Oct. 17, 1933. G. P. DENTON 1,931,406

BUOYANT LIFE PRESERVER

Filed Oct. 21, 1931

Fig. 1.

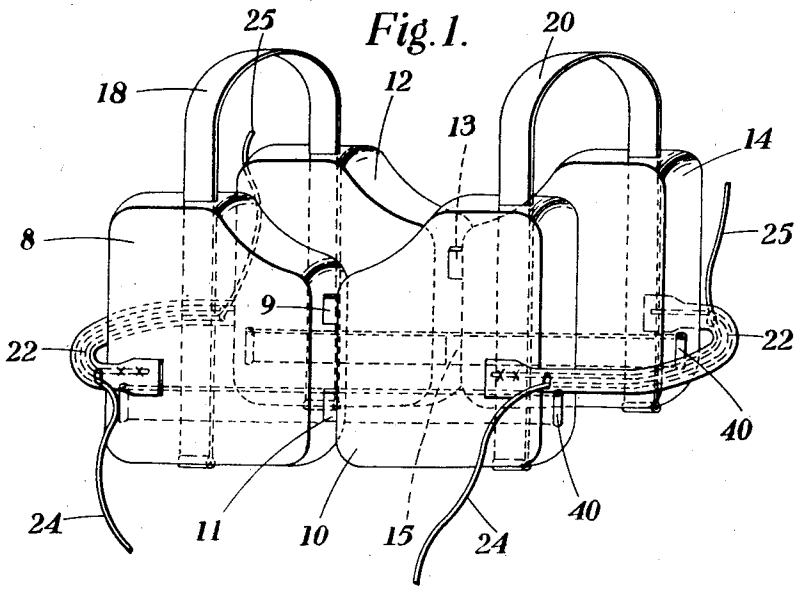


Fig. 2.

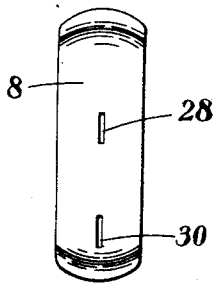


Fig. 3.

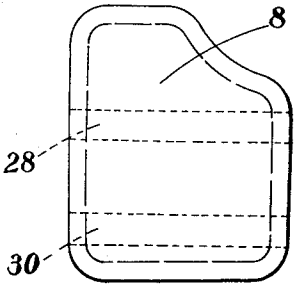


Fig. 4.

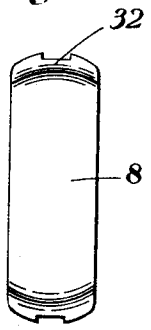


Fig. 5.

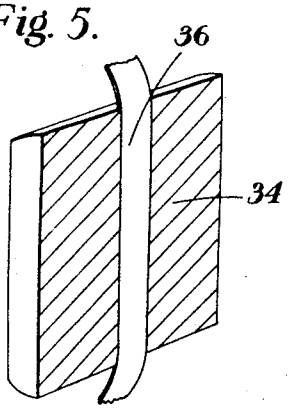
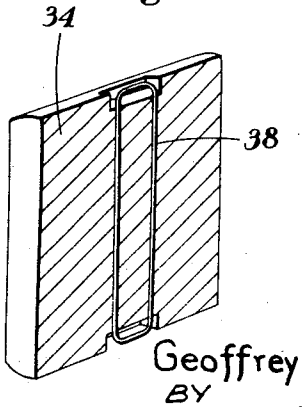


Fig. 6



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BUOYANT LIFE PRESERVER

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3 Claims. (Cl. 9—17)

This invention has reference to improvements in or relating to buoyant life preservers.

In the case of buoyant life preservers, of which vast numbers are required to be stored on board ships, it has long been recognized that they are by no means perfect and many attempts have been made to improve on them.

Although the defects inherent in preservers in use are well known, no satisfactory substitute has heretofore been found.

The most serious defect inherent in buoyant life preservers heretofore almost universally in use is that the buoyant blocks usually of cork are contained in the pockets of linen jackets, the said jackets being very liable to rot, and also liable to harbour dirt and vermin when the preservers are stowed away on board ship; further they are cumbersome in storage and in wearing.

Notwithstanding these defects, and various efforts from time to time made to obviate them, the said life preservers are still practically the only ones in use in ships.

