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(54) **Mooring system for a floatable unit**

(57) The present invention relates to an inflatable, floatable unit, such as a liferaft or platform, having a first side, which during use is facing a side of a vessel. Said floatable unit comprising a mooring system for mooring the floatable unit to the side of the vessel by means of a first and a second turning point arranged at the side of

the vessel, said mooring system is attached directly or indirectly to the first side of the floatable unit at at least a first and a second connection point. The invention is characterised in that the mooring system comprises one mooring line which is connected to one mooring point at the vessel.

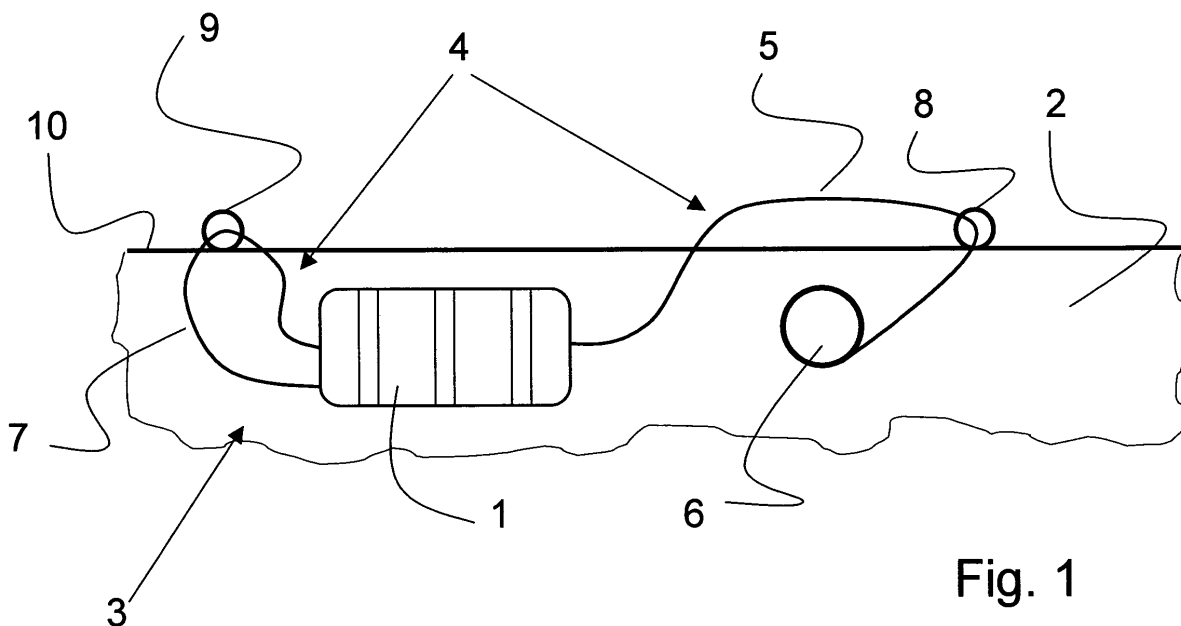


Fig. 1

Description

Field of the Invention

[0001] The present invention relates to an inflatable floatable unit, such as a liferaft or platform, having a first side, which during use is facing a side of a vessel, said floatable unit comprising a mooring system for mooring the floatable unit to the side of the vessel by means of a first and a second turning point arranged at the side of the vessel, said mooring system is attached directly or indirectly to the first side of the floatable unit at at least a first and a second connection point.

[0002] The term "vessel" is in this context to be construed as a marine installation, such as vessel, ship, boat or offshore installation.

[0003] The term "attached indirectly" is in this context to be construed as an intermediate element arranged between the floatable unit and the connection point - opposite to "attached directly" wherein the mooring system is attached to the floating unit without any intermediate elements.

Background Art

[0004] Inflatable, floatable units, such as liferafts or platforms are often used in the evacuation of the passengers or crew members from a vessel.

[0005] During evacuation a container housing the non-inflated floatable unit may be released into the water, wherein after it will start to inflate. During this process both the inflated, floatable unit as well as the non-inflated, floatable unit will be connected to the vessel via mooring lines. After having been inflated, the unit will be positioned and moored to the vessel, which often takes time due to the stressed situation as well as heavy weather conditions.

[0006] However, heeling movements as well as the movements which are caused by the loads such as wind, current or waves, exerted on the vessel, render that the position as well as the movements of the vessel change all the time. Furthermore, due to the fact that the floatable unit is smaller in size than the vessel, the floatable unit moves more rapidly than the vessel.

[0007] These movements of the vessel, as well as of the floatable unit causes the difficulties of entering the floatable unit from the vessel, as the distance, both in height, in the transverse as well as in the longitudinal direction between the vessel and the floatable unit varies constantly, whereby it is almost impossible to hold the floatable unit in a secure and fixed position in relation to the vessel.

[0008] Often the evacuation of persons from the vessel takes place during heavy weather, which furthermore influences as well as exerts great forces and loads on the vessel and the floatable unit.

[0009] Thus, several resources, i.e. persons, are dedicated to handle and moor the floatable unit to the vessel.

[0010] The above-mentioned drawbacks and disadvantages are primarily explained in connection with the vertical distance. However, similar drawbacks and disadvantages occur in relation to the transverse and longitudinal distances between the evacuation point of the vessel and the floatable unit.

[0011] Some known mooring systems consist of two lines which each extend from two winches placed on the deck of the vessel and down to separate turning points, placed on the vessel side above the waterline and towards the liferaft. The turning points are placed in a mutual distance larger than the length of the inflatable raft. The lines are fixed at each corner of the liferaft by means of a glued or welded attachment arrangement.

