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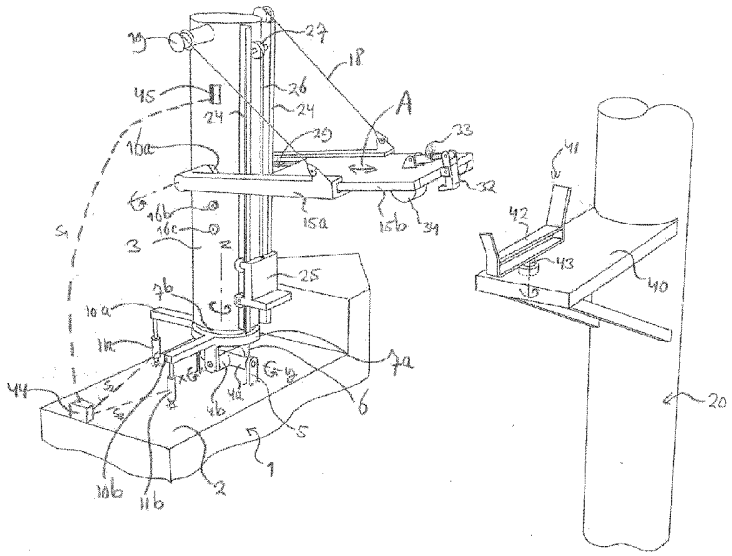
(54) **Vessel provided with a gangway supported by a 2-DOF hinged upright column, in particular a cardan.**

(57) A vessel 1 with bridging means comprising an upright column 3, a gangway 15, a first hinge connection 16 for hingedly connecting the gangway to the column, coupling means 32 at or near a free end of the gangway for coupling the gangway to an offshore construction 20, and one or more gangway support organs 18. The column is supported by and connected to the vessel by means of a second hinge connection 4 designed to allow the vessel to rotate relative to the column in a first rotation direction around an x-axis and in a second rotation direction around an y-axis, wherein the x- and y-axes extend substantially horizontal and orthogonal relative to each other. Positioning means are provided which comprise force actuators 11 between the vessel and the column for swivelling the column around the second hinge connection relative to the vessel around said x- and y-axis.



P31136NL00/RR

Title: Vessel provided with a gangway supported by a 2-DOF hinged upright column, in particular a cardan.

The invention relates to a vessel which is provided with bridging means for transferring persons and/or cargo to an offshore construction.

The transfer of cargo from a vessel towards an offshore construction in general takes place with a hoisting crane. The cargo then for example is placed upon a pallet or inside a crate which hangs down at hoisting cables and needs to be put down at a loading platform which is positioned at a considerable height above the water level, in particular above the maximum expected wave height. If there is no crane on the offshore platform itself, then a hoisting crane of the vessel needs to be present. Such a vessel crane in general is a special (heavy) crane which is preferably capable of compensating vessel movements to a certain degree. The vessel movements in relation to weather conditions however still limit the use of such cranes. Furthermore the pendulum effect of the hoisting cables limit the weight of the cargo which can be transferred. Also this type of cargo transfer can not be used towards unmanned offshore constructions.

The transfer of people from a vessel towards an offshore construction in general takes place via a gangway as bridging element placed in between them. For example EP-1 315 651 shows a transfer system for positioning a telescopingly extendable gangway with a fixed and a movable gangway section between a vessel and an offshore construction. A hydraulic piston extends between the fixed and movable gangway sections and is able to adjust the total length of the gangway. The fixed gangway section is pivotally connected, around a horizontal rotation axis, to an upper end of an upright supporting column by means of a hinge connection. A hydraulic piston extends between the supporting column and the fixed gangway section and is able to adjust the angle of inclination of the gangway. The supporting column itself is rotatably mounted, around a vertical rotation axis, on the deck of the vessel by means of a turntable. Hydraulics is provided for adjusting the rotational position of the assembly of the column and gangway around the turntable relative to the vessel. The movable gangway section at its free end is provided with hydraulically operable coupling claws which are designed to be coupled to a substantially vertical gripping bar which is mounted to the offshore construction.

During coupling the vessel is sailed and manoeuvred to a suitable starting position relative to the offshore construction. Subsequently the gangway by means of suitable steering of the respective hydraulics is swivelled/rotated such that it is directed towards a center part of the gripping bar. Then the gangway is extended until the coupling device is

able to enclose the gripping bar. At that moment the coupling claws are moved from an open position towards a closed position. The closing is such that the claws still have the freedom to slide upwards along the gripping bar. As soon as an aimed coupling position along an upper part of the gripping bar just beneath a loading platform is reached, the coupling claws are moved further towards each other in order to fixedly clamp the gripping bar there. Finally, all the hydraulics for positioning the gangway are set free, such that the gangway is freely able to extend or retract, change its angle of inclination around the horizontal rotation axis, and/or change its rotational turntable position around the vertical rotation axis. The vessel then at the same time is kept in place by means of a suitable driving of thrusters or the like in dependency of satellite navigation. Thus no big forces are exerted on the gangway and the gripping bar.

A disadvantage with this known transfer system is that it is less suitable to transfer heavy cargo loads of for example 2 tons or more from the vessel towards the offshore construction and vice versa. In particular during heavy weather conditions this could easily result in too big forces occurring on the gangway and supporting column. This in turn would require the gangway and supporting column to be constructed relative strong and heavy. Furthermore a coupling under heavy weather conditions may be somewhat difficult. Forces which occur at the time that the gangway hits the coupling bar are difficult to manage under such conditions.

The present invention aims to overcome one or more of those disadvantages at least partly or to provide a usable alternative. In particular the invention aims to provide a user-friendly and relative light-weight transfer system which is able to transmit forces more equally into the construction.

