

## INFLATABLE STRUCTURE(S)

Inflatable structure(s) made up of tubes forming crosses, corners, T-bars and bends so as to create spaces which contain a combination of means allowing the rapid fitting and removal of a netting, canvas or accessories

A strip of fabric with receiving fixing elements is attached inside the spaces created by the structure.

A netting or canvas comprising fixing elements that are compatible with the receiving fixing elements is placed in one or more openings in correlation with the receiving elements.

If desired, this surface may have a bridge added to it, on which it is possible to walk, this bridge being reproduced on any number of faces of the base module where it is desirable to increase the number of wide openings. The bridge is constructed according to the same principle of rapid fitting and removal.

The techniques developed in the present invention which allow the rapid fitting and removal of a netting, canvas, bridge or accessories relate to all sorts of applications: life raft, sports ground, toboggan that can be used as a boat, swimming pool safety device.

Document WO 01/06076 A1 forming part of the prior art discloses an inflatable grille, all the openings of which are provided with open-work netting in which the openings can be unlocked, moved apart and re-locked and the grille may be used as a life raft, in sports grounds and in swimming pools. The fixing means used for the netting, as described on page 9, line 26, is not totally satisfactory in terms of securing the netting, and the eyelets are placed directly on the extension of the join of two superposed canvases, thus making the structure more fragile. Fig. 3.

## SWIMMING POOL

This same document does not address the problem of weighting to enable the grille to be returned to the bottom of the swimming pool because it is necessary to weight the surface of the deflated tubes sitting flat on the water with heavier materials. Furthermore, because the grille is made up of sections, there is nothing to prevent anybody walking on it from putting his feet between the two tubes at a joining point when in the inflated and juxtaposed position.

Document FR 2 505 914 discloses a rigid frame around the edge of a swimming pool, over which netting is stretched to cover the entire swimming pool, and a float causes the frame to rise to the surface. The rigidity constitutes a problem because a frame of this design bends when subjected to load.

On page 9, publication WO 03/015046 talks of an extendable frame located on the periphery of the grille, which is used to tauten the netting. The frame is moved so that it sits underneath the tubes, positioned along the axis thereof, which leaves a gap of 15 to 20cm between the frame and the edge of the swimming pool, depending on the diameter of the tube, so that a limb, arm or foot can become trapped between the frame and the edge of the swimming pool as it is being raised.

#### **LIFE RAFT**

Document DE32 10590 A1 discloses a life raft made up of units attached by hooks. It is not possible to walk on the joining point between two surfaces because of the way the surfaces are joined. Document WO02/079027 discloses a reversible life raft consisting of a single unit.

#### **SPORTS GROUND**

For applications involving sports grounds, the prior art discloses aquatic trampolines and these trampolines generally comprise an air chamber with a centre opening over which is placed a canvas, on which it is possible to jump and rebound because springs or elastic ropes or both are used as the fixing systems and are mounted on a rigid tube: documents US 5,810,695, US 6,508,682. These are essentially designed to enable jumping on the single canvas or mat, and rapid fitting and removal of the rebound canvas so as to allow other activities is not envisaged. Document US6,223,673 discloses a trampoline to which an access ramp and two joined tubes can be fitted to form a slide. This system is designed so that it is possible to jump on the mat and the access ramp is used for mounting and dismounting the trampoline and the slide is used to get down from it. These trampolines are limited in terms of the possible activities for which they can be used and are not designed for sports other than trampolining or games which involve getting on and off the trampoline.

In the case of the inflatable structure presented here, it is the structure itself which reacts, whereas in the case of standard trampolines the structure is rendered rigid by tubing and it is the tension on the elastic ropes and/or springs which causes the rebound. This inflatable

structure also enables a base surface for multiple games to be created, wherein rapid fitting and removal of netting, canvas and accessories is possible, which surface can be added to on each of its sides by virtue of a bridge.

In said document US 6,223,673, the fixing means for the trampoline surface consist of a rigid frame which is fed into attachment means fixed to the circular tube, which frame receives springs which are in turn attached to the trampoline surface.

Furthermore, the fixing of another inflatable object or cushion is obtained by means of an apron. A rope passes into eyelets located at the edge of the apron and surrounds the frame of the trampoline, passing over the tube. Another way of attaching another inflatable object is by means of straps which pass either all the way around the tube or all the way around the frame and are tightened by tightening means.

The means used here are heavy and do not allow the rapid fitting and removal of a trampoline surface or another inflatable object.

The apron, as described in the document US 6,223,673, is incompatible with the inflatable structure described in the present invention. This apron cannot be used cumulatively to fix a bridge and the near surface of the netting or canvas to the structure held by the bridge. This determines the novelty by evidence of non-application.

#### APPLICATIONS IN SNOW

Document US 4,894,033 discloses an inflatable mattress which can be used on snow. Although the oarlocks illustrated in Fig.9 and guide elements 22 depicted in Fig. 2 enable the mattress to be guided, there are no means of braking given the position of the body imposed by the shape.

Document US 4,206,933 discloses a sled with a triangular-shaped inflatable structure but which is difficult to manoeuvre round corners during travel.

