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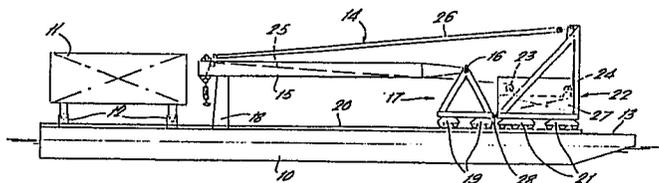
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⑤4 **Improvements in cranes.**

⑤7 A shearleg crane has a shearleg (15) which is pivotally mounted on a carriage (17) movable over the deck (20) of a vessel (10), a further carriage (22) carrying winching units (23, 24) for the load hoist tackle (25) and shearleg support tackle (26), and an intermediate strut (30) which is engageable between the two carriages to maintain their separation.

FIG. 1.



Description

IMPROVEMENTS IN CRANES

This invention relates to cranes and in particular, shearleg cranes.

According to the present invention there is provided a crane comprising a shearleg, means mounting the shearleg for pivotal movement relative to a deck about an axis extending parallel to the plane of the deck, means for supporting the shearleg at a desired angle of pivot, and means for moving the shearleg mounting means over the deck in a direction transverse to the pivotal axis of the shearleg, wherein means is provided for moving the shearleg supporting means over the deck in said direction and strut means is provided for engagement between the shearleg mounting means and the shearleg support means to keep them spaced apart along the deck at least while the shearleg is under load.

The invention also provides a vessel incorporating a crane as defined above and a method of shifting a load using said crane or said vessel. By way of example, some embodiments of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 shows a vessel with cranes according to the invention and transporting a module,

Figure 2 shows the cranes being prepared for lifting the module,

Figure 3 shows lifting of the module,

Figure 4 shows setting of the module on a platform jacket,

Figure 5 is a head-on view showing the module suspended from the cranes,

Figures 6 illustrates the effect of relative longitudinal movement between the cranes,

Figure 7 and 8 illustrate the forces acting on the vessel,

Figure 9 and 10 show vessels with modified forms of cranes, and

Figure 11 shows a detail of one form of carriage drive.

There is seen in Figure 1 a vessel 10 incorporating shearleg cranes 14 according to the invention. The vessel 10 is a deck load barge, ie it is purpose built to be able to support and carry on its deck large modules such as offshore platforms or decks. The vessel 10 is seen here in its transport mode, with a module 11 being supported on sea fastenings 12 on the deck 13 of the vessel. The shearleg cranes 14 seen here on the vessel are in their stowed position on deck. The cranes extend over a distance of at least half the length of the vessel.

The shearleg cranes 14 comprise a shear leg 15, which is pivotably mounted at 16 on a carriage 17. In the stowed position shown in Figure 1, the shear leg 15 rests on a cradle 18. The carriage 17 has sets of bogie wheels 19 which are arranged to travel along rails 20 on the deck 13 of the vessel 10. Also arranged to travel along the rails 20 via set of bogie wheels 21, is a further carriage 22.

Carriage 22 mounts winches 23 and 24 which are respectively for the module lifting tackle 25 and the

shear leg support tackle 26. To prevent the carriage 22 from lifting off the rails 20 in use of the crane, the carriage contains ballast 27. In addition, or alternatively the carriage 22 may have means such as counter bogies to react against the rails. Buffers 28 are provided where the two carriages 17 and 22 meet. The carriages are equipped with suitable means, eg motor drive through rack and pinions, enabling them to be moved along the rails and suitable means, eg brakes, enabling the carriages to be held in position. The carriage drive system has to have sufficient power to enable initial erection of the shearleg and also to enable movement of the crane under load.

Figure 2 shows the shearleg cranes 14 being readied for lifting of the module 11. The two carriages 17 and 22 have been moved apart along the rails 20, and the shear leg 15 hoisted by its support tackle 26 under control of winch 24. The module 11 is linked up to its lifting tackle 25, via slings 29, under control of winch 23. Also seen in Figure 2 is an intermediate structure, strut 30, being installed between the two carriages 17 and 22. The strut 30 in this case is mounted on the rails 20, via bogies 31, and is installed using a crane 32. The strut 30 has sufficient strength to resist buckling during use of the crane 14. The strut 30 effectively provides a removable/installable part of the crane 14.

Figure 3 shows the module 11 being lifted up off the deck 13 of the vessel 10, under control of winch 23, having been cut away from its sea-fastenings 12. The crane 14 is seen here fully assembled, with strut 30 installed between the two carriages 17 and 22.

Figure 4 shows the vessel 10 in position relative to an offshore support structure, in this case a platform jacket 33, ready for installation of the module 11. The vessel is positioned using mooring lines 34 and/or other means such as dynamic positioning with thrusters. The crane 14 is moved along the rails 20 on the deck 13 of the vessel 10 so that the module 11 is suspended clear of the end of the vessel over the platform jacket 33. Means such as tugger lines 35 are provided for adjustment of the position of the module 11 relative to the platform jacket 33 during setting down of the module. Guides 36 are provided on the platform jacket 33 to receive stabbing pins 37 on the module 11.

Figure 5 shows a head-on view of the vessel 10, from which it can be seen that the vessel has two shearleg cranes 14 working in tandem and moving side by side parallel to each other.

Figure 6 illustrates how relative longitudinal movement between the two cranes 14 can be used to control the yaw of the module 11, that is, its rotational position about a vertical axis. Yaw control is needed to enable stabbing pins 37 to be aligned with guides 36 during setting down of the module. Yaw control by adjustment of the relative position of the cranes avoids the need for highly loaded tugger lines and winches.

