Dec. 14, 1948. C. F. SCHWALL, JR 2,456,086

COLLAPSIBLE BOAT AND METHOD OF MAKING THE SAME

Filed May 17, 1945 3 Sheets-Sheet 1

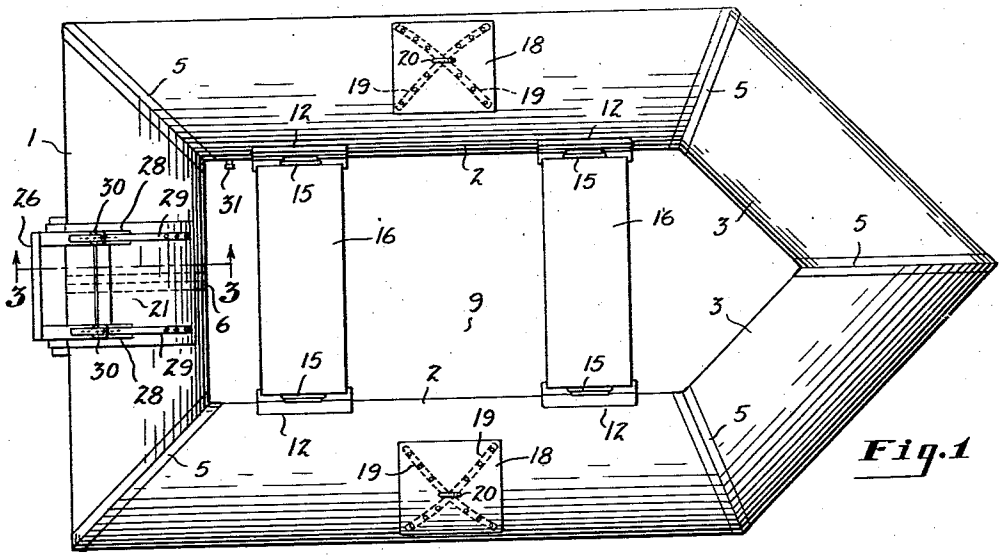

Fig. 1

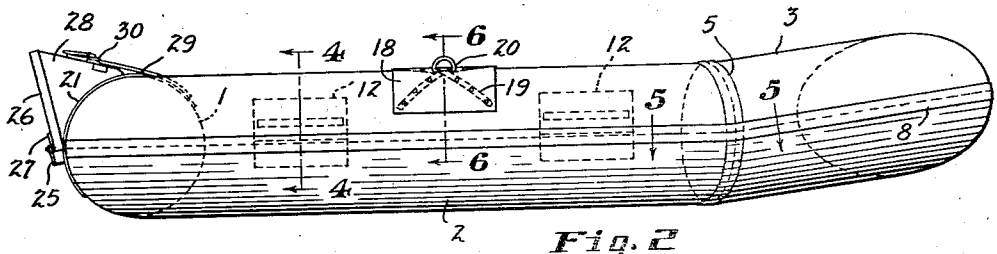

Fig. 2

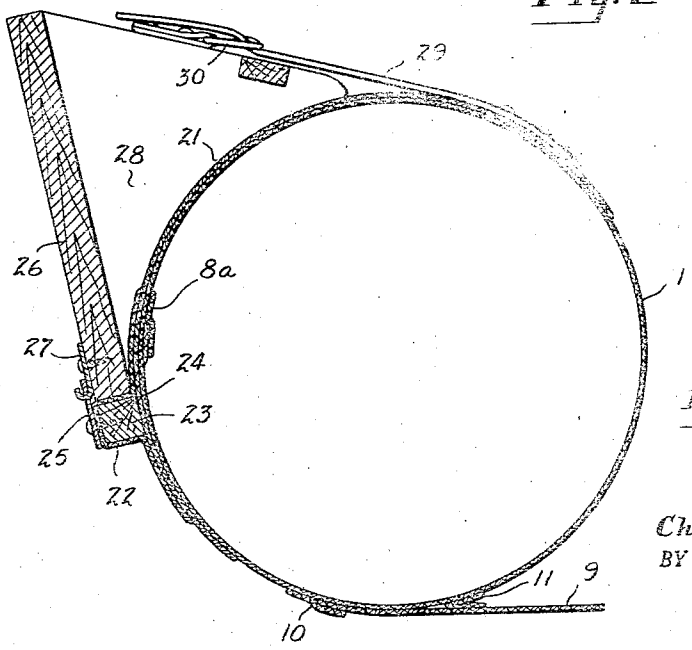

Fig. 3

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COLLAPSIBLE BOAT AND METHOD OF MAKING THE SAME

Filed May 17, 1945 3 Sheets-Sheet 2

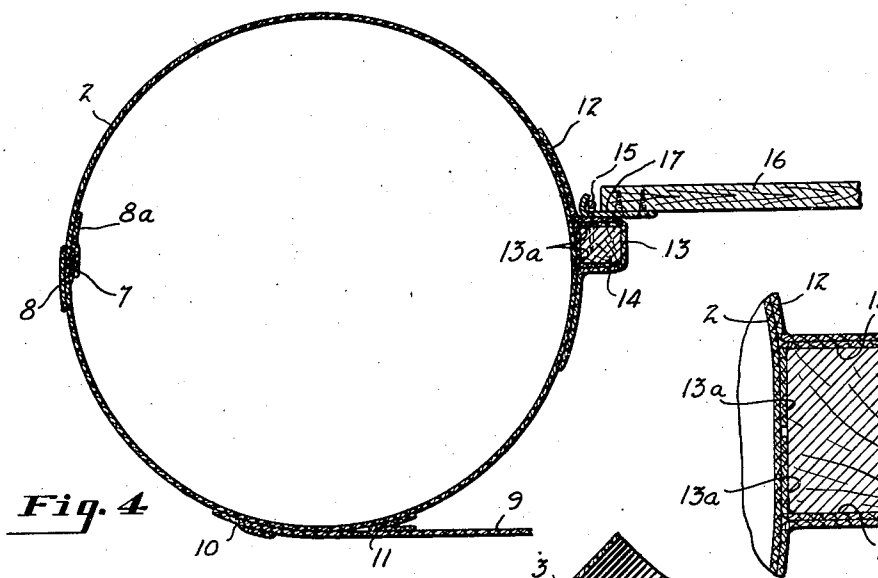

