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(54) **LIFTING AND STORAGE ARRANGEMENT FOR BOATS**

(57) A lifting and storage arrangement (1) for boats (4), comprising a frame (2), characterized in that the arrangement (1) comprises a floating cradle (5) configured to receive the boat (4) to be lifted, the cradle (5) being movable along the frame (2) between a retracted position, in which the cradle (5) is on the frame (2), and an extended position, in which the cradle (5) is configured to float in water, and a drive mechanism (11) for moving the cradle (5) between the retracted and extended positions.

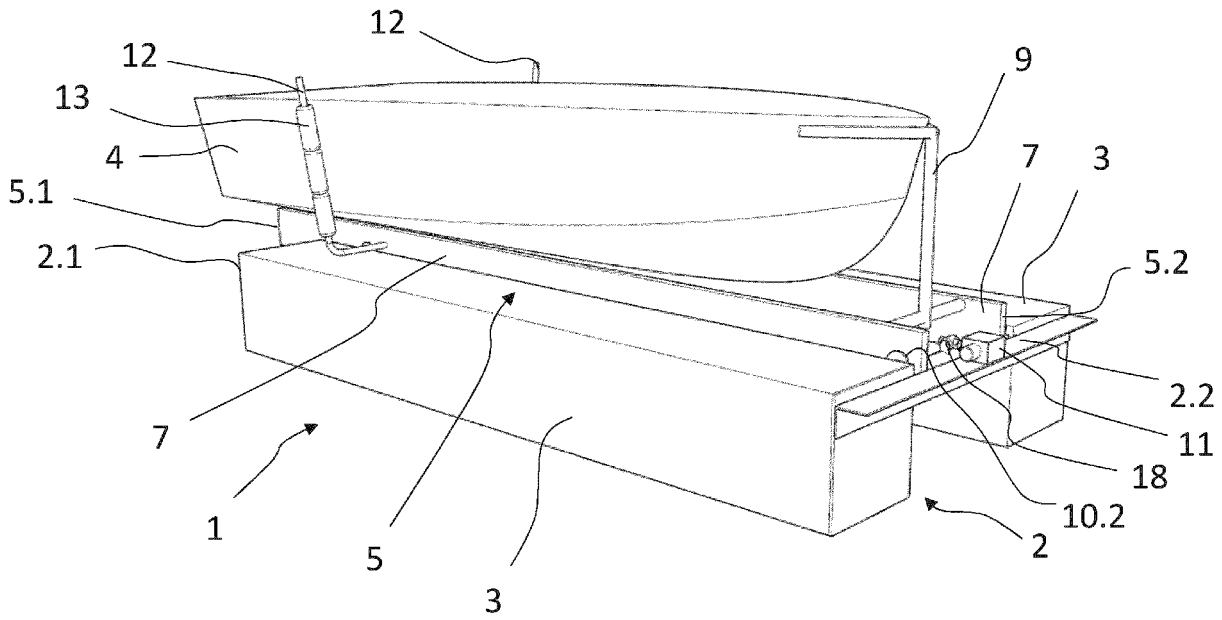


Fig. 1

EP 4 159 611 A1

Description

FIELD OF THE INVENTION

[0001] The invention relates to a lifting and/or storage arrangement for boats according to the preamble of claim 1.

BACKGROUND OF THE INVENTION

[0002] Boats require dry storage to avoid algae growth without the need for antifouling painting. Also in freezing waters boats need to be lifted up. Typically, the boats are lifted from water and placed on a land area at the marina for dry storage, maintenance and repair. When boat is left in water for longer periods build-up of algae and barnacles on the boat hull. Maintenance of the boat hull, e.g. antifouling painting and other surface treatments requires a lot of work and is costly. Antifouling paints may also contain chemicals that have serious toxic effects on marine life. Therefore, many boat owners keep their boats out of the water when not using them.

[0003] Conventionally boats are lifted out of and lowered into water using a crane or trailer. There are also many types of boat lifts suitable for lifting boat out of the water. The drawback of these solutions is that they usually have complex structure and/or assisting persons may be required to lift and lower the boat.

[0004] The object of the present invention is to provide an improved lifting and storage arrangement for boats.

SUMMARY

[0005] The object of the invention can be achieved by a boat lifting and storage arrangement according to claim 1.

