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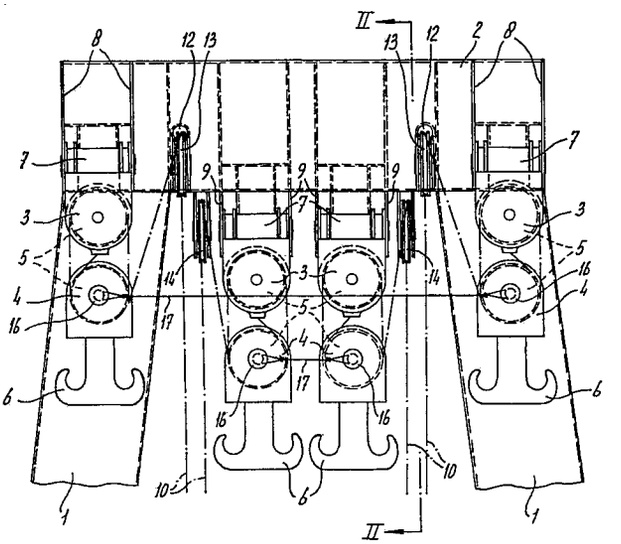
(54) Hoisting device, in particular floating derrick.

(57) The invention is related to a hoisting device, in particular a floating derrick with a hoisting portal (1, 2) or hoisting pole on the upper end (2) of which a plurality of juxtaposed tackles (3, 4) is pivotably mounted in which each of said tackles (3, 4) comprises a fixed upper block (3) with a plurality of pullies and a free lower block (4) with a plurality of pullies (5).

The invention aims to provide a hoisting device of the said type having more pullies (5) in the tackles to increase the hoisting power; of which the lift height is increased; the pivot angle about which the lifting cables may pivot sidewards is far greater than 15°; the construction is simple; and having the possibility of mutual oupling of the outer and inner blocks.

According to the invention this is obtained by the fact that the rotary shafts of the pullies (5) extend substantially perpendicular to the pivot shafts by which the upper-blocks (1, 2) are suspended to the portal or pole.

The freedom of use of the hoisting device according to the invention is increased considerably.



EP 0 049 001 A1

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Hoisting device, in particular floating derrick.

The invention is related to a hoisting device, in particular a floating derrick with a hoisting portal or hoisting pole on the upper end of which a plurality of juxtaposed tackles is pivotably mounted in which each of said tackles comprises a fixed upper block with a plurality of pullies and a free lower block with a plurality of pullies.

In known embodiments of a hoisting device of this type the rotary shafts of the pullies and the pivot suspension shafts by which the upper blocks are suspended are mutually parallel and between each of the rotary shafts and each of the pivot suspension shafts a further intermediate pivot is provided of which the axis is perpendicular to the axis of the rotary shafts of the pullies and to the pivot suspension shafts. Apart from the friction the hoisting capacity of a tackle equals the product of the pulling power and the number of cable portions of which the load is suspended.

The full hoisting capacity of the hoisting device equals the sum of the hoisting capacities of the single tackles. To increase the hoisting capacity the number of the pullies per block or the number of tackles has to be increased. In both cases space parallel to the pivot suspension shafts is required. In case this space is not available, for instance in case the upper width of the portal of the floating derrick is fixed and in this space a to large number of pullies has to be accomodated it is possible to split the upper blocks into two parts and to mount them one behind the other or one below the other. The mounting below each other of the two parts of the upper blocks means a decrease in lift height. The mounting behind each other of the two parts of the upper blocks results in a complicated and expensive construction and also restricts the lift height because of the fact that the parted upper blocks have to remain free from the hoisting portal.

Further disadvantages of known embodiments of floating derricks are the required further intermediate pivot that decreases the lift height and the restricted pivot angle (for instance 15^{o}) about which the tackles may pivot with regard to each other.

The invention aims to position tackle-blocks of a hoisting device of the above type in such way that the above indicated objections can be removed.

According to the invention the hoisting device of the above type is characterized in that the rotary shafts of the pullies extend substantially perpendicular to the pivot shafts by which the upper blocks are suspended to the portal or pole.

In connection with this suspension of the blocks (rotated over 90^{o} with regard to the current suspension) it also is possible to connect mutually the outer and inner blocks in a simple manner by means of hoisting slings that are connected to the pully shafts of the lower block.

