(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 868 342 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
19.06.2002 Bulletin 2002/25

(21) Application number: **96942443.1**

(22) Date of filing: **12.12.1996**

(51) Int Cl.[7]: **B63C 9/22**, B63B 27/28, A62B 1/20

(86) International application number:
PCT/GB96/03083

(87) International publication number:
WO 97/22514 (26.06.1997 Gazette 1997/27)

(54) **MARINE ESCAPE SYSTEMS**

RETTUNGSVORRICHTUNGEN FÜR WASSERFAHRZEUGE

SYSTEME DE SECOURS EN MER

(84) Designated Contracting States:
DE DK FR GR IT SE

(30) Priority: **19.12.1995 GB 9525968**
12.09.1996 GB 9619069

(43) Date of publication of application:
07.10.1998 Bulletin 1998/41

(73) Proprietor: **Wardle Storeys (Safety & Survival Equipment) Limited**
Barnoldswick BB18 6UT (GB)

(72) Inventors:
- **BELL, Richard, Edward**
  Crumlin, County Antrim BT29 4JF (GB)
- **McLEAN, Iain, Henry**
  Lisburn, County Antrim BT27 4AS (GB)
- **PHIPPS, Peter, John**
  Godalming, Surrey GU7 1NL (GB)

(74) Representative: **Knott, Stephen Gilbert et al**
MATHISEN, MACARA & CO.
The Coach House
6-8 Swakeleys Road
Ickenham Uxbridge UB10 8BZ (GB)

(56) References cited:
WO-A-84/02658
WO-A-94/01324
US-A- 3 994 366

EP 0 868 342 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The invention relates to marine escape systems.

[0002] A marine escape system is used for evacuating people from a structure at sea in the event of an emergency. Such a structure may be an oil rig or a ship.

[0003] One form of marine escape system includes liferafts into which the people are evacuated. Since, when liferafts are deployed on water, there is usually a significant difference in height (freeboard) between the point on the structure from which the people are evacuated and the liferafts, it is necessary to provide some form of passage between the two.

[0004] It is known to provide an angled chute, which may be formed from inflatable members, extending between the evacuation point and the liferafts. The chute can extend either direct to the liferafts or to an inflatable floating structure to which the liferafts are attached. In some vessels, the freeboard may be 14-15 metres and so the chute is of significant length.

[0005] Recent sinkings of ships have placed greater emphasis on the need to evacuate marine structures quickly in the event of an emergency. It is likely to be a requirement that any sea-going vessel must be able to evacuate 400 people in 17 minutes 40 seconds. In addition, it is likely to be a requirement that any marine escape system must be able to operate in force six weather which will include a 3 metre swell and that the marine escape system must be usable for a considerable period of time with the vessel side-on to the sea.

[0006] An angled chute is not readily able to meet such a requirement. Since the chute projects from the side of a vessel it requires stabilization in order to prevent significant lateral movements in heavy weather. Further, to accommodate such weather, the chute must be comparatively rigid and this can increase significantly the bulk of the chute.

[0007] Marine escape systems have also been proposed in which the connection between the evacuation point and the inflatable liferafts is via a tube containing a helical slide passage. See, for example, WO-A-84/D2658, WO-A-94/01324 and US-A-3994366. A person entering the passage at the escape point travels in a helical path along the passage and emerges at an exit at the lower end of the tube.

[0008] A tube requires less stabilization than a chute against lateral movement in heavy weather. However, the tube has the problem of accommodating swell which, as mentioned above, may alter the freeboard of a vessel by six or more metres.

[0009] It has previously been proposed to accommodate this by making the tube of flexible material with a maximum length sufficient to accommodate the swell. The tube hangs from the evacuation point on the structure and has excess length heaped on a platform to which people are evacuated when the swell is less than the maximum. As the space in between the platform and the evacuation point varies, more or less of the tube is either extended from or piled into the heap on the platform. This is disclosed in WO-A-94/01324.

[0010] It is a problem with such an arrangement that no single exit can be provided. In order to overcome this problem, such tubes have previously been provided with a plurality of exits spaced along their length; with evacuated persons emerging from the exit closest to the platform at the time they reach the platform. This is not, however, satisfactory because a person may exit too soon or the position of the platform may change to make a selected exit suddenly inappropriate.

[0011] According to the invention, there is provided a marine escape system comprising a passage for persons and having an entrance at one end and an exit at an end opposite said one end, at least one support for the passage being provided between the entrance and the exit, the support being suspended by at least one first elongate elastic member, at least one second elongate elastic member extending from the support towards the exit, the at least one second elongate elastic member having a greater elasticity than the at least one first elongate elastic member, so that a portion of the passage between the exit and the support is extensible and contractible before the extension and contraction of a portion of the passage between the entrance the support, the passage being extensible and contractible to accommodate changes in the spacing between the entrance and the exit.

[0012] By varying the length of the tube between the entrance and the exit, a swell can be accommodated while maintaining a single exit.

[0013] According to a second aspect of the invention, there is provided an escape chute comprising an elongate tube which is deployed generally vertically and a succession of spaced members within the tube, each spaced member being formed by a panel extending transversely across the tube, the panel having an upper edge connected to the tube and a lower edge spaced from the tube characterized in that a funnel outlet depending from each aperture to provide a vertical component of said path, the panels and the funnel outlet defining, with the tube, a path for the passage of a person through the tube.

[0014] The following is a more detailed description of some embodiments of the invention, by way of example, reference being made to the accompanying drawings in which:-

Figure 1 is a side elevation of a ship showing schematically a marine escape system including two escape chutes leading from an emergency exit to liferafts deployed on the sea,

Figure 2 is a side elevation of a part of one of the escape chutes,

Figure 3 is a perspective view of part of the escape chute of Figure 2,

Figure 4 is a cross-section through the escape

chute of Figures 2 and 3,
Figure 5 is an elevation of one side of a right hand side cell of an alternative form of escape chute,
Figure 6 is a front elevation of the right hand cell shown in Figure 5,
Figure 7 is an elevation of the other side of the right hand cell of Figures 5 and 6,
Figure 8 is a rear elevation of the right hand cell of Figures 5 to 7,
Figure 9 is a schematic view of an outer wall of the right hand cell of Figures 5 to 8,
Figure 10 is a schematic view of the slide path assembly of the right hand cell of Figures 5 to 9,
Figure 11 is a partial section of the right hand cell of Figures 5 to 10 showing the slide path and the outer wall in an extended disposition,
Figure 12 is a similar view to Figure 11 showing the outer wall in a collapsed disposition,
Figure 13 is a similar view to Figure 12 but showing the whole of a right hand cell with the outer wall in a collapsed disposition,
Figure 14 is an elevation of one side of a left hand cell of the alternative form of chute,
Figure 15 is a front elevation of the left hand cell,
Figure 16 is an elevation of the other side of the left hand cell,
Figure 17 is a rear elevation of the left hand cell of Figures 14 to 16,
Figure 18 is a similar view to Figure 14 but showing the outer wall of the left hand cell of Figures 14 to 17 in a collapsed disposition,
Figure 19 is an elevation of one side of a bottom cell of the alternative escape chute,
Figure 20 is a front elevation of the bottom cell of Figure 19,
Figure 21 is an elevation of the other side of the bottom cell of Figures 19 and 20,
Figure 22 is a rear elevation of the bottom cell of Figures 19 to 21, and
Figure 23 is a similar view to Figure 19 but showing the outer wall of the bottom cell of Figures 19 to 22 in a collapsed disposition.

[0015] Referring first to Figure 1, the marine escape system comprises two emergency exits 10 each leading to a respective escape chute indicated generally at 11. Each escape chute terminates at a respective liferaft 12 with two further liferafts 12 also being provided. It will be appreciated that the marine escape system is normally held in a container at the side of the ship and deployed in an emergency, in a manner to be described below.

[0016] Referring now to Figures 2, 3 and 4, each escape chute 11 comprises a closed tube 13 of foldable material (such as a fabric) formed into a helix. The tube 13 may be provided with stiffening bands 14 at spaced intervals along its length in order to hold the tube 13 open.

[0017] The tube 13 is supported by a plurality of hoops 15 spaced apart along the length of the tube 13. As seen in Figure 2, there are eleven hoops 15, but there may be more or less hoops as required. Each hoop 15 is made from a rigid alloy or a carbon fibre material. A typical hoop diameter might be 2.3 metres.

[0018] As best seen in Figures 3 and 4, each hoop is provided with six fixing points 16 equiangularly spaced around the exterior of the hoop 15. The purpose of these will be described below.

[0019] As will be seen in Figures 2, 3 and 4, each hoop 15 is positioned at a point along the length of the tube 13 where the axis 17 of the tube is at a maximum spacing from the axis 18 of the hoop. The tube 13 is held in this position by five flexible but inelastic elongate members 19 and seven flexible and elastically elongatable members 20. The inelastic members 19 may be cords while the flexible members 20 are preferably formed from a resilient elastomeric material.

[0020] The inelastic members 19 extend between equiangularly spaced points 21 on the portion of the periphery of the tube 13 lying between two parallel planes, one extending through the tube axis 17 and the other extending through the hoop axis 18 and both being normal to a hoop radius extending between the hoop axis 18 and the tube axis 17. This is the portion of the tube 13 that faces the hoop axis 18. In this way, the inelastic members 20 fix the maximum spacing between the tube axis 17 and tube axis 18 so preventing the tube 13 moving any closer to the hoop 15.

[0021] The elastic members 20 are also connected between the tube 13 and the hoop 15. Two of the elastic members 20 extend from diametrically opposite points 22 on the periphery of the tube 13 and lying in a plane including the tube axis 17 and normal to a radius extending from the hoop axis through the tube axis. The remaining elastic members 20 are equiangularly spaced around the periphery of the tube 13 between these two points 22.

[0022] The elastic members 20 thus allow the tube 13 to move so that the spacing between the axis of the tube 17 and the axis of the hoop 18 decreases. The elastic members 20 are permanently in tension and so they provide a force tending to restore the tube 13 to the position shown in Figure 3. This may be a position in which the helical tube 13 has a helix angle of 30°.

[0023] The hoops 15 themselves are also interconnected by flexible members of two kinds; inelastic flexible members 23 and elastic flexible members 24.

[0024] The inelastic flexible members 23 extend from a support 25 at the top of the escape chute 11 and the sixth hoop 15, as seen in Figure 2. There are six members 23 equiangularly spaced around these hoops 15 and connected at each hoop 15 to an associated one of the fixing points 16. Thus, the inelastic flexible members 23 fix the maximum spacing between the first and sixth hoops 15.

[0025] The sixth hoop 15 is connected to an associated liferaft 12 by the elastic flexible members 24. There

are three different types of elastic flexible member 24, the types having different elasticities. The first elastic members 24a are the least elastic and they extend between the sixth hoop 15 and the eighth hoop 15. There are six members 24a and they are attached to the fixing points 16 on the sixth, seventh and eighth hoops 15.