The aim of the invention is therefore to provide a polyvalent inflatable structure which can remedy these drawbacks and disadvantages via fixing means which allow the rapid fitting and removal of a netting, canvas, bridge or accessories. The invention is defined by the combination of features of claim 1 and the subsequent claims.

The objective of the present invention is to overcome these disadvantages and this will be more readily understood from the description of the appended drawings showing different embodiments, which are given by way of example but not intended to be restrictive.

Figure 1 : illustrates an inflatable structure 1, in the shape of a cross 2 with corners, in this particular case right-angled corners 3, T-bars 4 and openings 5, with handles 15 and an inflation/deflation valve 19, 4 pieces of netting 18 fixed in the openings and the protective strip 49 in the openings 5.

Figure 2 : depicts a strip of fabric 10 with eyelets 7, the strip of fabric being folded back on itself to form four sections 6, of which two sections (separated in the drawing for illustrative purposes), on a level with the fold, are joined or bonded 33, fixing means, in this case eyelets 7, being fixed to this part spaced at regular intervals apart, whilst the other two sections, which are opened out and folded back, are placed on the tube 8 to which they are fixed by bonding, the eyelets then being covered with a strip of fabric 49.

Figure 3 : illustrates how two structures 1 are joined, the bridge 9 of which is formed by two superposed strips of fabric 59, each having eyelets 7, which strip is fixed, bonded or heat-welded on either side of two tubes 8 to be joined, a rope 11 being threaded through the eyelets 7 and secured by a knot 12. A strip of fabric 49 protects the ropes (not visible here).

Figure 4a : depicts a rope 11, folded back on itself to form loops 60.

Figure 4b : illustrates a section through a tube 8 which will be used to form the bridge. There can be seen a wide strip of fabric with eyelets 13b, fixed so that it straddles the rope 11, the arrangement of which underneath the fabric is indicated by a broken line, the rope 11 being pulled through the eyelets to form loops 60 which are fixed at their base by a ring 50.

Figure 4c : shows the join between two structures 1, where a strip of fabric 13a with eyelets 7 for forming the bridge 9 covers the wide strip of fabric with eyelets 13b through which the rope 11 is pulled. The rope 11 is pulled through the eyelets 7 forming loops 60. A foldable strip of fabric 49 covers this rope 11 and a knot 12 is tied at the end of the bridge.

- Figure 4d : illustrates a rope 11 forming loops 60. The rope is disposed along the netting 18 and the loops are held by a ring 50 at their base.
- Figure 4e : illustrates the tube 8, the strip of fabric 10 with eyelets 7 and a different method of assembly, in this case the rope 11 which is fixed to the netting 18; the loops 60 of the rope 11, pulled through the eyelets 7, are threaded one in the other and then pulled across to the left so as to fix them, the lacing being covered by a foldable strip of fabric 49.
- Figure 4 f : illustrates another method of assembling a bridge, this time consisting of miniature mooring bitts mounted on a strip of rubber 66 for example, which strip thus formed is fixed to a strip of fabric 67 on each of the structures. A strip of fabric 49 which can be folded is fixed to each structure so that it covers each of the strips with the mooring bitts 66 and the rope 11, which ends the lacing with a knot 12.
- Figure 5 : illustrates a section through one tube 8, provided with a strip of fabric 10 with eyelets 7 and an accessory, in this case a rope 11, and with a knot 12 at the end of the rope.
- Figure 6 : illustrates a section through one tube 8, provided with a strip of fabric 10 with eyelets 7 and an accessory, in this case a foot rest 16 with a protective strip of fabric 49.
- Figure 7 : depicts the strip of fabric 10 with eyelets 7, which is fixed to the tube 8, and double-ended hooks 17 for fixing the netting 18, the hooks 17 being covered by a foldable strip of fabric 49. A reinforcing seam 65 can be seen in broken line.
- Figure 8 : illustrates a tube 8, made in the form of an inflatable mattress with internal reinforcements 57. The strip of fabric 10 with eyelets 7 can be seen, as well as a fixed strip of fabric 49 to protect hooks or rope and, on the left-hand side, a strip of fabric attached to a seam 58, with an eyelet 7 and a handle 15.
- Figure 9 : is a schematic illustration of a module made up of four rectangles, two of which rectangles are provided with a strip of fabric 10 with eyelets 7, the netting 18 with double-ended hooks 17 and a foldable protective strip 49 which covers them in the cross-section shown here, and two of the openings 5 are left empty. One of the sides has handles 15, an inflation/deflation valve 19: a wide

strip of fabric 13 covers a rope 11 pulled through the eyelets 7 to form loops 60 which are fixed at their base by a ring 50. A strip of fabric 49, shown here in cross-section, is provided as an extension of the strip of fabric 13, which folds down to cover the rope 11.

Figure 10 : is a schematic diagram illustrating an example of a base module consisting of six elements with netting 18, a protective strip of fabric 49 shown in bold line, and handles 15.

Figure 11 : shows a module comprising twelve elements with handles 15, this module having two elements provided with netting 18 and a protective strip 49 and four elements with strips of fabric 10 with eyelets 7 and a protective strip 49, shown here in bold line, for attaching either accessories or detachable netting or canvas, and six empty elements 5 which do not have a strip of fabric with eyelets. The means used to fix the netting are not visible in this case.

