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2,771,899

VALVE MEANS

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Fig. 1

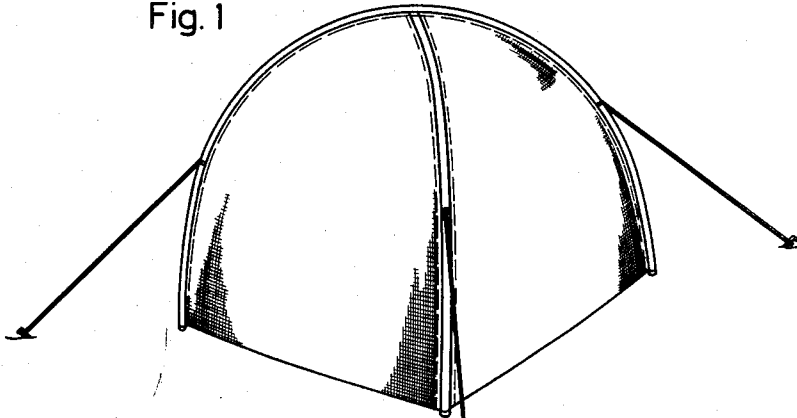


Fig. 2

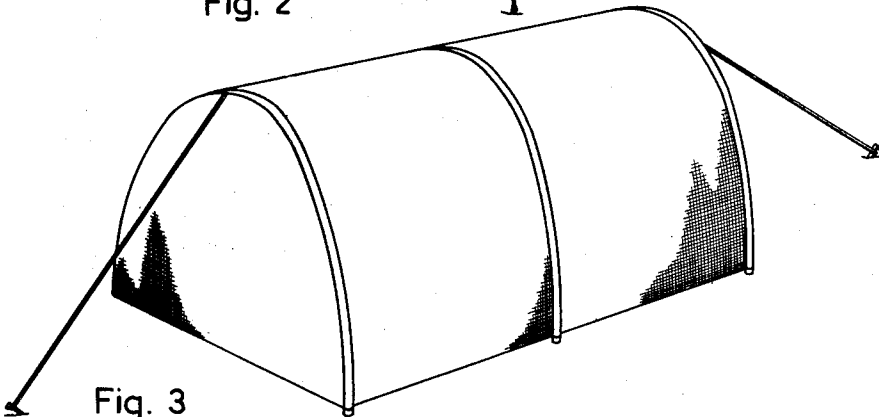


Fig. 3

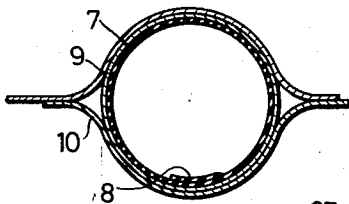


Fig. 6

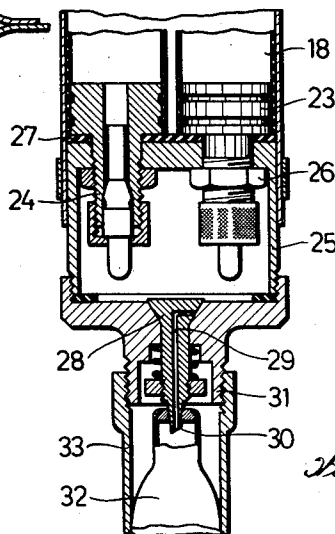


Fig. 5

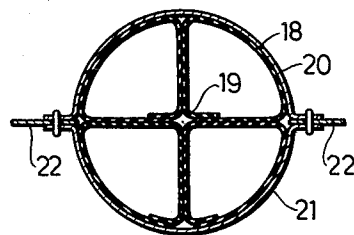
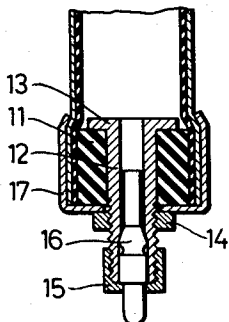


Fig. 4



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VALVE MEANS

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1 Claim. (Cl. 137—224)

The invention relates to improvements in a collapsible tent having the canvas supported by inflatable tubes.

In tents of this type the inflatable tubes are generally made of rubber hoses surrounded by a layer of flexible, non-elastic material. To obtain a required carrying capacity such tubes must be filled up with gas under pressure to a rather high pressure, as otherwise the tent will float. At such a rather high pressure, however, the tubes will easily get a tendency to twist, so that the tent will be distorted.

The object of the invention is to provide a tent supported by inflatable tubes which are not twisted even when a rather high pressure is applied. Another object of the invention is to provide closure means for sealing the ends of said inflatable tubes in a simple and effective manner.

According to the invention, a tube of rubber, plastic or similar flexible and elastic material is provided with at least one rib-like, longitudinal reinforcement serving as effective means to secure the tube against twisting. The longitudinal reinforcement may consist of a rib-like thickened portion of the tube material itself or it is quite sufficient, if the tube is produced from a strip, the longitudinal edges of which are joined in overlapping each other, whereby the double material in the joint provides the desired stiffening. Of course, tubes of this latter type are old, but they have never before been used to support a tent and one could not expect that a longitudinal thickened joint would solve the problem, i. e. secure the tube against twisting.

If desired, a tube according to the invention may be provided with more than one longitudinal reinforcement, although this is generally not necessary. In the case of only one longitudinal rib or bead the latter must preferably be located along the inner periphery, when the tube is bent into a substantially hemi-circular shape in supporting the tent. Further, in one embodiment two or more hoses of rubber or plastic may be arranged in parallel to each other and surrounded by a common sleeve of fabric or similar non-resilient material. This embodiment involves certain advantages as to the carrying capacity, as described more in detail hereinafter.

The invention will be more fully described in the following with reference to the accompanying drawing which shows different embodiments of the invention.

