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(54) Mooring device.

(57) A mooring device for mooring a ship while allowing vertical displacement of the ship, such as in a tidal port of waterway with fluctuating water level or on loading and unloading.
The mooring device (3) slides along a fixed means (4) in a vertical direction said fixed means being installed at a quay (2) or other mooring faciltiy, itself consisting of a mooring arm.
The positions of the mooring arm (3) and the fixed means (4) are interchangeable.

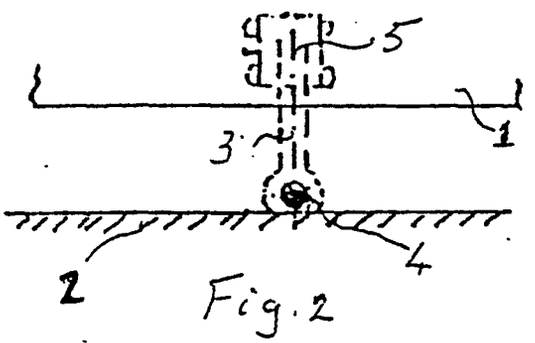

Fig. 2

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Mooring device

The invention relates to a mooring device, in particular for mooring a ship while allowing vertical displacement, such as in a tidal port or waterway with fluctuating water level or during loading and unloading.

Presently precautions have to be taken to adjust the customary mooring ropes under such conditions at regular intervals in order to prevent undesired displacement of the ship or, as the case may be, snapping of one or more of the mooring ropes. This requires continuous attention or alternatively a rather complex mechanism for achieving such a continuous adjustment of mooring ropes and actually allowing to refrain from the use of mooring ropes completely, if desired.

The present invention provides a mooring device comprising an extendable part, hereinafter referred to as mooring arm, fitted on the ship or at a quay or other mooring facility, capable of cooperating with fixed means ont the counterpart, said extendable arm, if extended and cooperating with said fixed means following the change in water level and/or change in the position of the ship on the water as a consequence of loading or unloading at all times while maintaining contact with said fixed means.

In essence the mooring device, if aboard the ship, can move freely in a vertical direction, whale sliding along the fixed means installed at the quay or other mooring facility. Alternatively, if the mooring device is mounted at the quay or other mooring facility, it is mounted adjustably is such a way that it will, once its proper position has been fixed, follow any change in water level and accordingly will maintain cooperation with the fixed means aboard the ship. The latter should be long enough to allow the mooring device to slide along the fixed means in a vertical direction during loading and unloading of the ship.

The fixed means may comprise a recess, such as can be sprovided by a U-beam or T-beam, or may consist of a rod. Their cooperation with the mooring device will be discussed below.

The mooring device, comprising the extendable part, can be extended by means of a hinge or preferably telescopically. Though the mooring device may be operated manually, it is preferably operated hydraulically, though mechanical or pneumatical operation are possible as well.

If the fixed means is a U-beam or I-beam, the mooring arm should properly fit into the recess of the beam while making the cooperation semi-permanent. This can be achieved by providing the mooring arm with separable, divided extensions at the end of the mooring arm facing the fixed means. Said extensions are sufficiently apart to be capable of passing beyond the front of the beam, if an I-beam is used with its head facing the mooring device, and capable of fitting into the recess of the beam once being brought towards each other again. Alternatively, using a U-beam, the extensions are kept together until they have been inserted into the recess of the U-beam, and are then moved sideways until they fit behind the inwardly directed ends of the U-beam. If the fixed means consist of a bar, the mooring arm should be capable of dividing its extensions sufficiently to pass a part of the extensions beyond the bar before bringing the extensions together again, thus clasping around the bar.

Apart from allowing the ship to follow any change in height, whether caused by a change of the water level or by loading or unloading, the mooring device will also keep the ship in position in the longitudinal direction along a quay, avoiding in principle the necessity of mooring ropes, though the latter may be used, if desired. Apart from providing a rather exact positioning of the ship along the quay, the mooring device according to the invention will also allow more ships to be berthed along a specific stretch of quay, as very little free space will be required between successive ships for the reasons set out above, in particular as the ships will not show any substantial displacement in the longitudinal direction along the quay.