[0012] Furthermore, in the prior art, it is known to provide two mooring lines, which are guided via turning points at the side of the vessel to one winch at the vessel. The winch is adapted to handle two lines.

[0013] The known mooring systems have the disadvantage that when the liferafts shall be pulled to the vessel side to evacuate passengers into the raft, great pulling forces have to be used, which affect the area where the lines are fixed. Thereby, the raft is easily damaged in the area around the fixed point for the mooring lines. Furthermore, due to the dual mooring line system as well as the high load on the prior art systems, the handling and mooring of the raft to the vessel takes time and require at least two persons. The evacuation is an extremely stressed situation where as many persons as possible advantageously may be allocated to help the crew as well as passengers to be evacuated. Thus, there is a need to provide an inflatable, floatable unit which is easy to handle and which may be moored by only one person.

Summary of the Invention

[0014] An object of the present invention is to wholly or partly overcome the above disadvantages and drawbacks of the prior art. More specifically, it is an object to provide a floatable unit which may be easy to moor.

[0015] An additional object of the present invention is to provide a mooring system for an inflatable, floatable unit which during inflating of the unit partially is self-adjusting.

[0016] The above objects, together with numerous other objects, advantages and features, which will become evident from the below description, are accomplished by a solution in accordance with the present invention by the mooring system comprising one mooring line which is connected to one mooring point at the vessel.

[0017] Hereby, a mooring system which may be handled by only one person is obtained, which furthermore is easy and simple to use.

[0018] According to the invention, the one mooring line, directly or indirectly, may be connected to the first connection point.

[0019] In addition, the one mooring line may be connected to the second connection point via adjustment

means.

[0020] Also, adjustment means may be arranged from the second connection point via the second turning point to the first connection point or a third connection point placed between the first and second connection point.

[0021] Furthermore, the adjustment means may be adapted to arrange the second connection point in relation to the second turning point at the vessel at the same time as the first connection point may be arranged in relation to the first turning point at the vessel by pulling the one mooring line.

[0022] According to the invention, the adjustment means may be arranged with a predetermined length so that during the inflating of the floatable unit the adjustment means brings the second connection point in a substantially correct mooring position in relation to the second turning point. Hereby an essentially self-adjusting mooring system is obtained. The term "correct mooring position" is in this context to be construed as the position wherein the floatable unit is ready for evacuation. Obviously, minor adjustments of the one mooring line may be necessary in view of the specific heeling of the vessel as well as weather conditions.

[0023] In an embodiment according to the invention, the adjustment means may comprise a line part which extends from the second connection point via the second turning point to the first connection point, said line part having a predetermined length. The term "line part" is in this context to be construed as a rope, belt or wire.

[0024] Also, the adjustment means may comprise a line part which extends from the second connection point via the second turning point to a third connection point placed between the first and the second connection point, said line part having a predetermined length.

[0025] In addition, a flexible element may be arranged between the floatable unit and the connection point. Thus, it is obtained that the flexible element takes up or absorbs the tensile stresses in the mooring system which are caused by the mutual movements between the floatable unit and the vessel. A further advantage is that strong pulls in the mooring system are avoided, and thereby the mooring system may be maintained at a considerably lower level of tension. The fact is that the movements of the floatable unit in relation to the vessel are almost eliminated by this system. The term "flexible element" is in this context to be construed as an element arranged for absorbing tensile stresses in the mooring system and may for instance be made of an elastic material, be an elastic or rubber rope or a spring.

[0026] Furthermore, a second line part may be arranged between the floatable unit and the second connection point, and a third line part is arranged between the floatable unit and the first connection point, said second and third line parts being securely attached to the floatable unit at the first side of the floatable unit. Hereby it is obtained that the second and third line parts function as back springs. By this attachment of the back springs (i.e. the second and third line parts), it is obtained that

the back springs substantially extend parallel in relation to the sides of the floatable unit and the vessel and thereby control the floatable unit in a longitudinal direction.

[0027] Moreover, flexible elements may either be arranged between the second and third line parts and the floatable unit or between the second and third line parts and the connection points.

[0028] In another embodiment according to the invention, the mooring system may comprise at least one strap which is connected to a second side of the floatable unit, the ends of said strap being connected to the connection points. Flexible elements may be arranged between the ends of the strap and the connection points. The strap extends from the second side of the floatable unit, which side is facing away from the vessel, towards the connection points. During use, the strap controls the floatable unit in the transverse direction in relation to the vessel. The strap extends essentially perpendicular from the connection point towards the second side of the floatable unit. The strap furthermore extends from the second side of the floatable unit past both ends of the floatable unit towards the connection points and thereby is connected to the mooring system in order to hold the floatable unit in a secure and fixed position especially in the transverse direction.

[0029] The term "strap" is in this context to be construed as a rope, belt or wire. The strap may be produced by an arbitrary material, which has sufficient strength for keeping the floatable unit towards the vessel side.

[0030] Also, the turning points may be adjustable in a vertical direction.

Brief Description of the Drawings

[0031] The invention and its many advantages will be described in more detail below with reference to the accompanying schematic drawings, which for the purpose of illustration show some non-limiting embodiments and in which

Fig. 1 shows schematically in a top view an embodiment of a mooring system according to the invention wherein the floatable unit is housed, non-inflated in a container, stored on a deck of a vessel,

Fig. 2 shows schematically in a top view an embodiment of a mooring system according to the invention wherein the floatable unit is inflated,

Fig. 3 shows schematically in a top view one embodiment of a mooring system according to the invention,

Fig. 4 shows schematically in a top view a further embodiment of a mooring system according to the invention,

Fig. 5 shows schematically in a top view an additional embodiment of a mooring system according to the invention, and

Fig. 6 shows schematically in a top view a further embodiment of a mooring system according to the

invention.

