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

(11) **EP 2 184 223 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
12.05.2010 Bulletin 2010/19

(51) Int Cl.:
B63B 15/02 *(2006.01)*

(21) Application number: **09445020.2**

(22) Date of filing: **10.11.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
AL BA RS

(30) Priority: **11.11.2008 SE 0802375**

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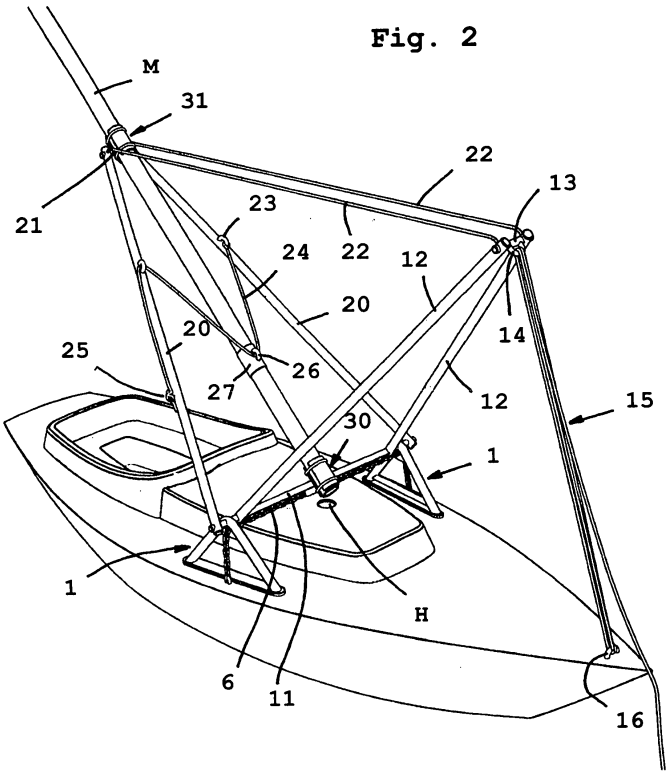
(54) **Device for raising/lowering of elongated objects**

(57) The present invention relates to a device for raising/lowering of elongate objects.

The device according to the present invention is distinguished by the fact that it comprises a spindle (11), means (1) for supporting the spindle (11) relative to a substrate, a lever element (12) which is rotatable relative to the spindle (11) and has a certain extent in a direction transverse to the spindle (11), a bearing element (20) which is rotatable relative to the spindle (11) and has a certain extent in a direction transverse to the spindle (11), a first flexible force-transmitting means (15; 115) fastened to the end of the lever element (12) which points away from the spindle (11), and a second flexible force-transmitting means (22) extending between the end of the lever element (12) which points away from the spindle (11) and the end of the bearing element (20) which points away from the spindle (11).

Fig. 2



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Description

Technical field of the invention

[0001] The present invention relates to a device for raising/lowering of elongate objects. Elongate objects in the present case means primarily boat masts, communication masts, flagpoles and maypoles.

Position of the art

[0002] A portable device for raising and lowering a sailing boat mast is known from US 5,865,136. In that device, the mast is articulatedly connected to a bracket and the connection is permanent. The device comprises rails along which a lifting means is drawn by a line which is connected to a crank. To this end, a lower portion of the mast abuts against a roller which forms part of the lifting means. When the lifting means is caused to move along the rails, the mast is raised or lowered.

[0003] An arrangement known from WO 87/02322 for raising and lowering a sailing boat mast takes the form of a permanent installation on a sailing boat. The arrangement thus comprises the sailing boat's boom, which is articulatedly fastened to the deck of the boat. A stay of the mast is fastened to the boom, which can be locked in a down position relative to the deck. The mast is articulatedly fastened at its lower end. The mast can be lowered by pivoting the boom to an upright position.

Object and features of the invention

[0004] A primary object of the present invention is to propose a device of the kind defined in the introduction which is mobile and easy to install close to the elongate object which is to be raised/lowered.

[0005] Another object of the present invention is to ensure that when engaged in raising/lowering an elongate object the operator/operators is/are not under the elongate object.

[0006] A further object of the present invention is that the device should be usable with respect to the majority of elongate objects of the respective kind which are available on the market.

[0007] At least the primary object of the present invention is achieved by a device which has the features indicated in the independent claim 1 set out below. Preferred embodiments of the invention are defined in the dependent claims.

Brief description of the drawings

[0008] Preferred embodiments of the invention are described below with reference to the attached drawings, in which:

Fig. 1 depicts a perspective view of a device according to the present invention, in which the device is assembled on a boat and the elongate object which the device is to handle is in a down position;

Fig. 2 depicts a perspective view of the device according to the present invention, in which the elongate object which the device is to handle is in an intermediate position;

Fig. 3 depicts a perspective view of the device according to the present invention, in which the elongate object which the device is to handle is in an up position;

Fig. 4 depicts a perspective view of the device according to the present invention, in which the elongate object which the device is to handle is in an up and dropped position;

Fig. 5 depicts a perspective view of an alternative embodiment of a device according to the present invention, in which the device is fitted close to the elongate object which the device is to handle, and the elongate object is in an upright position, i.e. a normal position of use;

Fig. 6 depicts a perspective view of the device according to Fig. 5, in which the elongate object which the device is to handle is in an intermediate position;

Fig. 7 depicts a perspective view of the device according to Fig. 5, in which the elongate object which the device is to handle is in a down position; and

Fig. 8 depicts a perspective view of the device according to Fig. 5, in which the elongate object has an alternative connection to the relating foundation during lowering/raising.

Detailed description of preferred embodiments of the invention

[0009] As illustrated in Figs. 1-3, the device according to the present invention comprises two supporting elements 1, which according to the embodiment depicted take the form of bearing pedestals which are generally triangular in shape. Each supporting element 1 comprises two limbs 3 and 5 and a base portion 7 which connects the limbs 3, 5 and which in an operative state is intended to abut against a substrate B which in the case depicted takes the form of a boat deck. Fig. 1-3 show the supporting elements 1 anchored to the deck by a chain 6 which has its ends connected to first eyes 8 in the deck. The chain 6 comprises a rigging screw 4 to allow stretching/tensioning of the chain 6 as necessary.