[0006] The boat lifting and storage arrangement according to the invention comprises a frame, a floating cradle configured to receive the boat to be lifted. The cradle is movable along the frame between a retracted position, in which the cradle is on the frame, and an extended position, in which the cradle is configured to float in water. The arrangement further comprises a drive mechanism for moving the cradle between the retracted and extended positions.

[0007] Significant benefits can be achieved by the means of the invention. The boat lifting arrangement according to the invention is easy and simple to use, and no assisting persons, trailer or crane is required to lift and lower the boat. As the lifting arrangement according to the invention is also used as a dry storage, costly and time-consuming transportation of the boat to a separate dry storage location is not necessary. The boat lifting arrangement may also have a relatively simple structure.

[0008] In one embodiment of the invention, the cradle has a first end and an opposite second end, the first end being configured to float in the water and the second end being pivotally connected to the frame when the cradle is in the extended position.

[0009] In one embodiment of the invention, floating depth of first end of the cradle is adjustable.

[0010] In one embodiment of the invention, the second end of the cradle is pivotable around a transverse axis relative to frame in the extended position.

[0011] In one embodiment of the invention, the transverse axis is perpendicular to the direction of movement of the cradle along the frame.

[0012] In one embodiment of the invention, the cradle is pivotally connected to the drive mechanism to allow the cradle to pivot around the transverse axis relative to the frame when the cradle is in the extended position.

[0013] In one embodiment of the invention, the frame comprises at least one rail along which the cradle is movable between the retracted and extended positions.

[0014] In one embodiment of the invention, the cradle comprises at least one wheel configured to roll along the rail.

[0015] In one embodiment of the invention, the frame comprises two rails, and the cradle comprises at least one front wheel and at least one rear wheel for each rail, which front wheels and rear wheels are configured to roll along the rails.

[0016] In one embodiment of the invention, the cradle comprises two front wheels for each rail, which front wheels are arranged on opposite sides of the rail.

[0017] In one embodiment of the invention, the cradle comprises a rotatable connecting axle, and the front wheels on the opposite sides of the rail are connected to a connecting piece, and the connecting pieces on the opposite sides of the cradle are connected to the connecting axle.

[0018] In one embodiment of the invention, the rails comprise stoppers configured to stop travel of the front wheels along the rails when the cradle is in the extended position.

[0019] In one embodiment of the invention, the transverse axis is the same as the axis of rotation of the connecting axle when the cradle is in the extended position.

[0020] In one embodiment of the invention, an end part of said at least one rail at the first end of the frame is downwardly curved and/or inclined.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] In the following the invention will be described in detail by means of examples with reference to the accompanying drawings, in which

Fig. 1 shows an arrangement according to an embodiment of the invention having a cradle in a retracted position,

Fig. 2 shows the arrangement of fig. 1 without a left side float,

Fig. 3 shows a front wheel structure of the cradle,

Fig. 4 shows a rear wheel structure of the cradle,

Fig. 5 shows the arrangement of fig. 2 as a side view,

Fig. 6 shows the arrangement of fig. 5 having the cradle in an extended position,

DETAILED DESCRIPTION

[0022] Figures show a lifting and storage arrangement 1 for boats according to an embodiment of the invention. The lifting and storage arrangement 1 can be floating. The arrangement 1 is configured to lift the boat 4 out of water and lower the boat 4 into water. The arrangement 1 may be a boat trailer or a pier module that is used as a mooring and/or a storage platform for boats. The pier module may be part of a pier that comprises a plurality of pier modules connected together. Alternatively, the lifting arrangement 1 may be installed in a boathouse into which boat 4 is driven for storage.

[0023] The lifting and storage arrangement 1 comprises a frame 2. The frame 2 is typically floating, but alternatively the frame 2 can be non-floating or fixed. The frame 2 has a first end 2.1, from which the boat 4 is lifted out of water and lowered into water, and an opposite second end 2.2. The frame 2 may comprise least one float 3, such as a pontoon or ballast tank. Typically, the floating frame 2 comprises two or more floats 3.