By loading the lower blocks the lower block will orient in the direction of the hoisting slings. In certain cases this may mean a great advantage.

Independent of the length of the blocks, that means of the number of pullies per block, the width covered by all upper blocks is mainly determined by the diameter of the pullies and by the number of upper blocks. Thus the number of pullies can be increased without requiring more space in width direction (for instance a greater width of the portal). The shafts of the upper blocks serve as pivot shafts about which these blocks may pivot crosswise to the direction of the cable portions of the hoisting cable while the pullies and pulley shafts serve as pivot points for the tackle in the direction parallel to the plane of the hoisting portal and the hoisting cable allows a far greater pivot angle with the vertical direction than the current 15^{o}. Moreover the intermediate pivots may be omitted. This means less decrease lift height.

In order to be able to pivot freely in two mutual perpendicular pivot directions it is preferred that at least the two outer upper- blocks are pivotably connected to a part extending forward with regard to the upper end of the portal of pole.

By situating all upper-blocks forward a maximum lift height may be obtained. The bending load on the top of the hoisting device (for instance the head of the portal), however, will increase.

In case at least one of the inner upper-blocks is positioned

backward with regard to the outer upper-blocks the bending load will decrease and the hoisting cables of the upper-blocks may cross each other over an angle and this leads to a greater freedom of use of the hoisting device. In that case the blocks may be pivotally suspended to simple bracket plates. Also by the possibility for mutually coupling the outer and the inner lower blocks respectively the freedom of use of the hoisting device is increased substantially.

In case the inner upper-blocks are moved backward with regard to the outer ones the horizontal distance between the inner and the outer upper-blocks, seen in a direction perpendicular to the shafts of the pullies of the tackles, will decrease in luffing (increase of the spread) of the portal or pole. To keep these differences in distance small in average over the complete luffing top angle it is preferred that the upper blocks that are moved backward are mounted lower than the other upper-blocks.

For the sake of simplicity the upper-blocks that are mounted lower also can be connected to projecting bracket plates.

In case the invention is applied to a floating derrick having a hoisting portal each of the hoisting cables extending to the higher mounted upper-block will pass a separate tube in the upper-beam of the portal.

The invention now will be elucidated with the aid of the drawings.

Figure 1 shows a view of the upper part of a hoisting portal of a floating derrick.

Figure 2 shows a section along the line II-II on larger scale.

In the construction only shown as an example the manner concerned is the way in which four tackles of a floating derrick are connected to the upper part of a hoisting portal and the resulting possibility of the mutual coupling between the lower blocks.

The portal comprises two legs 1 and a connection beam 2. Each of the tackles comprises a fixed upper block 3 existing of five rotatable pullies and a lower block 4 that is suspended freely there below by the portions of the hoisting cable and comprises five rotatable pullies. The number of pullies of upper- and lowerblock

may differ by one.

A schematically shown hook 6 is connected to each of the lower blocks 4. This hook may be of any suited construction.

The upper-blocks 3 are pivotable connected to the portal 1,2. The pivot shafts 7 extend in length direction of the beam 2. It is essential for the invention that the rotary shafts 16 of the pullies 5 of the blocks 3, 4 extend perpendicular to the pivot shafts 7.

With this is obtained that within the width determined by the length of the beam 2 there is a smaller restriction for the number of pullies that can be accomodated in the upper-blocks. Moreover the angle about which the parts of the hoisting cables 10 extending between an upper-block 3 and a lower block 4 may pivot sideways (about the pullies 5) is far greater than 15^{o} which commonly is the maximum angle about which corresponding portions of the hoisting cables of known floating derricks may give way sideways. An advantage is also that between the pivot shafts 7 and the upper-blocks 3 no intermediate pivots are required that will decrease the maximum lift height. The pulley shafts 16 of the lower blocks are made longer. By this the inner blocks and the outer blocks respectively can be coupled mutually by a hoisting sling 17. This measure increases considerably the freedom of use of the hoisting device. In the shown embodiment the two tackles provided at the outer side are connected by their pivot shafts 7 to forward extending bracket plates 8 while the two tackles provided at the inner side are suspended by their pivot shafts 7 to bracket plates 9 that do not extend forward but downward. As result of this two fold staggered positioning of the outer and inner tackles is obtained that the hoisting cables 10 are allowed to give way about a relatively great angle in two directions and the hoisting cables of the outer block and those of the inner block may even cross mutually.

