Feb. 24, 1953

L. P. FRIEDER ET AL

2,629,118

BUOYANT VEST

Filed Nov. 4, 1950

3 Sheets-Sheet 1

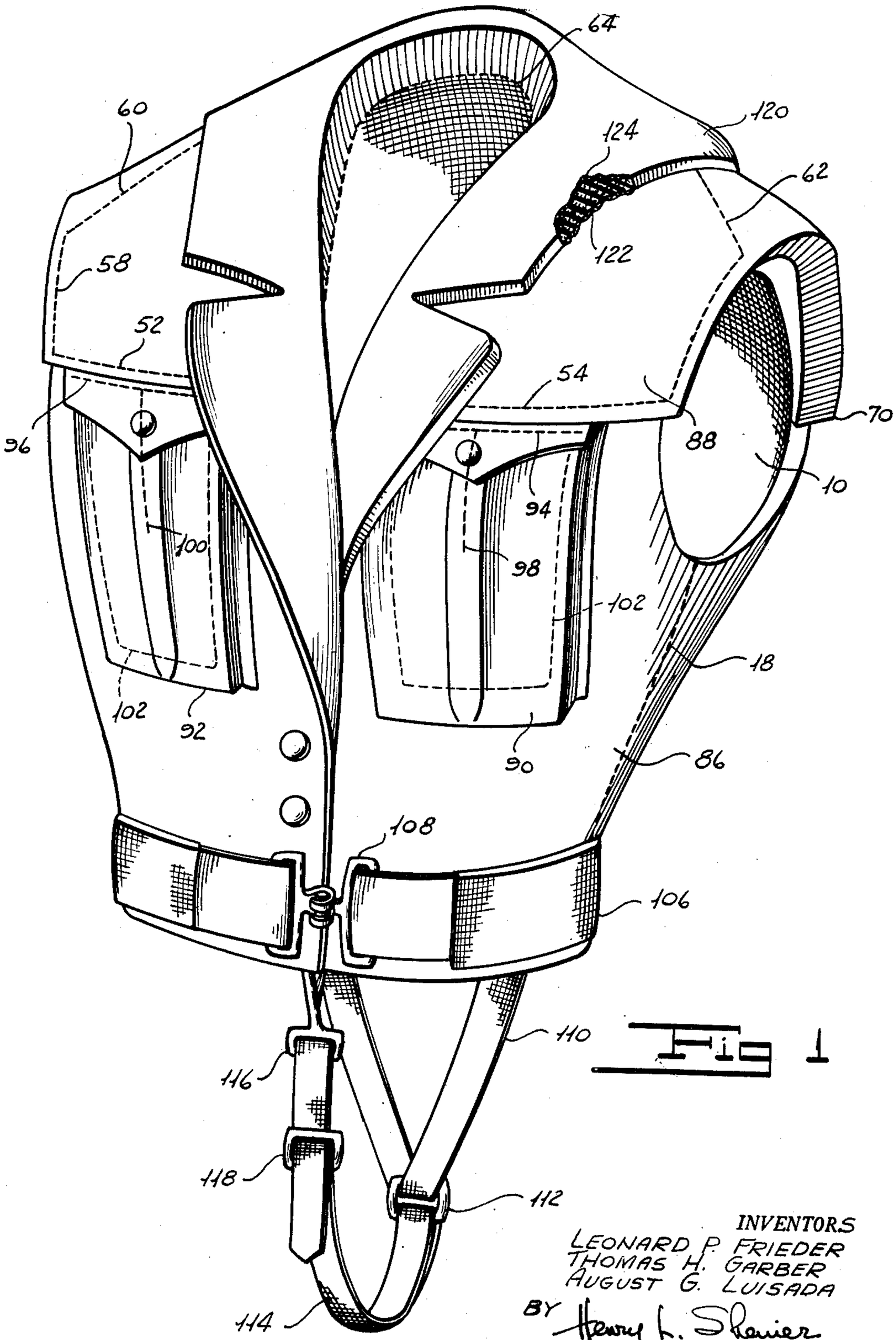

Fig. 1

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3 Sheets-Sheet 2

Fig 2

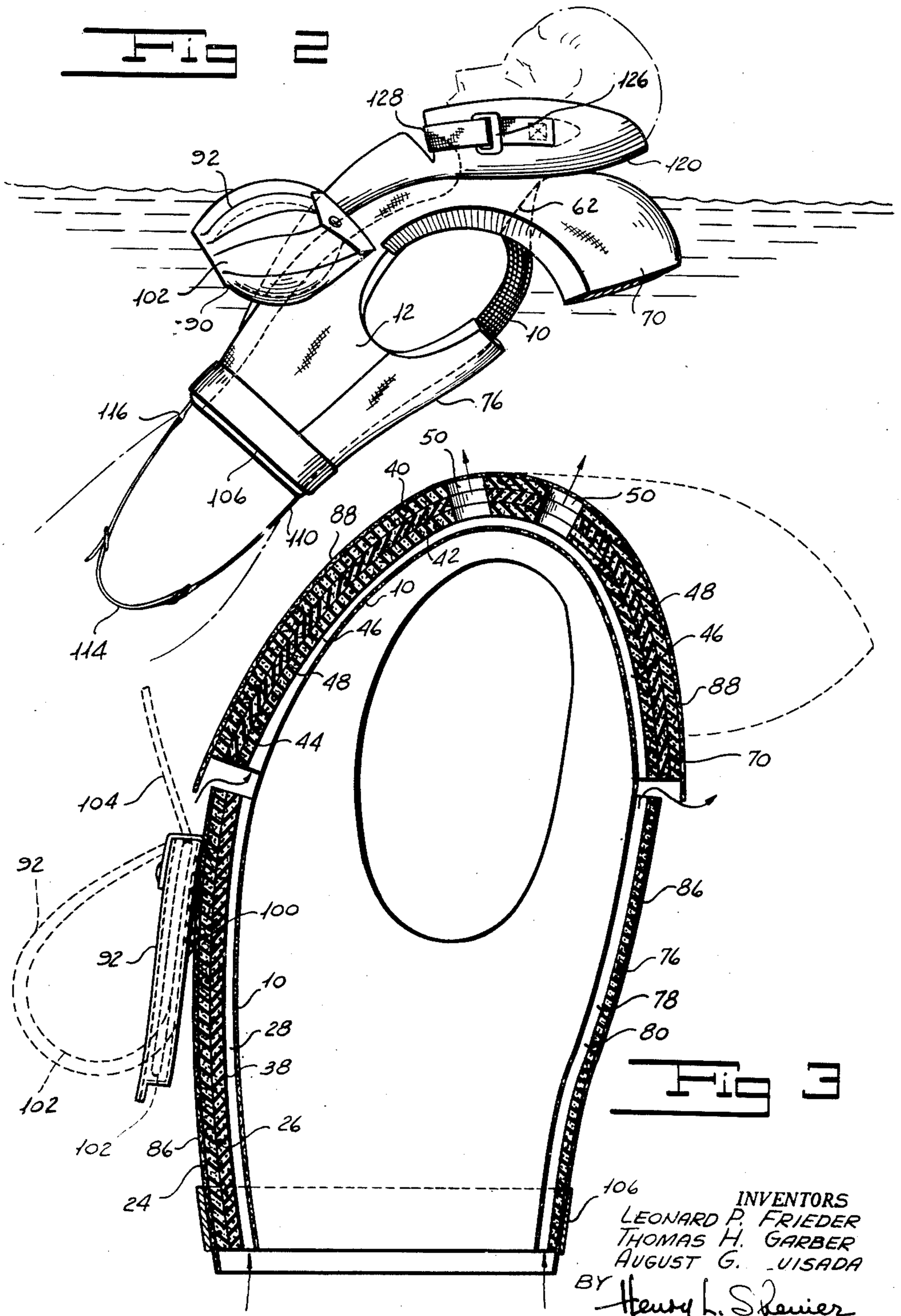

Fig 3