[0024] The lifting and storage arrangement 1 further comprises a floating cradle 5 configured to receive the boat 4 to be lifted. The cradle 5 is movable along the frame 2. The cradle 5 is reciprocally movable between a retracted position (shown in figs. 1, 2 and 5), in which the cradle 5 is on the frame 2 above a water level, and an extended position (shown in fig. 6), in which the cradle 5 is configured to float in the water. The cradle 5 comprises a first end 5.1 and an opposite second end 5.2. The boat 4 is configured to be moved onto cradle 5 from the first end 5.1. At least the first end 5.1 is configured to float freely in the water when the cradle 5 is in the extended position. The first end 5.1 of the cradle 5 is configured to float below water level. The floating depth of the first end 5.1 of the cradle 5 is adjustable.

[0025] The cradle 5 may comprise two longitudinal beams 7 arranged at a distance from each other. The longitudinal beams 7 may be parallel. The longitudinal beams 7 may be floating. The cradle 5 may further comprise a bow support 9 for supporting the bow of the boat 2. The bow support 9 is placed at the second end 5.2 of cradle 5. The cradle 5 may be provided with keel rollers that support the keel of the boat 4.

[0026] The cradle 5 comprises at least one cradle float 13. The cradle 5 may comprise two vertical side bars 12 arranged on the opposite sides of the cradle 5. The side bars 12 are attached to the longitudinal beams 7. The side bars 12 are provided with cradle floats 13. The floatability of the cradle 5, e.g. the floating depth of the cradle 5 and/or the first end 5.1 of the cradle 5, can be adjusted by changing the size and/or position of the cradle float(s) 13.

[0027] The frame 2 may comprise at least one rail 6, such as a T-bar, along which the cradle 5 is movable between the retracted position and the extended position, and vice versa. Typically, the frame 2 comprises two rails 6 along which the cradle 5 may be moved. The rails 6 are placed on opposite sides of the cradle 5 such that the cradle 5/longitudinal beams 7 is/are between the rails 6. The rails 6 are parallel. The rails 6 extend from the first end 2.1 of the frame 2 toward the second end 2.2 of the frame 2. The rails 6 may be inclined downward toward the first end 2.1 of the frame 2. The end parts of the rails 6 at the first end 2.1 of the frame 2 may be downward curved and/or inclined. The rails 6 may be placed on the upper surface of the frame 2.

[0028] The second end 5.2 of the cradle 5 is pivotally connected to the frame 2/rails 6 when the cradle 5 is in the extended position. The cradle 5 is pivotable around a transverse pivot axis 19 relative to frame 2 in the extended position. The transverse pivot axis 19 is perpendicular to direction of movement of the cradle 5 along the frame 2/rails 6.

[0029] The cradle 5 is movable along the rail(s) 6. The cradle 5 comprises at least one wheel 10.1, 10.2 for each rail 6. The wheels 10.1, 10.2 are rotatably mounted on the cradle 5. The cradle 5 comprises at least one front wheel 10.2 and at least one rear wheel 10.1 for each rail 6. The wheels 10.1, 10.2 are configured to roll along the rails 6.

[0030] Typically, as shown in the drawings, the cradle 5 may comprise two front wheels 10.2 for each rail 6. The front wheels 10.2 are arranged against the opposite sides of the rail 6, i.e. against the top and bottom sides of the rail 6. The front wheels 10.2 on the opposite sides of the rail 6 are rotatably connected to a connecting piece 21. The cradle 5 further comprises a rotatable connecting axle 14. The connecting pieces 21 on the opposite sides of the cradle 5 are connected to the connecting axle 14. The connecting axle 14 is placed between the longitudinal beams 7. The connecting axle 14 may extend through the longitudinal beams 7. The connecting axle 14 is placed in an outer tube 15 that is arranged between and connected to the longitudinal beams 7.

[0031] The rails 6 comprise stoppers 17 for stopping the travel of the front wheels 20.2 along the rails 6 when the cradle 5 is in the extended position. The stoppers 17 are placed on the bottom surfaces of the rails 6. The stoppers 17 are placed at the ends of the rails 6. The front wheels 10.2 allow the cradle 5 pivot around the transverse axis 19 when the cradle 5 is in the extended position. The transverse axis 19 is the same as the axis of rotation of the connecting axle 14. The front wheels 10.2 allow the cradle 5 to pivot around the connecting axle 14 when the cradle 5 is being moved toward the extended position and/or the rear wheels 10.1 are off the rails 6.

