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(54) SUPPORT UNIT FOR SUPPORTING AN OUTBOARD MOTOR OF A BOAT

(57) A support unit for supporting an outboard motor of a boat comprises a first plate (18) adapted to be connected to the stern board (12) of the boat (10; 10a), and a second plate (20) intended to be connected with a bracket for fixing the outboard motor (14), these plates being separated from each other. The two plates (18, 20) are associated with changing means for changing their position which comprise a mechanism (26, 28, 29, 30) adapted to allow a rotation of the second plate (20) with respect to the first plate (18) about an axis transverse thereto and substantially parallel to the longitudinal axis of the boat (10; 10a). The mechanism is associated with locking means for locking the second plate (20) in a position rotated by a desired angle with respect to the first plate (18), so as to allow the outboard motor (14) to be locked into a desired angled position with respect to the normal navigation attitude. The support unit may comprise a telescopic extension device (34) for axially spacing its plates (18, 20).

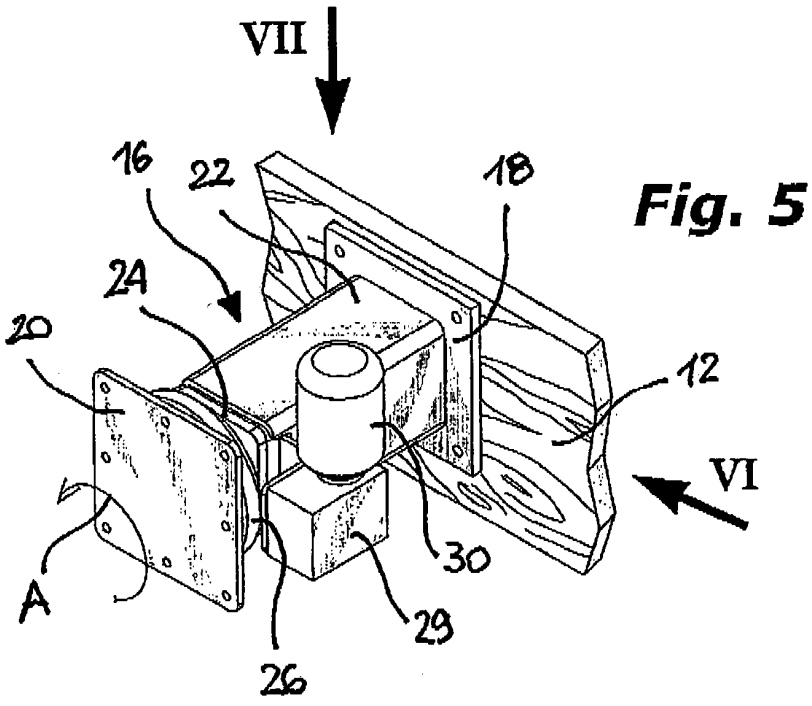

Fig. 5

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Description

[0001] The present invention refers in general to support devices which allow an outboard motor to be connected to the stern of a boat.

[0002] As known, an outboard motor has an upper part that includes a propulsion unit, for example consisting of a heat engine, which is connected by a drive shaft to a lower part of the motor called foot, usually provided with a thrust propeller. The drive shaft extends along an elongated intermediate part of the motor, which is interposed between the propulsion unit and the foot. The propeller is keyed on a respective shaft arranged substantially horizontal in the normal operation of the motor, which is connected to the drive shaft by a pair of toothed wheels. Usually, at the side of the intermediate part of the motor facing the boat, a fixing bracket is arranged to be connected to the stern board of the boat, in order to allow the motor to be fixed on this stern board.

[0003] In general, this fixing bracket allows both a swinging movement of the motor about a vertical axis, and a swinging movement of the motor about a horizontal axis transverse to the longitudinal direction of the boat. A swinging movement of the outboard motor about this horizontal axis makes it possible to rotate it to lift the foot, both to facilitate landing operations in areas with shallow water, and to avoid its contact with submerged obstacles during navigation.

[0004] A rotation of the motor about the aforesaid horizontal swing axis can also be carried out to raise the foot of the motor in view of the boat-storage or transportation of the boat by a travel lift, particularly in the case of low weight outboard motors, to avoid removal of the motor from the stern board.

[0005] In fact, removal of the motor from the stern board is usually a complex operation requiring relatively long times, since the motor, when removed in order to be placed inside the boat in a lying down position, must be previously emptied of the liquids it contains, and separated from cables and lines that connect it to the boat.

[0006] If the outboard motor remains installed on the boat for the boat-storage, as it is usually preferred, it can be arranged in its attitude of navigation, or in a configuration rotated about the horizontal swing axis, with the motor foot in a position raised with respect to the usual configuration of navigation. In any case, the motor installed on the boat takes up a considerable space in height, which is particularly undesirable in view of the boat-storage.

[0007] In fact, the large space in height of a boat required by the presence of the motor, needs that the compartment prepared for shelter at the boat-storage place has a corresponding extended height, which limits the number of boats that can be arranged superimposed in the area intended for their shelter. This affects boat-storage costs, which are proportional to the size of the space required for storing the boats.