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3 Sheets-Sheet 3

Fig 5

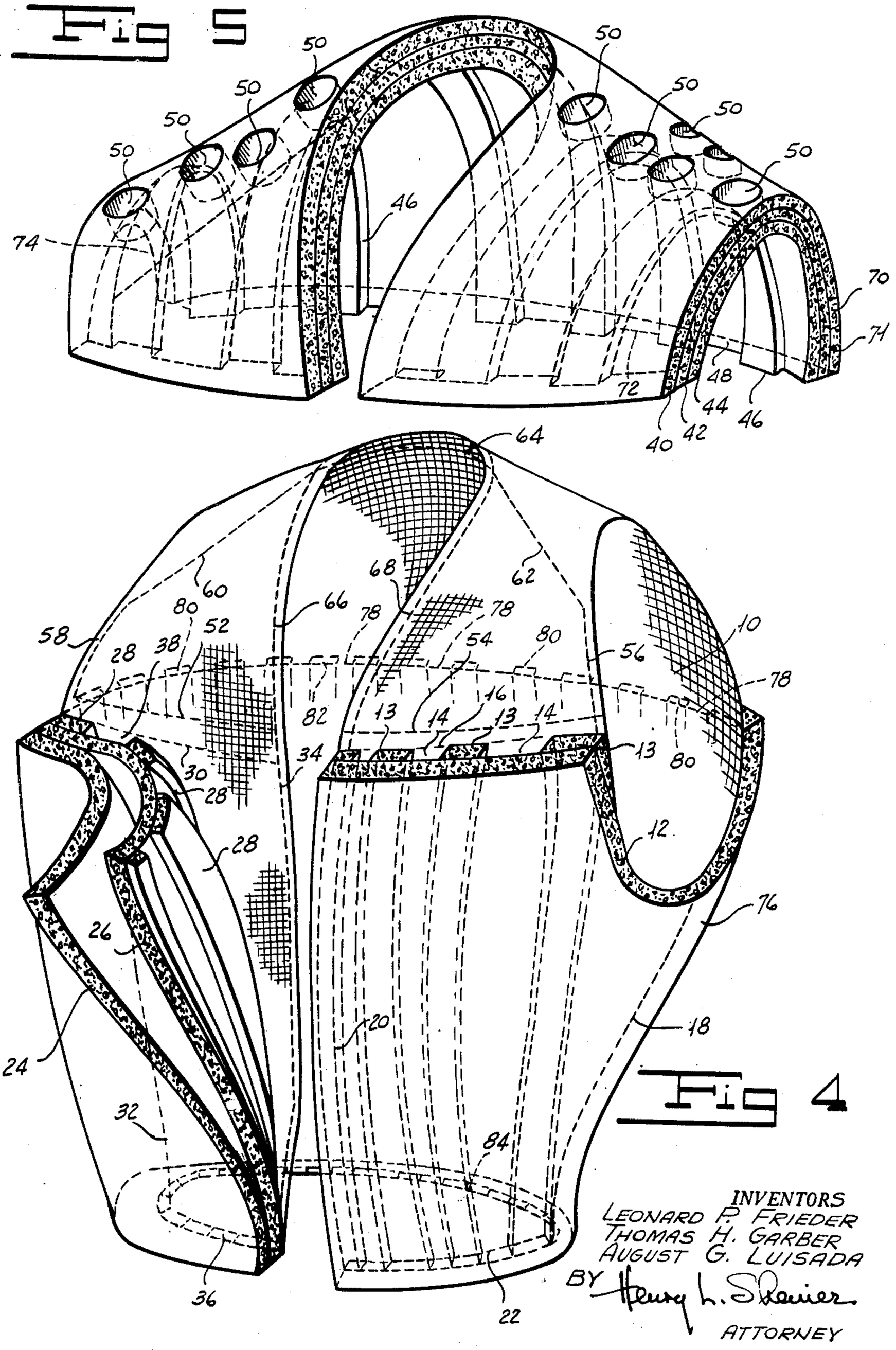

Fig 4

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BUOYANT VEST

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7 Claims. (Cl. 9—20)

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Our invention relates to buoyant vests, and more particularly to an improved buoyant vest adapted to be worn in comfort during shipboard activities and on small boats and which will support a wearer in the water in a position with his head and face out of water for extended periods of time in safety and in comfort.

