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JOINT CONSTRUCTION IN A SEGMENTED INFLATABLE FABRIC MEMBER

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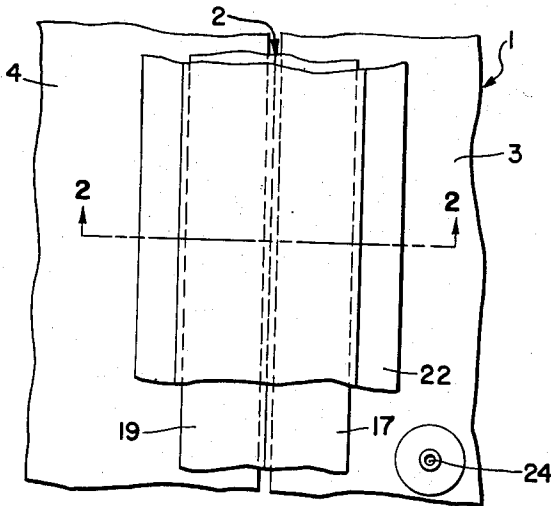


FIG. 1

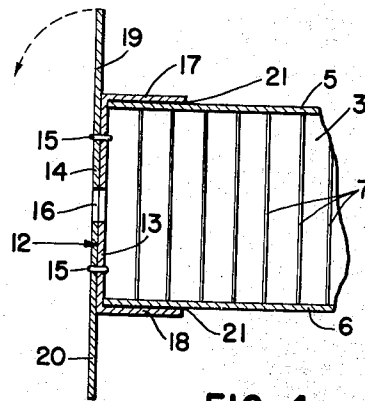


FIG. 4

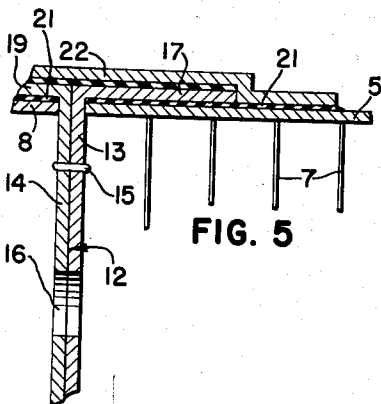


FIG. 5

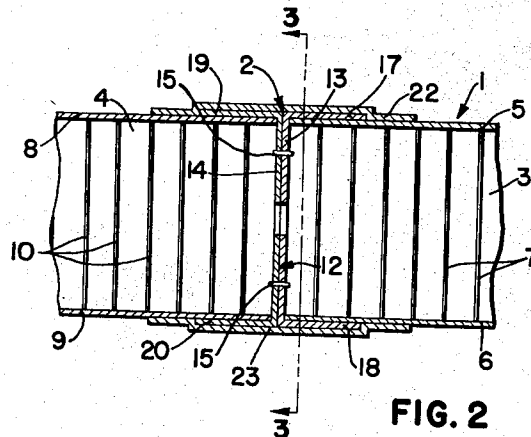


FIG. 2

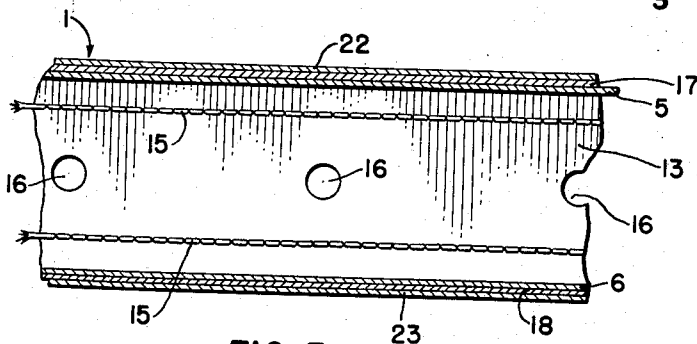


FIG. 3

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JOINT CONSTRUCTION IN A SEGMENTED
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5 Claims. (Cl. 154-43)

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The present invention relates to a form of construction for a fluid-inflatable fabric member or structure embodying a plurality of adjacent interconnecting segments. More particularly, the invention pertains to a form of junction for the several contiguously arranged segments comprising an inflatable fabric member which may be of extensive or continuous length.

In the fabrication of various products of this general type embodying inflatable fabric members of very considerable length or span, it is often necessary to unite a large number of smaller or individual segments. This is due to the fact that the size of the weaving frame employed in the manufacture of the individual segments is limited and, therefore, restricts at least one of the dimensions of the material. To this end, the present invention contemplates a highly advantageous form of junction which makes possible the joining together of a large number of individual segments into a unitary inflatable fabric member.