[0032] All the figures are highly schematic and not necessarily to scale, and they show only parts which are necessary in order to elucidate the invention, other parts being omitted or merely suggested.

Description of Preferred Embodiments

[0033] In Fig. 1 a container 1 stored on a deck 2 of a vessel 3 is schematically shown. Furthermore, a mooring system 4 according to the invention is shown. Said mooring system 4 comprises one mooring line 5, one winch 6, adjustment means 7 and a first and second turning point 8, 9. Said turning points 8, 9 are placed on the side 10 of the vessel 3. The turning points 8, 9 are in the present embodiment as well as the following placed at the side of the vessel having a larger distance there between than the extension of the floatable unit, however, within the inventive idea, the distance between the turning points 8, 9 may also be identical to the extension of the floatable unit as well as smaller. Also, at least one of the turning points 8, 9 may be adjustable in a horizontal direction. The turning points 8, 9 may be securely fixed to the side of the vessel, for instance by welding, or they may be a part of a guiding wire. Advantageously, at least one of the turning points may be adjustable in a vertical direction for enabling vertical movement of the floatable unit in relation to the vessel.

[0034] In Fig. 2, an embodiment of the invention is shown, wherein the inflated, floatable unit 11 is moored at the side 10 of the vessel 3. The mooring system 4 comprises the first and second turning point 8, 9 arranged at the side 10 of the vessel 3. The mooring system 4 is, in this embodiment, attached indirectly to the first side 12 of the floatable unit 11 at at least a first and a second connection point 13, 14. One mooring line 5 is connected to one mooring point 6 at the vessel 3.

[0035] The one mooring line 5 is in this embodiment directly connected to the first connection point 13 and is connected to the second connection point 14 via adjustment means 7.

[0036] In another embodiment, the adjustment means may be arranged from the second connection point via the second turning point to a third connection point placed between the first and second connection point.

[0037] According to the invention, the adjustment means 7 is adapted to arrange the second connection point 14 in relation to the second turning point 9 at the vessel 3 at the same time as the first connection point 13 is being arranged in relation to the first turning point 8 at the vessel 3 by pulling the one mooring line 5.

[0038] The adjustment means 7 comprises in this embodiment a line part 16 which extends from the second connection point 14 via the second turning point 9 towards the first connection point 13, said line part 16 having a predetermined length. In the shown embodiment in Fig. 2, the line part 16 ends in a third connection point

40 which is placed between the first and second connection points 13, 14. By arranging the adjustment means 7 with a predetermined length, it is obtained that during the inflating of the floatable unit 11 the adjustment means 7 brings the second connection point 14 in substantially correct mooring position in relation to the second turning point 9. The matter is that the mooring system including the adjustment means 7 is carefully arranged in predetermined lengths and packed with the non-inflated floatable unit in a container 1. When the floatable unit 11 is to be used, the container 1 is released into the water already being loosely moored to the vessel. Subsequently, the container 1 is opened and the floatable unit is being inflated. During the inflating, the floatable unit expands in size whereby the adjustment means 7, during this expansion, brings the floatable unit 11 into position for evacuation and, at the same time, controls the floatable unit 11. After the floatable unit 11 has become at least partially inflated, the one person handling the mooring of the floatable unit only has to tune the tension of the one mooring line 5 at a winch at the mooring point in relation to the specific conditions. Hereby, a substantially self-adjusting mooring system is obtained, which advantageously may be handled by only one person with a low effort. Thereby, the energy of the persons may be directed to helping and assisting the persons who are to be evacuated.

[0039] The connection point may be a ring shaped part or a loop and adapted for connection of line parts, etc. Furthermore, a swivel block may be arranged in connection with the connection point or/and the turning points for guiding the lines. This provides a more simple and easy system to handle.

[0040] In this embodiment, according to the invention, a second line part 17 is arranged between the floatable unit 11 and the second connection point 14, and a third line part 18 is arranged between the floatable unit 11 and the first connection point 13, said second and third line parts 17, 18 being securely attached to the floatable unit 11 substantially at the centre of the first side 12 of the floatable unit 11, thereby acting as back springs for controlling the floatable unit in a longitudinal direction in relation to the vessel. Flexible elements 19 are arranged between the second and third line parts 17, 18 and the floatable unit 11. The line part 16 ends, in this embodiment, at the flexible element 20.

[0041] The mooring system 4 comprises furthermore at least one strap 21 which is connected to a second side 22 of the floatable unit 11, the ends 23, 24 of said strap 21 being connected to the connection points 13, 14. Flexible elements 25, 26 are arranged between the ends 23, 24 of the strap 21 and the connection points 13, 14. The strap 21 is adapted to control the floatable unit 11 in a transverse direction in relation to the vessel 3.

[0042] The strap 21 may be led alongside the second side 22, so as to provide an encircling of the floatable unit 11, and each end of the strap 21 is connected to the vessel via the mooring system 5. By this encircling of the floatable unit 11 by the strap 21, a secure way to hold

the floatable unit 11 in a fixed position is obtained. Furthermore, the pulling forces exerted on the strap 21, which in the known floatable units 11 are absorbed by the attachments onto which the strap 21 is fixed, may be absorbed by the entire second side 22 of the floatable unit 11. The fact is that the exerted forces absorbed by the strap 21 are pushing the floatable unit 11 against the vessel, rather than as the prior art pulling the strap 21 away from the floatable unit 11, with the result of damaging the attachment.

[0043] In another embodiment (not shown), the mooring system may comprise two straps, in which one end of the straps is fixed to the second side of the floatable unit and the other end of the straps is connected to the connection points.