[0026] The second elastic flexible members 24b are more elastic than the first elastic flexible members 24a. There are six of these members 24b and they extend between the eighth hoop 15 and the tenth hoop 15 and are connected to the fixing points 16 on these hoops.

[0027] The third elastic flexible members are connected between the tenth hoop 15 and the associated liferaft 12. They are more elastic than the second elastic flexible members 24b. There are six of these members 24c and they are connected to the fixing points 16 on the tenth and eleventh hoops 15 and to fixing points (not shown) on the liferaft 12.

[0028] A typical first elastic flexible member 24a might have a diameter of 19mm and extend in excess of 4000mm under a load of about 7.5N. Each second elastic flexible member 24b might typically have a diameter of 16mm and extend in excess of 4000mm under a load of about 5.5N. Each third elastic flexible members 24c might have a diameter of 12.5mm and extend in excess of 4000mm under a load of 3.5N.

[0029] The outside of this structure may be covered by a fabric tube (not shown) of generally the same diameter as the hoops 15.

[0030] Each exit 10 is connected to the support 25 at the upper end of the escape chute 11. This provides an exit from the ship and leads to the entrance to the escape chute 11 at the upper end of the escape chute 11.

[0031] The liferafts 12 are formed by inflatable tubes 26 and are provided with a fabric cover 27. The liferafts are generally rectangular in plan view and, as shown in Figure 1, are held together in a rectangular array. Each escape chute 11 provides at its lower end an exit within an associated one of the liferafts 12.

[0032] In use, the liferafts 12 are deflated and are held with the escape chutes 11 in a container mounted at the exits 10 on the ship. It will be appreciated that the escape chutes 11 require very little space because the hoops 15 will collapse to lie on top of one another and the fabric of the tube 13 can readily be collapsed. The members 23,24 will also collapse into a comparatively small space.

[0033] In an emergency, the liferafts 12 and the escape chutes 11 are ejected from the container and the exits 10 opened. As they deploy, the liferafts 12 are inflated from a source of gas under pressure (not shown) in conventional fashion. The liferafts 12 are provided with water pockets (not shown) which, as the liferafts 12 hit the sea, fill with water. The weight of the liferafts 12 and the length of the inelastic members 23 and the elastic members 24 are chosen so that, in a calm sea and with the ship normally loaded, the inelastic members 23 are fully extended and the elastic members 24 are under tension. As indicated above, typical elastic members 24 may provide between them an extension in excess of 12000mm. In this case, the arrangement may be such that in calm sea the flexible members 24 are extended by 6000mm.

[0034] The extension of the members 24 increases the spacing between the sixth hoop 15 and the associated liferaft 12. This causes the tube 13 to have an increased helix angle, as seen in Figure 2. This in turn causes straightening of the tube and thus extension of the flexible elastic members 24 connecting the tube 13 to the hoops 15 with the tube 13 moving towards the axis 18 of the hoops 15.

[0035] When deployed in this way, persons can enter the entrance at one end of the tube 13, slide through the tube in a helical path and emerge within the liferaft. They are, therefore, never exposed to the outside elements in the whole of their travel between the ship and a liferaft 12.

[0036] Sea swell will cause the liferafts 12 to move up and down relative to the exits 11 so increasing and decreasing the freeboard of the ship. This is accommodated by extension and retraction of the elastic members 24 and by extension and retraction of the tube 13. The third elastic members 24c will extend first followed by the second elastic members 24b and followed by the first elastic members 24a. The weight at the end of the tube 13, provided by the liferafts 32, is sufficient to cause this extension without the liferafts 12 lifting out of the sea. The position of the axis 17 of the tube 13 will also change, with such changes being accommodated by the flexible members 20. As this occurs, the helix angle of the tube 13 will vary.

[0037] It will be appreciated that there are a number of variations that can be made to the marine escape system described above with reference to the drawings.

[0038] There need not be two escape chutes 11; there could be one or three or more. The or each escape chute 11 need not terminate within a liferaft 12; it could terminate at a floating platform to which liferafts are attached.

[0039] In an alternative arrangement, the tube 13 may split at a point along its length into two parallel tubes so that persons evacuating the ship can pass successively down one and then the other of the tubes.

[0040] The connections between the hoops need not be formed by flexible members 24; they could be formed by any suitable extendible member such as a spring.

[0041] Although the arrangement described above is elastically extendible and retractible only from the sixth hoop 15 to the liferaft 12; it could be elastically flexible all the way along its length or between the liferafts and hoops other than the sixth hoop 15.

[0042] It will also be appreciated that the weight of the liferafts 12 at the end of the escape chutes 11 tend to keep the chutes in a vertical disposition. This minimizes the requirement for any stabilization of the position of the escape chutes 11 relative to the ship.

[0043] The escape path for evacuees need not be a

helical tube; it could be an open-topped helical chute or a tube containing a succession of alternately oppositely facing panels spaced along the length of the tube, each panel being angled relative to the length of the tube. A person entering the tube slides down one panel and then turns to slide down an oppositely facing panel and so on until the end of the tube is reached. In this case, the panels may be of flexible material to accommodate extension and retraction of the tube.

[0044] Referring next to Figures 5 to 22, there will now be described an alternative form of the escape chute shown in Figure 1.

[0045] In this embodiment, the escape chute is formed from three different kinds of cell. A left hand cell 30 shown in Figures 5 to 13, a right hand cell 31 shown in Figures 14 to 18 and a bottom cell 32 shown in Figures 19 to 23. The right hand and left hand cells 30,31 are joined end to end alternately to form the chute, in a manner to be described in more detail below, and the bottom cell 32 is attached at the end, again in a manner to be described in more detail below.

[0046] Referring first to Figures 5 to 13, the left hand cell 30 is formed from a cell wall 33, best seen in Figure 9, and a slide path 34, best seen in Figure 10. The cell wall 33 is, as seen in Figure 9, generally cylindrical and formed of a high strength waterproof fabric. As best seen in Figures 5 to 8, the cell wall 33 has an upper edge 35 provided with a circumferentially spaced series of loops 36. The cell wall 33 also has a lower edge 37 with similar spaced loops 38. A series of tubular pockets 39 extend around the cell wall 33 intermediate the upper edge 35 and the lower edge 37 to form an interrupted annular passage around the cell wall.

[0047] The function of the loops 36,38 and the pockets 39 will be described below.

[0048] The cell wall 33 contains a slide path 34, best seen in Figure 10. The slide path 34 is also formed from strong waterproof fabric.

[0049] The slide path 34 comprises a back panel 40 which is generally elongate with a rounded upper end edge 41 and a convexly curved side edge 42. The edge of the side of the back panel 40 opposite the side edge 42 is straight and the lower edge 44 of the back panel 40 opposite the upper end edge 41 is also straight. A diverter panel has an edge connected to the straight edge 43 of the back panel 40 and lies in a plane that subtends an obtuse angle to the plane of the back panel 40. An outer skirt panel 46 curves between a lower portion of the outer edge 47 of the diverter panel 45 and a lower portion of the side edge 42 of the back panel. The back panel 40, the diverter panel 45 and the outer skirt 46 thus between them form a converging enclosed pathway or pocket. This terminates in an aperture 48.

[0050] The slide path 34 is connected inside the cell wall 33 in the following way.

[0051] The upper end edge 41 of the slide path 34 is connected to the interior surface of the cell with the apex of this edge 41 being adjacent the upper edge 35 of the cell wall 33. This connection continues around the upper end edge 41, the side edge and the outer edge 47 of the diverter panel 45, until approximately the level of the pockets 35. In addition, the outer skirt 46 has an upper edge 50 that is also connected to the interior of the outer of the cell wall 33 also roughly at the level of the pockets 35.

[0052] Thus, as seen in Figures 5 to 8, the back panel 40 extends diagonally across the cell wall 33 between the upper edge 35 and the lower edge 37. As seen in Figure 7, the diverter panel 45 is at an obtuse angle relative to the back panel 40. The funnel outlet 49 extends downwardly beyond the lower edge 37 of the cell wall 33. In this way, as seen in Figure 13, the lower part of the cell wall 33 can be collapsed upwardly without affecting the disposition of the slide path 34. The purpose of this will be described below.

[0053] The right hand cell 31 will now be described with reference to Figures 14 to 18. As seen in these Figures, the cell is largely identical to the left hand cell 30 and the common parts will not be described in detail and will be given the same reference numerals. The difference between the right hand cell 31 and the left hand cell 30 is that, in the right hand cell 31, the slide path 34 is rotated by 90° relative to the loops 36,38 as compared to the slide path 34 of the left hand cell 30. This allows the loops 35,38 to form a passage in a manner to be described below.

[0054] The bottom cell 32 is formed by an annular cell wall 55 having an upper edge 56 provided with loops 57 which are the same as the loops 36 on the upper edge 35 of the cell wall 33 of the left hand cell 30. The cell wall 55 has, however, no pockets 35 and no loops on its lower edge 58. The length of the cell wall 55 between the upper edge 56 and the lower edge 58 is longer than the length of the cell wall 33 of the left hand cell 30 between its upper edge 35 and lower edge 37. The cell wall 55 contains a slide path 59 which is identical to the slide path 34 in the left hand cell 30 and is connected to the cell wall 55 in the same way as the slide path 34 is connected to the left hand cell 30. Thus, as seen in Figures 18 to 22, the funnel outlet 49 projects only a short distance below the lower edge 58 of the cell wall 55. However, the back panel 40 may be perforate to allow water to drain through the panel 40.

[0055] The chute is formed by connecting together left and right hand cells 30,31 alternately until a chute of the required length has been formed. The cells are so arranged that the back panel 40 of each slide path 34 is skewed by 90° relative to the preceding and succeeding back panels 40. The skewing is successively in the same sense (either clockwise or anticlockwise).

[0056] The cells 30,31 are interconnected by hoops (not shown). The loops 38 at the lower edge 37 of one slide path 34 (of a left or right hand cell 30,31) fit between the spaces of the loops 36 of the upper edge of the next slide path 34 (of a right or left hand cell 31,30). There is thus formed a continuous tubular passage through

which a hoop extends to form the connection. The hoops may, for example, be made of metal.

[0057] The bottom cell 32 is connected to the lowermost left hand or right hand cell 30,31 in the same way; by a hoop passing through the passage formed by the loops 36,38.

[0058] A hoop 53 is also passed through the tubular pockets 39 between the upper and lower edges 35,37 of each cell wall 33. The effect of these hoops 52,53 is to hold the cell walls 33, 55 open while permitting them to be collapsed.

[0059] The hoops 52 at the upper and lower edges 35,37 of the cell walls (but not the intermediate hoops 53) are connected together by elastic members which are arranged in the same way as the elastic members 19 connecting the hoops 15 in the embodiment described above with reference to Figures 2 to 4. The escape chute so formed is connected between a ship and a life raft 12 in a manner of the escape chute described above with reference to Figures 2 to 4.