Fig. 4

Fig. 11

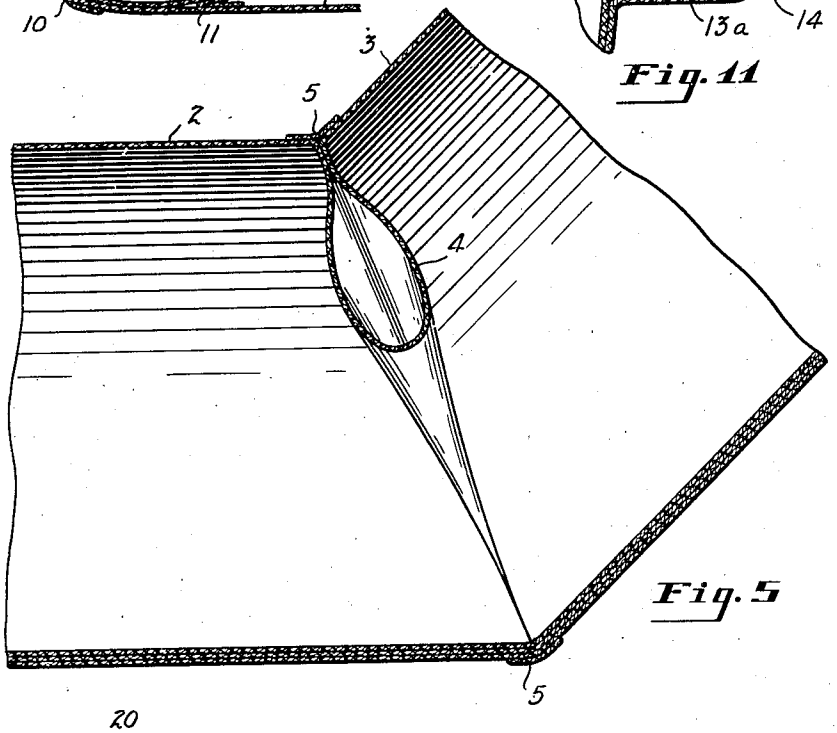

Fig. 5

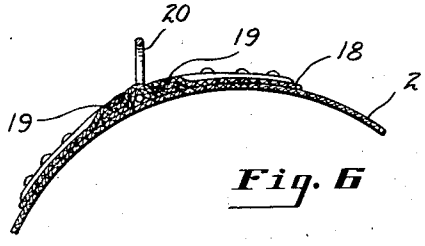

Fig. 6

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COLLAPSIBLE BOAT AND METHOD OF MAKING THE SAME

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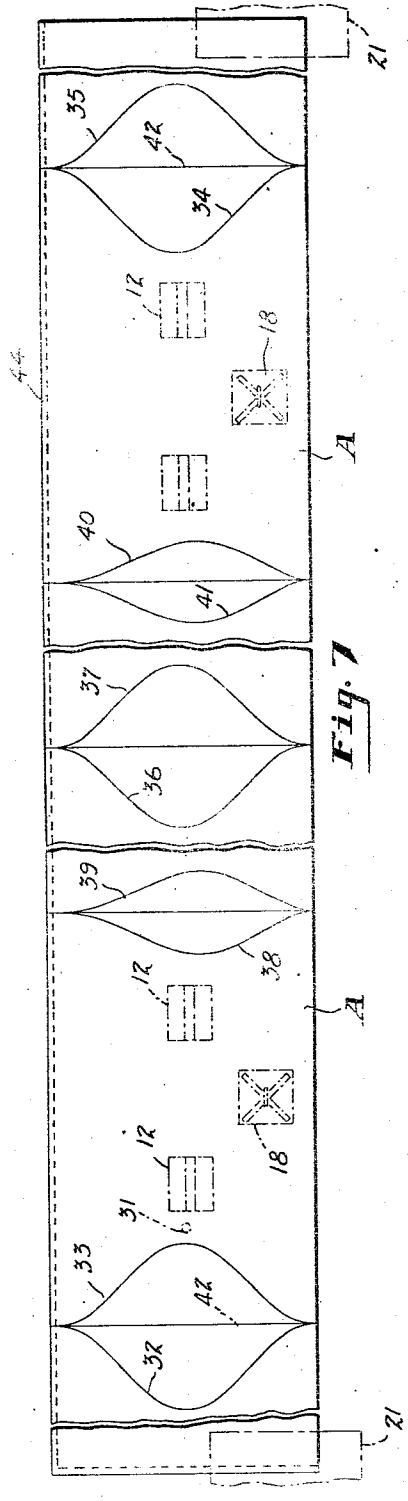

Fig. 7

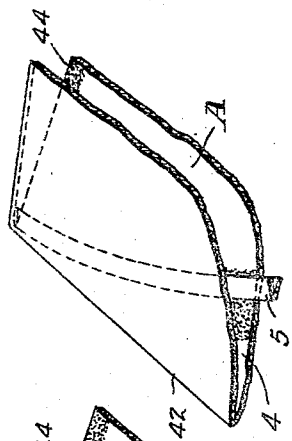

Fig. 10

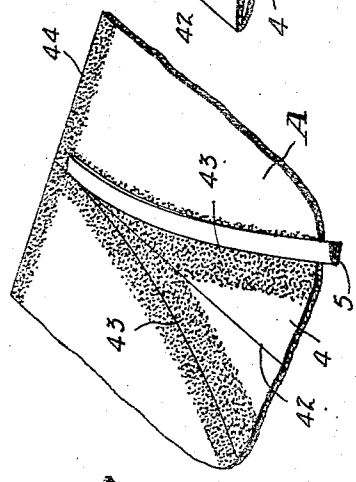

Fig. 9

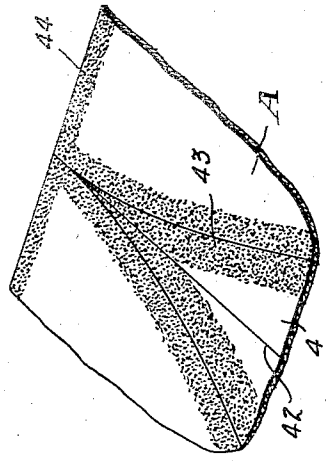

Fig. 8

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COLLAPSIBLE BOAT AND METHOD OF MAKING THE SAME

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Application May 17, 1945, Serial No. 594,233

16 Claims. (Cl. 9—2)

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This invention relates to collapsible fabric boats of the inflatable type and to a method of making the same.

