(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 192 943 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
19.07.2017 Bulletin 2017/29

(21) Application number: **17151395.5**

(22) Date of filing: **13.01.2017**

(51) Int Cl.:
E04G 21/14 *(2006.01)* ***B66C 1/62*** *(2006.01)*
E04D 13/03 *(2006.01)*

(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
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **15.01.2016 DK 201670024**

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(54) SYSTEM FOR LIFTING A WINDOW

(57) A system (1) for lifting a window for installation in a roof structure such as to lift the window to a desired place on or in said roof structure, the system comprising a window (2) for installation in a roof structure and comprising a frame (10) with a top member (11), a bottom member (12) and two side members (13, 14), the frame comprising an upper wall (15), a lower wall (16) and an outer side wall (17) formed by respective walls of the frame members, the outer side wall (17) extending between the upper wall (15) and the lower wall (16), the frame (10) further comprising a frame groove (18) in the lower wall of the frame, and at least two lifting brackets (30), where each lifting bracket comprises a first leg portion (31) adapted for abutting the frame of the window and a second leg portion (32) extending in an angle of more than 90 degrees to the first leg portion (31), the second leg portion (32) comprising at least one element (33) adapted for attachment of lifting gear (50), and the first leg portion (31) comprising a central leg section (34) forming a connection to the second leg portion and two opposite outer leg sections (35), where each of the outer leg sections comprise a clamping element (37) adapted for engagement with an edge (19) of the frame (10) extending opposite the outer side wall (17) at the upper side wall (15), a locking element (38) adapted for locking the clamping element and a hook member (39) adapted for engagement with the frame groove (18).

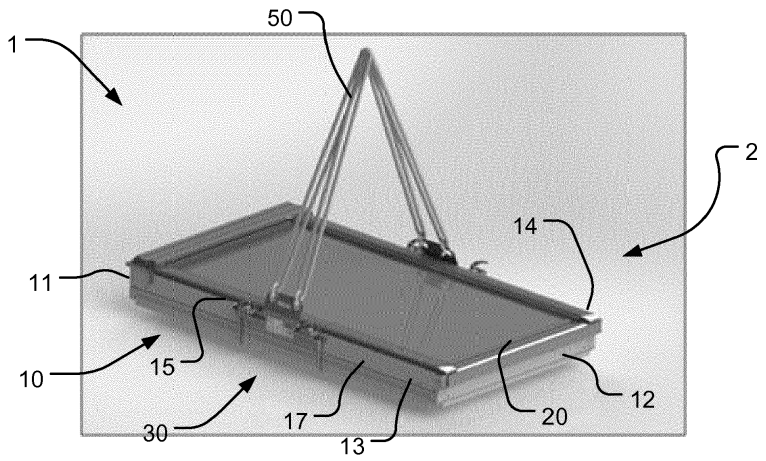

Fig. 1

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Description

[0001] The present invention concerns a system and a lifting bracket for lifting a window for installation in a roof structure such as to lift the window to a desired place on or in said roof structure. The invention further concerns a method for arranging a window for installation in a roof structure in a desired place on or in a roof structure by means of a system or a lifting bracket according to the invention. The invention further concerns the use of a system or of a lifting bracket according the invention for lifting the window to a desired place on or in said roof structure.

[0002] When installing roof windows, the roof windows must be brought to the roof construction in which the window is to be installed. This may and have been done by moving and lifting the roof windows manually. However, roof windows are normally quite heavy structures weighing up to and sometimes even more than 100 kg.

[0003] Thus, lifting gear, such as cranes, hoists or the like, is used to aid in lifting the roof windows in place on the roof structure or even directly into an opening in the roof structure provided for receiving the roof window. This solution obviously lightens the job of the workers installing roof windows considerably and is more gentle to both the window and the worker's health.

[0004] However, drawbacks still remain. In particular, it is a slow and cumbersome, but nevertheless inevitable, process to ensure that the roof windows are securely fastened during the lifting process. Inevitable as it enables the lifting process to be completed without putting the workers in danger and while avoiding detrimental effects on the material used, windows and roof structure included, and thus in such a manner that all security regulations are complied with.

[0005] Therefore, it is the object of the invention to provide a system of the type mentioned in the introduction simplifying the mounting of a roof window by enabling the roof windows to be brought to the roof construction in which the window is to be installed in a simple, safe and time efficient manner while complying with security regulations, and while also reducing the risk of damage to the window as well as the roof structure and workers during lift of the window.

[0006] According to the invention, this is obtained by a system of the type described in the introduction, and comprising a window for installation in a roof structure and comprising a frame with a top member, a bottom member and two side members, the frame comprising an upper wall, a lower wall and an outer side wall formed by respective walls of the frame members, the outer side wall extending between the upper wall and the lower wall, the frame further comprising a frame groove in the lower wall of the frame, and at least two lifting brackets, where each lifting bracket comprises a first leg portion adapted for abutting the frame of the window and a second leg portion extending in an angle of more than 90 degrees to the first leg portion, the second leg portion comprising at least one element adapted for attachment of lifting gear, and the first leg portion comprising a central leg section forming a connection to the second leg portion and two opposite outer leg sections, where each of the outer leg sections comprise a clamping element adapted for engagement with an edge of the frame extending opposite the outer side wall at the upper side wall, a locking element adapted for locking the clamping element and a hook member adapted for engagement with the frame groove.

[0007] By providing each lifting bracket with a first leg portion adapted for abutting the frame of the window and a second leg portion extending in an angle of more than 90 degrees to the first leg portion, a lifting bracket is provided which has a robust and durable structure and is easy to bring into abutment with the frame of the window.

[0008] By providing the second leg portion with at least one element adapted for attachment of lifting gear, lifting gear may be attached to the lifting bracket in an easy, safe and quick manner.

[0009] Furthermore, by providing the first leg portion with a central leg section forming a connection to the second leg portion and two opposite outer leg sections, where each of the outer leg sections comprise a clamping element adapted for engagement with an edge of the frame extending opposite the outer side wall at the upper side wall, a locking element adapted for locking the clamping element and a hook member adapted for engagement with the frame groove, a lifting bracket is provided having a particularly robust and durable structure.

[0010] Furthermore, the clamping element, locking element and hook member make it very simple and quick to both attach the lifting bracket to and detach it from the window, and further provides for a particularly robust and durable connection with the window when attached thereto, this connection simultaneously being very gentle to the window during lifting thereof. This in turn provides for a system making it simple and quick to lift a window to a desired place in or on a roof construction and also being sufficiently safe to comply with the relevant security regulations.

[0011] Thus, the system according to the invention provides a solution to the above-mentioned objects. In this connection, it is noted that experiments have shown that the lifting brackets have a life time corresponding to at least 20.000 lifts, and thus a very high robustness and durability.

[0012] In an embodiment the hook member is rotatable by 90 degrees between a first position in which a bend of the hook member extends in parallel with the first leg portion of said lifting bracket and a second position in which the bend of the hook member extends in an angle of 90 degrees to the first leg portion.

[0013] Thereby a system is provided with which it is particularly simple, and fast to bring the hook member into and out of engagement with the frame groove of the window.

[0014] The hook member may comprise an operating

element, such as a handle or the like, for rotating the hook member, thereby enabling simple and quick rotation of the hook member.

[0015] The operating element may furthermore optionally comprise a stop element preventing rotation of the hook member beyond the 90 degrees, i.e. beyond one or both of the first and second positions.

[0016] In an embodiment the hook member comprises a substantially semi-circular bend, preferably having an inner diameter of 18 to 20 mm.

[0017] Thereby a system is provided with which a particularly well-functioning and simple engagement between the hook member and the frame groove of the window is provided for. Furthermore, a hook member with a bend having an inner diameter of 18 to 20 mm is particularly adapted to roof windows of the type produced and sold under the model names of V21 and V22 by Velux A/S.

[0018] In an embodiment the hook member comprises a bend terminating in a pointed end.

[0019] Thereby a system is provided with which a particularly robust and safe engagement between the hook member and the frame groove of the window is provided for, while still ensuring both minimum impact on the roof window and that the engagement may easily be reverted when it is desired to remove the lifting bracket from the roof window.

[0020] In an embodiment the second leg portion extends in an angle of between 153 and 157 degrees to the first leg portion.

[0021] Thereby a system is provided with which the distribution of forces in the lifting bracket and therefore also between in particular lifting bracket and roof window but also lifting bracket and lifting gear during lift of the roof window is optimized. This in turn provides for a system, and in particular lifting brackets, that is made very durable while also being particularly gentle to the roof window during lifting.