[0060] This embodiment of the escape chute forms, in essence, a spiral path between the uppermost cell 30,31 and the bottom cell 32. A person entering the uppermost cell 30,31 initially sits on the back panel 40 of the first slide path 34. As the person travels down the back panel 40, they engage the diverter panel 40 and this twists them in anticlockwise direction. They then pass through the funnel outlet 49 to engage the back panel 40 of the next succeeding cell 30,31 which is skewed by 90° to the back panel 40 the person has just left. The effect of the funnel outlet and the skewed arrangement of the back panels 40 is to cause the person to slow down by friction engagement with the material of the slide path and by the constriction provided by the funnel outlet. A person travelling through the escape chute thus reaches a safe speed at which the person passes in a spiral path through succeeding slide paths 34 until the bottom cell 32 is reached. As the person leaves the bottom cell 32 through the funnel outlet 49, they enter the life raft 12 as described above with reference to Figures 1 to 4.

[0061] As the spacing between the life raft 12 and the ship varies, such variation is accommodated by the collapse and extension of the chute under the control of the flexible members 20 which progressively collapses the chute from the bottom cell 32 upwards, as described above with reference to Figures 1 to 4.

[0062] As a result of the way in which the slide paths 34 are connected to the cell walls 33,55, such collapsing of the walls 33,55 does not collapse the slide paths 34. As the escape chute length gets shorter, they merely concertina into one another so that, as a person leaves a funnel outlet 49 of one cell 30,31 they engage the back panel 40 of the next succeeding cell 30,31 at a position lower down the back panel 40 than the person would if the cells 30,31 were fully extended.

[0063] It will be appreciated that there are a number of variations that can be made to this second form of escape chute. The slide path 34 need not be formed as described. It could have any shape which guides and controls the path of a person through the chute. The cells 30,31,32 need not be connected by loops 36,38 as described above, they could be connected in any suitable way. The cell walls 33,55 need not be continuous; they may include cut-outs.

Claims

1. A marine escape system comprising a passage (11) for persons and having an entrance (10) at one end and an exit (12) at an end opposite said one end, at least one support (15) for the passage being provided between the entrance and the exit, the support being suspended by at least one first elongate elastic member (24), at least one second elongate elastic member (24) extending from the support (15) towards the exit, the at least one second elongate elastic member (24) having a greater elasticity than the at least one first elongate elastic member (24), so that a portion of the passage (11) between the exit and the support (15) is extensible and contractable before the extension and contraction of a portion of the passage (11) between the entrance the support (15), the passage being extensible and contractible to accommodate changes in the spacing between the entrance and the exit.

2. A system according to claim 1 wherein a further support (15) is provided between the first mentioned support (15) and the exit (12), the at least one second elongate elastic member (24) being connected between the first-mentioned and the further supports (15), at least one third elongate elastic member (24) extending from the further support (15) towards the exit (12) so that the passage (11) extends and contracts initially between the exit (12) and the further support (15) and then between said support (15) and the first-mentioned support (15) and then between the first-mentioned support (15) and the entrance (10).

3. A system according to claim 1 or claim 2 wherein the at least one first elongate elastic member (24) is connected between an upper support (15) and the first-mentioned support (15), said upper support (15) being spaced from the entrance of the passage (11), the connection between said entrance and said upper support (15) being non-elastic.

4. A system according to claim 3 wherein the connection between said entrance and said upper support comprises at least one elongate inelastic member (23).

5. A system according to any one of claims 1 to 4

wherein the or each support is formed by a hoop (15) extending around the passage.

6. A system according to claim 5 when dependent on any one of claims 2 to 4 wherein a plurality of hoops (15) are provided at spaced locations along the passage (11) between the entrance and the exit, said hoops (15) forming said supports.

7. A system according to any one of claims 1 to 6 wherein each at least one elongate elastic member (24) comprises a plurality of said elongate elastic members (24), each member (24) extending generally parallel to the length of the passage (11) and the members being spaced around the passage (11).

8. A system according to any one of claims 1 to 7 wherein the passage (11) is formed from a tube of foldable material.

9. A system according to any one of claims 1 to 8 wherein the passage comprises a helical chute (13) extending from the entrance to the exit.

10. A system according to claim 9 wherein the chute is a closed helical tube (13).

11. A system according to claim 9 or claim 10 when dependent on claim 8, wherein the helical tube (13) is connected to the hoops (15) to position the helical chute relative to the hoops.

12. A system according to claim 11 wherein the helical chute (13), as the chute passes through at least one hoop (15) has the centre line thereof eccentrically arranged relative to the axis of the hoop (15), the connection between the helical chute (13) and the hoop (15) allowing the centre line of the helical chute (13) to move relative to the axis of the hoop (15) between a maximum spacing an a minimum spacing to accommodate extension and retraction of the helical chute (13).

13. A system according to claim 13 wherein, at said at least one hoop (15), a plurality of angularly spaced flexible connections (19,20) extend between the hoop (15) and the helical chute (13), the longer connections (19) being inextensible to limit the maximum spacing of the centre line and the axis and the shorter connections (20) being elastically extensible to permit the centre line to move towards the axis.

14. A system according to claim 9 wherein the passage (11) includes a succession of alternately oppositely spaced facing panels (40) spaced along the length of a tube (30) each panel (40) being angled relative to the length of the tube.

15. A system according to claim 14 wherein at least some of the panels (40) are made from an elastically extendible material to accommodate extension and retraction of the tube.

16. A system according to any one of claims 1 to 15 wherein the exit is on an inflatable structure.

17. A system according to claim 16 wherein the inflatable structure is a liferaft (12), the tube exit being within the liferaft.

18. An escape chute comprising an elongate tube (30,31,32) which is deployed generally vertically and a succession of spaced members (34) within the tube, each spaced member (34) being formed by a panel (40) extending transversely across the tube, the panel (40) having an upper edge (41) connected to the tube (30,31,32) and a lower edge (44) spaced from the tube (30,31,32) **characterized in that** a funnel outlet (49) depending from each aperture (48) to provide a vertical component of said path (34), the panels (40) and the funnel outlet (49) defining, with the tube, a path for the passage of a person through the tube (30,31,32).

19. An escape chute according to claim 18 wherein the panels (40) and funnel outlets (49) are arranged in succession along the tube (30,31,32) such that a person passing through the tube (30,31,32) contacts a succession of panels (40) and funnel outlets (49).

20. An escape chute according to claim 18 or claim 19 wherein each panel (40) is rotated about the axis of the tube relative to the panels (40) of the preceding and succeeding members (34).

21. An escape chute according to claim 20 wherein successive panels (40) are rotated in the same sense by 90° relative to one another so that the path is a spiral path.

22. An escape chute according to any one of claims 18 to 21 wherein each panel (40) has spaced first and second side edges (42,43), at least a portion of the first side edge (42) being connected to the tube (30,31,32) and the second side edge (43) being connected to a diverter panel (45) which is connected to the tube (30,31,32) and which lies in a plane at an obtuse angle to the plane of the associated transverse panel (40), the diverter panel (45) being arranged to impart to a person a twist in the same sense as the relative rotation between successive panels (40).

23. An escape chute according to claim 21 or claim 22 wherein a skirt panel (46) extends around a lower portion of each transverse panel (40) to form, with the panel (40), a pocket terminating at a lower end thereof in an aperture (48) leading to the next panel.

24. An escape chute according to claim 23 wherein each skirt panel (46) has an upper edge (50) connected to the tube (30,31,32) and a lower edge forming an edge of said aperture.

25. An escape chute according to claim 24 wherein each transverse panel (40) is connected to the tube (30,31,32) only along that portion of the edge (41) of the transverse panel (40) that is above the line along which the upper edge (50) of the associated skirt panel (46) is connected to the tube (30,31,32) so that the portion of the tube (30,31,32) below the upper edge (50) of the skirt panel can collapse upwardly without collapsing the associated path member (34).

26. An escape chute according to any one of claims 18 to 25 wherein at least one of said transverse panels (40) is perforate.

27. An escape chute according to any one of claims 18 to 26 wherein each funnel outlet (49) is sized to fit closely around a person passing therethrough so that the speed of the person is arrested during such passage.

28. An escape chute according to any one of claims 18 to 27 wherein the tube is formed from a plurality of annular walls (30,31,32) of flexible material, each wall surrounding an associated member, the walls being connected end-to-end to form said tube.

29. An escape chute according to claim 28 wherein a hoop (53) extends around the connection between successive walls (30,31,32).

30. An escape chute according to claim 29 wherein each wall (30,31,32) has an upper edge (35;56) and a lower edge (37;58), each said edge including a plurality of circumferentially spaced loops (36;57), the loops (36;57) of each said edge (35;56;37;58) forming, with the loops (36;57) of an adjacent edge (35;56;37;58) of an adjacent wall (30,31,32), a passage which receives said hoop (53).

31. An escape chute according to claim 29 or 30 wherein at least some of the walls (30;31;32) have an additional hoop (53) extending therearound at a position spaced between said connections.

32. An escape chute according to claim 31 when dependent on claim 26 wherein said additional hoop (53) is at a position level with the connection of the skirt panel (46) with the wall (30,31,32).

33. An escape chute comprising a plurality of slide paths (34) arranged successively along the escape chute, each slide path (34) including a converging pocket leading to an aperture (48) and a funnel outlet (49) leading from said aperture (48) to provide a path for the passage of a person through the escape chute.

34. An escape chute according to claim 33 in combination with a liferaft (12) formed by inflatable tubes (26) and provided with a cover (27), the escape chute having an outlet within the liferaft (12).

35. A system according to any one of claims 1 to 17 wherein the passage is formed by an escape chute according to any one of claims 18 to 34.

Patentansprüche

1. Rettungssystem für Wasserfahrzeuge, das einen Durchlass (11) für Personen umfasst und einen Eingang (10) an einem Ende sowie ein Ausgang (12) an einem dem einen Ende gegenüberliegenden Ende aufweist, wobei wenigstens ein Träger (15) für den Durchlass zwischen dem Eingang und dem Ausgang vorhanden ist und der Träger mit wenigstens einem ersten länglichen elastischen Element (24) aufgehängt ist, wobei sich wenigstens ein zweites längliches elastisches Element (24) von dem Träger (15) auf den Ausgang zu erstreckt und das wenigstens eine zweite längliche elastische Element (24) eine größere Elastizität aufweist als das wenigstens eine erste längliche elastische Element (24), so dass ein Teil des Durchlasses (11) zwischen dem Ausgang und dem Träger (14) ausgedehnt und verkürzt werden kann, bevor es zum Ausdehnen und Verkürzen eines Teils des Durchlasses (11) zwischen dem Eingang und dem Träger (15) kommt, wobei der Durchlass ausgedehnt und verkürzt werden kann, um Veränderungen des Abstandes zwischen dem Eingang und dem Ausgang auszugleichen.

