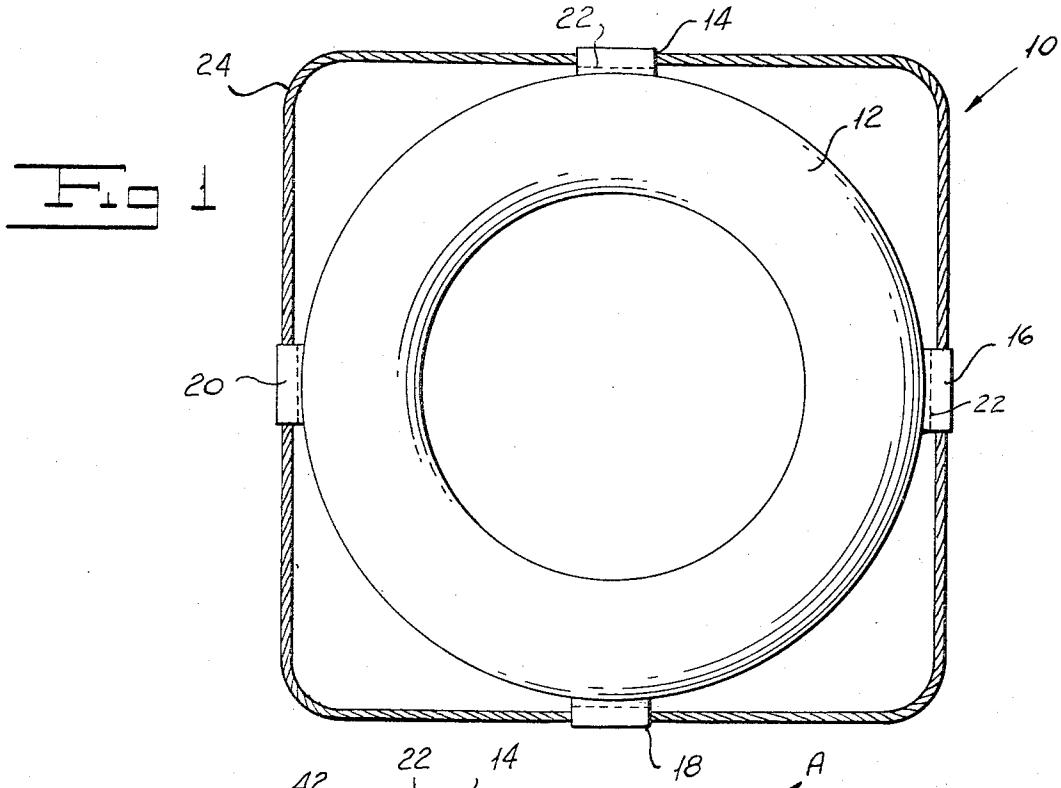
Nov. 21, 1967 L. P. FRIEDER ET AL 3,353,197

