



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.01.2019 Bulletin 2019/04

(51) Int Cl.:
B66C 23/22 (2006.01)

(21) Application number: **18166749.4**

(22) Date of filing: **11.04.2018**

(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:
KH MA MD TN

(71) Applicant: **Vinser Oy**
20810 Turku (FI)

(72) Inventor: **KAUPPINEN, Tomi**
20400 TURKU (FI)

(74) Representative: **Berggren Oy, Turku**
P.O. Box 99
Tykistökatu 2-4 B
20521 Turku (FI)

(30) Priority: **18.04.2017 FI 20174103 U**
18.07.2017 FI 20174188 U

(54) **HOISTING ARRANGEMENT AND HOISTING CAGE**

(57) A hoisting arrangement (1) to be used for hoisting windows, balcony glass, doors or the like at a building site, which comprises a support structure to be arranged in an opening in a building and hoisting means (2) arranged in the support structure. The support structure comprises horizontal support bars (3) supported on the upper edge (11) of the opening and horizontal support bars (4) supported on the lower edge (12) of the opening arranged at a distance from each other in the width direction of the opening, which support bars (3, 4) have a first end and a second end and which support bars (3, 4) are substantially perpendicular to the opening, and a support beam structure (6, 6a, 6b), to which the first ends of the support bars (3, 4) in the upper edge and lower edge are attached and/or a vertical tensioning bar (5) connecting the support bars (3, 4) in the upper edge and lower edge, which tensioning bar is adjustable to extend from the support bar (3) supported on the upper edge to the support bar (4) supported on the lower edge.

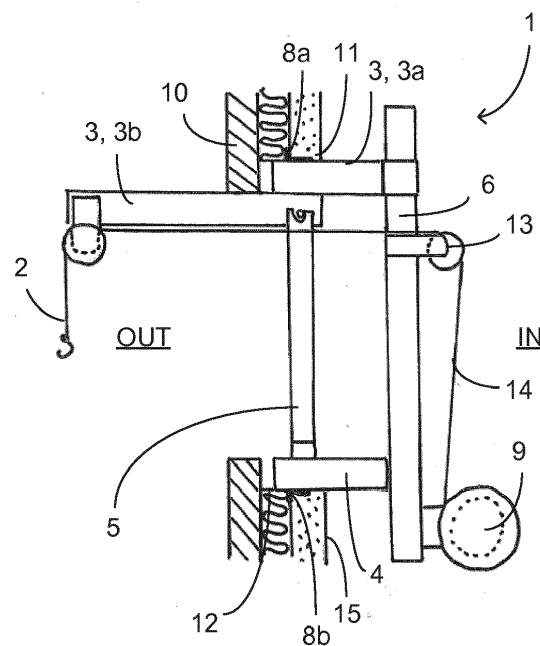


Fig. 1

Description

Object of the invention

[0001] The invention relates to a hoisting arrangement according to the enclosed claims to be used for hoisting windows, balcony glass, doors and the like into their installation place and a hoisting cage to be used with the hoisting arrangement.

Background of the invention

[0002] When installing windows, especially in apartment buildings, hoisting the windows into place in the window openings is time-consuming and typically requires the use of separate cranes or crane cars at the site. This is often time-consuming and requires moving and hoisting the windows from one place to another several times. Especially moving heavy windows can be physically straining and demanding for the installer. Correspondingly, removing old windows is physically straining, cumbersome and time-consuming. The corresponding problems also relate to the installation of balcony glass and balcony doors in apartment buildings.

Object and description of the invention

[0003] The object of the present invention is to present a hoisting arrangement for hoisting windows, balcony glass, doors and the like, especially in buildings comprising two or more floors, which makes the hoisting to the installation place quicker and easier and thus also makes the installation work quicker. One object of the invention is particularly to present a simple hoisting arrangement for hoisting windows via openings in a building.

[0004] The object of the invention is to present a hoisting arrangement, which is quick to assemble and disassemble in the installation place and easy to transport from one place to another.

[0005] Additionally, an object of the invention is to present a hoisting cage to be attached to the hoisting means of the hoisting arrangement, which makes possible the easy hoisting of windows, balcony glass or the like to their installation place and so that they can easily be brought directly to their installation place already with the hoisting cage. Thus, the physical strain of the installers can be reduced, and the installation work will be faster and easier.

[0006] In order to attain these objects, the hoisting arrangement according to the invention is primarily characterized in what is presented in the characterising part of the independent claim.

[0007] The other, dependent claims present some advantageous embodiments of the invention.

[0008] A typical hoisting arrangement according to the invention to be used for hoisting windows, balcony glass, doors and the like into their installation place comprises a support structure to be arranged in an opening in the

building, such as a window opening or a balcony, and hoisting means arranged in the support structure.

[0009] A typical support structure to be arranged in a window opening of the hoisting arrangement according to the invention comprises

- horizontal support bars supported on the upper edge of the opening and horizontal support bars supported on the lower edge of the opening arranged at a distance from each other in the width direction of the opening, which support bars have a first end and a second end and which support bars are substantially perpendicular to the opening, and
- a support beam structure, to which the first ends of the support bars in the upper edge and lower edge are attached and/or a vertical tensioning bar connecting the support bars in the upper edge and lower edge, which tensioning bar is adjustable to extend from the support bar supported on the upper edge to the support bar supported on the lower edge.

[0010] A typical hoisting cage according to the invention to be attached to the hoisting means of a hoisting arrangement comprises

- an outer cage, which comprises a bottom part and vertical side edges, and
- an inner cage, which is arranged inside the outer cage, so that the bottom part and vertical side edges of the inner cage are substantially parallel to the bottom part and vertical side edges of the outer cage, and the inner cage is attached by its vertical side edges in an articulated manner to the vertical side edges of the outer cage, whereby the inner cage is turnable from a vertical position to a horizontal position.

[0011] The hoisting cage according to the invention is advantageously used with the hoisting arrangement according to the invention, whereby the hoisting cage is arranged to be attached to the hoisting means of the hoisting arrangement. The combination of the hoisting arrangement and hoisting cage make possible an easy and quick way of hoisting windows, balcony glass and corresponding loads to their installation place via window openings or balconies in the building.

[0012] In the description according to the invention an opening in a building refers to a window opening in a building, or a balcony. Typically, a window opening comprises substantially parallel upper and lower edges and vertical side walls. In apartment buildings there are typically several window openings above each other in the same line. In the depth direction of the window opening the window opening typically extends from the outer wall of the building to the inner wall, thus the window opening has an outer edge and inner edge. In the invention the upper edge and lower edge of the opening can mean the upper edge and lower edge of the window opening. The

opening can also mean a balcony, whereby the upper edge of the opening is the ceiling of the balcony and the lower edge is the floor of the balcony, whereby the support structure of the hoisting arrangement is arranged on the balcony between the ceiling and the floor. The hoisting arrangement can also be arranged in other wall openings in the building, which make possible the attaching of the hoisting arrangement between the upper edge and lower edge.