2. System nach Anspruch 1, wobei ein weiterer Träger (15) zwischen dem zuerst genannten Träger (15) und dem Ausgang (12) vorhanden ist und das wenigstens zweite längliche elastische Element (24) zwischen den erstgenannten und den weiteren Trägern (15) angebracht ist und sich wenigstens ein drittes längliches elastisches Element (24) von dem weiteren Träger (15) auf den Ausgang (12) zu erstreckt, so dass sich der Durchlass (11) zunächst zwischen dem Ausgang (12) und dem weiteren Träger (15) und anschließend zwischen dem Träger

(15) und dem zuerst genannten Träger (15) und danach zwischen dem zuerst genannten Träger 815) und dem Eingang (10) ausdehnt und verkürzt.

3. System nach Anspruch 1 oder Anspruch 2, wobei das wenigstens eine längliche elastische Element zwischen einem oberen Träger (15) und dem zuerst genannten Träger (15) angebracht ist und der obere Träger (15) von dem Eingang des Durchlasses (11) beabstandet ist, wobei die Verbindung zwischen dem Eingang und dem oberen Träger (15) nicht elastisch ist.

4. System nach Anspruch 3, wobei die Verbindung zwischen dem Eingang und dem oberen Träger wenigstens ein längliches unelastisches Element (23) umfasst.

5. System nach einem der Ansprüche 1 bis 4, wobei der oder jeder Träger durch einen Ring (15) gebildet wird, der sich um den Durchlass herum erstreckt.

6. System nach Anspruch 5, wenn abhängig von einem der Ansprüche 2 bis 4, wobei eine Vielzahl von Ringen (15) an beabstandeten Positionen entlang des Durchlasses (11) zwischen dem Eingang und dem Ausgang vorhanden sind und die Ringe (15) die Träger bilden.

7. System nach einem der Ansprüche 1 bis 6, wobei jedes wenigstens eine längliche elastisches Element (24) eine Vielzahl der länglichen elastischen Elemente (24) umfasst und sich jedes Element (24) im Allgemeinen parallel zur Länge des Durchlasses (11) erstreckt und die Elemente um den Durchlass (11) herum beabstandet sind.

8. System nach einem der Ansprüche 1 bis 7, wobei der Durchlass (11) aus einer Röhre aus faltbarem Material besteht.

9. System nach einem der Ansprüche 1 bis 8, wobei der Durchlass eine wendelförmige Rutsche (13) umfasst, die sich von dem Eingang zu dem Ausgang erstreckt.

10. System nach Anspruch 9, wobei die Rutsche eine geschlossene wendelförmige Rutsche (13) ist.

11. System nach Anspruch 9 oder Anspruch 10, wenn abhängig von Anspruch 8, wobei die wendelförmige Rutsche (13) mit den Ringen (15) verbunden ist, um die wendelförmige Rutsche in Bezug auf die Ringe zu positionieren.

12. System nach Anspruch 11, wobei die Mittellinie der wendelförmigen Rutsche (13), wenn die Rutsche durch wenigstens einen Ring (15) hindurchtritt, exzentrisch in Bezug auf die Achse des Rings (15) angeordnet ist, und die Verbindung zwischen der wendelförmigen Rutsche (13) und dem Ring (15) es ermöglicht, dass sich die Mittellinie der wendelförmigen Rutsche (13) in Bezug auf die Achse des Rings (15) zwischen einem maximalen Abstand und einem minimalen Abstand bewegt, um Ausdehnung und Verkürzung der wendelförmigen Rutsche (13) auszugleichen.

13. System nach Anspruch 12, wobei an dem wenigstens einen Ring (15) eine Vielzahl winklig beabstandeter flexibler Verbindungen (19, 20) sich zwischen dem Ring (15) und der wendelförmigen Rutsche (13) erstreckt und die längeren Verbindungen (19) nicht gedehnt werden können, um den maximalen Abstand zwischen der Mittellinie und der Achse zu beschränken, und die kürzeren Verbindungen (20) elastisch gedehnt werden können, so dass sich die Mittellinie auf die Achse zu bewegen kann.

14. System nach Anspruch 9, wobei der Durchlass (11) eine Abfolge abwechselnd gegenüberliegend beabstandeter, einander zugewandter Bahnen (40) enthält, die über die Länge einer Röhre (30) beabstandet angeordnet sind, wobei jede Bahn (40) winklig in Bezug auf die Länge der Röhre ist.

15. System nach Anspruch 14, wobei wenigstens einige der Bahnen (40) aus einem elastisch dehnbaren Material bestehen, um Ausdehnung und Verkürzung der Röhre auszugleichen.

16. System nach einem der Ansprüche 1 bis 15, wobei sich der Ausgang an einer aufblasbaren Struktur befindet.

17. System nach Anspruch 16, wobei es sich bei der aufblasbaren Struktur um ein Rettungsfloß (12) handelt und der Röhrenausgang innerhalb des Rettungsfloßes liegt.

18. Rettungsrutsche, die eine längliche Röhre (30, 31, 32), die im Allgemeinen vertikal eingesetzt wird, und eine Abfolge beabstandeter Elemente (34) in der Röhre umfasst, wobei jedes beabstandete Element (34) durch eine Bahn (40) gebildet wird, die sich quer über die Röhre erstreckt, und wobei die Bahn (40) einen oberen Rand (41), der mit der Röhre (30, 31, 32) verbunden ist, und einen unteren Rand (44) aufweist, der von der Röhre (30, 31, 32) beabstandet ist, **dadurch gekennzeichnet, dass** ein Trichterauslass (49) von jeder Öffnung (48) nach unten vorsteht, so dass eine vertikale Komponente des Weges (34) entsteht, wobei die Bahnen (40) und der Trichterauslass (49) mit der Röhre einen Weg bilden, auf dem eine Person durch die

Röhre (30, 31, 32) gelangt.

19. Rettungsrutsche nach Anspruch 18, wobei die Bahnen (40) und die Trichterauslasse (49) so nacheinander entlang der Röhre (30, 31, 32) angeordnet sind, dass eine Person, die die Röhre (30, 31, 32) passiert, mit einer Abfolge von Bahnen (40) und Trichterauslassen (49) in Kontakt kommt.

20. Rettungsrutsche nach Anspruch 18 oder Anspruch 19, wobei jede Bahn (40) in Bezug auf die Bahnen (40) der vorangehenden und der folgenden Elemente (34) um die Achse der Röhre herum verdreht ist.

21. Rettungsrutsche nach Anspruch 20, wobei aufeinanderfolgende Bahnen (40) in der gleichen Richtung um 90° zueinander verdreht sind, so dass der Weg ein spiralförmiger Weg ist.

22. Rettungsrutsche nach einem der Ansprüche 18 bis 21, wobei jede Bahn (40) einen ersten und einen zweiten seitlichen Rand (42, 43) aufweist, die voneinander beabstandet sind, und wenigstens ein Teil des ersten seitlichen Randes (42) mit der Röhre (30, 31, 32) verbunden ist und der zweite seitliche Rand (43) mit einer Ableitbahn (45) verbunden ist, die mit der Röhre (30, 31, 32) verbunden ist und die in einer Ebene in einem stumpfen Winkel zu der Ebene der dazugehörigen Querbahn (40) liegt, wobei die Ableitbahn (45) eine Person in eine Drehung in der gleichen Richtung wie die relative Verdrehung aufeinanderfolgender Bahnen (40) zueinander versetzt.

23. Rettungsrutsche nach Anspruch 21 oder Anspruch 22, wobei eine Einfassungsbahn (46) sich um einen unteren Abschnitt jeder Querbahn (40) herum erstreckt, und mit der Bahn (40) eine Tasche bildet, die an einem unteren Ende in einer Öffnung (48) endet, die zur nächsten Bahn führt.

24. Rettungsrutsche nach Anspruch 23, wobei jede Einfassungsbahn (46) einen oberen Rand (50), der mit der Röhre (30, 31, 32) verbunden ist, und einen unteren Rand aufweist, der einen Rand der Öffnung bildet.

25. Rettungsrutsche nach Anspruch 24, wobei jede Querbahn (40) mit der Röhre (30, 31, 32) nur an dem Abschnitt des Randes (41) der Querbahn (40) verbunden ist, der über der Linie liegt, an der der obere Rand (50) der dazugehörigen Einfassungsbahn (46) mit der Röhre (30, 31, 32) verbunden ist, so dass der Abschnitt der Röhre (30, 31, 32) unter dem oberen Rand (50) der Einfassungsbahn nach oben zusammenklappen kann, ohne dass das dazugehörige Wegelement (34) zusammenklappt.

26. Rettungsrutsche nach einem der Ansprüche 18 bis 25, wobei wenigstens eine der Querbahnen (40) perforiert ist.

27. Rettungsrutsche nach einem der Ansprüche 18 bis 26, wobei jeder Trichterauslass (49) so bemessen ist, dass er enganliegend um eine Person herum passt, die ihn passiert, so dass die Geschwindigkeit der Person während des Passierens verringert wird.

28. Rettungsrutsche nach einem der Ansprüche 18 bis 27, wobei die Röhre aus einer Vielzahl ringförmiger Wände (30, 31, 32) aus flexiblem Material besteht und jede Wand ein dazugehöriges Element umschließt und die Wände an den Enden miteinander verbunden sind, um die Röhre zu bilden.

29. Rettungsrutsche nach Anspruch 28, wobei sich ein Ring (53) um die Verbindung zwischen aufeinanderfolgenden Wänden (30, 31, 32) herum erstreckt.

30. Rettungsrutsche nach Anspruch 29, wobei jede Wand (30, 31, 32) einen oberen Rand (35; 56) und einen unteren Rand (37; 58) aufweist und jeder Rand eine Vielzahl in Umfangsrichtung beabstandeter Schlaufen (36; 57) enthält, wobei die Schlaufen (36; 57) jedes Randes (35; 56, 37; 58) mit den Schlaufen (36; 57) eines angrenzenden Randes (35; 56; 37; 58) einer angrenzenden Wand (30, 31, 32) einen Durchlass bilden, der den Ring (53) aufnimmt.

31. Rettungsrutsche nach Anspruch 29 oder 30, wobei wenigstens einige der Wände (30; 31; 32) einen zusätzlichen Ring (53) aufweisen, der sich um sie herum an einer Position erstreckt, die beabstandet zwischen den Verbindungen angeordnet ist.

32. Rettungsrutsche nach Anspruch 31, wenn abhängig von Anspruch 26, wobei der zusätzliche Ring (53) sich an einer Position auf einer Höhe mit der Verbindung der Einfassungsbahn (46) mit der Wand (30, 31, 32) befindet.

33. Rettungsrutsche, die eine Vielzahl von Gleitwegen (34) umfasst, die nacheinander entlang der Rettungsrutsche angeordnet sind, wobei jeder Gleitweg (34) eine zusammenlaufende Tasche, die zu einer Öffnung (48) hin führt, und einen Trichterauslass (49) enthält, der von der Öffnung (48) weg führt, so dass ein Weg entsteht, auf dem eine Person durch die Rettungsrutsche gelangen kann.