Figure 12 : is a schematic diagram illustrating an example of a different type of module made up of hexagons 21 which can be nested with another module of the same dimensions 21, and showing the handles 15, four of the openings being provided with netting 18. The bridges are fixed between the two structures A and B by means of a wide strip with eyelets 13a fixed to the structure A, with structure B having a strip of fabric 13b with eyelets 7 through which the rope is pulled to form loops 60. Each of the structures A and B has an additional side with a strip of fabric with eyelets 13, ready to receive another module.

Figure 13 : illustrates the second grille, being a metal grille 69, which is disposed in the pool and will conform to the shape of the inflatable structure and the pool for use as a weighting means, the grille being made up of bars 22 which are secured in T-bars 23, crosses 24, and corners 25.

Figure 14a : illustrates a tube 8 in cross section with a length of fabric strip 26 attached to the tube to support the metal grille.

Figure 14b : depicts a tube 8 in cross section with the fabric strip being used as a support 26 for the metal grille 26 and shows a section of metal bar 22 and the wall of the swimming pool 27.

Figure 15 : shows a toboggan made up of two tubes 8 joined at an acute angle, a cross-piece 28. It is possible to see the netting 18, two handles 15, an

inflation/deflation valve 19, a flexible and articulated and height-adjustable rudder shaft 30 with handle bar 31 and the strip of fabric 10 with eyelets 7 as well as the foldable strip 49 is shown here in bold line.

Figure 16 : shows a toboggan or bob made up of two tubes 8, this bob having two compartments, one of which has a netting 18, with two cross-pieces 28, handles 15, safety belts 29, two foot rests 71 shown here by two bold lines, a flexible and articulated and height-adjustable rudder shaft 30 with a handle bar 31 and an inflation/deflation valve 19, the strip of fabric with eyelets 10 being shown here in bold line.

Figure 17a: illustrates the rudder and brake system, comprising a height-adjustable tubular shaft 30 and showing orifices 34 on either side of the tubular shaft, a metal rod 35 which is inserted through the tubular shaft and sits freely on the transverse bar 32 holding the unit at a certain height and enabling the rudder to pivot. Also illustrated, underneath the transverse bar 32 and on each side, is a respective rod 40, these rods nesting in female receiving fixing means 41 provided on the inner sides of the tubes, see Fig. 17b. Also illustrated is the plate which acts as braking means 36, linked to the tubular shaft 33 by springs or elastic elements, in this case elastic bars 37, these elastic bars being attached to hooks 38, whilst the plate 36 has a foot rest 44 and a part 39 which brushes against the ground for guidance purposes. The tube 8 is indicated by broken lines.

Figure 17b : illustrates a female receiving piece 41 for the rods 40 illustrated in Fig.17a.

Figure 18a : illustrates another embodiment of the rudder and brake system, comprising a Z-shaped strip of flexible material 46 secured between two plates 36, a foot rest 44 shown in section, the part which brushes against the ground 39, and also showing the tubular shaft 30 and a foot 20, a broken line showing the ground 45.

Figure 18b : shows the top brake plate 36 with three points of attachment, in this case hooks 38, for elastic elements or springs, in this instance large elastic elements 37, which hook into the hooks 38 provided on the tubes at the desired level but not illustrated here.

Figure 19 : illustrates a tarpaulin mounted on a board with rollers 42, straps 43 and handles 15.

Figure 20 : depicts an inflatable structure 1 with weighted netting 47 attached to the bottom part of the inflatable structure, the fixing means 48 thereof underneath the structure and shown by broken lines and the netting 18. It is possible to see the open-work arrangement which can be unlocked, moved apart and re-locked 14. The protective strips on the means used to fix the netting are not visible here.

Figure 21a and b: each illustrate a section through the double-ended hook 17 used to attach the netting. The narrower part locates in the eyelet and the wider part engages around the edge of the netting. Arrow A indicates the traction force on the eyelet and arrow B that exerted on the netting when jumped on.

Figure 21c : illustrates a section through another design of double-ended hook 17 used to link two strips of fabric 10 with eyelets 7. Arrow A denotes the traction force on the eyelet and arrow B that exerted on the netting or canvas when jumped on.

La figure 22 : shows a means for sealing the structure for aquatic use. There can be seen the strip of fabric 10 with eyelets 7 attached to the tube 8 and a strip of fabric with eyelets 10b to support the canvas, not illustrated here. The two strips of fabric 10 with eyelets 7 and 10b are assembled by means of a rope 11. This is covered by another strip of fabric 54 bonded at the edge of the strip of fabric with eyelets 10 b to cover the strip of fabric 10 with eyelets 7 and fixed to the tube 8 by means of a series of button-holes 52 in the strip of fabric 54 and in the tube 8, the buttons being mounted on a strip 53, the strip of fabric 54 being provided with a part which acts as a sucker 51, shown here by a bold line. The strip of fabric 54 is folded back in the direction of the arrow when the canvas is fitted.

Figure 23 : shows an adjustable, flexible and articulated rudder shaft 30 which is fixed directly to a plank 36 for steering, using the arms, either in a standing or seated position.

Figure 24 : depicts an example of a support 55 for the rudder and brake system and shows a piece with a volume and shape designed to match the inside front part of the

tube 8 constituting the toboggan, this volume incorporating a tubular part 56 for receiving the rudder shaft 30, this volume being flat at the top and the transverse bar 35 inserted through the tubular shaft 30 being seated on this flat region 57.