[0032] The rear wheels 10.1 are placed against the top

sides of the rails 6. The cradle 5 comprises a fixed axle 16 placed between the longitudinal beams 7 and connected to the longitudinal beams 7. The rear wheels 10.1 are rotatably connected to the fixed axle 16 or the longitudinal beams 7. The fixed axle 16 may extend through the longitudinal beams 7.

[0033] The lifting arrangement 1 further comprises a drive mechanism 11 configured to move the cradle 5 along the frame 2. The drive mechanism 11 is configured to move the cradle 5 reciprocally between the retracted position and the extended position. The drive mechanism 11 is mounted on the frame 2, for example the second end 2.2 of the frame 2. The drive mechanism 11 may comprise a linear actuator, such as a ball screw. The drive mechanism 11 may be electrically operated. The cradle 5 is pivotally connected to the drive mechanism 11. The second end 5.2 of the cradle comprises a pivotable connector 18 to which the drive mechanism 11 is connected. The pivotable connector 18 allows the cradle 5 to pivot relative to the frame 2 when the cradle 5 is in the extended position.

[0034] The lifting and storage arrangement 1 is operated as follows. For lifting the boat 4 out of the water, the cradle 5 is moved to the extended position by means of the drive mechanism 11. The stoppers 17 stop the movement of the front wheels 10.2 along the rails 6. In the extended position, the first end 5.1 of the cradle 5 floats in the water, typically below the water level. In the extended position the cradle 5 may pivot around the transverse axis 19 relative to the frame 2. The boat 4 to be lifted is moved on the cradle 5. The boat 4 may be driven on the cradle 5 with its own power. The cradle 5 comes into the contact with and against the bottom of the boat 4. The boat 4 may be attached to the cradle 5, e.g. to the side bars 12 and/or the bow support 9. Thereafter, the cradle 5 is moved to the retracted position by means of the drive mechanism 11. In the retracted position, the cradle 5 is above the water level. The boat 4 is lowered back into the water by moving the cradle 5 to the extended position.

[0035] It is obvious to a person skilled in the art that with the advancement of technology, the basic idea of the invention may be implemented in various ways. The invention and its embodiments are thus not limited to the examples described above, instead they may vary within the scope of the claims.

Claims

1. A lifting and storage arrangement (1) for boats (4), comprising a frame (2), **characterized in that** the arrangement (1) comprises a floating cradle (5) configured to receive the boat (4) to be lifted, the cradle (5) being movable along the frame (2) between a retracted position, in which the cradle (5) is on the frame (2), and an extended position, in which the cradle (5) is configured to float in water, and a drive mechanism (11) for moving the cradle (5) between the retracted and extended positions.

2. The arrangement (1) according to claim 1, **characterized in that** the cradle (5) has a first end (5.1) and an opposite second end (5.2), which first end (5.1) is configured to float in the water and the second end (5.2) is pivotally connected to the frame (2) when the cradle (5) is in the extended position.

3. The arrangement according to claim 2, **characterized in that** floating depth of the first end (5.1) of the cradle (5) is adjustable.

4. The arrangement (1) according to claim 2 or 3, **characterized in that** the second end (5.2) of the cradle (5) is pivotable around a transverse axis (19) relative to frame (2) in the extended position.

5. The arrangement (1) according to claim 4, **characterized in that** the transverse axis (19) is perpendicular to the direction of movement of the cradle (5) along the frame (2).

6. The arrangement (1) according to any of the preceding claims, **characterized in that** the cradle (5) is pivotally connected to the drive mechanism (11) to allow the cradle (5) to pivot around the transverse axis (19) relative to the frame (2) when the cradle (5) is in the extended position.

7. The arrangement (1) according to any of the preceding claims, **characterized in that** the frame (2) comprises at least one rail (6) along which the cradle (5) is moveable between the retracted and extended positions.

8. The arrangement (1) according to claim 7, **characterized in that** the cradle (5) comprises at least one wheel (10.1, 10.2) configured to roll along the rail (6).

9. The arrangement (1) according to claim 7 or 8, **characterized in that** the frame (2) comprises two rails (6), and the cradle (5) comprises at least one front wheel (10.2) and at least one rear wheel (10.1) for each rail (6), which front wheels (10.2) and rear wheels (10.1) are configured to roll along the rails (6).

10. The arrangement (1) according to claim 9, **characterized in that** the cradle (5) comprises two front wheels (10.2) for each rail (6), which front wheels (10.2) are arranged on opposite sides of the rail (6).