Figures 7 and 8 illustrate the forces acting on the

vessel 10: downward forces W_a , W_b and W_c from the weight of the two carriages 17 and 22, the strut 30 and the module 11 itself. These forces are opposed by the upthrust from the water on the vessel 10 caused by its displacement in the water. These upward forces are denoted by D_a , D_b and D_c over the areas beneath the carriage 17, the strut 30 and the carriage 22 respectively.

In order to be able to keep the vessel 10 level, the vessel has transferrable ballast 38. When the cranes 14 are moved from their initial position lifting the module 11 off the deck (Figure 7) to a position ready to set down the module on the platform jacket 33 (Figure 8), the ballast 38 is transferred to the opposite end of the vessel to counterbalance the shift in weight.

In Figure 9 there is seen a vessel which is very similar to that shown in Figure 1 except here, the shear legs 15' are rather longer and are stored on somewhat higher cradle 18'.

In Figure 10 there is seen a further modified version of the vessel seen in Figure 1. Here, the strut 30' is a fixed, permanent bridge to transfer load between the two carriages 17 and 22.

In Figure 11 there is seen a detail of one form of carriage drive. Wheels 50 support the carriage 51 on the rails 20, which are provided at approximately the level of the deck 13 of the vessel 10. Positioned between the rails 20 and running parallel with the rails is a rack 52. Pinions 53 are mounted on the carriage 51 to engage the rack 52 and are driven by motors 54.

The shearleg cranes have been described above with reference to their incorporation on a vessel, eg, deck load barge. It will be appreciated, however, that these cranes may be used on other decks including fixed surfaces such as quaysides.

Claims

1. A crane comprising a shearleg, means mounting the shearleg for pivotal movement relative to a deck about an axis extending parallel to the plane of the deck, means for supporting the shearleg at a desired angle of pivot, and means for moving the shearleg mounting means over the deck in a direction transverse to the pivotal axis of the shearleg, wherein means is provided for moving the shearleg supporting means over the deck in said direction and strut means is provided for engagement between the shearleg mounting means and the shearleg support means to keep them spaced apart along the deck at least while the shearleg is under load.

2. A crane as claimed in Claim 1 wherein said strut means is removable to allow the shearleg mounting means and shearleg supporting means to come together to enable the shearleg to be collapsed to a deck storage position.

3. A crane as claimed in Claim 1 or Claim 2 wherein said shearleg mounting means in-

cludes wheeled carriage means for travel over the deck.

4. A crane as claimed in Claim 1, Claim 2 or Claim 3 wherein the shearleg supporting means includes wheeled carriage means for travel over the deck.

5. A crane as claimed in Claim 3 wherein said means for moving said shearleg mounting means comprises a rack and pinion drive.

6. A crane as claimed in Claim 4 wherein said means for moving said shearleg supporting means comprises a rack and pinion drive.

7. A vessel incorporating a crane as claimed in any preceding claim wherein said deck is the deck of the vessel.

8. A vessel as claimed in Claim 7 wherein said deck is elongate in said direction of movement of the shearleg mounting means and shearleg supporting means.

9. A vessel as claimed in Claim 7 or Claim 8 wherein said vessel is a deck load barge.

10. A vessel as claimed in Claim 7, Claim 8 or Claim 9 wherein the shearleg, shearleg mounting means and shearleg supporting means extend over a distance of at least half the length of the vessel.

11. A vessel as claimed in any one of Claims 7 to 10 and including means to transfer ballast in said direction to compensate for movement of loads along the deck.

12. A vessel as claimed in any one of claims 7 to 11 and incorporating two said cranes as claimed in any one of Claims 1 to 6 arranged for parallel movement in said direction over the deck.

13. A vessel as claimed in Claim 12 wherein the cranes are capable of moving in said direction relative to each other whilst under load whereby to enable adjustment of the rotational position of the load about a vertical axis.

14. A vessel as claimed in any one of Claims 7 to 13 wherein said deck is provided with rails, skidding beams or the like along which said shearleg mounting means and supporting means are movable.

