

(19)



(11)

EP 2 468 623 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
01.01.2014 Bulletin 2014/01

(51) Int Cl.:
B63C 15/00 (2006.01) B63C 5/02 (2006.01)

(21) Application number: **11195256.0**

(22) Date of filing: **22.12.2011**

(54) **Device for supporting an object**

Vorrichtung zum Tragen eines Gegenstandes

Dispositif pour support d'un objet

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

(30) Priority: **22.12.2010 NL 2005907**

(43) Date of publication of application:
27.06.2012 Bulletin 2012/26

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Description

[0001] The invention relates to a device for at least partially supporting an object such as a vessel, comprising:

- a support mounting for mounting the device on a frame,
- a first and a second seat, which are each provided with a covering element which is adapted to lie against the object,
- a first carrier element which is connected via at least a first rotation mounting to the support mounting, which first carrier element is connected via a second and a further second rotation mounting to respectively the first and the second seat.

[0002] Such a device is known in the field and marketed at least by applicant. Document US 7025531 constitutes the closest prior art. This device is used for supporting on either side a vessel, the hull of which generally has a double curve. The weight of the vessel is at least partially carried by the first and the second seat of each supporting device. Each seat loaded by the weight of the vessel thus produces a concentration of stress in the hull of the vessel. There is a trend to manufacture vessels more cheaply, for instance by saving on material costs. In order to achieve this object, hulls of the vessels are given a thinner form, whereby greater stresses occur in the hull when the vessel is supported with the known device. Because of the trend of manufacturing vessels more cheaply by applying a minimal wall thickness, it occurs increasingly more often that a seat causes concentrations of stress exceeding a maximum acceptable value in the hull of the vessel, whereby damage to the hull of the vessel occurs.

[0003] The present invention has for its object to prevent damage to vessels, which damage is the result of the vessel being supported via the hull thereof, particularly the damage which occurs in vessels whose hull comprises a very thin wall.

[0004] The device according to the invention has for this purpose the feature that a second carrier element is connected via the second rotation mounting to the first carrier element, which second carrier element is connected via a third rotation mounting to the first seat, and that a third seat is connected via a fourth rotation mounting to the second carrier element, and that a further second carrier element is connected via the further second rotation mounting to the first carrier element, which further second carrier element is connected via a further third rotation mounting to the second seat, and that a fourth seat is connected via a further fourth rotation mounting to the further second carrier element, wherein the third and the fourth seat are each provided with a covering element which is adapted to lie against the object.

[0005] This makes possible a device for supporting an object such as the vessel, which device is adapted to lie over a greater surface area against the hull, wherein the

position of the seats of the supporting device can further be adjusted to the shape of the hull in order to reduce stress concentrations on the hull of the object, thereby decreasing the chance of damage to the vessel at the position of the hull with a very small wall thickness.

[0006] This enables a very stable embodiment of the device according to the invention in which the first, second, third and fourth seats are each adjustable under the influence of the shape of the object via two mutually dependently coupled rotation mountings. The device according to the invention has the advantage that the magnitude of the load is distributed more uniformly. In the known device it may occur that the seats are unequally loaded, and in an extreme case it may even be the case that at least one of the seats is even not loaded because the shape of the object does not extend to the seat and is situated a distance therefrom. The first and the second carrier element can be forced into a determined position under the influence of the shape of the object, wherein the device according to the invention is adaptive and able to position the seats such that the position thereof is adjusted to the shape of the object.

[0007] In a favourable embodiment the first rotation mounting comprises first elements which are fixedly connected to the support mounting and comprises second elements which are fixedly connected to the first carrier element, and the first elements are disposed rotatably relative to the second elements for a rotation of the first carrier element relative to the support mounting about an axis extending substantially in the longitudinal direction of the device. It hereby becomes possible for the device arranged on a frame to be adjustable for the purpose of adjusting the position of the seats relative to the shape of the object. When a cross-section of the object, which cross-section is directed transversely of the longitudinal direction of the object, has a first parabolic form, the device can lie on either side of the object with the seats lying against the first parabolic hull, wherein the load on the device is distributed over the seats in the longitudinal direction.

[0008] In a further favourable embodiment the first rotation mounting comprises a further first rotation mounting for a rotation of the first carrier element relative to the support mounting about an axis extending substantially transversely of the longitudinal direction of both the device and the support mounting. It hereby becomes possible for the device to be adjustable to the shape of the hull in the longitudinal direction of the object along a second parabolic hull, whereby the seats can lie against the second parabolic hull, wherein the load on the device is distributed over the seats in longitudinal direction.

[0009] In a general embodiment the first, second, third and fourth rotation mounting each provide a rotation about an axis, wherein the axes run substantially parallel to each other, and the axes are directed substantially transversely of the first axis. It hereby becomes possible for the device arranged on a frame to be further adjustable for the purpose of adjusting the position of the seats

relative to the shape of the object. A line which runs on the hull in the longitudinal direction of the object and along which the device is adapted to engage on the object generally has a second parabolic form, which is generally weaker than the first parabolic form. When present on either side of the object, the device is adapted to lie against the second parabolic form of the hull, wherein the load on the device is uniformly distributed in longitudinal direction over the seats. The stress concentrations occurring when the object lies against the seats of the device according to the invention are hereby minimized so that the wall thickness, and so the weight of the object, is further minimized.

[0010] The invention will be elucidated hereinbelow on the basis of a preferred embodiment, with reference to the accompanying figures.