[0022] In an embodiment at least one of the first leg portion and the second leg portion comprises a marking element arranged at a position distanced equally from each of the two opposite outer leg sections.

[0023] Thereby, and since the center of the side frame members of most roof windows is already marked in virtue of the transition between the two frame coverings arranged on each side frame member, a system is provided with which the positioning of the lifting brackets at the center of the side frame members does not require any measuring and is thus made particularly simple and fast.

[0024] In a further embodiment at least one and preferably each of the outer leg sections of the first leg portion comprises a flange on which the clamping element and optionally also the locking element are mounted. Thereby the lifting bracket is provided with further robustness and durability.

[0025] In a second aspect of the invention, a lifting bracket for a system according to the first aspect of the invention has been provided, the lifting bracket comprising features according to any one of claims 7 to 12.

[0026] In a third aspect of the invention, a method for arranging a window for installation in a roof structure in a desired place on or in a roof structure has been provided, the method involving the use of a system according to the first aspect of the invention or at least two lifting brackets according to the second aspect of the invention, the method further comprising the steps according to any one of claims 13 to 16.

[0027] In further aspects the invention concerns the use of a system according to the first aspect of the invention, or of at least two lifting brackets according to the second aspect of the invention, for lifting a window for installation in a roof structure to a desired place on or in said roof structure.The invention will be described in more detail below by means of non-limiting examples of presently preferred embodiments and with reference to the schematic drawings, in which:

Fig. 1 shows a perspective view of a system for lifting a window according to the first aspect of the invention, lifting gear being attached to the lifting bracket;
Fig. 2 shows a perspective view of a lifting bracket according to the second aspect of the invention;
Fig. 3 shows a perspective view of another embodiment of a lifting bracket according to the second aspect of the invention;
Figs 4a and 4b show a front and side view of a clamping element according to the second aspect of the invention, respectively;
Figs 5 - 18 shows an embodiment of a method for arranging a window for installation in a roof structure in a desired place on or in a roof structure according to the third aspect of the invention.

[0028] Fig. 1 shows a perspective view of a system 1 for lifting a window according to the invention. The system shown comprises a roof window 2 for for installation in a roof structure, the window having a frame 10 and a sash 20. The frame further comprises four frame members, a top member 11, a bottom member 12 and two side members 13 and 14. The frame 10 further comprises an exterior wall and an interior wall 21 (shown on Figs 7 and 8), said exterior wall comprising an upper wall 15, a lower wall 16 (shown on Fig. 7) and an outer side wall 17 formed by respective walls of the frame members. The outer side wall 17 extends between the upper wall 15 and the lower wall 16. The frame 10 further comprises a frame groove 18 (shown on Figs 7 and 8) in the lower wall 16 of the frame 10 and an edge 19 (shown on Figs 7 and 8) extending opposite the outer side wall 17 between the interior wall 21 and the upper side wall 15.

[0029] The system 1 shown further comprises two lifting brackets 30, which will be described in further details below. Further Fig. 1 shows lifting gear 50 (not a part of the invention), which is attached to the system 1 via the lifting brackets 30.

[0030] Figs 2 and 3 show a perspective view of a lifting bracket 30 according to the invention having a first leg portion 31 and a second leg portion 32 extending in an angle β of 155 degrees to the first leg portion 31, the second leg portion 32 comprising two openings 33 adapted for attachment of lifting gear 50. In the embodiment shown in Fig. 3, the lifting bracket 30 further comprises a marking element 41, shown as a cut at the intersection between the first leg portion 31 and the second leg portion 32, substantially at the center of the lifting bracket 30. The first leg portion 31 comprises a central leg section 34 and two opposite outer leg sections 35, where each of the outer leg sections 35 comprise a flange 36 (cf. also Fig. 5) with a clamping element 37 adapted for engagement with an edge 19 of a side frame member 13 and 14 of the window 2. The outer leg sections 35 further comprise a locking element 38 adapted for locking the clamping element 37 and a hook member 39 adapted for engagement with a frame groove 18 of the window 2. One, lower, end, which may be threaded, of the locking element 38 may, after the end has been inserted through the flange 36 and the clamping element 37, be spot welded such as to keep the locking element 38 and thereby also the clamping element 37 in place and avoid disassembly. In the embodiment shown, the hook members 39 have a bend 391 having an inner diameter of 19 mm, the bend 391 leading to a pointed end 40 for engaging the frame groove 18 of the frame 10. The bend 391 may be continuous (i.e. substantially have a U-shape), or it may comprise an elbow at a lowest point (i.e. substantially have a V-shape) and/or at the transition to a shank 392 of the hook member 39 and/or at the transition to the pointed end 40. A washer 393 may be provided for abutment against the leg section 35 in the mounted position of the hook member 39. The hook member 39 is connected to an operating element 42 seen in Figs 2 and 3 in the form of a handle 42. The operating element 42 further comprises a stopping element 43, which limits the rotation of the operating element 42. In the embodiment shown in Fig. 3, the stopping element 43 is at an angle of substantially 90 degrees compared to the handle 42, thus limiting the handle to rotating 90 degrees. The hook member 39, the washer 393 (where provided) and the operating element 42 may be spot welded together.

[0031] Figs 4a and 4b show a front and side view of a clamping element 37 of a lifting bracket 10 according to the second aspect of the invention, respectively. As seen in Fig. 4b, the clamping element 37 has a section adapted for extending over the upper wall 15 of the frame 10 when the lifting bracket 30 is positioned on the window 10. The clamping element 37 further comprises a bent end 371, which is adapted to be engaged with an edge 19 of the frame 10 when the lifting bracket 30 is positioned on the window 10. In one embodiment the bent end 371 has a length of 2,5 mm.

[0032] Figs. 5 - 18 show an embodiment of the method for arranging a window for installation in a roof structure in a desired place on or in a roof structure according to an aspect of the invention.

[0033] Fig. 5 shows the lifting bracket 30 with the locking element 38 in the open position, the handles 42 and connected hook members 39 in the engaging position, substantially having the handles 42 parallel to the first leg portion 31 and the hook members 39 at a substantially 90 degree angle to the first leg portion 31. The clamping element 37 is pulled back with respect to the first leg portion.

[0034] Fig. 6 shows placing two lifting brackets 30 at opposite sides of the window 2 in the center of the side frame members 13 and 14. The center of the lifting bracket 30 is shown by a marking element 41 in the second leg portion 32 of the lifting bracket 30.

[0035] Fig. 7 shows a lifting bracket 30 during a step of the method, wherein the pointed end 40 of the hook member 39 is placed into engagement with a frame groove 18 of the window 2. In this step the clamping element 37 is in a pulled back position.

[0036] Fig. 8 shows a lifting bracket 30 during a step of the method, wherein the clamping element 37 is moved forward into engagement with an edge 19 of the frame 10 extending opposite the outer side wall 17 at the upper side wall 15.

[0037] Fig. 9 shows a lifting bracket 30 during a step of the method, wherein the locking element 38 is turned clockwise around its turning axis, in order to tighten the locking element 38.

[0038] As seen in Fig. 10, once the locking element 38 is tightened to a point where it cannot be moved by hand, the locking element 38 is moved into the closed position, such as to increase the clamping force between the clamping element 37 and the hook member 39. The locking element 38 can be closed in any position around its turning axis.

[0039] Figs 11 and 12 show two lifting brackets 30 in a mounted position on the window 2, wherein lifting gear 50 is attached to the openings 33 provided in the second leg portion 32. The lifting gear 50 is attached such that a lifting force acts on the lifting brackets 30 at an angle of at least 60 degrees with respect to the window 2. Fig. 11 shows the window 2 being lifted in a substantially horizontal position, having lifting gear 50 attached to two openings 33 of each lifting bracket 30, in order to achieve a stable movement to the rooftop when lifted. Fig. 12 shows the window 2 being lifted in a substantially vertical position, having lifting gear 50 attached to one opening 33 of each lifting bracket 30, in order to achieve a stable movement to the rooftop when lifted. The window 2 is guided into the correct position in an opening in a roof structure. When in the correct position, the tension on the lifting gear 50 is released, in order to demount the lifting brackets 30 from the window 2.

[0040] Fig. 13 shows a lifting bracket 30 during a step of the method, preferably performed subsequently to guiding the window 2 into the correct position in an opening in the roof structure, wherein the locking element 38 is moved from its closed position to its open position, thus

releasing the clamping force applied in the step shown in Fig. 10.

