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Advanced rescue device

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The invention provides a rescue device (1, 1', 1", 1''') for capturing objects or people (100) from a liquid medium (110), characterized in that it comprises a capturing element (2, 2', 2", 2'''), floatation means (14, 14', 14", 14'', 14''', 15, 15', 15'', 15'''), navigation means, a frame structure for holding said capturing element, said navigation means and said floatation means (14, 14', 14", 14'', 14''', 15, 15', 15'', 15'''), and remote control receiving means (12) for controlling said navigation means and/or said floatation means (14, 14', 14", 14'', 15, 15', 15'', 15''') so that the direction of the movement, the inclination and the floatation of the device are suitable for capturing a person (100) or object on the capturing element (2, 2', 2", 2''').

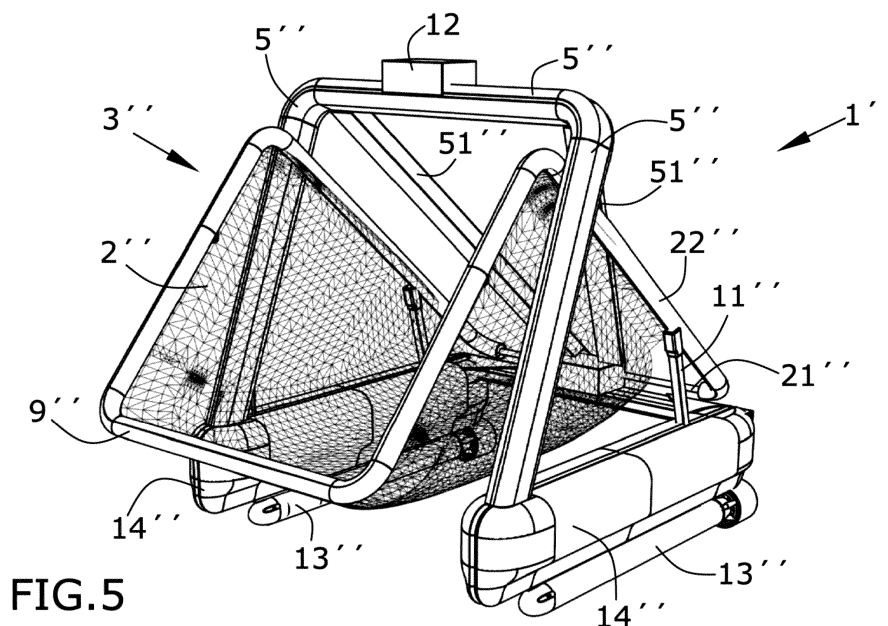


FIG.5

Description

OBJECT OF THE INVENTION

[0001] Falling overboard is one of the most dangerous and life-threatening events that can take place at sea, particularly when it happens from a large vessel that is slow to manoeuvre and when rough seas or high wind conditions are present. When a person falls overboard from a vessel or from an offshore installation not only do they put at risk their own life, but also, potentially, the lives of other people trying to rescue them.

[0002] The present invention relates to a rescue device characterized by its accuracy and effectiveness, even in difficult operations, and, more importantly, in that it does not present, in most cases, any danger for the rescuers.

PRIOR ART

[0003] There are many devices designed to perform rescue operations. The simplest of them is a life buoy, commonly known as "Kisby Ring" or "Perry Buoy", which can be ringshaped or horseshoe-shaped and which is connected to a rope or line that allows it to be thrown towards the person to be rescued, and to be retrieved back to the rescuers. These devices, although cheap and simple, have many disadvantages even in favourable conditions - they do little to assist the process of recovery of the Man Over Board (MOB) from the water. For instance, if the MOB loses consciousness or feels weak they may not be able to hold on to the life buoy and be lifted to safety. High waves and cold temperatures could also undermine the possibilities of a MOB being rescued by this method.

[0004] Other MOB rescue devices are net type devices, which are suspended from the ship's side and are able to capture people in its surroundings. There are different rescue systems of this kind. The Dacon Rescue Scoop is a manoeuvrable rescue net operated by a standard deck crane, with a reach of 4-6 metres and designed as an open meshed net formed by parallel fibre glass rods tied together, which make the net rigid in the along-ship direction. The Cosalt Personnel Recovery Device is similar to the Dacon, but it is constructed from high density plastic rungs and steel rods and it has lifting strops attached to help with retrieval. The Markus Lifenet is also very similar to the two previous products - the net is hung down along the side of the boat close to the person in the water; it has a "pull-in line" swung to the other side of the person that, when pulled, makes the net roll around the person and lift him/her back on board. Finally, the Rob Reid Rescue Device has the particularity of the basket being rigid, conferring the MOB more protection. All these devices require that the vessel has to manoeuvre very close to the MOB for the deployment, capture and rescue operations. This approaching manoeuvre tends to delay rescue (reducing the chances of retrieving the MOB alive) and is fairly dangerous for the MOB, espe-

cially in harsh weather and when the vessel is of considerable dimensions. Moreover, when the MOB drifts away from the ship quickly they are of no avail.

[0005] Differently from the previously described systems, daughter crafts or dedicated rescue crafts allow a faster approach to the MOB and the chances of a successful retrieval rise, but they require additional people to be put at risk (normally, four people) to save one MOB.

DESCRIPTION OF THE INVENTION

[0006] Advantageously, the present invention overcomes these problems by the provision of a rescue device according to claim 1, a system according to claim 17 and a method according to claim 18; the dependent claims define preferred embodiments of the invention. That way, it is possible to rescue people, even when they are weak or unconscious, at a considerable distance from a ship, which does not have to perform approaching manoeuvres, usually slow and dangerous for the MOB, and without involving any risk for the rescuers when the conditions of the sea or the weather are difficult and therefore too hazardous for the launch of a rescue craft.

[0007] In a *first inventive aspect*, the present invention describes a rescue device characterized in that it comprises:

- a capturing element,
- floatation means,
- navigation means,
- a frame structure for holding said capturing element, said navigation means and said floatation means, and
- remote control receiving means for controlling said navigation means and/or said floatation means so that the direction of the movement, the inclination and the floatation of the device allow the capture of the person or object on the capturing element.

[0008] This rescue device aims to solve the technical problems found by rescue systems of the prior art.

[0009] Even in the cases where other rescue crafts must be deployed, the rescue device of the invention can be deployed in a matter of minutes and the rescue operations can begin before the conventional craft is on the water, saving time that can be vital for the success of the operation.

[0010] In an embodiment, the rescue device further comprises on board control means, which allow the MOB or even a pilot, in another embodiment suitable for more than one person, to command the device controlling its navigation, inclination and floatation. This configuration is useful when the MOB can handle the rescue device better than the remote controllers, due to the distance, the visibility or other reasons.

[0011] Advantageously, the rescue device does not need the intervention of any human being on board, neither in piloting nor in rescuing the MOB, since the oper-

ation of driving and rescuing can be controlled, either remotely from an installation on the sea, from a ship or from ashore, either by a human, by a computer assisted human or fully by a computer, or even by the MOB using the on-board control means. Hence it differs from a rescue craft in that it does not imply a threat to personnel involved in the rescue operations. In a particular embodiment, the frame structure comprises structure bars. The frame structure supports the remote control receiving means, which are the elements incorporated for receiving the signals emitted from remote control transmitting means controlled by a person on said ship or marine structure or installation.

[0012] In a *second inventive aspect*, a system comprising the rescue device of the first inventive aspect plus the remote control transmitting means at a nearby vessel or installation is defined.

[0013] The remote control receiving means are suitable for acting on the navigation means of the rescue device. The navigation means comprise propulsion means, which in different embodiments comprise propellers, thrusters or any other way of propulsion known in the prior art, and steering means to control the direction of the rescue device. This way, the direction of movement of the structure, from the surroundings of the vessel to the surroundings of the MOB, is remotely controlled.

[0014] The rescue device also comprises floatation means that makes the structure float. In an embodiment, these floatation means are low-density elements preferably located at certain points of the frame structure, in form of buoys, and around the bars of this frame structure. The material of construction of the floatation means may be such that are protective for the MOB in case these floatation means hit the MOB during the rescue. The remote control receiving means also act on said floatation means in such a way that the inclination of the rescue device, or its depth of immersion, can be remotely controlled by the rescuers. In a particular embodiment, this control is achieved by means of the different levels of floatation that said floatation elements can provide, for example, with a control of its ballast or through the vertical vector of a force exerted by some thruster system, or the like, comprised in them. The propulsion means can similarly be able to exert such vertical force and thus be the elements that control the inclination or floatation of the rescue device.

[0015] The rescue device also comprises a capturing element preferably held on some of the bars of the frame structure. This capturing element can be, for instance, a net, a mesh, a grid or any other element able to capture a person, preferably with minimal hydrodynamic resistance. When the rescue device is near the MOB, the rescuers vary the inclination and floatation of the device so as to capture the MOB (who does not have to make any effort during the process) on the capturing element, which is an advantage with respect to other devices that require cooperation from the MOB, like the case of the life buoy, and even with respect to the net type devices, since the

proceedings of capture are safer and more accurate, which is of particular advantage when sea conditions are difficult. Once the MOB is on the capturing element, the rescue device is remotely steered back for a safe retrieval.

[0016] A *third inventive aspect* defines the method to capture objects or persons with the rescue device afore described in any of its embodiments, which comprises the following steps:

- *deploying a rescue device according to the first inventive aspect on the water surface,*
- *steering the rescue device by means of the remote control means or the on-board control means and the navigation means toward the object or person,*
- *once the rescue device is in the surroundings of the person or object, controlling its inclination and/or floatation by means of the remote control means or the on-board control means and by means of the floatation means and/or the navigation means so that the person or object ends up on the capturing element.*

[0017] This method also contemplates the possibility of the direction of movement, inclination or floatation being controlled by on-board control means, described as a possible embodiment in a dependent claim, which could be handled, for example, by a pilot or even by the MOB in case they feel strong enough when on the capturing element. This has the advantage of allowing the rescue device to act as a piloted rescue craft, but even that configuration improves the systems disclosed in the state of the art - only one pilot is needed to perform the operation, instead of the four people involved in rescues with known crafts. It must be highlighted that these on board control means are an additional non-defining feature of the device, which could be helpful under certain circumstances, but they must not be understood, on any account, as a limiting alternative to the remote control means.