[0010] The device according to the present invention further comprises a cradle 10 provided with a spindle 11 which is supported in the region of its ends by the supporting elements 1. The device according to the present invention comprises also a lever element which in the embodiment depicted takes the form of two lever rods 12 which are rotatably connected to the spindle 11, i.e. the lever rods 12 can rotate relative to the spindle 11. The lever rods 12 converge towards one another away

from the spindle 11 and their ends which point away from the spindle 11 are connected together by a first cross-stay 13 which is provided with a second eye 14 for a first rope 15 which forms part of the device according to the present invention. The first rope 15 extends with a multiplicity of strands between the second eye 14 and a third eye 16 which is mounted on the deck close to the prow of the boat. The fact that the first rope 15 extends with a multiplicity of strands between the eyes 14 and 16 results in a function corresponding to that of a tackle, making it possible for raising/lowering of the elongate object to be effected by using a relatively small force which is normally applied manually by the operator.

[0011] The cradle 10 comprises also a bearing element which in the embodiment depicted takes the form of two bearing rods 20 which each have one of their ends connected to the spindle 11. The bearing rods 20 converge towards one another away from the spindle 11. The ends of the bearing rods 20 which point away from the spindle 11 are joined together by a second cross-stay 21. Two second ropes 22 which are in principle of constant length extend between the ends of the lever rods 12 which point away from the spindle 11 and the ends of the bearing rods 20 which point away from the spindle 11. In an active state of the device, the respective planes defined by the lever element 12 and the bearing element 20 thus form an angle within the range 50°-80°. The respective angle is preferably of the order of 60°.

[0012] Both the lever element 12 and the bearing element 20 have an extent transverse to the spindle 11, i.e. the ends of the lever element 12 and the bearing element 20 situated away from the spindle 11 are at certain distances from the spindle 11. These distances are preferably equal for a given device and are also adapted to the length of the elongate object M which the device according to the present invention is intended to handle. As a non-limitative example it may be mentioned that for a mast of about 9 m the distance between the spindle 11 and the ends of the lever element 12 and the bearing element 20 which point away from the spindle 11 will be of the order of 3-4 m, preferably about 3.5 m. In this context it should be noted that the centre of gravity of the elongate object in the position of use will normally be closer to the lower end of the elongate object M. It should also be noted that the distances between the spindle 11 and the ends of the lever element 12 and the bearing element 20 which point away from the spindle 11 need not be equal in a device according to the present invention.

[0013] A fourth eye 23 is mounted on each of the bearing rods 20, and a third rope 24 which forms part of the device according to the present invention has one of its ends anchored in one fourth eye 23, extends through the other fourth eye 23 and has its other end fastened in a bracket/cleat 25 in which the other end of the third rope 24 may be fastened. The third rope 24 passes also through a fifth eye 26 mounted on a sleeve 27 which is fitted on the elongate object/mast M which is to be handled by the device according to the present invention. The sleeve 27 is fitted temporarily on the mast M for the latter's raising/lowering but is fixed relative to the mast M, i.e. it is not movable in the longitudinal direction of the mast M.

[0014] A first guide 30 is fitted on the spindle 11 close to the region of the spindle 11 which supports the lower end of the mast M in Fig. 1, which first guide 30 forms part of the device according to the present invention and is substantially stationary relative to the spindle 11. However, the first guide 30 is so configured that the mast M can move in its longitudinal direction relative to the first guide 30. A second guide 31 fitted close to the second cross-stay 21 forms part of the device according to the present invention and is substantially stationary relative to the second cross-stay 21. The second guide 31 is likewise so configured that the mast M can move in its longitudinal direction relative to the second guide 31. In the embodiment depicted, the guides 30, 31 take the form of pipe halves and ropes which surround the mast M, which guides 30, 31 are suitably fastened to the spindle 11 and the second cross-stay 21 respectively.

[0015] The embodiment described above of the device according to the present invention functions in the following manner, the device being initially assembled on a boat in the manner depicted in Fig. 1, i.e. the supporting elements 1 are anchored relative to the boat's deck B by the chain 6, and the cradle 10 assumes the position depicted in Fig. 1. The elongate object/mast M is then placed on the device according to the present invention in such a way that a lower portion of the mast M is accommodated in the first guide 30 and an intermediate portion of the mast M is accommodated in the second guide 31. The sleeve 27 is fitted on the mast M between the guides 30 and 31, and the third rope 24 is run and anchored in the manner described above. The mast M therefore cannot move in its longitudinal direction towards the first guide 30. The mast M will now be in its initial position and ready for raising.

[0016] To transfer the mast M from the position depicted in Fig. 1 to the position depicted in Fig. 2, the operator activates the first rope 15 and hence also the function of a tackle, enabling the operator by pulling a strand of the first rope 15 to cause the free end of the lever element 12 to move towards the prow of the boat. At the same time, the opposite end of the lever element 12 will pivot about the spindle 11. The motion of the lever element 12 is transmitted via the second rope 22 to the bearing element 20. The bearing element 20 will therefore also move from the substantially horizontal position to a more upright position illustrated in Fig. 2. Further pulling of a strand of the first rope 15 will cause the free end of the lever element 12 to continue moving towards the prow of the boat while the opposite end of the lever element 12 pivots about the spindle 11. Fig. 3 shows the mast M raised to a substantially vertical position in which its lower end is centrally above a hole H, which is most clearly visible in Fig. 1 and 2, in the deck. Releasing the third

rope 24 will cause the mast M to drop down into the hole H and Fig. 4 shows the mast M fully down in the hole H. In this context it should be noted that the sleeve 27 also drops when the mast M drops, but the positioning of the sleeve 27 is such that it will not foul the deck when the mast M is in the fully dropped position. In this context it should be noted, see particularly Fig. 2, that during the raising operation the operator will be close to the first rope 15, i.e. not under the mast M when the latter is being raised to an upright position. This is an important aspect from the safety point of view.

[0017] When the mast M has assumed its final position, it is fixed relative to the boat by conventional stays and the like. Thereafter the first rope 15, the third rope 24 and the sleeve 27 are removed. The guides 30, 31 are also inactivated so that their interaction with the mast ceases. The remainder of the device according to the present invention is also removed, which entails its parts being disassembled so that they can be taken away from the boat B.

[0018] The procedure for lowering the mast M is a reverse sequence whereby the constituent parts of the device according to the present invention are reassembled.