[0041] Fig. 14 shows a lifting bracket 30 during a step of the method, wherein the locking element 38 is turned counter clockwise around its turning axis, in the opposite direction as in the step shown in Fig. 9, in order to loosen the locking element 38 enough to be removed.

[0042] Fig. 15 shows a lifting bracket 30 during a step of the method, wherein the clamping element 37 is moved back into its pulled back position, thus no longer engaging with the edge 19 of the frame 10. Further the lifting bracket 30 is pushed down such that the hook member 39 is clear of the lower side of the side frame member 13.

[0043] Fig. 16 shows turning the handles 42 and connected hook members (not shown in Fig. 16) from the engaging position, substantially having the handles 42 parallel to the first leg portion 31 and the hook members (not shown in Fig. 16) at a substantially 90 degree angle to the first leg portion 31, to the removing position, wherein the handles 42 are at a substantially 90 degree angle to the first leg portion 31 and the hook members (not shown in Fig. 16) is substantially parallel to the first leg portion 31.

[0044] Figs 17 and 18 show a lifting bracket 30 during a step of the method, wherein the lifting bracket 30 is removed from the window 2 by lifting the handle 42 in an upwards direction, away from the window 2, until the lifting bracket 30 is clear of the window 2 in its installed position.

[0045] The person skilled in the art realizes that the present invention by no means is limited to the preferred embodiments described above. On the contrary, many modifications and variations are possible within the scope of the appended claims.

Claims

1. A system for lifting a window for installation in a roof structure such as to lift the window to a desired place on or in said roof structure, the system comprising:

   a window for installation in a roof structure and comprising a frame with a top member, a bottom member and two side members, the frame comprising an upper wall, a lower wall and an outer side wall formed by respective walls of the frame members, the outer side wall extending between the upper wall and the lower wall, the frame further comprising a frame groove in the lower wall of the frame, and

   at least two lifting brackets, where each lifting bracket comprises a first leg portion adapted for abutting the frame of the window and a second leg portion extending in an angle of more than 90 degrees to the first leg portion,

   the second leg portion comprising at least one element adapted for attachment of lifting gear, and

   the first leg portion comprising a central leg section forming a connection to the second leg portion and two opposite outer leg sections, where each of the outer leg sections comprise a clamping element adapted for engagement with an edge of the frame extending opposite the outer side wall at the upper side wall, a locking element adapted for locking the clamping element and a hook member adapted for engagement with the frame groove.

2. A system for lifting a roof window according to claim 1, wherein the hook member is rotatable by 90 degrees between a first position in which a bend of the hook member extends in parallel with the first leg portion and a second position in which the bend of the hook member extends in an angle of 90 degrees to the first leg portion.

3. A system for lifting a roof window according to any one of the above claims, wherein the hook member comprises a substantially semi-circular bend with an inner diameter of 18 to 20 mm.

4. A system for lifting a roof window according to any one of the above claims, wherein the hook member comprises a bend terminating in a pointed end.

5. A system for lifting a roof window according to any one of the above claims, wherein the second leg portion extends in an angle of between 153 and 157 degrees to the first leg portion.

6. A system for lifting a roof window according to any one of the above claims, wherein at least one of the first leg portion and the second leg portion comprises a marking element arranged at a position distanced equally from each of the two opposite outer leg sections.

7. A lifting bracket for a system according to any one of the above claims, the lifting bracket comprising a first leg portion and a second leg portion extending in an angle different from zero degrees to the first leg portion,

   the second leg portion comprising at least one element adapted for attachment of lifting gear, and

   the first leg portion comprising a central leg section forming a connection to the second leg portion and two opposite outer leg sections, where each of the outer leg sections comprise a clamping element adapted for engagement with an edge of the frame extending opposite an outer side wall of the frame at an upper side wall of the frame, a locking element adapted for locking the clamping element and a hook member adapted for engagement with a frame groove in a lower wall of the frame.

8. A lifting bracket according to claim 7, wherein the hook member is rotatable by 90 degrees between a first position in which a bend of the hook member extends in parallel with the first leg portion and a second position in which the bend of the hook member extends in an angle of 90 degrees to the first leg portion.

9. A lifting bracket according to claim 7 or 8, wherein the hook member comprises a substantially semi-circular bend with an inner diameter of 18 to 20 mm.

10. A lifting bracket according to any one of claims 7 to 9, wherein the hook member comprises a bend terminating in a pointed end.

11. A lifting bracket according to any one of claims 7 to 10, wherein the second leg portion extends in an angle of between 153 and 157 degrees to the first leg portion.

12. A lifting bracket according to any one of claims 7 to 11, wherein at least one of the first leg portion and the second leg portion comprises a marking element arranged at a position distanced equally from each of the two opposite outer leg sections.

13. A method for arranging a window for installation in a roof structure in a desired place on or in a roof structure, the method comprising the steps of:

- providing a system according to any one of claims 1 to 6 or a window for installation in a roof structure and two lifting brackets according to any one of claims 7 to 12,
- positioning the two lifting brackets on mutually opposite frame members, preferably opposite side frame members, of the window by bringing the first leg portion of each lifting bracket into abutment with an outer side wall one of the mutually opposite frame members of the window,
- attaching the two lifting brackets to the mutually opposite frame members of the window by:
  - o bringing the hook member into engagement with the frame groove of the window,
  - o bringing the clamping element of each lifting bracket into engagement with an edge of the frame extending opposite an outer side wall of the frame at an upper side wall of the frame, and
  - o locking the clamping element by means of the locking element,
- attaching lifting gear to the elements provided in the second leg portion,
- lifting the window by means of the lifting gear, and
- arranging the window in a desired place on or in said roof structure.

14. A method according to claim 13, wherein the step of positioning the two lifting brackets comprises positioning the two lifting brackets centrally on the mutually opposite frame members of the window.

15. A method according to any one of claims 13 and 14, and further comprising, prior to the step of positioning, any one or more of:

loosening the locking elements,
positioning the hook elements such that the bend extends in an angle of 90 degrees to the first leg portion, and
displacing the clamping elements in a direction away from the first leg portion.

16. A method according to any one of claims 13 to 15, wherein the step of arranging the window in a desired place on or in said roof structure comprises the further steps of:

- detaching the two lifting brackets from the mutually opposite frame members of the window by:
  - o releasing the clamping element by releasing the locking element,
  - o bringing the clamping element of each lifting bracket out of engagement with the edge of the frame of the window, and
  - o bringing the hook member out of engagement with the frame groove of the window, and
- removing the two lifting brackets from the window.

17. Use of a system according to one or more of claims 1 to 6 for lifting a window for installation in a roof structure to a desired place on or in said roof structure.

18. Use of at least two lifting brackets according to one or more of claims 7 to 12 for lifting a window for installation in a roof structure to a desired place on or in said roof structure.

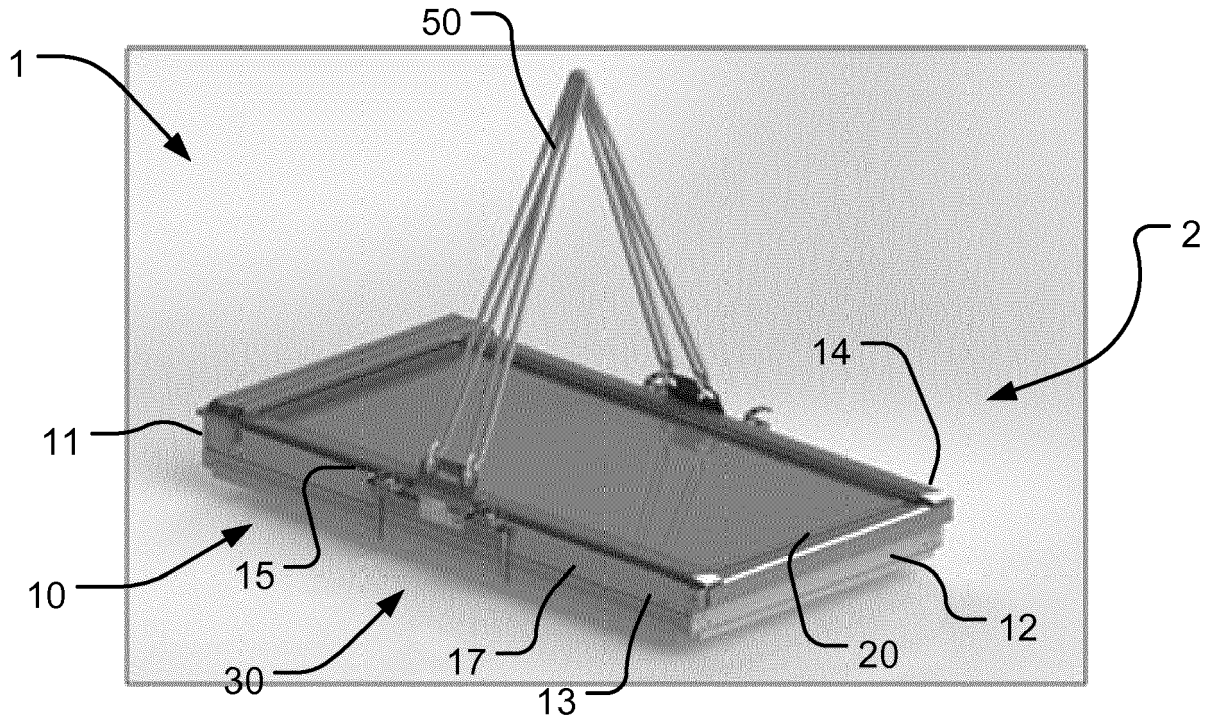
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Fig. 1