34. Rettungsrutsche nach Anspruch 33 in Kombination mit einem Rettungsfloß (12), das durch aufblasbare Röhren (26) gebildet wird und mit einer Abdeckung (27) versehen ist, wobei die Rettungsrutsche einen

Auslass in dem Rettungsfloß (12) hat.

35. System nach einem der Ansprüche 1 bis 17, wobei der Durchlass durch eine Rettungsrutsche nach einem der Ansprüche 18 bis 34 gebildet wird.

Revendications

1. Système de sauvetage en mer, comprenant un passage (11) destiné aux personnes et ayant une entrée (10) à une première extrémité et une sortie (12) à une extrémité opposée à la première extrémité, et au moins un support (15) du passage placé entre l'entrée et la sortie, le support étant suspendu par au moins un premier organe élastique allongé (24), au moine un second organe élastique allongé (24) s'étendant depuis le support (15) vers la sortie, le second organe élastique allongé au moins (24) ayant une élasticité supérieure à celle du premier organe élastique allongé au moins (24), si bien qu'une partie du passage (11) comprise entre la sortie et le support (15) peut s'allonger et se contracter avant l'allongement et la contraction d'une partie du passage (11) entre l'entrée et le support (15), le passage pouvant s'allonger et se contracter pour compenser les changements de distance entre l'entrée et la sortie.

2. Système selon la revendication 1, dans lequel un support supplémentaire (15) est placé entre le premier support (15) et la sortie (12), le second organe élastique allongé au moins (24) étant raccordé entre le premier support et le support supplémentaire (15), un troisième organe élastique allongé au moins (24) s'étendant depuis le support supplémentaire (15) vers la sortie (12) afin que le passage (11) s'allonge et se contracte initialement entre la sortie (12) et le support supplémentaire (15), puis entre le premier support cité (15) et le premier support (15), puis entre le premier support (15) et l'entrée (10).

3. Système selon la revendication 1 ou 2, dans lequel le premier organe élastique allongé au moins (24) est raccordé entre le support supérieur (15) et le premier support cité (15), le support supérieur (15) étant distant de l'entrée du passage (11), le raccord entre l'entrée et le support supérieur (15) n'étant pas élastique.

4. Système selon la revendication 3, dans lequel le raccord entre l'entrée et le support supérieur comporte au moins un organe allongé non élastique (23).

5. Système selon l'une quelconque des revendications 1 à 4, dans lequel le support ou chaque support est formé par un cercle (15) qui s'étend autour du passage.

6. Système selon la revendication 5 lorsqu'elle dépend de l'une quelconque des revendications 2 à 4, dans lequel plusieurs cercles (15) sont disposés à des emplacements espacés le long du passage (11) entre l'entrée et la sortie, les cercles (15) formant les supports.

7. Système selon l'une quelconque des revendications 1 à 6, dans lequel chacun des organes élastiques allongés au moins (24) comporte plusieurs organes élastiques allongés (24), chaque organe (24) s'étendant de façon générale parallèlement à la longueur du passage (11), et les organes étant espacés autour du passage (11).

8. Système selon l'une quelconque des revendications 1 à 7, dans lequel le passage (11) est formé d'un tube d'un matériau qui peut se plier.

9. Système selon l'une quelconque des revendications 1 à 8, dans lequel le passage comporte une goulotte hélicoïdale (13) qui s'étend de l'entrée vers la sortie.

10. Système selon la revendication 9, dans lequel la goulotte est un tube hélicoïdal fermé (13).

11. Système selon la revendication 9 ou 10, lorsqu'elle dépend de la revendication 8, dans lequel le tube hélicoïdal (13) est raccordé aux cercles (15) afin que la goulotte hélicoïdale soit positionnée par rapport aux cercles.

12. Système selon la revendication 11, dans lequel la goulotte hélicoïdale (13), lorsqu'elle passe dans au moins un cercle (15), a un axe central disposé excentriquement par rapport à l'axe du cercle (15), le raccord entre la goulotte hélicoïdale (13) et le cercle (15) permettant un déplacement de l'axe central de la goulotte hélicoïdale (13) par rapport à l'axe du cercle (15) entre un espacement maximal et un espacement minimal pour la compensation de l'allongement et du rétrécissement de la goulotte hélicoïdale (13).

13. Système selon la revendication 12 dans lequel, au niveau d'un cercle au moins (15), plusieurs raccords flexibles angulairement espacés (19, 20) s'étendent entre le cercle (15) et la goulotte hélicoïdale (13), les raccords relativement longs (19) n'étant pas extensibles afin que l'espacement maximal de l'axe central et dudit axe du cercle soit limité, les raccords relativement courts (20) pouvant s'allonger élastiquement pour permettre un déplacement de l'axe central vers l'axe du cercle.

14. Système selon la revendication 9, dans lequel le passage (11) comporte une série de panneaux espacés (40) opposés en alternance, espacés sur la longueur d'un tube (30), chaque panneau (40) étant incliné par rapport à la longueur du tube.

15. Système selon la revendication 14, dans lequel certains des panneaux au moins (40) sont formés d'un matériau extensible élastiquement destiné à compenser l'allongement et le rétrécissement du tube.

16. Système selon l'une quelconque des revendications 1 à 15, dans lequel la sortie se trouve sur une structure gonflable.

17. Système selon la revendication 16, dans lequel la structure gonflable est un radeau de sauvetage (12), la sortie du tube se trouvant à l'intérieur du radeau de sauvetage.

18. Goulotte de sauvetage comprenant un tube allongé (30, 31, 32) qui est déployé en direction générale verticale et une série d'organes espacés (34) placés dans le tube, chaque organe espacé (34) étant formé par un panneau (40) qui s'étend transversalement au tube, le panneau (40) ayant un bord supérieur (41) raccordé au tube (30, 31, 32) et un bord inférieur (44) distant du tube (30, 31, 32), **caractérisé en ce qu'**une sortie (49) en entonnoir dépasse sous chaque orifice (48) pour donner une composante verticale dudit trajet (34), les panneaux (40) et la sortie en entonnoir (49) délimitant avec le tube un trajet pour le passage d'une personne dans le tube (30, 31, 32).

19. Goulotte de sauvetage selon la revendication 18, dans laquelle les panneaux (40) et les sorties (49) en entonnoir sont disposés en série le long du tube (30, 31, 32) afin qu'une personne passant dans le tube (30, 31, 32) soit au contact d'une série de panneaux (40) et de sorties (49) en entonnoir.

20. Goulotte de sauvetage selon la revendication 18 ou 19, dans laquelle chaque panneau (40) est tourné autour de l'axe du tube par rapport aux panneaux (40) des organes précédent et suivant (34).

21. Goulotte de sauvetage selon la revendication 20, dans laquelle les panneaux successifs (40) sont tournés dans le même sens de 90° les uns par rapport aux autres afin que le trajet soit un trajet spiralé.

22. Goulotte de sauvetage selon l'une quelconque des revendications 18 à 21, dans laquelle chaque panneau (40) a un premier et un second bords latéraux espacés (42, 43), une partie au moins du premier bord latéral (42) étant raccordée au tube (30, 31, 32) et le second bord latéral (42) étant raccordé au tube (30, 31, 32), et le second bord latéral (43) étant raccordé à un panneau de déviation (45) qui est raccordé au tube (30, 31, 32) et qui se trouve dans un plan formant un angle obtus avec le plan du panneau transversal associé (40), le panneau de déviation (45) étant destiné à faire tourner une personne dans le sens de la rotation relative entre les panneaux successifs (40).

23. Goulotte de sauvetage selon la revendication 21 ou 22, dans laquelle un panneau (46) en forme de jupe s'étend autour d'une partie inférieure de chaque panneau transversal (40) pour former, avec le panneau (40), une poche se terminant à son extrémité inférieure par un orifice (48) conduisant au panneau suivant.

24. Goulotte de sauvetage selon la revendication 23, dans laquelle chaque panneau à jupe (46) a un bord supérieur (50) raccordé au tube (30, 31, 32) et un bord inférieur formant un bord de l'orifice.

25. Goulotte de sauvetage selon la revendication 24, dans laquelle chaque panneau transversal (40) est raccordé au tube (30, 31, 32) uniquement le long de la partie du bord (41) du panneau transversal (40) qui se trouve au-dessus de la ligne le long de laquelle le bord supérieur (50) du panneau associé de jupe (46) est raccordé au tube (30, 31, 32), si bien que la partie du tube (30, 31, 32) qui se trouve sous le bord supérieur (50) du panneau de jupe peut s'écraser vers le haut lors de l'affaissement de l'organe associé du trajet (34).

26. Goulotte de sauvetage selon l'une quelconque des revendications 18 à 25, dans laquelle l'un au moins des panneaux transversaux (40) est perforé.

27. Goulotte de sauvetage selon l'une quelconque des revendications 18 à 26, dans laquelle chaque sortie en entonnoir (49) a une dimension telle qu'elle peut s'ajuster intimement autour d'une personne passant à l'intérieur, si bien que la vitesse de la personne est réduite au cours de ce passage.

28. Goulotte de sauvetage selon l'une quelconque des revendications 18 à 27, dans laquelle le tube est formé de plusieurs parois annulaires (30, 31, 32) d'un matériau flexible, chaque paroi entourant l'organe associé, les parois étant raccordées bout à bout pour former le tube.

29. Goulotte de sauvetage selon la revendication 28, dans laquelle un cercle (53) s'étend autour du raccord entre les parois successives (30, 31, 32).

30. Goulotte de sauvetage selon la revendication 29, dans laquelle chaque paroi (30, 31, 32) a un bord

supérieur (35 ; 56) et un bord inférieur (37 ; 58), chacun des bords comprenant plusieurs boucles espacées circonférentiellement (36 ; 57), les boucles (36 ; 57) de chaque bord (35 ; 56 ; 37 ; 58) formant, avec les boucles (36 ; 57) d'un bord adjacent (35 ; 56 ; 37 ; 58) d'une paroi adjacente (30, 31, 32), un passage qui loge le cercle (53).

31. Goulotte de sauvetage selon la revendication 29 ou 30, dans laquelle certaines au moins des parois (30 ; 31 ; 32) possèdent un cercle supplémentaire (53) s'étendant autour d'elles à une position distante entre les raccords.

32. Goulotte de sauvetage selon la revendication 31 lorsqu'elle dépend de la revendication 26, dans laquelle le cercle supplémentaire (53) se trouve au niveau du raccord du panneau en forme de jupe (46) avec la paroi (30, 31, 32).

33. Goulotte de sauvetage comprenant plusieurs trajets de glissade (34) disposés successivement le long de la goulotte de sauvetage, chaque trajet de glissade (34) comprenant une poche convergente qui conduit à un orifice (48) et une sortie en entonnoir (49) qui conduit depuis l'orifice (48) pour former un trajet de passage d'une personne dans la goulotte de sauvetage.

34. Goulotte de sauvetage selon la revendication 33, en combinaison avec un radeau de sauvetage (12) formé de tubes gonflables (26) et ayant une couverture (27), la goulotte de sauvetage ayant une sortie à l'intérieur du radeau de sauvetage (12).