The buoyant vests of the prior art have been bulky, uncomfortable to wear, and confining to the user. It is frequently desirable that life jackets be worn prior to proximate immersion in water. On shipboard when cruising in submarine areas during wartime it is frequently necessary that life jackets be worn for extended periods of time during which their wearers must perform their usual shipboard duties. Then, too, men engaged in work on bridges, in shipyards, on piers and the like, should wear life jackets for safety. Due to the uncomfortable experience of carrying the life jackets of the prior art around, men frequently assumed the risk rather than suffer the annoyance and restriction of movement accompanying the use of life jackets of the prior art. Fishermen, sportsmen in sailboats, outboard motorboats and the like, frequently wear life jackets only to find that those available are uncomfortable and impede normal activities out of the water.

One object of our invention is to provide a buoyant vest of minimum bulk consonant with the function of the vest of maintaining the wearer with his head and nose out of the water with maximum freedom of movement and comfort not only out of the water but also in the water.

Another object of our invention is to provide a buoyant vest which will support a wearer in a substantially upright, slightly backwardly inclined position in the water and which will position a wearer in this fashion even though he be unconscious.

Another object of our invention is to provide a buoyant vest which is sufficiently ventilated so that it may be worn for long periods of time in warm climates such as encountered in the tropics.

Another object of our invention is to provide a buoyant vest of such comfort that it may be worn for long periods of time without chafing and may be worn while sleeping without discomfort.

Another object of our invention is to provide a buoyant vest which normally has the minimum buoyancy necessary for flotation so that it may be formed with minimum bulk and which has additional inflatable elements of minimum bulk which may be inflated by the user in the water to provide additional buoyancy if desired.

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Another object of our invention is to provide a buoyant vest which will support a wearer in the water in comfort over long periods of time with minimum chafing or abrasion to the skin of the wearer.

Another object of our invention is to provide a buoyant vest which may be used to jump from heights into the water with safety.

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 perspective view of our buoyant vest containing one embodiment of our invention with a portion of the collar broken away to show its construction.

Figure 2 is a perspective view showing the position assumed by our buoyant vest in use in the water.

Figure 3 is a longitudinal sectional view of our vest with the collar removed.

Figure 4 is a perspective view showing the construction of our vest with the hood, the collar and the outer fabric of our vest removed.

Figure 5 is a perspective view showing the construction of the hood.

In general, our invention consists of a vest made of a lining of net or like porous material to which is secured from the waist to adjacent the armpits a plurality of masses of cellular rubber or elastomer. This material, unlike sponge rubber, in which the air spaces of the material are interconnected, is composed of minute cells each of which is individually encased in a wall of rubber like so many tiny balloons. The cells are filled with an inert gas, such as nitrogen or carbon dioxide. Since there is no communication between the 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, depending upon the degree of expansion, as compared with actual rubber, which, before expansion, has a density of about sixty-four pounds per cubic foot.

The mass of rubber adjacent one side of the front, say the left side, is slightly less in volume than that adjacent the right front side of the vest. This eccentricity of buoyancy, as pointed out hereinafter, insures a turning moment in calm water. The mass of buoyant material secured to the back of the vest is less than that across the front of the vest. The upper portion

of the vest around the neck and upper shoulders is comprised of a hood formed of the cellular flexible buoyant material. The masses of buoyant material are provided with vertically extending air passages and the hood is provided with openings adjacent these passages to permit warm air to rise upwardly, thus ventilating the vest. The front of the hood is secured to the vest, and the back of the hood is secured only around the neck, so that the hood is adapted to float free of the shoulders when the jacket is immersed. The masses of buoyant material are covered with an outer fabric which may be fitted with pockets in front. The pockets contain inflatable cells. The arrangement is such that the normal buoyancy of the buoyant masses is just sufficient or slightly more than sufficient to support a wearer's head above the water. For comfort and ease in breathing, an increased buoyancy is required, and this is supplied from the inflatable cells in the pockets. A crotch strap is provided for holding the vest in place, and a collar adapted to fit around the chin and back of the neck of the wearer may also be provided.