Figure 1 shows a schematic perspective view of an object carried by a frame using the device according to the invention;

Figure 2 shows the device according to figure 1 in a schematic cross-section extending in the longitudinal direction of the device along a line II-II in figure 4;

Figure 2A shows a cross-section of the device according to figure 1 along a line IIA-IIA in figure 3;

Figure 3 shows a schematic side view of the device according to figure 1 along a line III-III in figure 4;

Figure 4 shows a schematic bottom view of the device according to figure 1 along a line IV-IV in figure 2;

Figure 5 shows a schematic perspective view of the device according to figure 1.

[0011] The same reference numerals designate the same components in all figures. Figure 1 shows a preferred embodiment of a device 1 according to the invention, in which device 1 is mounted on a frame 20, such as a chassis of a trailer, via a support mounting 2. Lying on device 1 is an object 11, in this example the hull 10 of a vessel 11, which for a stable placing on frame 20 is supported by a further device (not shown) on either side of hull 10. Device 1 is provided with four seats 51, 52, 53, 54 which are each provided with a covering element 50 and make contact with hull 10 of vessel 11.

[0012] Covering element 50 is manufactured from plastic which, while being hard, is still sufficiently flexible to provide a further local adjustment to the shape of hull 10. A further property of covering element 50 is that sufficient friction can be generated to absorb lateral loads, which occur for instance while travelling through bends, and to absorb loads in the longitudinal direction of frame 20 which occur for instance during acceleration and deceleration of frame 20.

[0013] Device 1 is equipped with first and second carrier elements 3, 4, 4' which connect seats 51, 52, 53, 54 to support mounting 2 via diverse rotation mountings discussed below. The first and second carrier elements 3, 4, 4' have the function of a lever and are embodied in this example as arms 3, 4, 4' for the purpose of absorbing

a transverse force which must be transmitted via seats 51, 52, 53, 54 to support mounting 2.

[0014] Figure 2 shows support mounting 2 which can be mounted with a downward directed end on frame 20 and is rotatably connected with an upward directed end to first carrier element 3 via a first rotation mounting S1, which is formed in this embodiment by a first shaft 21 which is disposed fixedly relative to support mounting 2 and which has a first axis HS1 which runs substantially parallel to the longitudinal direction of device 1 and is directed substantially transversely of the axis H2 extending in the longitudinal direction of support mounting 2, relative to which first shaft 21 the first carrier element 3 is coupled rotatably via engaging elements 31 coacting with first shaft 21 for the purpose of adjusting device 1 to the shape of hull 10 in the transverse direction of frame 20.

[0015] The rotatability of first carrier element 3 relative to for instance support mounting 2 is limited to an angle A as shown in figure 2A which in this embodiment runs clockwise but which can of course also run in the opposite direction (not shown). First carrier element 3, which is situated in an extreme position due to rotation through an angle A, is bounded in this embodiment in that a part 33 of first carrier element 3, in this embodiment an edge 33, lies against a part 23 of support mounting 2. It is possible hereby for first carrier element 3, and further parts supported by first carrier element 3, such as the second and the further second carrier element 4, 4', and seats 51, 52, 53, 54, to be located in a position for a ready-to-use device 1 suitable for placing of for instance the vessel 11.

[0016] In an embodiment the first rotation mounting S1 comprises a further rotation mounting S1' as according to figure 2A, which further rotation mounting S1' is formed by a further first shaft 22 which is disposed fixedly relative to the first rotation mounting S1 and which has a further first axis HS1' directed substantially transversely of both the first axis HS1 and the axis H2 extending in the longitudinal direction of support mounting 2. First carrier element 3 is coupled rotatably relative to the further first shafts 22 for the purpose of adjusting device 1 to the shape of hull 10 in the longitudinal direction of frame 20. In this embodiment the first carrier element 3 is disposed for rotation relative to support mounting 2 about both the first axis HS1 and the further first axis HS1' in order to form a double hinge.

[0017] Figure 3 shows the first carrier element 3 disposed on support mounting 2 which, as shown in figure 4, extends transversely of the longitudinal direction of device 1 substantially over the width of device 1. First carrier element 3 is provided on either side close to its outer ends with fixedly arranged shafts 25, 25' extending in the longitudinal direction along respective axes HS2, HS2' as shown in figure 4. Openings with a circular cross-section (not shown) are for instance arranged halfway along the length dimension of the second and the further second carrier element 4, 4', which openings are adapted

to engage on shafts 25, 25' and together for instance form a slide bearing. Shafts 25, 25', which co-act with the openings present in the second and the further second carrier element 4, 4', form in this embodiment a second and a further second rotation mounting S2, S2' for disposing respectively the second carrier element 4 and the further second carrier element 4' for rotation relative to first carrier element 3, wherein the rotation runs relative to respectively a second and a further second axis HS2, HS2' as shown in figure 4 which are directed substantially transversely of the first axis HS1 and are directed substantially transversely of the axis H2 extending in the longitudinal direction of support mounting 2.

[0018] In this embodiment the second carrier element 4 is located in a first space which is bounded by a plane V, in which plane V run both the first further axis HS1' and the axis H2 extending in the longitudinal direction of support mounting 2, and the further second carrier element 4 is located in a second space which is separated from the first space by means of plane V. In this embodiment the second and the further second carrier element 4, 4', including the first and third seats 51, 53 and the second and fourth seats 52, 54 respectively arranged thereon, are the mirror image of each other relative to plane V.