11. The arrangement (1) according to claim 10, **characterized in that** the cradle (5) comprises a rotatable connecting axle (14), the front wheels (10.2) on the opposite sides of the rail (6) being connected to a connecting piece (21), and the connecting pieces

(21) on the opposite sides of the cradle (5) being connected to the connecting axle (14).

12. The arrangement (1) according to any of claims 7 to 11, **characterized in that** the rails (6) comprise stoppers (17) configured to stop the travel of the front wheels (10.2) along the rails (6) when the cradle (5) is in the extended position.

13. The arrangement (1) according to any of claims 4 to 12, **characterized in that** the transverse axis (19) is the same as the axis of rotation of the connecting axle (14) when the cradle (5) is in the extended position.

14. The arrangement (1) according to any of claims 7 to 13, **characterized in that** an end part of said at least one rail (6) at the first end (2.1) of the frame (2) is downwardly curved and/or inclined.

15. A pier module, a boathouse or a boat trailer, **characterized in that** it comprises at least one lifting and storage arrangement (1) according to any of claims 1 to 14.

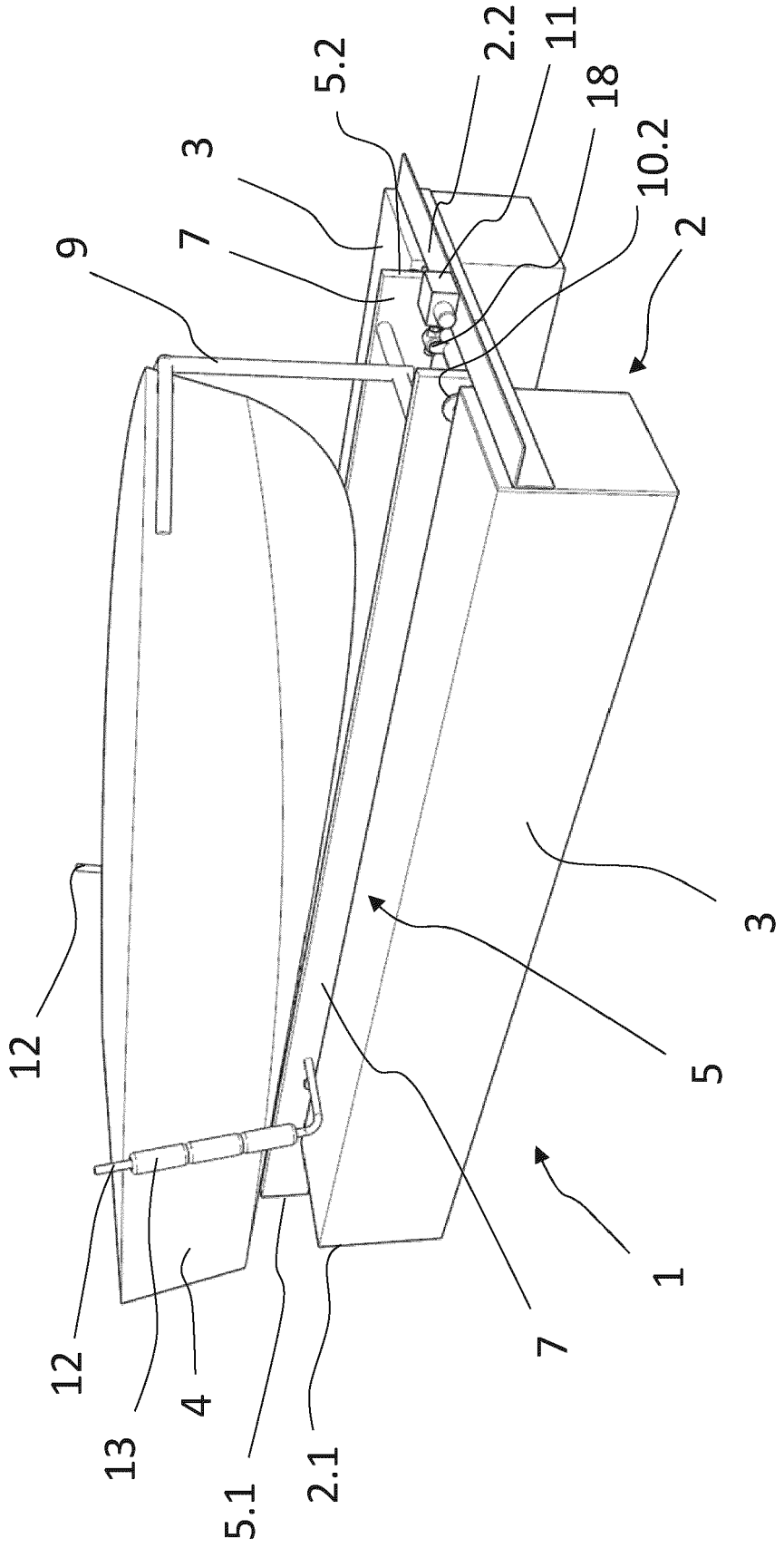


Fig. 1

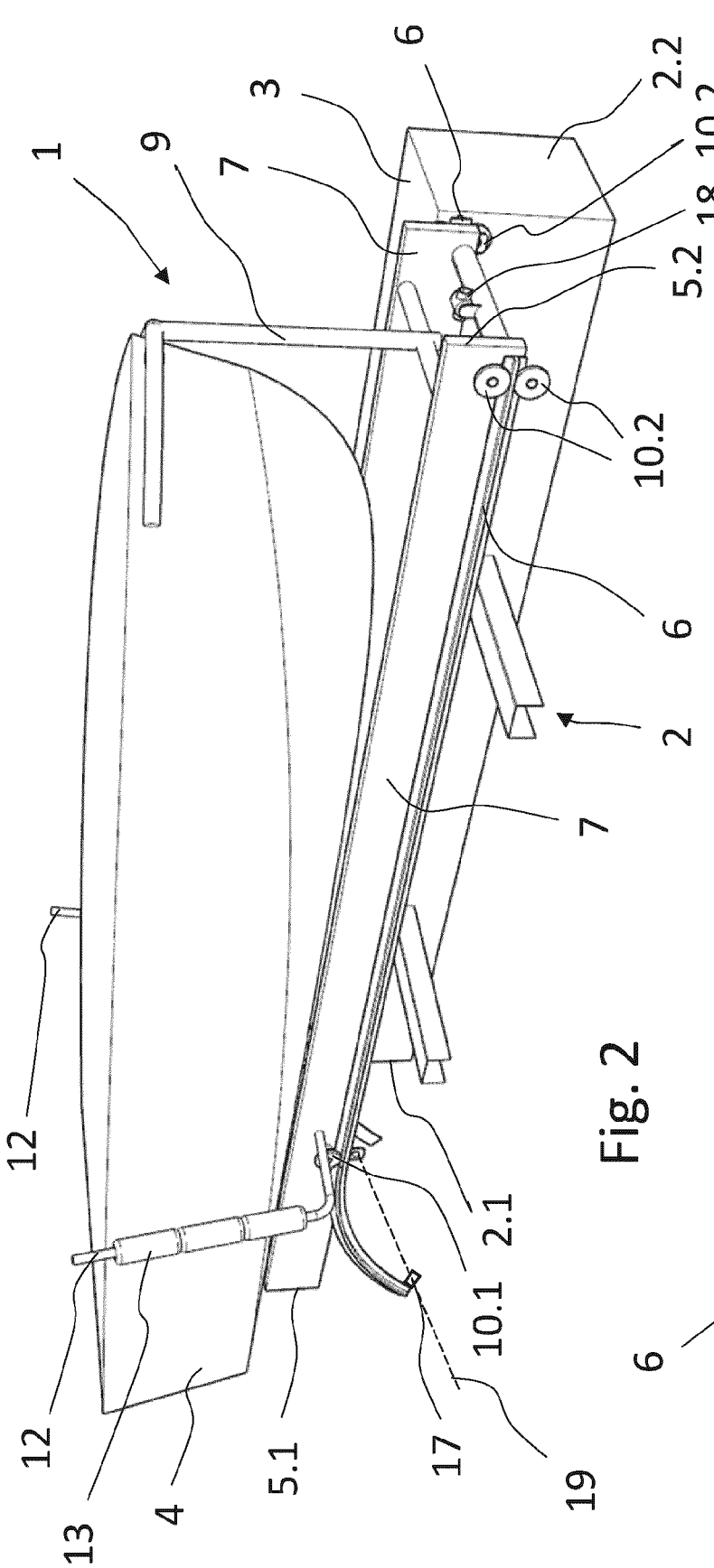


Fig. 2

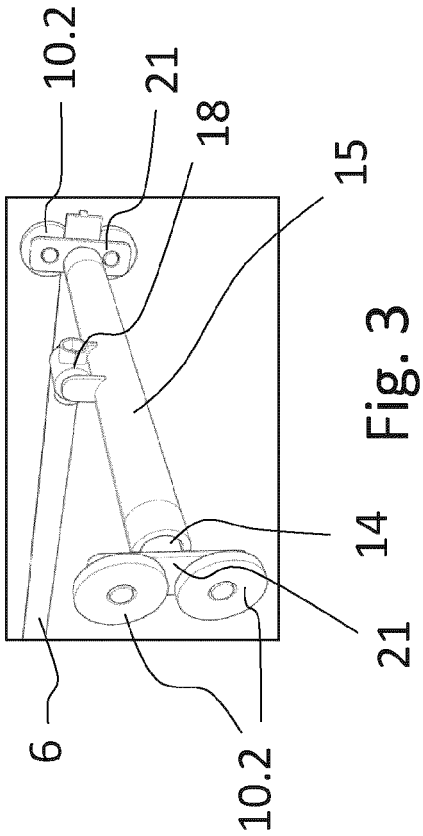


Fig. 3

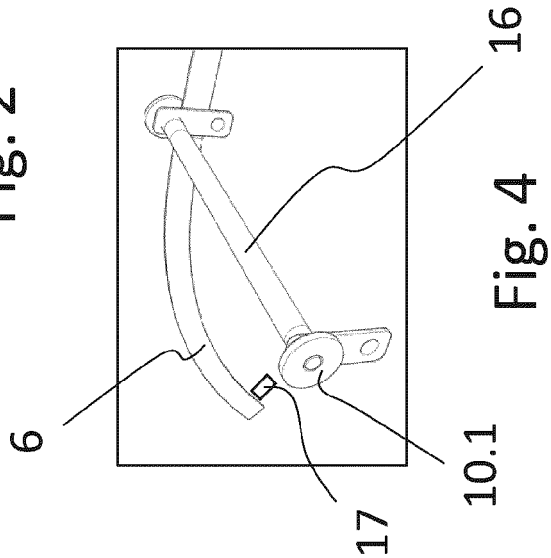
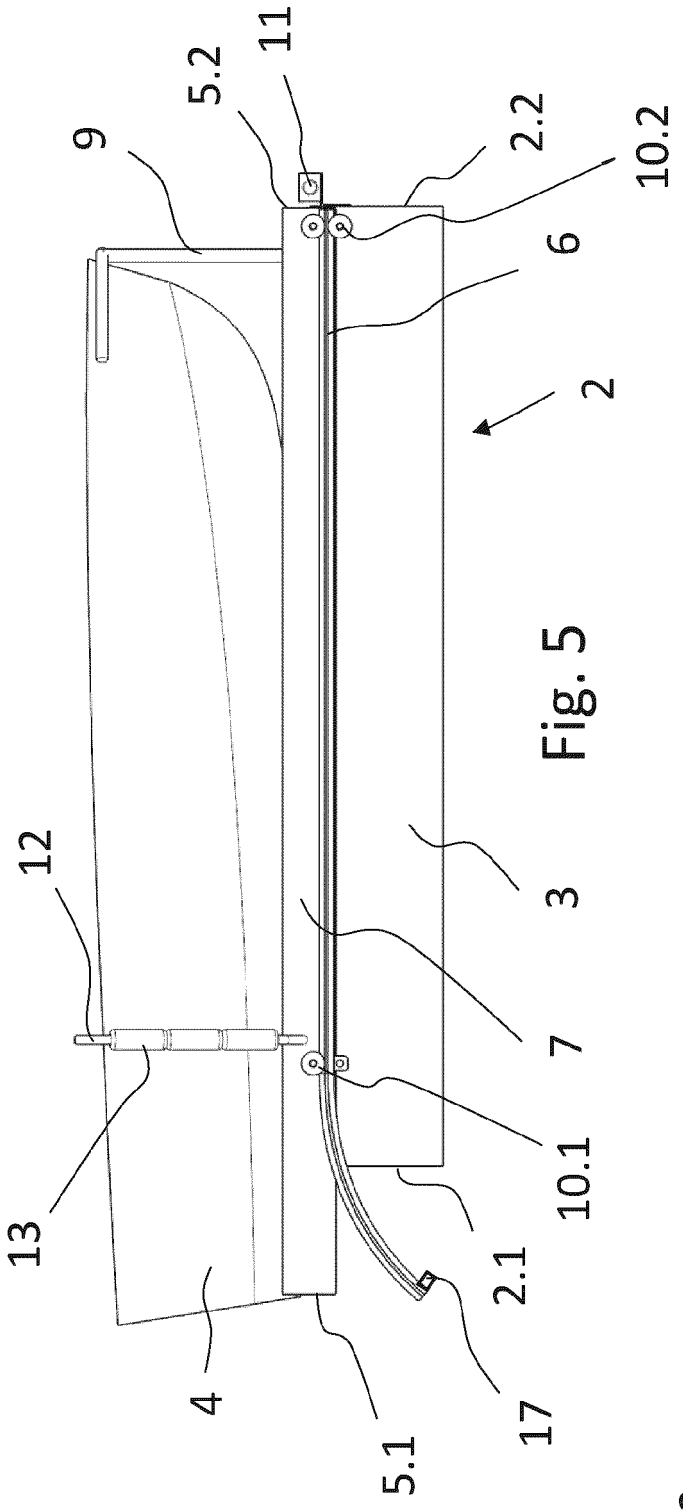