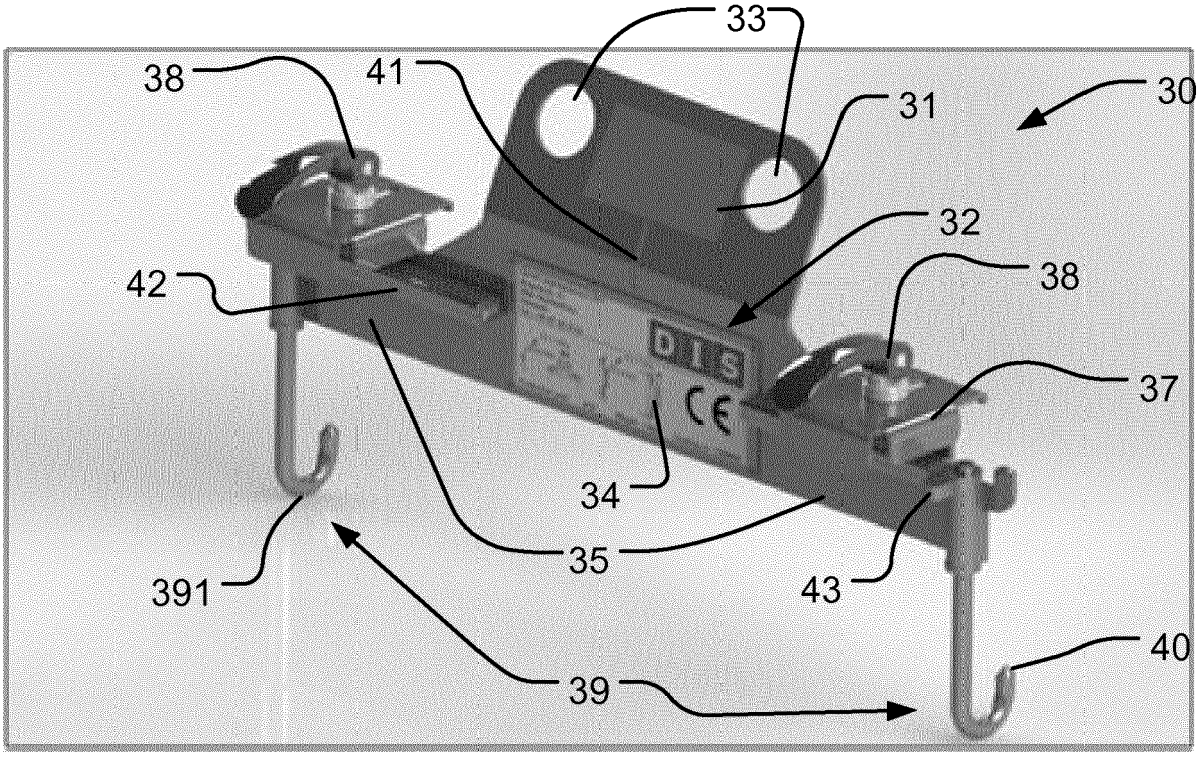
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Fig. 2

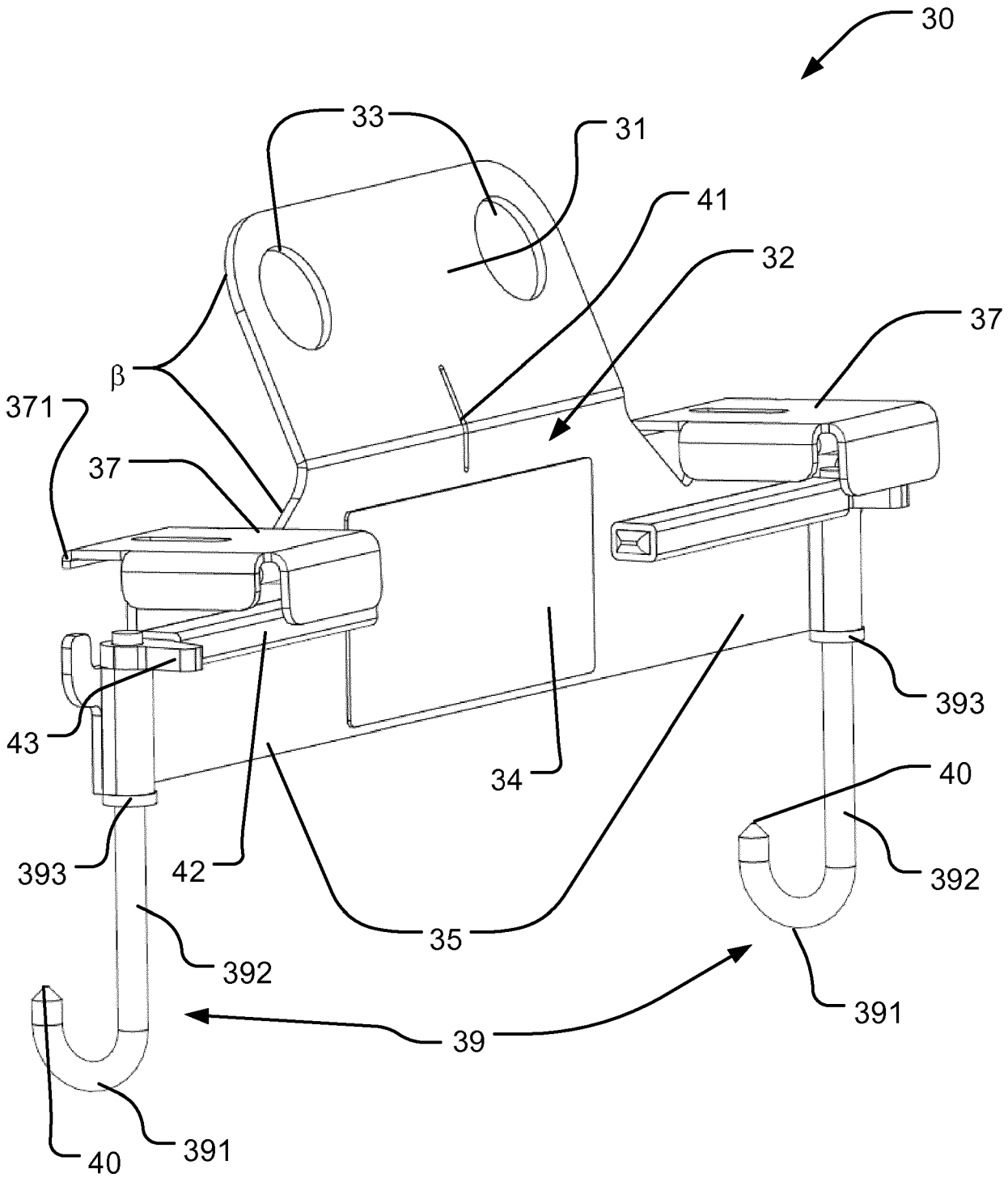
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Fig. 3