[0019] According to figure 4 the second carrier element 4 extending parallel to the longitudinal direction of device 1 takes a dual form, wherein each second carrier element 4 is arranged at outer ends of shaft 25 remote from each other and form the bearing for second rotation mounting S2. Second carrier element 4 is provided on either side close to the outer ends thereof with fixedly arranged shafts 35, 45 extending in the longitudinal direction along respective axes HS3, HS4 as shown in figure 4. Openings with a circular cross-section (not shown) are for instance arranged halfway along the longitudinal dimension of the first and third seats 51, 53, which openings are adapted to engage on shafts 35, 45, and together form for instance a slide bearing. Shafts 35, 45, which co-act with the openings present in first and third seats 51, 53, form in this embodiment a third and a fourth rotation mounting S3, S4 for arranging respectively the first and third seat 51, 53 for rotation relative to second carrier element 4, wherein the rotation runs relative to respectively a third and a fourth axis HS3, HS4 as shown in figure 4, which are directed substantially transversely of the first axis HS1 and are directed substantially transversely of the axis H2 extending in the longitudinal direction of support mounting 2.

[0020] According to figure 4 the further second carrier element 4' extending parallel to the longitudinal direction of device 1 takes a dual form, wherein each further second carrier element 4' is arranged at outer ends of shaft 25' remote from each other and form the bearing for second rotation mounting S2'. The further second carrier element 4' is provided on either side close to its outer ends with fixedly arranged shafts 35', 45' extending in the longitudinal direction along respective axes HS3', HS4' as

shown in figure 4. Openings with a circular cross-section (not shown) are for instance arranged halfway along the longitudinal dimension of second and fourth seats 52, 54, which openings are adapted to engage on shafts 35', 45' and together form for instance a slide bearing. In this embodiment shafts 35', 45' which co-act with the openings present in second and fourth seats 52, 54 form a further third and a further fourth rotation mounting S3', S4' for disposing respectively the second and fourth seat 52, 54 for rotation relative to the further second carrier element 4', wherein the rotation runs relative to respectively a further third and a further fourth axis HS3', HS4' as shown in figure 4, which are directed substantially transversely of first axis HS1 and are directed substantially transversely of the axis H2 extending in the longitudinal direction of support mounting 2.

[0021] Figure 5 shows in a perspective view that seats 51, 52, 53, 54 form a substantially double-curved surface for the purpose of adapting to a shape of hull 10 which has a substantially similar double-curved surface, which hull 10 positions the seats 51, 52, 53, 54 under the influence of a weight load of the object such that a connection fitting substantially on hull 10 occurs, wherein the weight of the object is distributed uniformly over seats 51, 52, 53, 54.

[0022] In an extended embodiment the support mounting 2 is placed on frame 20 such that each whole device 1 is rotatable about the axis H2 extending in the longitudinal direction of support mounting 2 for the purpose of supporting an object 11 which has in the longitudinal direction thereof a tangent at the position of device 1 which varies from a progression parallel to the longitudinal direction of frame 20. In a further extended embodiment the support mounting 2 is height-adjustable for the purpose of supporting objects so that a supported object 11 can be positioned a sufficient distance from the ground.

[0023] The invention therefore extends to all embodiments falling within the scope of protection of the appended claims, which must be interpreted in light of the figures and the accompanying description.

Claims

1. Device (1) for at least partially supporting an object such as a vessel, comprising:
 - a support mounting (2) for mounting the device (1) on a frame (20),
 - a first and a second seat (51, 52), which are each provided with a covering element (50) which is adapted to lie against the object,
 - a first carrier element (3) which is connected via at least a first rotation mounting (S1) to the support mounting (2), which first carrier element (3) is connected via a second and a further second rotation mounting (S2, S2') to respectively the first and the second seat (51, 52),

characterized in that

- a second carrier element (4) is connected via the second rotation mounting (S2) to the first carrier element (3), which second carrier element (4) is connected via a third rotation mounting (S3) to the first seat (51), and that a third seat (53) is connected via a fourth rotation mounting (S4) to the second carrier element (4), and that a further second carrier element (4') is connected via the further second rotation mounting (S2') to the first carrier element (3), which further second carrier element (4') is connected via a further third rotation mounting (S3') to the second seat (52), and that a fourth seat (54) is connected via a further fourth rotation mounting (S4') to the further second carrier element (4'), wherein the third and the fourth seat (53, 54) are each provided with a covering element (50) which is adapted to lie against the object.

2. Device as claimed in claim 1, **characterized in that** the first rotation mounting (S1) comprises first elements (21) which are fixedly connected to the support mounting (2) and comprises second elements (31) which are fixedly connected to the first carrier element (3), and that the first elements (21) are disposed rotatably relative to the second elements (31) for a rotation of the first carrier element (3) relative to the support mounting (2) about an axis (HS1) extending substantially in the longitudinal direction of the device (1).
3. Device as claimed in claim 2, **characterized in that** the first rotation mounting (S1) comprises a further first rotation mounting (S1') for a rotation of the first carrier element (3) relative to the support mounting (2) about an axis (HS1') extending substantially transversely of the longitudinal direction of both the device (1) and the support mounting (2).
4. Device as claimed in any of the foregoing claims, **characterized in that** the first, second, third and fourth rotation mounting each provide a rotation about an axis, wherein the axes run substantially parallel to each other, and that the axes are directed substantially transversely of the first axis.