Referring now to Figure 4, the vest is formed with an inner lining material **10** which may be made of a net or other similar porous material sufficiently strong to form the base for the buoyant material. A section of buoyant material for the left front of the vest is composed of a sheet **12** of closed-cell blown elastomer, which may be natural or synthetic rubber or the like. This sheet extends from the breast to the waist and is formed of two thicknesses. The second thickness **13** is in the form of vertically extending ribs which may be either integral with the sheet **12** or may be separate strips cemented to or otherwise secured to the sheet **12** in such a manner as to provide longitudinally extending air passageways **14**. The left front mass may be joined to the lining **10** by horizontal seam **16** and vertical seams **18** and **20** and a cross bottom horizontal seam **22**, which seams connect the outer fabric **86** to the inner lining **10**. The right front of the lining **10** holds a buoyant mass comprised of sheet **24** of cellular elastomer of the closed-cell blown type, sheet **26** similar to sheet **24**, and a plurality of ribs **28** similar to ribs **13**, either formed integrally with sheet **26** or secured thereto in any suitable manner. The right front buoyant mass, composed of the two thicknesses plus the ribs, is sewed to the lining along top horizontal seam **30**, outer fabric seam **32**, inner vertical seam **34** and bottom horizontal seam **36**. It will be observed that the left front buoyant mass is of less volume than the right front buoyant mass. When the right front buoyant mass is sewed to the lining, or otherwise secured thereto, the ribs **28** will form vertical air ducts **38** similar to the air passageways **14** formed by the ribs **13** of the left front buoyant mass.

A yoke or hood, as shown in Figure 5, is adapted to fit over the shoulders and around the neck of the vest. It is composed of a buoyant mass formed of three layers or sheets **40**, **42** and **44** of closed-cell blown elastomer and a plurality of ribs **46** of the same material defining air passageways **48** therebetween. Along the upper portion of the shoulder we provide a plurality of openings **50** communicating with the air passageways through which air heated by the body of a wearer may rise and escape. The lower front portion of the yoke is secured to the lining **10** by sewing along front seams **52** and **54** and side seams **56** and **58**, which extend only part of the way around

the arms. The yoke is then secured to the lining along seams **60** and **62**, joining each other by seam **64** around the back of the neck. From the back of the neck to the seam **52** the yoke is secured by a seam **66** on the right side and by a seam **68** along the left side of the jacket. The left-hand rear edge **71** of the hood **70**, the entire lower back edge **72** of the hood, and the rear right edge **74** of the hood are free and not secured to the lining. The holes **50** not only provide venting of the air passageways but also make the main body of buoyant material over the shoulders more compressible, permitting easy raising of the arms of the wearer. The seams **60** and **62** are tangent to the back of the neck seam **64** and when on a wearer form approximately an angle of ninety degrees with each other. The arrangement is such that when the jacket is worn in water, the rear of the hood will be lifted, causing it to assume the shape of a truncated cone with the upper portion of the cone around the head of the wearer supporting it out of water in easy breathing position.

The buoyant masses of the hood, as can be seen by a reference to Figure 3, have their lower edges spaced from the upper edges of the rear buoyant mass **76** and from the upper edges of the left and right from buoyant masses. This provides an area into which or out of which air may flow from the lower air passages. The lower portion of the rear of the lining holds a rear buoyant mass **76** which is of much less volume than the front buoyant masses. It, too, has a plurality of ribs **78** defining vertical air passages **80**. The buoyant mass **76** is confined by the lining and the fabric **86** along an upper seam **82**, the side seams **18** and **32** and a rear lower horizontal seam **84**. The outside of the hood is formed by fabric **88**. This fabric may be dyed with a dye of a bright color easily visible in the daylight and locatable at night by its ability to fluoresce under searchlights containing an ultraviolet element of the spectrum. In addition, the fabric covering and the lining may be treated with any mildew-resistant material known to the art.