[0044] Advantageously, the strap 21 may be held in position on the second side 22 by strap attachments (not shown), in which the strap 21 is able to move sideways. Hereby it is obtained that the floatable unit 11 is not exerted by any forces from the strap 21, as the strap 21 in this embodiment is not securely fixed in the attachments. Thus the floatable unit 11 is wrapped or encircled by the strap 21. The strap 21 may in an arbitrary way be fixed around the floatable unit 11, but in a preferred embodiment it is held in position by strap attachments, which are placed on the side of the floatable unit, which faces away from the vessel side as well as on the two longitudinal sides.

[0045] In Fig. 3 the connection points 13, 14 are directly attached to the first side 12 of the floatable unit 11. The line part 16 extends from the second connection point 14 via the second turning point 9 to a third connection point 40. The third connection point 40 is in this embodiment placed at the floatable unit 11 between the first and second connection points 13, 14. The one mooring line 5 is directly connected to the first connection point 13. In another embodiment, the line part 16 may be connected directly or indirectly to the one mooring line 5.

[0046] In Fig. 4, another embodiment of the mooring system according to the invention is shown. This embodiment is substantially identical with the embodiment shown in Fig. 2 with the exception of the line part 16 extending from the second turning point 9 to the first connection point 13.

[0047] In Fig. 5, an additional embodiment is shown, wherein the one mooring line 5 extends from the second connection point via the second turning point 9 to the first turning point 8. From the first turning point 8, the one mooring line extends towards the first connection point 13 and back to the first turning point 8 and there from to the mooring point 15 at the vessel 3.

[0048] In Fig. 6, a further embodiment according to the invention is shown. In this embodiment, the line part 16 ends in a loop 30, through which the one mooring line 5 extends before it is led to the one mooring point 15 at the vessel 3.

[0049] The floatable unit 11 is in the above described embodiments shown substantially as having four sides.

However, the floatable unit may within the inventive concept have many different designs or shapes, such as for instance round or have another number of sides.

[0050] Although the invention above has been described in connection with preferred embodiments of the invention, it will be evident for a person skilled in the art that several modifications are conceivable without departing from the invention as defined by the following claims.

Claims

1. An inflatable floatable unit (11), such as a liferaft or platform, having a first side (12), which during use is facing a side (10) of a vessel (3), said floatable unit (11) comprising a mooring system (4) for mooring the floatable unit (11) to the side (10) of the vessel (3) by means of a first and a second turning point (8, 9) arranged at the side (10) of the vessel (3), said mooring system (4) is attached directly or indirectly to the first side (12) of the floatable unit (11) at at least a first and a second connection point (13, 14), **characterised in that** the mooring system (4) comprises one mooring line (5) which is connected to one mooring point (6) at the vessel (3).
2. A floatable unit (11) according to claim 1, wherein the one mooring line (5) directly or indirectly is connected to the first connection point (13).
3. A floatable unit (11) according to claim 1 or 2, wherein the one mooring line (5) is connected to the second connection point (14) via adjustment means (7).
4. A floatable unit (11) according to claim 1 or 2, wherein adjustment means (7) is arranged from the second connection point (14) via the second turning point (9) to the first connection point (13) or a third connection point (40) placed between the first and second connection point (13, 14).
5. A floatable unit (11) according to claim 3 or 4, wherein the adjustment means (7) is adapted to arrange the second connection point (14) in relation to the second turning point (9) at the vessel (3) at the same time as the first connection point (13) is being arranged in relation to the first turning point (8) at the vessel (3) by pulling the one mooring line (5).
6. A floatable unit (11) according to any of the claims 3 to 5, wherein the adjustment means (7) is arranged with a predetermined length so that during the inflating of the floatable unit (11) the adjustment means (7) brings the second connection point (14) in substantially correct mooring position in relation to the second turning point (9).

7. A floatable unit (11) according to any of the claims 3 to 6, wherein the adjustment means (7) comprises a line part (16) which extends from the second connection point (14) to the second turning point (9) via the first connection point (13), said line part (16) having a predetermined length. 5
8. A floatable unit (11) according to any of the claims 3 to 7, wherein the adjustment means (7) comprises a line part (16) which extends from the second connection point (14) via the second turning point (9) to a third connection point (40) between the first and the second connection point (13, 14), said line part (16) having a predetermined length. 10
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9. A floatable unit (11) according to any one of the preceding claims, wherein a flexible element (19, 20) is arranged between the floatable unit (11) and the connection point (13, 14). 20
10. A floatable unit (11) according to any one of the preceding claims, wherein a second line part (17) is arranged between the floatable unit (11) and the second connection point (14), and a third line part (18) is arranged between the floatable unit (11) and the first connection point (13), said second and third line parts (17, 18) being securely attached to the floatable unit (11) at the first side (12) of the floatable unit (11). 25
11. A floatable unit (11) according to claim 10, wherein flexible elements (19, 20) are either arranged between the second and third line parts (17, 18) and the floatable unit (11) or between the second and third line parts (17, 18) and the connection points (13, 14). 30
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12. A floatable unit (11) according to any one of the preceding claims, wherein the mooring system (4) comprises at least one strap (21) which is connected to a second side (22) of the floatable unit (11), the ends (23, 24) of said strap (21) being connected to the connection points (13, 14). 40
13. A floatable unit (11) according to claim 12, wherein flexible elements (25, 26) are arranged between the ends (23, 24) of the strap (21) and the connection points (13, 14). 45
14. A floatable unit (11) according to any of the preceding claims, wherein at least one of the turning points (8, 9) are adjustable in a vertical direction. 50