Patentansprüche

1. Vorrichtung (1) zum zumindest teilweise Abstützen eines Gegenstandes, wie einem Schiff, umfassend:
 - eine Trägerhalterung (2) zum Befestigen der Vorrichtung (1) auf einem Rahmen (20),
 - einen ersten und einen zweiten Sitz (51, 52), die jeweils mit einem Abdeckelement (50) ver-

sehen sind, das ausgebildet ist, um an dem Gegenstand anzuliegen,

- ein erstes Trägerelement (3), das über zumindest eine erste Drehhalterung (S1) mit der Trägerhalterung (2) verbunden ist, wobei das erste Trägerelement (3) über eine zweite und ein weitere zweite Drehhalterung (S2, S2') mit dem ersten bzw. dem zweiten Sitz (51, 52) verbunden ist,

dadurch gekennzeichnet, dass

- ein zweites Trägerelement (4) über die zweite Drehhalterung (S2) mit dem ersten Trägerelement (3) verbunden ist, wobei das zweite Trägerelement (4) über eine dritte Drehhalterung (S3) mit dem ersten Sitz (51) verbunden ist und dass ein dritter Sitz (53) über eine vierte Drehhalterung (S4) mit dem zweiten Trägerelement (4) verbunden ist und dass ein weiteres zweites Trägerelement (4') über die weitere zweite Drehhalterung (S2') mit dem ersten Trägerelement (3) verbunden ist, wobei das weitere zweite Trägerelement (4') über eine weitere dritte Drehhalterung (S3') mit dem zweiten Sitz (52) verbunden ist und wobei ein vierter Sitz (54) über eine weitere vierte Drehhalterung (S4') mit dem weiteren zweiten Trägerelement (4') verbunden ist, wobei der dritte und der vierte Sitz (53, 54) jeweils mit einem Abdeckelement (50) versehen sind, das ausgebildet ist, um an dem Objekt anzuliegen.

2. Vorrichtung gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die erste Drehhalterung (S1) erste Elemente (21) umfasst, die fest mit der Trägerhalterung (2) verbunden sind und zweite Elemente (31) umfasst, die fest mit dem ersten Trägerelement (3) verbunden sind und daß die ersten Elemente (21) relativ zu den zweiten Elementen (31) drehbar ausgebildet sind, um eine Drehung des ersten Trägerelementes (3) relativ zu der Trägerhalterung (2) um eine Achse (HS1) zu erlauben, die im Wesentlichen in Längsrichtung der Vorrichtung (1) verläuft.
3. Vorrichtung gemäß Anspruch 2, **dadurch gekennzeichnet, dass** die erste Drehhalterung (S1) eine weitere erste Drehhalterung (S1') umfasst, um eine Drehung des ersten Trägerelementes (3) relativ zu der Trägerhalterung (2) um eine Achse (HS1') zu erlauben, die im Wesentlichen senkrecht zu der Längsachse sowohl der Vorrichtung (1) als auch der Trägerhalterung (2) verläuft.
4. Vorrichtung gemäß einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die erste, zweite, dritte und vierte Drehhalterung jeweils eine Drehung um eine Achse ermöglichen, wobei die Achsen im Wesentlichen parallel zueinander angeordnet sind und dass die Achsen im Wesentlichen

senkrecht zu der ersten Achse verlaufen.

Revendications

1. Dispositif (1) pour supporter au moins partiellement un objet tel qu'un navire, comprenant:

- un élément support (2) pour fixer le dispositif (1) sur un cadre (20),
- un premier et un deuxième siège (51, 52) pourvus chacun d'un élément de couverture (50) apte à s'appuyer contre l'objet,
- un premier élément porteur (3) qui est relié à l'élément support (2) par le biais d'au moins un premier élément pivotant (S1), lequel premier élément porteur (3) étant relié par le biais d'un deuxième élément pivotant et d'un deuxième élément pivotant supplémentaire (S2, S2') respectivement au premier et au deuxième siège (51, 52),

caractérisé en ce que

- un deuxième élément porteur (4) est relié au premier élément porteur (3) par le biais du deuxième élément pivotant (S2), lequel deuxième élément porteur (4) étant relié au premier siège (51) par le biais d'un troisième élément pivotant (S3), et **en ce qu'un** troisième siège (53) est relié au deuxième élément porteur (4) par le biais d'un quatrième élément pivotant (S4), et **en ce qu'un** deuxième élément porteur (4') supplémentaire est relié au premier élément porteur (3) par le biais du deuxième élément pivotant supplémentaire (S2'), lequel deuxième élément porteur (4') supplémentaire étant relié au deuxième siège (52) par le biais d'un troisième élément pivotant (S3') supplémentaire, et **en ce qu'un** quatrième siège (54) est relié au deuxième élément porteur (4') supplémentaire par le biais d'un quatrième élément pivotant (S4') supplémentaire, le troisième et le quatrième siège (53, 54) étant chacun pourvus d'un élément de couverture (50) apte à s'appuyer contre l'objet.

2. Dispositif selon la revendication 1, **caractérisé en ce que** le premier élément pivotant (S1) comprend des premiers éléments (21) qui sont reliés fixement à l'élément support (2), et présente des deuxièmes éléments (31) qui sont reliés fixement au premier élément porteur (3), et **en ce que** les premiers éléments (21) sont disposés de sorte à pouvoir tourner par rapport aux deuxièmes éléments (31) pour permettre une rotation du premier élément porteur (3) par rapport à l'élément support (2) autour d'un axe (HS1) s'étendant essentiellement dans la direction longitudinale de l'objet (1).