Figure 25 : illustrates a mounting bridge for volley-ball consisting of a plank 61, which slides respectively onto each tube at either side through hems 62 provided on the bridge. Attached to the plank 61 is a tubular receiving part 63 into which the post that will hold the net is slotted. Grommets in the form of D-shaped rings 64 are provided on the tubes 8 in order to stabilise the netting or post 75 and the volleyball net 76 by means of laces, not illustrated. A foldable strip of fabric 49 covers the D-shaped rings 64.

Figure 26 : shows the fixing of the netting 18, by means of miniature mooring bitts 66 fixed to the fabric 10 and with loops 70 on the netting and the foldable protective strip 49.

Various examples will now be described to illustrate various design options for the inflatable structure, although these are given by way of illustration only and not intended to be restrictive.

- For example, a base module comprising twelve openings, in this case rectangular, wherein the openings 6 are provided with strips of fabric 10 and eyelets 7 covered by foldable protective strips 49, two openings are provided with netting 18 and the rest are without netting. Fig. 11.

- One variant would be the same structure with a strip of fabric 10 and eyelets 7 provided with a protective strip of fabric 49, ready to receive the netting and accessories in all the openings 5.

- One variation might be one in which all the openings of the structure were provided with a strip of fabric 10 with eyelets 7, a protective strip 49 and netting 18. Fig. 10, Fig. 20.

- Another variant is a module with no strip of fabric 10 with eyelets 7.

Each module can be used on its own and a bridge 9 is created on each of the sides where it is desired to add another surface.

#### **FITTING AND REMOVAL OF NETTING OR BRIDGE**

The method of fixing the netting illustrated in Figs. 4a, b, c, d, e is particularly rapid. The rope is passed through the edge of the netting and, once the length of the loop has been defined, it can be fixed to the base by adhesive or by a ring for example, the loop is then passed into an eyelet and folded to the right and passes into the next loop and is folded to the left, carrying the right loop with it, and so on. With a rope end left hanging at each end, the two rope ends merely have to be attached together in the corners to fix the netting or canvas. Dismantling of the system is even more rapid. All that is required is to detach the corners and the netting drops down. This mode of execution also applies to the fixing of a bridge. For a bridge, all that is required is to undo the knots at the end of the bridge and the bridge comes undone. Fig. 4 c.

The same applies to Fig. 4 f with the use of miniature mooring bitts for fitting the netting or bridge. As soon as the rope is undone, everything comes apart. Other embodiments may include the use of double-ended hooks, Fig. 7, tap-in but non-collapsible hooks, clip hooks, loops 70, Fig. 26, this list not being limiting.

#### **OPENINGS, WHICH MAY OR MAY NOT BE PROVIDED WITH NETTING**

- The fact of fixing a strip of fabric 10 with fixing means and a protective strip 49 with accessories such as rope 11 or foot rest 16 for example, Figs. 5, 6, in some openings 5 or in all the openings 5 creates a new effect and allows use thereof both in aquatic environments and on a beach or soft ground so as to develop ball games, games requiring dexterity, racing, physical exercises and any number of activities imaginable to be organised.
- The structure can therefore be set up in the form of a chequer board, which might incorporate a single block or consist of several blocks linked by a bridge, dimensioned to match the size of a volleyball court or more.

#### **STRIP OF FABRIC ASSOCIATED WITH FIXING MEANS**

This strip of fabric 10 with eyelets 7 or fixing means consists of a long strip of fabric folded in two in the lengthwise direction and is joined, for example bonded 33, across approximately one third to one half starting from said fold, this part having eyelets 7 or fixing means, hooks or mooring bitts fixed across the entire length of the strip. The non-welded or non-bonded part

33 is separated into two parts and opened out and can then be fixed or bonded directly to the inner periphery of the space(s) created by the structure or to the tube 8 itself. A protective strip of fabric 49 is bonded onto this strip of fabric 10 at the fixing means, and is left free and covers the fixing means and ropes. Depending on the solidity of the materials used, the strip of fabric 10 will be reinforced for example by at least one seam 65 at the fixing means, Fig. 7. The seam is formed either on the strip of fabric 10 or on the protective strip 49. This applies to any type of structure, swimming pool, life raft, sports ground, toboggan.

If necessary, depending on the tensions and tractions on the tubes which the strip of fabric 10 will have to withstand, it will be covered on its upper and lower part by a strip of fabric bonded at its edge to the tube and covering the strip of fabric 10 over a few centimetres.

This strip of fabric 10 with eyelets 7 or fixing means may be used both around the inner periphery of the structure for accessories, such as foot rests for example, netting or canvas 18, and on the exterior, below the structure, as a means of fitting the weighted netting 47 using ropes or hooks. Figs. 2, 4 e, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 20, 22, 26. Depending on the size of the tubes and the selected activities, the same strip of fabric 10 with fixing means and protective strip 49 is fixed at a number of desired heights, thereby increasing the possibilities for use.

Note: it is the diameter ratio of the tubes, surface of the netting or canvas and height position of the netting or canvas which determine the contact with water or ground and the use thereof for safety or play purposes.