[0019] The alternative embodiment depicted in Figs. 5-7 of a device according to the present invention comprises two supporting elements 101 which in the embodiment depicted take the form of bearing pedestals which are generally triangular in shape. Each supporting element 101 comprises two limbs 103 and 105 and a transverse portion 107 connecting the limbs 103, 105. The supporting elements 101 are so configured that they can be anchored in a substrate which normally takes the form of a ground surface.

[0020] The device according to Figs. 5-7 further comprises a cradle 110 comprising a spindle 111 which is supported in the region of its ends by the supporting elements 101. The device comprises also a lever element which in the embodiment depicted takes the form of two lever rods 112 connected rotatably to the spindle 111, i.e. the lever rods 112 can rotate relative to the spindle 111. The lever rods 112 converge towards one another away from the spindle 111 and are connected together in the region of their ends which point away from the spindle 111 by a first cross-stay 113 provided with a second eye 114 for a first rope 115 which forms part of the device according to the present invention. The first rope 115 extends with a plurality of strands between the second eye 114 and a third eye 116 which is anchored in the same substrate, i.e. normally a ground surface, as the supporting elements are anchored in. The fact that the first rope 115 extends with a plurality of strands between the eyes 114 and 116 results in a function corresponding to that of a tackle, making it possible for raising/lowering of the elongate object M1 to be effected by using a relatively small force which is usually applied manually by the operator. In this context it should be noted that in the respective case the elongate object M1 takes the form of a flagpole supported by a foundation F which is anchored in the substrate.

[0021] The cradle 110 comprises also a bearing element which in the embodiment depicted takes the form of two bearing rods 120 which each have one of their ends connected to the spindle 111. The bearing rods 120 converge towards one another away from the spindle 111. The ends of the bearing rods 120 which point away from the spindle 111 are joined together by a second cross-stay 121. Two second ropes 122 which in principle are of constant length extend between the ends of the lever rods 112 which point away from the spindle 111 and the ends of the bearing rods 120 which point away from the spindle 111. As regards the mutual angle which the lever element 112 and the bearing element 120 form with one another in an active state of the device according to the present invention, we refer to what was mentioned above in relation to the embodiment according to Figs. 1-4. Likewise as regards the extent of the lever element 112 and the bearing element 120 relative to the spindle 111, we refer to what was mentioned above in relation to the embodiment according to Figs. 1-4.

[0022] In this context is should be noted that in the alternative embodiment according to Figs. 5-7, there is no need for any guides for the flagpole M1 relative to the device according to the present invention. The reason for this is that the foundation F serves as a guide for the flagpole M1, i.e. the latter can only be lowered/raised in a predetermined direction and is also locked, via the foundation F, against movement in the longitudinal direction of the flagpole M1. This means that there is also no need for any sleeve or associated ropes.

[0023] The device according to the present invention depicted in Figs. 5-7 functions in the following manner. The initial situation is that the flagpole F is in its normal position, i.e. an upright vertical position. The flagpole M1 is normally anchored to the foundation F by two bolts, and the upper one is slackened to begin the lowering of the flagpole M1. It may at this stage be appropriate to provide some temporary safety device close to the foundation F to ensure that the flagpole M1 is not lowered in an incorrect direction. Initiating the lowering of the flagpole M1 entails slackening somewhat the first rope 115, whereupon the cradle 110 will tilt towards the position depicted in Fig. 6 and the flagpole M1 will abut against the second cross-stay 121. In this respect it should be noted that as the first rope 115 has a number of parallel strands it functions like a tackle. Further lengthening/slackening of the first rope 115 will result in reaching the position depicted in Fig. 6, which is an intermediate position between the up and down positions of the flagpole M1. Further lengthening/slackening of the first rope 115 will cause the flagpole M1 to go down to a substantially horizontal position, see Fig. 7, thereby completing the lowering of the flagpole M1. The device according to the present invention is thereafter removed by disassembling its constituent parts and taking them away for storage at a suitable location until the next time the device is used.

[0024] The procedure for raising the flagpole M1 is in principle a reverse sequence starting from the horizontal position of the flagpole M1 depicted in Fig. 7.

[0025] Fig. 8 depicts schematically how the device according to Figs. 5-7 is used when instead the lower bolt of the foundation F is released. This usually occurs in the raising/lowering of maypoles. The most significant difference is that the spindle 111 is situated on the opposite side of the foundation F to avoid fouling the lower end of the flagpole M1.

Conceivable modifications of the invention

[0026] The embodiments described above use a number of ropes as force-transmitting means. Within the scope of the present invention it is possible to conceive of using other flexible force-transmitting means, and wires and chains may be mentioned as non-limitative examples. In this context it should be noted that the flexible force-transmitting means comprises at least one wire or chain. In the embodiments described above the flexible force-transmitting means comprise two ropes.

[0027] As regards the embodiment depicted in Figs. 5-8 of the device according to the present invention, the bearing element 120 may be provided with a guide for the elongate object M1 which corresponds to the guide 31 in the embodiment according to Figs. 1-4. The result is further assurance against the elongate object M1 tilting in an incorrect direction when being raised/lowered.

Claims

1. A device for raising/lowering of elongate objects, **characterised in that** the device comprises a spindle (11; 111), means (1; 101) for supporting the spindle (11; 111) relative to a substrate, a lever element (12; 112) which is rotatable relative to the spindle (11; 111) and has a certain extent in a direction transverse to the spindle (11; 111), a bearing element (20; 120) which is rotatable relative to the spindle (11; 111) and has a certain extent in a direction transverse to the spindle (11; 111), a first flexible force-transmitting means (15; 115) fastened to the end of the lever element (12; 112) which points away from the spindle (11; 111), and a second flexible force-transmitting means (22; 122) extending between the end of the lever element (12; 112) which points away from the spindle (11; 111) and the end of the bearing element (20; 120) which points away from the spindle (11; 111).

2. A device according to claim 1, **characterised in that** in an active state of the device the respective planes defined by the lever element (12; 112) and the bearing element (20; 120) form an angle within the range 50°-80°.

3. A device according to claim 2, **characterised in that** the angle is of the order of 60°.

4. A device according to any one of the above claims, **characterised in that** the lever element (12; 112) and the bearing element (20; 120) have an extent transverse to the spindle (11; 111) which is 30-40% of the length of the elongate object (M; M1).

5. A device according to any one of the above claims, **characterised in that** it comprises a first guide (30) and a second guide (31) for the elongate object (M), that the first guide (30) is anchored to the spindle (11) and that the second guide (31) is anchored to the end of the bearing element (20) which points away from the spindle (11).