[0018] Although the main purpose of both the device and the method is to rescue people fallen overboard, they are also suitable for capturing any other object (including animals) on the surface of a liquid medium.

[0019] All the features and/or the steps of the methods described in this specification (including the claims, description and drawings) can be grouped in any combination, except the combinations of such features which are mutually excluding.

DESCRIPTION OF THE DRAWINGS

[0020] Embodiments of the invention will now be described, by way of example only, with reference to the following drawings.

Figure 1 This figure is a perspective view of a first embodiment of a rescue device according to the invention.

- Figure 2 This figure is a top view of said first embodiment.
- Figure 3 This figure shows a perspective side view of a second embodiment of a rescue device according to the invention.
- Figure 4 This figure is a top view of the embodiment of said second embodiment.
- Figure 5 This figure shows a perspective view of a third embodiment of a rescue device according to the invention.
- Figure 6 This figure is a side view of said third embodiment.
- Figures 7a-7c These figures show different positions of a rescue device according to the invention, including the rescue device in its folding position.
- Figures 8a-8c These figures show a side view of the positions of Figures 7a-7c.
- Figure 9 This figure shows an embodiment of the remote control transmitting means commanded by the rescuers, and of the rescue device comprising the remote control receiving means.
- Figure 10 This figure shows an image of the live video captured by a camera installed in the rescue device, over which a virtual outline is included to aid the capture.
- Figure 11 This figure shows an image of this live video at the instant of the capture, wherein the MOB is inside the virtual outline.
- Figure 12 This figure shows another embodiment of a rescue device wherein the rescue device is deployed on the water surface by means of a crane.
- Figure 13 This figure shows the embodiment of Figure 12, being retrieved by means of a crane.

DETAILED DESCRIPTION OF THE INVENTION

[0021] As shown in the drawings, a rescue device (1, 1', 1", 1''') according to the invention comprises: a capturing element (2, 2', 2''), floatation means (14, 14', 14", 15, 15', 15''), navigation means, a frame structure for holding said capturing element (2, 2', 2''), said navigation

means and said floatation means (14, 14', 14", 15, 15', 15''), and remote control receiving means (12) for controlling said navigation means and/or said floatation means (14, 14', 14", 15, 15', 15'') so that the direction of the movement, the inclination and the floatation of the device are suitable for capturing a person (100) or object on the capturing element (2, 2', 2'').

[0022] Navigation means should be understood as steering means and propulsion means (13, 13', 13''), both of them able to be remotely controlled. In an embodiment, the steering means are conventional helms, known by a person skilled in the art, as the ones incorporated in small boats, led by the remote control receiving means. In another embodiment, propulsion means (13, 13', 13'') also provide the steering action, by exerting different forces in each of the propulsion means (13, 13', 13'').

[0023] In particular embodiments, the remote control receiving means (12) are an antenna. The remote control receiving means (12) are suitable for receiving signals from remote control transmitting means (16).

[0024] All of these elements, and other ones which are part of preferred embodiments, are carried out in a wide range of shapes and configurations. Figures show four different embodiments, the features thereof will be described.

First embodiment

[0025] Figures 1 and 2 show a perspective and a plan view of a first embodiment of a rescue device (1) according to the invention. In this embodiment, the frame structure of the rescue device (1) comprises a main sub-frame (3) for holding the capturing element (2), and a hull (24) connected to said main sub-frame (3). The main sub-frame (3) comprises an entry bar (9), a rear bar (21) essentially parallel to said entry bar (9), and side bars (22) connecting the entry bar (9) and the rear bar (21). The X axis drawn in figure 2 defines the longitudinal direction of the rescue device (1), perpendicular to said entry bar (9).

[0026] As can be observed in these Figures 1 and 2, the main sub-frame (3) is tapered shaped. Tapered should be understood, in the context of the present invention, as a shape of an object that becomes narrower towards one end. In this case, the entry bar (9) is thus longer than the rear bar (21). This entry bar (9) is located so that the object or MOB (not represented) which is to be rescued by the rescue device (1) passes over it when entering the rescue device (1).

[0027] This configuration facilitates the entry of the MOB on the capturing element (2), as the sub-frame (3) presents a wide entry, which is the entry bar (9), and a progressively reduced section to guide the MOB into a secure position. The capturing element (2) is linked to the main sub-frame (3) with the objective of preventing the lateral exit of the MOB when the rescue device (1) rocks in rough waters.

[0028] In the embodiment of these Figures 1 and 2,

the frame structure also comprises rigidity bars (5) each of which extends in a substantially triangular shape from one point of a side bar (22) to another point of the same side bar (22). This rigidity bars can also be cables or any other similar element that provides rigidity to this joint.

[0029] In this embodiment, the capturing element (2) is a net or grid completely attached to the entry bar (9), the rear bar (21) and the side bars (22).

[0030] In this embodiment, floatation means (14, 15) comprise three main floatation elements (14) and two floatation coatings (15), one floatation coating (15) covering each rigidity bar (5). Floatation means (14, 15) are preferentially made of low density materials typical in buoys and floats, and adopt different configurations in different embodiments. Main floatation elements (14) let the rescue device (1) keep floating over the water. In one particular embodiment, these main floatation elements (14) are buoys. Floatation coatings (15) helps the rescue device (1) self-righting, not letting the rigidity bars (5) being submerged, when the rescue device (1) is capsized.

[0031] To carry out the rescue, the rescue device (1) is adapted to provide a variable floatation power at least in the capturing element (2), changing its floatation depth and its inclination respectively. There are many ways of achieving this variable level of floatation. For instance, in one embodiment, the main floatation elements (14) are buoys comprising each one a ballast, such as liquid ballast. When ballast is released in all the main floatation elements (14) in a balance manner, the device (1) rise; when ballast is only released in the rear floatation element (14), that is, those further from the entry bar (9) of the main sub-frame (3), the device (1) partially steep into the water (110), in a position suitable for the capture of the MOB. When ballast is then released in the front main floatation elements (14), the device (1) tilts back toward a position in which the MOB keeps safely on the capturing element (2). In another embodiment, the propulsion means (13) of the navigation means are able to exert a vertical component and, therefore, they are also used for changing the floatation and the inclination of the device (1).

Second embodiment

[0032] A second embodiment is shown in Figures 3 and 4. In this embodiment, the frame structure of the rescue device (1') also comprises a main sub-frame (3') for holding the capturing element (2'), and a hull (24'), which is connected to said main sub-frame (3'). The main sub-frame (3') comprises an entry bar (9'), a rear bar (21') essentially parallel to said entry bar (9'), and side bars (22') connecting the entry bar (9') and the rear bar (21'). The main sub-frame (3') is also tapered shape.

[0033] In the embodiment of these Figures 3 and 4, the frame structure also comprises rigidity bars (5'). These are not attached to the main sub-frame (3'), as in the first embodiment, but to the hull (24'). These rigidity bars (5') extends in a substantially rectangular chamfered

shape from one point of the hull (24') to another point of the hull (24'), overcrossing the main sub-frame (3') from one side of the X axis to the other side.

[0034] This embodiment also comprises a keel element (8') that crosses the hull (24') longitudinally, thus providing stability to the rescue device (1'). In preferred embodiments, this keel element (8') comprises keel bars, as shown in figure 3. The keel element (8') adds stability to the whole assembly and, together with the floatation means, allows the device (1') to self-right if capsized.

[0035] In this embodiment, the capturing element (2') is also a net or grid completely attached to the entry bar (9'), the rear bar (21') and the side bars (22').

[0036] In this embodiment, floatation means (14', 15') comprise four main floatation elements (14') and two floatation coatings (15'), one covering each rigidity bar (5').

[0037] In an embodiment, the remotely controlled propulsion means (13') are usual methods employed in small boats, such as thrusters or propellers. In a particular embodiment, these propulsion means obtain their energy from inert low-maintenance energy sources, like electrical batteries or stored gas.

[0038] In the embodiment of figures 3 and 4, the main floatation elements (14') are four buoys located under the main sub-frame (3'). The rigidity bars (5') and the main sub-frame (3') are coated with floatation coating (15').

[0039] To carry out the rescue, the rescue device (1') is adapted to provide a variable floatation power at least in the capturing element (2'), changing its floatation depth and its inclination respectively. There are many ways of achieving this variable level of floatation. In this embodiment, the main sub-frame (3') is a tilting frame, that is, it can move independently from the rest of the structure, so that it is the control of its inclination which allows the rescue device (1') to capture the MOB on the capturing element (2').

[0040] In another embodiment, the variation of inclination or floatation is achieved through a thruster system installed in the main floatation elements (14'). Small thrusters, able to exert a force with a vertical component and also remotely controlled, are placed in the main floatation elements (14'), the actuation of these thrusters result in a change of the floatation depth. Like before, certain distributions of forces in the thrusters make the rescue device (1') vary the inclination to capture and then secure the MOB.

[0041] In yet another embodiment, the propulsion means (13') of the navigation means are able to exert a vertical component and, therefore, they are also used for changing the floatation and the inclination of the device (1').

[0042] In the embodiment of these figures 3 and 4, the remote control receiving means (12) are suitable for causing the main sub-frame (3') to acquire a certain inclination relative to the hull (24'), thus helping in the process of capturing. In this embodiment, the device (1') com-

prises a piston system (11') to achieve this relative movement of the main sub-frame (3'). This piston system (11') is only seen in Figure 3. Many other means of conferring this relative movement can also be used.

Third embodiment

[0043] A third embodiment is shown in Figures 5 and 6. The frame structure of the rescue device (1'') comprises a main sub-frame (3'') for holding the capturing element (2''), and main floatation elements (14''). The main sub-frame (3'') comprises an entry bar (9''), a rear bar (21'') essentially parallel to said entry bar (9''), and side bars (22'') connecting the entry bar (9'') and the rear bar (21'').