LIFE RING

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Fig 1



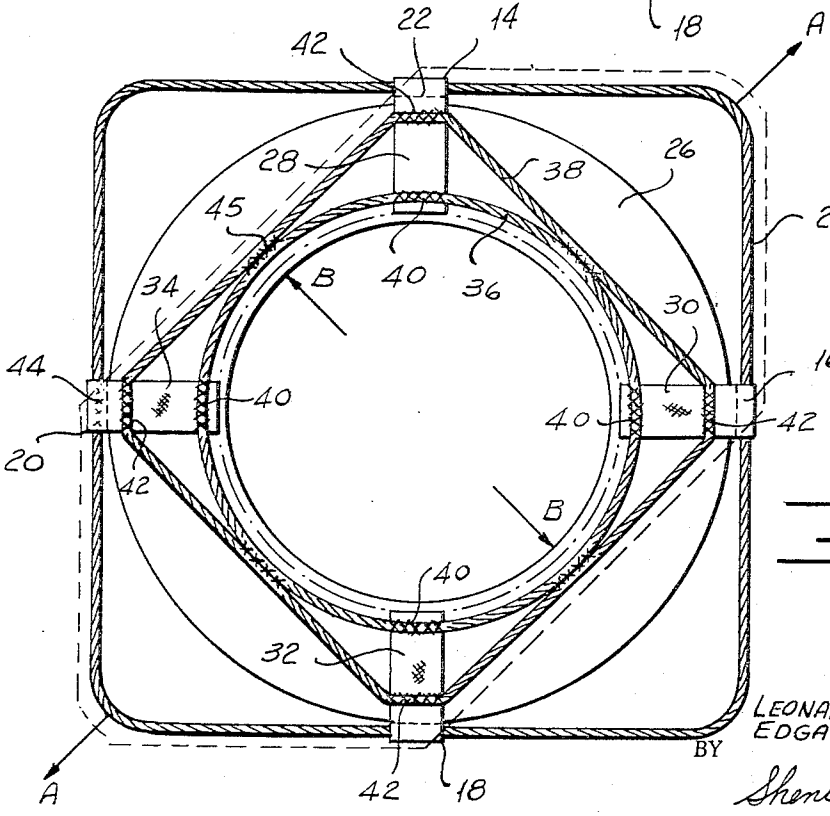


Fig 2

INVENTORS
LEONARD P. FRIEDER
EDGAR G. BAKER

BY

Shenier & Connor

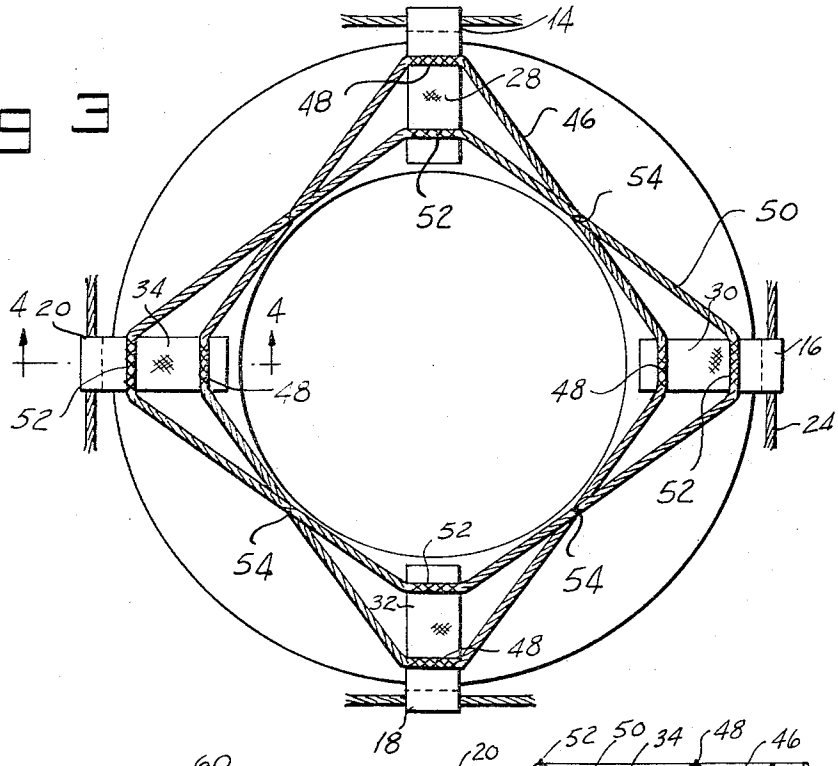
ATTORNEYS