[0008] More particularly, the invention relates to a support unit for supporting an outboard motor of a boat, which comprises a first plate adapted to be rigidly connected to the stern board of the boat, a second plate separated from the first plate and intended to be connected to a fixing bracket of the outboard motor, and changing means for changing the mutual position of said first and second plates, operatively interposed therebetween. Support units for outboard motors are known, which comprise a pair of parallel plates associated with each other by means of a four-bar linkage articulation mechanism which allows the position in height of the plate to which the bracket of the outboard motor is fixed, to be changed with respect to the plate for connection to the stern board. In these known supports, however, the change of the relative position of the aforesaid plates in order to modify the position in height of the motor with respect to the boat, also causes the distance of the two plates to be changed along the longitudinal direction of the boat, which may be undesired. Instead, this change of position does not cause the space in height required for the motor to be changed, because the latter is only moved parallel to itself. Moreover, these known support units are mostly suitable for small outboard motors, and are unsuitable and unreliable for medium-large, and in any case heavy, outboard motors.

[0009] The main object of the invention is to provide a support unit which allows the position of an outboard motor associated with the stern board of a boat to be changed, so as to minimize the space in height required for the motor, and therefore for the whole boat.

[0010] According to the invention, in order to achieve this purpose, the change means for changing the position of said plates comprise a mechanism adapted to allow the second plate to rotate with respect to the first plate about an axis transverse to the first plate and substantially parallel to the longitudinal axis of the boat, locking means for locking the second plate in a position rotated by a desired angle with respect to the first plate being associated with said mechanism, so as to enable the outboard motor to be locked in an angled position with respect to its normal attitude for navigation.

[0011] In this manner, the outboard motor of the boat can be rotated by a desired angle about a longitudinal axis of the boat, so that it can reach a configuration in which the height of the boat with the associated motor substantially corresponds to the height of the stern board or, in any case, of the boat without the motor, thus reducing the space in height necessary for its shelter for boat-storage.

[0012] According to a preferred feature of the invention, a first support member extends cantilever from the first plate, such support member having an inner cavity in which a correspondingly shaped second support member is engaged, to which the second plate is coaxially rotatably connected, the latter bearing in a fast manner a toothed crown the teeth of which mesh with a toothed control wheel rotatably mounted about an axis transverse to said first support member.

[0013] By virtue of this feature, rotation of the second plate of the support unit, together with the outboard motor connected to it, with respect to the first plate fixed to the stern board, takes place as a result of driving into rotation of the toothed control wheel.

[0014] The mechanism that allows the second plate to be rotated with respect to the first plate may be operated manually, or by means of a motorized drive that comprises a ratio-motor unit associated with the first support member.

[0015] According to another preferred feature of the invention, the support unit comprises axial displacement means for axially displacing the second plate with respect to the first plate, which are operable manually by means of a mechanical drive, or by means of a hydraulically, pneumatically or electrically driven linear control actuator.

[0016] The displacement achieved by means of these axial displacement means enables the axial distance of the outboard motor with respect to the stern board to be easily and quickly adjusted, without involving a change in height of the position of the second plate with respect to the first one. More particularly, by virtue of this feature, the change of the axial distance of the outboard motor with respect to the stern board allows to avoid an interference of parts of the motor, during its rotation about a longitudinal axis of the boat, with members of the hull projecting behind the stern board, as is generally the case with inflatable boats. Moreover, by virtue of this feature, it is possible to change at will the position of the outboard motor along the longitudinal axis of the boat in order to change the position of the center of gravity of the boat, possibly during navigation, with the purpose of changing the navigation characteristics of the boat.

[0017] According to a further preferred feature of the invention, the first support member comprises a tubular portion in which the second support member is axially and slidably engaged, to allow the distance of said second plate to be telescopically changed with respect to said first plate.

[0018] According to yet another preferred feature of the invention, said control actuator for displacing axially the second plate, together with the second support member, with respect to the first plate and to the respective support member, is interposed between said first and second support members.

[0019] By virtue of this feature, the axial distance of the second plate with respect to the first plate can be controlled by acting on a drive device of such an actuator, mounted inside the boat, which is able to cause a relative axial displacement of the second support member with respect to the first support member.

[0020] Further characteristics and advantages of the invention will become more apparent from the following detailed description, given by way of a non-limitative example and referred to the appended drawings, in which:

Figure 1 is a schematic side elevational view of a boat, particularly a rigid-hulled boat, to the stern board of which an outboard motor (shown in its normal navigation configuration) is connected by means of a support unit according to the invention,

Figure 2 is a rear elevational view of the boat of Figure 1,

Figure 3 is a top elevational view of the boat of Figure 1, with its outboard motor rotated, by way of example, at an angle of about 90° with respect to its normal navigation attitude,

Figure 4 is a view similar to Figure 2, with the outboard motor rotated as shown in Figure 3,

Figure 5 is a schematic and enlarged perspective view of a support unit indicated by the arrow V in Figure 1,

Figures 6 and 7 are side and upper elevational views of the support unit of Figure 5, from arrow VI and from arrow VII, respectively,

Figures 8 to 11 are views similar to Figures 1 to 4, respectively, representing a boat consisting of an inflatable boat, in which the support unit of the invention allows the outboard motor to be telescopically displaced with respect to the stern board,

Figure 12 is a schematic and enlarged perspective view of a support unit indicated by arrow XII in Figure 8,

Figures 13 and 14 are side and upper elevational views of the support unit of Figure 12, from arrow XIII and arrow XIV, respectively, and

Figure 15 is a perspective view of the assembly of Figure 12 in its elongated and rotated configuration.

