comfort and supports the wearer's head clear of the water in easy breathing position. We have provided a life jacket which will be comfortable to a wearer while performing shipboard duties or when wearing the jacket prior to immersion during a possible emergency, in which the buoyant material comprises a cellular rubber. The material is such that it is highly resistant to moisture absorption so that our jacket will support a wearer through extended periods of immersion without the danger of water-logging and with considerable comfort.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of our claims. It is further obvious that various changes may be made in details within the scope of our claims without departing from the spirit of our invention. It is therefore to be understood that our invention is not to be limited to the specific details shown and described.

Having thus described our invention, what we claim is:

1. A life jacket including in combination a vest formed with a pair of armholes, means securing a mass of buoyant material to the vest back between the armholes, means securing a mass of buoyant material to the right front of the vest, means securing a mass of buoyant material to the left front of the vest, the center of buoyancy of the back buoyant mass being positioned above the center of buoyancy of the front buoyant masses, the aggregate buoyancy of the front buoyant masses being greater than the aggregate buoyancy of the rear buoyant mass, said vest being formed along its upper portion to provide a collar and deformable buoyant material positioned in said collar, one of the front buoyant masses displacing a larger volume than the other of said front buoyant masses whereby the center of buoyancy of the aggregate front buoyant masses is eccentrically disposed.

2. A life jacket including in combination a vest formed with a pair of armholes, means securing a mass of buoyant material to the vest back between the armholes, means securing a mass of buoyant material to the right front of the vest, means securing a mass of buoyant material to the left front of the vest, the center of buoyancy of the back buoyant mass being positioned above the center of buoyancy of the front buoyant masses, the aggregate buoyancy of the front buoyant masses being greater than the buoyancy of the rear buoyant mass, one of

the front buoyant masses having a greater buoyancy than the other of the front buoyant masses, whereby the center of buoyancy of the aggregate front buoyant masses is eccentrically disposed.

LEONARD P. FRIEDER.
THOMAS H. GARBER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,336,400	Young	Apr. 6, 1920
1,366,344	Bailey	Jan. 25, 1921
2,226,564	Kienitz	Dec. 31, 1940
2,363,639	Brown	Nov. 28, 1944
2,377,865	Coombs	June 12, 1945
2,415,490	Macdonald	Feb. 11, 1947
2,553,798	Van Deventer	May 22, 1951