This aim is achieved by means of a vessel with bridging means for transferring persons and/or cargo to an offshore construction according to claim 1. The vessel comprises an upright column extending upwards from the vessel, and a gangway, in particular a telescopically extendable gangway, which extends sideways from the column. A first hinge connection is provided for hingedly connecting the gangway to the column. Furthermore coupling means are provided at or near a free end of the gangway for coupling the gangway to the offshore construction, and one or more support organs are provided for supporting the gangway relative to the column in its sideways extending position. According to the inventive thought the column is supported by and connected to the vessel by means of a specific type of second hinge connection. This second hinge connection is chosen such that it is able to have the vessel rotate relative to the column in both a first rotation direction around an x-axis as well as in a second rotation direction around an y-axis, wherein those x- and y-axes both extend substantially horizontally, and wherein those x- and y-axes extend orthogonal relative

to each other. Positioning means are provided which comprise force actuators between the vessel and the column for swivelling the column around the x- and y-axes of the second hinge connection relative to the vessel.

This specific type of 2-DOF hinge support of the column on the vessel together with the provision of the force actuators acting in those same 2-DOF's advantageously make it possible to provide a gangway supporting column, of which a desired orientation, in particular a desired substantially vertical orientation, can be maintained under all circumstances whatever pitching or rolling movements the vessel makes on the waves. Each time the column leaves its desired orientation, the force actuators can be actuated in such a way that the column is quickly and smoothly brought back into its desired orientation. The force actuators do not have to bear the weight of the column, this weight can be carried by the second hinge connection. The force actuators merely serve the purpose of keeping the column in its desired upright orientation.

The second hinge connection is of the type having at least two rotational degrees-of-freedom (DOF) whereas shifting displacements between the vessel and the column at the location of the second hinge connection are counteracted, and whereas forces, like weight forces, can be transmitted from the column towards the vessel and vice versa. The second hinge connection can take up forces not only in a downward direction but also in the sideways directions without allowing relative displacements of the second hinge connection itself in those directions. The second hinge connection thus forms a true 2-D pivotal connection between the column and the vessel.

Persons and cargo can now first be transported from the second hinge connection upwards along the column towards the first hinge connection, and from there be transferred over the gangway towards the offshore construction. When coupled to the offshore construction, the gangway is supported at both ends between the column and the offshore construction, and forms a reliable bridge between them. The permanent vertical positioning of the column herewith helps to prevent or minimize uncontrollable acceleration forces in horizontal directions caused by sudden pitching or rolling vessel movements. Such forces could otherwise lead to uncontrollable situations in which the vessel might even capsize. The only substantial movement the column makes is a vertical movement up and down together with the vessel. This vertical movement within certain boundaries is no problem since it can easily be absorbed by the gangway changing its angle of inclination around the first hinge connection.

Since forces which occur during transfer of persons and cargo can now be entered more equally into the column-gangway construction, this can be constructed more light-weight. Also lighter vessels can now be used for the transfer. Furthermore it is noted that height differences between the vessel and a landing platform on the offshore construction,

in particular height differences of more than 18 metres, can now be overcome more easily. A transfer of heavy loads is now also possible during heavy weather.

In a particular embodiment the second hinge connection comprises two substantially horizontal orthogonal pivot pins. Those two pivot pins may form part of a so-called Universal or Cardan joint or an assembly of two Gimbals also referred to as a two-axis Gimbal. The Universal joint, Cardan joint or Gimbal assembly allows the column and vessel to swivel around both the x- and y-axes relative to each other. The pivot pins are located close together and preferably lie in a same common substantially horizontal plane. They form a double-pivoted support that allows the rotation of the column and vessel relative to each other about two respective axes. With the Universal joint, the Cardan joint and the Gimbal assembly, the column can be mounted on one of the pivot pins, whereas the vessel can be mounted to the other remaining pivot pin. Together the pivot pins of the second hinge connection are well able to keep the column substantially immobile with respect to its upright orientation relative to the horizon regardless of the pitching and rolling motions of the vessel.

In another embodiment the second hinge connection can further be designed to allow the vessel to rotate relative to the column in a third rotation direction around a z-axis, wherein the z-axis extends substantially vertical and orthogonal relative to the x- and y-axes. This gives the second hinge connection 3-degrees-of-freedom for rotation in all directions around the x-, y- and z-axes. The column now can not only swivel around its substantially horizontal pivot pins, but also is able to swing the gangway towards different directions. A possible type of hinge connection for this is a ball-and-socket joint. Preferably, however the second hinge connection, besides comprising the two substantially horizontal pivot pins, further comprises a turntable which is rotatable around the z-axis. This turntable then preferably is positioned underneath a bottom end of the column and above the two substantially horizontal pivot pins.

In a further embodiment lever arms can be provided which are fixedly connected to the column or, if present, to the mentioned turntable. Those lever arms extend in a substantially sideways direction. The force actuators are provided in between the vessel and the lever arms. The lever arms make it possible to use less strong force actuators.

The force actuators can be of various types, like spindles, stays which can be tensioned or loosened, etc. Preferably, hydraulic cylinders are used since they are able to respond very quickly and thus are able to prevent the column from swinging around too much.

The force actuators can be driven manually. Preferably however the positioning means are automated. For this the positioning means further comprise a position sensor for sensing the orientation of the column relative to the horizon, in particular for sensing deteriorations of the column from a substantially vertical orientation. Furthermore a control

unit then is provided for automatically steering the force actuators in dependence of sensed orientations by the position sensor in such a way that the force actuators bring the column back to its aimed upright orientation, in particular back to its substantially vertical orientation. Depending on the rolling and pitching speed of the vessel, the column in this way can be kept within +/-2 degrees from the vertical until wind-force 8.

The column can have all kinds of lengths depending on the expected situations, tides, etc. Preferably, the column at least has a height of 5 meters, in particular at least 10 meters.

Persons can reach the gangway via stairs or the like. In a specific embodiment a lift can be provided which is movable up and down along the column between the vessel and the gangway. Advantageously the column can then be provided with guiding means for the lift. By keeping the orientation of the column substantially vertical, an upwards travel of the lift together with a number of persons and/or heavy cargo does not lead to tilting forces being exerted on the vessel. This makes the transfer system rather safe even during storm and high waves. The lift further makes it possible to use small wheeled carts for transferring the cargo.

In a further embodiment the first hinge connection can be adjusted in height on several points along the column. By this adjustment the position of the gangway, and more specifically its angle during installation and operation, can be adapted and optimized in relation to the height position of the complementary coupling means and support point respectively on the stationary offshore construction towards the vessel as tidal differences may influence this relation.