As the inner blocks are in a position that, with regard to the outerblocks not only is placed backward but also downward, during so called luffing of the portal 1,2, that means inclining the portal at a smaller angle with regard to a horizontal plane, the horizontal distance seen in the direction of the rotary shafts of the pullies 5 in average will have a constant value between the outer blocks and the inner blocks over the whole luffing area. The connection of the

pivot shafts 7 to the bracket plates 8 and 9 respectively instead of a connection to the head extending the whole length of the beam promotes the simplicity of the construction.

The hoisting cables 10 intended for the two outer tackles are guided from a winch, not shown, about a guide pulley 11, through a pipe 12 mounted in beam 2 and a guide pulley 13 to a free lower block 4. The hoisting cables 10 for the two inner tackles are guided by a guide pulley 14 to a free lower block 4. Each of the hoisting cables 10 travels according to the cable portions a number of times upward and downward between an upper block and a lower block.

To stay a portal 1,2 on the beam 2 backward extending brackets are welded.

The shown construction has among others the following advantages

-Within a width of the portal determined by the length of the beam 2 a substantial smaller restriction is present with regard to the number of pullies 5 that can be housed in the upper blocks 3.

The height over which a load can be lifted at a certain fixed length of the portal is increased.

-The pivot angle about which the lifting cables may pivot sidewards with regard to each other is far greater than the usual 15^{o}.

- By the fact that an extra intermediate pivot is omitted the construction is less complicated.

- The cable parts extending between the blocks of the tackles are able to pivot freely in two directions, and the hoisting cables of an outer block may even cross those of an inner block.

- By the possibility of mutual coupling of the outer and of the inner blocks respectively by means of projecting pivot shafts 16 the freedom of use of the hoisting device is increased considerably.

The invention is not restricted to the shown an discussed embodiment. Within the scope of the claims several modifications are possible.

Claims

1. Hoisting device, in particular floating derrick, with a hoisting portal or hoisting pole on the upper end of which a plurality of juxtaposed tackles is pivotably mounted, in which each of said tackles comprises a fixed upper block with a plurality of pullies and free lower block with a plurality of pullies characterized in that the rotary shafs of the pullies (5) extend substantially perpendicular to the pivot shafts (7) by which the upper-blocks (1,2) are suspended to the portal or pole.

2. Hoisting device according to claim 1 characterized in that at least the two outer upper-blocks (3) are pivotably connected to a part (8) extending forward with regard to the upper end of the portal or the pole.

3. Hoisting device according to claim 2 characterized in that at least one of the inner upper-blocks (3) is situated backward with regard to upper outer-blocks.

4. Hoisting device according to claim 3 characterized in that the backward positioned upper-blocks are mounted lower than the other upper-blocks.

5. Hoisting device according to claim 4 characterized in that the lower situated upper-blocks are pivotably connected to projecting bracket plates (9).

6. Hoisting device according to claims 2-5 inclusive, characterized in that each of hoisting cables extending to the higher mounted upper-block pass a separate tube (12) in the upper beam 2 of the portal.

7. Hoisting device according to claims 2-6 inclusive, characterized in that the pulley shafts (16) of the lower blocks (4) are extended by which the mutual coupling of outer- and inner lower blocks respectively is possible.