One of the most versatile forms of inflatable fabric member is that embodying a plurality of individual segments each of which comprises two plies of substantially fluid-impervious fabric woven with the plies disposed in opposed relation to each other and joined together by a large number of inextensible tie threads which are woven at least partially into each of the plies. This form of fabric construction requires a sturdy reinforcement at the junction between adjacent segments to prevent destruction of the fabric when it is sealed at its margins and subsequently inflated. It has been found that a junction in the form of a flexible fabric member or curtain insures a satisfactory reinforcement and at the same time provides a joining plane for each one of several contiguously arranged segments.

Thus, it is an object of the present invention to provide a practical means of joining together several contiguously arranged fabric segments to form a unitary structure.

It is a further object of the present invention to provide a reinforcement element for the junction of adjacent fabric segments to insure stability of the structure upon inflation.

Other features and advantages of the present invention will become apparent as the following description of one embodiment of the inventive concept proceeds.

In the drawing, Fig. 1 represents a plan view of the junction of a pair of contiguously arranged segments with parts broken away. Fig. 2 is a vertical cross-section across the joint in Fig. 1 as seen from the line 2-2 therein. Fig. 3 is a

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vertical section taken along the line 3-3 in Fig. 2. Fig. 4 is a partial section corresponding generally to Fig. 2 and illustrating the manner in which the joint is constructed. Fig. 5 illustrates at a somewhat larger scale the completed joint between the contiguously arranged segments.

In Fig. 1 of the drawing, the reference numeral 1 identifies an inflatable fabric member or structure in which a joint or junction 2 is formed between a pair of contiguously arranged segments 3 and 4. The segment 3 comprises a fabric structure in which a top fabric ply 5 is arranged in opposed relation to the bottom fabric ply 6 and secured thereto by a multiplicity of tie threads 7 which are woven at least partially into each of the fabric plies as the material is formed in the weaving operation. The tie threads 7 are of the same length and are substantially inextensible, thereby enabling the fabric plies 5 and 6 to be disposed in spaced parallel relation when the edges are sealed and the segment is inflated.

The segment 4 is constructed in identically the same fashion as the segment 3 and involves a top fabric ply 8, a bottom fabric ply 9, and the tie threads 10.

In each instance the segments 3 and 4 are rendered fluid-impervious by coating the respective fabric plies 5, 6, 8, and 9 with a thin coating of rubber or other similar material which is capable of closing the interstices in the fabric. The segments 3 and 4 are highly advantageous for use in inflatable structures by reason of their being light and readily portable. This form of construction, upon inflation, provides a multiple walled element of remarkable rigidity. Thus, it is that a combination of inflatable segments such as the segments 3 and 4 into an inflatable fabric member 1 has a great many uses in the construction of temporary buildings, shelters, boats, pontoons, and other similar products.

Inasmuch as the fabric plies 5 and 6, as well as the fabric plies 8 and 9 of the segments 3 and 4, respectively, are dependent upon the multiplicity of tie threads 7 and 10 (only a few being illustrated) to enable them to be retained in spaced relation upon inflation, the edges or joints formed between contiguously arranged segments must be of substantial yet flexible construction to prevent the breaking of the tie threads 7 or 10 when the segments 3 and 4 are inflated with fluid under pressure to prevent the complete destruction of the segments. This joint or junction 2 is accomplished by means of a fabric element or reinforcement 12.

The fabric element 12 is composed of fabric

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plies or strips 13 and 14 which are joined or sewn together by means of ordinary stitching 15. This form of junction between the fabric strips 13 and 14 is highly desirable since it affords reasonable flexibility of the fabric element 12 internally of the inflatable fabric member 1 when the segments 3 and 4 are securely joined. The fabric element 12 comprising the fabric strips 13 and 14 is provided with a plurality of apertures 16 arranged at spaced intervals substantially along the center line of the element intermediate the ends thereof.

In joining the fabric element to the individual segments 3 and 4, the end portions 17 and 18 of the fabric strip 13 are folded back (see Fig. 4) so that they will lay directly upon the top fabric ply 5 and the bottom fabric ply 6, respectively, of segment 3. Similarly, the end portions 19 and 20 of the fabric strip 14 are folded back in the manner indicated by the dotted line in Fig. 4 so as to contact the top fabric ply 8 and the bottom fabric ply 9, respectively, of the segment 4.

These end portions 17, 18, 19, 20 are then secured to their respective ply surfaces 5, 6, 8, 9 of the segments 3 and 4 by means of a thin layer of adhesive 21 as will be noted in Fig. 5 of the drawings. Care is taken to insure that the adhesive does not penetrate down between the fabric strips 13 and 14 of the fabric element 12. After the end portions of the fabric strips 13 and 14 are securely bonded to the segments 3 and 4 as described above, a cover tape or strip 22 is thereafter adhesively bonded to the corresponding end portions 17 and 19 while a similar strip 23 is secured in place over the end portions 18 and 20 (see Fig. 2).