[0044] In this embodiment, the main floatation elements (14'') are two buoys which extend through the length of the rescue device (1'') in a direction which is substantially perpendicular to the entry bar (9'') providing the rescue device (1'') a catamaran-like shape.

[0045] In this embodiment, the remotely controlled propulsion means (13'') are usual methods employed in small boats, such as thrusters or propellers. In a particular embodiment, said propulsion means (13'') obtain their energy from inert low-maintenance energy sources, like electrical batteries or stored gas. In this embodiment, the capturing element (2'') is a net or grid completely attached to the entry bar (9'') and the side bars (22'').

[0046] In the embodiment of these Figures 5 and 6, the frame structure also comprises two types of rigidity bars (5'', 51''). The first rigidity bars (5'') are three bars forming an arc joining the two main floatation elements (14''), and the second rigidity bars (51'') are two bars, each of one joining one point of the frame structure of the rescue device (1'') with one point of one of the first rigidity bars (5'').

[0047] In this embodiment, the main sub-frame (3'') is a tilting frame, that is, it can move independently from the rest of the structure. In this embodiment, its inclination is caused by means of a piston system (11''), but other embodiments achieve this effect with other displacement means. One part of this piston system (11'') is placed in one main floatation means (14'') and the other is placed in the main sub-frame (3''). Many other means of conferring this relative movement can also be used. This piston system (11'') is controlled by the remote control receiving means (12').

[0048] It is the control of inclination of the main sub-frame (3'') which allows the rescue device (1'') to capture the MOB on the capturing element (2'').

[0049] To carry out the rescue, the piston system (11'') changes the inclination of the main sub-frame (3''), submerging said main sub-frame (3'') in the water when the rescue device (1'') is near the MOB. When the MOB is on a suitable point, the piston system (11'') causes the main sub-frame (3'') to return to the position over the water, carrying the MOB with it.

[0050] Nevertheless, another embodiment comprises

a thruster system installed in the main floatation elements (14'') to control the inclination of the rescue device (1''), similarly to other described embodiments. Like in these cases, certain distributions of forces in the thrusters make the rescue device (1'') vary the inclination to capture and then secure the MOB.

[0051] In another embodiment, some of the elements of the rescue device (1'') are foldable. In the embodiment shown in Figures 7a-7c and 8a-8c, some side bars (22'') and the second rigidity bars (51'') are foldable. Further, two of the first rigidity bars (5'') are hingably movable. Because of this, the rescue device (1'') according to this embodiment takes up very little room once folded.

[0052] Figures 7a to 7c show different positions of a rescue device (1'') according to this embodiment. Figure 7a shows a rescue device (1'') with the main sub-frame (3'') in its submerged position. Figure 7b shows a rescue device (1'') with the main sub-frame (3'') in its raised position. Figure 7c shows a rescue device (1'') in its folded position. To achieve this configuration, the main sub-frame (3'') is in its submerged position, with some side bars (22'') being folded; the first rigidity bars (5'') are taken down over the main floatation means (14'') and the second rigidity bars are also folded.

[0053] Figures 8a-8c show a side view of these different positions.

[0054] It is convenient to highlight, once more, that the combination of configurations of the different elements of the rescue device (1'') is not limited to the examples shown in the figures. It is obvious that depicting all the possible combinations would result in an unnecessarily high number of figures and embodiments descriptions.

Common features

[0055] Any of the embodiments already described comprise, in other particular embodiments, at least one of the following elements:

In one embodiment, the capturing element (2, 2', 2'') also comprises a unidirectional skidding layer (not represented) located under the capturing element (2, 2', 2''). The combination of these elements with the variation of inclination and floatation of the rescue device (1, 1', 1'') makes the MOB (100) enter the rescue device (1, 1', 1'') and be kept on said capturing element (2, 2', 2''). The materials of this unidirectional skidding layer, additionally, keep the MOB (100) from sliding out into the sea once on the capturing element (2, 2', 2''). An example of such materials is the seal skin used for cross country skies, but many other alternatives are possible to achieve this "easy entry, difficult exit" effect.

[0056] In one embodiment, the frame structure comprises a tow element (6) suitable for being tugged, lifted or retrieved by a crane or davit (20) located at the offshore

installation or in a vessel and, similarly, to be deployed on the water surface at the beginning of the rescue operation, as shown in Figure 14. In an embodiment, this tow element (6) comprise a plurality of bars converging in an apex, as the ones shown in figures 1 and 2. In a particular embodiment, this tow element (6) comprises a hinge (7) in their apex so that they can be folded for compact storage.

[0057] The hull (24, 24') is designed to reduce the drag, by means of reducing the surface of a transversal section. Because of this, the weather effects on the navigation are also minimized. In an embodiment, the hull (24, 24') provides stability to the rescue device (1, 1', 1''), thanks, among other features, to the arc-shaped bars which are transversally attached to the main sub-frame (3, 3', 3''). This stability turns out to be so high that the rescue device (1, 1', 1'') self-rights even in the most adverse conditions.

[0058] In some embodiments, the main sub-frame (3, 3', 3'') comprise an extension tray that forms an obtuse angle with the rest of the main sub-frame, with the purpose of ensuring the MOB remains on the capturing element (2, 2', 2'').

[0059] In a further embodiment, the rescue device (1, 1', 1'') is equipped with beacon lights (19) so it can be seen from other vessels and thus reducing the risk of collision.

[0060] In different embodiments, the rigidity bars (5, 5', 5'', 5''') are disposed in triangular shapes, in quadrangular transversal shapes, united by additional side and rear bars and by a bottom structure comprising two perpendicular surfaces, or following many other distributions.

[0061] One of the advantages of the rescue device (1''), as can be seen in Figures 9 and 10, is that it can retrieve a MOB (100) drifting away from the vessel or installation. When the MOB (100) does not get too far, a visual control of the process is possible, but when they get beyond the visual range, or when there is reduced visibility, other aid features become important. For that reason, in some embodiments, the rescue device (1'') comprise sensory equipment like a camera, preferably a 360° camera, a sonar device, a GPS device and/or an infrared device, which gather data, such as images, video, range of operation, positioning information, etc. which are transmitted from a data transmission system on board the rescue device (1'').

[0062] In the embodiment of figure 9, a rescuer commands the rescue device (1'') with remote control transmitting means (16) comprising a video screen (17) in which on-board live video of the rescue device (1'') is shown. In yet another embodiment, also shown in this figure, this remote control transmitting means (16) permits the selection between the video camera mode and the infrared mode, suitable for virtually no-visibility conditions. The remote control transmitting means (16) of figure 9, moreover, also gives the coordinates of the rescue device (1''), its navigation direction, its range and includes a GPS mode.

[0063] Figure 10 shows a screenshot of the video screen of the remote control transmitting means of a rescue device according to another embodiment. When on video or infrared mode, the screen shows, over the live video or infrared video, a virtual outline (18). The rescuers use this virtual aid to know when they must carry out the capture operation - once the MOB (100) is inside the virtual outline (18), as in figure 11, the inclination is changed to secure the MOB (100) on the capturing element (2'').

[0064] A second inventive aspect provides a system comprising a rescue device according to the first inventive aspect and remote control transmitting means (16) for the remote control of the rescue device (1, 1', 1'', 1''') suitable for being controlled by a person on a nearby vessel or structure. With respect to the technology behind these remote control means, conventional remote control techniques, known by people skilled in the art, are suitable for the present invention.

[0065] With respect to the third inventive aspect, it is presented a rescue method employing a rescue device (1, 1', 1'', 1''') according to any of the embodiments previously described. The first step of such method, as shown in Figure 12, consists of the deployment of the rescue device (1'') onto the water surface (100), which can be done in different ways. Figure 12 shows the rescue device (1'') being laid on the water by means of a crane or davit (20) which holds to the vessel or installation.

[0066] The next step in the method comprises steering the rescue device (1'') by means of acting on the remote control transmitting means (not shown in this figure) or the on-board control means and controlling the navigation means so that they move the rescue device (1'') toward the object or person (100). Once the rescue device (1'') is in the surroundings of the person (100) or object, the next step of the method comprises controlling inclination and/or flotation of the capturing element (2'') by means of the remote control means or the on-board control means and by means of the flotation means (14'', 15'') and/or the navigation means so that the person (100) or object ends up on the capturing element (2''). All this process can be seen in Figures 9, 10 and 11.

[0067] Once the rescue device (1'') has reached and captured the MOB (100) thanks to its described features and has returned to the surroundings of the vessel, installation or port, it can be, similarly, retrieved and lifted, in an embodiment, by means of said crane or davit (20) that captures the rescue device (1'') from its tow element (6') previously described. This action is shown in figure 13.

[0068] In rescue operations that involve short distances and take place in benign conditions, the tow element (6'), in an embodiment, also permits the rescue device (1'') to be towed back to the vessel or installation once it has rescued the MOB (100). Again, it can be an alternative to the remote controlled retrieval, in case it falters after the rescue proceedings, or it can be used to speed

up the return of the rescue device (1, 1', 1'' 1''').

Claims

1. A rescue device (1, 1', 1'', 1''') for capturing objects or people (100) from a liquid medium (110), **characterized in that** it comprises:

- a capturing element (2, 2', 2'', 2'''),
- floatation means (14, 14', 14'', 14''', 15, 15', 15'', 15'''),
- navigation means,
- a frame structure for holding said capturing element, said navigation means and said floatation means (14, 14', 14'', 14''', 15, 15', 15'', 15'''), and
- remote control receiving means (12) for controlling said navigation means and/or said floatation means (14, 14', 14'', 14''', 15, 15', 15'', 15''') so that the direction of the movement, the inclination and the floatation of the device are suitable for capturing a person (100) or object on the capturing element (2, 2', 2'', 2''').

2. A rescue device (1, 1', 1'', 1''') according to claim 1, further comprising on board control means for controlling the displacement, the inclination and the floatation of the rescue device (1, 1', 1'', 1''').