6. A device according to any one of the above claims, **characterised in that** it comprises means (23-27) for preventing the elongate object (M) from moving in its longitudinal direction.

7. A device according to claim 6, **characterised in that** the means (23-27) for preventing the elongate object from moving in its longitudinal direction comprise a sleeve (27) intended to be fixed temporarily on the elongate object (M).

8. A device according to any one of the above claims, **characterised in that** the first flexible force-transmitting means (15; 115) is endowed with a tackle function.

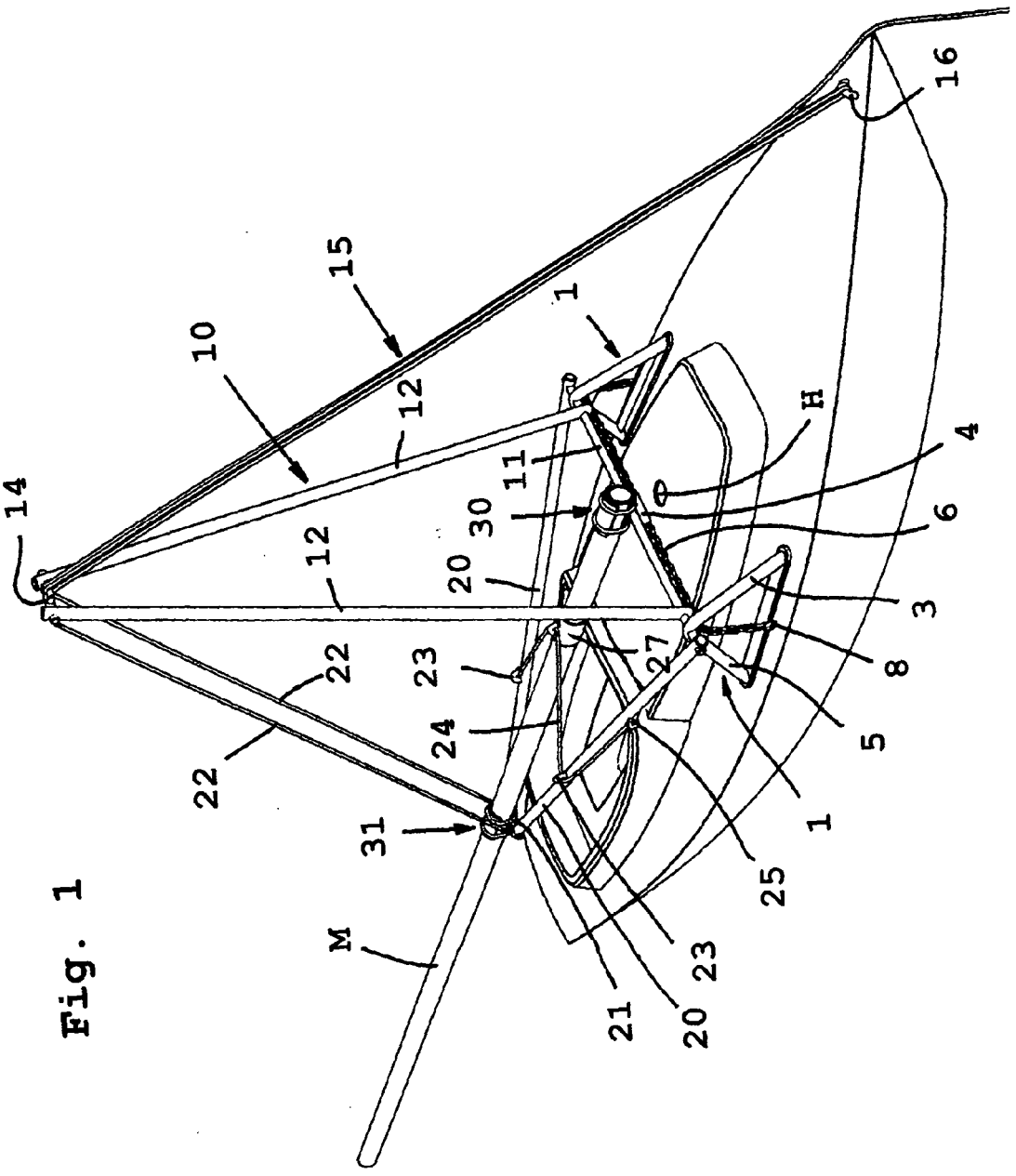


Fig. 1

Fig. 2

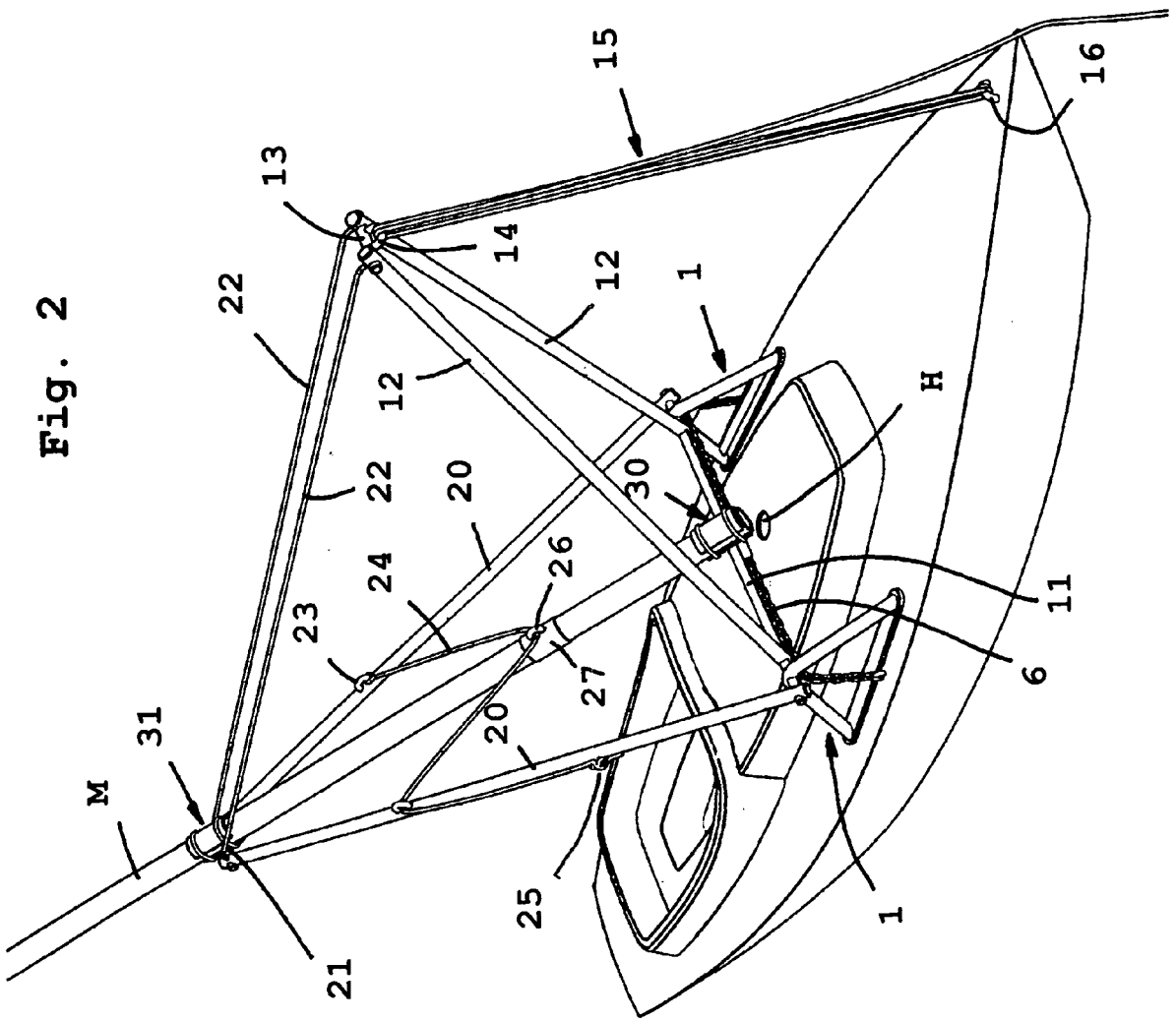


Fig. 3

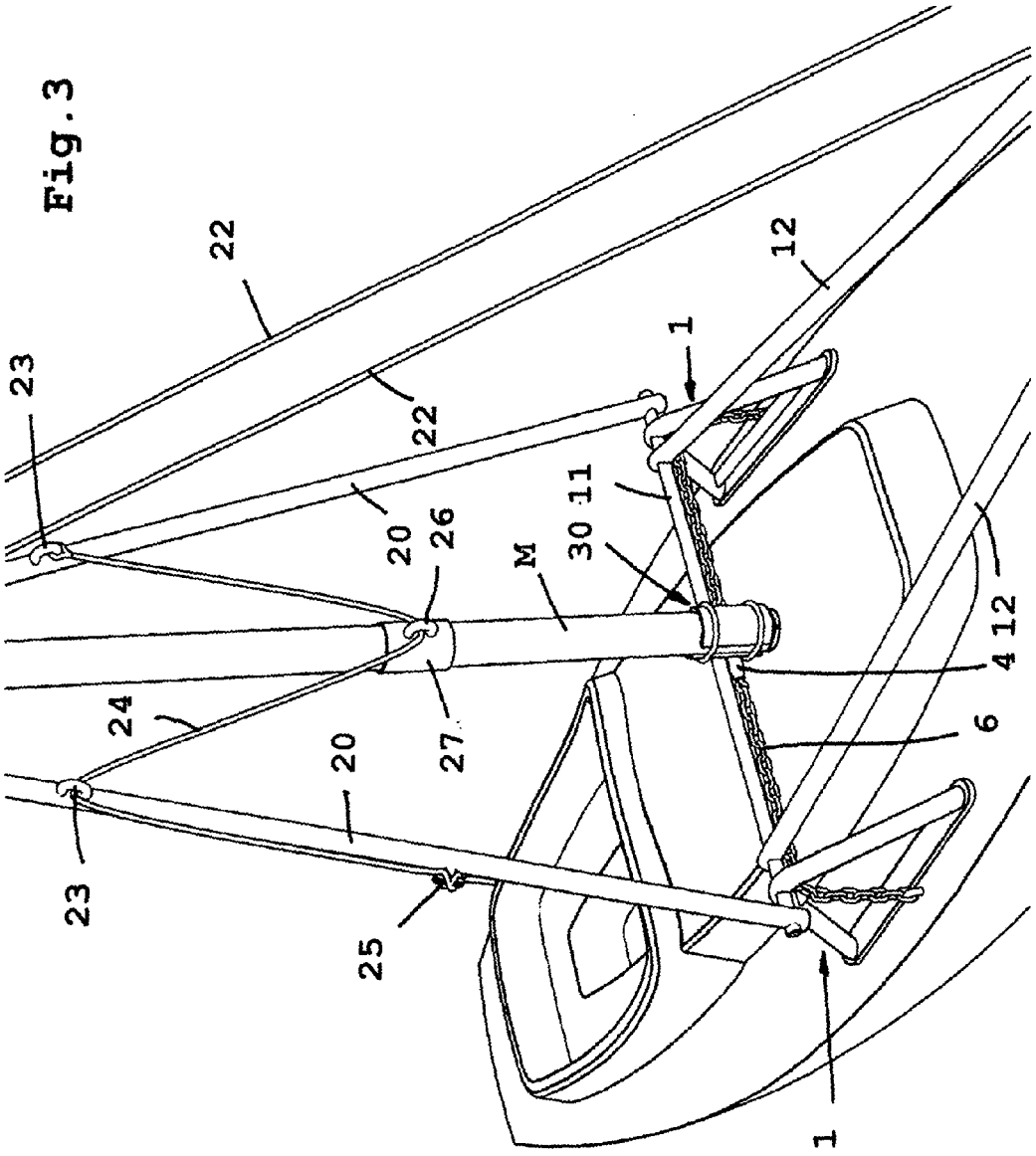
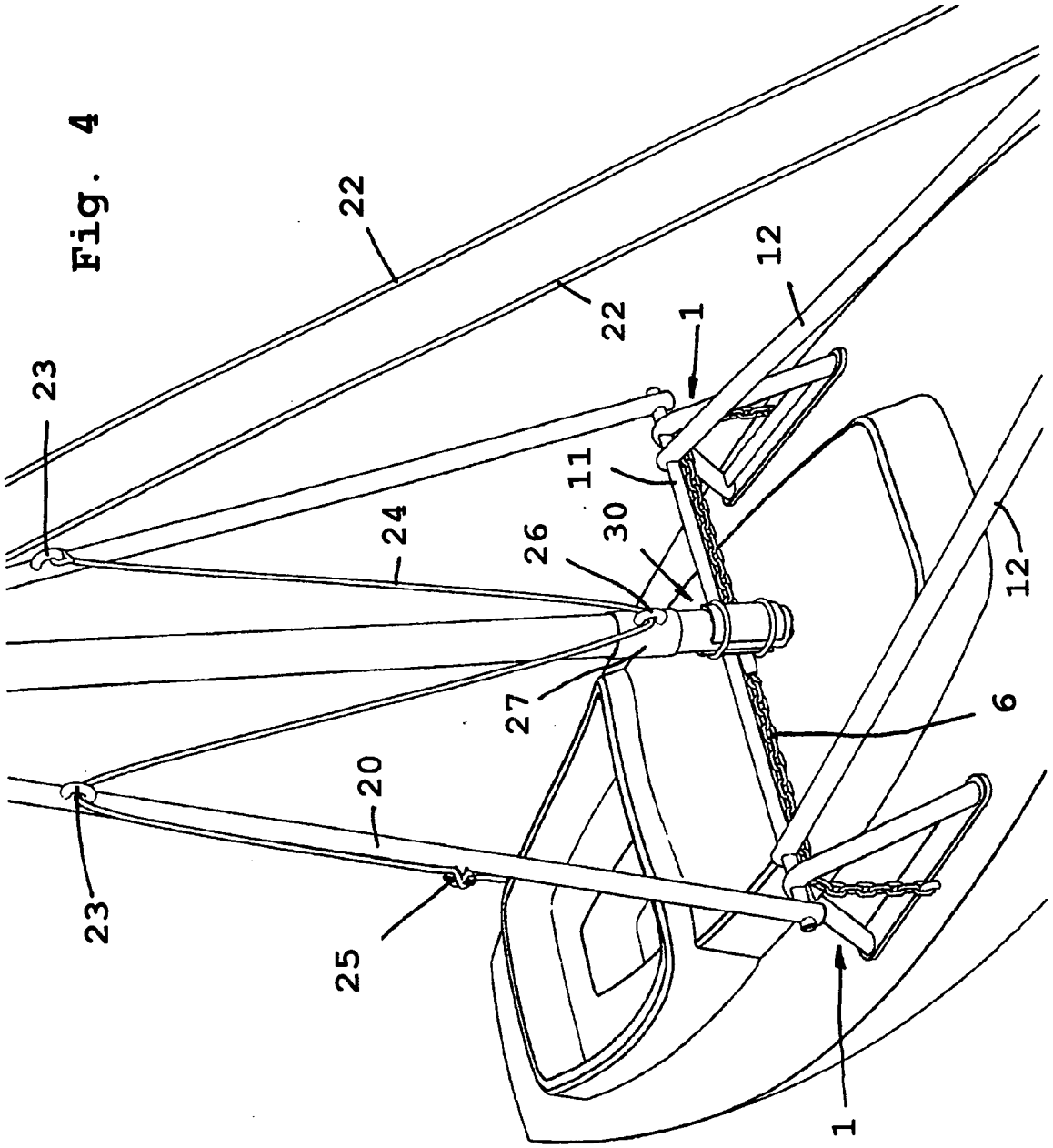