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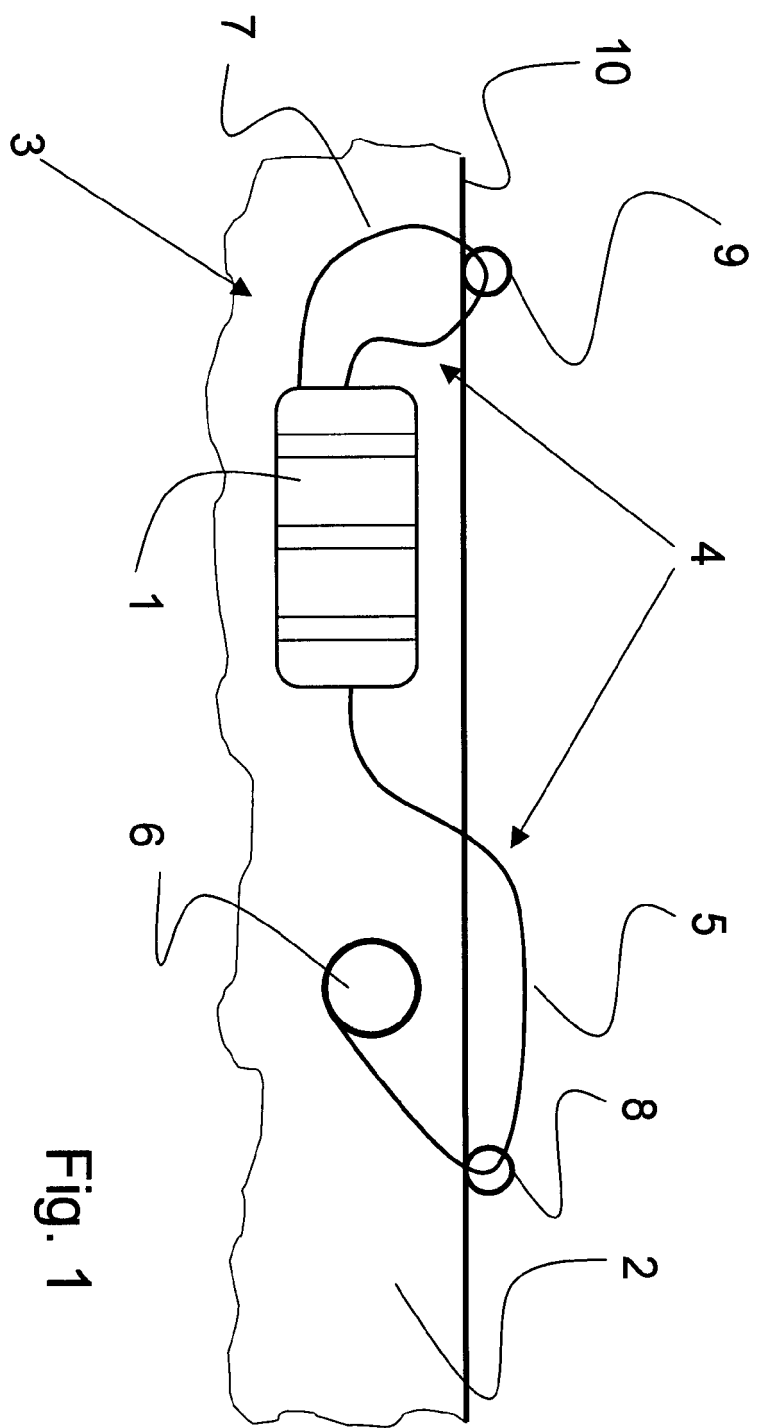