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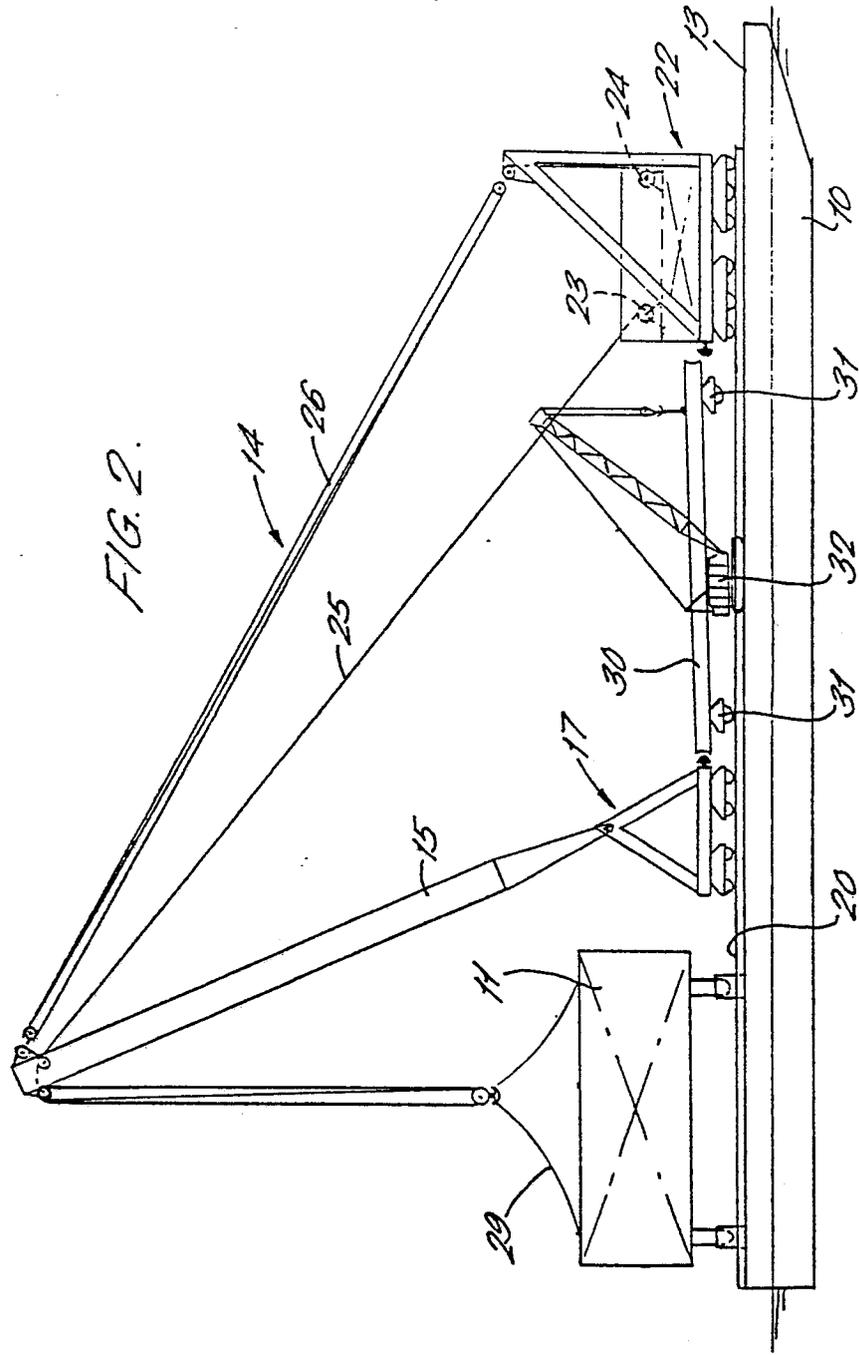
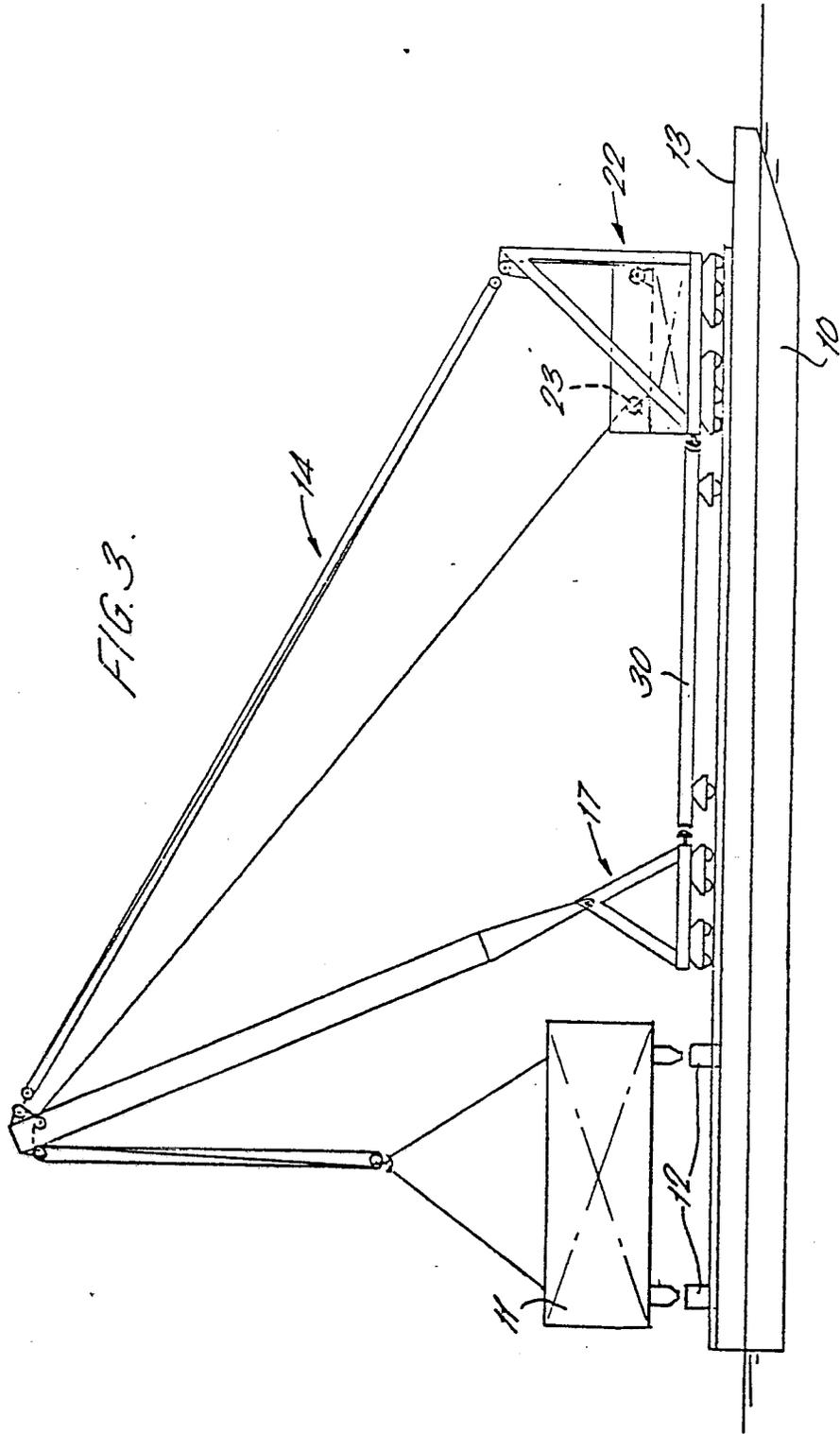


FIG. 2.