Fig. 4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12
13
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2.1
4
5.1
17

Fig. 5

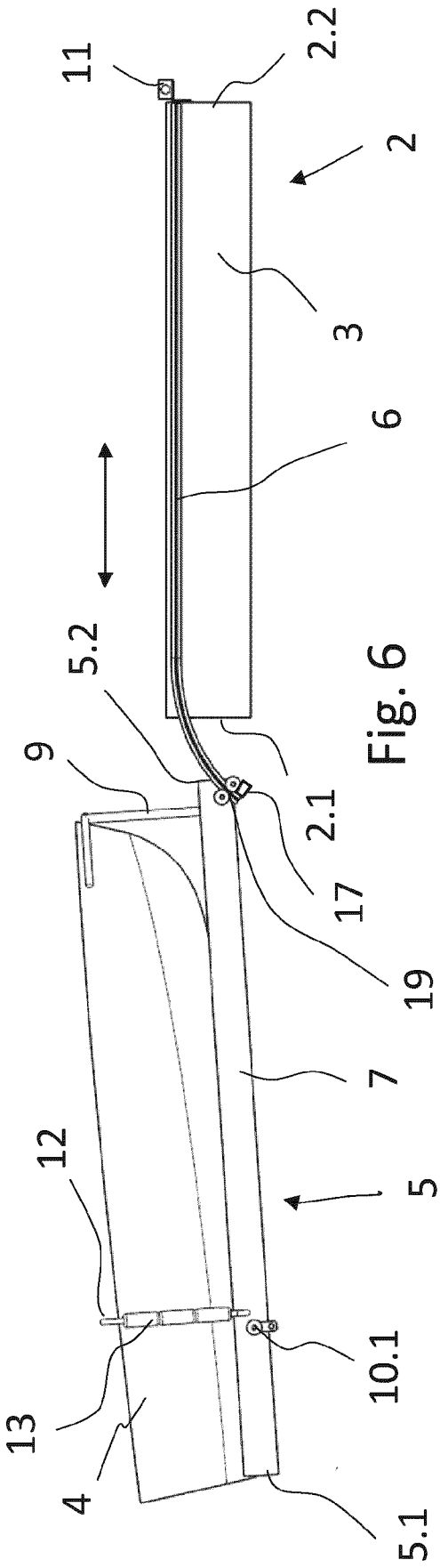
11
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Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 21 19 9875

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	US 2008/014067 A1 (CALDER RICHARD A [US]) 17 January 2008 (2008-01-17) * paragraphs [0016] - [0026] * * figures 1 - 5 *	1-15	TECHNICAL FIELDS SEARCHED (IPC) B63C B63J B60P

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 March 2022	Gatti, Davide

CATEGORY OF CITED DOCUMENTS

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