This invention comprises improvements in and relating to pneumatic structures or structural elements and is concerned with improvements in fabric outer covers for the inflatable tubes for structures which may be erected or dismantled by inflation or deflation. The invention is applicable to structures such as tents, awnings, temporary bridges, boats and other light portable structures, or pylons or poles for wireless aerials or other articles where inflatable tubes can be substituted for wood or metal structures. In the inflated condition the fabric cover is liable to stretch and contract in various directions according to the disposition of the warp and the weft, with the result that distortion occurs and the rigidity of the structure is impaired.

The object of the present invention is to provide an improved construction of fabric outer cover which will be substantially free from stretching or contraction and which will enable a very rigid article to be obtained in the inflated condition of the pneumatic member which may be either straight or curved.

According to this invention the outer cover, made of fabric such as canvas, is composed of longitudinal strips of which some have the weft running longitudinally and others have the warp running longitudinally. Thus, the tendency for stretching and contracting of one strip is counteracted by the opposite dispositions of the warp and weft in another strip, and a very rigid rod-like structure is provided when inflated. The cover advantageously comprises two halves joined together along their longitudinal edges, one strip having the weft disposed longitudinally of the tube and the other having the warp disposed longitudinally of such tube. Naturally each strip may be made up of a number of pieces of fabric joined end to end, according to the desired length of the strip. If desired each strip may be composed of a double layer of fabric to provide a two-ply strip, one layer of each strip having a longitudinal weft and the other layer having a longitudinal warp.

According to a modification, the object and purpose of the invention may be achieved by the provision of longitudinal strips with the wefts running longitudinally, the strips having different textures so that one strip has a fine weave and the other has a coarse weave.

In order to enable the invention to be readily understood reference will now be made to the accompanying drawing illustrating two examples of construction in which the weft and warp are conventionally represented.

In the drawing—

Figure 1 is a perspective view illustrating part of a pneumatic structure in the form of a rib for a tent, such rib being shown in the deflated condition.

Figure 2 is a cross section of the pneumatic structure shown in Figure 1, in the inflated condition.

Figure 3 is a perspective view of a modified construction in the deflated condition, and

Figure 4 is a cross section of the pneumatic structure of Figure 3, in the inflated condition.

Referring to Figures 1 and 2 of the drawing, the pneumatic structure comprises an inner tube a, made of indiarubber of flattened tubular section, and an outer cover b made of fabric such as canvas, a nipple c being provided for inflating the inner tube. The outer cover b is composed of longitudinal strips d, e, the strip d having the weft running longitudinally and the strip e having a warp running longitudinally. The strips d, e are joined along their edges by adhesive and by rows of zig-zag stitching f, the two longitudinal seams g provided by the attachment of the strips to each other forming marginal edge portions which in the case of a tent, or boat for example, are utilised for the attachment of the panels or gores of the article. The strip d having the weft running longitudinally is less extensible than the strip e, so that when the rib is inflated it presents a curved form.

The ends of the pneumatic structure may be closed by clamping jaws h h' which may be tightened against each other by screwing up nuts i on bolts j extending through holes in the canvas strips. The opening of these jaws permits rapid deflation of the rib. Except at its ends the outer cover is wider than the inner tube a to provide for the expansion of the latter when inflated. At the ends its width is narrowed down to that of about the same width as the inner tube, by the provision of short oblique lines of stitching f. The clamping bolts j conveniently pass through the canvas between the oblique and longitudinal lines of stitching f, f'. A short reinforcing length of fabric k may be secured by stitching and adhesive around the inflating nipple c.

As shown in Figures 3 and 4 each longitudinal strip of the outer cover is composed of a double layer of fabric d1 d2 and e1 e2, one layer d1 or e1 of each strip having a longitudinal weft and the other layer d2 or e2 of each strip having a longitudinal warp.

I claim:

1. A collapsible pneumatic structure comprising...
an inflatable support member having a curved form in the inflated, erected condition of said structure or element, said member comprising an inflatable inner tube, and a fabric outer cover composed of a plurality of longitudinal strips of inelastic woven material and of relatively narrow width compared with their length, some of said strips having the warp running longitudinally and being disposed on one side of the curve of said member and the other of said strips having the weft running longitudinally and being disposed on the other side of said curve, and said strips having marginal edge portions joined together in adjacent strips by adhesive and by stitching along the inner boundary of said marginal portions so as to form a tubular structure adapted to definitely limit the inflation of said inner tube.

2. A collapsible pneumatic structure comprising an inflatable support member having a curved form in the inflated, erected condition of said structure or element, said member comprising an inflatable inner tube, and a fabric outer cover composed of a plurality of longitudinal strips of inelastic woven material and of relatively narrow width compared with their length, some of the strips having a fine weave and other of the strips having a coarse weave and said strips all having the weft running longitudinally, the fine and coarse woven strips being disposed on opposite sides of the curve of said member and said strips having marginal edge portions joined together in adjacent strips by adhesive and by stitching along the inner boundary of said marginal portions so as to form a tubular structure adapted to definitely limit the inflation of said inner tube.

3. A collapsible pneumatic structure comprising an inflatable support member having a curved form in the inflated, erected condition of said structure or element, said member comprising an inflatable inner tube and a fabric outer cover composed of a plurality of pairs of longitudinal strips of inelastic woven material and of relatively narrow width compared with their length, one strip of each pair having a longitudinal weft and the other a longitudinal warp, the pairs of strips being disposed respectively on opposite sides of said inner tube and so that the strips with longitudinal warp are on one side of the curve of said member and the strips with longitudinal weft are on the other side of the curve of said member, and said strips having marginal edge portions joined together in adjacent strips by adhesive and by stitching along the inner boundary of said marginal portions so as to form a tubular structure adapted to definitely limit the inflation of said inner tube.

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