Fig. 1

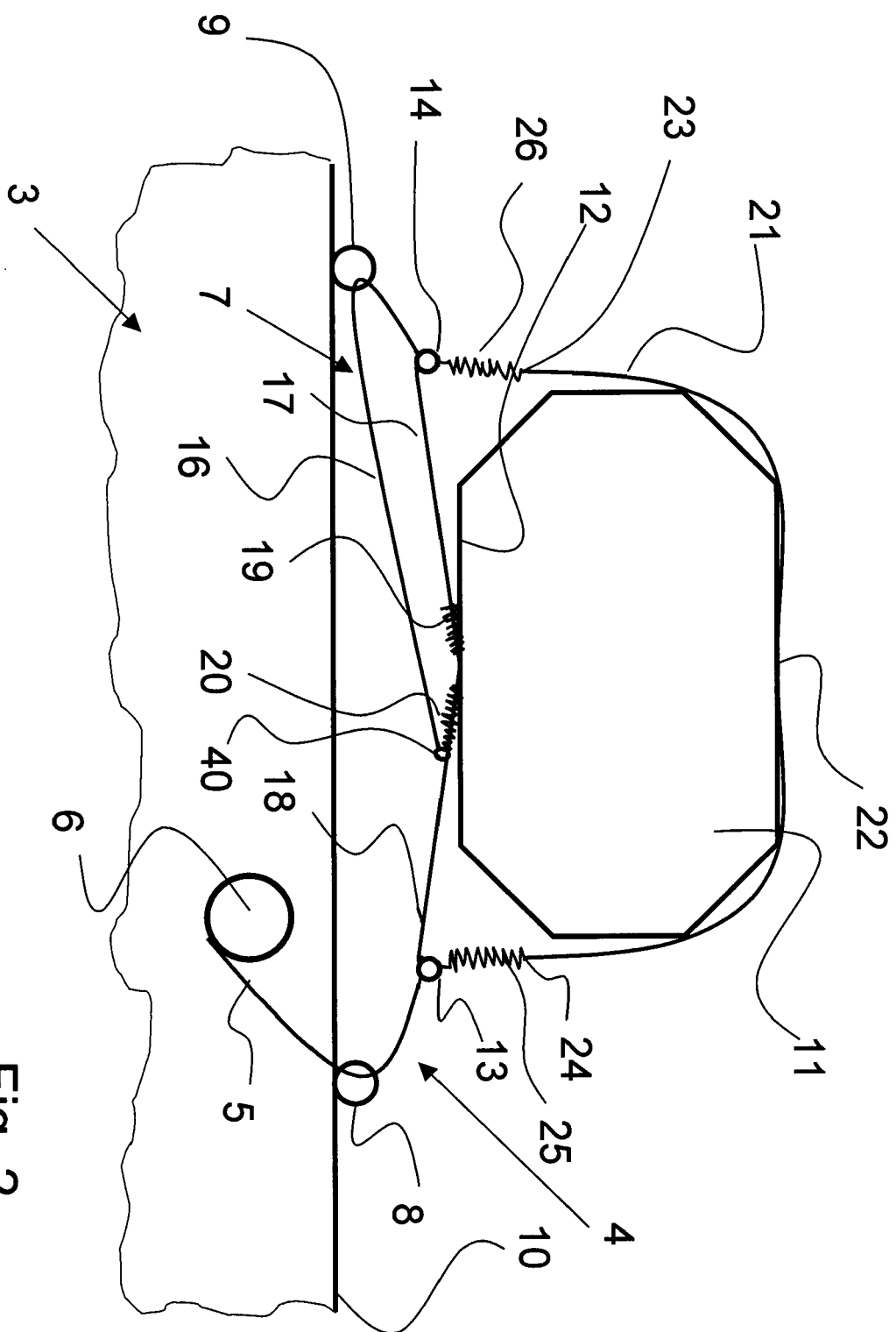


Fig. 2

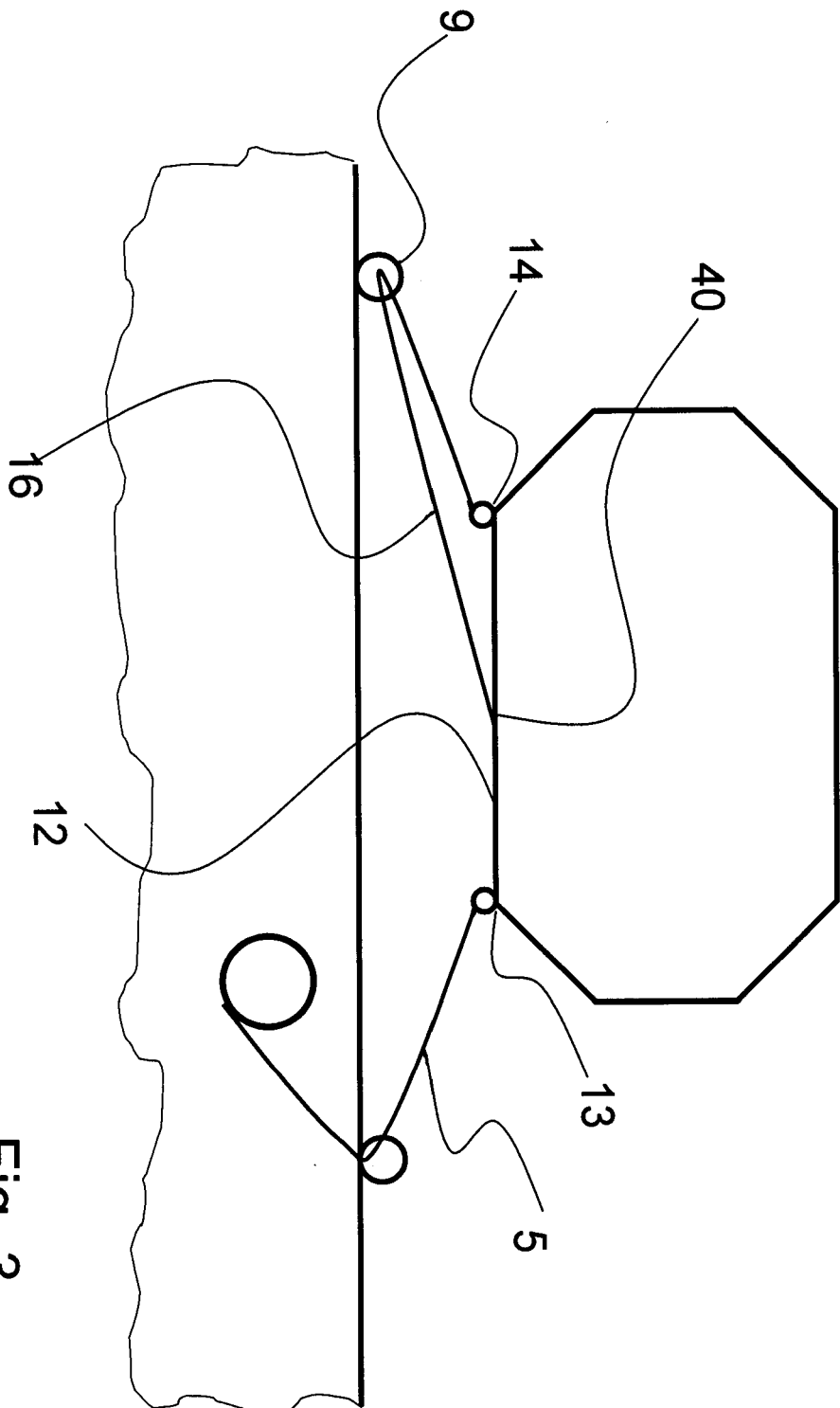