It will be observed that the sewing of the front covering to the back lining forms a series of pockets into which the buoyant masses are positioned. The lining and the front covering protect the cellular rubber material. To the front of the outer covering **86** we secure a pair of pockets **90** and **92**. These pockets are sewed adjacent the front covering of our vest along the upper seams **94** and **96** and vertical seams **98** and **100**. Each of the pockets contains buoyant material and an inflatable balloon **102** each fitted with a tube **104** through which the inflatable balloons or bladders may be inflated. If desired, a small cylinder of compressed gas, as is well known to the art, may be used to inflate the cells **102**. These cells, when inflated, provide additional buoyancy in front of the jacket.

The buoyant masses we have thus far described are sufficient to support a wearer in the slightly inclined, face upward position shown in Figure 2, though the buoyancy is not sufficient to hold the wearer out of the water in easy breathing position when the water is rough. In other words, the buoyancy of the jacket is slightly below that desired for safety at sea under all conditions. In order to be able to provide a jacket which can be worn with comfort for shipboard duties or in and about the water we have reduced the buoyancy of the fixed buoyant masses to a point below the desired buoyancy but

still sufficient to float a wearer. When immersion takes place, a wearer inflates the cells in the pockets so that these will assume the position shown in Figure 2, thus maintaining the wearer in a comfortable position for easy breathing.

A belt 106 is secured to the lower portion of the vest in any suitable manner and is provided with a front buckle 108. A crotch strap 110 in the form of a V is secured to the back of the belt adjacent the upper portions thereof. A connecting buckle 112 secures a single front crotch strap 114 to a snap hook 116 through an adjustable buckle 118. The snap hook is adapted to be secured to a ring carried by the jacket. A wearer may be lifted from the water by means of this belt, if desired.

A collar 120, which comprises a sheet of cellular rubber material 122 enclosed in a fabric cover 124 may be sewed to the jacket as shown in Figure 1. This collar is provided with a buckle 126 and a chin strap 128 for securing the collar around the head of the wearer, as shown in Figure 2. The collar cradles the head and prevents it from dropping to the rear or to the sides when a person is unconscious. When the chin strap is secured, the collar will prevent the head from dropping forward, so that a wearer may sleep with safety in the water.

The total buoyancy of the front masses is greater than the buoyancy of the rear masses, thus inducing a turning movement constraining the wearer to float in the front upward position. The buoyancy of the rear masses, principally that of the free end of the hood, is such that the wearer will be floated in the inclined position with his head resting on the hood which, due to the manner in which it is secured to the lining, will form a truncated cone faced downwardly. The securing of the pockets so that the lower ends are free causes these to move upwardly and away from the body when inflated, as shown in Figure 2. In this position the buoyant cells apply a much greater turning moment to the body, insuring that the position at which the wearer floats will be rearwardly inclined, that is, face upwardly. The ventilating channels provide sufficient circulation of the air to keep the wearer comfortable when wearing the jacket on shipboard, even in warm climates. The reduction of the buoyant material in volume, accompanied by the use of an extremely light buoyant material, prevents the jacket from being ugly and bulky, as is the case with traditional life vests.

The arrangement of the buoyant material around the head has a strong directing force on a body dropped in any position in the water, insuring the turning of the body, head upwardly. The distribution of the buoyant masses insures that a person will float face upwardly. The provision of a greater buoyant mass on the right side of the front than on the left side of the jacket, as pointed out above, will turn a person face upwardly even in calm water. This prevents the center of gravity and the center of buoyancy from reaching a position of dead center, as might be the case if an unconscious person were immersed face downwardly in the water. The uneven distribution of the buoyant masses in the front of the jacket insures a turning moment when a person is lying face downwardly. This turning moment, once started, turns the face out of the water, in which position our jacket will maintain a wearer.