3. A rescue device (1, 1', 1'', 1''') according to any of the previous claims, wherein the frame structure comprises:

- a main sub-frame (3, 3', 3'') for holding the capturing element (2, 2', 2'', 2'''), and
- a hull (24, 24', 24'') connected to said main sub-frame (3, 3', 3'').

4. A rescue device (1, 1', 1'', 1''') according to claim 3, wherein the main sub-frame (3, 3', 3'') is a tilting frame, so that the control of its inclination allows the capture of the person (100) or object on the capturing element (2, 2', 2'', 2''').

5. A rescue device (1, 1', 1'', 1''') according to claims 3 or 4, wherein the main sub-frame (3, 3', 3'') is tapered shaped.

6. A rescue device (1, 1', 1'', 1''') according to any of the previous claims wherein the capturing element (2, 2', 2'', 2''') is a net or grid.

7. A rescue device (1, 1', 1'', 1''') according to any of the previous claims wherein the capturing element (2, 2', 2'', 2''') further comprises a unidirectional skidding material.

8. A rescue device according to any of the previous claims wherein the floatation means (14, 14', 14'', 14''', 15, 15', 15'', 15''') comprise ballast control means.

9. A rescue device (1, 1', 1'', 1''') according to any of the previous claims wherein the floatation means (14, 14', 14'', 14''', 15, 15', 15'', 15''') comprise at least one thruster system with a vertical vector component.

10. A rescue device (1, 1', 1'', 1''') according to any of the previous claims wherein the navigation means are adapted to exert a force with vertical component.

11. A rescue device (1, 1', 1'', 1''') according to any of the previous claims wherein the propulsion means (13, 13') of the navigation means are thrusters or propellers.

12. A rescue device (1, 1', 1'', 1''') according to claim 11 wherein the propulsion means (13, 13') of the navigation means comprise low-maintenance inert energy sources, such as batteries or stored gases, for supplying energy to said propulsion means (13, 13').

13. A rescue device (1, 1', 1'', 1''') according to any of the previous claims further comprising a data transmission system.

14. A rescue device (1, 1', 1'', 1''') according to claim 13, further comprising sensory equipment, suitable for gathering data transmitted by the data transmission system, such as a camera, a sonar device, a GPS device or an infrared device.

15. A rescue device (1, 1', 1'', 1''') according to any of the claims from 3 to 14, wherein the frame structure comprises a tow element (6) suitable for being tugged, lifted or retrieved by a crane or davit (20).

16. A rescue device (1, 1', 1'', 1''') according to any of claims from 3 to 15 further comprising:

- rigidity bars (5), and
- a keel element (8', 8'').

17. A rescue system comprising:

- a rescue device (1, 1', 1'', 1''') according to any of the previous claims, and
- remote control transmitting means (16) for the remote control of the rescue device (1, 1', 1'', 1''') suitable for being controlled by a person on a nearby vessel or structure.

18. A method for capturing objects or people (100) in a liquid medium (110), **characterized in that** it com-

prises the following steps:

- deploying a rescue device (1, 1', 1", 1''') according to any of the claims from 1 to 16 on the water surface (110), 5
- steering the rescue device (1, 1', 1", 1''') by means of the remote control means or the on-board control means and the navigation means toward the object or person (100),
- once the rescue device (1, 1', 1", 1''') is in the surroundings of the person (100) or object, controlling its inclination and/or flotation by means of the remote control means (12, 16) or the on-board control means and by means of the floatation means (14, 14', 14", 14''', 15, 15', 15", 15''') 10
- and/or the navigation means so that the person (100) or object ends up on the capturing element (2, 2', 2" 2'''). 15

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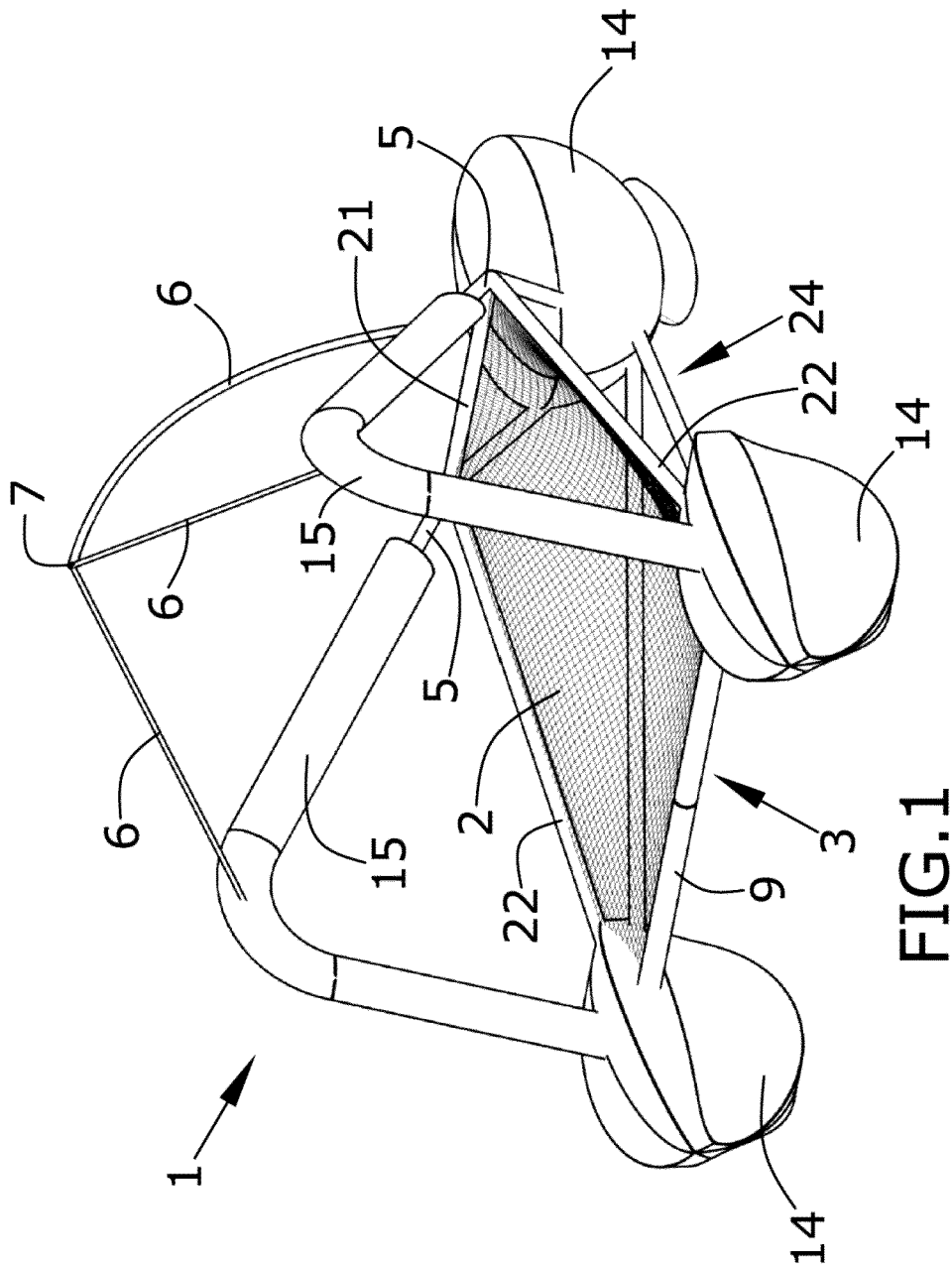
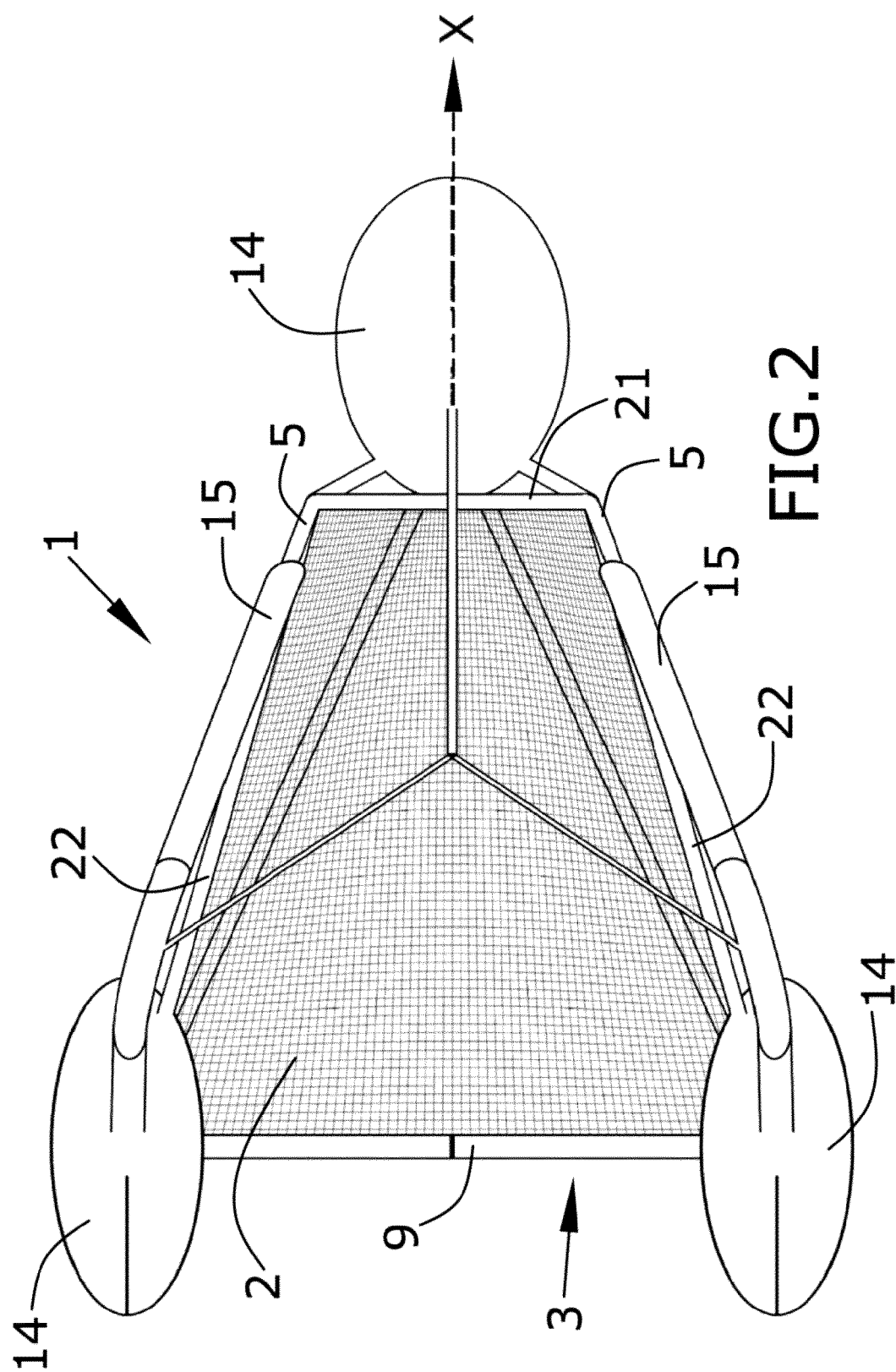