Fig. 3

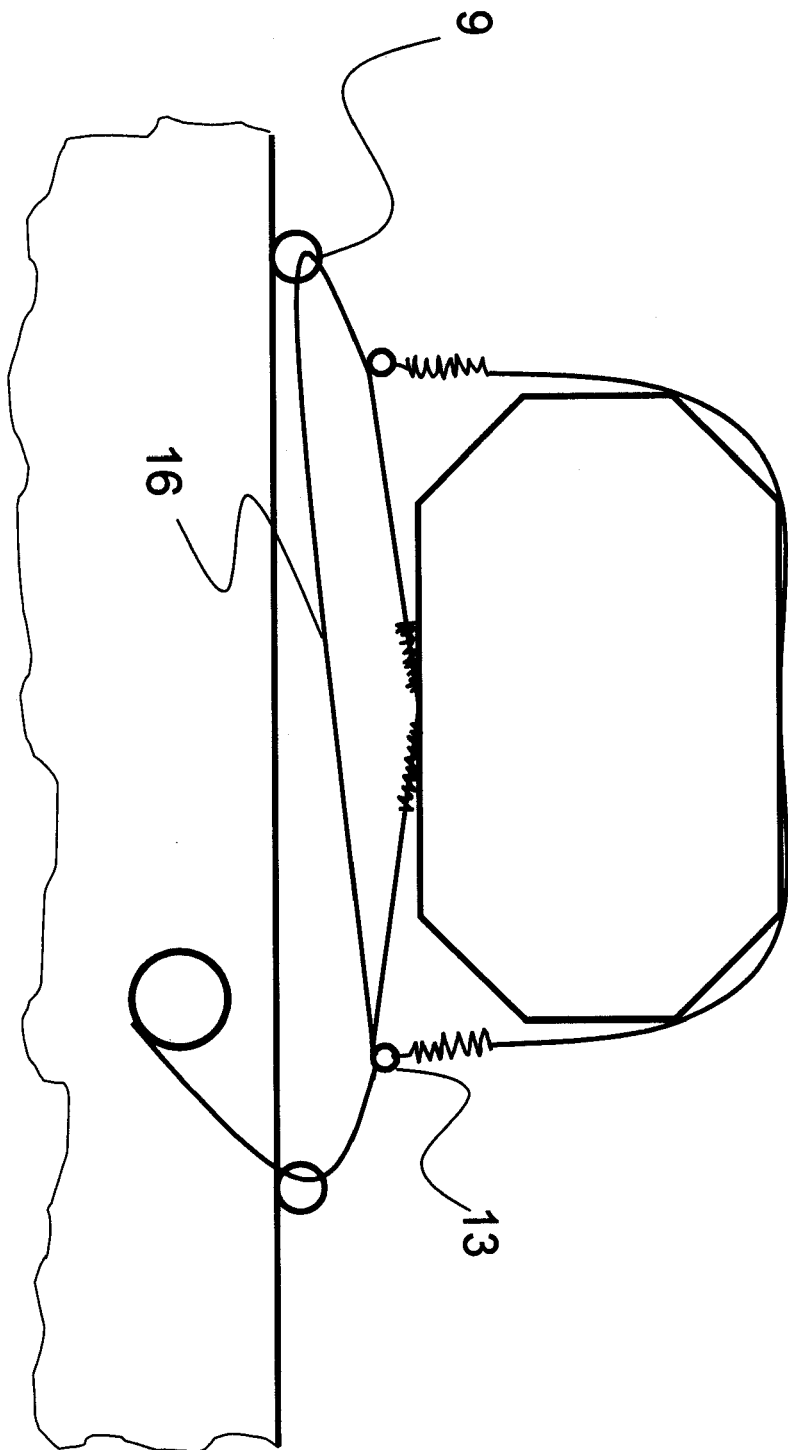


Fig. 4