The inflatable fabric member 1 embodying the joined segments 3 and 4 is ready for inflation as soon as the edges of the individual segments have been sealed. This is accomplished by means of the valve 24 mounted upon one of the segments. In Fig. 1 the valve 24 is shown as being mounted on segment 3. Fluid under pressure admitted through the valve 24 will inflate the segment 3 as well as segment 4 by reason of the presence of the apertures 16 in the fabric element 12 forming the joint 2 between the contiguously arranged segments.

It will be readily understood that any number of contiguously arranged segments 3, 4, etc., embodying a similar joint 2 therebetween may be arranged in any of several different constructions, whether they be of continuous length or arranged in endless relation, and all of them may be inflated from the single valve 24 if desired.

While certain representative embodiments and details have been shown for the purpose of illustrating the invention, it will be apparent to those skilled in this art that various changes and modifications may be made therein without departing from the spirit or scope of the invention.

I claim:

1. An inflatable fabric member of unitary construction having substantially planar surfaces comprising a plurality of segments having fluid-impervius fabric plies in spaced opposed substantially parallel relation in the inflated condition and disposed in edge-to-edge relation to form a single pneumatic chamber; a fabric element embodying a pair of strips attached together in superposed relation and defining a plurality of spaced apertures therein, an end portion of each strip being doubled back and se-

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cured to the exposed surfaces of the segments adjacent the adjoining edges thereof, the length of the element between the end portions being substantially equal to the space between the plies in the inflated condition; a tape covering the end portions of the strips and adhesively secured to the segments; and an inflating member on one of the segments.

2. An inflatable fabric member of unitary construction having substantially planar surfaces comprising a plurality of segments having fluid-impervius fabric plies in spaced opposed substantially parallel relation in the inflated condition and disposed in edge-to-edge relation to form a single pneumatic chamber; a fabric element embodying a pair of strips of fabric disposed in superposed relation and sewn together, said fabric element having a plurality of spaced apertures formed therein and extending longitudinally thereof substantially intermediate the lateral edges of the strips, portions of the strips adjacent the edges thereof being adhesively secured to the exposed surfaces of the segments adjacent the junction, the length of strips between the adhered portions thereof being substantially equal to the space between the plies in the inflated condition; a tape covering the above-mentioned portions and adhesively bonded to the surfaces of the segments; and an inflating member on one of the segments.

3. An inflatable fabric member of unitary construction having substantially planar surfaces comprising a plurality of segments arranged in mutually contiguous relation to form a single pneumatic chamber, each of said segments embodying two plies of substantially fluid-impervius fabric disposed in spaced opposed parallel relation to each other in the inflated condition and joined together by a plurality of substantially inextensible tie threads which are woven at least partially into each of the plies; a fabric element for joining together the margins of adjacent segments and maintaining the margins of the segments in the spaced relation when inflated, said element having spaced apertures therein; and a fluid inlet in one of the segments for introducing an inflating fluid to the several segments.

4. An inflatable fabric member of unitary construction having substantially planar surfaces comprising a plurality of segments arranged in mutually contiguous relation to form a single pneumatic chamber, each of said segments embodying two plies of substantially fluid-impervius fabric disposed in spaced opposed parallel relation to each other in the inflated condition and joined together by a plurality of substantially inextensible tie threads which are woven at least partially into each of the plies; a fabric element for joining together the margins of adjacent segments and maintaining the margins of the segments in the spaced relation when inflated, said fabric element embodying a pair of fabric strips attached together and having a plurality of spaced apertures therein; and a fluid inlet in one of the segments for introducing an inflating fluid to the several segments.

5. An inflatable fabric member of unitary construction having substantially planar surfaces comprising a plurality of segments arranged in mutually contiguous relation to form a single pneumatic chamber, each of said segments embodying two plies of substantially fluid impervious fabric disposed in spaced opposed parallel relation to each other in the inflated condition

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and joined together by a plurality of substantially inextensible tie threads which are woven at least partially into each of the plies; a fabric element for joining together the margins of adjacent segments embodying two strips of fabric in which the strips are joined in part by a row of stitching and have a plurality of spaced apertures therein, the ends of the strips forming said fabric element being folded back and adhesively bonded to each of the plies of fabric at the margins of the segments, the elements maintaining the margin of the segments in the spaced relation when inflated; and a fluid inlet in one of the segments for introducing an inflating fluid to the several segments.

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