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Fig 3



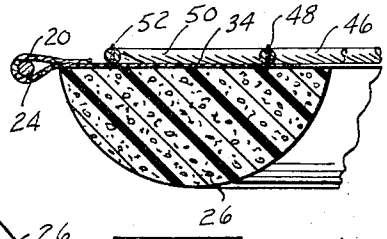


Fig 4

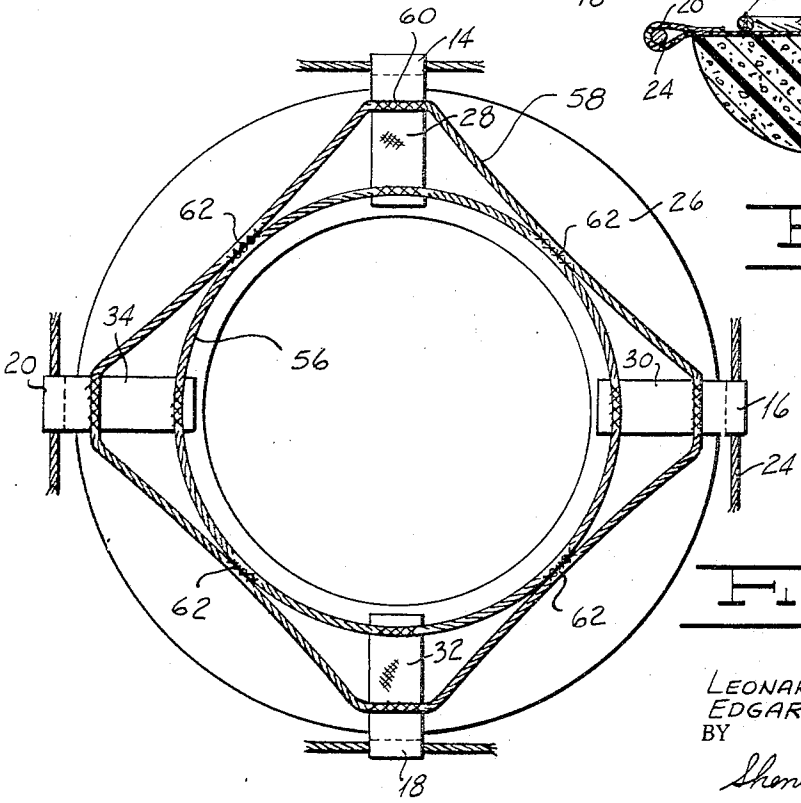


Fig 5

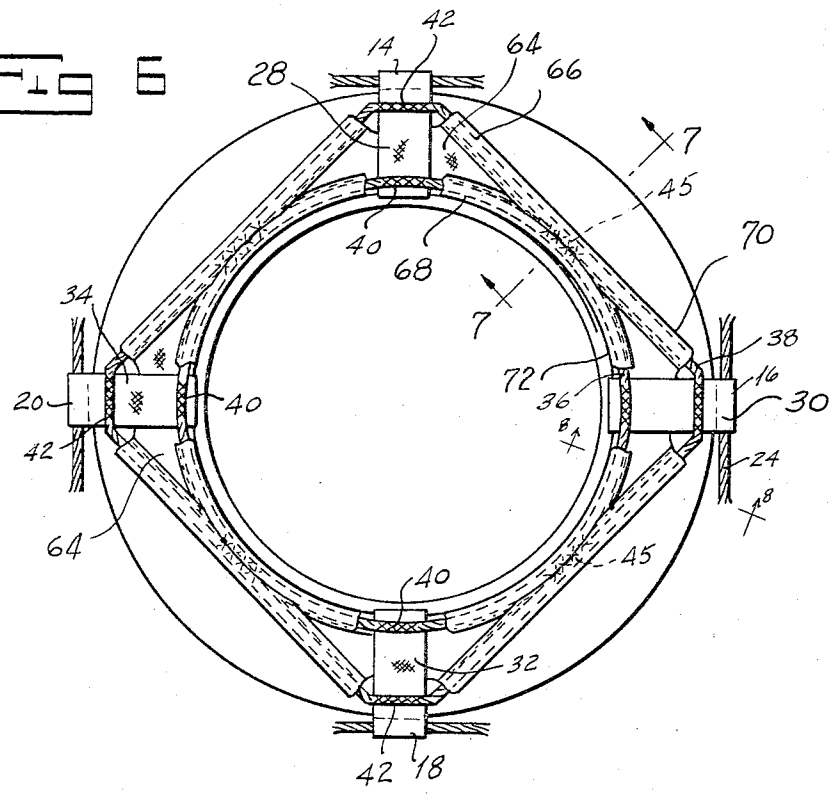
INVENTORS
LEONARD P. FRIEDER
EDGAR G. BAKER
BY
Shenier & Connor
ATTORNEYS