[0013] A typical hoisting arrangement according to the invention comprises a support structure, which can be arranged in an opening in a building, which support structure is designed so that it is supported on the upper edge and lower edge of the opening, whereby the hoisting arrangement does not need to be separately mechanically attached to the structures of the building. The structure of the support structure can vary, but typically the support structure is arranged so that there are corresponding structures supported on the upper edge and lower edge of the opening at a distance from each other in the opening. When attaching the hoisting arrangement to a window opening, the support structure is typically arranged in both edges of the window opening in the width direction of the window opening. On a balcony, the structures of the support structure supported on the upper edge and lower edge of the opening are arranged at a suitable distance from each other. The hoisting arrangement according to one embodiment of the invention comprises two separate hoisting means, one in each of the structures in the edges of the opening, with which hoisting means for example a window can be hoisted by attaching to opposite edges of the window. In an advantageous embodiment according to the invention a hoisting cage according to the invention has been attached to the hoisting means. Of the hoisting arrangement according to the invention typically the hoisting means and part of the support bar in the upper edge of the support structure, to which the hoisting means are attached, are outside the building. The support beam structures of the hoisting arrangement and actuators of the hoisting means are located inside the building or balcony.

[0014] In the support structure of the hoisting arrangement according to the invention, the horizontal support bar in the upper edge can be formed from one or more parts, so that at least one part is supported against the upper edge of the opening. The second end of a support bar formed from one or more parts extends out of the opening, substantially perpendicularly to the opening, and hoisting means for hoisting a load outside the building are arranged in this end. The structure of the support bar depends for example on the window opening and the structure of the outer wall of the object to be installed, wherefore the horizontal support bar in the upper edge cannot necessarily continue at the same level out of the window opening, while simultaneously being supported on the upper edge of the window opening. In this case, the support bar in the upper edge is made from several parts attached together. In any case, the horizontal sup-

port bar in the upper edge, formed from one or more parts, is substantially perpendicular to the opening and its second end extends out of the opening and the hoisting means are attached thereto.

[0015] The horizontal support bar of the support structure, supported on the lower edge, is also arranged to be substantially perpendicular to the opening. The horizontal support bar in the lower edge comprises a first end and a second end. During installation in a window opening, the second end of the support bar in the lower edge typically extends to the outer edge of the window opening (the edge of the outer wall) or is supported at least part of the way on the edge of the window opening in the depth direction of the window opening, so that the structure is well supported on the lower edge of the window opening. On a balcony, the support bars in the upper edge and lower edge are typically supported on the balcony floor and ceiling.

[0016] In one advantageous embodiment of the invention the support structure's horizontal support bars in the upper edge and lower edge additionally comprise a projection part or the like, which is substantially perpendicular to the bar, which arranges against the edge of the window opening. Thus, the support bar can be made to settle in its place in a stable manner and to remain in its place.

[0017] The support bars in the upper edge and lower edge of the support structure of the hoisting arrangement are tensioned to be supported in the opening, where the hoisting arrangement is installed, whereby a separate mechanical fastening is not needed for attaching the support bars. In one advantageous embodiment the support bars in the upper edge and lower edge are connected together with a separate vertical tensioning bar, which can be adjusted to extend from the support bar supported on the upper edge to the support bar supported on the lower edge. The tensioning bar typically has adjustment means, such as a screw or tensioning sleeve, which makes possible the adjustment of the length of the tensioning bar. With the aid of the tensioning bar the distance between the support bars in the upper edge and lower edge is adjusted to correspond to the height of the opening and in this way the support bars in the upper edge and lower edge can be stretched between the upper and lower edge of the opening. The tensioning bar is typically between the support bars in the upper edge and lower edge. The structure may also comprise another corresponding way, in which the support bars in the upper and lower edge have been stretched between the upper and lower edges of the opening, for example only with the support beam structure inside the building. The tensioning bar structure above is however advantageous and makes the installation of the support structure easier and makes the structure more stable.

[0018] The support structure of the hoisting arrangement according to the invention may further comprise a support beam structure inside the building/balcony, to which the horizontal support bars in the upper edge and

lower edge have been attached by their first ends. The support beam structure can be formed from one beam or several beams attached together, either of horizontal and/or vertical support beams, whereby the support bars in the upper edge and lower edge can be attached to a different part of the support beam structure. In one advantageous embodiment the support beam structure comprises vertical support beam structures, which are made up of one or more parts attached together. The horizontal support bars can be attached by their first ends in an adjustable manner to the support beam structure, whereby the fastening point can be adjusted depending on the depth of the opening and the space needed inside the building or balcony between the inner wall and support beam structure. The first end of the support bar in the upper edge or lower edge means the end of the support bar, which extends inside the building or balcony, or the point, where the support bar is attached to the support beam structure. The vertical length (height) of the support beam/support beam structure can vary. The support beam structure of the hoisting arrangement according to the invention does not require any mechanical fastenings to the inside of the building or balcony, but the hoisting arrangement is arranged in place with the aid of the horizontal support bars tensioned between the upper edge and lower edge of the opening. In one embodiment the support beam structure can be placed between the upper edge of the opening and the floor, or it can be supported inside the building between the floor and the ceiling.

[0019] Typically, the support structure of the hoisting arrangement is in the depth direction dimensioned so, that it is as close as possible to the wall comprising the opening inside the building or balcony, but however so, that for example a heating battery or the like, possibly situated beneath the window opening, remains between the support structure and the wall. Thus, in one embodiment of the invention, the support structure is inside the building, at a distance of for example about 20 - 50 cm from the wall.

[0020] At least one horizontal support bar has typically been arranged between the vertical support beam structures of the support structure arranged at a distance from each other in the width direction of the opening or between the support bars in the upper edge and/or lower edge, for supporting and stiffening the support structure inside the building or balcony. The horizontal support bar is typically arranged in the lower part of the structure. The horizontal support bar is advantageously also adjustable, so that the distance of the structures from each other can be adjusted depending on how wide it is desired to install the support structure. In one advantageous embodiment the support structure is arranged so that it makes it possible that a window to be installed is hoisted through the window opening inside the building, whereby the support beam structures are typically arranged in both edges of the window opening in the width direction of the window opening.

[0021] In one advantageous embodiment actuators for

the hoisting means, such as a motor and other necessary actuators and control devices, have additionally been arranged in the lower end of the support structure, such as the lower end of the vertical support beam structures, or in the first end of the support bars in the lower edge. Thus, the centre of gravity of the support structure can be had in the lower part of the support structure inside the building or balcony, which prevents the hoisting arrangement from falling over or buckling when hoisting windows, balcony glass or other loads. Typically, both edges of the opening have their own actuators for hoisting means. The support structure can also comprise other control means needed by the hoisting means.

[0022] The support structure is typically manufactured from a material suited for the purpose, such as for example metal. The structure, design and thicknesses of the support bars and support beams can vary.

[0023] The hoisting arrangement according to the invention can be disassembled and reassembled easily in the window opening or balcony. Typically, the support bars and support beam structures can be detached from each other and thus the hoisting arrangement can be fit into a small space for moving and transportation.

[0024] A hoisting cage can be arranged in the hoisting means of the hoisting arrangement according to the invention, which hoisting cage comprises two cages or frames placed inside each other: an outer cage and an inner cage attached to the outer cage in an articulated manner. The inner cage attached in an articulated manner to the outer cage makes it possible to turn the inner cage from a vertical position at least substantially to a horizontal position, whereby for example moving windows out from the inner cage at the installation place is possible easily by pulling them directly from the inner cage of the hoisting cage. When moving the hoisting cage, the outer cage and inner cage are both in the vertical position, advantageously locked together.