FIG. 1



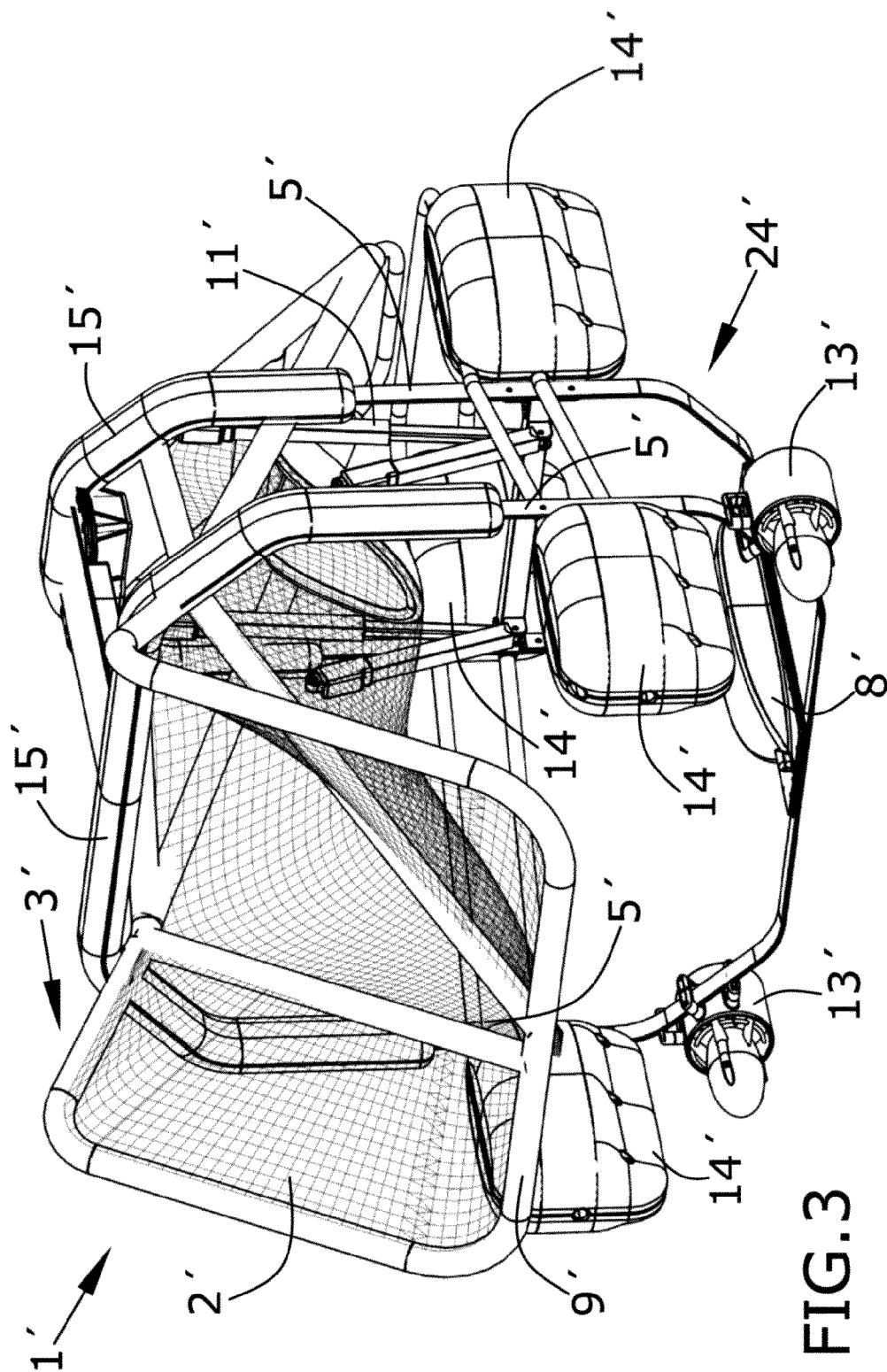
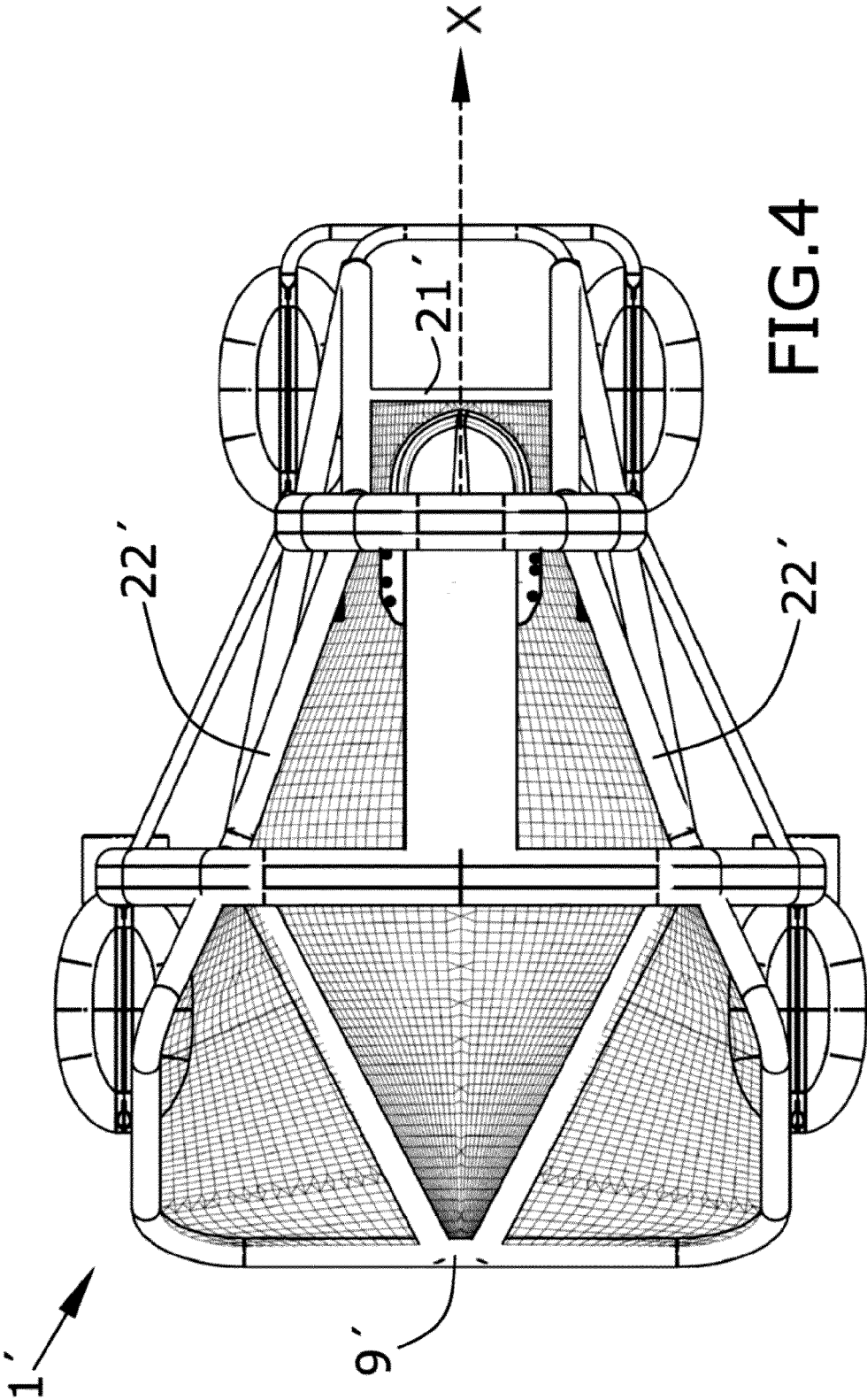