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FIG. 3.



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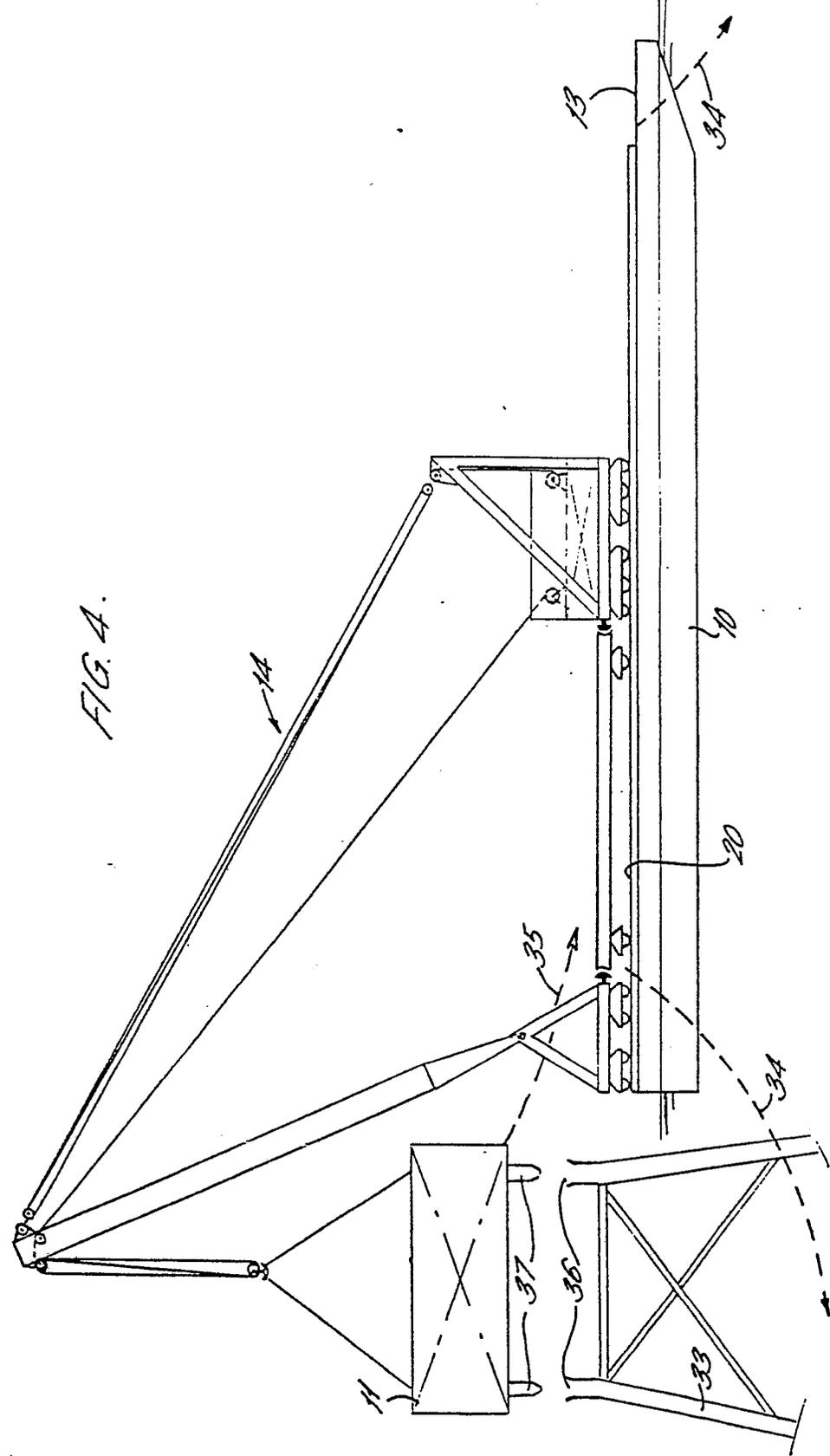
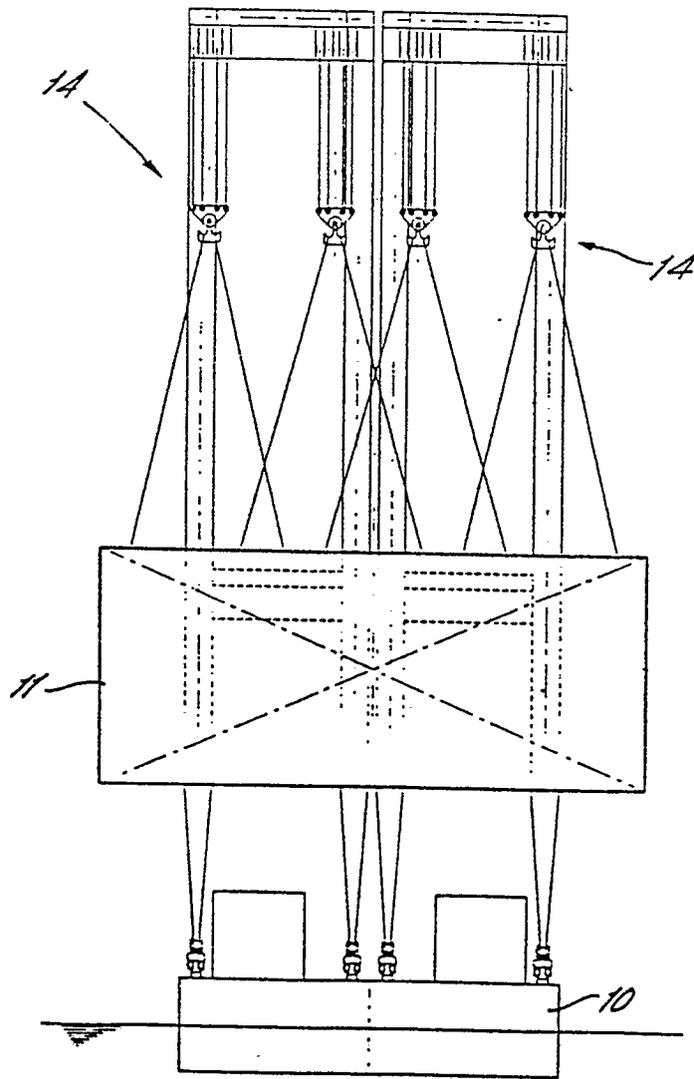