[0025] The outer cage of the hoisting cage according to the invention comprises a structure, which is formed of vertical side edges and a bottom part connecting the vertical side edges. The vertical side edges comprise two substantially parallel side edges at a distance from each other, the distance of the side edges from each other determines the width direction of the outer cage and thus also the hoisting cage. The bottom part of the outer cage is arranged at the lower end of the vertical side edges. The outer cage is typically open in its upper part, i.e. by the upper part of the side edges. The vertical side edges determine the height direction of the outer cage. The dimensions of the outer cage can be adjustable in the width direction and depth direction of the outer cage. Typically, the width direction of the outer cage is larger than the depth direction. The side surfaces of the outer cage, i.e. the side surfaces in the width direction of the outer cage, which are substantially perpendicular to the vertical side edges, are typically at least mainly open, so that it is possible to turn the inner cage from a vertical position substantially to a horizontal position. The side surfaces

in the width direction of the outer cage can comprise horizontal support structures, however so that they do not interfere with the turning of the inner cage from the vertical position substantially to the horizontal position. The bottom part of the outer cage can be formed of a plate or beams. The vertical side edges of the outer cage are typically formed of pillars or the like, which determine the corners of the outer cage. The vertical side edges of the outer cage can be closed or partially open.

[0026] The inner cage of the hoisting cage according to the invention is attached inside the outer cage in an articulated manner. The inner cage is in other words a so-called turning cage. The inner cage is attached by its vertical side edges in an articulated manner to the vertical side edges of the outer cage, whereby the inner cage can be turned from a vertical position at least substantially to a horizontal position. Typically, the articulation makes it possible to turn the inner cage freely from one position to another in relation to the outer cage. The articulated fastening point of the inner cage to the outer cage is arranged in the vertical side edges of the inner cage and outer cage so that the articulated fastening point is adjustable in the height direction of the vertical side edges. Thus, the centre of gravity of the hoisting cage is adjustable to the right point according to the size of the load in the inner cage of the hoisting cage, such as the window/windows to be hoisted. For the operation of the hoisting cage according to the invention it may be practical that the centre of gravity of the hoisting cage is below the midpoint of the load, such as the window, in the hoisting cage in the height direction of the hoisting cage, so that the operation of the hoisting cage is stable during use. Adjustment of the articulated fastening point is possible simply by altering the articulated fastening point in the height direction of the hoisting cage. The inner cage and/or outer cage can comprise several fastening points for the articulation in the height direction of the structure. In a typical hoisting cage according to the invention the vertical side edges of the outer cage and inner cage are formed from vertical pillars, and the vertical pillars of the outer cage and/or vertical pillars of the inner cage comprise height adjustment means for horizontal support bars arranged between the vertical pillars, which comprise the articulated fastening point. The articulation between the outer cage and inner cage can be realized with any arrangement suited for the purpose.

[0027] The inner cage of the hoisting cage according to the invention is dimensioned so that it can be placed inside the outer cage of the hoisting cage. The vertical side edges and side surfaces of the outer cage and inner cage in the width direction and depth direction of the hoisting cage structure are substantially parallel and settle against each other when the inner cage and outer cage are in the vertical position. The vertical side edges of the hoisting cage structure are attached in an articulated manner to each other, as is described above. In one embodiment of the invention in the width direction of the hoisting cage structure, the inner cage comprises

on one of its side surfaces rollers arranged in the width direction of the side surface, which rollers are in the height direction of the inner cage arranged at a distance from each other, the side surface in the width direction is substantially perpendicular to the side edges of the inner cage, which comprise the articulated fastening point. This side surface is during use of the hoisting cage the side surface, which is toward the outer wall of the building, and when turning the inner cage from the vertical position substantially to a horizontal position the rollers form the lower surface of the inner cage structure. Thus, with the aid of these rotating rollers, the load in the hoisting cage, such as a window, can easily be moved out of the inner cage or respectively pushed into the inner cage. The rollers can also be other corresponding structures, which make possible the smooth movement of the load in the hoisting cage, such as a window, in the inner cage structure when the inner cage is substantially in the horizontal position. In one advantageous embodiment of the invention the surface of the rollers is formed from some soft and/or elastic material or the rollers are coated with a soft and/or elastic material, so that the windows or other load in the hoisting cage do not get damaged or scratched when they are moved on the rollers. The rollers or corresponding structures can be arranged in the structure in a fixed or adjustable manner. An adjustable structure can comprise different rollers and vertical rails arranged in the structure, so that their length can be adjusted in the width direction of the inner cage.

[0028] In one embodiment of the invention the second side surface in the width direction of the inner cage of the hoisting cage typically comprises in the width direction one or more support beam structures or the like, which are arranged so that they can be opened. The purpose of these is to support the windows or other load in the hoisting cage during movement of the hoisting cage. The support beam structures must advantageously be such that they can be opened, so that the windows or other corresponding load can effortlessly, without unnecessary lifting, be placed in the inner cage when the inner cage is in the vertical position.

[0029] Typically, during movement of the hoisting cage, the inner cage is locked in place in the outer cage in the vertical position. The outer cage and inner cage comprise locking means suited for the purpose.

[0030] The outer cage of the hoisting cage according to the invention comprises means for attaching the hoisting cage to the hoisting means of the hoisting arrangement, with which the hoisting cage is moved. Typically, the means are arranged in the vertical side edges of the outer cage, in both vertical side edges of the outer cage in the width direction of the outer cage. Thus, to both vertical side edges of the hoisting cage in the width direction of the hoisting cage are arranged own hoisting arrangement with hoisting means, which hoisting means are arranged to operate in a synchronized manner and thus enable even movement of the hoisting cage up and down in the height direction of the building. Advanta-

geously, the hoisting cage is attached to a hoisting arrangement according to the invention.

[0031] In one advantageous embodiment of the invention the outer cage of the hoisting cage can comprise a substantially horizontal support part or the like arranged in the vertical side edge of the outer cage, in the bottom part of the outer cage and/or in a support bar in the side surface in the width direction of the outer cage, which support part or the like prevents the hoisting cage from hitting the wall during movement of the hoisting cage and/or when turning the inner cage from the vertical position to the horizontal position.

[0032] In one advantageous embodiment of the invention locking means are arranged in the inner cage of the hoisting cage, which locking means make it possible to attach the inner cage to the bottom edge of an opening in a building, when the inner cage is turned substantially in the horizontal position. Thus, the inner cage can be made to remain in its place. Typically, the hoisting cage according to the invention is used so that during hoisting, both the inner cage and the outer cage are in the vertical direction, the inner cage of the hoisting cage is turned from the vertical position substantially to the horizontal position by the opening in the building, so that the inner cage arranges against the bottom edge of the opening substantially in its horizontal position, for unloading/loading the load. Thus, the window or other load in the inner cage of the hoisting cage can substantially in the horizontal plane be slid along the rollers forming the bottom surface of the inner cage into the building through the opening. This makes it remarkably easier to move windows to be installed or other load at the installation place.

[0033] The dimensions of the hoisting cage according to the invention may vary. The hoisting cage is for example dimensioned to correspond to the distance of the support beam structure of the hoisting arrangement according to the invention from each other. The hoisting cage is for example dimensioned in the width direction according to the window opening, because the moving of the hoisting cage is performed with a hoisting arrangement according to the invention, the support structure of which is arranged in the outer edges of the window opening in the highest floor of the building. This makes it possible to hoist windows in the same window line, i.e. in the same line above each other, with the same hoisting arrangement or to hoist other load via window openings in the same window line into the building. The width of the hoisting cage structure according to the invention may be for example 1200 - 2500 mm. The side surface of the outer cage, which forms the width direction of the outer cage, is during use of the hoisting cage typically parallel to the outer wall of the building. Thus, the width of the outer cage typically corresponds to the width of the window opening, to which window opening hoisting means are attached for moving the hoisting cage according to the invention. In the depth direction the hoisting cage may for example be 300 - 500 mm. The height of the hoisting cage may also vary, typically the height is for example

1500 mm. The above-presented dimensions are only examples and the dimensions of the hoisting cage can vary freely.