In an advantageous embodiment, the vertical adjustment of the gangway along the column can be guided and controlled by connecting the gangway temporarily with the lift in order to bring its first hinge connection to a another level and corresponding hinge point on the column. In a similar manner it is also possible to lower the gangway fully downwards onto the level of the vessel deck during sailing over large distances and/or during heavy seas.

Further preferred embodiments are stated in the dependent subclaims.

The invention also relates to an assembly of the above described vessel transfer system together with an offshore construction which is equipped with complementary coupling means, as well as to a coupling method of the vessel to such an offshore construction.

The invention shall be explained in more detail below with reference to the accompanying drawings, in which:

Fig. 1 is a schematic perspective view of an assembly of a vessel and offshore construction according to the invention in an uncoupled position;

Fig. 2 is a view according to fig. 1 in a coupled position;

Fig. 3 is a view according to fig. 1 showing the permanent vertical orientation of the column with the vessel moving beneath it; and

Fig. 4 shows a variant of fig. 1 in a coupled operating situation during transfer of cargo.

In fig. 1 the vessel is given the reference numeral 1. The vessel 1 is provided with an upper deck 2 on top of which a supporting column 3 is placed. Between the column 3 and the vessel a Cardan joint 4 is provided. The Cardan joint 4 forms a hinge connection (the so-called second hinge connection) which has two pivot pins 4a, 4b extending in the horizontal directions x and y and allowing the vessel and column to rotate relative to each other around those x- and y-axes. An angle of 90 degrees is enclosed between the two pivot pins 4a, 4b.

The pivot pin 4a is supported by brackets 5 which are fixedly connected to the vessel 1. The pivot pin 4b is supported by brackets 6 which are fixedly connected to a fixed ring segment 7a of a turntable 7. The turntable 7 further comprises a rotatable ring segment 7b which is connected to a lower end of the column 3 and which is rotatable relative to the fixed segment 7a around a z-axis. This z-axis extends in the vertical direction and encloses angles of 90 degrees with both pivot pins 4a, 4b.

The fixed ring segment 7a is equipped with two lever arms 10, a first one 10a extending in the y-direction, and a second one 10b extending in the x-direction. Between outer ends of the lever arms 10 and the vessel, hydraulic cylinders 11a, 11b are placed. Those cylinders 11 may be pivotally mounted with one side to the lever arms 10 and at their other side to the vessel 1. When operated, the hydraulic cylinders 11 are lengthened or shortened and force the column 3 to rotate/swivel around the x- and/or y-axis relative to the vessel 1.

Approximately halfway the column 3, that is to say at a height h1 of between 5-25 meter, a gangway 15 is hingedly connected by means of a hinge connection (the so-called first hinge connection) which has a single pivot pin 16a which extends in a horizontal direction and which allows the gangway 15 and column 3 to rotate relative to each other around this horizontal axis when the gangway 15 is coupled to this pivot pin 16a. In the embodiment shown a plurality of pivot pins is provided, in which pivot pins 16b, 16c are provided at other heights h2, h3 along the column 3. By connecting the gangway 15 to a specific desired one of the pivot pins 16a-c it can be achieved that the gangway 15 is able to take and maintain a specific average angle of inclination during coupling.

The gangway 15 comprises a fixed gangway section 15a and a telescoping gangway section 15b. The telescoping gangway section 15b can slide in and out of the fixed gangway section 15a in the direction A. Between the two sections (hydraulic) drive means can be provided for actively lengthening or shortening the gangway 15 whenever desired, in particular during a coupling action to an offshore construction 20.

The gangway 15 is hung to the column 3 by means of cables 18 which are run over a hoisting device 19. Thus the angle of inclination of the gangway 15 can actively be altered whenever desired, in particular during a coupling action to the offshore construction 20.

Along the column 3, guide rails 24 are provided along which a lift 25 is guided with pairs of wheels. The lift 25 is hung to the column by means of a cable 26 which is run over a hoisting device 27. Thus the lift 25 can be moved up and downwards along the column 3, in particular between the vessel deck 2 and the gangway 15. The gangway 15 is provided with an opening 29 which allows the lift 25 to pass through and get leveled with the gangway 15.

At its outer free end the gangway 15 is provided with a coupling hook 32 which is operable between an open and closed position by means of a hydraulic cylinder 33. Rounded bumper/cushioning elements 34 are provided underneath the gangway 15.

The offshore construction 20, which is also schematically shown in fig. 1, comprises a pole of a wind turbine or the like surrounded by the sea. A landing platform 40 is provided at the offshore construction 20 which platform is equipped with coupling means 41 complementary to the coupling hook 32. Those complementary coupling means 41 on the offshore construction 20 comprises a substantially U-shaped supporting element 42 which is pivotally connected to the construction 20 by means of a pivot pin 43 having a vertical rotation axis.

A possible method for coupling the gangway 15 to the offshore construction 20 shall now be explained with reference to fig. 1-3. In fig. 1 it is shown that the vessel 1 has been sailed to a position near the offshore construction 20. If necessary the column 3 can be rotated around the turntable 7 in order to get the gangway 15 to point with its outer end towards the offshore construction 20. If necessary, for example depending on the water level of the sea, it is also possible to operate the hoisting device 19 in order to raise or lower the gangway 15 in such a way that the gangway 15 gets to point towards the coupling means 41. Subsequently the gangway 15 can be extended until the coupling hook 32 comes to lie behind the supporting element 42. By subsequently retracting the gangway 15, the hook 32 automatically gets to grip behind the supporting element 42. During the entire coupling process the hook 32 can be kept in its closed position as is shown in fig. 1 and 2. In this closed position it is positioned such that it leaves an opening free which is large enough for the supporting element 42 to enter it. In this closed position the bumper/cushioning element lies upon the supporting element 42. The hook only needs to be brought into its

open position in case uncoupling is desired or in case of emergency. The cylinder 33 can then be retracted, which causes the hook 32 to rotate upwards and no longer grip behind the supporting element 42.

As soon as the coupling is made, the gangway 15 is given the full freedom to extend or retract such that the distance between the vessel 1 and the offshore construction 20 can change somewhat. At the same time the hoisting devices 19 for the cables 18 are set free such that the gangway 15 is free to alter its angle of inclination, which gives the vessel 1 the freedom to rise up and downwards somewhat together with the waves. Furthermore the turntable 7 is given the full freedom to rotate around the z-axis such that the vessel 1 is given the freedom to turn left or right.