With initial reference to figures 1 to 7, showing a first embodiment of the invention, a rigid-hulled boat, particularly for recreational use, is generally indicated 10.

[0021] The boat 10 is provided at its rear end with a stern board 12 that extends between the ends of its sides, and to which an outboard motor 14 is connected by means of a support unit 16 according to the invention.

[0022] In brief, the motor 14 comprises an upper part 14a that includes the propulsion unit, and a lower part, or foot, 14b provided with a thrust propeller keyed on a respective shaft connected in rotation with a drive shaft extending between the part 14a and the part 14b, along an intermediate part of the motor 14.

[0023] The support unit 16 comprises a first plate 18 adapted to be rigidly connected, for example by means of bolts, to the stern board 12, and a second plate 20, separated from the plate 18, intended to be rigidly connected with a fixing bracket (not shown in detail) connected to the aforementioned intermediate part of the motor 14. Between the two plates 18 and 20 there is a device for changing the mutual position of the plates 18 and 20, which allows the second plate 20 to be rotated with respect to the first plate 18. This device may be driven manually, or in a motorized manner, for example by means of a drive located inside the boat 10. Preferably,

and as shown in the Figures, the plate 20 is substantially parallel to the plate 18.

[0024] More particularly, and according to the embodiment shown in the enclosed figures, a first support member 22 extends cantilever from the plate 18, from its side opposite to the stern board 12. Such a first support member 22 has an elongated shape and an inner cavity in which a second support member 24, the shape of which corresponds to that of the member 22 and which is coaxial to it, is engaged, the plate 20 being connected to the support member 24 in order to be axially rotatable. The cross-section of the support members 22 and 24 is preferably polygonal, for example square-shaped.

[0025] A toothed crown 26 is fixed to the plate 20, the teeth of which mesh with a toothed drive wheel 28 keyed onto a rotatable shaft that extends transversely to the general direction of the members 22 and 24. Preferably, the toothed crown 26 and the toothed wheel 28 are conical. In the case the aforementioned device for changing the position of the plates 18 and 20 is driven manually, a possibly removable handle (not shown) may be provided to control the rotation of the toothed wheel 28 in order to cause rotation of the toothed crown 26 and, with it, of the plate 20.

[0026] In the case the aforementioned device is driven by a motor, the toothed wheel 28 is keyed onto a shaft transverse to the support member 22, which extends outside the member 22 from a reduction unit 29 connected to a motor 30, for example of the hydraulic, pneumatic or electric type, which can be conveniently controlled by drive means arranged inside the boat 10.

[0027] The unit 16, by virtue of the meshing of the toothed wheel 28 and of the crown 26, and to the fact that the ratio-motor unit 29, 30 is usually of the irreversible type, allows the plate 20 to be locked in a preferred rotated position with respect to the plate 18, so that the same ratio-motor unit 29, 30 constitutes locking means which allows the second plate 20 to be locked in a position rotated by a desired angle with respect to the first plate 18.

[0028] In the case the crown 26 and the wheel 28 are not employed, or if an additional locking device is required, for example for safety reasons, a locking member (not shown in detail in the figures) can be provided, which includes for example a locking pin arranged so as to cross an area of the wall of the member 22, and having an end adapted to interfere with the outer surface of the member 24. This locking pin can consist of a threaded rod intended to be driven manually by an outer knob, the thread of which engages a nut screw fixed on the wall of the member 22.

[0029] The support unit 16 allows the outboard motor 14 to be rotated by any angle, typically between 0 and 90°, with respect to the stern board 12, for example of 45°.

[0030] In the operation of the unit 16 by the aforesaid manual drive, or as a result of driving the ratio-motor unit 29 and 30, the gear wheel 28 is caused to rotate and, consequently, the toothed crown 26 is rotated by a desired angle, as shown by arrow A of Figure 5, so as to draw into rotation the plate 20, and therefore the motor 14 connected to it. In this manner, the motor 14 undergoes a rotation about an axis transverse to the plate 22 and substantially parallel to the longitudinal axis of the boat 10, which allows its foot 14a to be raised laterally.

[0031] Another embodiment of the support unit of the invention, here indicated 16a, is shown in Figures 8 to 15 of the drawings, being understood that parts equal to, or similar to, those of the previous embodiment are indicated by analogous reference numerals. The parts already described with reference to the previous embodiment will not be described again, for the sake of brevity, being common to the embodiment described below.

[0032] In particular, the boat of Figures 8 to 11, here indicated 10a, is a pneumatic boat in which the rear ends of its inflatable side members 11 of the hull project behind with respect to the stern board 12. In this case, in order to allow the outboard motor 14 to be rotated about the longitudinal axis of the boat 10a, the plates 18 and 20 of the unit 16a need to be previously spaced, so that the upper part 14a of the motor 14 and its foot 14b cannot interfere with the members 11.

[0033] For this purpose, the member 22 is axially and slidably mounted with respect to the member 24, so that these two members can extend telescopically. The polygonal cross-section of the support members 22 and 24 allows a prismatic coupling between them to be achieved, so as to avoid their relative rotation.