By using welding technology at high ultrasonic frequencies, the strip of fabric 10 with eyelets 7 may be made in two parts, which are then grafted at a seam, and handles, accessories, ropes, ladders, eyelets and fixing means can be attached to this strip as desired. Fig. 8.

#### **PROTRUDING ELEMENTS**

For safety reasons, any detachable protruding elements on the top of the structure which may cause injury to the human body, such as (semi-circular) D-shaped rings 64 or grommets for example, will also be covered by a protective strip 49 or by another protective means such as blocks made of foam, cork or rubber for the volleyball posts. Fig. 25.

#### **NETTING AND FIXING MEANS**

The netting or canvas 18 itself for example may be cut so as to be quite free or, for greater firmness, can be edged with whipping, a rope 11, rope with loops 60 which are interlaced in the eyelets 7 in the strip of fabric 10, Fig. 4a, 4d, 4e; loops 70 which can hook over the miniature mooring bitts 66 or hooks on the strip of fabric 10, Fig. 26; a hem or another strip of fabric 10 with eyelets 7, Fig. 22; or other fixing means, double-ended hooks 17, Figs. 7, 21 a, b, c.

The fixing means on the strip of fabric 10 are, for example: hooks in the form of mooring bitts mounted on a strip 66 or directly on the strip of fabric 10, eyelets 7, Figs. 2, 7, 26, which make it possible to attach the netting, canvas, accessories, foot rest for example, Fig. 6.

#### **POSTS FOR VOLLEY BALL**

On each side of the bridge, left and right, a plank 61 slides in hems or pockets 62 provided for this purpose, above whichever system has been chosen to fix the bridge. At the middle of this plank is a tubular part 63 in which the post 75 that will be used to mount the net 76 is screwed or nested. The grommets, in this case D-shaped rings 64, will be disposed on the structure at the sides of the tubes 8 and on the structure to enable the posts 75 and net 76 to be stabilised by laces 74, and the D-shaped rings can be covered by a foldable strip of fabric 49, Fig. 25. Variant: flag-holders in the form of cones, which are bonded either directly to the structure if it is made in one piece or to a plank 61, this not being limiting in nature.

#### **INFLATION / DEFLATION SAFETY**

- Each structure is fitted with at least one inflation/deflation valve 19 which corresponds to an air chamber, each valve supplying an internal section of the structure which is separated by a wall placed in the desired location.
- When the structure is used to create a closed environment or far from a shore, particularly in respect of sports grounds, it comprises an open-work arrangement in its netting or canvas which can be unlocked, moved apart and re-locked. Fig. 20.
- In the case of independent sports facilities or for covers for swimming pools independently of a life raft, an inflation device of the type used as standard in nautical applications or a pneumatic aspirator with inverted functions may be used for inflation/deflation purposes.

#### **PRESSURE-RELIEF VALVE**

Depending on the application, in addition to an inflation/deflation valve, a pressure-relief valve may also be provided, thereby enabling air to escape in the event of violent shocks, without bursting the tubes.

### **TRANSPORT**

For this purpose, the base module has ropes 11 and handles 15 around its periphery. These may also be used for all other applications.

In the deflated state, on the other hand, the module is carried by means of a tarpaulin with straps and handles 15 attached to the exterior of the tarpaulin, the entire unit being placed on a board with rollers. Another solution would be to make a cover in the form of a large suitcase or box, mounted on a board with rollers 42, with a locking system, zip fastener or straps 43 and/or handles 15.

### **BRIDGE**

A bridge 9 may be created for use in swimming pools, sports facilities or with life rafts. The join between two surfaces must impart a certain rigidity to the unit because the bridge 9, by whatever means it is created, is designed to prevent the feet being placed between two tubes 8 when moving on the flat or jumping between the tubes 8. Figs. 3, 4c, 4f.

Two modules can be attached by threading a rope 11 through the handles 15, although the bridge should be created by attaching:

Solution a: a strip of fabric 13 with eyelets 7, left free and fixed at one side to a tube and, facing it, on the other structure, a strip of fabric 13a straddling the rope which passes through the eyelets 7 in loops 60, the loops being fixed by a ring 50. Fig. 4 a, 4 b, 4 c.

Solution b: two strips of fabric 10 with eyelets 7, attached to either side of the tubes to be assembled, the two strips 59 being placed one on top of the other with a rope 11 threaded above and below the two strips of fabric, Fig. 3.

Solution c: two sets of mooring bitts 66, each on a strip of fabric 67 attached to each tube to be assembled, with a rope threaded through from one mooring bitt to the other, Fig. 4 f.

In all the situations illustrated in the drawings, a strip of fabric 49 will be attached to one of the strips of fabric 10 and will be used to cover the fixing means. This strip of fabric 49 is folded down when the rope has been fitted.

To ensure that the tubes 8 sit in contact with one another when assembled, it is useful to arrange the handles 15 offset from one another from one module to the next.

#### **WEIGHTING THE STRUCTURE FOR SWIMMING POOLS**

For applications which involve use with a lifesaving device in swimming pools, one solution for weighting the grille is to provide not just one grille but also a second grille made from metal disposed underneath the inflatable structure. The grille will have connectors, corners 25, T-bars 23 and crosses 24 to enable it to be assembled/dismantled on site, and is attached to the inflatable structure by strips of fabric 26 into which the posts or bars 22 slide. The outer periphery of this second grille will be fixed so that this grille is as close as possible to the edges of the swimming pool. Fig. 13, 14a, 14b.