The construction of inflatable boats or boat bodies such as are now used by the air forces is slow, laborious and expensive because of the extreme accuracy and care with which the fabric forming the tubular inflatable body must be cut and joined together at the bends or corners of the tubular body.

The present invention has for its object to provide a simple, rapid and inexpensive method of constructing such tubular inflatable bodies that eliminates such laborious cutting and joining operations and greatly reduces the labor required to build the tubular body.

A further object of the invention is to provide a collapsible fabric boat that can be folded into a compact bundle convenient for transportation by automobile or plane that is strong and durable but relatively inexpensive.

An additional object is to provide the collapsible fabric boat with a detachable bracket for supporting an outboard motor.

A further object is to provide seats so connected to the opposite portions of the tubular body as to provide cross ties holding the side portions in parallel relation.

A further object of the invention is to provide connections between the seats and the tubular inflatable body that are detachable when the body is deflated and locked when the body is inflated.

With the above and other objects in view, the invention may be said to comprise the boat and method of making the same, as illustrated in the accompanying drawings hereinafter described and particularly set forth in the appended claims, together with such variations and modifications thereof as will be apparent to one skilled in the art to which the invention pertains.

Reference should be had to the accompanying drawings forming a part of this specification, in which:

Figure 1 is a top plan view of a collapsible fabric boat embodying the invention;

Fig. 2 is a side elevation of the boat;

Fig. 3 is a section through the stern portion of the boat body taken on the line indicated at 3—3 in Fig. 1;

Fig. 4 is a section through one of the side portions of the tubular body taken on the line indicated at 4—4 in Fig. 2;

Fig. 5 is a fragmentary longitudinal section taken on the line indicated at 5—5 in Fig. 2;

Fig. 6 is a fragmentary transverse section through an oarlock taken on the line indicated at 6—6 in Fig. 2;

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Fig. 7 is a plan view of the fabric strip from which the inflatable tubular body is formed;

Fig. 8 is a fragmentary perspective view showing the manner of applying cement to the face of the fabric strip along the curved lines that are located at the bases of the tucks to be formed in the fabric;

Fig. 9 is a perspective view showing a longitudinally folded strip of bias cut tape laid upon the cement along one of the tuck base lines;

Fig. 10 is a perspective view showing the fabric body folded to cement the unattached flap of the tape to the fabric body along the opposite base line of the tuck, and

Fig. 11 is a fragmentary section on an enlarged scale through the seat supporting block.

Referring to the accompanying drawings, the boat of the present invention has a tubular inflatable body formed of an impregnated fabric such as rubberized fabric that is capable of retaining air under pressure. The tubular boat body is endless and comprises a stern portion 1, parallel side portions 2 and converging prow portions 3. The side portions 2 are joined to the stern portion 1 by miter joints and are disposed substantially at right angles to the stern portion 1. The prow portions 3 which have a slight upward inclination with respect to the boat bottom, are disposed at abtuse angles to the side portions 2 and are connected by a miter joint at the point of the prow.

Each of the miter joints at the corners of the inflatable body is formed with a tuck 4 on the interior of the tube, as shown in Fig. 5 to dispose of the excess fabric and each miter joint is reinforced by a tape band 5 that extends diagonally around the tube and covers the base of the tuck. Midway between the ends of the stern portion 1 the fabric of the tubular body is joined end to end in a transverse circumferential seam 6 and side edges of the fabric forming the inflatable body are joined along a seam 7 that extends around the exterior perimeter of the body. The seams are suitably reinforced, the seam 7 being reinforced and made air tight by a strip of reinforcing tape 8 covering the seam on the outside and a second strip of tape 8a covering the seam on the inside.

The boat has a fabric bottom 9 formed of suitable waterproof flexible material such as rubberized fabric. The bottom 9 is cemented to the under side of the tubular inflatable body along its peripheral edge, the outer edge of the fabric

bottom 9 being covered with a strip of reinforcing tape 10. The bottom 9 is additionally connected to the tubular inflatable body by means of a hinge tape 11 which is folded longitudinally to provide two flaps of equal width, one of which is cemented to the top of the bottom 9 and the other of which is cemented to the inflatable body.