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fig-1

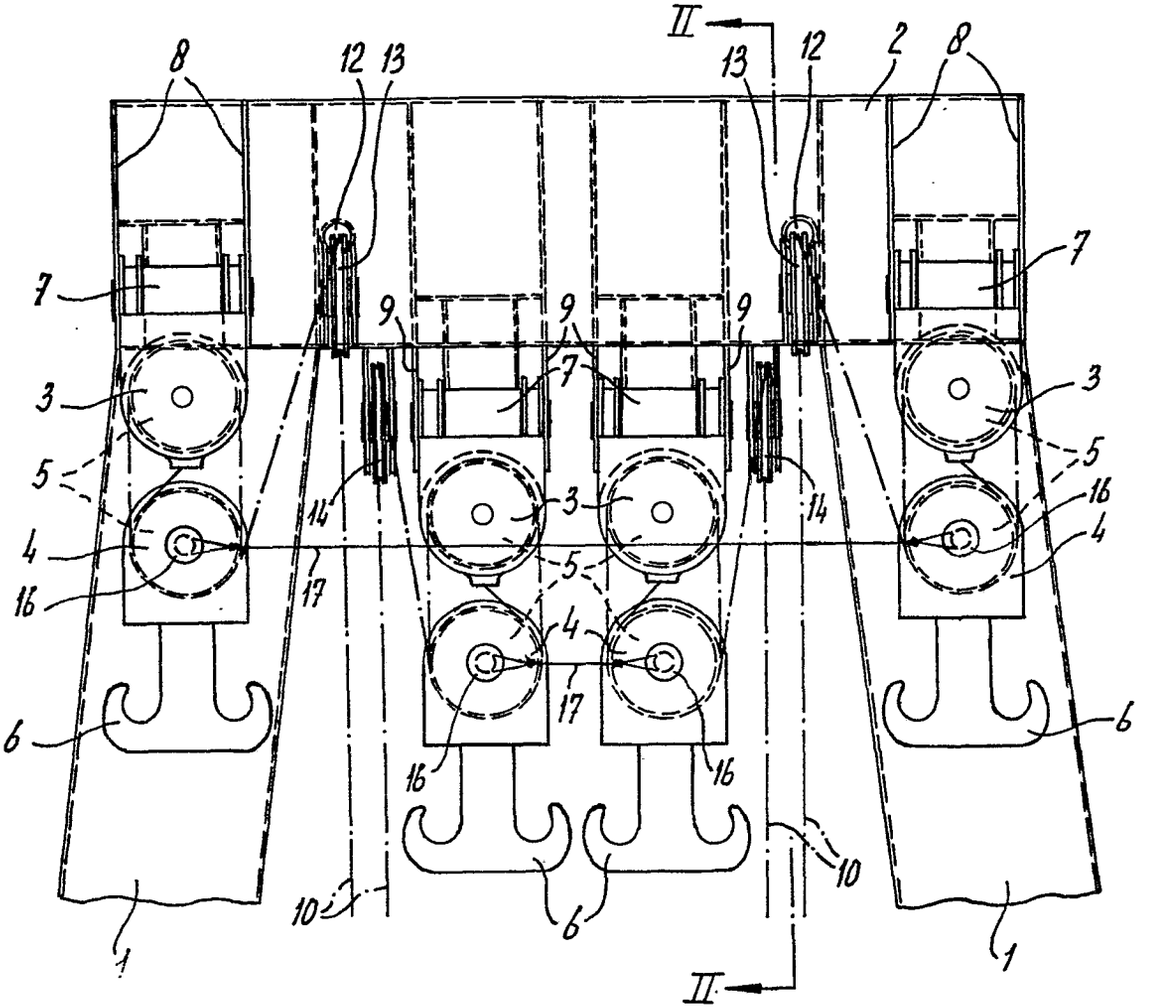

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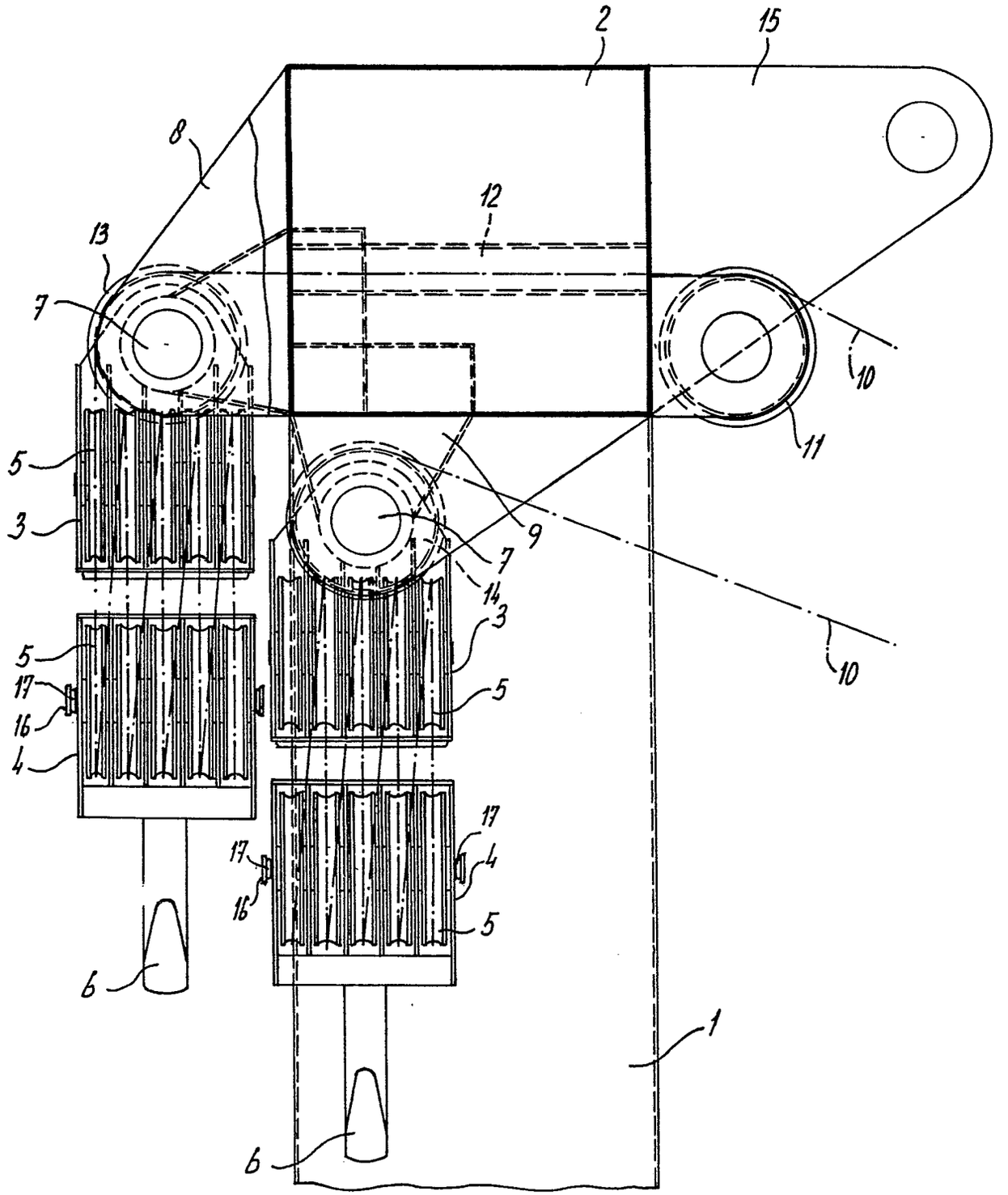
Fig-2



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EUROPEAN SEARCH REPORT

0049001
Application number
EP 81 20 0749

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	FR - A - 2 075 858 (WARNOWWERFT WARNEMUNDE) * Page 4, lines 20-39; page 5, lines 1-30 *	1,2,5
X	FR - A - 2 140 279 (BEGHIN) * Page 2, line 37; page 3, lines 1-8; page 4, lines 10-20 *	1,2
X	US - A - 3 042 222 (LEHMANN) * Column 2, lines 33-56 *	1
A	US - A - 3 375 937 (BRADSHAW) * Column 8, lines 35-49 *	7
A	DE - B - 1 201 715 (STULCKEN SOHN) * Column 2, lines 26-52; column 3, lines 1-12 *	1
A	US - A - 2 902 177 (STODDARD) * Column 2, lines 12-16, 33-46 *	1
A	US - A - 3 245 549 (TREVISAN)	
A	DE - B - 1 260 334 (BLOM & VOSS) & GB - A - 1 123 040 & US - A - 3 446 363	

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CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)

B 66 C 23/52
23/66

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

B 66 C
B 63 B

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
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E: earlier patent document, but published on, or after the filing date
D: document cited in the application
L: document cited for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18-01-1982	VAN DEN BERGHE

EPO Form 1503.1 06.78

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	FR - A - 2 322 817 (HOWALDTSWERKE-DEUTSCHE WERFT) & GB - A - 1 543 086 & US - A - 4 078 665		TECHNICAL FIELDS SEARCHED (Int. Cl.³)