As shown in fig. 2, in the coupled position, the gangway 15 projects slightly slanting upwards, in particular with an angle of between 0-20 degrees. In this way it is prevented that the hook 32 unhooks from the supporting element 42. This slightly upwardly slanting positioning of the gangway 15 is obtained by having the first hinge connection 16 between the gangway 15 and the column 3 positioned at a height h slightly lower, in particular 0-10 meter lower, than the height H of the coupling means 41 on the offshore construction.

According to the invention the column 3 maintains to be vertically orientated both during coupling and after the coupling has been made. For this operation of the hydraulic cylinders 11 may be necessary. Depending on the amount and direction of rolling or pitching movements the vessel 1 makes, the hydraulic cylinders 11 need to be adjusted in length in order to have the column 3 maintain its vertical orientation. This is obtained by means of a control unit 44 which receives sensor signals s1 of a position sensor 45 which is built into the column 3. Whenever the control unit receives a signal s1 of the sensor 45 that the column 3 has left its vertical orientation, it immediately sends out corresponding signal s2 or s3 to the hydraulic cylinders 11 to change their length(s) and with this exert suitable forces to the column 3 in order to have it move back towards its aimed vertical orientation.

An example hereof is shown in fig. 3 where both hydraulic cylinders 11 have been operated towards shortened lengths such that a slanting position of the vessel 1 is compensated in such a way that the column is orientated vertical again. In a similar manner the hydraulic cylinders 11 can be operated over and over again each time that it is necessary to make a correction in order to have the column 3 maintain its vertical orientation.

In fig. 4 a variant is shown in which the hydraulic cylinders 11 now act upon a platform 50 which is mounted to the column 3. Furthermore in this embodiment safety stairs 51 are provided along the column 3. In this fig. 4 it can also be seen how according to the invention relative large and/or heavy cargo containers 52 can now be easily picked and placed upon the lift 25 and subsequently be transferred upwards to the beginning of the

gangway 15 and form there be rolled over the gangway 15 towards the landing platform 40 on the offshore construction 20.

Besides the embodiments shown numerous variants are possible. For example the dimensions and shapes of the various parts can be varied, and instead of hydraulic cylinders between the vessel and the column other types of force actuators can be used. Instead of the gangway being hung in cables it is also possible to have it supported by other types of gangway support organs, for example by means of hydraulic cylinders. Instead of the hook organ other types of coupling means can be provided at or near the free end of the gangway. For example coupling means which include one or more DOF's and/or hinge axes. Also coupling means may be used which are releasably connected to complementary coupling means on the offshore construction, like a clamp or the like.

Thus the invention provides for an effective, user-friendly and save transfer system with which persons and all kinds of cargo can be quickly transferred from a vessel towards an offshore construction even at heavy sea or otherwise difficult conditions.

C O N C L U S I E S

1. Vaartuig met brugmiddelen voor het overbrengen van personen en/of lading naar een offshore constructie, omvattende:

- een rechtopstaande kolom die zich naar boven toe uitstrekt vanaf het vaartuig;
- een loopbrug, in het bijzonder een telescopisch verlengbare loopbrug, die zich zijdelings uitstrekt vanaf de kolom;
- een eerste scharnierverbinding voor het scharnierbaar verbinden van de loopbrug aan de kolom;
- koppelmiddelen aan of nabij een vrij einde van de loopbrug voor het koppelen van de loopbrug aan een offshore constructie; en
- een of meer loopbrugsteunorganen voor het steunen van de loopbrug ten opzichte van de kolom in de zich zijdelings uitstrekkende positie,

met het kenmerk, dat

de kolom wordt gesteund door en verbonden is met het vaartuig door middel van een tweede scharnierverbinding die is ingericht om het mogelijk te maken dat het vaartuig roteert ten opzichte van de kolom in een eerste rotatierichting rondom een X-as en in een tweede rotatierichting rondom een Y-as, waarbij de X- en Y-assen zich in hoofdzaak horizontaal uitstrekken en loodrecht ten opzichte van elkaar staan, waarbij positioneermiddelen voorzien zijn die krachtactuatoren omvatten tussen het vaartuig en de kolom voor het draaien van de kolom rondom de tweede scharnierverbinding ten opzichte van het vaartuig rondom de X- en Y-as.

2. Vaartuig volgens conclusie 1, waarbij de tweede scharnierverbinding twee in hoofdzaak horizontale orthogonale scharnierpennen omvat.

3. Vaartuig volgens conclusie 2, waarbij de tweede scharnierpennen deel uit maken van een kruiskoppeling, cardankoppeling of een Gimbal samenstel.

4. Vaartuig volgens conclusie 2 of 3, waarbij de tweede scharnierverbinding verder is ingericht om het mogelijk te maken dat het vaartuig roteert ten opzichte van de kolom in een derde rotatierichting rondom een Z-as, waarbij de Z-as zich in hoofdzaak verticaal uitstrekt en orthogonaal ten opzichte van de X- en Y-assen.

5. Vaartuig volgens conclusie 4, waarbij de tweede scharnierverbinding verder een draaitafel omvat die roteerbaar is rondom de Z-as.

6. Vaartuig volgens een van de voorgaande conclusies, waarbij hefboomarmen voorzien zijn die vast verbonden zijn met de kolom en zich in een in hoofdzaak zijdelingse richting daarvan uitstrekken, waarbij de krachtactuatoren voorzien zijn tussen het vaartuig en de hefboomarmen.

7. Vaartuig volgens een van de voorgaande conclusies, waarbij de krachtactuatoren hydraulische cilinders zijn.

8. Vaartuig volgens een van de voorgaande conclusies, waarbij de positioneermiddelen verder omvatten:

- een positiesensor voor het detecteren van de rechtopstaande oriëntatie van de kolom ten opzichte van de horizon, in het bijzonder voor het detecteren van afwijkingen van de kolom van een in hoofdzaak verticale oriëntatie; en
- een regeleenheid voor het sturen van de krachtactuatoren in afhankelijkheid van een gedetecteerde oriëntatie door de positiesensor zodanig dat de krachtactuatoren de kolom terugbrengen naar zijn beoogde rechtopstaande oriëntatie, in het bijzonder zijn in hoofdzaak verticale oriëntatie.