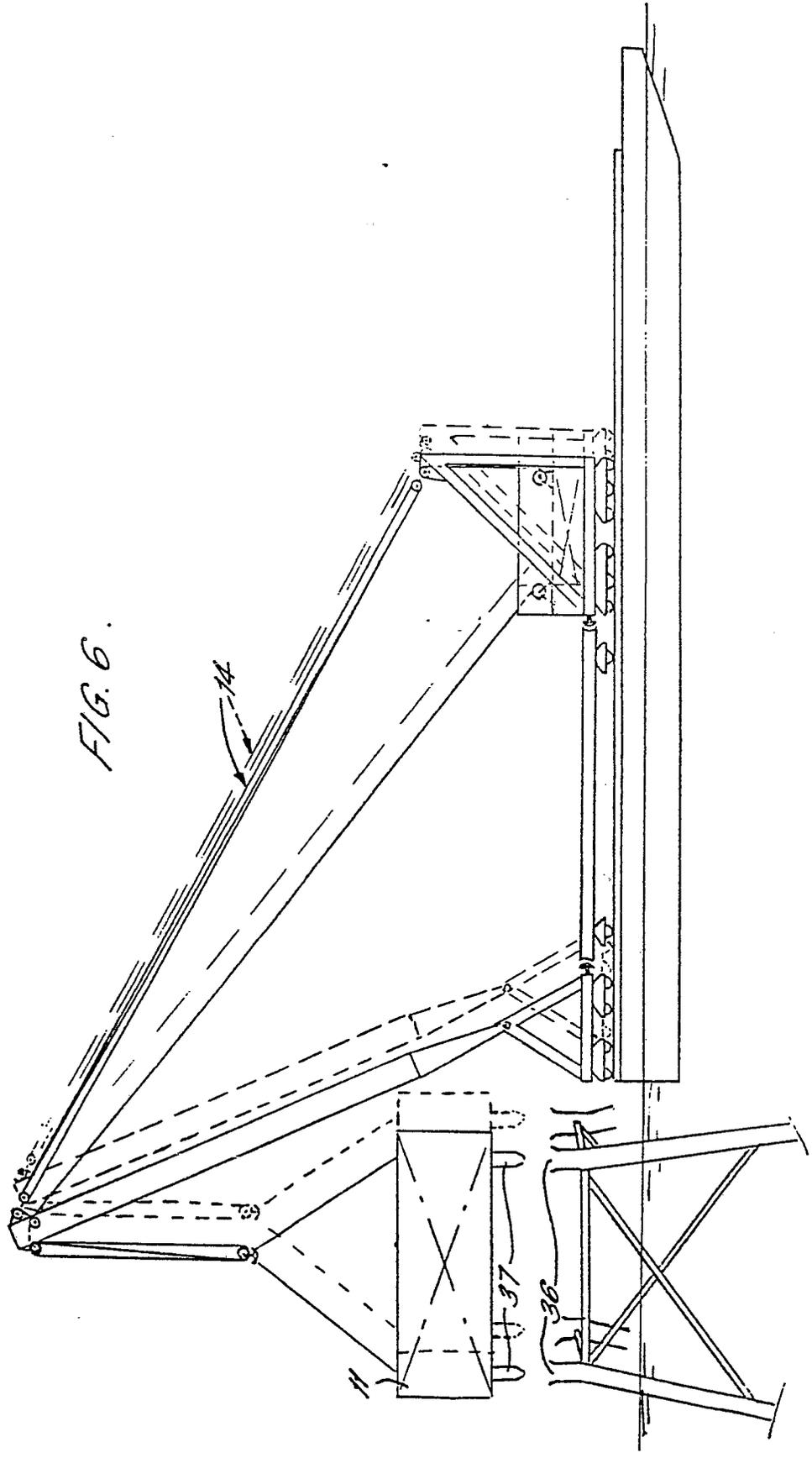
FIG. 4.

FIG. 5.