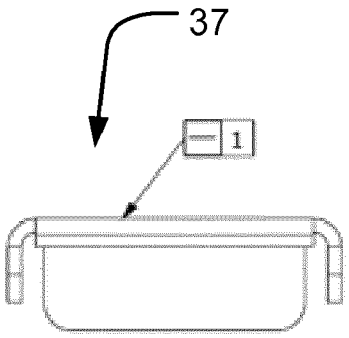

Fig. 4a

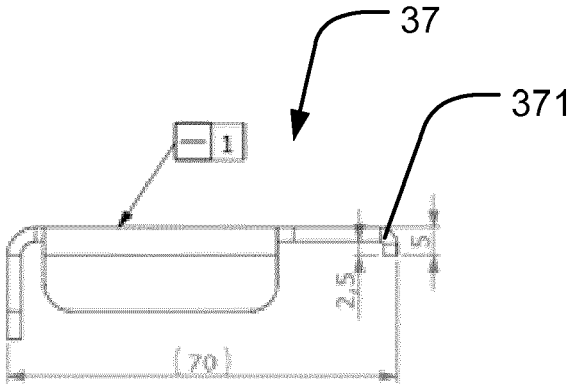

Fig. 4b

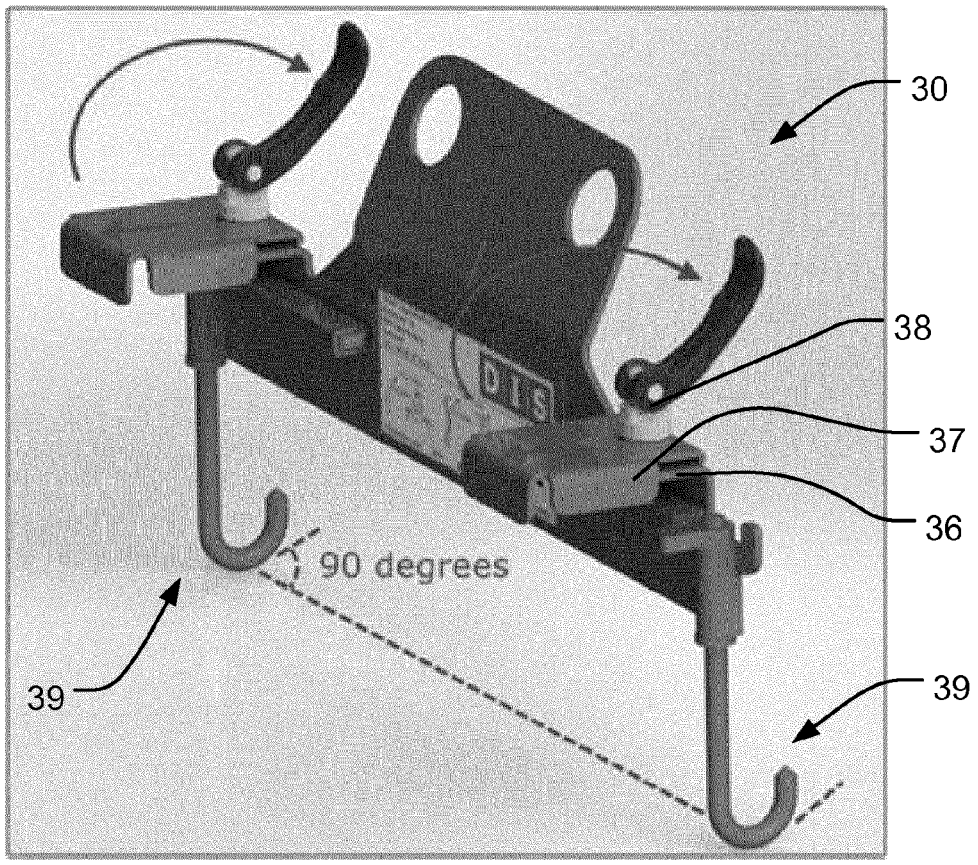

Fig. 5

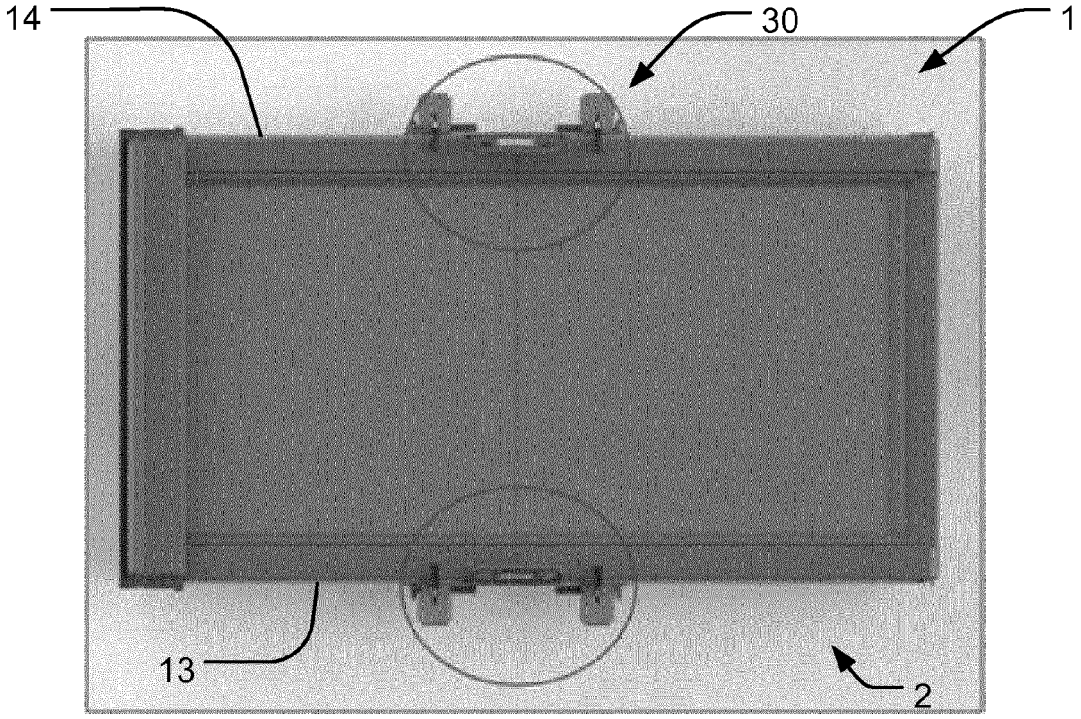

Fig. 6

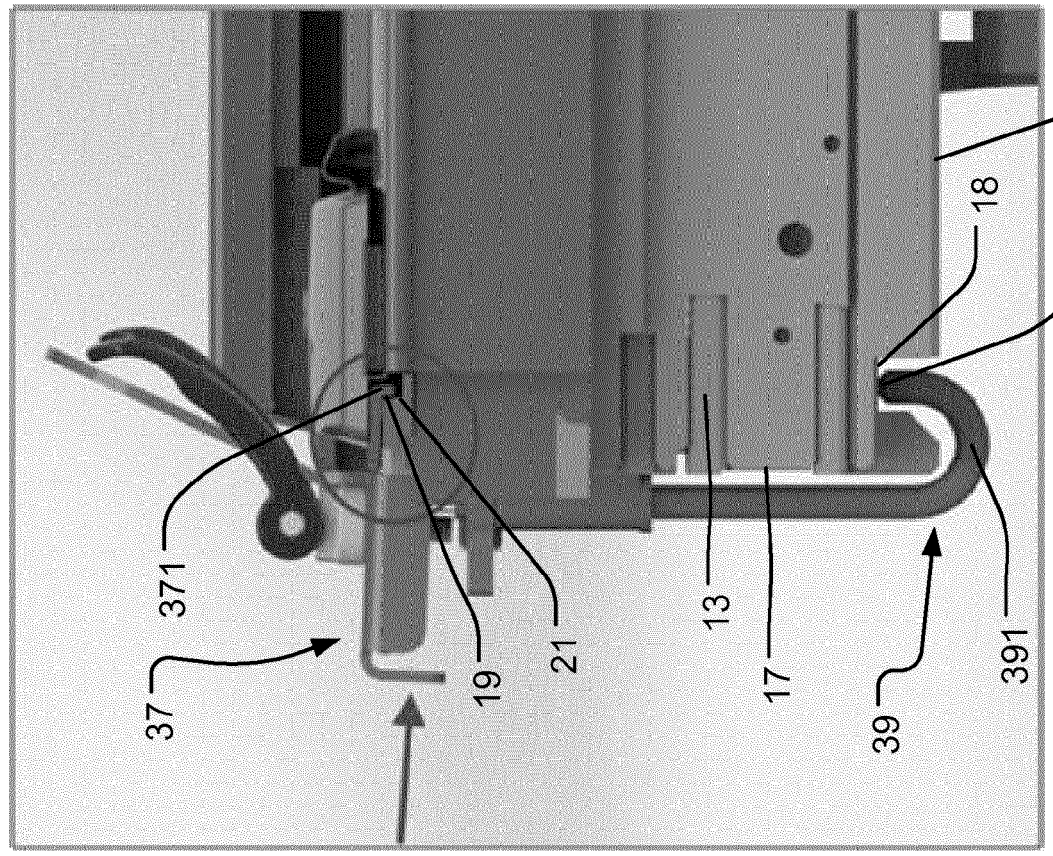

Fig. 8

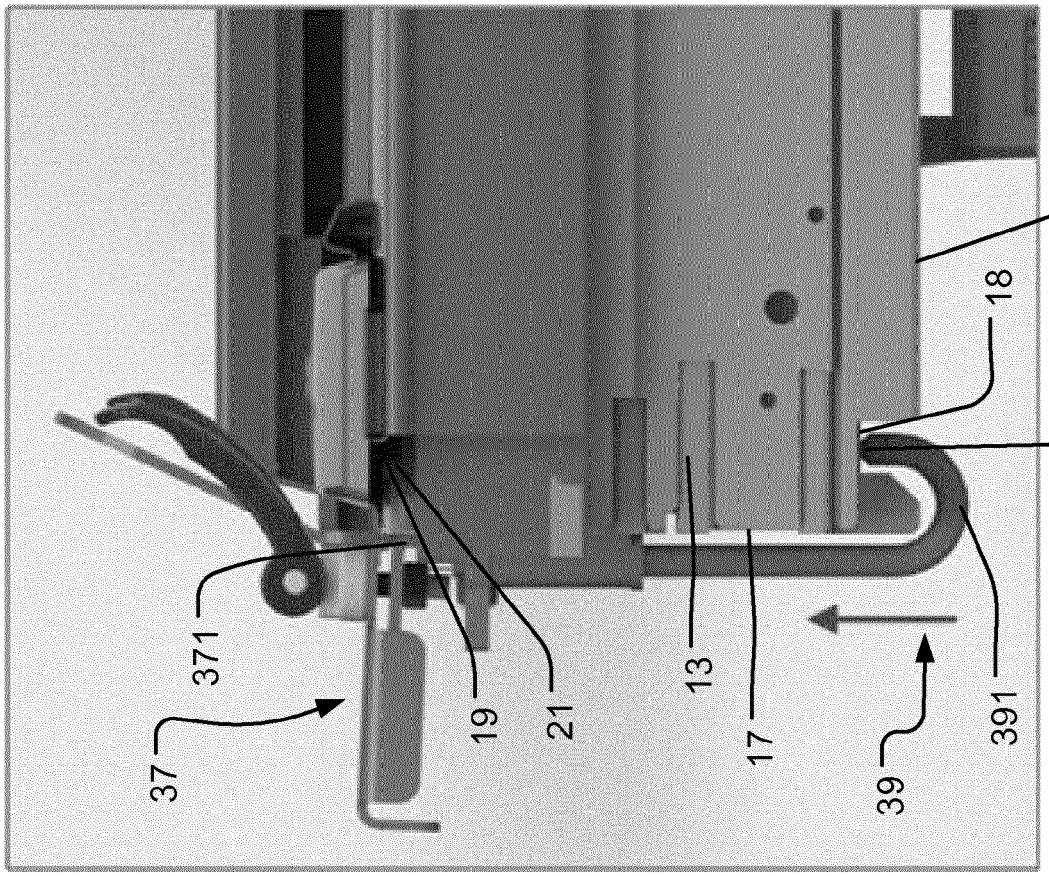

Fig. 7

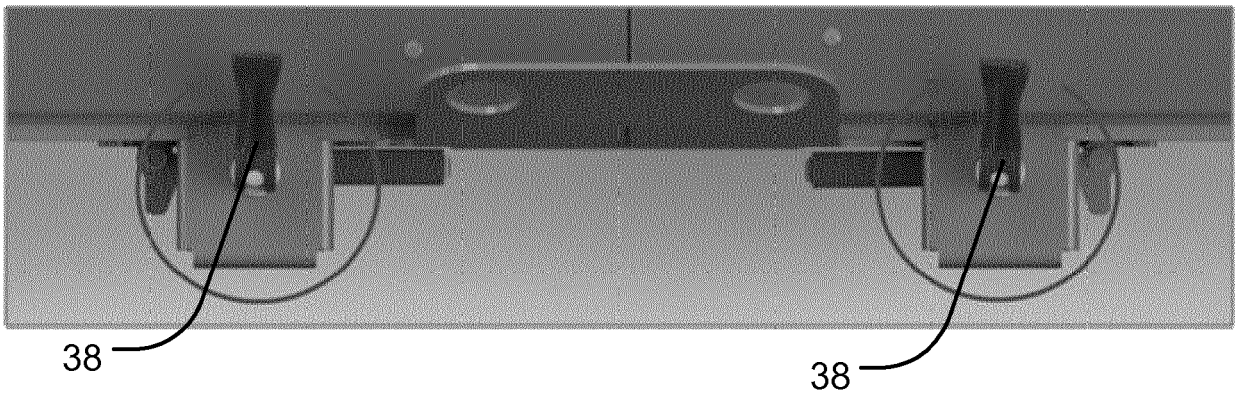

Fig. 9

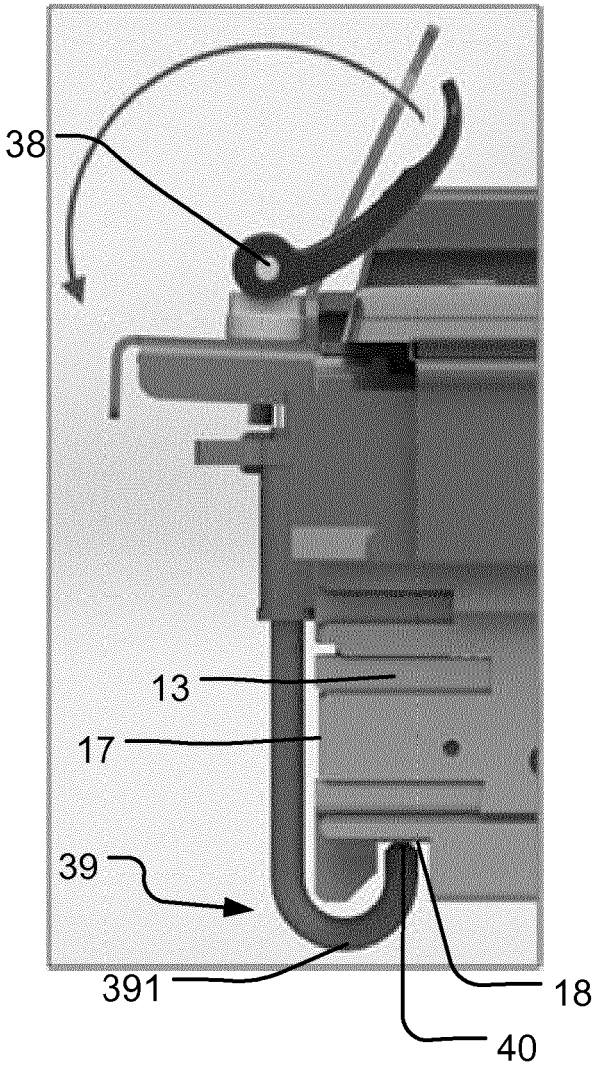