Nov. 21, 1967 L. P. FRIEDER ET AL 3,353,197

LIFE RING

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Fig 6



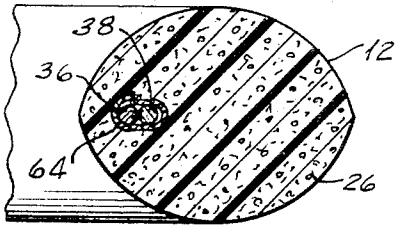


Fig 7

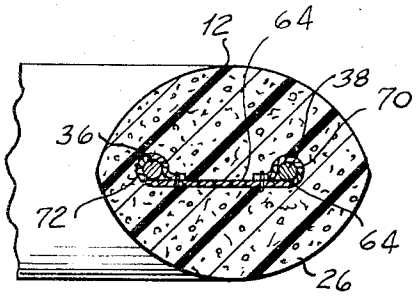


Fig 8

INVENTOR.
LEONARD P. FRIEDER
EDGAR G. BAKER
BY
Shenier & Monnot
ATTORNEYS

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3,353,197

LIFE RING

Leonard P. Frieder, Clarks Green, and Edgar G. Baker, Carbondale, Pa., assignors to Gentex Corporation, New York, N.Y., a corporation of Delaware

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7 Claims. (Cl. 9—311)

ABSTRACT OF THE DISCLOSURE

A lift ring comprising an annular body of soft and resilient buoyant material in which there is embedded flexible cordlike material extending completely around the body and including an external line provided with means for securing the line to the material embedded in the body at spaced points therearound.

Our invention relates to a life ring and more particularly to an improved life ring which is soft and resilient and which has a relatively high resistance to tension applied to the ring.

There are known in the prior art life rings to which a surrounding length of line is secured to permit a person to hold the ring. Rings of this type must of course be buoyant so as to assist a person in remaining afloat. Moreover, if rings of this type are to achieve their intended purpose, they must be sufficiently strong to permit a person grasping the ring to be drawn through the water. Not only must they permit the person to be drawn through the water but they should have sufficient strength to permit the person grasping the ring to be drawn out of the water and up onto the deck of a rescue ship, for example, by means of the ring.

Rings of the type described above originally were machined from a material such as cork which not only is buoyant but which has sufficient structural strength to permit the rescue operations described above to be carried out. More recently, high density expanded vinyl plastic has been substituted for cork. When that material is used it is molded in a relatively small size and then expanded approximately 3 to 1.

Rings of the type described above have a generally elliptical cross-section with a relatively sharp peripheral edge. Owing to the requirement for structural strength consistent with the buoyancy requirement, both the cork and the expanded vinyl resins of the prior art are hard and non-resilient. This characteristic is highly undesirable in that in use very often the ring is thrown to a person in the water and may strike his head resulting in some injury, if not in rendering the person unconscious. Moreover, owing to the hardness of the rings of the prior art, they are not readily grasped with the hand save by means of the peripheral line.

We have invented an improved life ring which overcomes the defects of rings of the prior art. Our ring is softer than are rings of the prior art and at the same time is resilient. While being soft and resilient, our ring has sufficient structural strength to permit a person grasping either the ring itself or the surrounding line to be drawn from the water by the ring. Our ring is highly resistant to tension applied to the ring at the inner edge thereof. Our ring also is highly resistant to tension applied to the ring through the surrounding line.

One object of our invention is to provide an improved life ring which is soft and resilient.

Another object of our invention is to provide a soft resilient life ring having sufficient structural strength to permit a person to be drawn from the water by means of the ring.

A further object of our invention is to provide an improved life ring which will not cause injury if it strikes a person in the water.

A still further object of our invention is to provide a soft, resilient life ring which is highly resistant to tension resulting from forces applied to the ring at its inner edge.

Yet another object of our invention is to provide an improved life ring which is highly resistant to tension applied to the ring through the line surrounding the ring.

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

In general our invention contemplates the provision of a safety life ring in which we embed an endless loop of tension-resisting cord in a body of soft, flexible, resilient, buoyant material to resist tension forces applied to the inner periphery of the ring. We secure this loop to the external line surrounding the ring in such a way as to resist tension resulting from forces applied to the line surrounding the ring.