3. Dispositif selon la revendication 2, **caractérisé en ce que** le premier élément pivotant (S1) comprend un premier élément pivotant (S1') supplémentaire pour permettre une rotation du premier élément porteur (3) par rapport à l'élément support (2) autour d'un axe (HS1') s'étendant essentiellement perpendiculairement à la direction longitudinale aussi bien de l'objet (1) que de l'élément support (2).

4. Dispositif selon l'une des revendications précédentes, **caractérisé en ce que** les premier, deuxième, troisième et quatrième éléments pivotants permettent chacun une rotation autour d'un axe, les axes s'étendant essentiellement parallèlement les uns par rapport aux autres, et **en ce que** les axes sont dirigés essentiellement perpendiculairement au premier axe.

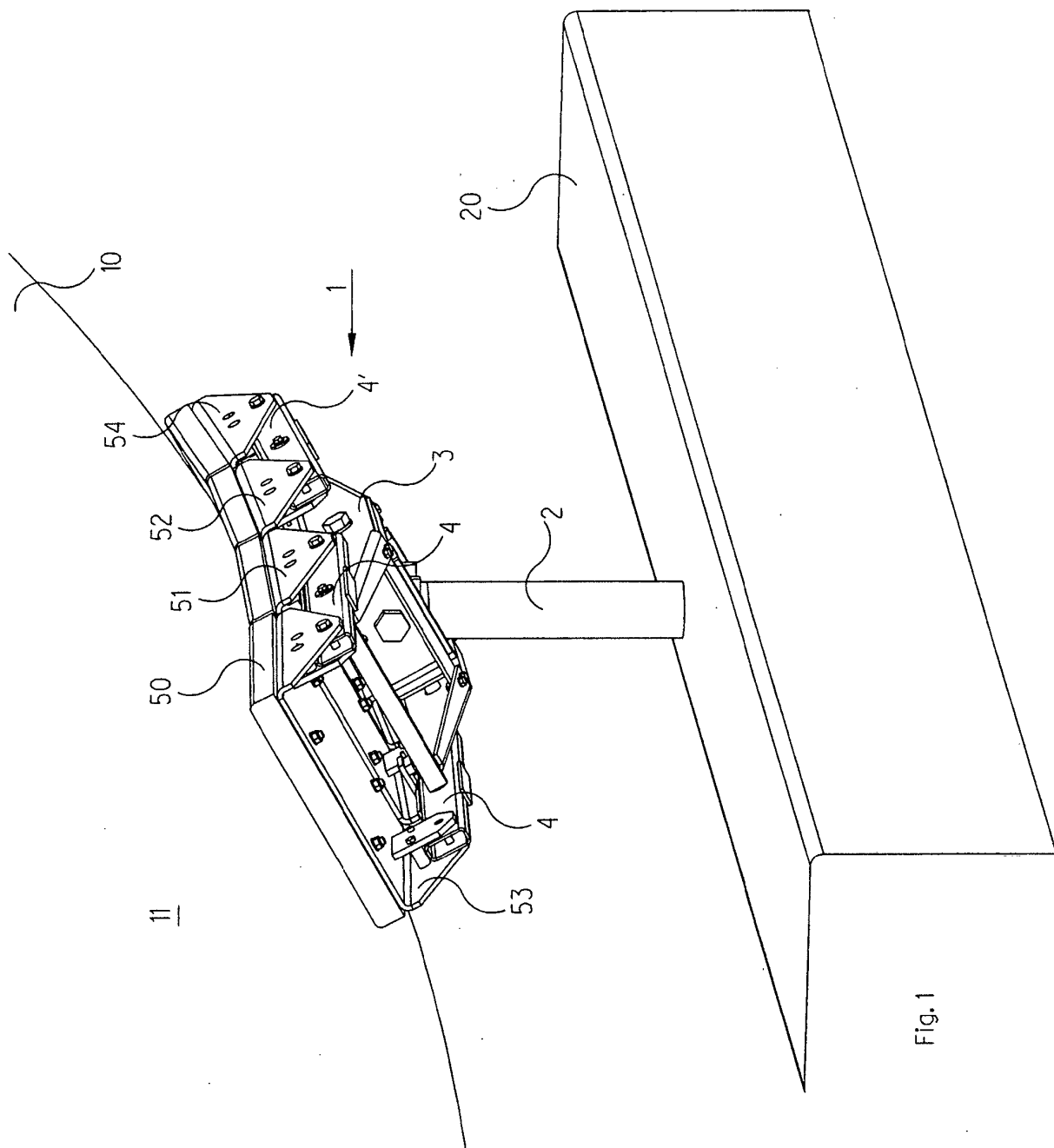


Fig. 1

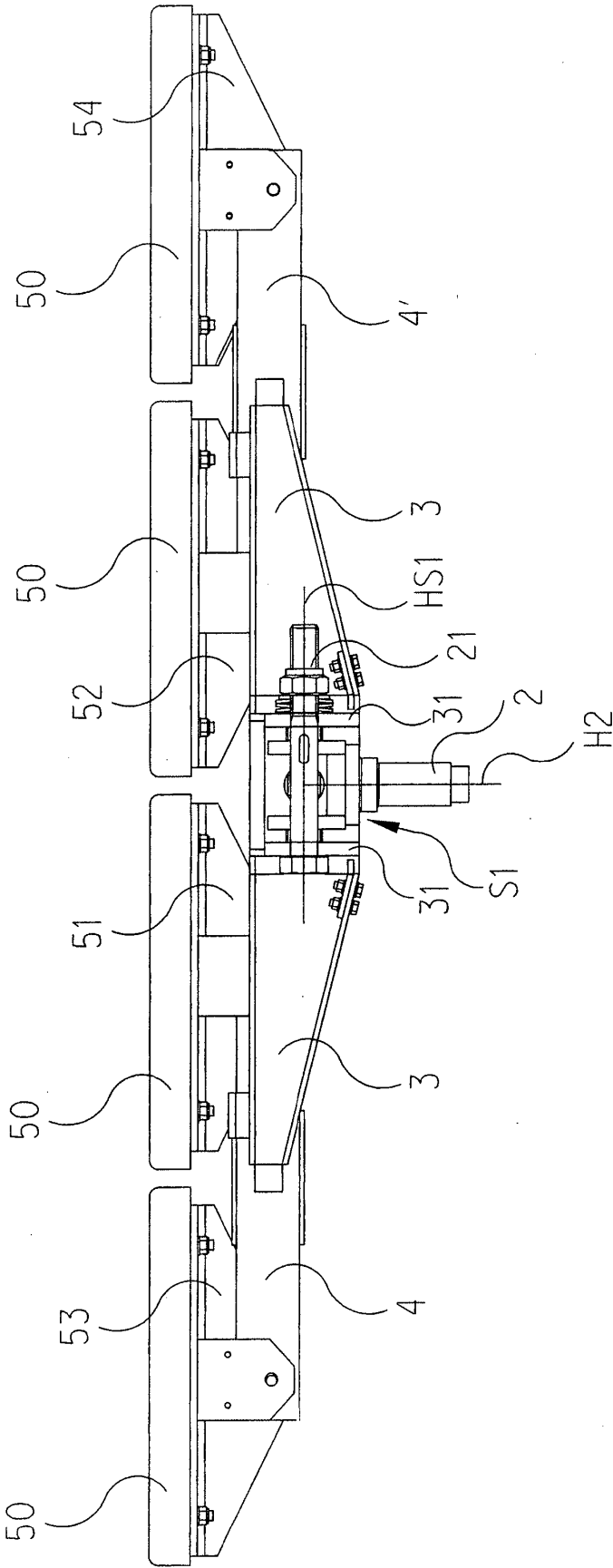


Fig. 2