Fig. 10

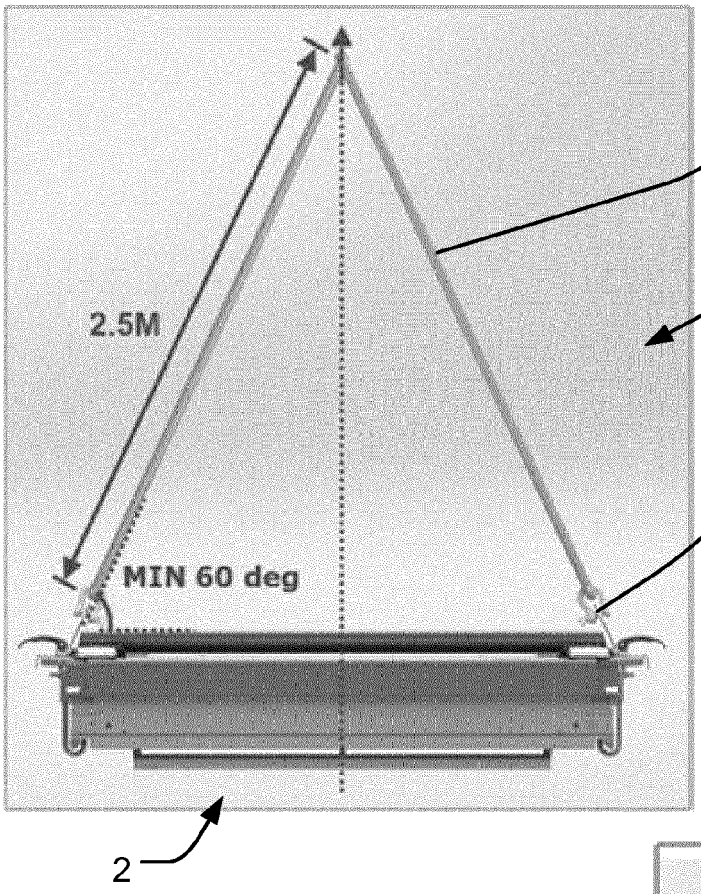

Fig. 11

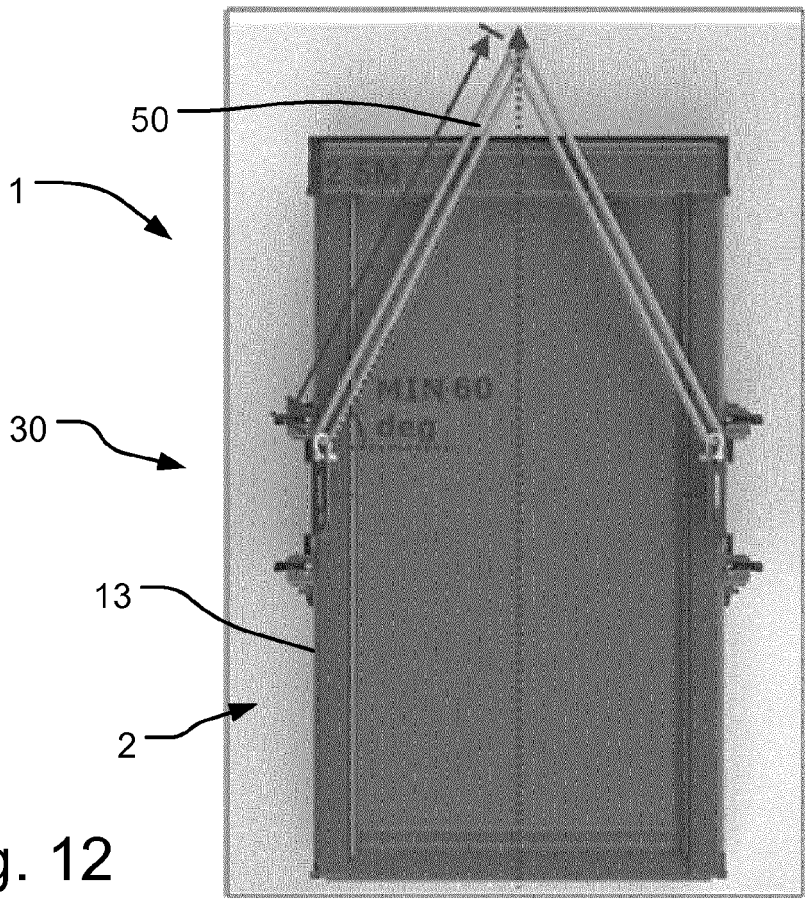

Fig. 12

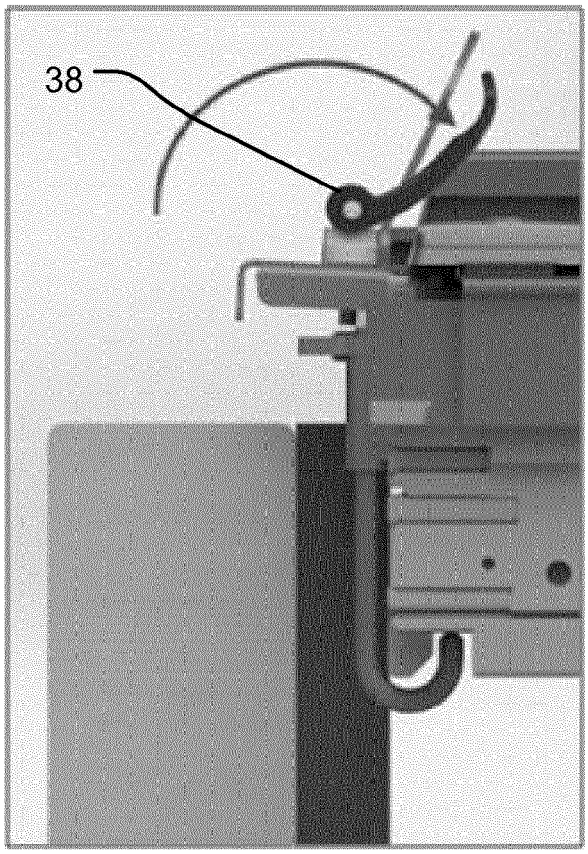

Fig. 13

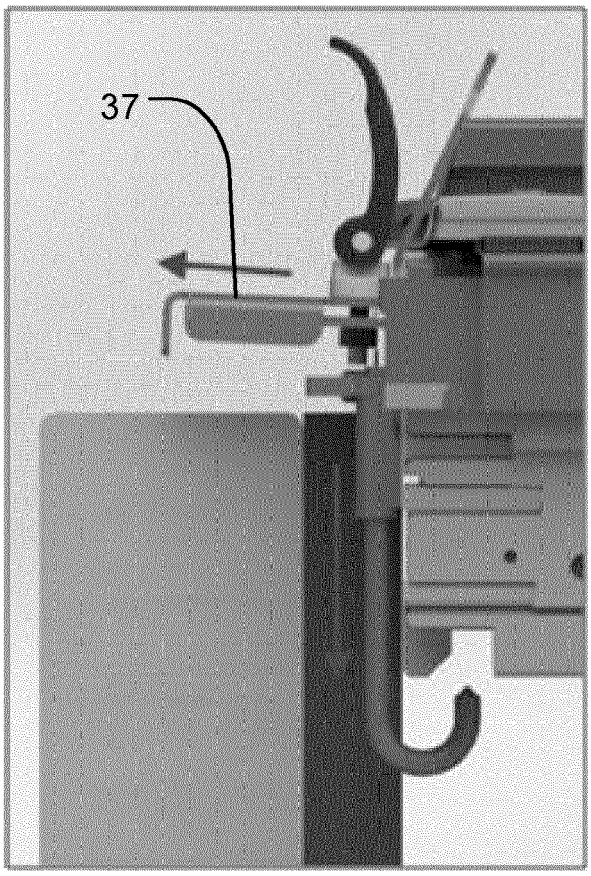

Fig. 15

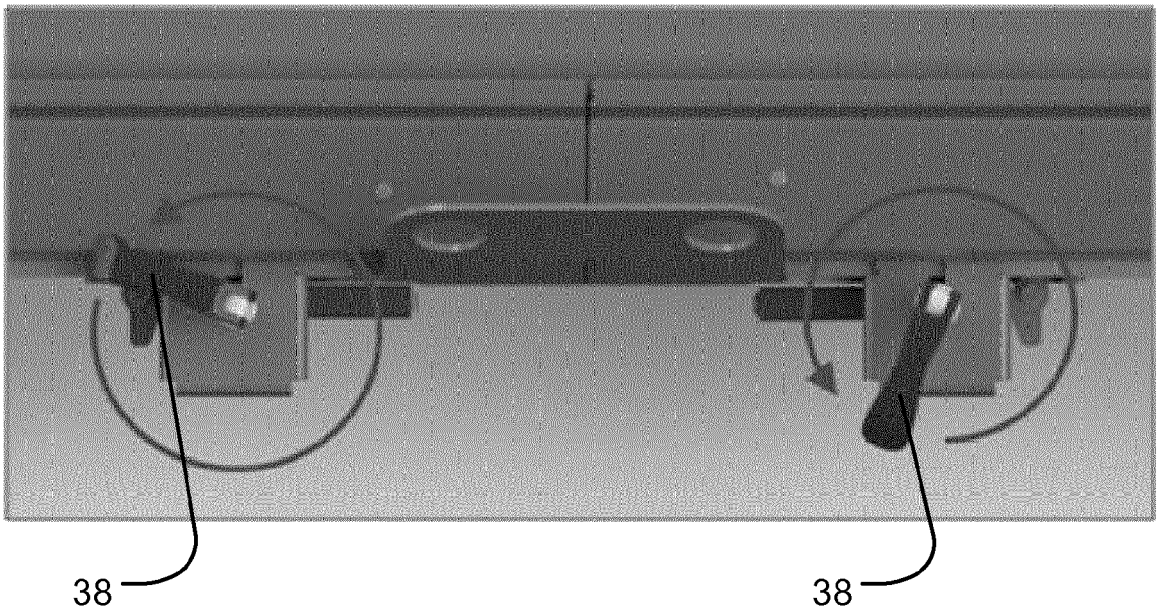

Fig. 14

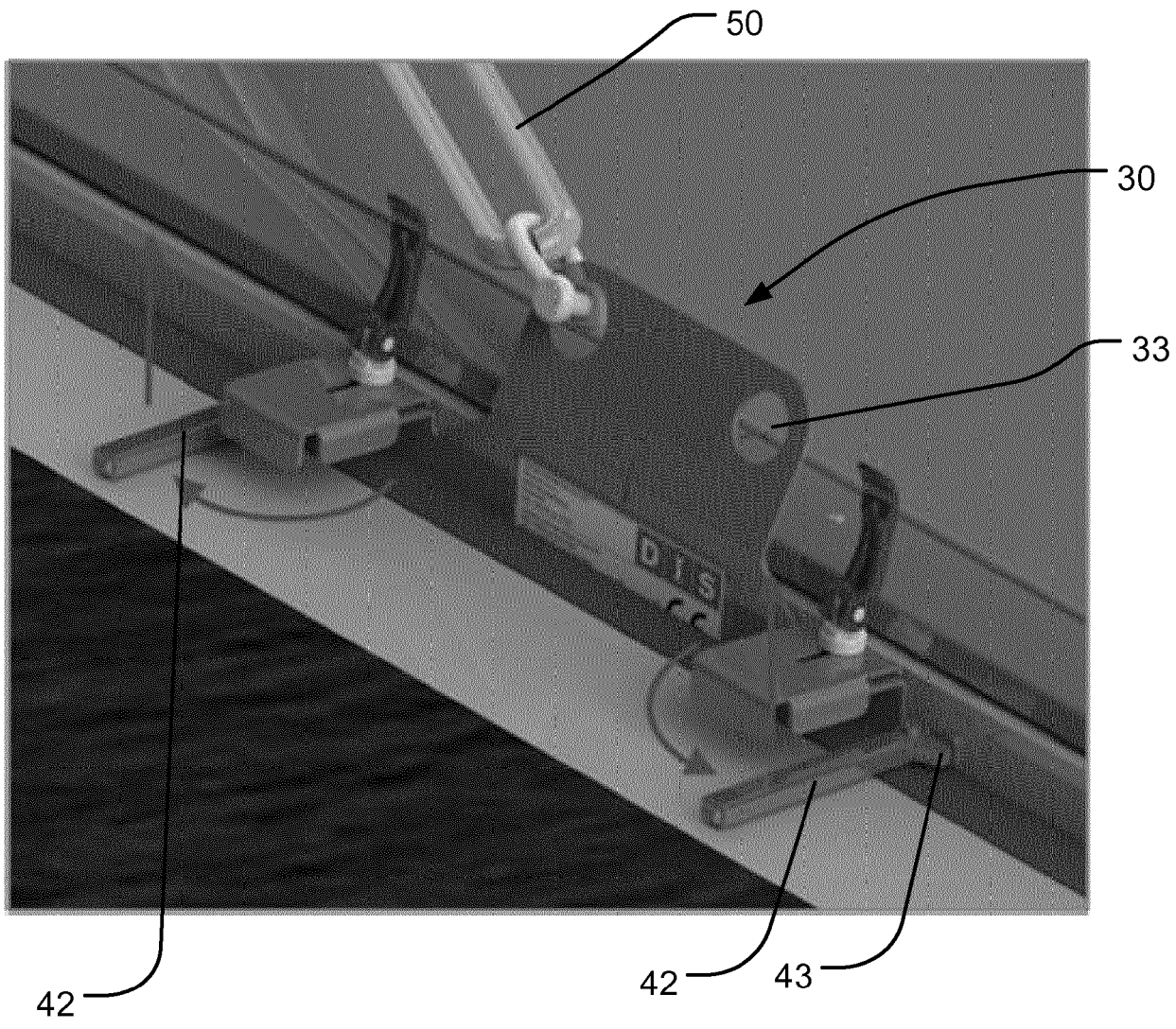

Fig. 16

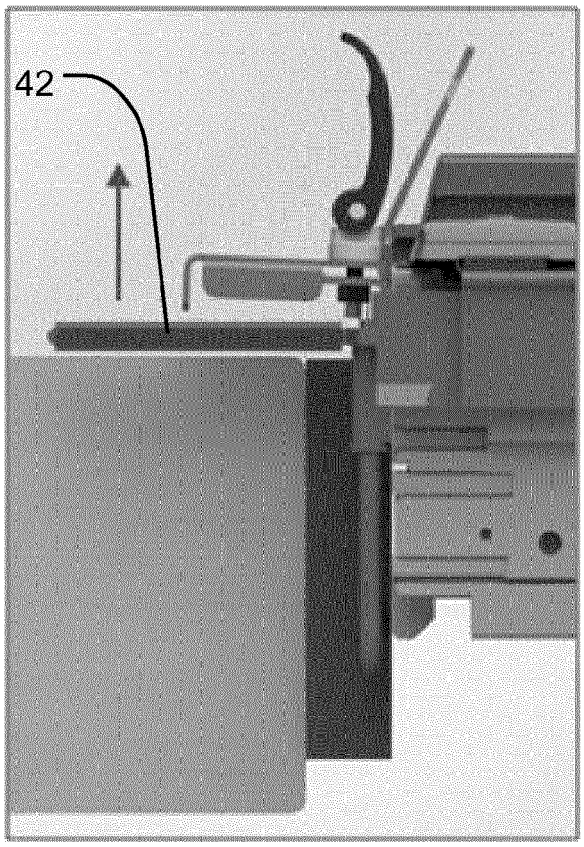

Fig. 17