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 plan view of a safety life ring embodying our invention.

FIGURE 2 is a plan view of half of one embodiment of our improved safety life ring.

FIGURE 3 is a plan view of half of an alternate form of our safety life ring with parts broken away.

FIGURE 4 is a sectional view of the form of our safety life ring shown in FIGURE 3 taken along the line **4—4** of FIGURE 3 and drawn on an enlarged scale.

FIGURE 5 is a plan view of half of a still further form of our safety life ring.

FIGURE 6 is a plan view of half of yet another form of our safety life ring.

FIGURE 7 is a sectional view of the form of our safety life ring shown in FIGURE 6 drawn on an enlarged scale and taken along the line **7—7** of FIGURE 6.

FIGURE 8 is a sectional view of the form of our improved safety life ring taken along the line **8—8** of FIGURE 6 and drawn on an enlarged scale.

Referring to FIGURE 1 of the drawings, our improved safety life ring indicated generally by the reference character **10** includes an annular body **12** of flexible resilient buoyant material such, for example, as unicellular foamed plastic. We provide the body **12** with, for example, four loops **14**, **16**, **18** and **20** at spaced locations around the periphery of the body. Each of the loops may be formed from a length of nylon webbing or the like, stitched on itself along a line **22** to form the loop and embedded in the body **12** in a manner to be described hereinafter. The loops **14**, **16**, **18** and **20** receive an endless line **24** to permit a person to hold onto the body **12** without difficulty. Line **24** may be made of any suitable material. It may be braided from nylon yarns. Alternatively, it might be braided from polypropylene yarns to afford a longer life in salt water. If desired we stitch the line **24** to the loops **14**, **16**, **18** and **20**.

Referring to FIGURE 2, the body **12** of our ring may be made in two halves, one half **26** of which is shown in the figure. We secure four spaced lengths **28**, **30**, **32** and **34** of woven tape or webbing of nylon or the like to the flat surface of the half **26** by use of any suitable adhesive such, for example, as an epoxy resin. Before so doing, however, we preferably make a subassembly of the lengths and a first endless cord **36** and a second endless cord **38**, each braided from nylon or from a suitable material of high tensile strength. We secure the cord **36** to the lengths **28**, **30**, **32** and **34** adjacent the inner edges thereof by stitching **40** for example. We secure the cord **38** to each

of the tapes 28, 30, 32 and 34 at points adjacent the outer periphery of the ring half by stitching 42.

As has been explained hereinabove in connection with the showing of FIGURE 1, the outboard ends of the lengths 28, 30, 32 and 34 are folded back on the lengths to provide the loops 14, 16, 18 and 20 which are retained in the lengths by stitching 22. In the course of forming the loops, the line 24 is enclosed in the loops. While we have shown each of the cords 36 and 38 as being formed as continuous lengths, it will readily be understood that a loop could be formed from a length having ends with the ends stitched to the same length of webbing such, for example, as the length of webbing 28 or to each other. After having formed the subassembly, in order to retain it in position with the proper orientation, preferably we cement it to the preformed ring half 26 in the manner shown in FIGURE 2. When that has been done, the other ring half is placed on the ring half 26 so as to sandwich the webbing lengths 28, 30, 32 and 34 and the cords 36 and 38 between the two ring halves and the halves are cemented together by means of an epoxy resin or the like. If desired, stitching 44 may be employed to prevent the line 24 from shifting relative to the loops. After the article has thus been assembled, it may be dipped in a suitable vinyl paint. It will readily be appreciated that the line 24 might be made from a discrete length and could be applied to the article after dipping.

From the structure just described, it will be seen that cord 36 has a generally circular configuration while cord 38 comprises four generally straight lengths extending between the respective adjacent pairs of the lengths 28, 30, 32 and 34 so as to be tangent to the cord 36. We stitch the straight lengths of cord 38 to the cord 36 at the regions of tangency to prevent relative shifting of the two cords.