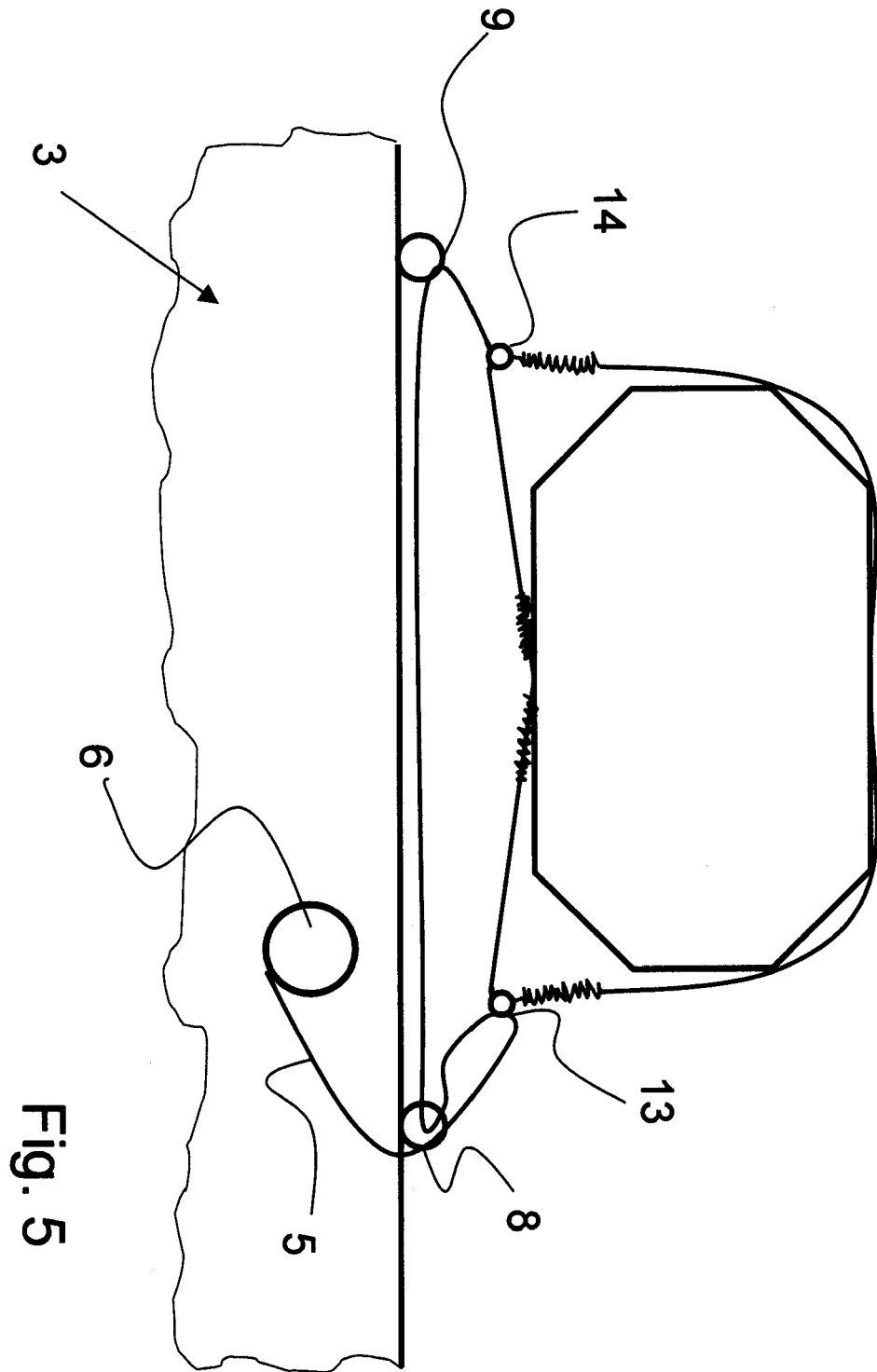


Fig. 5

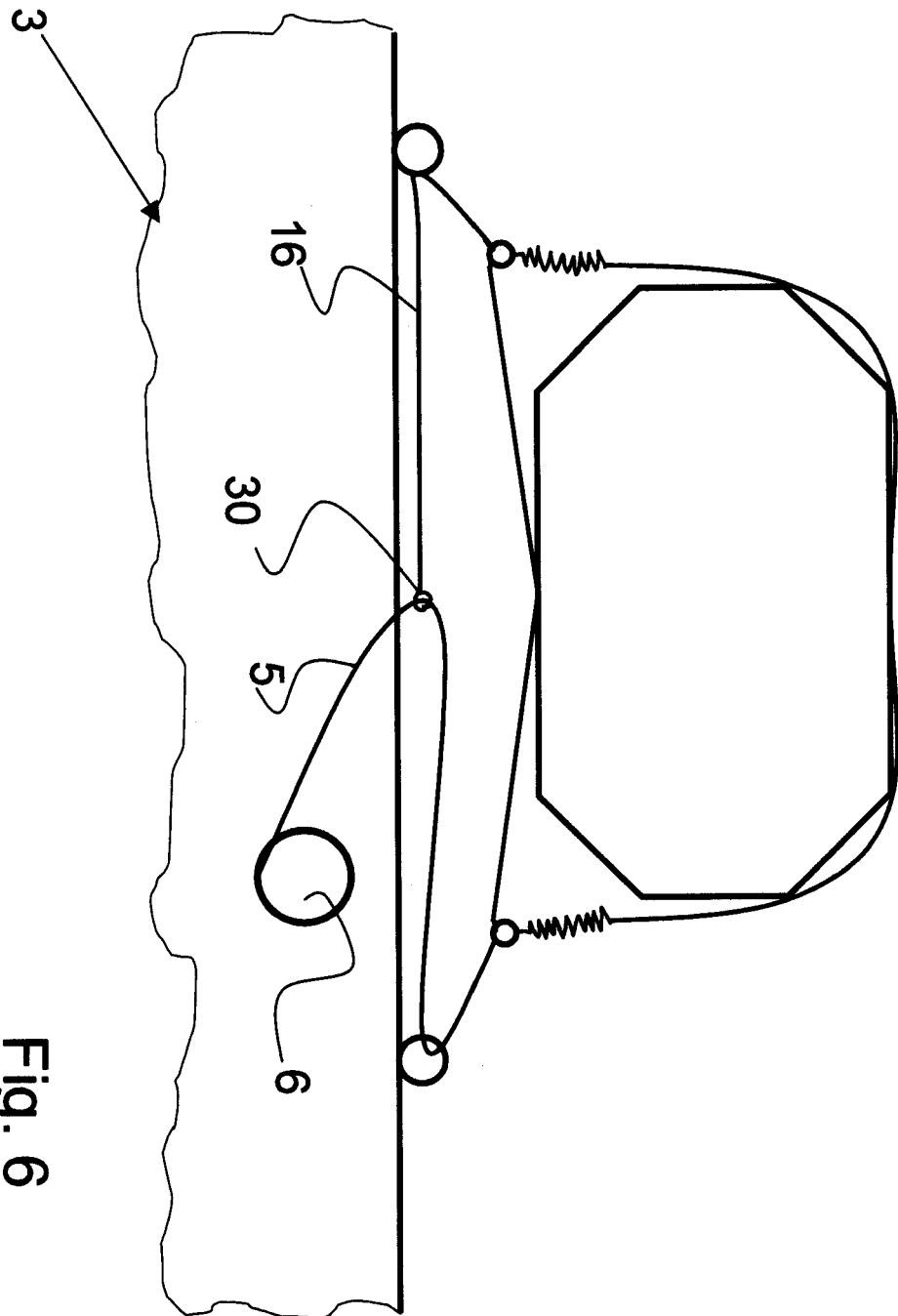


Fig. 6