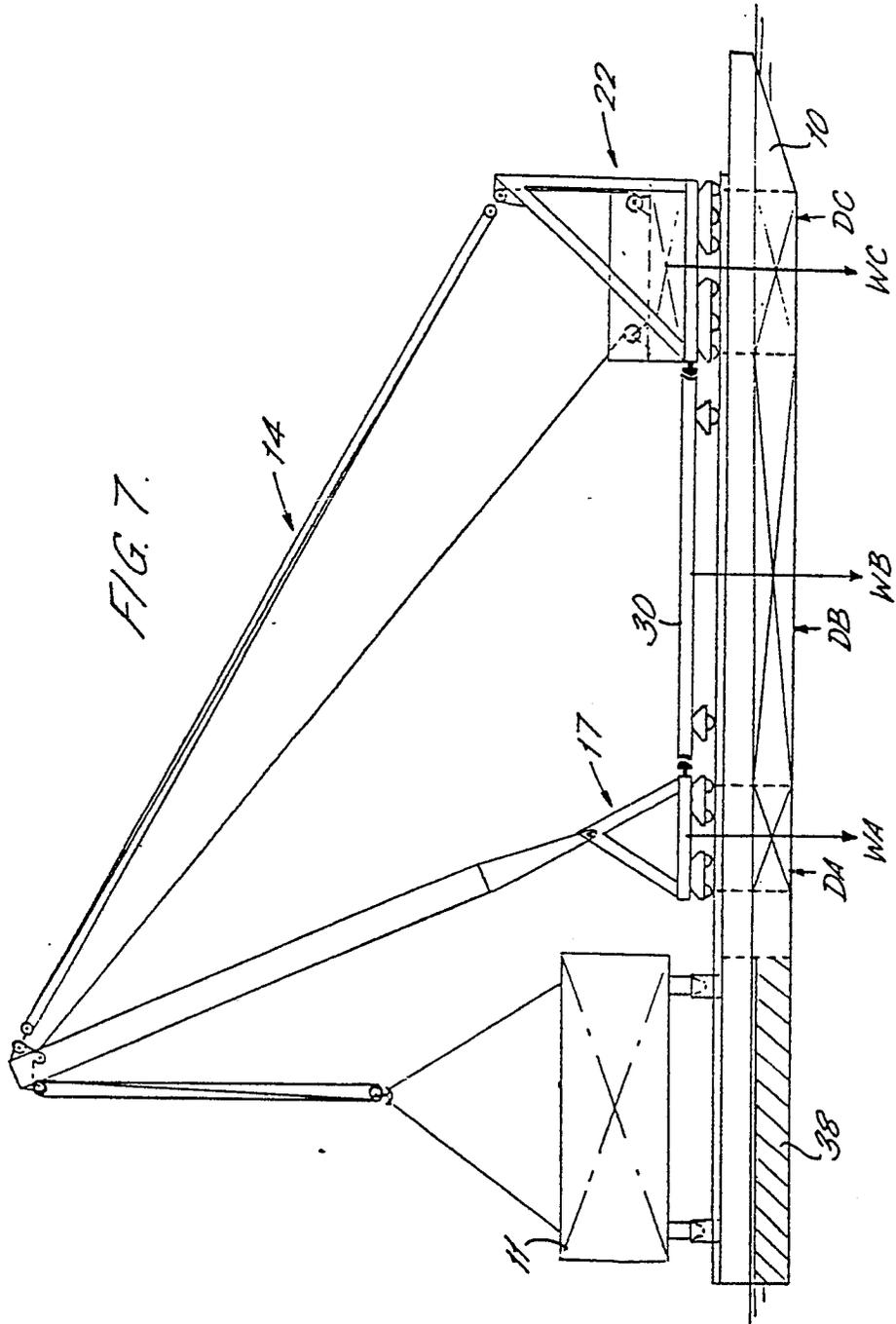


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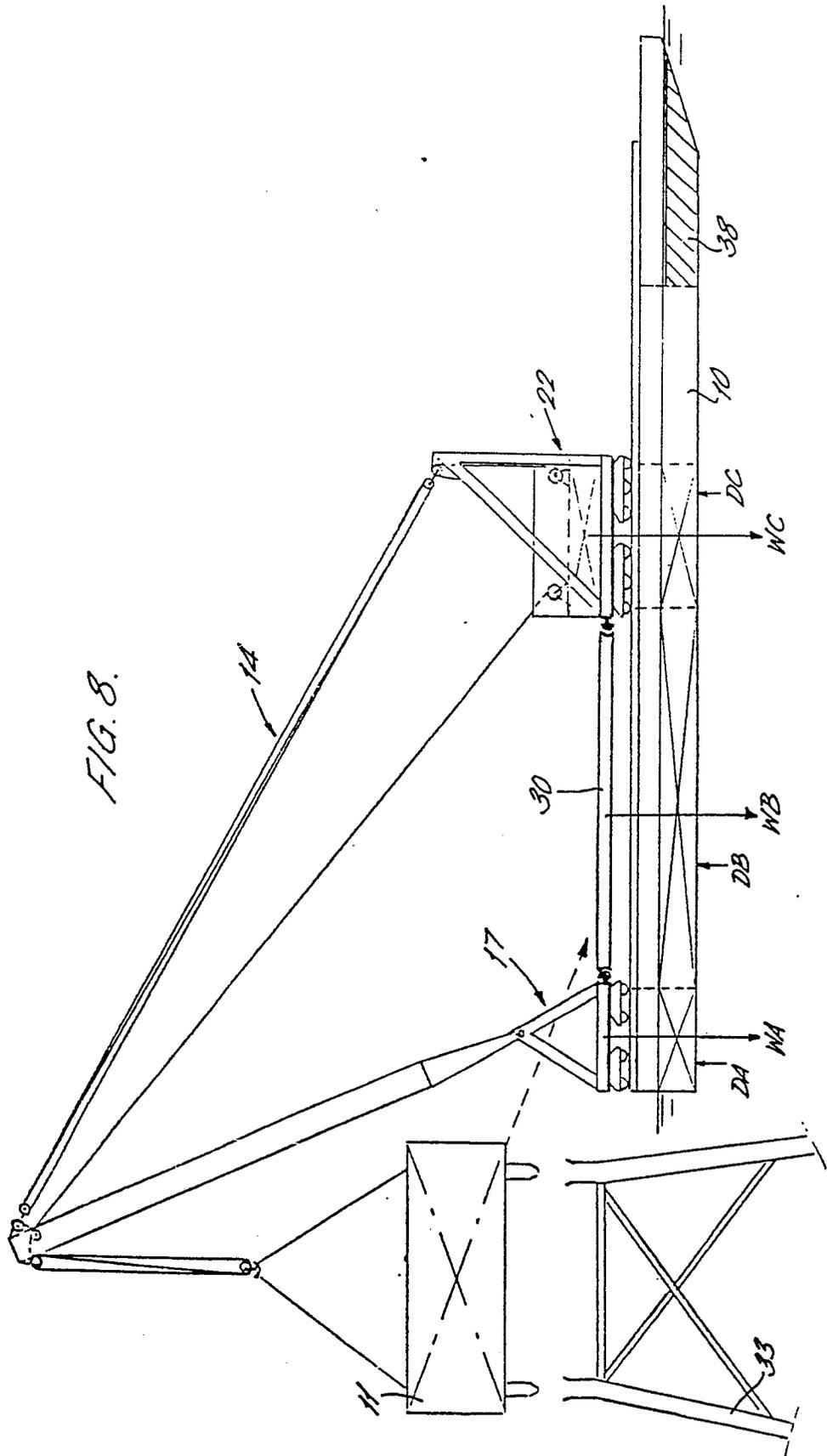
FIG. 6.