FIG. 3



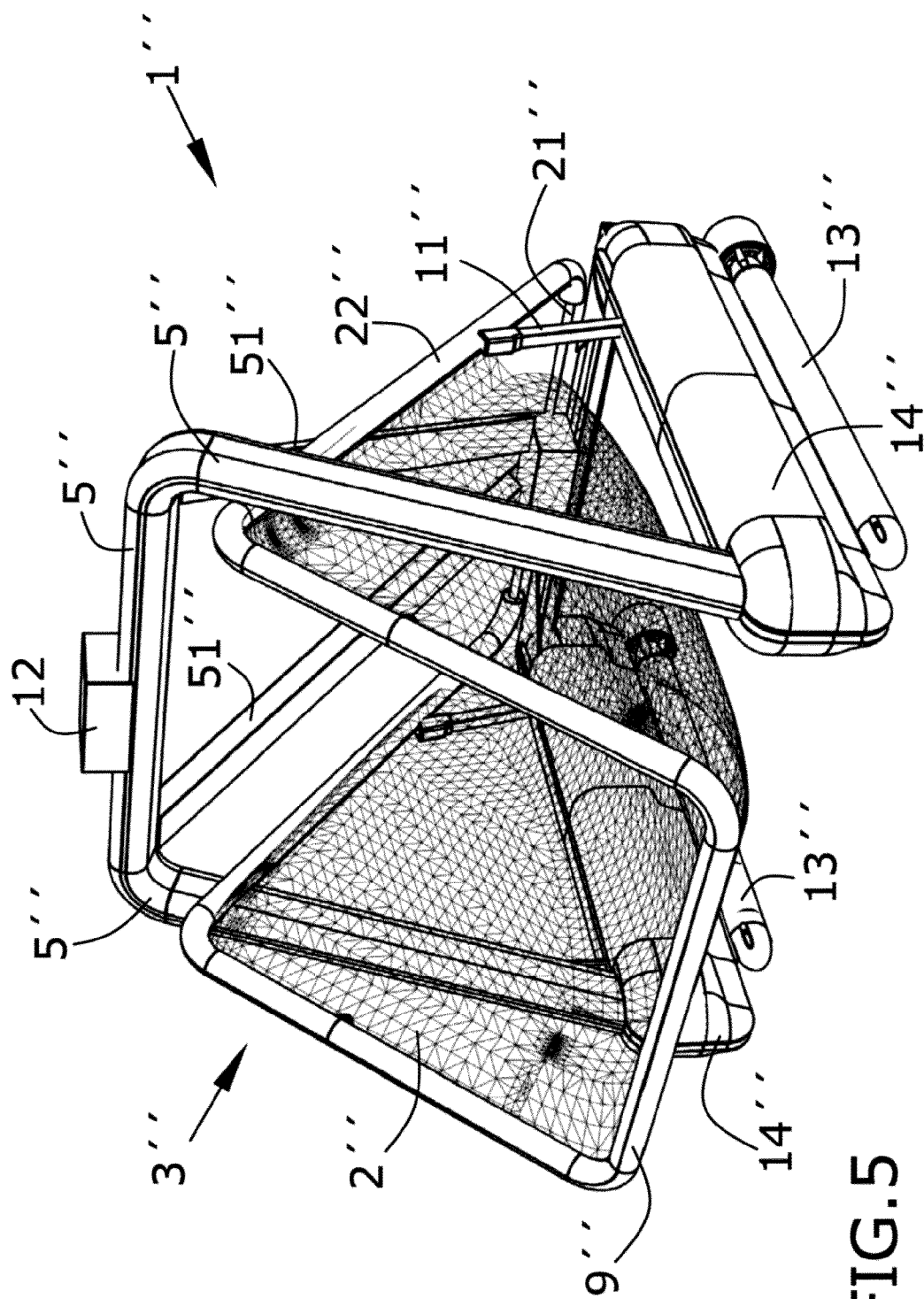


FIG. 5

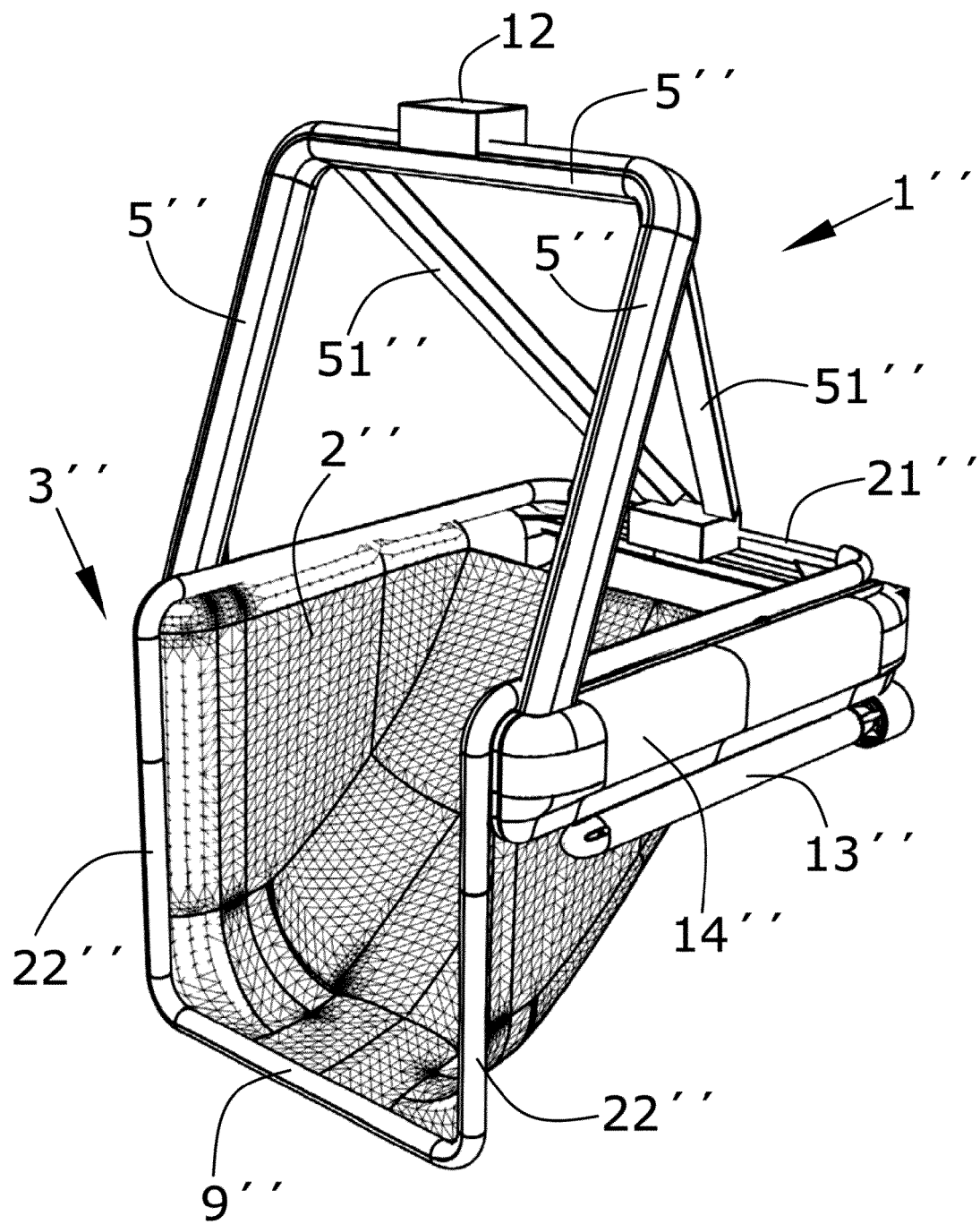
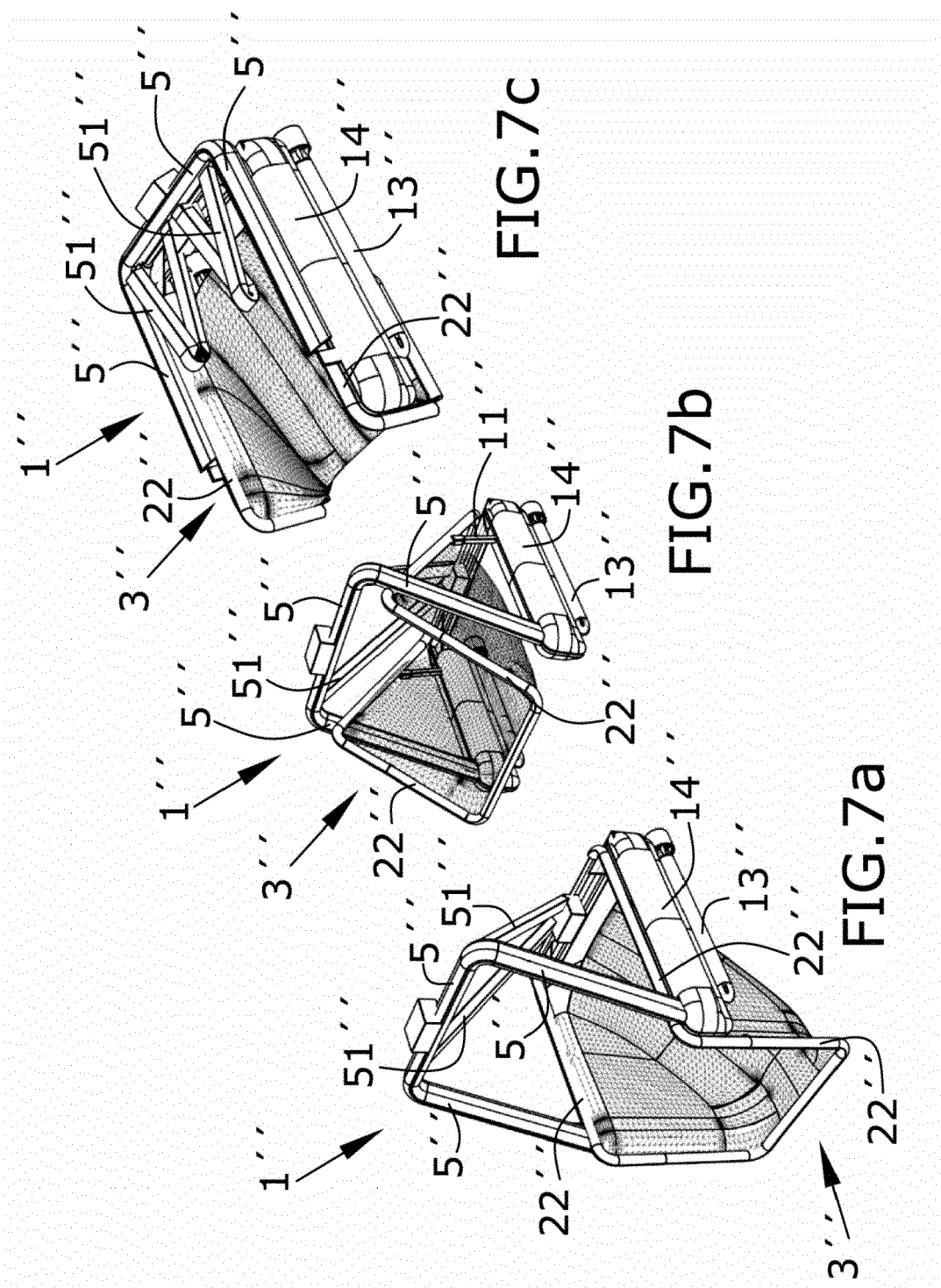