Various forms of buoyant life preservers have been proposed in which the use of a linen jacket is obviated such for example as those in the form of a wide body belt with loose ends to be tied, made by stringing a number of cork or wood blocks, at distances apart, on a pair of ropes.

This form of preserver not only takes up much stowage space but it is very unwieldly because it is by no means easy even for a strong man to put it around his trunk evenly and level and then to tie the ends first of one rope and then the ends of the other rope. For most women and young persons this is an almost impossible task to accomplish in the excitement and panic probably prevailing at the time the preservers are to be put on. Also there is a considerable risk of the person getting his or her arms entangled in the mass of ropes and loops or openings between the spaced blocks. This form of preserver is therefore useless on board ship.

It has also been proposed to make a life preserver of a single piece of rubber sponge material and, in order to ensure the buoyancy thereof, to produce on its outer face or to cover it with a thin layer of material whereby access of water to the sponge rubber body of the preserver is prevented.

Life preservers thus made are seriously defective in that, if the outer protecting coating be perforated or torn, the body of the preserver will absorb water and therefore rendered practically useless. Further it is obvious that rubber sponge material is not practically suitable for connecting two or more buoyant blocks together because the material is too easily damaged or torn.

The main object of my invention is the provision of a buoyant life preserver that obviates the defects of those in use or proposed and which, further, is not only more buoyant—assuming equality of bulk—than any buoyant life preserver heretofore in use or proposed, but is non-absorbent of water, which is not the case either with cork, wood, sponge rubber, or kapok, and which will retain its buoyancy practically unimpaired even when punctured or torn.

To this end an important feature of my invention consists in a buoyant life preserver which comprises buoyant blocks for the front and back of the wearer which blocks are directly connected at their upper ends by shoulder straps and at their lower part by body tapes, all so arranged that the preserver may be placed above the head and dropped so that the shoulder straps engage on the shoulders and then the body tapes tied at the front. The body tapes are always in situ and whether one block or the other be at the front of the wearer there will be a pair of tapes ready for tying as soon as the blocks are supported by the shoulder straps.

The buoyant blocks, in their most desirable form, consist of expanded rubber of the kind in which the rubber material is in the form of froth, that is to say the expanded rubber material consists of innumeral gas containing cells the walls of which are homogeneous films (as distinct from rubber sponge the cells of which are separated by films that are not homogeneous) and which blocks of rubber froth are directly connected to each other by members of non-rubber material, such as tapes of linen or other woven fabric or metal wire or links.

By the construction described, a buoyant life preserver is obtained that is extremely simple in construction and may be quickly put on; that occupies the minimum of stowage space, is, bulk for bulk, more buoyant than any heretofore in use or proposed, and avoids the other defects of the known or proposed life preservers.

The buoyant blocks, when consisting of rubber froth, are made by subjecting rubber or rubber compound, containing vulcanizing material, to the action of heat and injecting air or preferably an inert gas such as nitrogen at a considerable pressure into the softened mass or dough until the gas is absorbed and contained in minute cells divided from each other by thin walls of the material, thereby constituting a

rubber froth that may be moulded to the desired form.

For producing the rubber froth slabs or blocks, I employ rubber and a suitable vulcanizing material, such as sulphur, together with other substances depending upon whether the finished blocks are to be fairly hard or less hard or soft.

I propose to describe a composition whereby buoyant blocks weighing not more than about five pounds or even less per cubic foot may be produced.

This consists of rubber 60%, sulphur 25%, hydrocarbon 6%, calcined magnesium 3%, ceresine wax 1% and colouring matter 5%. In place of the colouring matter the percentage of rubber may be increased.

This compound or dough is subjected in a suitable mould to heat and gas pressure, the temperature being obtained by gradually admitting steam at a pressure of about 8 lbs. into the jacket of an autoclave in which the mould is inserted and the pressure of the gas about 180 atmospheres. This temperature and pressure will be maintained for a period of about 400 minutes.

The steam is then shut off and the apparatus allowed to cool down—this may be expedited by circulating cold water through the jacket.

The rubber material is then removed from the box or mould (when it will expand to about six times its original bulk) and is inserted into another and larger mould and this is then subjected to the action of heat, by steam being gradually admitted to the jacket of a container or press in which the mould is placed until a pressure of about 85 lbs. is reached and this maintained for a period of about 45 minutes.