On the inner sides of the side portions 2 of the body seat patches 12 are attached, each patch 12 being formed of suitable rubberized fabric having end portions cemented to the exterior portions of the tubular portion 2. Intermediate the ends each of the patches 12 has a loop portion 13 which encloses a horizontally disposed block 14 which is held against the tubular body and serves as a seat support. The block 14 is preferably attached at its inner side to the tubular boat body by means of tape strips 13a adhered to the body and to the inner side and top and bottom of the block. The strips 13a are also adhered to the interior of the loop 13 and serve to prevent twisting of the block 14 within the loop 13 which would tend to break the bond between the patch and tubular body adjacent the opposite sides of the loop 13. Each of the blocks 14 has a wide staple 15 attached to its top which provides a retaining bar spaced above the upper side thereof, the blocks on opposite side portions 2 providing supporting ledges for opposite ends of seats 16. Each seat has an upwardly facing hook 17 at each end which can be inserted into the space between the top bar of the staple 15 and the upper side of the block when the boat body is deflated and which is locked against removal to retain the seat when the body is inflated.

Midway between the ends and upon the tops of the side portions 2, patches 18 are cemented, each patch 18 having crossing straps 19 riveted or cemented to the under side thereof and passing through an oarlock ring 20 that is secured by the straps to the patch.

On the central portion of the stern 1 a large fabric patch 21 is adhesively secured, the patch 21 having a loop 22 adjacent its rear lower end which encloses a block 23 similar to the seat supporting blocks 14. An additional chafing patch 24 may be provided beneath the block 23 and both the patches 21 and 24 extend across and serve to reinforce the end seam 6. The block 23 has an attaching plate 25 secured thereto and forms a seat for the body 26 of an outboard motor supporting bracket. The body 26 has a hook 27 engaging the plate 25 and forwardly extending braces 28 that have forward edges shaped to conform to the inflated boat body. A pair of straps 29 are riveted or cemented at their forward ends to forward end portions of the patch 21 and engage at their rear ends with buckles 30 attached to the braces 28 of the motor supporting bracket.

A suitable inflation valve 31 is attached to the tubular body at a convenient point, as indicated in Fig. 1. When the tubular body portion of the boat is deflated the boat may be rolled or folded into a compact bundle for transportation in an automobile or plane. The seats and motor supporting bracket being detachable, may be suitably disposed in or attached to the bundle if desired.

The entire boat body is formed of a single piece of suitably impregnated fabric such as rubberized fabric that is capable of retaining air under pressure. As shown in Fig. 7, the piece of fabric A from which the boat body is made is in the form of an elongated rectangular strip of a length corresponding to the transverse perimeter of the tube which forms the boat body. In Fig. 7, curved transverse lines 32 and 33 are shown adjacent one end of the fabric strip which are the base lines of the tucks that are located at the corner joining the stern portion 1 with one of the side portions 2. Adjacent the opposite end of the fabric strip, similar curved lines 34 and 35 are shown which are the base lines of the tuck at the corner between the stern portion 1 and the opposite side portion 2. Midway between the ends of the fabric strip A curved lines 36 and 37 similar to those at the ends of the strip are shown which are the base lines of the tuck that is required at the prow of the boat. Intermediate the central portion of the strip and the end portions thereof, curved lines 38, 39, 40 and 41 are the base lines of the tucks at the obtuse angled corners between the side portions 2 and the prow portions 3. As shown in Fig. 7, the tuck base lines converge to opposite side edges of the strip and in each case the base lines converge to a centrally disposed transverse fold line 42 that extends across the strip A.

The method of forming the tucks is illustrated in Figs. 8, 9 and 10. An adhesive is applied to the strip A in bands 43 of suitable width extending along the tuck base lines, after which a tape 5 is applied along one base line of each tuck as shown in Fig. 9. The tape 5 is in the form of a longitudinally folded strip of bias cut fabric which can be readily bent to follow a curved line, and one of the two flaps of this strip is first attached to the cement band along one of the tuck base lines as shown in Fig. 9, the folded edge of the tape 5 being disposed toward the central fold line 42. In applying the tapes 5, the ends thereof are spaced from one margin 44 of the fabric strip A so as to leave the margin 44 free for forming a lap seam with the opposite edge of the fabric strip. After each tape 5 has been adhesively secured to the face of the fabric strip A the fabric strip is folded on the adjacent transverse line 42 to bring the band of adhesive along the opposite tuck base line into engagement with the free flap of the tape 5 so that when the folded fabric is pressed down upon the tape 5, the tape 5 will be adhesively secured to the fabric along the two oppositely curved base lines of the tuck.