FIG. 6



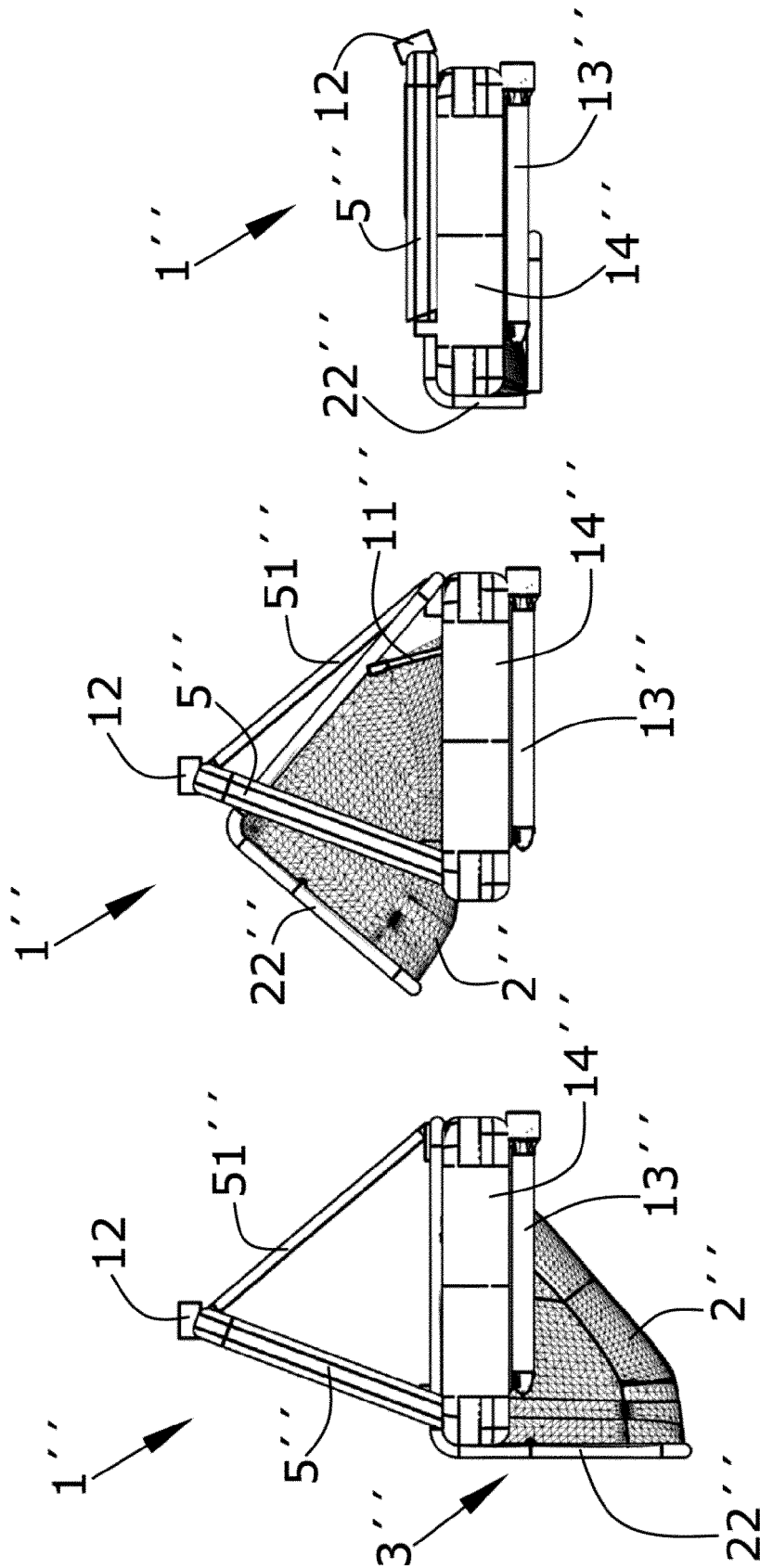
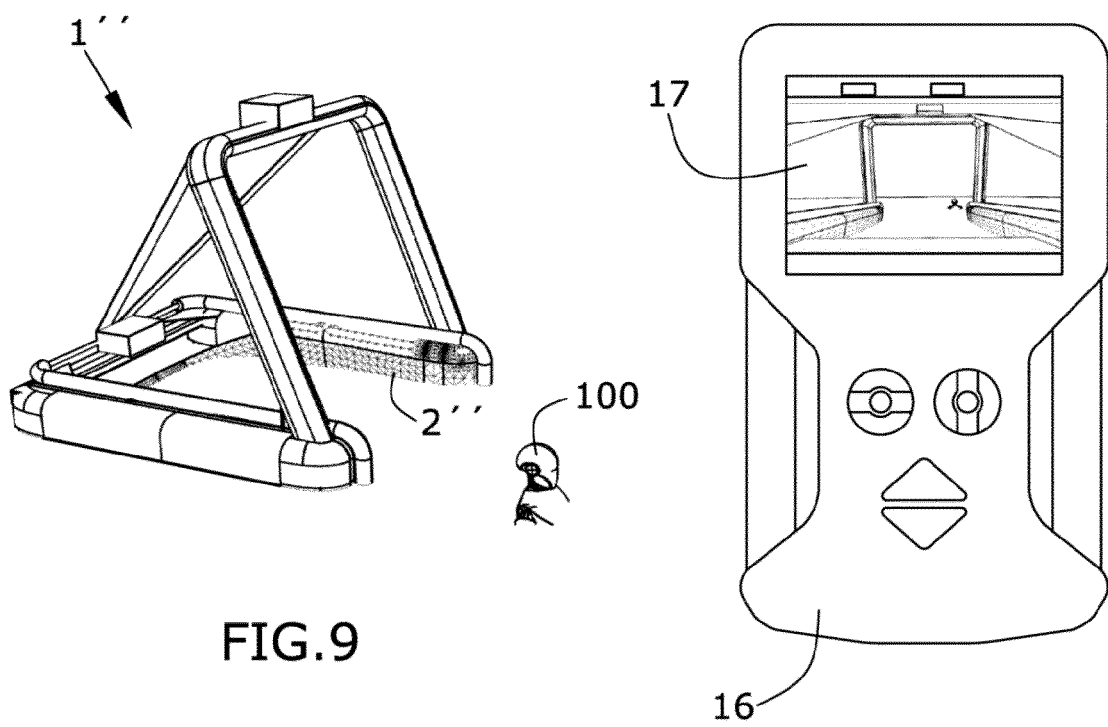