The mooring arm is preferably provided with at least one wheel or roller at the head of the end facing the recess thus allowing unhampered movement upwards and downwards along the beam or bar with any change in vertical direction of the ship with respect to the mooring site. Wheels or rollers will facilitate movement by diminishing friction between the mooring arm and the fixed means.

If the mooring arm is mounted at the quay side, he is preferably capable of moving upwards and downwards with any change of the water level, for example by mounting on a vertical rail, while being slidable along said rail. In that connection the mooring arm may be mounted directly or indirectly, for example by an intermediate support, on a float.

The mooring device according to the invention, if mounted on a ship, is preferably positioned in an enclosed area of the ship, preferably at midship, and in such a way, that it can be operated from a command post, such as from the bridge.

The invention will now be described by means of the accompanying drawing, showing an embodiment of the invention without limiting the invention thereto.

In the drawing:

Fig .1 shows a ship provided with a mooring device according to the invention, berthed alongside a quay,

Fig .2 shows a mooring device according to the invention while in cooperation with fixed means, and

Fig .3 shows another mooring device according to the invention while in cooperation with fixed means.

In Fig.1 a ship 1 is berthed alongside a quay 2 by means of a mooring device 3, capable of moving along a vertical steel beam 4 with changes of the vertical position of the ship 1 with respect to the quay 2. In Fig.2 a mooring device 3 encloses a vertical steel beam 4, which latter is mounted at the quay 2. Mooring device 3 is operated by a hydraulic unit 5 aboard of the ship 1.

In Fig.3 a modification of mooring device 3 is shown, wherein it is attached to the ship 1 by means of a hinge 6, while it encloses a vertical steel beam 4, which in turn is mounted on the quay 2.

It will be obvious that it is equally possible to use the mirror image arrangement of the mooring device, that is that the mooring device is positioned on the quay and cooperates with a vertical steel beam mounted at the ship. It is of course also possible to realise the mounting device in a different way, provided that it complies with the inventive concept, that is that it attaches on or in a fixed meens. The extension and withdrawal of the mooring device may be carried out manually, but for practical reasons it is preferred that this is done mechanically, hydraulically or pneumatically. It is also possible to provide the extreme end of the extended part of the moording device with one or more wheels or rollers in order to reduce the friction with the fixed means as much as possible.

Claims

1. A mooring device allowing vertical displacement of a ship with respect to a quay, characterised in that it is provided with an extendible arm (3) , positioned in the ship (1) or on the quay (2) or some other mooring facility, and capable of cooperating in extended position with a fixed means at the counterpart whereby said mooring arm is capable of following every change of the position of the ship (1) while maintaining cooperation with the fixed means, while in extended position.

2. A mooring device according to claim 1, characterised in that the extendable arm (3) is mounted hingingly.

3. A mooring device according to claim 1, characterised in that the extendable arm (3) is operated by a mechanical, hydraulic or pneumatic unit.

4. A mooring device according to any one of claims 1 to 3, characterised in that the mooring arm (3) is provided with separable, parted extensions, capable of being moved apart and together, and suitable to enclose the fixed means in a slidable manner.

5. A mooring device according to olaim 4, characterised in that the extensions are provided with at least a wheel or roller at the extreme end of the extension, facing the fixed means (4).

6. A mooring device according to claim 5, characterised in that the extensions are provided with a wheel or roller at the upper side of the extreme end of each extension and with two wheels or rollers at both sides of the extreme end.

7. A mooring device according to any one of claims 1 to 6, characterised in that the mooring arm (3) is provided with a discongruous extreme end, rotatable around the longitudinal axis of the arm.