Enclosed in its fabric casing, this metal grille will either sit on the base of the swimming pool when the inflatable grille is deflated or can be embedded in the base of the swimming pool, where the imprint of its contour is reproduced.

#### **STOP**

To prevent the metal grille from knocking against the walls of the swimming pool, it will be necessary to provide protective elements or strips made of rubber 68 to avoid friction. As a variant, stop elements will be secured either at susceptible areas around the periphery of the grille or on the walls of the swimming pool.

#### **INTERNAL ACCESS TO THE STRUCTURE**

To install the air distribution network with access to the structure from inside, sealed traps are attached to the crosses, T-bars or corners when the lifesaving device is put in place.

#### **PROHIBITED ACCESS / SAFETY**

If it is necessary to prevent swimming underneath the structure or for sports facilities located in the middle of a swimming pool or on a stretch of water with other areas extending off from it, it is necessary to fit fixing means positioned around the bottom periphery of the structure, on which the weighted netting 47 can be hooked around the entire periphery, which weighted netting 47 will sink to the bottom preventing access to this area. The means which might be used for this purpose include grommets with a rope passing around the structure, D-shaped rings, i.e. semi-circular rings, or loops attached at regular intervals to the bottom periphery of the defined surface, for example. Hooks or small clips might be used to fit the netting,

although this option is not restrictive. The weighting may be provided for example by means of a strip containing lead and encased in insulating material, Fig. 20, or weights.

#### **STABILISATION**

These sports facilities in aquatic environments, swimming pools, lakes, sea, are stabilised by means of ropes or deadmen to ensure that they are sound.

#### **REINFORCING TAPE**

If the structure is likely to come into contact with friction, feet, rough ground or elements or the walls of the swimming pool, regardless of the application, it is advisable to fit reinforcing tape made of rubber 68 or some other material which can be attached to the fabric used for the tubes, and this can be done at any point which might be susceptible to wear, be it on the sides, underneath or on the top, Fig. 16.

#### **SEAMS**

If the tubes are made using a technology based on cold-bonding, or a hybrid technique, the internal and external seams will be reinforced with narrow strips of fabric to ensure a perfect seal.

#### **REINFORCING THE INFLATABLE STRUCTURE**

If high-frequency ultrasonic heat welding technology is used, the structure of inflatable tubes is reinforced by incorporating tubular elements 57, such as used on inflatable mattresses. The strips of fabric 10 with eyelets 7 or strip of fabric used to form handles will then be attached to a reinforcement, provided as an extension of the seams 58, Fig. 8.

#### **SNOW / WATER APPLICATIONS**

A boat-shaped structure has reinforcement strips underneath and on the sides where there could be some risk of friction; one or more cross-pieces 28 for the canvas or the netting 18 attached to a strip of fabric 10 with eyelets 7 by means of a rope 11 or double-ended hooks 17, or by means of two strips of mooring bitts and a rope, and the structure is also provided with handles 15, safety belts 29, with a rudder and brake system, and then becomes a toboggan or bob for travelling down and climbing snow-covered slopes. The brake and rudder system is detachable. The advantages of this are that the bob can be dismantled and deflated, takes up little space, can be folded and stored in a bag and the tubes provide protection. A user can sit either on the canvas or on the cross-pieces and, for additional comfort, an elastic netting may be fixed along a cross-piece for carrying luggage and foot rests may be secured or

bonded to the inner side on either side of the tubes, for steering either in a standing or seated position. Fig.15, 16, 17a, 17b, 18a, 18b.

In summer, it can be used on water, with a motor fixed to the rear and with oars. Edged with eyelets 7, the canvas will be rendered watertight in the following way, for example: a strip of fabric 54 is attached to the periphery adjacent to the strip of fabric with eyelets 10b so as to cover them and is applied by forming the corner and running it up onto the tubes, where it is fixed by a series of button-holes 52 which are formed in the strip of fabric 54 and hook onto the tube 8 where a series of buttons 53 are mounted on a strip of rubber. The strip of fabric 54 comprises a strip which acts as a sucker 51. Fig. 22. The strip of fabric 54 folds back to enable the canvas to be attached.

As a variant, the buttons may be flat hooks. Another solution: a watertight zip fastener attached to the tube at one side and to the strip of fabric with the canvas at the other side. These solutions are not intended to be restrictive.

#### **RUDDER - BRAKE SYSTEM**

It consists for example of an articulated and flexible tubular shaft or rudder shaft 30 with a handle bar 31, the height of which can be adjusted. Its height position is locked by a metal rod 35 inserted through orifices 34 provided on the rudder shaft 30. Fig. 17a.

The tubular shaft 30 freely engages in a transverse bar 32, which bar may or may not be extendible in width and has on its bottom part and at each end, left and right, a rod 40, which may or may not be threaded, each of these locating in female mountings 41 fixed at either side at the inside front part of the bob. Fig. 17a, 17b. The threaded rods are fitted with nuts or wing nuts.