35. Système selon l'une quelconque des revendications 1 à 17, dans lequel le passage est formé par une goulotte de sauvetage selon l'une quelconque des revendications 18 à 34.

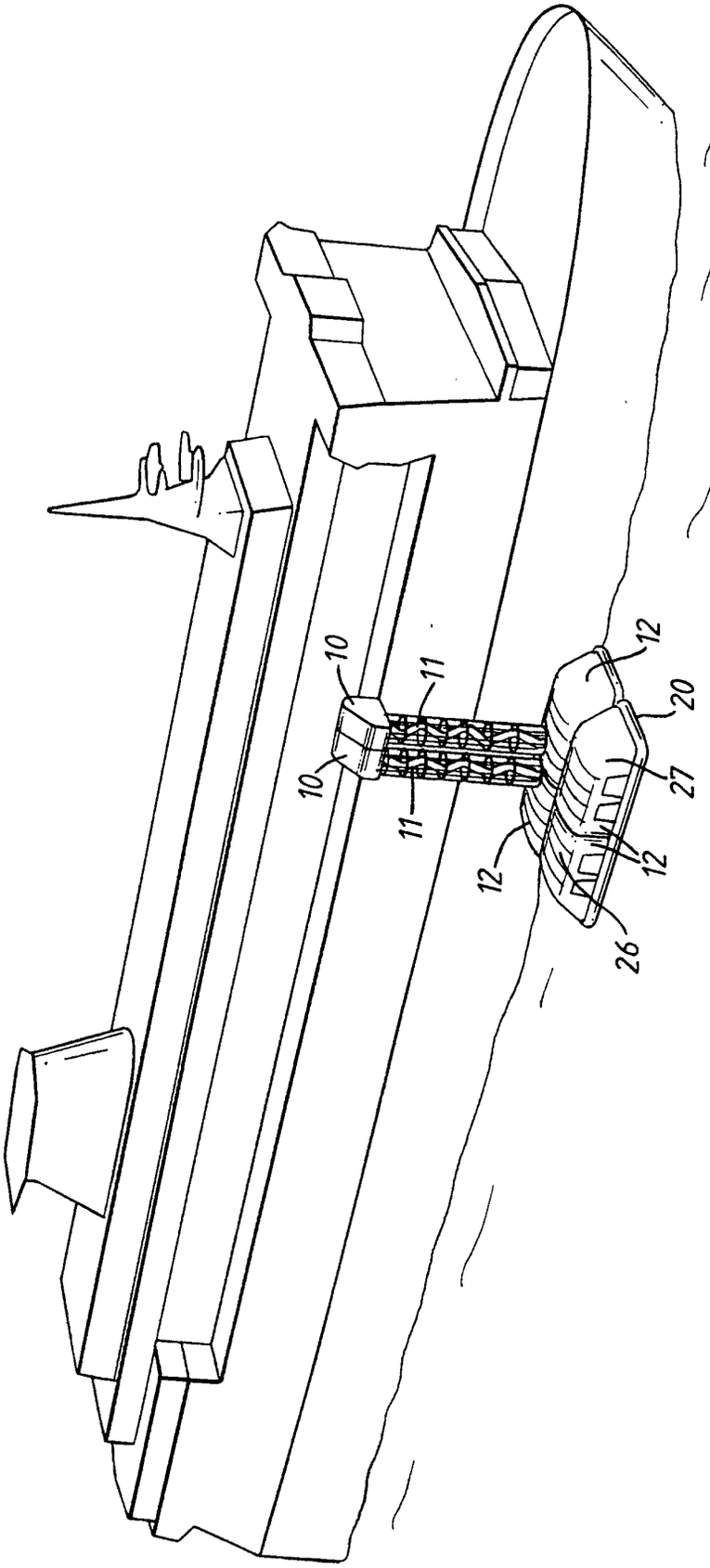

Fig.1

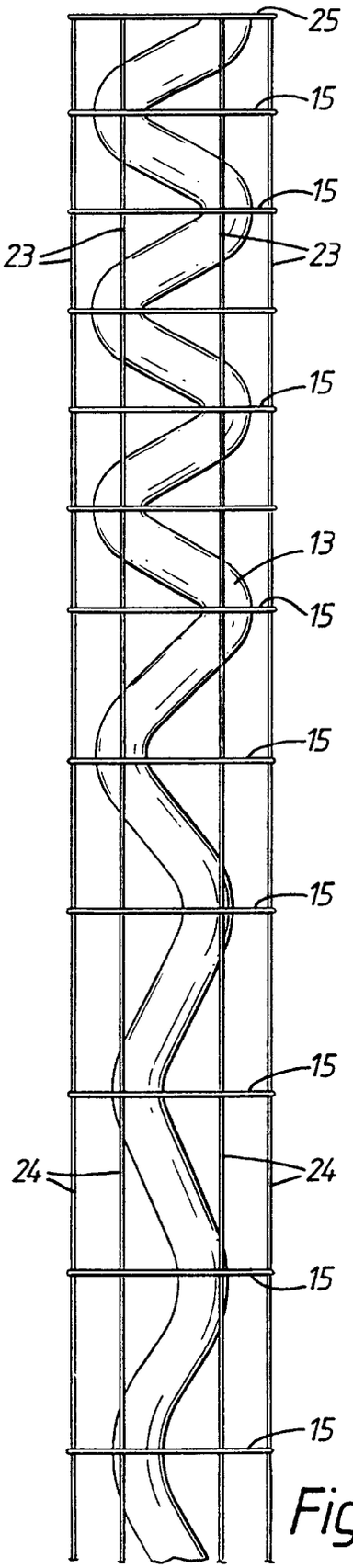
25
15
15
23
23
15
13
15
15
15
15
15
24
24
15
15

Fig.2

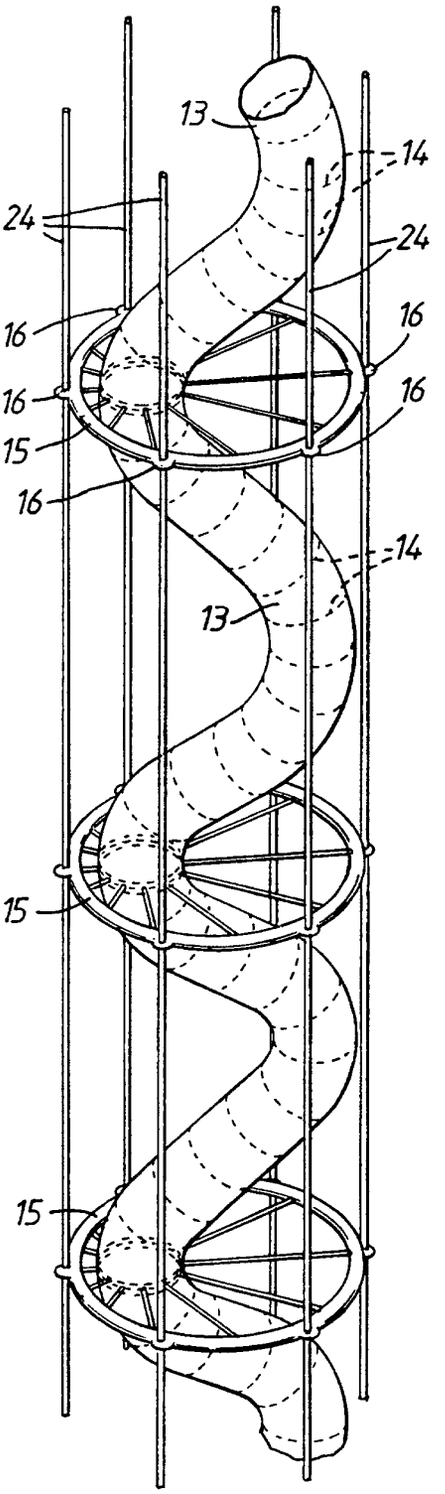
13
14
24
24
16
16
16
16
15
16
14
13
15
15

Fig.3

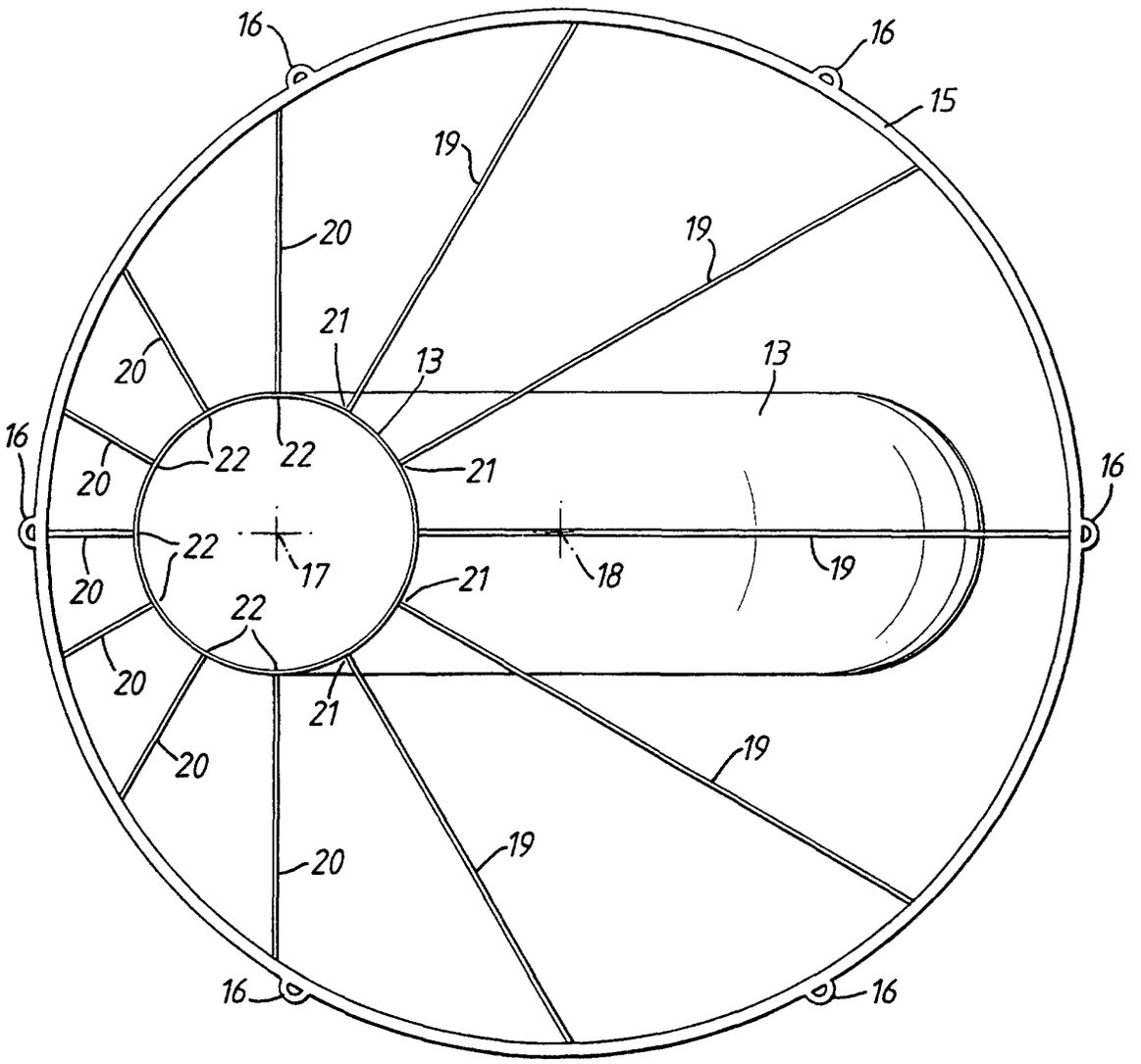
16
16
15
19
20
19
21
13
13
20
16
22
22
21
16
20
22
17
18
19
20
21
22
20
21
20
19
20
19
16
16