Referring now to FIGURE 3, in an alternate form of our improved life ring we employ a first cord 46 which is secured by stitching 48 to the lengths 28, 30, 32 and 34, alternatively, at points adjacent the outboard ends of the lengths and points adjacent the inboard ends of the lengths. Specifically, the cord 46 might be secured to the length 28 adjacent the outboard end thereof, to the length 30 adjacent the inboard end thereof, to the length 32 adjacent the outboard end thereof and to the length 34 adjacent the outboard end thereof. This embodiment of our invention includes a second cord 50 secured to the lengths 30, 32, 34 and 28, alternatively, adjacent the inboard ends of the lengths and the outboard ends of the lengths by stitching 52. Specifically, cord 50 is secured to the length 28 adjacent the inboard end thereof, to the length 30 adjacent the outboard end thereof, to the length 32 adjacent the inboard end thereof and to the length 34 adjacent the outboard end thereof. It will readily be seen that this configuration results in a plurality of points of intersection of the cords 46 and 50. We secure the two cords at the points of intersection by stitching 54 to prevent relative shifting therebetween.

Referring to FIGURE 5, in a still further form of our invention we employ a first cord 56 having a generally circular configuration and secured to the lengths 28, 30, 32 and 34 adjacent their inboard ends in a manner similar to that described hereinabove in connection with the showing of FIGURE 2. In the form of our invention shown in FIGURE 5, however, we secure a second cord 58 to the lengths 28, 30, 32 and 34 adjacent their outboard ends by stitching 60 to divide the cord 58 into four lengths which assume catenary configurations between pairs of adjacent lengths 28, 30, 32 and 34. The low points of the catenaries are secured to the cord 56 by stitching 62.

In each of the forms of our invention thus far described, the subassembly of the cords and the external loop-forming webbing lengths are applied to one half 26 of the ring and the second half is then adhered to the first half sandwiching the cords between the two.

As will be apparent, with this arrangement the cords cannot move with respect to the halves of the ring without to some extent destroying the bond between the two halves. We have discovered that in some instances it may be desirable to permit the cords to shift with relation to the halves making up the ring.

Referring to FIGURES 6 to 8, we have shown a further form of our invention which we apply a thin fabric of nylon or the like 64 to the surface of the half 26 by means of a suitable adhesive. We fold over the edges of the fabric between adjacent pieces of webbing such as the pieces 28 and 30 and stitch the edge of the fabric as by lines of stitching 66 and 68 to form tunnels 70 and 72. The lengths of the respective cords such, for example, as cords 36 and 38 between the two pieces 28 and 30 extend through the tunnels 70 and 72. It will be appreciated that before forming the tunnels, we stitch the cords together as at 45. We repeat this procedure between pieces 30 and 32, between pieces 32 and 34 and between pieces 34 and 28. With this arrangement, after the two halves 26 are adhered to form the ring body 12 and when in a manner to be described the cords 36 and 38 are tensioned, they can move with relation to the body 12.

It will be appreciated by those skilled in the art that our article may be formed in various ways. While we have described an arrangement in which the ring is made in two halves which would be individually molded and then adhered, we could mold the ring body to its final shape, slit it around its inner periphery and insert the preformed assembly of the pieces 28, 30, 32 and 34 and cords 36 and 38 in the slit. The ends of the pieces 28, 30, 32 and 34 might then be drawn outwardly through openings burned or otherwise formed radially from the outer periphery into the slit. The slit could then be sealed.

In operation of the form of our life ring shown in FIGURE 2, for example, if the ring were thrown to a person in the water, if it should strike him it would not cause injury owing to the fact that the material of the body 12 is soft and resilient. If it became necessary to pull the person out of the water by means of the ring, the person might, for example, have his arm through the ring opening and the rescuer might be pulling also on the inner periphery of the ring. We have indicated the resultant forces applied to the ring by the arrows B in FIGURE 2. Under these circumstances, the ring would tend to stretch along a diameter so that appreciable tension would be applied to the ring. With our arrangement, this tension would be taken up almost entirely by the cord 36 so that the material of the ring body 12 would not be torn. Owing to the resilience of the material, when the forces were released, the ring would readily return to its initial shape.