The tubular shaft 30 has a metal rod 35 inserted through it and sits freely on the transverse bar 32, enabling the unit to be pivoted.

In another embodiment designed to support the rudder, a piece adapted to the shape of the internal or external front of the tubes forming the toboggan has a tubular part 56 for receiving the rudder shaft 30 and the top part of this piece will form a platform 57 on which the rod 35 inserted through the rudder shaft 30 sits. Fig. 23. To prevent too much friction, a circular cavity representing the pivoting motion of the rod 35 may be provided either on the transverse bar 32, Fig. 17 a, or on the support platform 57, Fig. 23.

### **FIXING THE BRAKE SYSTEM**

Attached to the bottom part of the tubular shaft 30 are hooks 38 or loops, onto which either springs or large elastic elements 37 are fixed, which are in turn attached by hooks 38, thereby providing a link to the tubular shaft 30, and a plate acts as a brake 36. Fig.17a.

The springs or elastic elements on the back of the plate 36 are shorter and/or have differing traction strengths so as to provide a gradual braking action. The rear part 39 of the plate 36, which is flexible, brushes against the snow, thereby keeping the rudder 31 straight so that the raft runs straight in the snow, and a sight may be fixed at the front at the joining point between the two tubes. An opening is left free in the canvas, through which the feet can be inserted.

A foot rest 44 is fixed slightly above the part which brushes against the snow. The part following the flexible part 39 is linked either by a joint or hinge or is made from the same material but more solid, and it is desirable if this part can be changed once it becomes worn. Fig.17a, 18a, 18b.

### **ALTERNATIVE SOLUTION FOR THE BRAKE**

A Z-shaped strip of flexible material 46 is secured between two plates 36. Fig. 18a. The top plate 36 has hooks 38 on its outer edge enabling the brake plate 36 to be attached and suspended, the latter being linked to the tubes by means of strong elastic elements 37 or springs 43, which are attached to the hooks 38 disposed at the desired height on the tubes 8.

### **BRAKING**

Braking is operated by depressing the plate 36 with the feet, either the left or right foot or both together, and then lifting the feet to raise the plate 36, the braking action being harder the stronger the depressing action.

### **MANUAL STEERING OF THE TOBOGGAN**

As a variant, the rudder shaft 30 is controlled manually from the handle bar 31 by means of cables and springs supported on two brake plates or a shaft mounted directly on a brake/steering plate 36 which is kept straight to travel straight and which is inclined slightly to turn, the braking being effected by applying more or less pressure to the shaft. The bob can thus be driven from either a seated or a standing position. Fig. 23. For steering using the force

of the arms, foot rests 71, Fig. 16, will be fixed to the inner face of the toboggan on either side of the tubes.

It is possible to form bobs or toboggans with just one seat or with multiple seats, with canvas on each seat or in just one or two seats, or with no canvas. If desired, seats which may or may not be foldable will be fixed to the cross-pieces by welding or bonding or by the fixing means of type 41, Fig. 17b, for example.

## CLAIMS

1. Inflatable structure (1) formed of tubes (8), the elements of which are assembled so as to create internal spaces or openings (5) which are able to contain a netting or canvas (18), said inflatable structure (1) comprising at least one inflating and deflating valve (19) corresponding to an air chamber, the air chambers being multiplied by the placement of internal wall(s), said inflatable structure (1) being characterised in that the basic structure thus created is associated with a combination of means (10), (7), (7+17), (11), (60), (66), (70) for fitting and removing the netting or canvas (18) so that, when a person jumps on the netting(s) or canvas(es), it is the structure itself which reacts.
2. Inflatable structure according to claim 1, characterised in that the basic structure comprises, on at least one side, means (10), (7), (7+17), (11), (60), (66), (70) which combine with one another so as to allow the fitting and removal of a bridge (9) at the side(s) where it is desired to attach another structure (1); these means are associated with at least one protective strip which is left free at one side (49) and covers them.
3. Inflatable structure according to claim 1, characterised in that, in the interior of one or more spaces formed by the structure (1), or of all of these spaces, there are means for fixing a netting, canvas (18) or accessories (16), these means consist of a strip of fabric (10) which is folded in two, with a first part at the fold which is glued, welded, reinforced, this part comprises means (7), (7+17), (66) for rapidly fixing accessories (16) (11), netting, canvas (18) which in turn have fixing elements (11), (60), (66), (70), (17) that are compatible with those located on the strip of fabric (10); the non-welded part of the strip of fabric (10) being separated into two flaps which are glued, welded, attached directly to the tube (8) so as to form a single piece with the latter; a protective strip (49) comprising one part fixed to the strip of fabric (10) below the means, the other part being left free and covering the fixing elements.
4. Inflatable structure according to claims 1 and 2, characterised in that the means for linking two modules so as to form a bridge (9) are established by applying two strips of fabric (13) with eyelets (7), these strips of fabric are fixed to the tops of the tubes on the faces of the modules to be assembled, they are placed one on top of the other, a rope (11) passes through the eyelets (7) to assemble them, above and below, with a knot (12) at

each end, the whole being in association with a protective strip which is left free at one side (49).