Fig.4

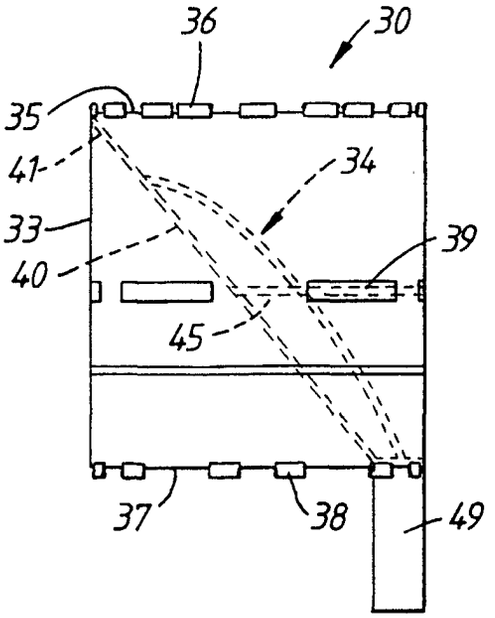

Fig.5

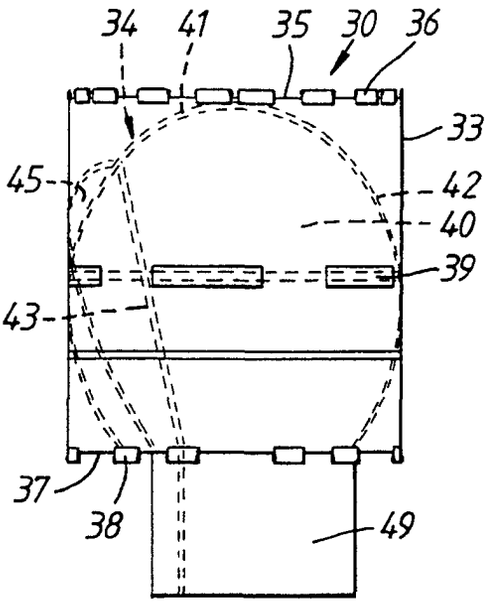

Fig.6

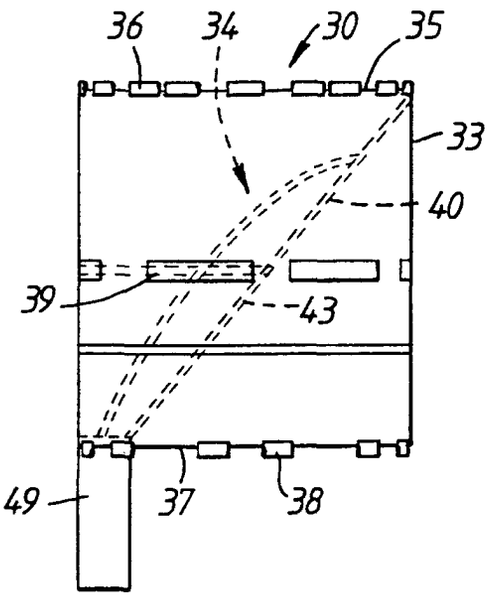

Fig.7

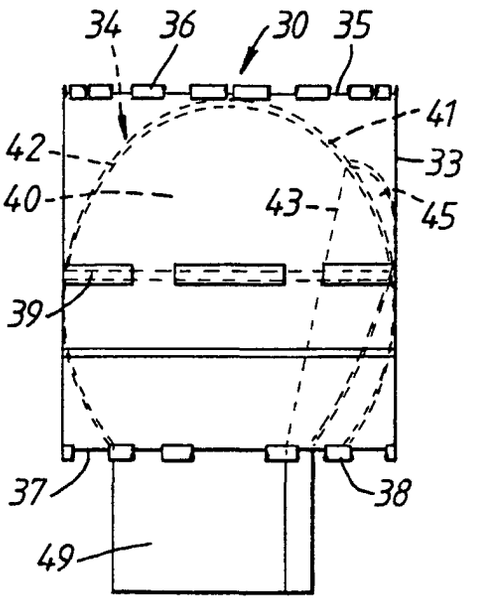

Fig.8

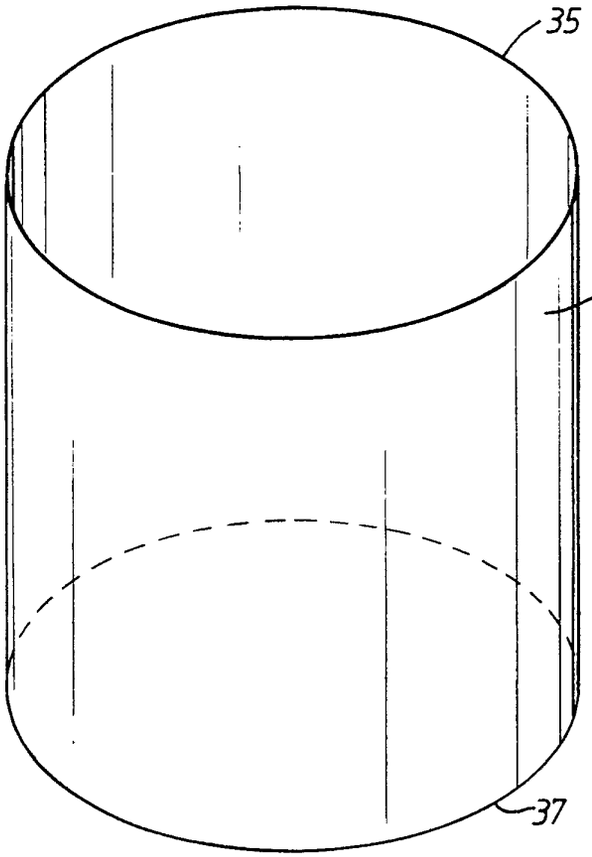

Fig.9

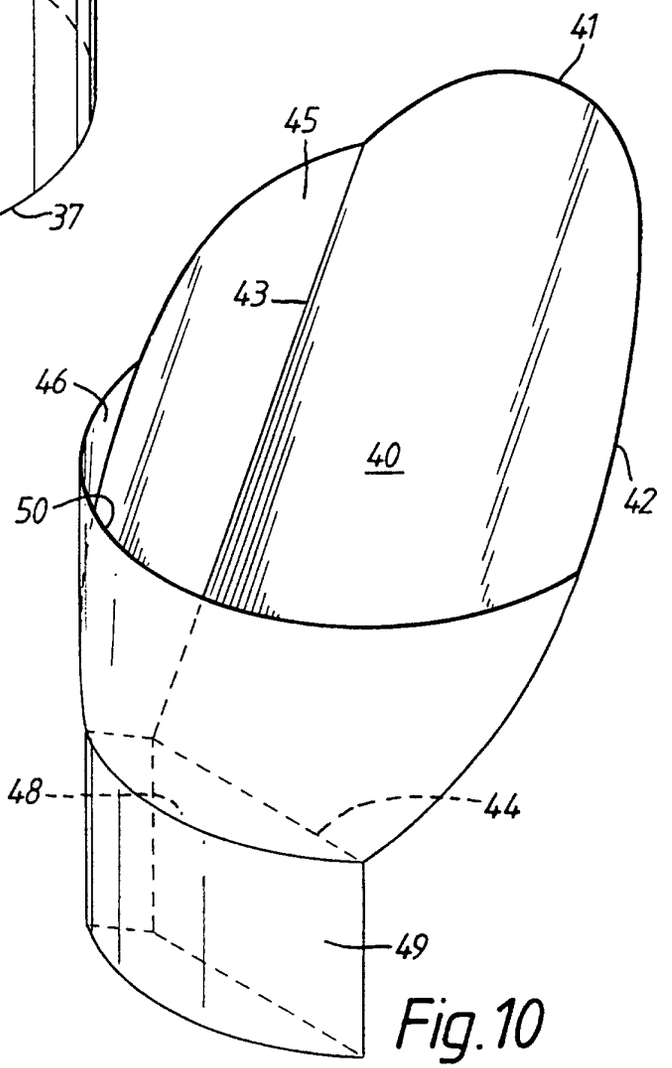

Fig.10

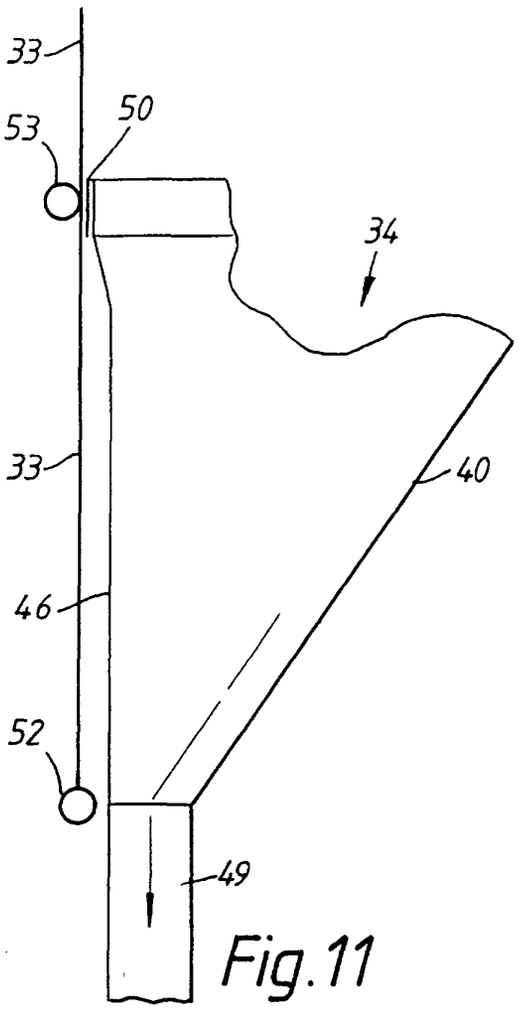

Fig.11

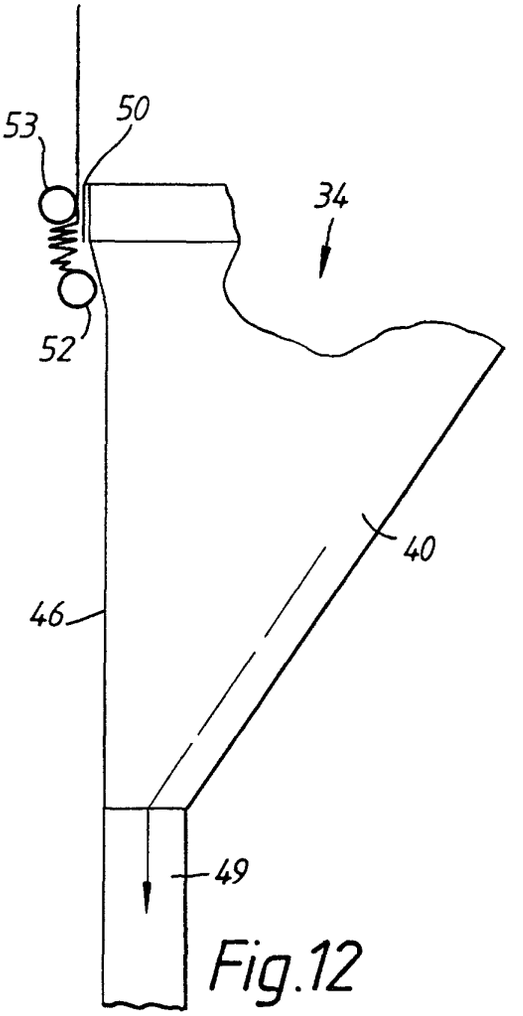

Fig.12

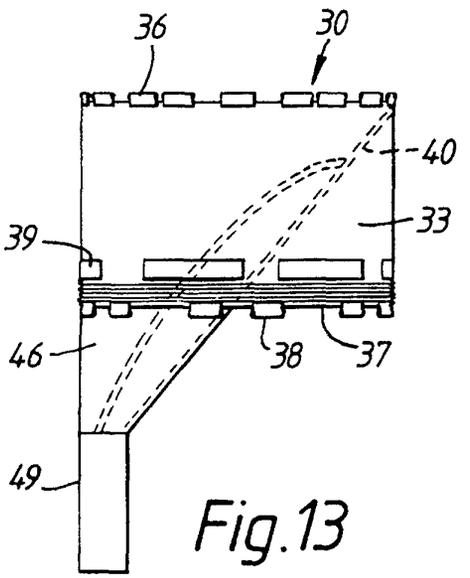

Fig.13

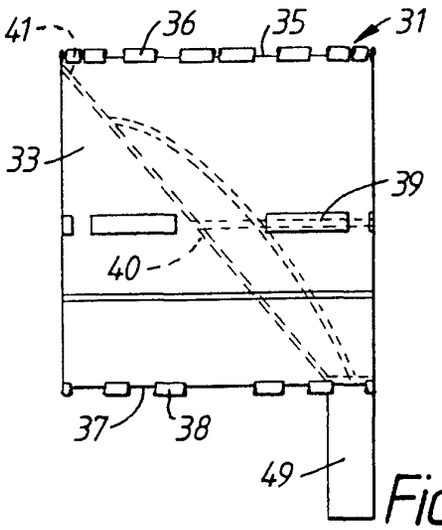