[0034] The hoisting cage according to the invention is designed especially for transporting windows in building sites comprising several floors; for hoisting windows to their installation place or for transporting down old removed windows. The hoisting cage attached to a window opening or balcony opening and the thereto related hoisting arrangement is generally used also for example for hoisting balcony doors or balcony glass to a desired floor. The hoisting cage according to the invention can be used also for transporting other products, such as for example building boards or elements, which are suited to be transported in the turning cage structure according to the invention.

[0035] The hoisting arrangement according to the invention for example makes it possible to install windows in an apartment building one window line at a time, which window line has two or more windows above each other in the height direction of the building. The windows can be hoisted into the window openings with the hoisting arrangement according to the invention, which is typically arranged in the opening of the highest window in the window line. Thus, the hoisting arrangement is arranged into one window opening when installing windows in one window line. Thus, the hoisting arrangement according to the invention speeds up the installation of windows. With the above-described hoisting arrangement according to the invention the window can be hoisted to the window opening outside the building, if needed inside through the opening, and thus the window can be set into place in the opening either from outside or inside the building. With the same hoisting arrangement arranged in the highest window opening of the window line, all the windows in the same window line can be hoisted into place easily and quickly. In a corresponding manner, the hoisting arrangement can be attached to a balcony for hoisting windows, balcony glass or other loads. The windows or balcony glass can be hoisted into their installation place also with the aid of a hoisting arrangement in another line.

[0036] The hoisting arrangement according to the invention is suited for hoisting windows, balcony glass and other loads in all kinds of sites, both in new construction and redevelopment sites. The hoisting arrangement is also suited for windows and other loads of all sizes. Especially when installing windows or balcony glass in apartment buildings, a hoisting arrangement according to the invention with a simple structure is advantageous. The hoisting arrangement according to the invention makes possible the hoisting of windows or balcony glass in a simple manner outside the building.

Short description of the drawings

[0037] In the following, the invention will be described in more detail with reference to the appended drawings, in which

- Figure 1 shows a schematic view of a hoisting arrangement according to an advantageous embodiment of the invention shown from the side,
- Figure 2 shows a schematic view of a hoisting arrangement according to an advantageous embodiment of the invention shown from inside a building,
- Figure 3 shows the structure of a hoisting cage according to an embodiment of the invention shown from the front and the side,
- Figure 4 shows the structure of an outer cage of a hoisting cage according to an embodiment of the invention shown from the front and the side,
- Figure 5 shows the structure of an inner cage of a hoisting cage according to an embodiment of the invention shown from the front and the side, and
- Figure 6 shows a hoisting cage according to an embodiment of the invention, so that the inner cage of the hoisting cage is turned substantially in the horizontal direction.

Detailed description of the invention

[0038] Figure 1 illustrates in a schematic manner a hoisting arrangement 1 according to one embodiment of the invention shown from the side. Figure 1 shows a support structure with hoisting means in one edge of a window opening, corresponding support structures are typically arranged in both edges of the window opening in the width direction of the window opening. In Figure 1 the window opening is the space between the upper edge 11 and lower edge 12 of the opening, in which the hoisting arrangement 1 according to the invention is arranged. The support structure of the hoisting arrangement 1 shown in the figure comprises a horizontal support bar 3 arranged in the upper edge 11 of the window opening, which support bar is formed from two parts attached together: a support bar 3a supported on the upper edge 11 of the window opening and an additional bar 3b attached thereto. This is because in the case shown in the figure the window opening is larger in the height direction of the building than the corresponding opening in the outer wall structure 10 of the building. If the upper edge 11 of the window opening opens out of the building at the same level, the support structure of the hoisting arrangement 1 typically comprises a support bar 3 formed from one part, which is supported against the upper edge 11 of the window opening. The first end of the support bar 3a supported against the upper edge of the window opening is attached to the support beam structure 6 on the inside IN of the building, and the second end, in the case shown in the figure the second end of the additional bar 3b, extends outside the window opening, substantially perpendicular to the window opening. In the structure shown in the figure the support beam structure 6 is

formed from one beam, but the support beam structure can comprise two or more parts attached together. Hoisting means 2 are arranged in the end of the additional bar 3b, outside OUT the building.

[0039] A horizontal support bar 4 is arranged in the lower edge 12 of the window opening, which support bar is supported against the lower edge of the window opening. The first end of the support bar 4 in the lower edge is attached to the support beam 6 and the second end extends into the window opening so that the structure can be set in its place in a stable manner.

[0040] Between the support bar 3 in the upper edge and the support bar 4 in the lower edge of the support structure there has been arranged a vertical tensioning bar 5, with the aid of which the horizontal support bars 3, 4 in the upper edge and lower edge are connected together and tensioned between the upper edge 11 and lower edge 12 of the window opening. The support bars 3, 4 in the upper edge and lower edge may further comprise a projection part 8a, 8b or the like, which is substantially perpendicular to the support bar and arranges in the edge of the window opening to support the support structure staying in place.

[0041] The vertical support beam structure 6 of the support structure is arranged inside IN the building. Actuators 9 needed by the hoisting means 2 and various control means 13 have further been arranged in the support beam structure 6. The hoisting means 2 further comprise means for attaching the window to be hoisted to the hoisting arrangement and a cable or rope 14 for hoisting the window. The structure and actuators of the hoisting means may vary, however so that typically the motor 9 or corresponding actuator required by the hoisting means is arranged in the lower end of the support beam structure 6 inside IN the building. The support structures in both edges of the window opening have their own hoisting means 2 and their own actuators 9, 13 for the hoisting means. With the aid of the hoisting means 2 the window can be hoisted into the window opening outside OUT the building. The vertical support beam structure 6 of the hoisting arrangement is typically arranged at a distance from the inner wall 15 of the building inside IN the building. Thus, the horizontal support bars 3, 4 extend through the window opening also inside IN the building.

[0042] Figure 2 shows in a schematic manner the hoisting arrangement according to Figure 1 shown from inside the building. The figure uses corresponding reference numbers as in Figure 1 to illustrate the structure of the hoisting arrangement. The vertical support beam structures 6a, 6b of the support structure are arranged in both side edges of the window opening in the width direction of the window opening. The length of the support beam structures 6a, 6b in the height direction is typically more than the height of the window opening, whereby the support beam structures 6a, 6b extend above the upper edge 11 of the window opening and below the lower edge 12 of the window opening. Between the vertical support beam structures 6a, 6b of the support structure arranged

in both sides of the window opening there has been arranged at least one horizontal support bar 7, the purpose of which is to stiffen the support structure and to support the vertical structures arranged in the opposite sides of the opening. The length of the support bar 7 is typically adjustable and thus the distance between the support beam structures 6a, 6b can be made to correspond to the width of the window opening. The support bar 7 is typically arranged in the lower part of the support beam structures 6a, 6b, so that it is situated below the lower edge 12 of the window opening. The actuators of the hoisting arrangement 1, such as the motors or the like 9a, 9b, are arranged in the lower end of the support beam structures 6a, 6b, typically so that they are situated below the lower edge 12 of the window opening.