As shown in Fig. 7, the tuck base lines at the ends and center of the strip are symmetrically disposed with respect to the fold lines 42 and also with respect to the longitudinal center line of the fabric strip. The base lines 38, 39, 40 and 41 are offset slightly with respect to both the fold line 42 and the center line so that when the operation is completed the prow portions 3 will be inclined upwardly at a slight angle to the side portions 2, as shown in Fig. 2 of the drawings.

When the tucks are formed by cementing the fabric to the tapes 5 along the tuck base lines as above described, the tucks 4 will all lie upon the under side of the fabric. After the tucks have been formed the fabric strip is folded longitudinally to bring one end of the strip into lapping engagement with the other, and the two ends are then cemented together to convert the fabric strip into an endless band with the tucks 4 located upon the exterior face of the band. After the strip has been converted into a band, the band is folded outwardly to lap one side edge upon the other and these side edges are cemented

together to form the lap seam 7 around the exterior periphery of the body. The tapes 8 and 8a may be cemented to the outside and inside of the fabric strip A along opposite edges and cement applied to the inner side of the strip 8 and the outer side of the strip 8a before the fabric is folded to form the lap seam 7. The tucks 4 on the interior of the tubular body will cause the body to assume the polygonal shape shown in Fig. 1 and upon inflation the tuck forming tapes 5 will form reinforcing bands covering the bases of the tucks and extending diagonally around the tubular body at each of the corners thereof.

When the boat body is inflated only the short end portions of the tucks will be in portions of the body in which the fabric is put under substantial tension by the inflation pressure and these end portions of the tucks may be firmly cemented together. Separation of portions of the miter joint by tension on the fabric will not cause leakage of air and any such rupture can be easily repaired by means of an external patch.

The patches 12 and 18 may be applied to the fabric body before forming the tucks if desired, or may be applied to the body after the fabric has been formed into a tubular body. The bottom 9 can be adhesively secured to the tubular body after the body has been formed as above described and before the same is inflated, the hinge strips 11 permitting the inflatable body to assume a transverse cylindrical form without distorting the bottom 9.

It is to be understood that variations and modifications of the specific device herein shown and described for purposes of illustration, may be made without departing from the spirit of the invention.

What I claim is:

1. The herein described method of making an inflatable boat body which comprises providing a strip of impregnated fabric adapted to retain air under pressure and of a length corresponding to the external periphery of the boat body to be formed, shortening the strip along its longitudinal central portion by forming spaced tucks in the fabric, all disposed upon the same side thereof, and converting the strip into an endless tube with the tucks upon the interior thereof by attaching together the longitudinal and end edges of the strip.

2. The herein described method of making an inflatable boat body which comprises providing a strip of impregnated fabric adapted to retain air under pressure and of a length corresponding to the external periphery of the boat body to be formed, shortening the strip along its longitudinal central portion by forming spaced tucks in the fabric, all disposed upon the same side thereof, cementing a tape strip across the base of each tuck, and converting the strip into an endless tube with the tucks upon the interior thereof by cementing together the longitudinal and end edges of the strip.

3. The herein described method of making an inflatable boat body which comprises providing a strip of impregnated fabric adapted to retain air under pressure and of a length corresponding to the external periphery of the boat body to be formed, shortening the strip along its longitudinal central portion by forming spaced tucks in the fabric, all disposed upon the same side thereof, converting said strip into an endless band by attaching one end thereof to the other with the tucks upon the outside of the band, and converting the endless band into an endless tube by folding the edges of the band outwardly and attaching the same together.

4. The herein described method of making an inflatable boat body which comprises providing a strip of impregnated fabric adapted to retain air under pressure and of a length corresponding to the external periphery of the boat body to be formed, shortening the strip along its longitudinal central portion by forming spaced tucks in the fabric, all disposed upon the same side thereof, converting said strip into an endless band by cementing one end thereof to the other with the tucks upon the outside of the band, and converting the endless band into an endless tube by folding the edges of the band outwardly and cementing the same together.