Fig.14

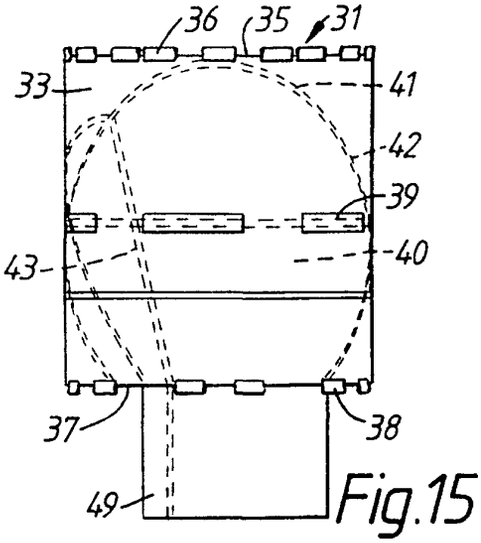

Fig.15

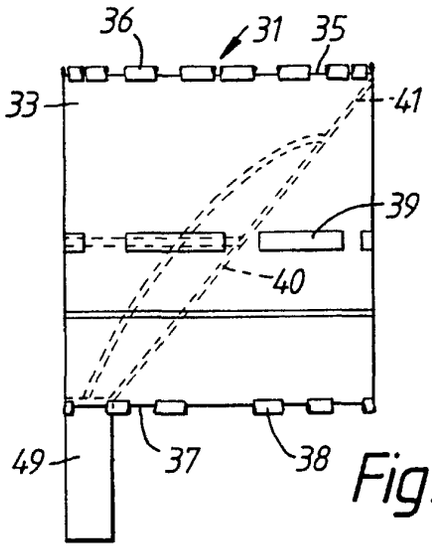

Fig.16

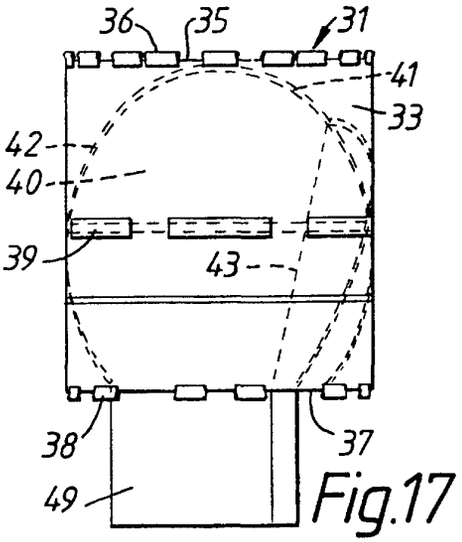

Fig.17

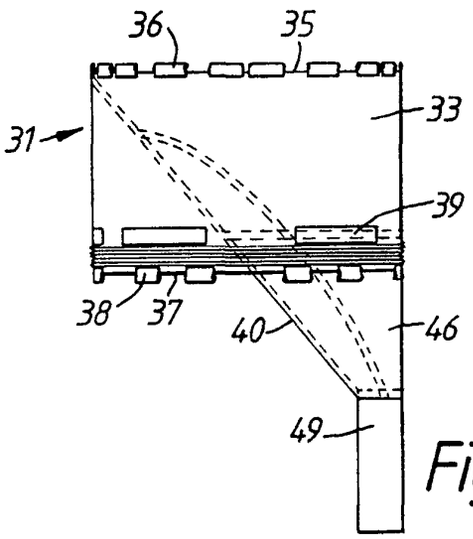

Fig.18

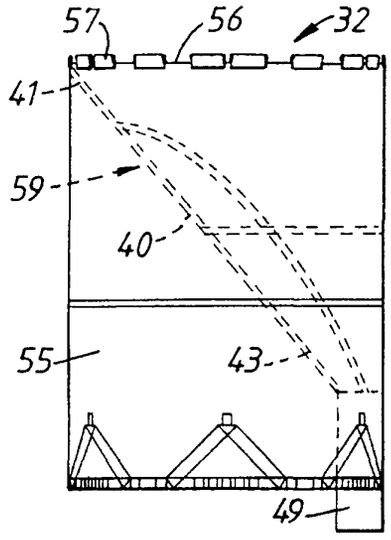

Fig 19

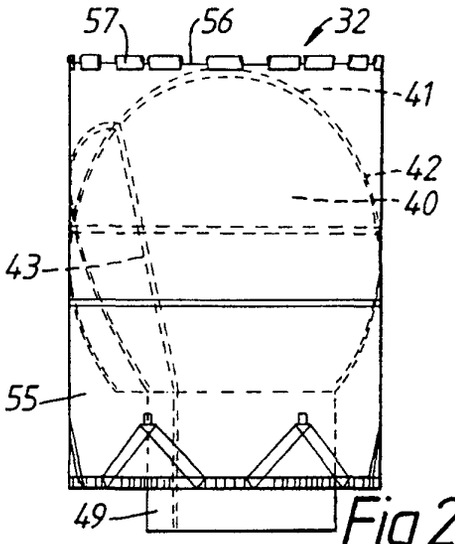

Fig 20

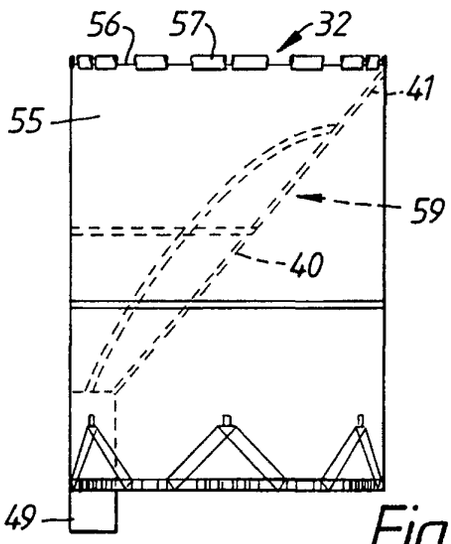

Fig 21

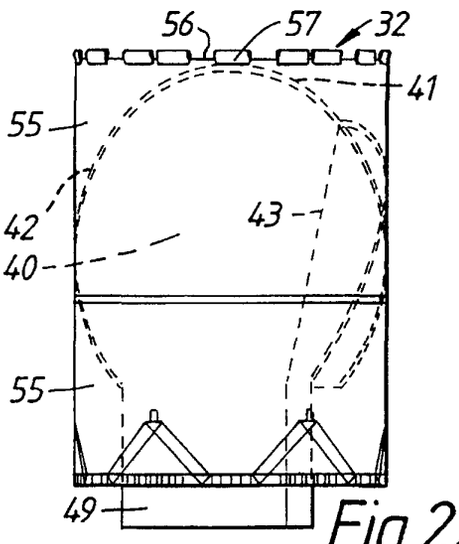

Fig 22

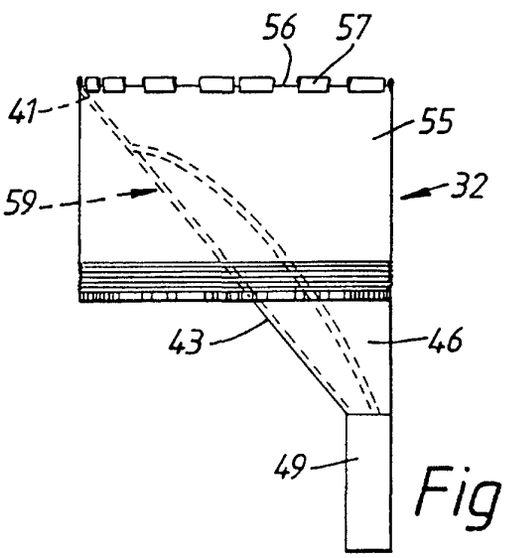

Fig 23