[0043] Figure 3 shows a hoisting cage 20 according to an embodiment of the invention, which comprises an outer cage 22 and an inner cage 23, shown from the front and the side. Figure 4 shows in more detail the structure of an outer cage 22 of a hoisting cage 20 according to an embodiment of the invention, shown from the front and the side. Figure 5 shows in more detail the structure of an inner cage 23 of a hoisting cage 20 according to an embodiment of the invention, shown from the front and the side. Figure 6 shows a hoisting cage 20 according to an embodiment of the invention, so that the inner cage 23 is turned substantially in the horizontal position, while the outer cage 22 is in the vertical position. Figure 3 shows the width direction A, the depth direction B and the height direction C of the hoisting cage. The window D in the hoisting cage 20 is illustrated also in Figures 3 and 6.

[0044] The inner cage 23 of the hoisting cage 20 is arranged inside the outer cage 22, so that the bottom part 24 and vertical side edges 41 of the outer cage 22 and the bottom part 30 and vertical side edges 42 of the inner cage 23 are substantially parallel and placed against each other when the inner cage 23 is in the vertical position in the outer cage 22. In the embodiment according to the invention shown in the figures, the vertical side edges 41 of the outer cage 22 comprise vertical pillars 25a, 25b, 25c attached to the bottom part 24, at least in the corners of the bottom part 24. The pillars 25a, 25b, 25c can be any type of pillars, posts or corresponding structures suited for the purpose, which are formed from one or several parts. The vertical pillars 25a, 25b, 25c arranged in the corners of the bottom part 24 of the outer cage 22 (shown in Figure 4 only from one side) are connected together with one, two or more horizontal support bars 28a, 28b or corresponding structures, so that they form the side edges 41 in the depth direction of the outer cage 22. The vertical pillars 25a, 25b, 25c of the outer cage 22 can comprise height adjustment means 29a, 29b arranged vertically in the pillars, such as openings, whereby the height of the horizontal support bar 28a arranged between the horizontal pillars 25a, 25b, 25c can be adjusted. The horizontal support bar 28a is typically arranged to be adjustable in the midpoint of the

pillars 25a, 25b, 25c, whereby the fastening point of the horizontal support bar 28a is possible to alter on both sides of the midpoint. In the embodiment shown in the figures an articulated fastening point 35 is arranged in the horizontal support bar 28a for attaching the inner cage 23 to the outer cage 22 in an articulated manner. This height adjustment makes it possible to adjust the position of the inner cage 23 of the hoisting cage according to the invention in the height direction of the outer cage according to the centre of gravity of the window to be hoisted or other load in the hoisting cage. The inner cage 23 can be locked to the outer cage 22 with the aid of a locking means 38.

[0045] The vertical side edges 41 of the outer cage 22 in the depth direction of the outer cage can be either an open structure formed from the vertical pillars 25a, 25b, 25c and one or more horizontal support bars or the vertical sides 41 can be formed for example from a plate to be closed or partly closed. The outer cage 22 can comprise in the width direction A of the cage at least one support bar 26 or the like on one side in the width direction of the cage, which bar is arranged to connect the vertical pillars 25a, 25b in the opposite side edges 41 of the outer cage 22.

[0046] Additionally, the outer cage 22 comprises means 27a, 27b for attaching the outer cage 22 and thus the entire hoisting cage structure to the hoisting means (not shown in the figure), which means 27a, 27b are arranged in the upper edge of the vertical side edges 41 of the outer cage 22, in both side edges 41 of the outer cage 22. The means 27a, 27b can be any type of loops, hooks or corresponding means suited for the purpose. In one advantageous embodiment the outer cage 22 comprises at least one substantially horizontal support part 37 or the like arranged in the vertical side edge 41, the bottom part 24 and/or the support bar 26 of the outer cage, which support part or the like prevents the hoisting cage from hitting the wall during movement of the hoisting cage and/or when turning the inner cage from the vertical position to the horizontal position.

[0047] Figure 5 shows the structure of an inner cage 23. The inner cage 23 comprises a bottom part 30 and vertical side edges 42, which are in the solution shown in Figure 5 formed from vertical pillars 31a, 31b, 31c, at least in the corners of the bottom part 30. The pillars 31a, 31b, 31c can be any type of pillars, posts or corresponding structures suited for the purpose, which are formed from one or several parts. As in the outer cage, the vertical pillars 31a, 31b, 31c arranged in the corners of the bottom part 30 of the inner cage 23 (shown in Figure 5 only from one side) are connected together with one, two or more horizontal support bars 33a, 33b or corresponding structures, so that they form the side edges 42 in the depth direction of the inner cage 23. The vertical pillars 31a, 31b, 31c of the inner cage 23 can comprise height adjustment means 34a, 34b arranged vertically in the pillars, such as openings, whereby the height of the horizontal support bar 33a arranged between the hori-

zontal pillars 31a, 31b, 31c can be adjusted. The horizontal support bar 33a is typically arranged to be adjustable in the midpoint of the pillars 31a, 31b, 31c, whereby the fastening point of the horizontal support bar 33a is possible to alter on both sides of the midpoint. The horizontal support bar 28a of the outer cage 22 and the horizontal support bar 33a of the inner cage 23 arrange in the hoisting cage according to the invention substantially against each other and they are attached together in an articulated manner by the fastening point 35, and thus the inner cage 23 is possible to turn from the vertical position at least substantially into the horizontal position while the outer cage remains in the vertical position. The articulation can also be performed in another manner, the figures only show one solution according to the invention. The inner cage 23 of the hoisting cage 20 is attached to the vertical side edges 41 of the outer cage 22 in an articulated manner by the vertical side edges 42 of the inner cage 23. The articulated fastening point 35 connecting the inner cage 23 and outer cage 22 is adjustable in the height direction C of the hoisting cage.

[0048] The inner cage 23 of the hoisting cage 20 shown in Figure 5 comprises on one of its side surfaces in the width direction rollers 32a, 32b, 32c, 32d arranged in the width direction A of the side surface, which rollers are in the height direction C of the inner cage 23 arranged at a distance from each other, the side surface in the width direction is substantially perpendicular to the side edges 42 of the inner cage 23, which comprise the articulated fastening point 35. The rollers 32a, 32b, 32c are for example attached to the vertical pillars 31a, 31b.

[0049] The second side surface in the width direction of the inner cage 23 of the hoisting cage typically comprises in the width direction one or more support beam structures 40a, 40b, 40c or the like, which are arranged so that they can be opened. The purpose of these is to support the windows or other load in the hoisting cage during movement of the hoisting cage.

[0050] The articulated fastening of the inner cage 23 to the outer cage 22 makes possible the turning of the inner cage 23 from the vertical position substantially to the horizontal position, as is shown in Figure 6. The inner cage 23 turns with the aid of the articulated fastening point 35 against the lower edge of the window opening 39, whereby a window or other load in the inner cage 23 can easily be slid out of the inner cage 23 with the aid of the rollers 32a, 32b, 32c, 32d, which rollers form the lower surface of the inner cage 23 in the horizontal position. Correspondingly, a window or other load can be pushed into the inner cage 23 with the aid of the rollers 32a, 32b, 32c, 32d and thereafter the inner cage 23 can be lifted from the horizontal position to the vertical position. In the horizontal position the inner cage 23 can be locked into place at the lower edge 39 of the window opening with the aid of fastening means 36, which can be any type of means or protrusions suited for the purpose.

Claims

1. A hoisting arrangement (1) to be used for hoisting windows, balcony glass, doors and the like to an installation place, **characterized in that** the hoisting arrangement (1) comprises

- a support structure to be arranged in an opening in a building, which comprises

- horizontal support bars (3) supported on an upper edge (11) of the opening and horizontal support bars (4) supported on a lower edge (12) of the opening arranged at a distance from each other in the width direction of the opening, which support bars (3, 4) have a first end and a second end and which support bars (3, 4) are substantially perpendicular to the opening,

and

- a support beam structure (6, 6a, 6b), to which the first ends of the support bars (3, 4) in the upper edge and lower edge are attached and/or a vertical tensioning bar (5) connecting the support bars (3, 4) in the upper edge and lower edge, which tensioning bar is adjustable to extend from the support bar (3) supported on the upper edge to the support bar (4) supported on the lower edge,

and

- hoisting means (2) arranged in the support structure.