FIG. 8a

FIG. 8b

FIG. 8c



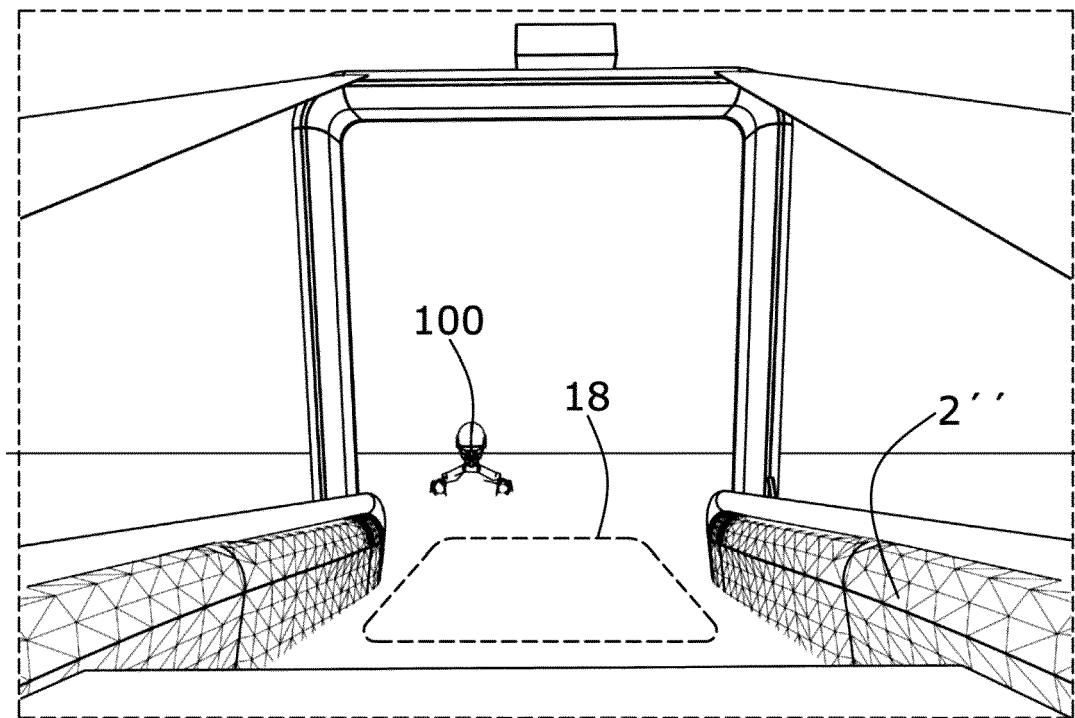


FIG.10

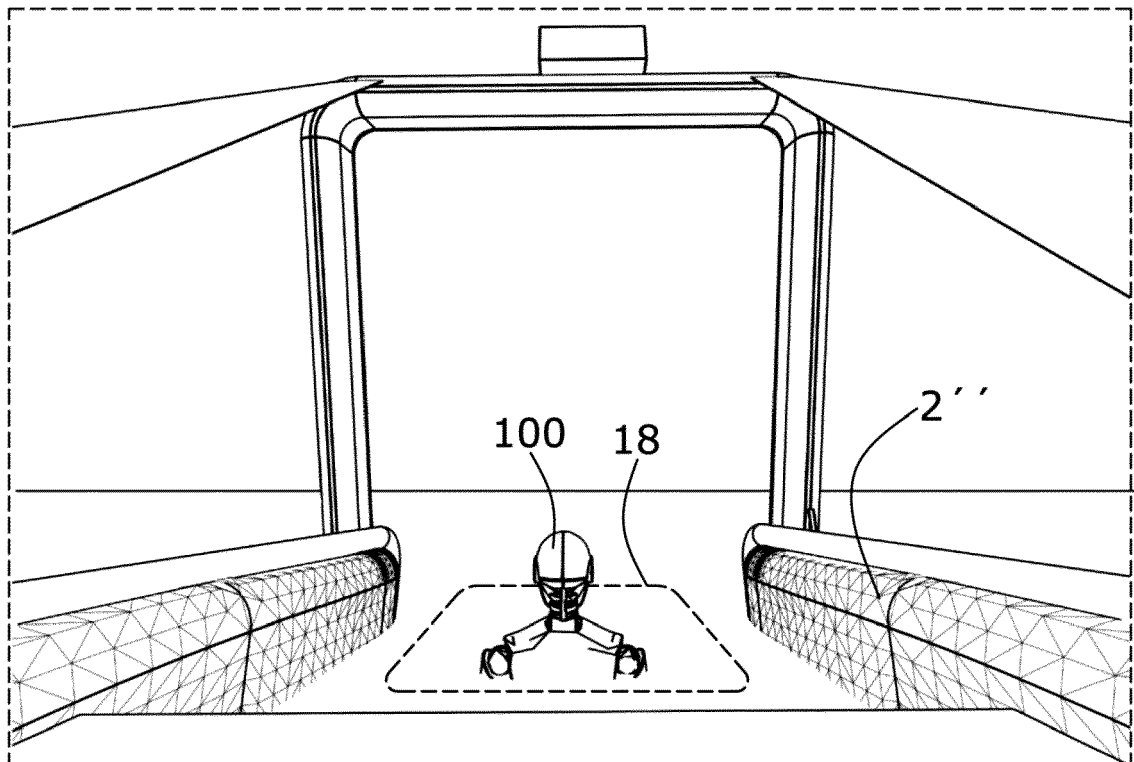


FIG.11

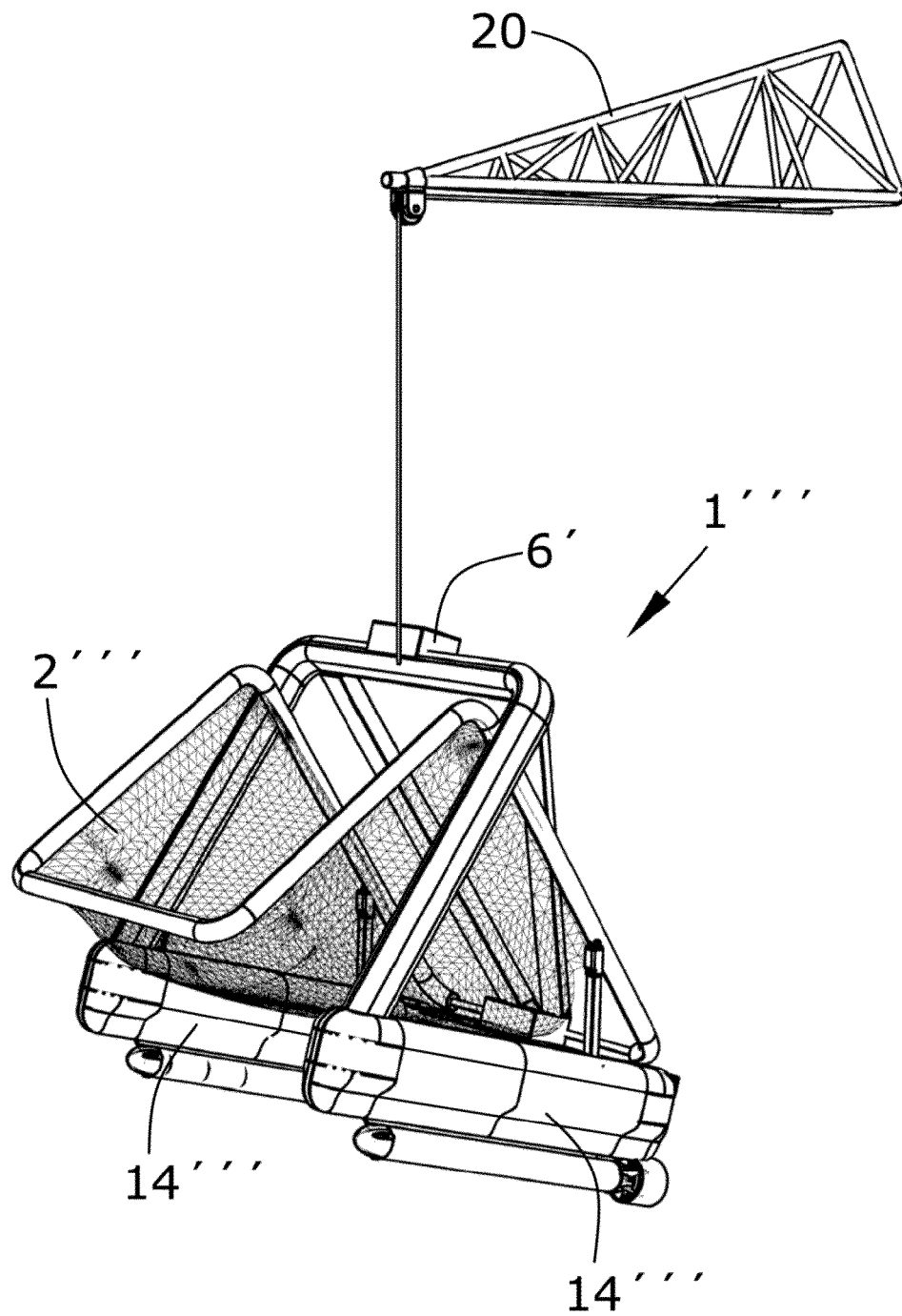


FIG.12

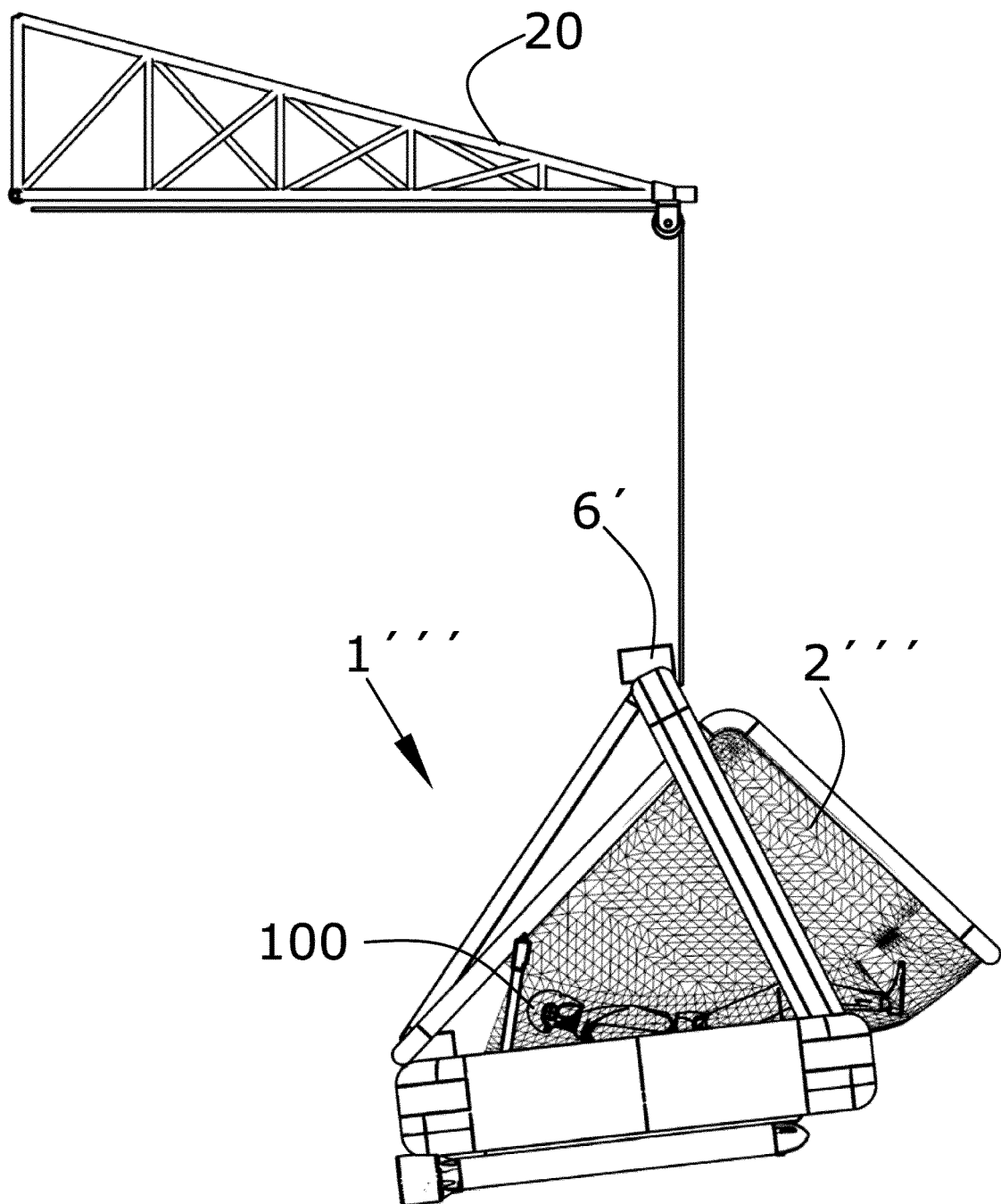


FIG.13



EUROPEAN SEARCH REPORT

Application Number
EP 13 19 1160

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Place of search The Hague		Date of completion of the search 24 March 2014	Examiner van Rooij, Michael
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24-03-2014

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