The partly expanded and vulcanized material will in the second box or mould be further expanded so that it takes the shape of the mould and at the same time its vulcanization is completed.

By the use of buoyant expanded rubber or rubber froth—and by reason of the fact that it is possible to make blocks of this the weight of which does not exceed 5 lbs. per cubic foot—not only is great buoyancy obtained but the buoyancy will be retained almost completely should the block be punctured or even torn, because in such event only the cells the thin walls of which have been ruptured will admit water. Further, blocks of expanded rubber or rubber froth may be immersed almost indefinitely in water without appreciably absorbing water, which is not the case with cork and other buoyant materials heretofore used in life jackets. Also it is not necessary to provide an outer protecting skin or coating to ensure the buoyancy of the block.

It is desirable that the buoyant blocks or slabs of the completed life jacket should be reasonably smooth and free from surface protuberances and to attain this I mould the slabs in such a way that those parts of the straps which connect directly to the slabs are sunk below its surface.

For example I may mould each block or slab so that it has an internal slot or channel that extends from one side face or edge to the opposite edge of the slab, through which slot the shoulder or other strap is to be passed and then secured in any suitable manner. The number of slots thus moulded in the slab will depend upon the number of straps it is desired to secure to the slab.

Alternatively I may mould the slab with an external channel around its side edges in which channel a strap is to be received and, when drawn taut secured in position. The strap is preferably of metal and constitutes an anchorage to which the flexible shoulder straps are secured. The shoulder and other straps may be secured in any suitable manner to the strap around the block or slab.

Or I may mould the slab by building it up in a mould of two or more thinner slabs and insert the end of the strap between the thin slabs so that, when the moulding and final vulcanization by heat and pressure, is effected, the slabs will fuse together into a homogeneous thicker slab and the end of the strap will have become securely anchored in the body of the slab.

As a further alternative method I may mould a steel or other metal wire into the slab in the manner just described, so that it becomes anchored in the slab, the ends of the wire being formed into loops or equivalents which project from the slab at its edge or edges and to which the flexible straps are to be connected in any suitable manner. In this instance it may be desirable to mould the slab with a recess at the part where the loop or the like protrudes from the body of the slab so that said loop will not project beyond the plane of the edge of the mould.

When moulding the block or slab with an internal or external channel I may employ a metal or other suitable pattern for insertion in appropriate position in the mould and which pattern has been treated, for instance by being smeared with oil or grease, or other lubricant, so that the rubber compound will not adhere to it during the moulding operation.

The lower parts of the front and rear blocks are connected by a pair of straps and tapes so arranged that the ends of the tapes are easily accessible for tying and by which tapes the blocks may be firmly secured to the trunk and further so that this may be done whether the preserver be put on with one or other of the blocks at the front of the wearer's body. That is to say the preserver is reversible.

In the accompanying drawing I have illustrated a simple constructional form of my improved life jacket. In the drawing Fig. 1 is a perspective view of the complete jacket and Figs. 2, 3, 4, 5 and 6 show alternative constructions of details to be referred to.

In the drawing the numerals 8, 10, 12, and 14 indicate four shaped or moulded blocks of buoyant material two of these 8, 10, (or 12, 14) are intended to be placed against the front and the other two against the back of the wearer. The blocks 8, 10 are connected by straps 9, 11, which may be of linen or other suitable material and the other two blocks are connected in similar fashion by straps 13, 15.

The blocks are also connected, by shoulder straps, the blocks 8 and 12 being connected by a shoulder strap 18 and the blocks 10 and 14 by the shoulder strap 20.

The straps may be secured to the blocks in any suitable manner. For instance I may form the block with slots such as 28, 30, Figs. 2 and 3 and pass the straps through these and at their ends I form the strap with an enlargement 40 (for instance by rolling a short length of the strap and securing the rolled portion by sewing or otherwise) to prevent their being pulled out. If desired said straps may be formed with enlarge-

ments at the part intermediate of the adjacent blocks 8 and 10 or 12 and 14. The shoulder straps will also be provided with means to ensure their being held in place.