Fig. 4



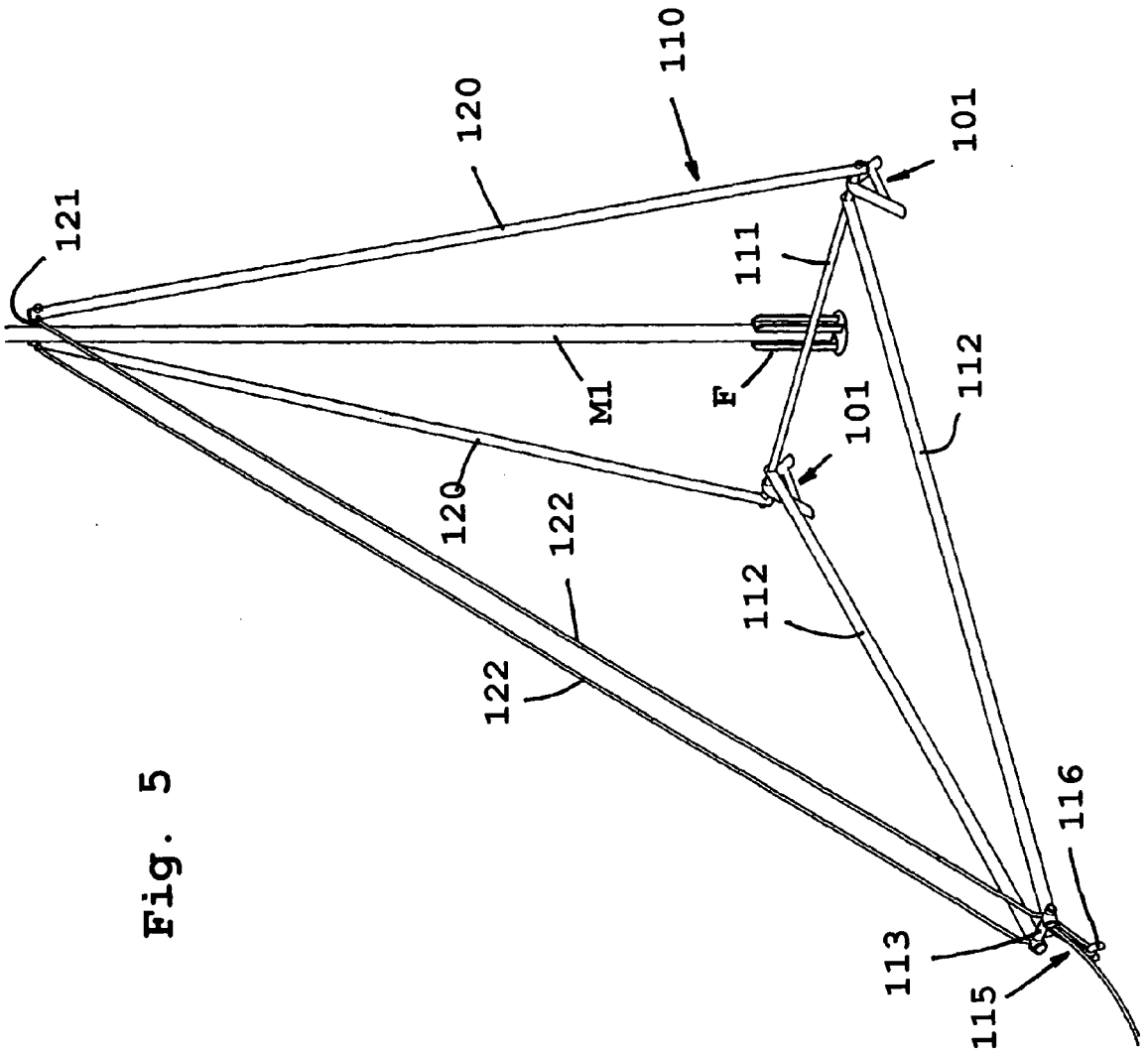


Fig. 5

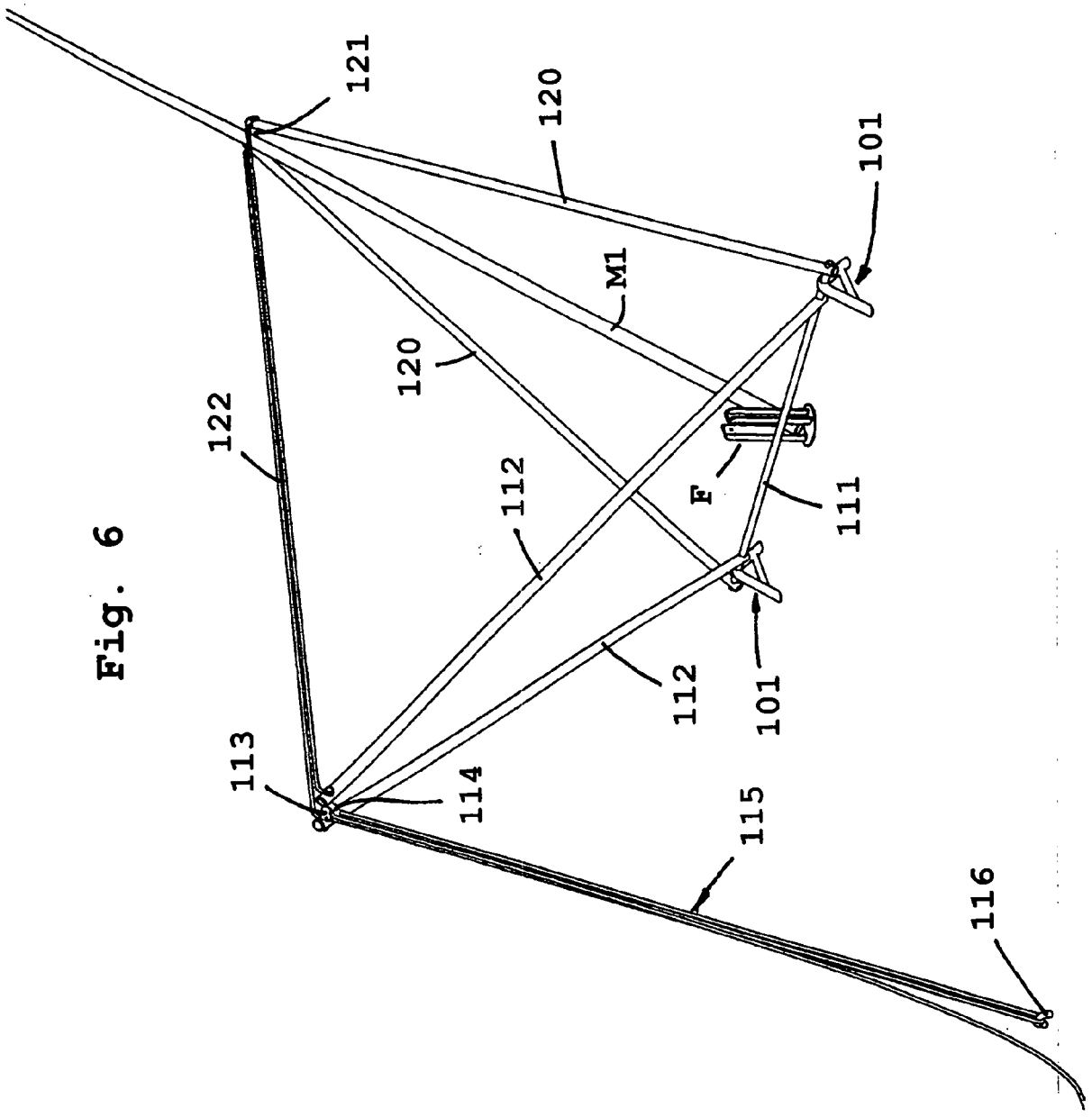


Fig. 6

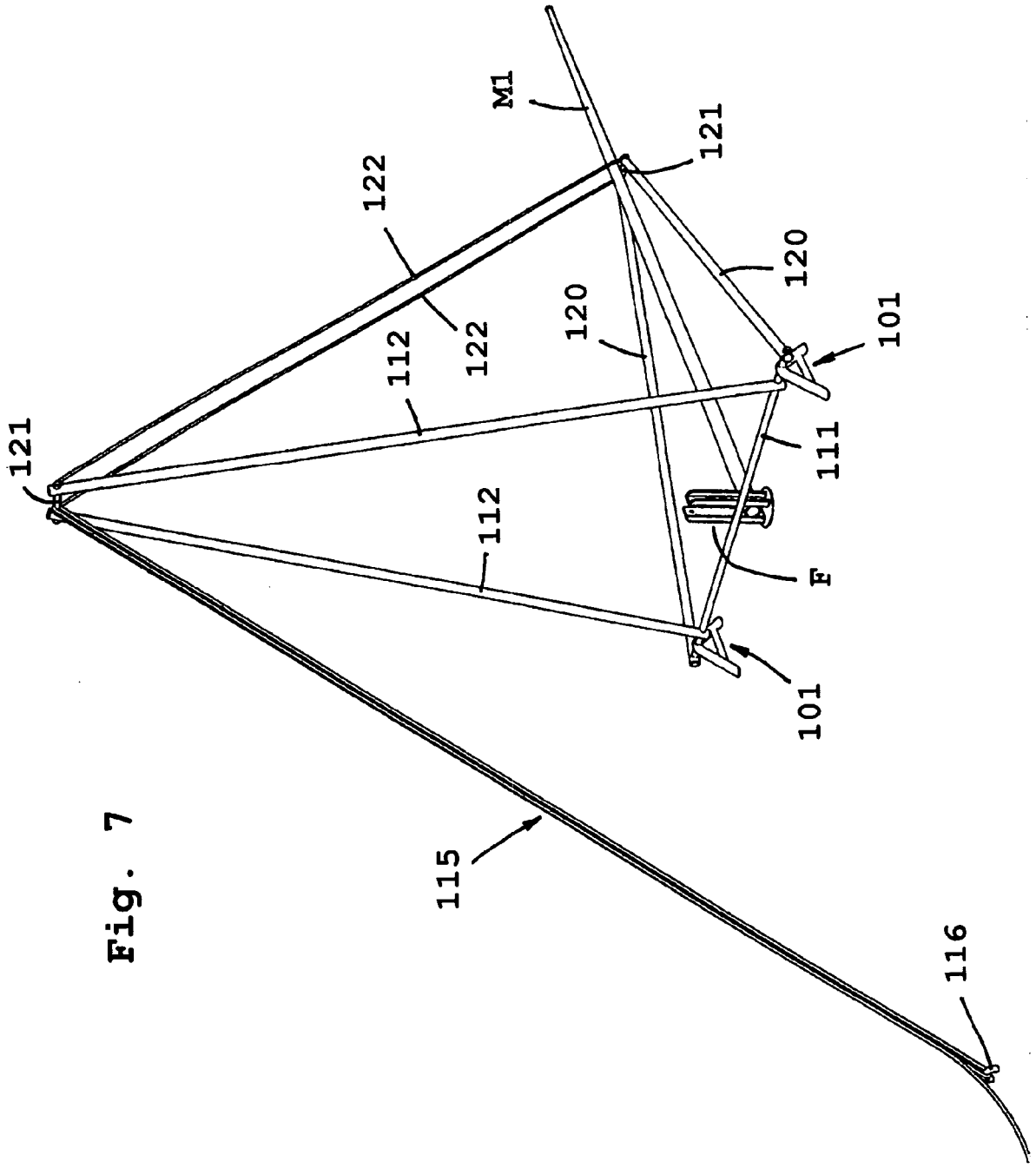