[0034] The control of the relative sliding of the members 22 and 24, and therefore of the change of the axial distance between the plates 18 and 20, can be carried out manually, for example by means of a crank (not shown) connected to a mechanical drive such as a rack and toothed wheel mechanism. As an alternative, the control of the aforementioned sliding can take place through a motorized drive comprising a linear actuator shown in the Figures and described below.

[0035] This linear actuator, indicated 34 in Figures 13 and 14, is interposed between the support members 22 and 24 in order to control their relative sliding and therefore the axial sliding of the plate 20 with respect to the plate 18 connected to the stern board 12. Although the linear actuator 34 can be of any known type, for example having an electric, hydraulic or pneumatic drive, it is schematically shown in the drawings as a hydraulic actuator that comprises a double-acting cylinder 34 having an inner chamber at the opposite ends of which respective ducts 36, 38 are connected to supply/discharge a pressurized fluid, in order to move a piston (not shown in detail) fixed to a stem 40 slidable with respect to the cylinder 34. The ducts 36, 38 are connected in a manner known per se to a distributor unit (not shown) arranged inside the boat 10a, so as to allow remote control of the change of the axial position of the plates 18 and 20, or of the motor 14, with respect to the stern board 12.

[0036] After the plates 18 and 20 have been spaced along the direction indicated by arrow B of Figure 12, so that the upper part 14a and the foot 14b of the motor 14

cannot interfere with the members 11, the motor 14 can be rotated about the axis transverse to the plates 18 and 20 and to the ring gear 26, in the direction indicated by arrow A of Figure 15, as described for the previous embodiment, so as to bring it to a desired angled position, with its foot 14a raised laterally.

[0037] Moreover, the axial displacement of the second plate 20 with respect to the first plate 18 can be carried out independently of the rotation of the second plate 20 with respect to the first plate 18, in order to modify the position of the outboard motor 14 along the longitudinal axis of the boat 10a, to change the navigation characteristics of this boat, possibly during navigation.

Claims

1. Support unit for supporting an outboard motor of a boat, comprising a first plate (18) adapted to be rigidly connected to the stern board (12) of the boat (10; 10a), a second plate (20) separated from the first plate (18) and intended to be connected to a fixing bracket of the outboard motor (14), and change means for changing the mutual position of said first and second plates (18, 20), operatively interposed therebetween;
characterized in that said change means for changing the position of said plates (18, 20) comprise a mechanism (26, 28, 29, 30) adapted to allow the second plate (20) to rotate with respect to the first plate (18) about an axis transverse to the first plate (18) and substantially parallel to the longitudinal axis of the boat (10; 10a), locking means for locking the second plate (20) in a position rotated by a desired angle with respect to the first plate (18) being associated with said mechanism, so as to enable the outboard motor (14) to be locked in an angled position with respect to its normal attitude for navigation.

2. Support unit according to claim 1, **characterized in that** a first support member (22) extends cantilever from the first plate (18), such support member having an inner cavity in which a correspondingly shaped second support member (24) is engaged, to which the second plate (20) is coaxially rotatably connected, the latter bearing in a fast manner a toothed crown (26) the teeth of which mesh with a toothed control wheel (28) rotatably mounted about an axis transverse to said first support member (22).

3. Support unit according to claim 2 or 3, **characterized in that** said toothed crown (26) and said toothed wheel (28) are conical.

4. Support unit according to any one of claims 1 to 3, **characterized in that** said mechanism (26, 28, 29, 30) adapted to allow the second plate (20) to rotate with respect to the first plate (18) can be driven manually.

5. Support unit according to any one of claims 1 to 3, **characterized in that** said mechanism (26, 28, 29, 30) adapted to allow the second plate (20) to rotate with respect to the first plate (18) is motorized.

6. Support unit according to claim 5, **characterized in that** the toothed control wheel (28) is connected for rotation with a ratio-motor unit (29, 30) associated with said first support member (22).

7. Support unit according to any one of claims 2 to 6, **characterized in that** said locking means include a locking pin crossing the wall of the first support member (22) in order to interfere with an outer portion of the second support member (24).

8. Support unit according to claim 7, **characterized in that** said locking means comprise a manually operable threaded rod, which rotatably engages a nut screw connected to the wall of the first support member (22).

9. Support unit according to any one of claims 1 to 8, **characterized in that** it comprises axial displacement means for axially displacing the second plate (20) with respect to the first plate (18).

10. Support unit according to claim 9, **characterized in that** said axial displacement means are manually operable by means of a mechanical drive.

11. Support unit according to claim 9, **characterized in that** said axial displacement means are operable by means of a hydraulically, pneumatically or electrically driven linear control actuator (34).

12. Support unit according to claim 10 or 11, **characterized in that** the first support member (22) comprises a tubular portion in which the second support member (24) is axially and slidably engaged, to allow the distance of said second plate (20) to be telescopically changed with respect to said first plate (18) .

13. Support unit according to claim 12, **characterized in that** said first and second support members (22, 24) have corresponding polygonal cross-sections, so that the first and the second support members (22, 24) are slidably coupled with each other in a prismatic manner.

14. Support unit according to any one of claims 11 to 13, **characterized in that** said control actuator (34) for displacing axially the second plate (20), together with the second support member (24), with respect to the first plate (18) and to the respective support member (22), is interposed between said first and second

support members (22, 24).