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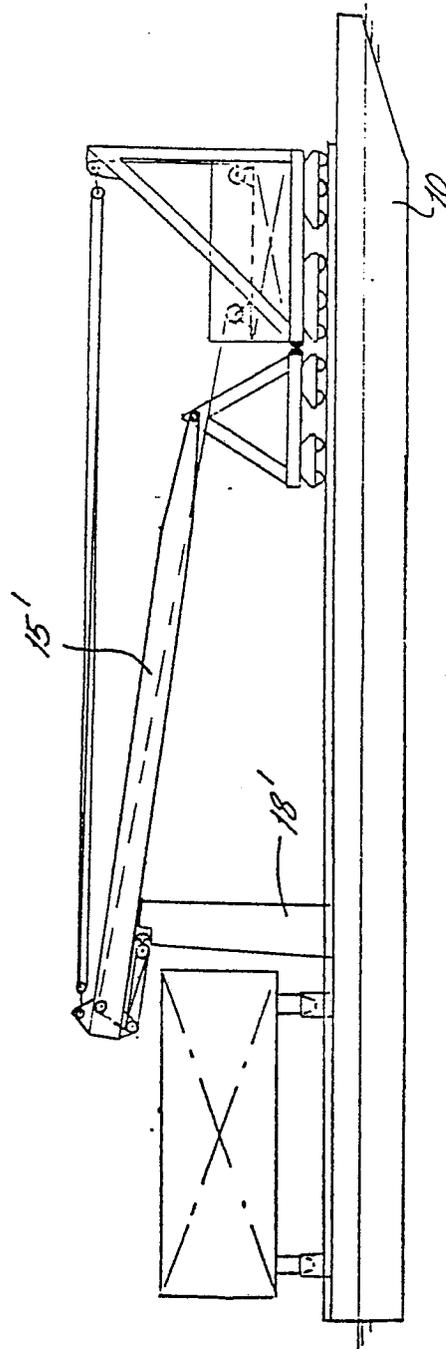


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FIG. 9.