2. The hoisting arrangement according to claim 1, **characterized in that** the support bar (3) in the upper edge is formed from one or more parts (3a, 3b), so that at least one part is supported against the upper edge (11) of the opening and the second end of the support bar extends out from the opening, substantially perpendicular to the opening, and in which second end the hoisting means (2) are arranged.
3. The hoisting arrangement according to any of the preceding claims, **characterized in that** between the support bars (3, 4) in the upper edge and lower edge and/or the support beam structures (6a, 6b) arranged at a distance from each other there has been arranged at least one horizontal support bar (7).
4. The hoisting arrangement according to any of the preceding claims, **characterized in that** the horizontal support bar (3) supported against the upper edge (11) of the opening and the horizontal support bar (4) supported against the lower edge (12) of the opening are arranged on both sides of the opening

in the width direction of the opening.

5. The hoisting arrangement according to any of the preceding claims, **characterized in that** actuators (9, 9a, 9b) for the hoisting means have been arranged in the lower end of the vertical support beam structures (6, 6a, 6b) of the support structure or in the first end of the support bars in the lower edge.

6. The hoisting arrangement according to any of the preceding claims, **characterised in that** the upper edge and lower edge of the opening are

- the upper edge and lower edge of a window opening, or
- the floor and ceiling of a balcony in a building.

7. The hoisting arrangement according to any of the preceding claims, **characterized in that** a hoisting cage (20) has been arranged in the hoisting means (2), which hoisting cage comprises

- an outer cage (22), which comprises a bottom part (24) and vertical side edges (41), and
- an inner cage (23), which is arranged inside the outer cage (22), so that the bottom part (30) and vertical side edges (42) of the inner cage (23) are substantially parallel to the bottom part (24) and vertical side edges (41) of the outer cage (22), and the inner cage (23) is attached by its vertical side edges (42) in an articulated manner to the vertical side edges (41) of the outer cage (22), whereby the inner cage (23) is turnable from a vertical position substantially to a horizontal position.

8. The hoisting arrangement according to claim 7, **characterized in that** the articulated fastening point (35) of the inner cage (23) to the outer cage (22) is arranged in the vertical side edges (41, 42) of the inner cage and outer cage, so that the articulated fastening point (35) is adjustable in the height direction of the vertical side edges (41, 42).

9. The hoisting arrangement according to claim 7 or 8, **characterized in that** the inner cage (23) comprises on one of its side surfaces in the width direction rollers (32a, 32b, 32c, 32d) arranged in the width direction of the side surface, which rollers are in the height direction of the inner cage (23) arranged at a distance from each other, the side surface in the width direction is substantially perpendicular to the side edges (42) of the inner cage (23), which comprise the articulated fastening point (35).

10. The hoisting arrangement according to any of the preceding claims 7 - 9, **characterized in that** the outer cage (22) comprises means (27a, 27b) for at-

taching the hoisting cage (20) to the hoisting means (2) of the hoisting arrangement (1), which means (27a, 27b) are arranged in the vertical side edges (41) of the outer cage (22), in both vertical side edges (41) of the outer cage in the width direction of the outer cage.

11. The hoisting arrangement according to any of the preceding claims 8 - 10, **characterized in that** the vertical side edges (41, 42) of the outer cage (22) and inner cage (23) are formed from vertical pillars (25a, 25b, 25c, 31a, 31b, 31c), and the vertical pillars (25a, 25b, 25c) of the outer cage (22) and/or the vertical pillars (31a, 31b, 31c) of the inner cage (23) comprise height adjustment means (29a, 29b, 34a, 34b) for the horizontal support bars (28a, 33a) arranged between the vertical pillars, which support bars comprise the articulated fastening point (35).

12. A hoisting cage (20) to be attached to hoisting means, **characterized in that** it comprises

- an outer cage (22), which comprises a bottom part (24) and vertical side edges (41), and
- an inner cage (23), which is arranged inside the outer cage (22), so that the bottom part (30) and vertical side edges (42) of the inner cage (23) are substantially parallel to the bottom part (24) and vertical side edges (41) of the outer cage (22), and the inner cage (23) is attached by its vertical side edges (42) in an articulated manner to the vertical side edges (41) of the outer cage (22), whereby the inner cage (23) is turnable from a vertical position substantially to a horizontal position.

13. The hoisting cage according to claim 12, **characterized in that** the articulated fastening point (35) of the inner cage (23) to the outer cage (22) is arranged in the vertical side edges (41, 42) of the inner cage and outer cage, so that the articulated fastening point (35) is adjustable in the height direction of the vertical side edges (41, 42).

14. The hoisting cage according to claim 12 or 13, **characterized in that** the inner cage (23) comprises on one of its side surfaces in the width direction rollers (32a, 32b, 32c, 32d) arranged in the width direction of the side surface, which rollers are in the height direction of the inner cage (23) arranged at a distance from each other, the side surface in the width direction is substantially perpendicular to the side edges (42) of the inner cage (23), which comprise the articulated fastening point (35).

15. The hoisting cage according to claim 13, **characterized in that** the vertical side edges (41, 42) of the outer cage (22) and inner cage (23) are formed from

vertical pillars (25a, 25b, 25c, 31a, 31b, 31c), and the vertical pillars (25a, 25b, 25c) of the outer cage (22) and/or the vertical pillars (31a, 31b, 31c) of the inner cage (23) comprise height adjustment means (29a, 29b, 34a, 34b) for the horizontal support bars (28a, 33a) arranged between the vertical pillars, which support bars comprise the articulated fastening point (35).

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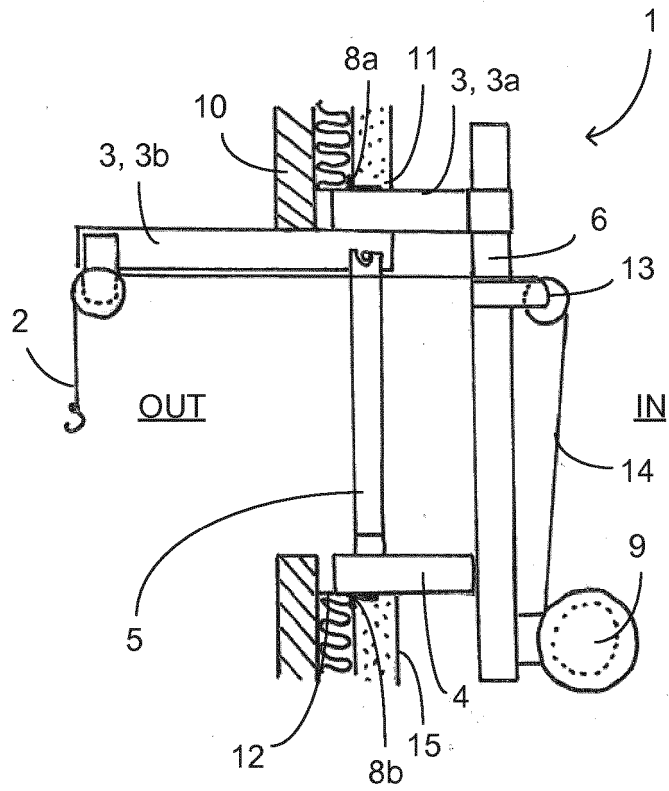