5. The herein described method of making an inflatable boat body from a single sheet of rubberized fabric which comprises providing an elongated strip of the rubberized fabric of a length corresponding to the outside perimeter of the body to be formed, forming a series of tucks at spaced points along the length of the strip, all lying upon the same side of the strip, each tuck being located wholly between the side edges of the strip and extending transversely of the strip, converting the strip into an endless band by securing one end of the strip to the other with the tucks upon the outside of the band, and converting the endless band into an endless tube by folding the edges of the band outwardly and securing the same together to form an external peripheral seam.

6. The herein described method of making a boat body in the form of an endless inflatable tube from a single piece of rubberized fabric which comprises providing a strip of the fabric of a length corresponding to the external perimeter of the body, shortening the central portion of the strip to a length corresponding to the internal perimeter of the body by forming spaced tucks intermediate the side edges of the strip, converting the strip into an endless band by cementing the end edges together, and converting the band into an endless tube by cementing the side edges thereof together.

7. The herein described method of forming a tuck intermediate the edges of a strip of fabric which comprises applying cement along curved lines converging to a transverse fold line adjacent the opposite edges of the strip, applying one side edge portion of a longitudinally folded tape to the cement along one of said curved lines and folding the strip about said transverse fold line to cement the opposite side edge portion of the tape to the fabric along the other of said curved lines.

8. The herein described method of making an inflatable boat body which comprises providing a strip of rubberized sheet material of a length corresponding to the outside perimeter of the body, forming tucks of various depths on one side of said fabric strip at spaced points along the length thereof and intermediate its side edges, forming the strip into a band by joining together the end edges thereof with the tucks upon the interior of the band, and forming the band into an endless tube by joining the side edges thereof outwardly of the tucks.

9. An inflatable boat body comprising an endless tube formed of a single piece of fabric which has a seam joining ends of the fabric around the tube and a seam joining side edges of the fabric along the exterior perimeter of the body, the fabric wall of said tube being continuous except

for said seams and having tucks upon the interior thereof at spaced points along the interior perimeter of the body.

10. An inflatable boat body comprising an endless tube formed of a single piece of fabric which has a seam joining ends of the fabric around the tube and a seam joining side edges of the fabric along the exterior perimeter of the body, the fabric wall of said tube being continuous except for said seams and having tucks upon the interior thereof at spaced points along the interior perimeter of the body, and a reinforcing strip adhesively secured to the fabric and covering the last mentioned seam.

11. An inflatable boat body comprising an endless tube formed of a single piece of fabric which has a seam joining ends of the fabric around the tube and a seam joining side edges of the fabric along the exterior perimeter of the body, said tube having tucks upon the interior thereof at spaced points along the interior perimeter of the body, and reinforcing strips adhesively secured to the exterior surface of the tube and extending across the bases of the tucks.

12. An inflatable boat body comprising an endless tube formed of a single piece of fabric and having a seam along its exterior perimeter and a transverse circumferential seam, said body having angularly disposed portions and miter joints connecting said angularly disposed portions, each miter joint comprising a tuck within the tube and a tape extending diagonally around the tube at the base of the tuck.

13. An inflatable boat body comprising an endless tube formed of a single piece of fabric and of substantially polygonal form, a tuck extending into the tube from the interior periphery thereof at each corner, and a reinforcing strip adhesively secured to the exterior of the tube along the base of each tuck.

14. A boat having an endless inflatable tubular body with substantially parallel side portions and a transverse rear end portion, a fabric patch adhesively secured to said rear end portion and extending over the top and downwardly over its rear thereof, said fabric patch having a loop adjacent its lower end, a block held against the tubular body by said loop, a motor bracket having a body seated on said block and detachably secured thereto and braces extending forwardly from said body and having edges shaped to conform to said body, and bracing straps attached to said patch and detachably secured to said bracket.

15. A boat having an endless inflatable tubular body with substantially parallel side portions, patches secured to the inner sides of said side portions, blocks attached to said patches, a retainer bar attached to each block and spaced from its top edge, seats having end portions resting on said blocks and upwardly facing hooks engaging said bars.

16. A boat having an endless inflatable tubular body with substantially parallel side portions, a patch secured to the top of each side portion, an oarlock ring disposed centrally of the patch, and means for securing said ring to said patch comprising angularly disposed straps having central unattached crossing portions extending through said ring and attached to said patch outwardly of said crossing portions.

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