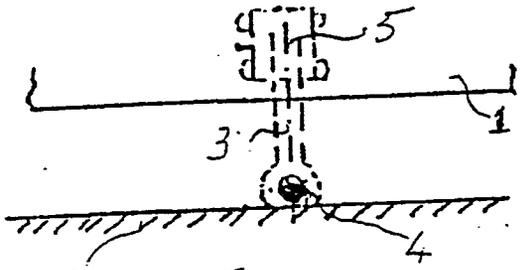

Fig. 2

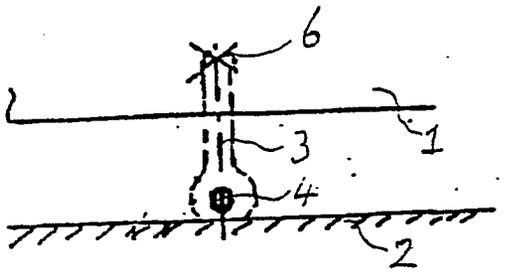

Fig. 3

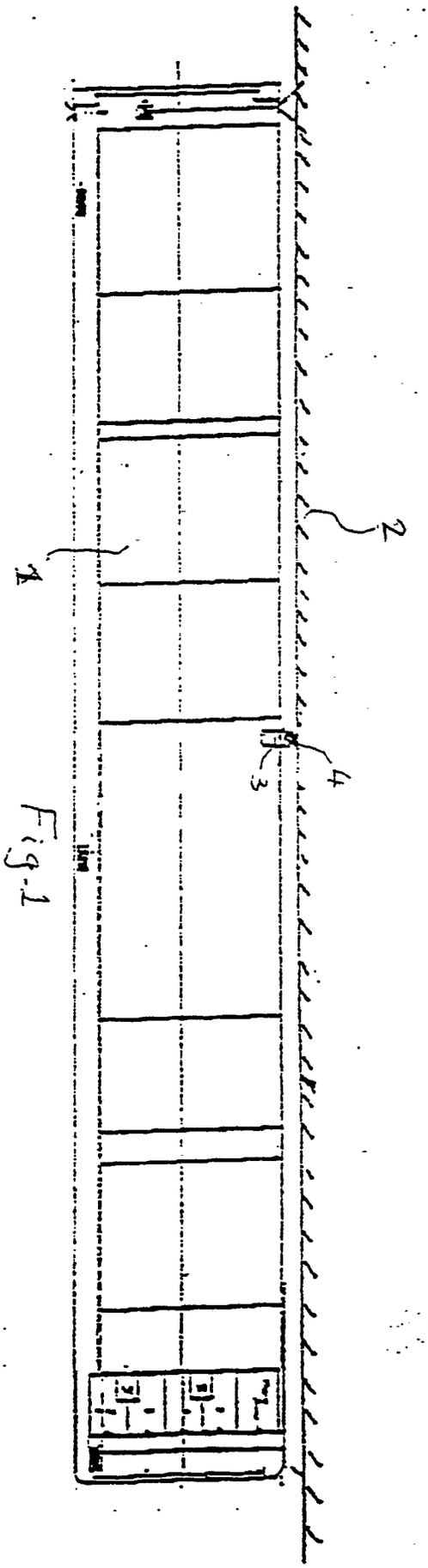

Fig. 1

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EUROPEAN SEARCH REPORT

Application Number

EP 89 20 2627

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	WO-A-8 705 875 (BURG) * Page 8, line 29 - page 9, line 7; page 12, line 1 - page 13, line 23; figures 6-10 *	1-3	B 63 B 21/00
Y	---	4,5,7	
X	PATENT ABSTRACTS OF JAPAN, vol. 7, no. 254 (M-255)[1399], 11th November 1983; & JP-A-58 136 587 (NIPPON SEIKOSHO K.K.)	1-3	
Y	---	7	
A	IDEM	6	
X	---	1-3	
A	DE-A- 913 984 (WÜRTH) * Page 2, lines 18-100; figures 1-5 *	4-7	
X	---	1-3	
A	GB-A-2 080 228 (NAVIRE CARGO GEAR) * Whole document *	4-7	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
Y	---	4,5	B 63 B B 63 C
A	US-A-2 697 410 (ANSCHUTZ) * Whole document *	6	
A	---	1-7	
A	US-A-2 845 892 (JORGENSON) * Column 3, line 56 - column 4, line 23; figures 1-8 *	1-7	
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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	24-01-1990	DE SENA Y HERNANDORENA A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EUROPEAN SEARCH REPORT

Application Number

EP 89 20 2627

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-2 754 792 (BAIRD)		
A	GB-A- 709 008 (ENGSTRAND)		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)

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