Fig. 1

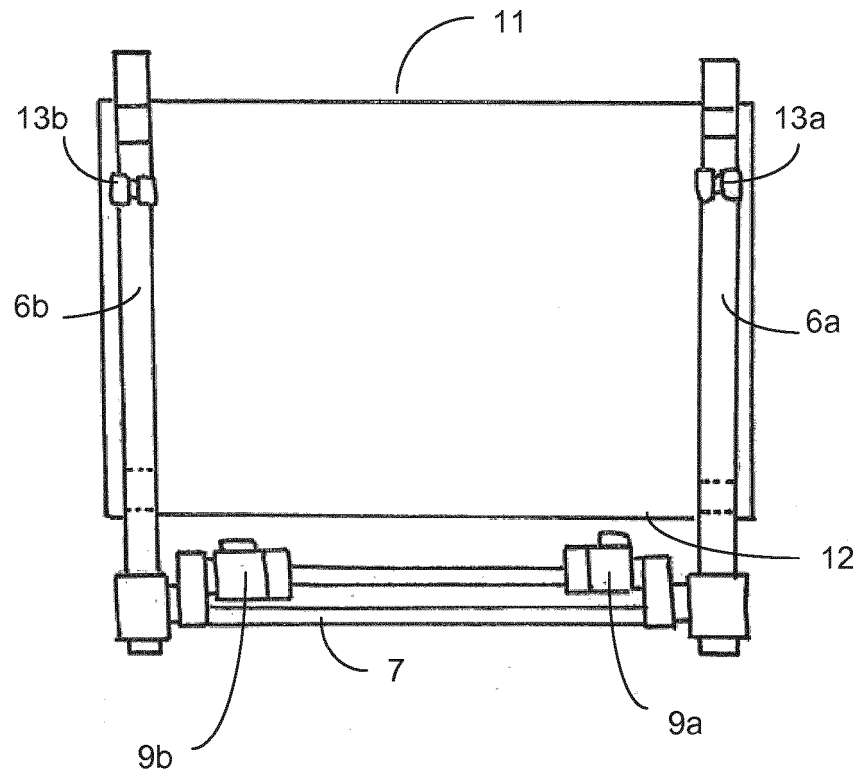


Fig. 2

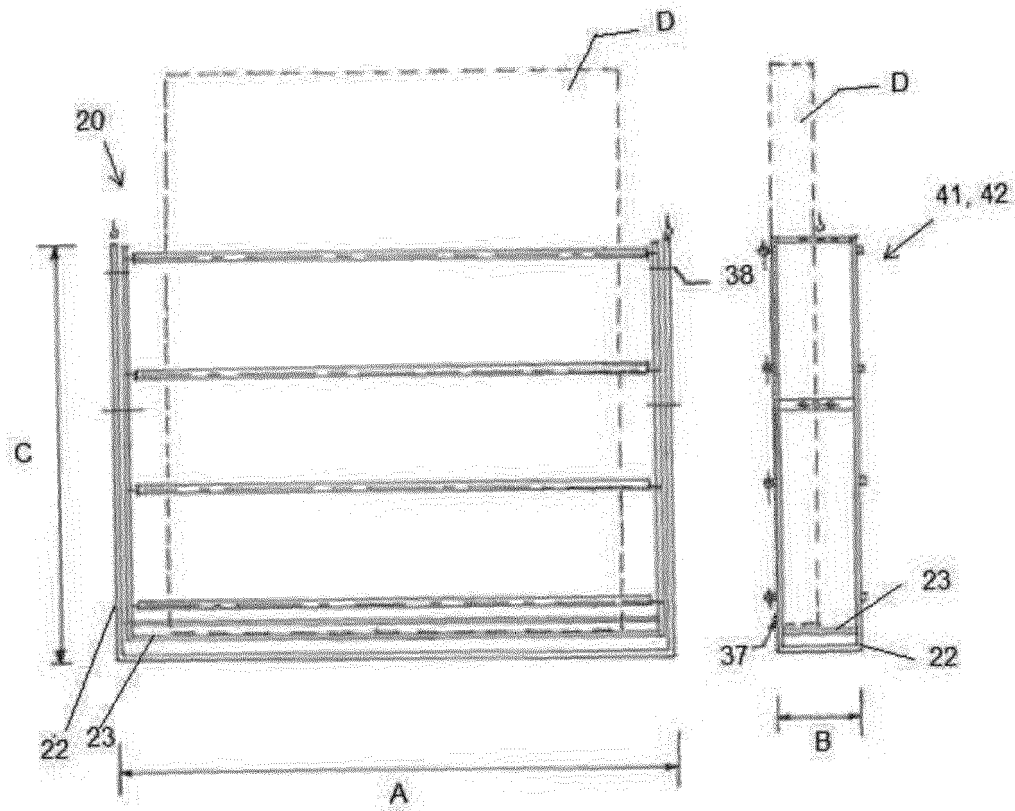


Fig. 3

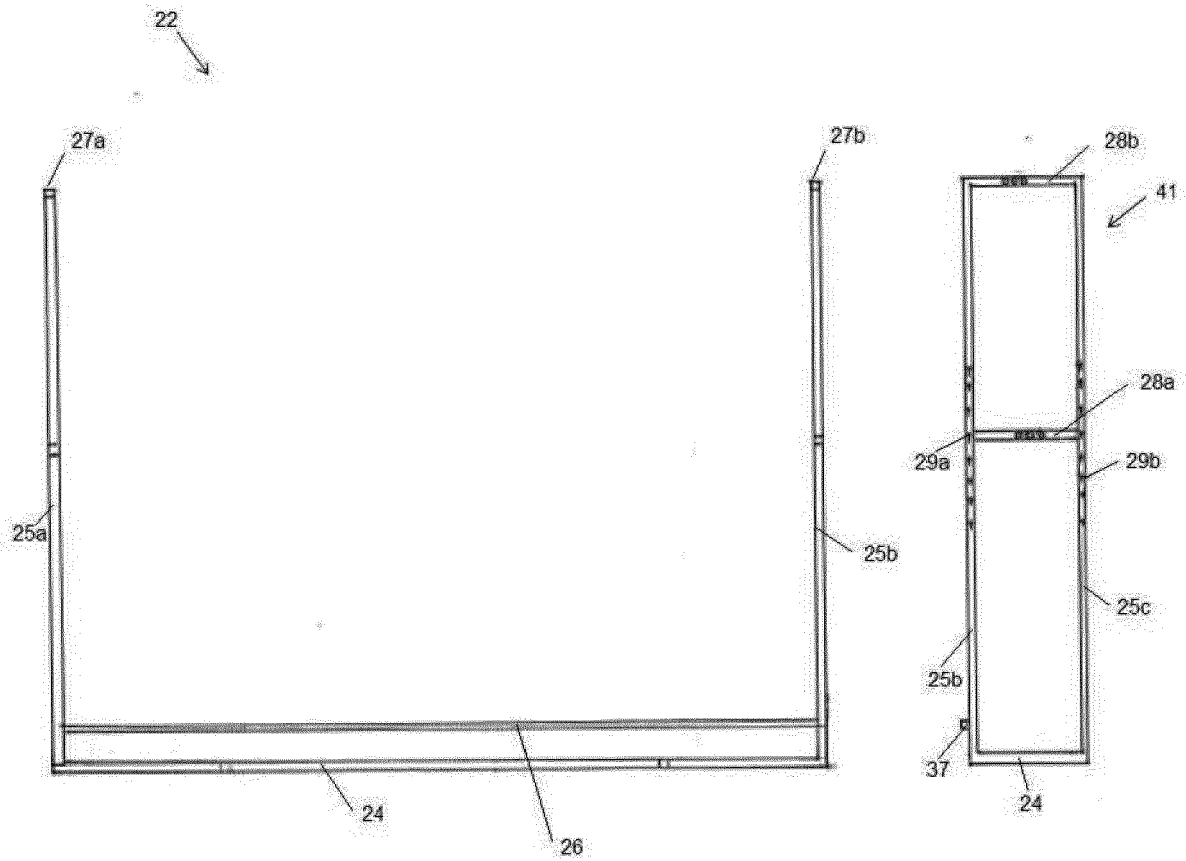


Fig. 4

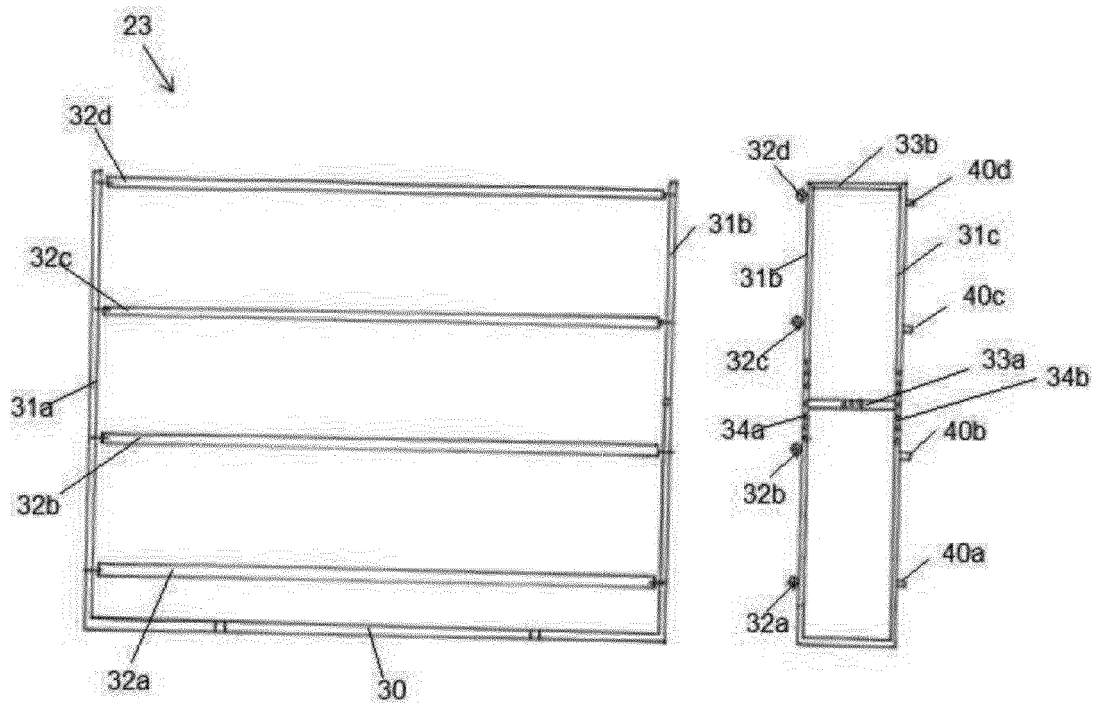


Fig. 5

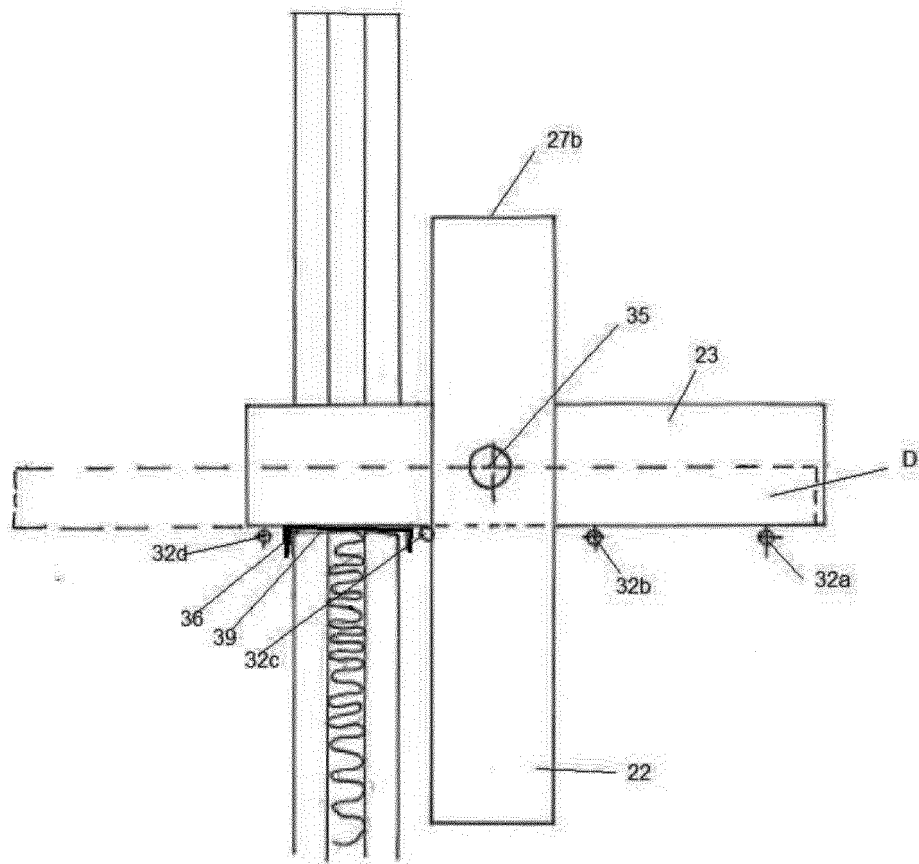


Fig. 6

**PARTIAL EUROPEAN SEARCH REPORT**

Application Number

under Rule 62a and/or 63 of the European Patent Convention.
This report shall be considered, for the purposes of
subsequent proceedings, as the European search report

EP 18 16 6749

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 20 2005 003873 U1 (BOEHL HARALD [DE]) 20 July 2006 (2006-07-20) * the whole document * -----	1-11	INV. B66C23/22
			TECHNICAL FIELDS SEARCHED (IPC)
			B66C

INCOMPLETE SEARCH

The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC so that only a partial search (R.62a, 63) has been carried out.

Claims searched completely :

Claims searched incompletely :

Claims not searched :

Reason for the limitation of the search:

see sheet C

1

EPO FORM 1503 03.82 (P04E07)

Place of search	Date of completion of the search	Examiner
The Hague	13 December 2018	Serôdio, Renato
CATEGORY OF CITED DOCUMENTS		
X : particularly relevant if taken alone		
Y : particularly relevant if combined with another document of the same category		
A : technological background		
O : non-written disclosure		
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E : earlier patent document, but published on, or after the filing date		
D : document cited in the application		
L : document cited for other reasons		
.....		
& : member of the same patent family, corresponding document		

**INCOMPLETE SEARCH
SHEET C**

Application Number

EP 18 16 6749

5

Claim(s) completely searchable:
1-11

10

Claim(s) not searched:
12-15

Reason for the limitation of the search:

15

Claims 12-15 not searched as per R. 62a EPC

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EPO FORM P0459

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