Fig. 7

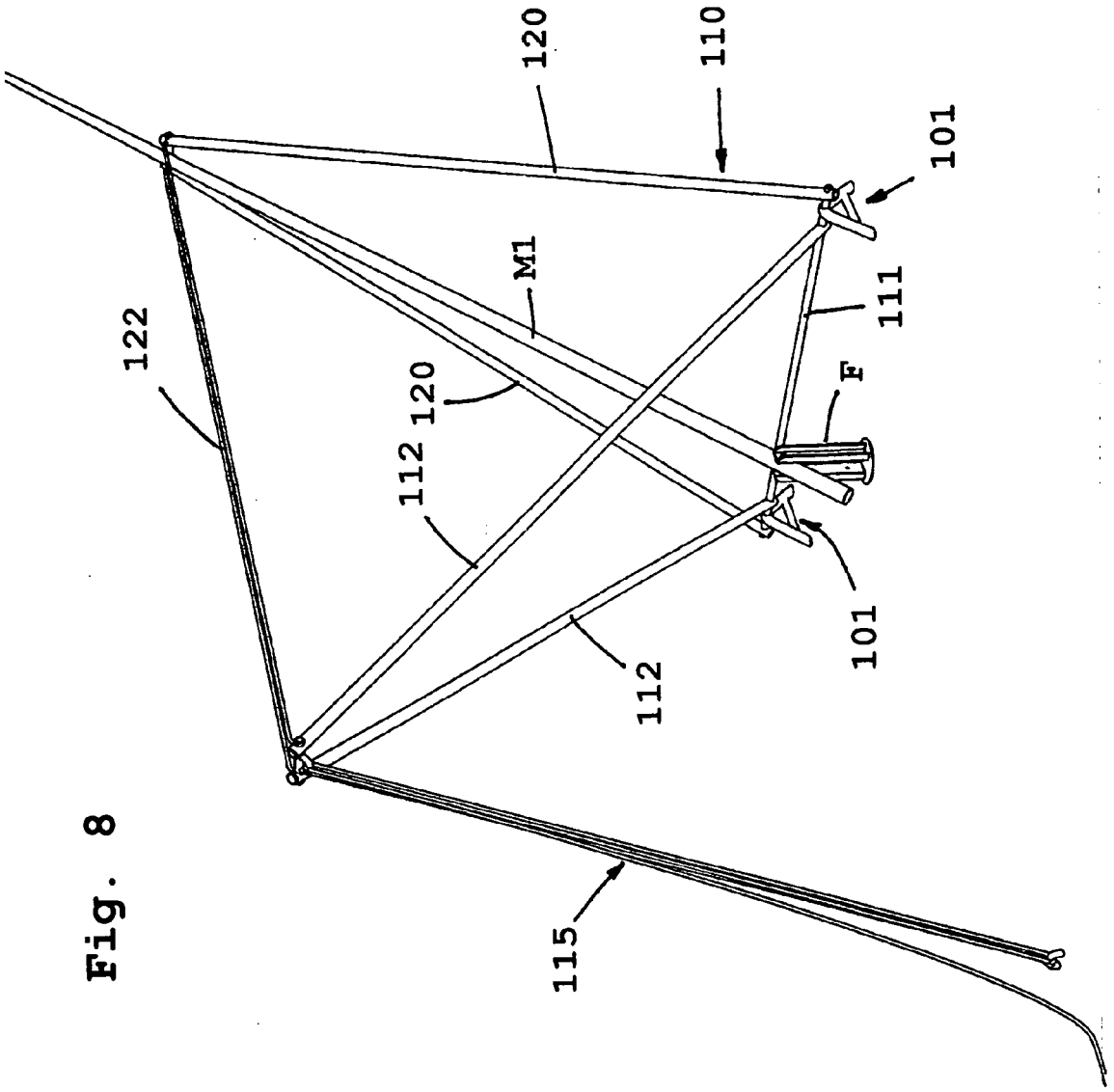


Fig. 8

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 5865136 A **[0002]**
- WO 8702322 A **[0003]**