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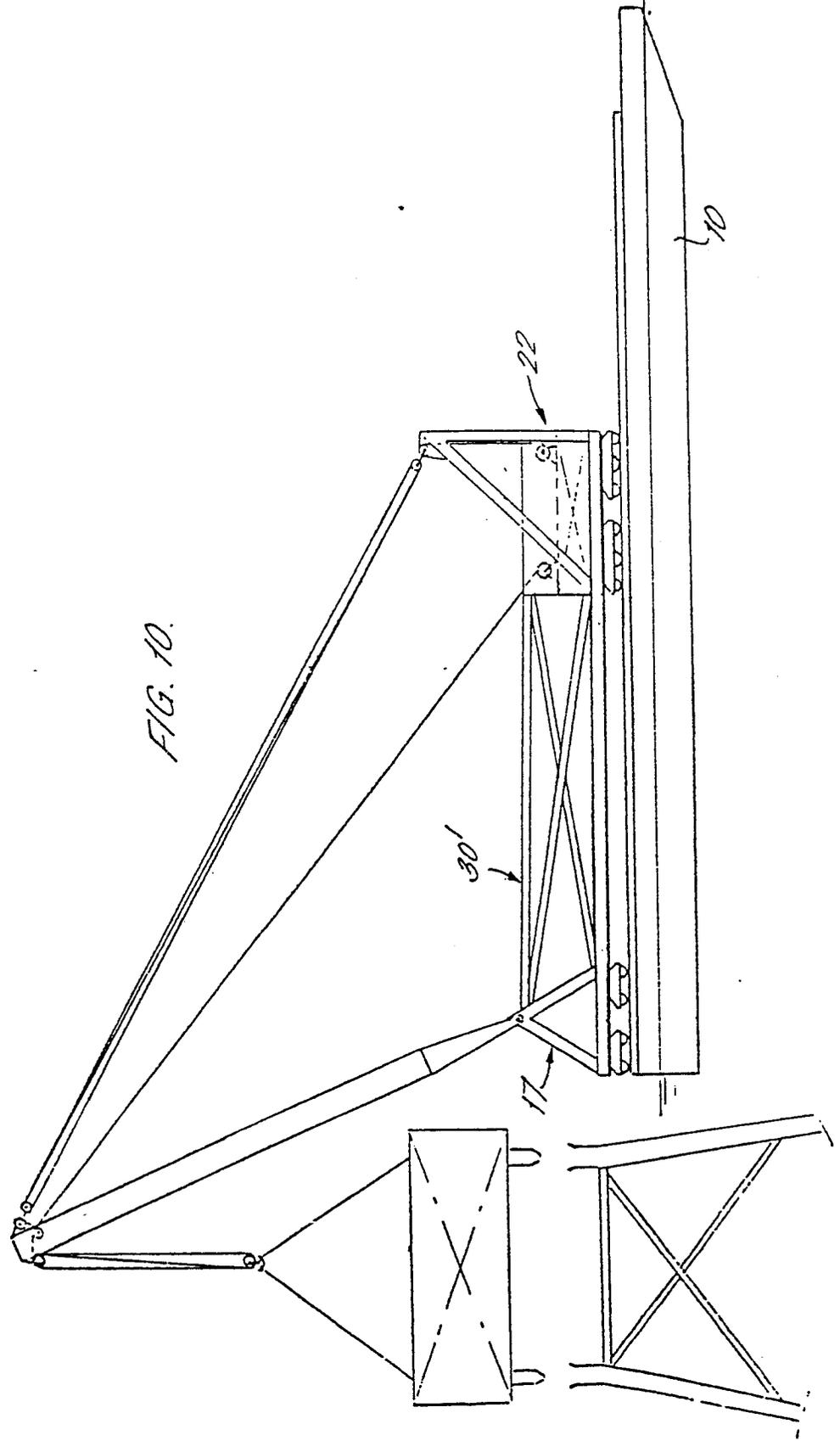
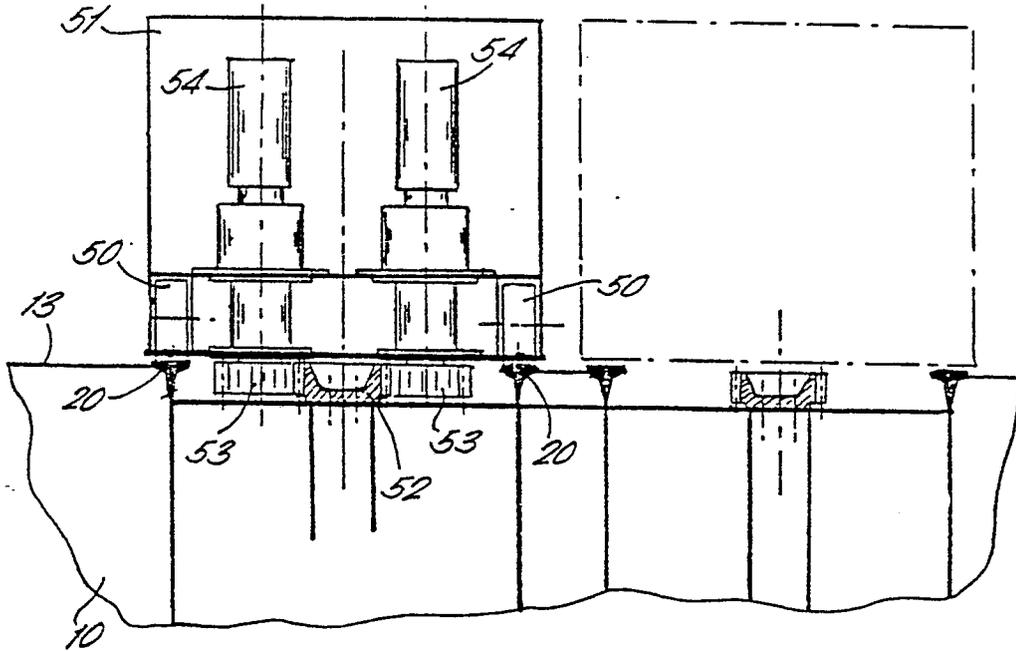


FIG. 10.

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FIG. 11.





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.4)
Y	GB-A-2 151 580 (CDF SS) * Whole document *	1,2,3,4 ,7,8,9, 10	B 66 C 23/52
Y	DE-A-1 962 895 (FA. KONE OSAKEYHTIOE) * Page 5; page 6, paragraphs 1,2 *	1,2,3,4 ,7,8,9, 10	
A	---	13,14	
A	GB-A- 383 730 (MARCHAUT) * Page 1, lines 47-61 *	1,3,5,7 ,8,9,13 ,14	
A	SHIPPING WORLD & SHIPBUILDER, vol. 167, no. 3897, September 1974, pages 949-950; "'MUSASHI' The world's largest floating crane" * Page 949, left-hand column; figures *	1,7,12	
A	GB-A- 20 507 (KIMMEL)(A.D. 1913) * Page 2, lines 9-15 *	11	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
P,A	GB-A-2 196 603 (HEEREMA ENGINEERING SERVICE) * Whole document *	1,3,4,5 ,6,7,8, 9,12,14	B 66 C
A	FR-A-2 322 817 (HOWALDSWERKE DEUTSCHE WERFT)	1,3,4,5 ,6,7,8, 9,12,14	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 06-09-1988	Examiner VAN DEN BERGHE E.J.J.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons</p> <p>----- & : member of the same patent family, corresponding document</p>			