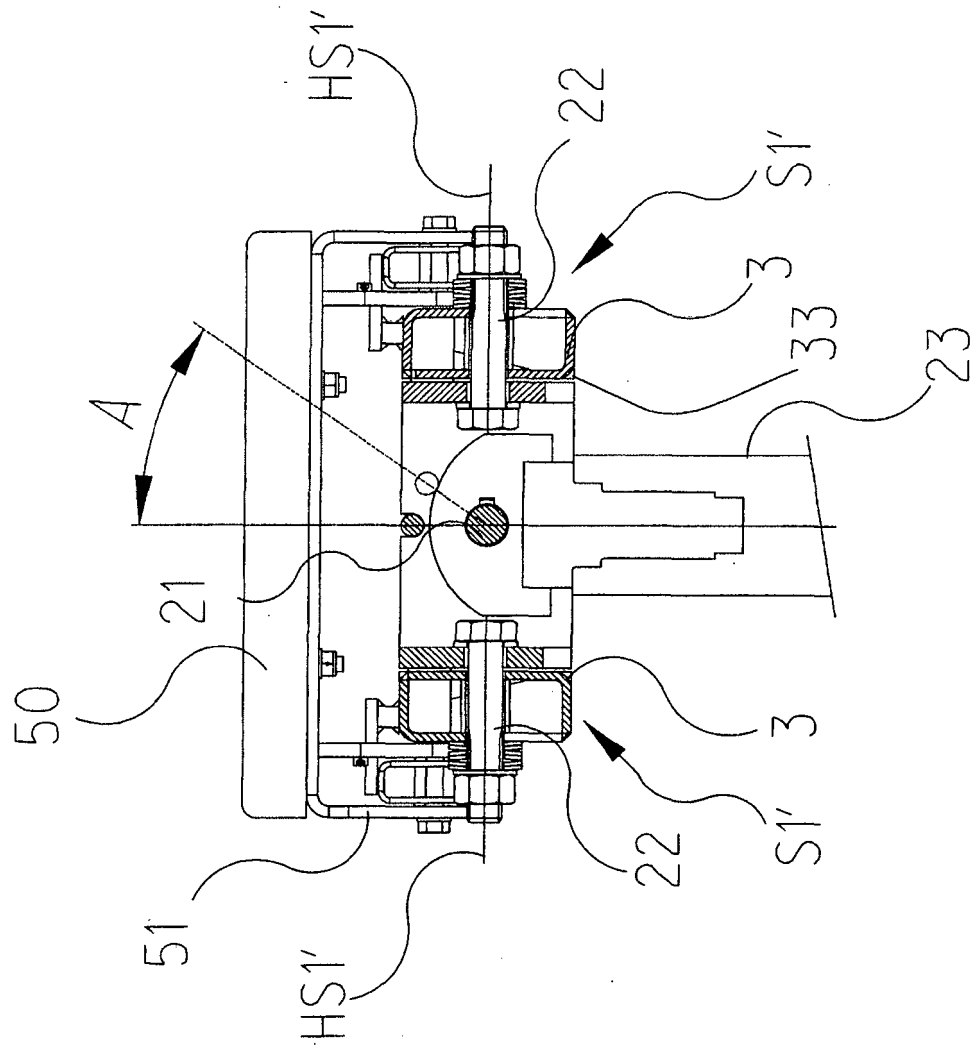


Fig. 2A

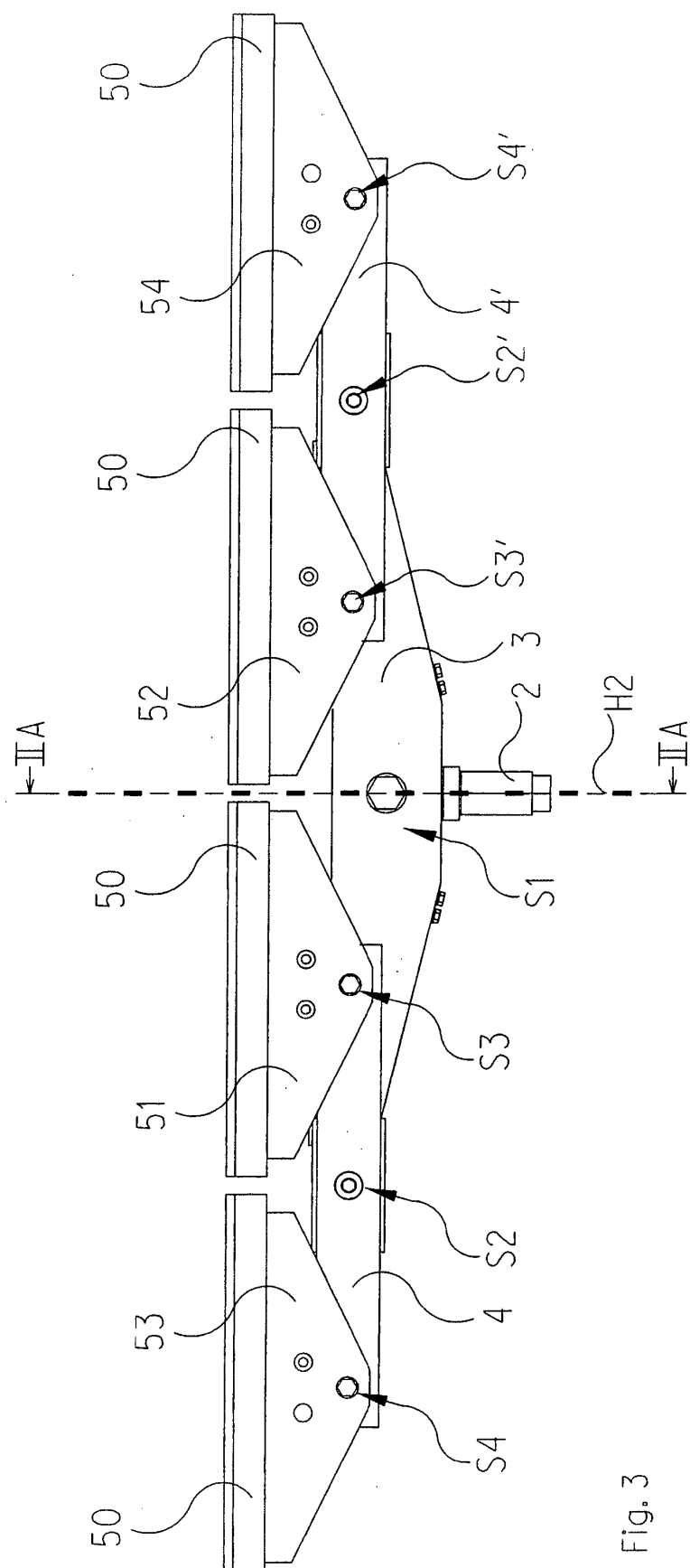


Fig. 3

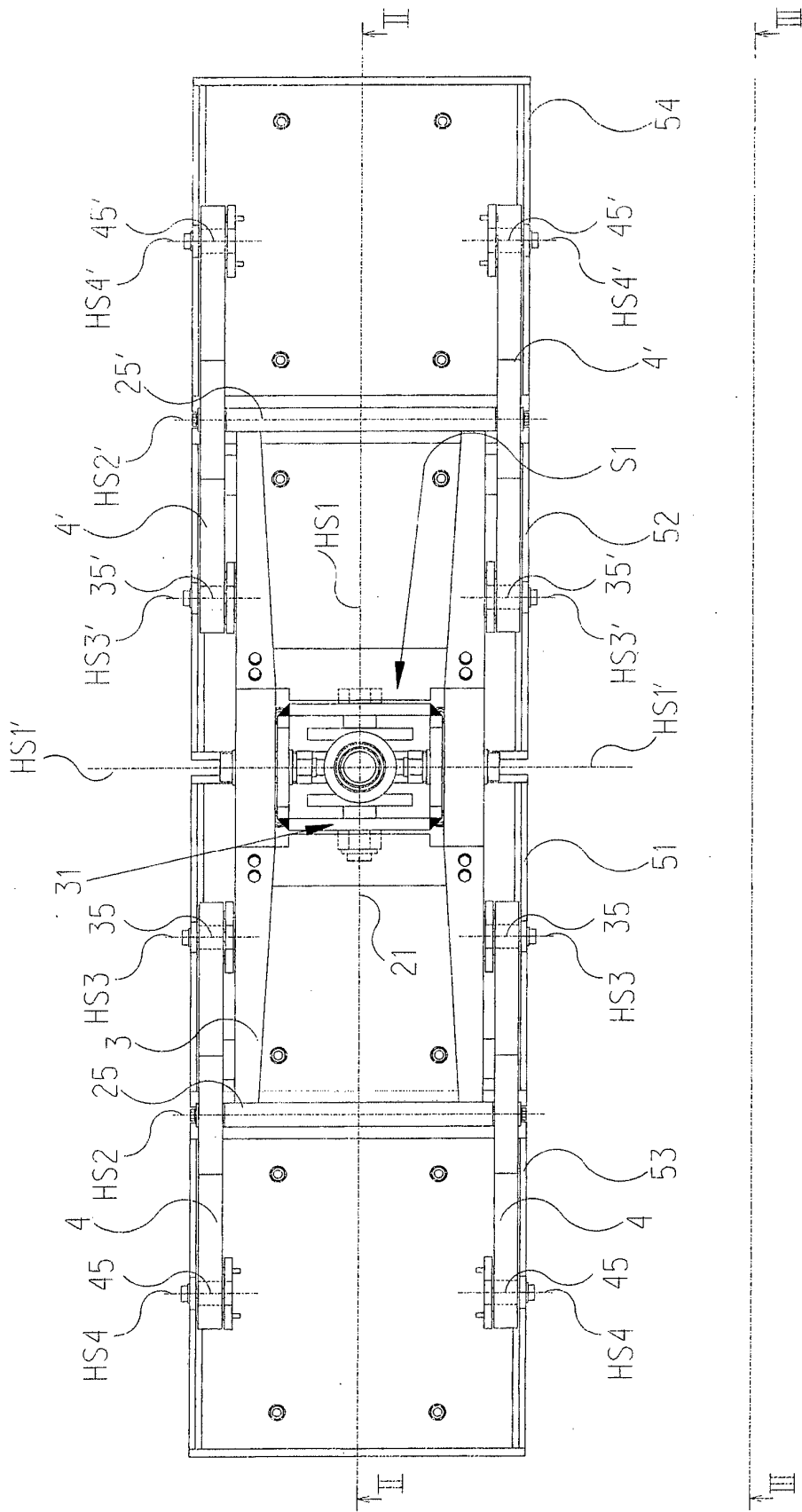


Fig. 4

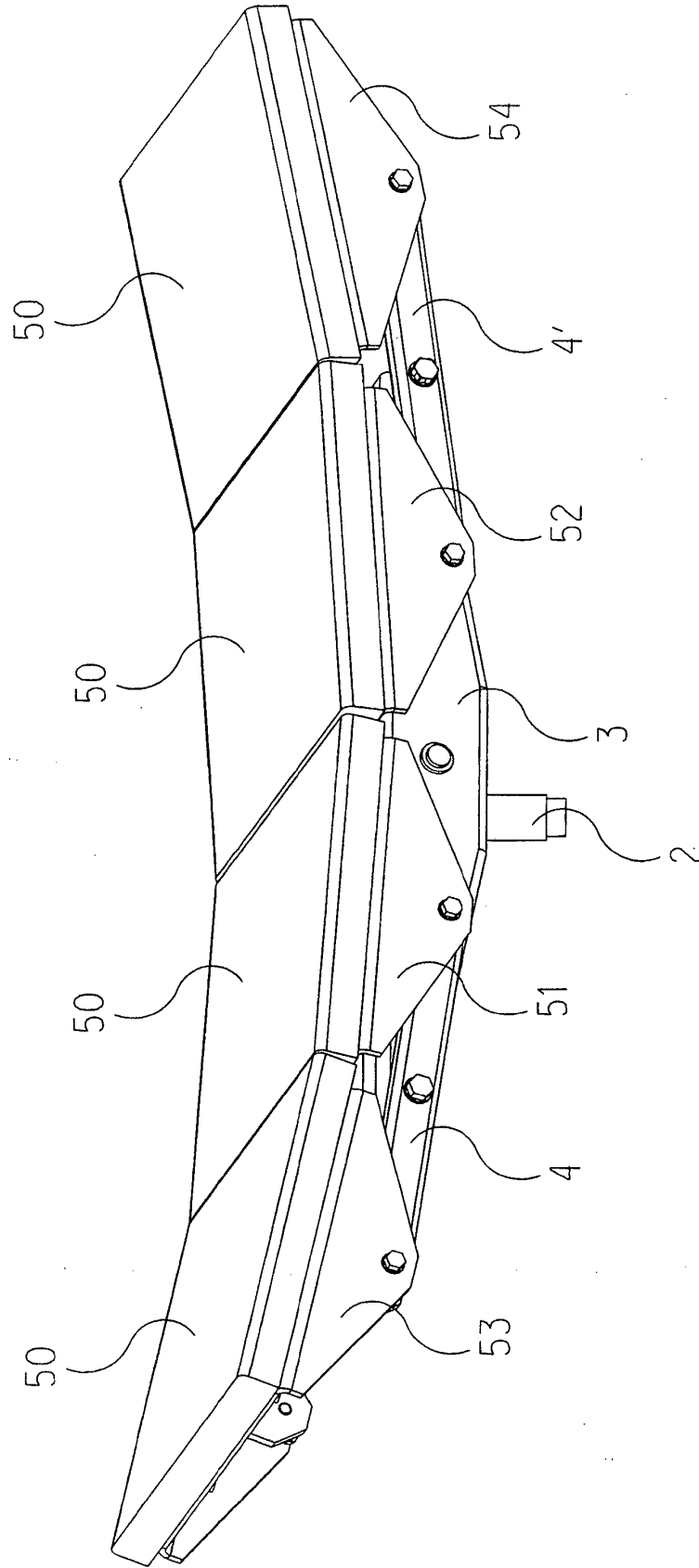


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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