In the drawing:

Figure 1 shows a perspective view of a tent supported by inflatable tubes crossing each other diagonally;

Figure 2 shows another tent supported by inflatable tubes in parallel and spaced relation to each other;

Figure 3 shows a cross section through a tube and adjacent portions of the canvas;

Figure 4 shows a longitudinal section through a tube end and its closure means;

Figure 5 shows a cross section through an embodiment having four hoses inserted in a common sleeve, and

Figure 6 shows a longitudinal section through an end of

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the tube assembly shown in Figure 5 and the closure means mounted thereon.

Tents of the types shown in Figures 1 and 2 are altogether known before and do not require any detailed description. As mentioned above, the invention deals exclusively with the construction of the inflatable tubes and their closure means. Thus, the embodiment shown in Figure 3 shows an inner hose 7 produced in a conventional manner from a strip of rubber, the longitudinal edges of which are joined in such a way that they overlap each other. The joint 8 thus formed serves as a longitudinal reinforcement, whereby the hose is not twisted even when bent into hemi-circular shape, as shown in Figures 1 and 2. The hose 7 is closely surrounded by an outer layer 9 of fabric or similar non-extensible material preferably fixed to the hose 7 by sizing. The tube is inserted in a sleeve or channel 10 formed between the edge portions of two adjacent panels of the canvas material.

Figure 4 shows a device for closing the tube in Figure 3, which closure device also contains a valve for supplying pressure gas. A cylindrical plug 11 of soft rubber material is introduced in the tube end. The plug has an axial hole in which the valve is inserted. The valve is of the same type as a common bicycle valve and consists of a tubular casing 12 threaded at the outside. A flange 13 on the inner end of the casing contacts the inner end of the plug 11. A nut 14 is screwed on the casing 12 to engage the outer end of the plug 11. Another nut 15 is screwed on the outer end of the casing to hold the valve body 16 in its position, as known per se. A cup-like sleeve 17 of metal or similar non-resilient material is mounted to enclose the tube end. Said sleeve has a cylindrical portion surrounding the tube end along its outer periphery and a bottom portion engaging the outer end of the plug 11. The valve casing 12 passes through a central bore in said bottom portion of the sleeve 17. Thus, when the nut 14 is tightened, the plug 11 will be compressed axially between said nut and the flange 13, and consequently it will extend radially so that the tube end will be air-tight secured between the plug 11 and the sleeve 17. Of course, a valve is necessary only at one end of the tube. At the other tube end the valve may be replaced by a bolt of similar shape.

In Figure 5, four hoses 18 are inserted in a common casing. Each of these hoses may be produced in the same way as the hose 7 in Figure 3, i. e. provided with a longitudinal joint 19. However, if hoses of plastic material are to be used, it may be preferable to produce such hoses by extrusion, and in such case the longitudinal reinforcement may be extruded as a rib-like portion of the plastic material. The outer tube in Figure 5 may be produced by two strips 20 and 21 of leather, rubberized cloth or similar material connected to each other as well as to adjacent portions 22 of the canvas along their longitudinal edges. By using several hoses in a common casing the carrying capacity of such a tube is considerably increased, because the wall portions of the hoses contacting each other form cross-supports within the tube. Moreover, the tent remains entirely useful even in case one hose gets smashed, since the remaining hoses fill up the space.

Figure 6 shows a valve housing arranged for several hoses in one casing. A plug 23 with a valve 24 (in the drawing a common bicycle valve) is inserted into one end of each hose 18 and may be fixed for instance by vulcanization. The valve tubes 24 are inserted through corresponding holes in one wall of a housing 25. Nuts 26 are screwed on the valve tubes 24 and tightened onto the inside of the housing to obtain a seal between the rear side of the housing and the plugs 23 or an inserted rubber packing 27. A check valve for supplying pressure gas is inserted in the front of the housing 25. By

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this device all the hoses may be pumped to exactly equal pressure. A spring-loaded valve member 28 in this valve has a narrow channel 29, the inner end of which is normally closed against the valve seat. The opposite end of said channel leads to the atmosphere through a small pipe 30 projecting from the valve member 28. A pipe socket 31 mounted on the outside of the housing 25 surrounds the valve 28 with a clearance. The device is constructed to render possible the supply of pressure gas by means of a pump as well as by a pressure gas cartridge. In the latter case a cartridge 32 filled with carbon dioxide may be inserted in an axial boring provided for this purpose in a handle 33. The threaded outer end of said boring is screwed on the pipe socket 31 so that the pipe 30 penetrates the sealed opening of the cartridge, when the valve member 28 has been forced back into open position. The gas under pressure flows then through the channel 29 into the valve housing 25 and from there through the valves 24 into the hoses.

Of course, it is also possible to mount the closure device shown in Figure 4 to each of the hoses 13 in Figures 5 and 6. Figure 6 shows the manner in which an assembly of hoses may be filled by a single device.

What I claim is:

Valve means for a plurality of flexible elastic tubes enclosed within a tubular flexible non-elastic casing, comprising a housing to which said tubular casing is attached,

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said housing having a plurality of apertures extending into said tubular casing, one for each tube therein, a plurality of check valves each having one end in gas tight relationship with one of said tubes and extending through said apertures, the ends of said valves outside of said housing being larger than the apertures, and the ends inside of said housing being threaded, resilient sealing means between the larger ends of the check valves and the outside of said housing, a plurality of nuts one threaded onto each check valve within the housing to draw the valves into gas tight relationship with said housing, a cap having an aperture therein on said housing, a spring loaded check valve in said aperture, and means on said cap to permit introduction of air under pressure through said spring loaded check valve into the housing and then into the plurality of tubes through said plurality of check valves in said housing.

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