The lower parts of the blocks will be provided with means, such as a tubular strap 22 at each side of the "jacket" and secured at their ends to a front and to a back buoyant block respectively, through which pass tapes or the like 24, 25 the end of one 24 being secured to the block 14 (or to the tubular strap at that part) its other end projecting through a slot at the front of the tubular part and the other tape being secured to the front block (or the tubular strap at that part) and its other end projecting through a slot in the tubular strap, about as shown so that whether the blocks 8 and 10 or the blocks 12 and 14 are at the front the wearer merely takes a hold of the forwardly projecting tapes 24, 24, or 25, 25, and pulls on them to draw the blocks firmly against his trunk and he then ties the tapes.

If desired the ends of the tubular straps 22 may be anchored in the blocks by being inserted between the strips or slabs prior to the joining together of said strips or slabs in a mould by the application of heat as described, the said ends having enlargements or being provided with hooks or the like and to constitute anchors within the finished blocks.

If desired the tapes may be inserted in the mould in which the expansion of the rubber material is effected so that it becomes embedded therein as indicated diagrammatically in Fig. 5 in which 36 indicates the strap and 34 one half of the block.

Or I may employ a metal wire formed for example into a link or loop as shown at 38 in Fig. 6 and mould this in with the expanded rubber block, the ends of the loop protruding so that linen tapes or metal links may be readily secured to them and thereby two or more blocks connected in about the fashion above indicated. It is desirable that the outer edges of the blocks shall be free from projections and therefore I make the mould so that recesses are formed in the block at the part where the wire link or loop is provided. As a further alternative I may mould the block with an external groove or channel 32 Fig. 4 to receive a strong band preferably of metal to constitute an anchorage to which the flexible shoulder straps are secured.

Or I may anchor the headed shanks or metal or other hooks, eyes or equivalent in the body of the block so that they become anchored in the block and to which flexible or like connecting pieces, shoulder straps or the like may be secured.

The blocks or slabs of rubber froth may be unprotected in any way. They may be painted or metal sprayed. Or they may have perforated metal or mesh wire, or wire gauze moulded upon the surfaces; or likewise, canvas or linen may be moulded on to the surface.

In these latter cases the linen, canvas, metal or other suitable material having been cut to size, is placed in the mould above and below the blocks or slabs and when the moulding is finally effected the expanded rubber or rubber froth becomes compressed on the surface of the material and for all practical purposes forms an integral part thereof. Being firmly attached to the rubber material, like a taut skin, it cannot provide a harbouring place for pests, neither is the linen so liable to rot as the comparatively voluminous life jacket of standard design. But even were it to rot in time the buoyant efficiency of the jacket will remain unaffected, for the material in question is not there for the purpose of retaining the buoyancy of the slabs, but merely offers them superficial protection.

These outer coverings will serve to protect the material, to some considerable extent, from abrasions.

Alternatively, to give the material a tougher exterior, I may calculate the thickness of the material required so as to leave room for the addition, in the final moulding operation, of a thin slab of material, placed on top and bottom surfaces.

This material, ⅛" thick or less, will be of greater density than the material of which the main body of the block is composed. Consequently, it will be somewhat heavier.

During the gassing process a skin will have been formed on each side, and being thin, the proportion of hard skin (when finally vulcanized) to internal cellular structure will be relatively high.

During the moulding operation the expansion of the material in the mould will have the effect of welding the thin top and bottom strips on to the body of the material so that they become as one and definitely inseparable. The effect is to reinforce the block against damage due to pressure or abrasion.

I wish it to be understood that I do not limit the scope of my invention to the particular constructional form thereof described nor, when the buoyant blocks are made of rubber froth, to the particular rubber composition described, nor to the processes or temperatures or times stated.

What I claim is:—

1. A life preserver comprising a block of rubber froth for the front and a block of rubber froth for the back of the wearer, vertical slots in the blocks, and shoulder straps engaged in said slots.

2. A life jacket comprising buoyant blocks, a groove around the periphery of said blocks, a non-rubber binding in said grooves, and flexible members connected to said binding.

3. A life preserver comprising a pair of buoyant blocks for the front and a pair of buoyant blocks for the back of the wearer, horizontal slots in both pairs of blocks, flexible members engaged in said slots, vertical slots in both pairs of blocks, and flexible shoulder straps engaged in said vertical slots.

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