5. Inflatable structure according to claims 1, 2 and 3, characterised in that the means for forming a bridge (9) by linking a module or for fixing a netting or canvas (18) are double-ended hooks (17) in association with a protective strip which is left free at one side (49).
6. Inflatable structure according to claims 1, 2 and 3, characterised in that the fixing of the netting, canvas or bridge is carried out by means of a rope (11) forming loops (60) which are attached at their bases (50), the rope (11) passing either along the edge of the netting or canvas (18) or into a strip of fabric with eyelets (13b) which is fixed to the top of the module to be assembled for the bridge, and ensures, by the interlacing of its loops in one another from right to left, the rapid fixing and removal of a bridge (9), netting or canvas (18), the ropes being attached together in the corners and at the ends; the loops (60) are covered by a protective strip which is left free at one side (49).
7. Inflatable structure according to claims 1, 2 and 3, characterised in that two sets of mooring bitts or hooks (66) make it possible by means of a rope to carry out a simple lacing operation and the rapid fitting and removal of a bridge, netting or canvas (18), the miniature mooring bitts being covered by at least one protective strip (49).
8. Inflatable structure according to claims 1 and 3, characterised in that a strip of fabric 10 which is glued or welded to the tube (8) and has miniature mooring bitts (66) or hooks is associated with loops (70) at the edge of the netting or canvas (18) and allows the fixing thereof, the whole being covered by a protective strip (49) which is left free at one side and is attached below the miniature mooring bitts.
9. Inflatable structure according to one of claims 1 to 8; for lifesaving in a swimming pool, characterised in that the inflatable structure (1) is faced with a metal grille (69) underneath, the dimensions of which are the same as the internal dimensions of the swimming pool, the grille comprising bars (22) which slide in the fabric strips (26) provided underneath the grille (69) and engage in the connectors, corners (25), T-bars (23), crosses (24), said metal grille (69) either resting on the bottom of the swimming pool or being embedded in the base of the swimming pool, the swimming pool walls

being protected from impacts by protective strips (68) placed on the structure (1) or by anti-impact stops disposed on the metal grille (69) or on the walls of the swimming pool.

10. Inflatable structure according to one of claims 1 to 9, characterised in that the structure (1) comprises, for sports grounds, fixing means (48) for weighted netting (47) which are positioned around the bottom periphery of the structure so as to prevent swimming underneath the structure.
11. Inflatable structure according to one of claims 1 to 8 and 10, characterised in that the structure comprises, for use as a volleyball court, two receiving supports (62) fixed to the tubes (8) associated with means (61), (62), (63) for the removable fixing of the posts (75) supporting the volleyball net (76), and also elements (64) which make it possible to tauten the ropes (74), said elements being protected by a foldable protective strip (49) so as to ensure the balance of the posts supporting the volleyball net (76).
12. Inflatable structure according to claims 1, 3, 5, 6, 7 and 8, characterised in that the means used to fit and remove the netting or canvas (18) apply to the creation of an inflatable structure consisting of two joined tubes (8), at least one of which is provided with a cross-piece (28), the cross-piece(s) being fixed in the extension of the two arms, and comprising a support for receiving a detachable rudder and brake device (32) (55), and also a pair of foot rests (71), a motor can be fixed to the rear, and also oarlocks.
13. Inflatable structure according to one of claims 1 to 12, characterised in that the inflatable structure (1) comprises protective strips (68) for protecting against friction and impacts, from above, from below, from the side, wherever necessary.
14. Inflatable structure according to claims 1, 3 to 8, 12 and 13, when the structure is a toboggan, characterised in that the inflatable structure (1) is provided with a steerable rudder and brake system (30), the toboggan being driven in a standing or seated position, the brake system for the toboggan comprising an articulated and flexible tubular shaft (30) which can be placed at adjustable positions (30) (33), fitted with a handle bar (31), the position of the tubular shaft is locked by a metal rod (35) inserted through the tubular shaft, the metal rod sitting freely on a transverse bar (32), which bar may or may not be extendible in width and having a rod (40) underneath the bottom at each end, left and right, which locates in female mountings (41) located on the tubes at either side; the bottom part of the tubular shaft (30) has hooks (38), to which are attached suspension

means (37) (38) linked to a brake plate (36) by other hooks (38), a part of this plate (39) brushing against the ground (45).

15. Inflatable structure according to claims 1, 3, 5, 6, 7, 8, 12, 13 and 14, characterised in that the steering system for the toboggan consists of a support (55) for the rudder shaft (30) which is a piece adapted to the shape of the tubes (8) and comprises a tubular part (56) in which there engages the articulated and flexible rudder shaft which can be set at adjustable positions (30).
16. Inflatable structure according to claims 1, 3 to 8, 12, 13, 15, characterised in that, for the toboggan, the brake plate (36) is a Z-shaped strip of flexible material (46) secured between two plates, the top plate being provided with fixing or suspension means (37) (38) linked to the tubes.
17. Inflatable structure according to claims 1, 3, 5 to 8, 12 to 16, characterised in that the base of the toboggan comprises a removable base in the form of impermeable canvas and also means for fixing it in an impermeable manner (54) (52) (53) (51).
18. Inflatable structure according to one of the preceding claims, characterised in that the deflated and folded structure (1) is transported in a tarpaulin, suitcase or box which is mounted on a board with rollers (42), provided with a zip fastener, straps (43) and handles (15).