15. Support unit according to claim 14, **characterized in that** said control actuator includes a cylinder (34) driven by a pressurized fluid, normally of the double-acting type, which can be controlled from inside the boat (10; 10a).

16. Support unit according to claim 14, **characterized in that** said control actuator (34) includes a rotary electric motor which can be controlled from inside the boat (10; 10a).

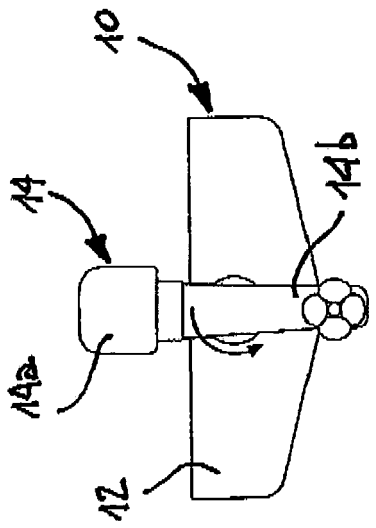


Fig. 2

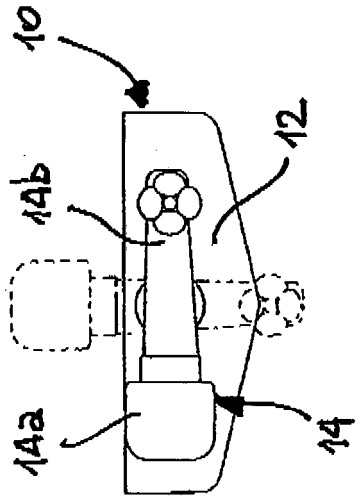


Fig. 4

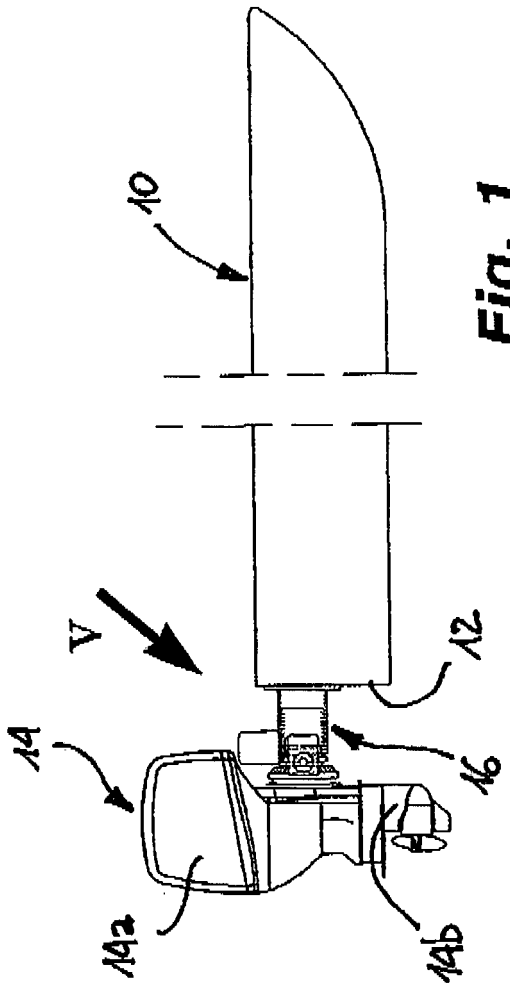


Fig. 1

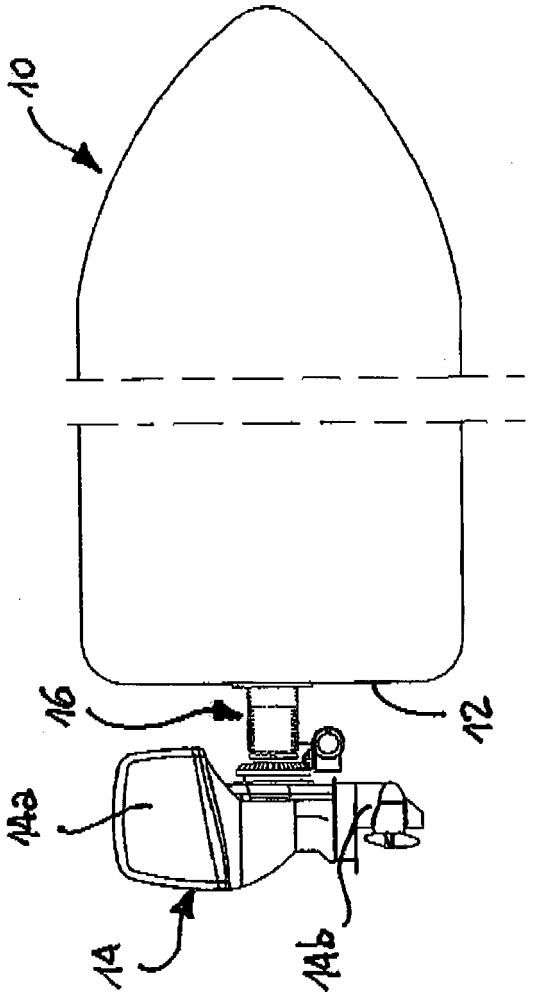


Fig. 3

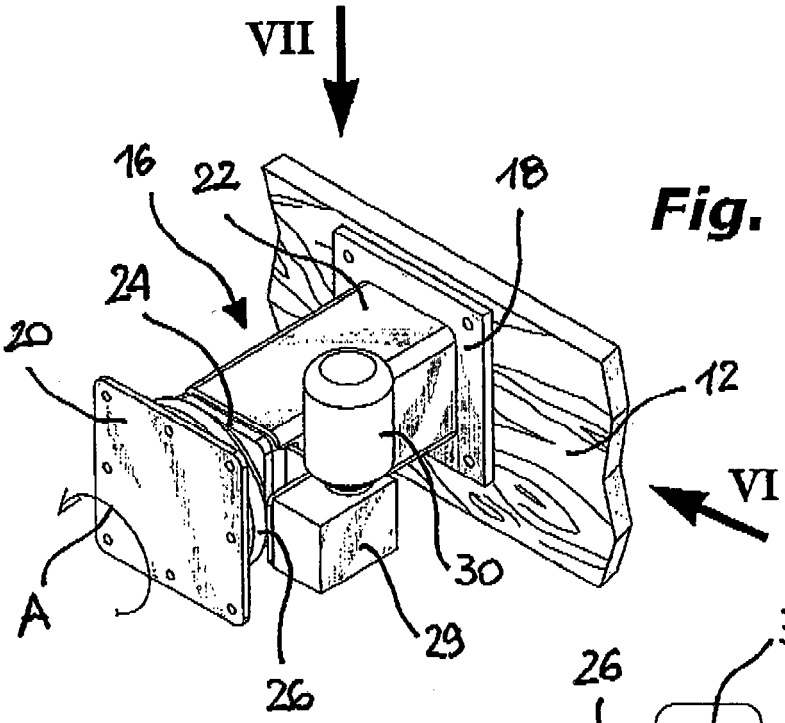
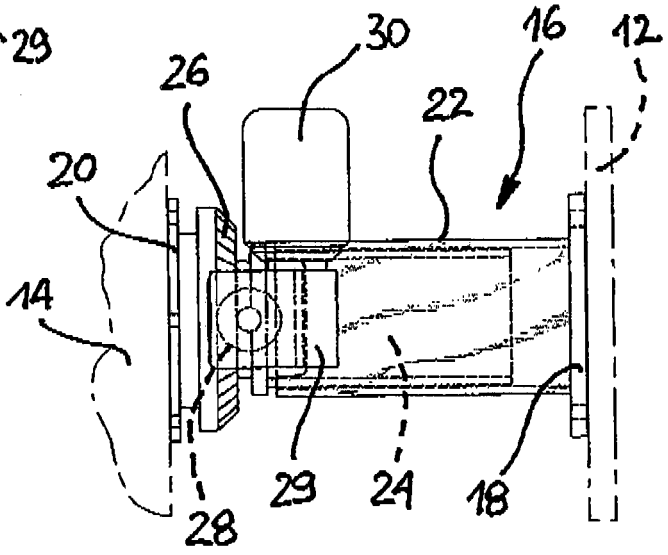