Alternatively, if forces were applied to the ring through the medium of the line 24, for example, in the direction of the arrows A, the pieces 28, 30, 32 and 34 would transmit these forces to the cord 38 as indicated by the broken line in FIGURE 2. Cord 38 would be tensioned to absorb these forces and while the ring body 12 would temporarily be distorted, its material would not be damaged.

The operation of the form of our improved safety ring shown in FIGURES 3 to 5 is similar to that described above in connection with the form of the invention shown in FIGURE 2. That is, whether forces be applied to the ring body 12 directly or through the rope or line 24, the material of the body 12 is not required to absorb these forces but they will be taken up by the cords 46 and 50 or 56 and 58.

The form of our invention shown in FIGURES 6 to 8 functions in the manner similar to that previously described. In this form of our ring, however, cords 36 and 38 may readily shift with respect to the body material owing to the fact that they are disposed in the tunnels 70 and 72 extending between pairs of adjacent loop-forming pieces 28, 30, 32 and 34.

It will be seen that we have accomplished the objects of our invention. We have provided an improved life ring which avoids the possibility of injury to a person being struck by the ring. Our ring is soft and resilient and yet has sufficient strength to permit a person to be lifted out of the water by means of the ring. Our ring resists appreciable tension resulting from the application of forces either directly to the ring or entirely through the surrounding line.

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 safety life ring including in combination an annular body of soft and resilient buoyant material, a line surrounding said body, respective means for connecting said line to said body at spaced points therearound, a first continuous length of flexible tension-resisting material embedded in said body said first length extending entirely around and within said annular body, respective second lengths of flexible tension-resisting material embedded in said body, said second lengths extending within said body between adjacent connecting means and means for securing said second lengths to said adjacent connecting means.

2. A safety life ring including in combination an annular body of buoyant material, a line surrounding said body, means comprising a plurality of strips of material embedded in said body at spaced points therearound for connecting said line to said body, said strips being elongated in a radial direction with reference to said body, respective first lengths of flexible tension-resisting material embedded in said body, said first lengths making up a continuous extent of said flexible tension-resisting material extending entirely around and within said body, means for securing said first lengths of material to the strips of adjacent pairs near the inboard end of one strip of each pair and near the outboard end of the other strip of each pair, a plurality of second lengths of flexible tension-resisting material embedded in said body, said second lengths respectively extending between the strips of adjacent pairs and means for securing said second lengths of material to the strips of said adjacent pairs near the outboard ends of said one strip and near the inboard ends of said other strip.

3. A safety life ring as in claim 2 in which said first and second lengths have regions of intersection and means securing said lengths at said points of intersection.

4. A safety life ring including in combination an annular body of buoyant material having an inner periphery and an outer periphery, a ring of flexible tension-resisting material embedded in said body adjacent the inner periphery thereof, said ring being a continuous extent of said flexible tension-resisting material extending entirely around and within said body, a line surrounding said body, respective means for attaching said line to said body at spaced points, and respective lengths of flexible tension-resisting material of catenary configuration extending between and secured to the attaching means of adjacent pairs.

5. A life ring as in claim 4 in which said lengths are secured to said rings at the low points of said catenaries.

6. A safety life ring including in combination an annular body of buoyant material having an inner periphery and an outer periphery, a ring of tension-resisting material embedded in said body adjacent the inner periphery thereof, a line surrounding said annular body, respective means for attaching said line to said body at spaced points and respective generally straight lengths of material secured between the attaching means of each adjacent pair, said lengths being tangent to said ring.

7. A safety life ring including in combination an annular body of buoyant material, a continuous extent of flexible tension-resisting material embedded in said body, said continuous extent extending entirely around and within said body, a line surrounding said body, respective means for attaching said line to said body at spaced points and respective lengths of flexible tension-resisting material extending between and secured to adjacent pairs of attaching means.

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MILTON BUCHLER, *Primary Examiner.*

FERGUS S. MIDDLETON, *Examiner.*

T. W. BUCKMAN, *Assistant Examiner.*