9. Vaartuig volgens een van de conclusies, waarbij de een of meer loopbrugsteunorganen kabels omvatten voor het ophangen van de loopbrug.

10. Vaartuig volgens een van de voorgaande conclusies, waarbij een hijstoestel voorzien is voor het verkorten of verlengen van de kabels.

11. Vaartuig volgens een van de voorgaande conclusies, waarbij een licht voorzien is die beweegbaar is tussen het vaartuig en de loopbrug, en waarbij de kolom voorzien is van geleidingsmiddelen voor de lift.

12. Vaartuig volgens een van de voorgaande conclusies, waarbij de kolom een hoogte heeft van ten minste 5 meter.

13. Vaartuig volgens een van de voorgaande conclusies, waarbij de eerste scharnierverbinding voorzien is tussen een tussengelegen deel van de kolom en de loopbrug.

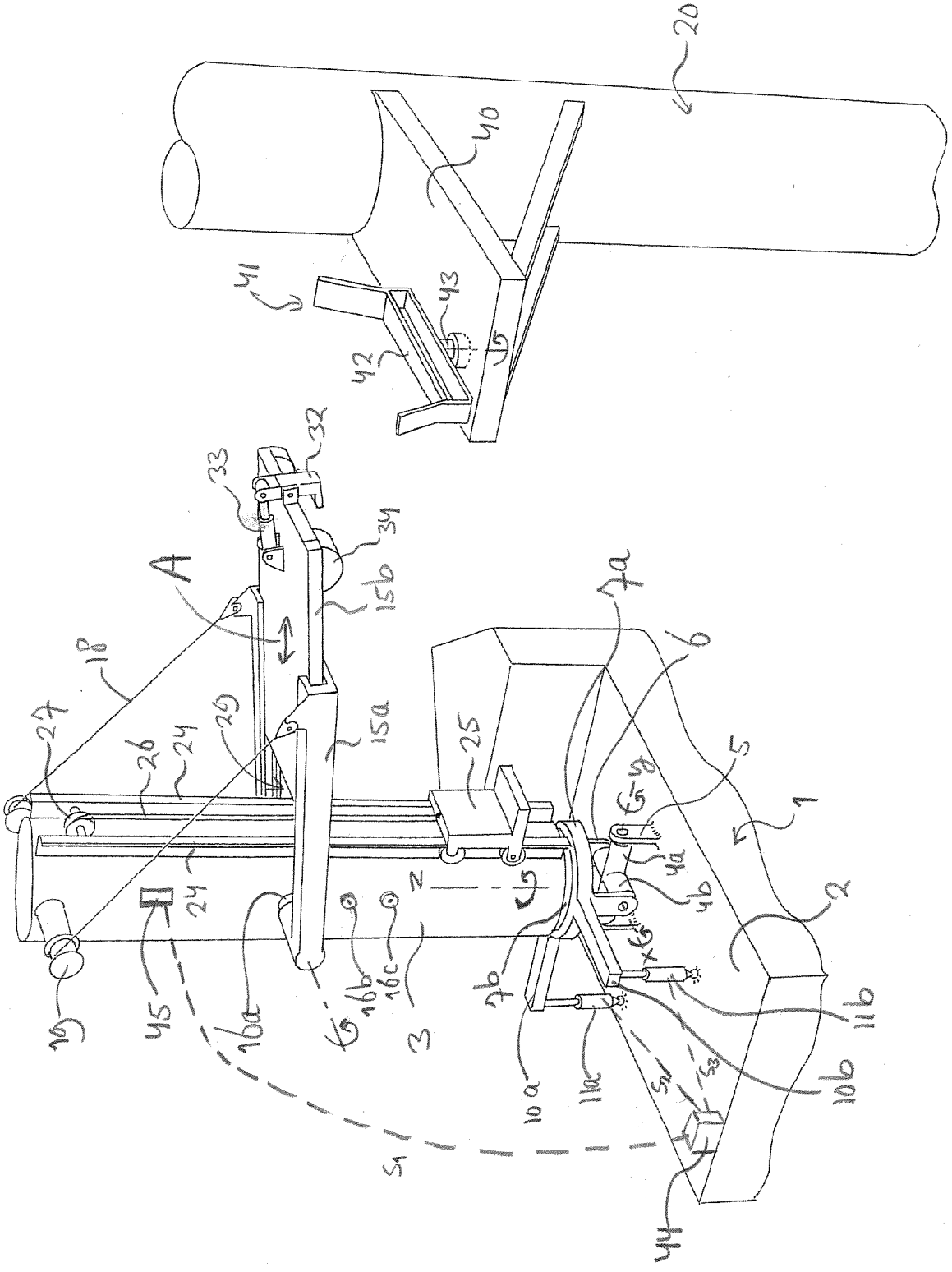
14. Samenstel van een vaartuig volgens een van de voorgaande conclusies en een offshore constructie, waarbij de offshore constructie voorzien is van koppelmiddelen die complementair zijn aan de koppelmiddelen aan of nabij het vrije einde van de loopbrug.

15. Werkwijze voor het koppelen van een loopbrug van een vaartuig volgens een van de voorgaande conclusies met een offshore constructie, omvattende de stappen:

- varen van het vaartuig naar een positie nabij de offshore constructie; en
- koppelen van de loopbrug met zijn koppelmiddelen aan complementaire koppelmiddelen op de offshore constructie,

met het kenmerk, dat

ten minste nadat de koppeling gemaakt is, de krachtactuatoren bediend worden voor het gepositioneerd krijgen of houden van de kolom in een in hoofdzaak verticale oriëntatie ten opzichte van de horizon onafhankelijk van bewegingen van het vaartuig.