Fig. 5



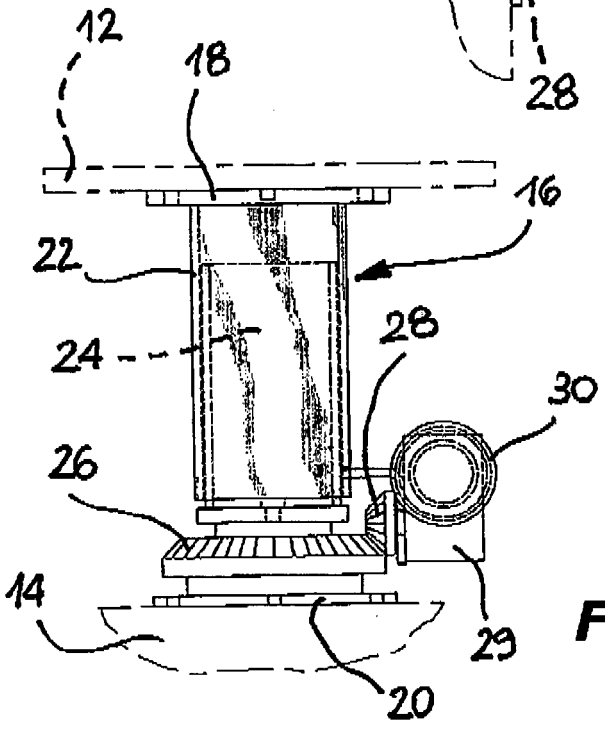


Fig. 6

Fig. 7

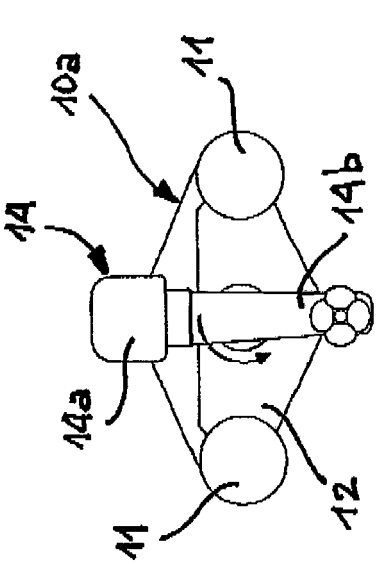


Fig. 9

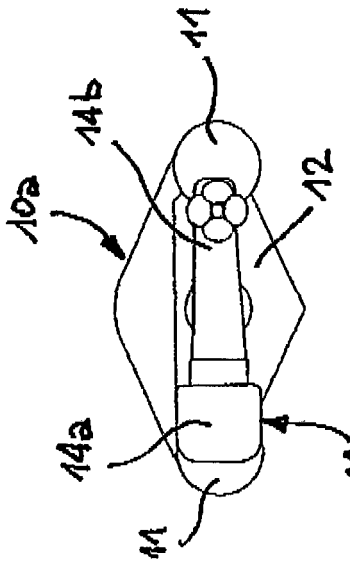


Fig. 11

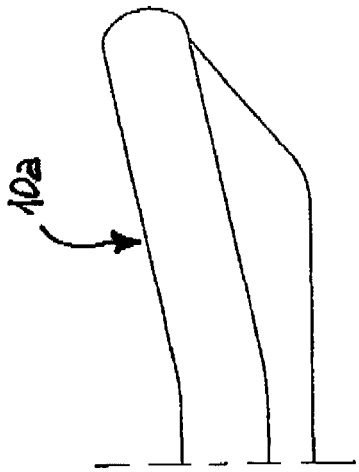


Fig. 8

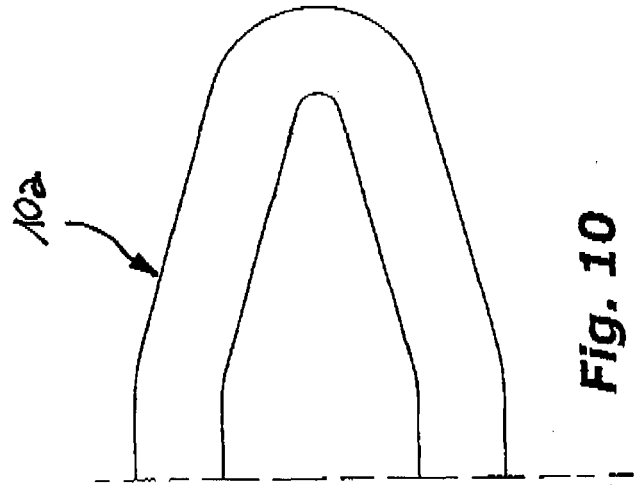
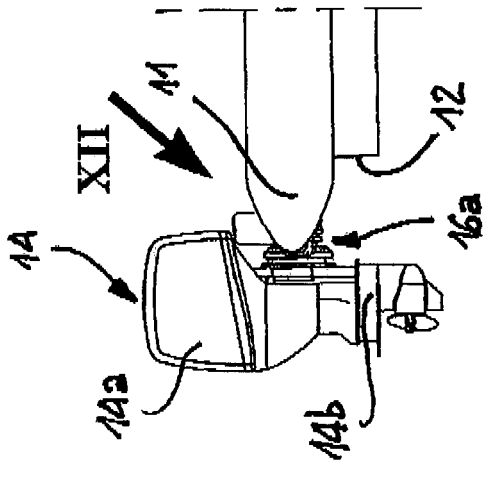
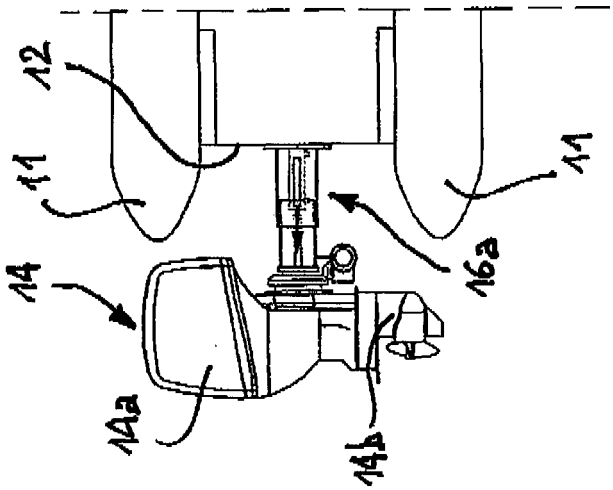