The collar is raised automatically upon immersion of the jacket on a wearer in the water. It provides sufficient turning moment to turn a wearer face upwardly with a minimum of buoyant masses. In a series of jumps from heights it was found that the jacket immediately brought the wearer to the surface and in a rearwardly inclined, face upward position. Lying face downwardly in calm water, the jacket turns a person face upwardly in a matter of seconds. A person wearing the jacket in the water may swim with ease. By inflating the cells of the pockets a wearer will be supported out of the water a greater distance than otherwise and sufficient buoyancy is present to support a wearer for long periods of time. The particular cellular rubber material is such that its rate of water absorption is substantially negligible so that there is little loss of buoyancy over long periods of time. Only the chafing of the surface of the rubber material and the rupture of the cells reduces buoyancy and this is confined to the surface. Furthermore, the fabric covering keeps this action to a minimum. It will be observed that the ventilating passages 80 and 28 and the corresponding upper passages 46 extend substantially vertically and are positioned adjacent the body of a wearer. This can readily be seen by reference to Figure 3. The passages form flues. They are open at the bottom and communicate to the atmosphere adjacent their upper portions. In this manner as the air in the passages becomes heated from body heat the heated air will rise escaping to the atmosphere at the top and being replaced by cooler air coming into the passages at the bottom. As pointed out above, the lower ends of the passages in the hood also communicate with the atmosphere and are vented at their upper ends by the apertures 50. Cool air will be drawn into the bottom of these and pass upwardly to the apertures 50. A portion of the air from the bottom passages may also flow upwardly through the passages 46 admixed with cool air. It is believed that the manner in which the ventilating passages function will be clear from the drawings and the structure described above.

It will be seen that we have accomplished the objects of our invention. We have provided a buoyant vest of minimum bulk consonant with the duty of the vest to maintain a wearer with his head and nose out of water, affording maximum freedom of movement and comfort both in the water and out. We have provided a vest which will support a wearer in a substantially upright, slightly backwardly inclined position in the water even though the wearer be unconscious. Our buoyant vest is provided with ventilation so that it may be worn for extended periods of time in warm climates without undue discomfort and without chafing. Our buoyant vest is such that additional buoyancy may be given to the assembly by inflating inflatable members positioned in effective locations.

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 buoyant vest including in combination a fabric foundation provided with armholes, and including front and back portions, masses of cellular buoyant material secured to said fabric foundation at said front and back portions and means providing elongated vertically extending ventilating passages formed in said masses of cellular buoyant material adjacent the body of a wearer and means providing communication with the atmosphere adjacent the bottom and top of said passages.

2. A buoyant vest as in claim 1 in which said fabric foundation is formed of porous material.

3. A buoyant vest including in combination a fabric foundation provided with a front, back and armholes, a lower mass of buoyant material secured to the fabric foundation and extending from the waist to adjacent the armholes, a hood formed of flexible buoyant material extending over the shoulders of the fabric foundation in front and in rear and having its lower portion terminating adjacent the upper portion of the lower mass of buoyant material, means securing said hood to the fabric foundation along the lower front portion thereof and along the shoulders of the fabric foundation, the rear portion of said hood being unattached to the fabric foundation, the construction being such that when the buoyant vest is immersed in water upon a wearer the rear of the hood will float away from the fabric foundation to support the back of the head of a wearer.

4. A buoyant vest as in claim 3 in which said buoyant material is formed of masses of cellular elastomer having vertically extending ventilating

passageways and said hood is formed with a plurality of openings communicating with said passageways.

5. A buoyant vest as in claim 3 in which said fabric foundation is formed of porous material.

6. A buoyant vest as in claim 3 in which said buoyant material is formed of cellular elastomer masses secured to the front of the vest in a plurality of layers.

7. A buoyant vest as in claim 3 in which the flexible buoyant material of the hood is formed of cellular elastomer masses disposed in a plurality of layers.

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