20
40
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15b
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15a
25
7a
6
5
1
4a
4b
2
24
N
45
16a
16b
16c
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7b
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11c
5a
5b
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11b
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19
44

FIG. 1

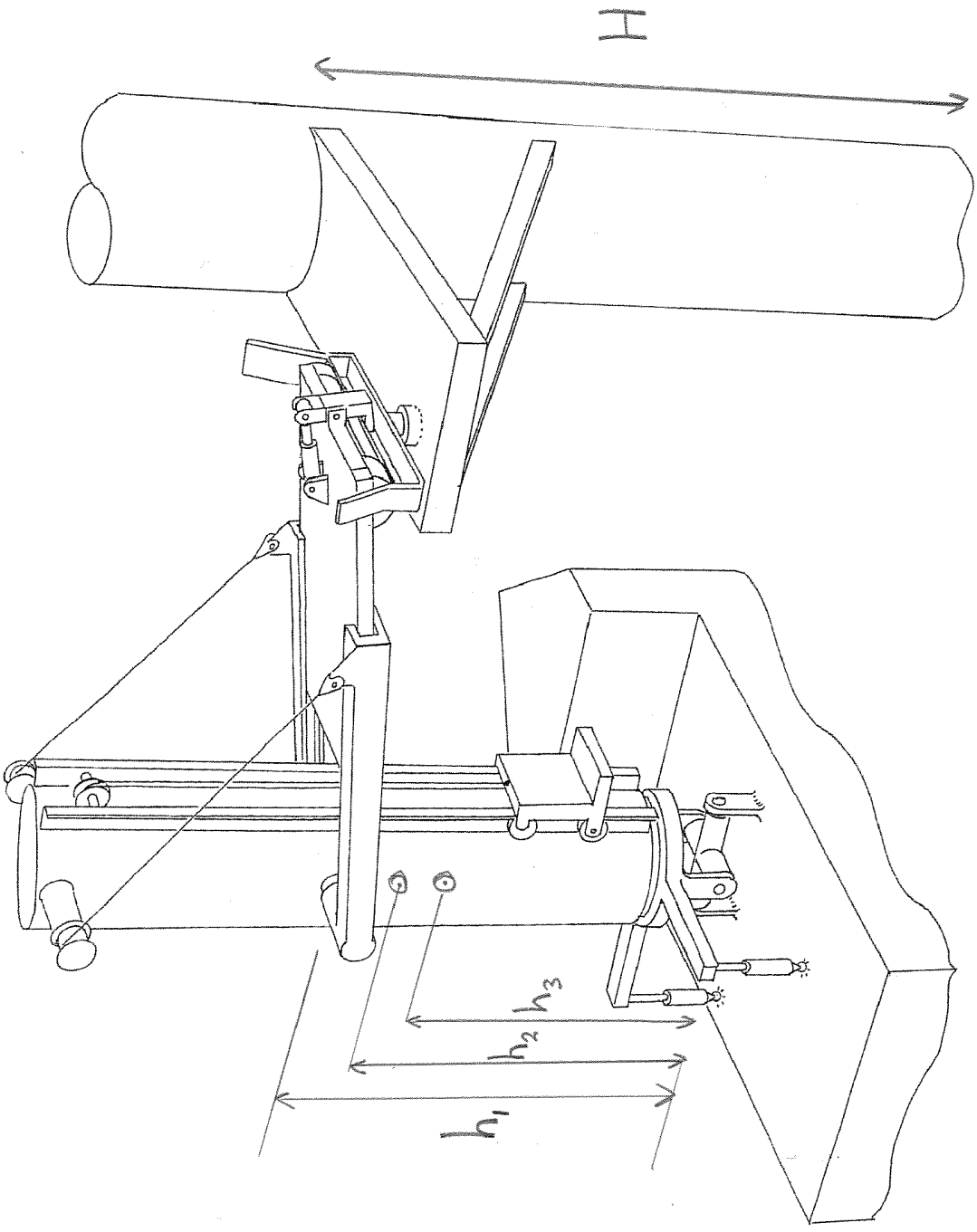

FIG. 2

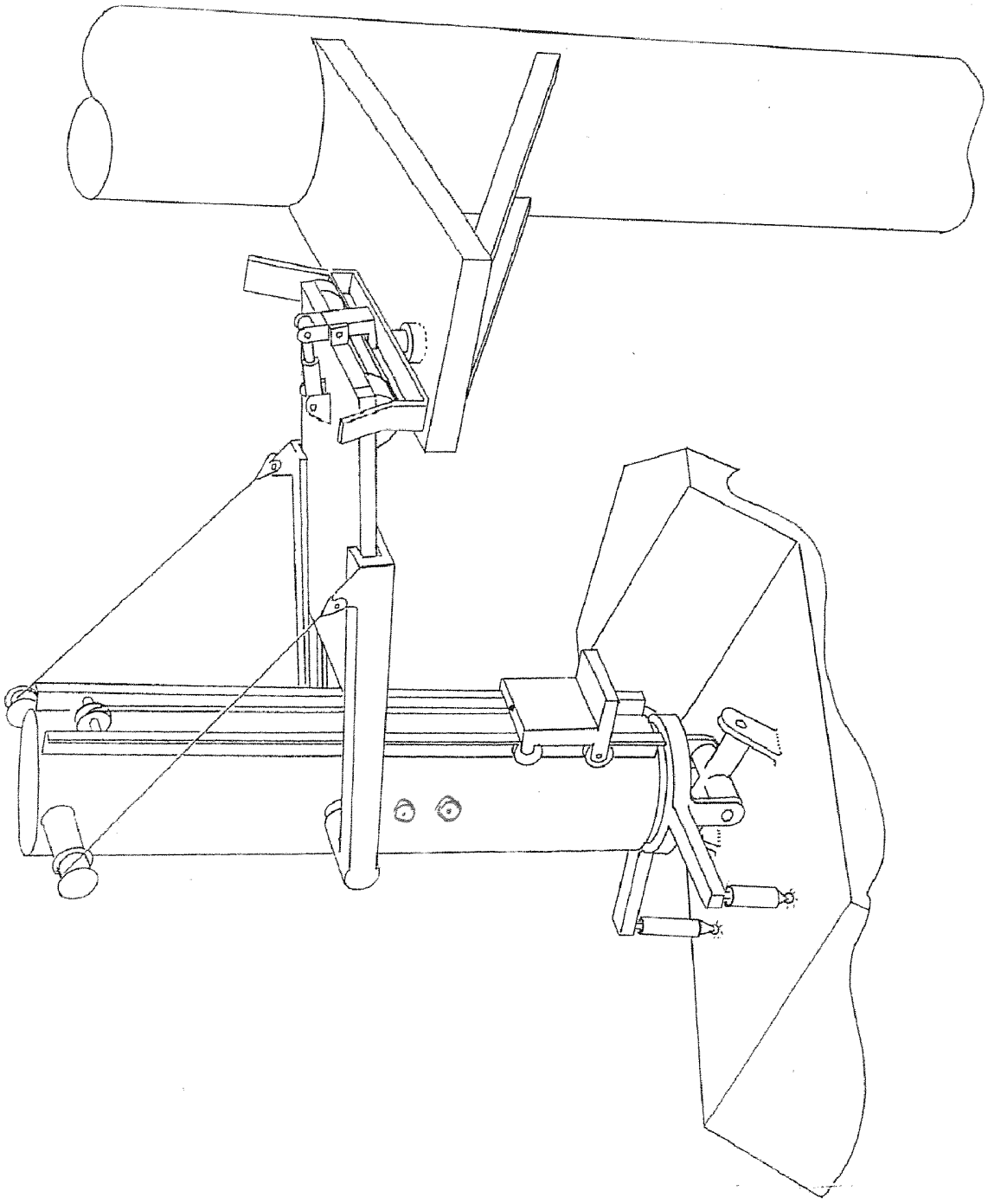

FIG. 3

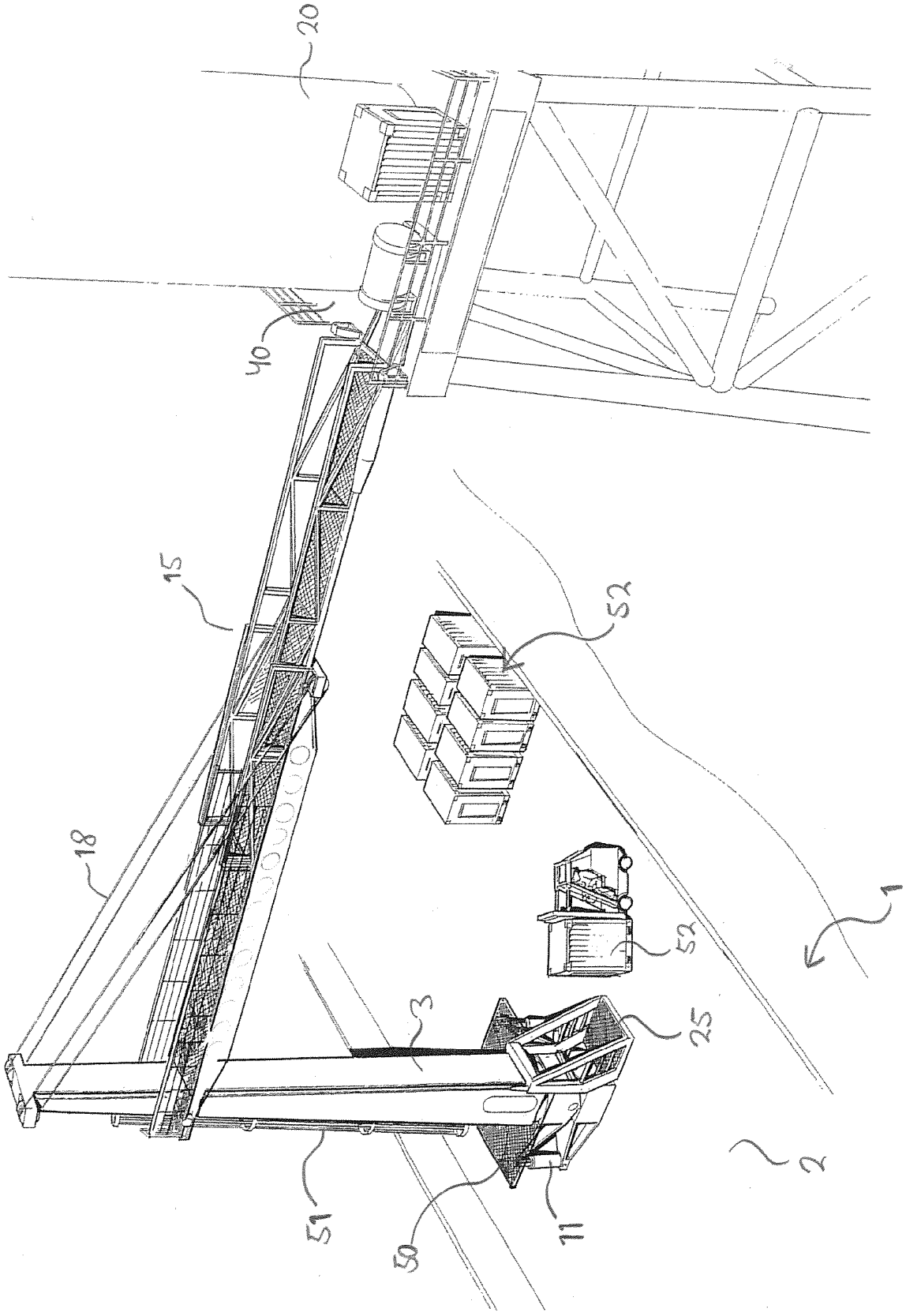

FIG. 4

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE
	P31136NL00/RR
Nederlands aanvraag nr. **2008920**	Indieningsdatum **01-06-2012**
	Ingeroepen voorrangsdatum
Aanvrager (Naam) **Z Knowledge B.V.**	
Datum van het verzoek voor een onderzoek van internationaal type **15-09-2012**	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. **SN 58821**

I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)

Volgens de internationale classificatie (IPC)

B63B27/14 **B63B27/30**

II. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimumdocumentatie

Classificatiesysteem	Classificatiesymbolen
IPC8	**B63B**

Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

III.	☐	**GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES**	(opmerkingen op aanvullingsblad)
IV.	☐	**GEBREK AAN EENHEID**	(opmerkingen op aanvullingsblad)

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2008920

A. CLASSIFICATIE VAN HET ONDERWERP
INV. B63B27/14 B63B27/30
ADD.

Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.

B. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte miminum documentatie (classificatie gevolgd door classificatiesymbolen)
B63B

Onderzochte andere documentatie dan de mimimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)
EPO-Internal

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
A,D	EP 1 315 651 B1 (P & R SYSTEMS [NL]) 9 augustus 2006 (2006-08-09) in de aanvraag genoemd * figuren 2a,2b * -----	1,14,15
A	NL 1 027 103 C2 (UNIV DELFT TECH [NL]) 27 maart 2006 (2006-03-27) * figuur 1 * -----	1,14,15
A	WO 2007/120039 A1 (UNIV DELFT TECH [NL]; VAN DER TEMPEL JAN [NL]; SALZMANN DAVID JULIO CE) 25 oktober 2007 (2007-10-25) * figuren 1,3,4,5 * -----	1,14,15
A	GB 2 163 402 A (BRITISH AEROSPACE) 26 februari 1986 (1986-02-26) * figuren 1,4 * -----	1,14,15
	-/--	

[X] Verdere documenten worden vermeld in het vervolg van vak C.

[X] Leden van dezelfde octrooifamilie zijn vermeld in een bijlage

° Speciale categorieën van aangehaalde documenten

"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

"D" in de octrooiaanvrage vermeld

"E" eerdere octrooi(aanvrage), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven

"L" om andere redenen vermelde literatuur

"O" niet-schriftelijke stand van de techniek

"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur

"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvrage, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding

"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur

"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht

"&" lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid	Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type
8 februari 2013	

Naam en adres van de instantie	De bevoegde ambtenaar
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	van Rooij, Michael

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ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2008920

C.(Vervolg). VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
A	US 6 347 424 B1 (VATNE PER [NO]) 19 februari 2002 (2002-02-19) * figuren 10a,22,45 * -----	1,14,15

Formulier PCT/ISA/201 (vervolg tweede blad) (Januari 2004)

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2008920

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)		Datum van publicatie
EP 1315651	B1 09-08-2006	AT	335652 T	15-09-2006
		AU	9438801 A	22-03-2002
		BR	0113414 A	29-07-2003
		CA	2421428 A1	14-03-2002
		DE	60122172 T2	05-07-2007
		DK	1315651 T3	04-12-2006
		EP	1315651 A1	04-06-2003
		ES	2269464 T3	01-04-2007
		NL	1016111 C2	07-03-2002
		PT	1315651 E	30-11-2006
		US	2003182741 A1	02-10-2003
		WO	0220343 A1	14-03-2002
NL 1027103	C2 27-03-2006	GEEN		
WO 2007120039	A1 25-10-2007	AT	553024 T	15-04-2012
		BR	PI0708432 A2	31-05-2011
		DK	1993902 T3	18-06-2012
		EP	1993902 A1	26-11-2008
		ES	2383830 T3	26-06-2012
		NL	1031263 C2	04-09-2007
		PT	1993902 E	05-07-2012
		US	2010032543 A1	11-02-2010
		WO	2007120039 A1	25-10-2007
GB 2163402	A 26-02-1986	AU	585880 B2	29-06-1989
		AU	4591785 A	27-02-1986
		BR	8504002 A	10-06-1986
		DE	3529790 A1	06-03-1986
		ES	8702266 A1	16-03-1987
		ES	8705814 A1	01-08-1987
		FR	2569385 A1	28-02-1986
		GB	2163402 A	26-02-1986
		IN	165778 A1	06-01-1990
		IT	1182815 B	05-10-1987
		JP	4017829 B	26-03-1992
		JP	61081895 A	25-04-1986
		US	4854800 A	08-08-1989
US 6347424	B1 19-02-2002	AT	248743 T	15-09-2003
		AU	742804 B2	10-01-2002
		AU	8041598 A	04-01-1999
		BR	9810166 A	08-08-2000
		CA	2294973 A1	23-12-1998
		CN	1261312 A	26-07-2000
		DE	69817813 D1	09-10-2003
		DK	181699 A	17-12-1999
		EP	0988221 A1	29-03-2000
		HK	1027541 A1	10-10-2003
		NO	972820 A	21-12-1998
		NZ	501561 A	24-11-2000
		RU	2200685 C2	20-03-2003
		US	6347424 B1	19-02-2002
		WO	9857845 A1	23-12-1998

WRITTEN OPINION

File No.	Filing date *(day/month/year)*	Priority date *(day/month/year)*	Application No.
SN58821	01.06.2012		NL2008920

International Patent Classification (IPC)
INV. B63B27/14 B63B27/30

Applicant
Z Knowledge B.V.

This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the application
- ☐ Box No. VIII Certain observations on the application

	Examiner
	van Rooij, Michael

Application number

WRITTEN OPINION

NL2008920

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ on paper

   ☐ in electronic form

   c. time of filing/furnishing:

   ☐ contained in the application as filed.

   ☐ filed together with the application in electronic form.

   ☐ furnished subsequently for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes:	Claims	1-15
	No:	Claims	
Inventive step	Yes:	Claims	1-15
	No:	Claims	
Industrial applicability	Yes:	Claims	1-15
	No:	Claims	

2. Citations and explanations

see separate sheet

WRITTEN OPINION

Box No. VII Certain defects in the application

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Technical field : Gangway between vessel and offshore structure.

State of the art. Document EP 1315 651 describes a gangway bridge according to the preamble of independent claim 1.

Problem.

To allow for heavier loads (than passengers) to be transferred over the gangway, in particular during heavy weather conditions.

Solution.

Above mentioned problems are solved by the characterizing portion of independent claim 1, in short by having an orthogonal rotational support under the column base with force actuators.

Method claim 15 and assembly claim 14 are dependent on claim 1.

Although prior art document NL 1027103 seems to deal with the same problem with hydraulic actuators that compensate for the ship's motions on a gangway, there is missing the vertical column and with it the simplicity of the lower connection to the vessel (with consequently less force transfers through the hydraulic actuators) of this application.

There is no indication to assume that one can come to the present invention with the relevant documents of the search report.

The independent claims 1 and 15 and dependent claims 2-14 therefore meet the requirements with regard to novelty and inventive step.

Re Item VII

Certain defects in the application

The features of the claims 1-15 are not provided with reference signs placed in parentheses.