Fig. 10





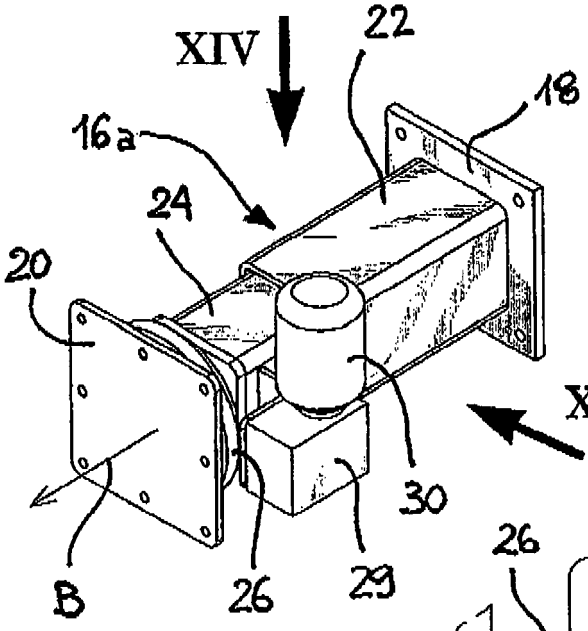


Fig. 12

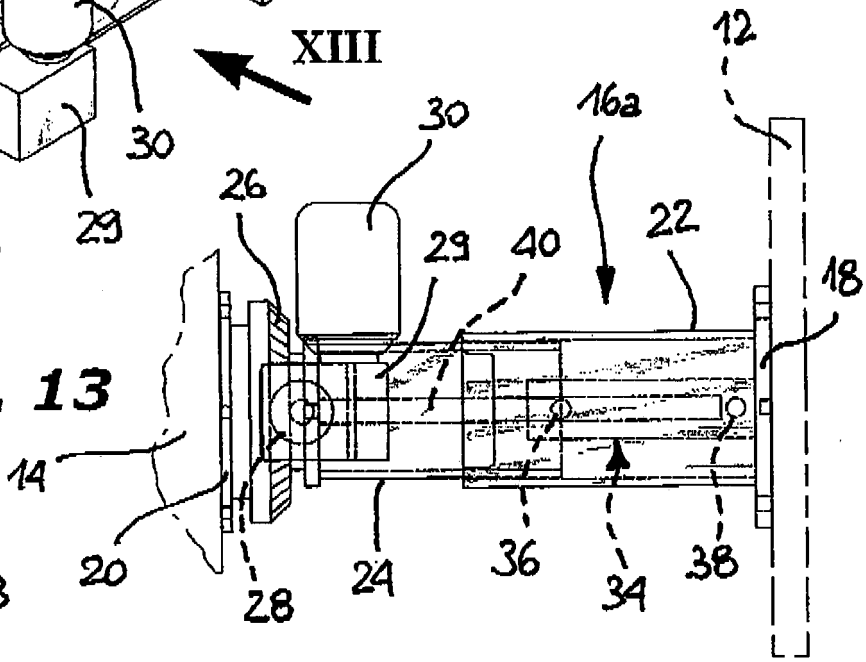


Fig. 13

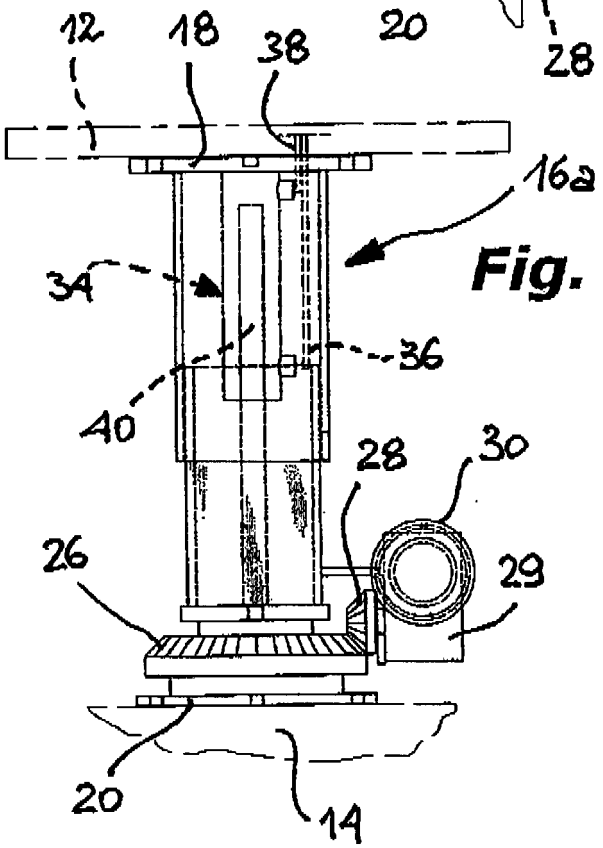


Fig. 14

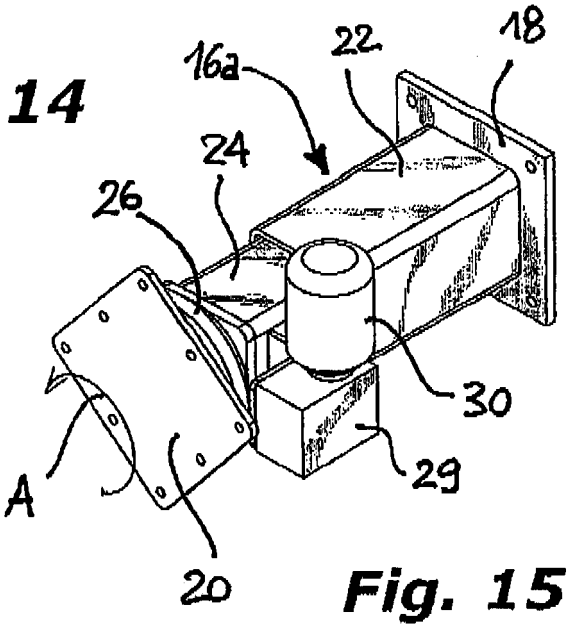


Fig. 15

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EUROPEAN SEARCH REPORT

Application Number
EP 19 00 0164

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 3 241 735 A1 (ULTRAFLEX SPA [IT]) 8 November 2017 (2017-11-08) * paragraph [0072] - paragraph [0107]; figures 1,2,9,10 *	1-16	INV. B63H20/10 B63H20/18
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 June 2019	Martínez, Felipe

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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