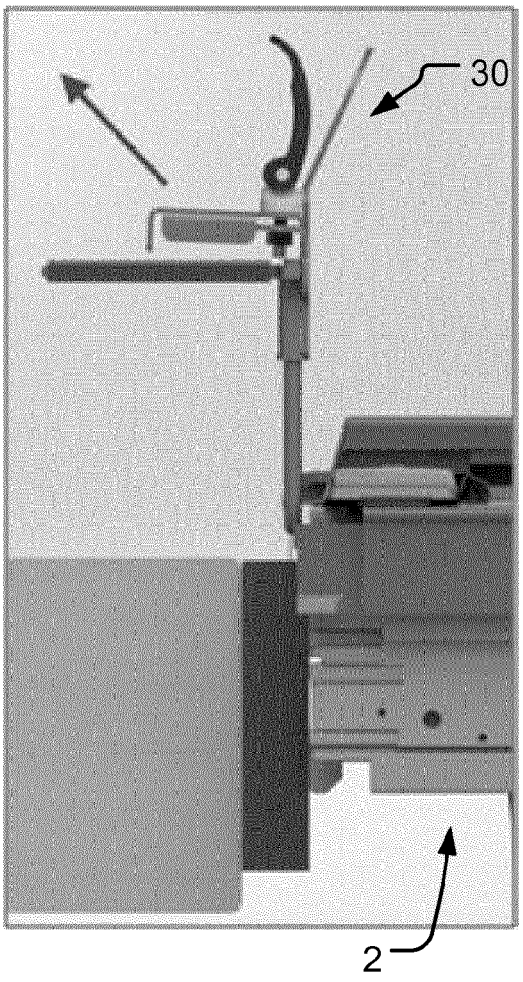

Fig. 18

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EUROPEAN SEARCH REPORT

Application Number
EP 17 15 1395

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	WO 2014/172748 A1 (MESHLIFT PTY LTD [AU]) 30 October 2014 (2014-10-30) * figures 10,11, 8,9,23,24,14b *	7-12,17, 18 1-6, 13-16	INV. E04G21/14 B66C1/62 E04D13/03
A	SU 1 197 978 A1 (TREST MOSORGSTROJ GLAVMOSSTROY [SU]) 15 December 1985 (1985-12-15) * figures *	1,7,13, 17,18	
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TECHNICAL FIELDS SEARCHED (IPC)

E04G
B66C
E04D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 February 2017	Andlauer, Dominique

CATEGORY OF CITED DOCUMENTS

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