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(71) Applicant: **KONE Corporation**
00330 Helsinki (FI)

(72) Inventor: **Urpala, Otto**
00330 Helsinki (FI)

(74) Representative: **Kolster Oy Ab**
(Salmisaarenaukio 1)
P.O. Box 204
00181 Helsinki (FI)

(54) **AN ELEVATOR CAR**

(57) The elevator car comprises a roof frame structure (15) and a roof (13) supported on the roof frame structure. The support of the roof comprises hinge supports (100) connecting a first edge (13A) of the roof to the roof frame structure so that the roof is pivotable around the hinge supports between an open position and a closed position. Support elements (200) support the first edge of the roof to the roof frame structure in the closed position of the roof. A locking arrangement is provided to lock and unlock a second edge of the roof to and from the roof frame structure.

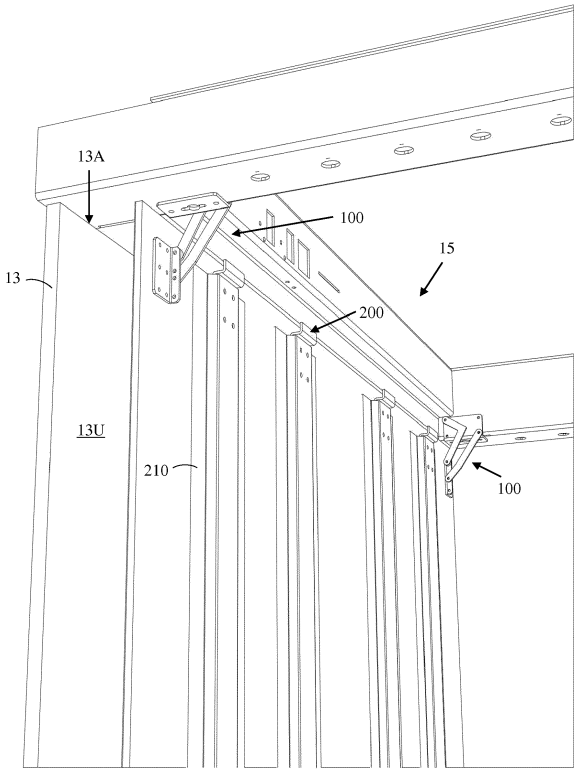

FIG. 6

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Description

FIELD

[0001] The invention relates to an elevator car.

BACKGROUND

[0002] An elevator may typically comprise a car, an elevator shaft, hoisting machinery, a hoisting member, and a counterweight. A car frame may surround and support the car or the car frame may form an integral part of the car. The hoisting machinery may be positioned in a machine room or in the shaft and may comprise a drive, an electric motor, a traction sheave, and a machinery brake. The hoisting machinery may move the car in a vertical direction upwards and downwards in the vertically extending elevator shaft. The car frame may be connected to the counterweight with the hoisting member passing over the traction sheave. The car frame may further be supported with gliding means on guide rails extending along the height of the shaft. The guide rails may be supported with fastening brackets on the side wall structures of the shaft. The gliding means may engage with the guide rails and keep the car in position in the horizontal plane when the car moves upwards and downwards in the elevator shaft. The counterweight may be supported in a corresponding way on guide rails supported on the wall structure of the shaft. The elevator car may transport people and/or goods between the landings in the building. The elevator shaft may be formed so that the wall structure is formed of solid walls or so that the wall structure is formed of an open steel structure.

[0003] The elevator car may comprise a bottom, a roof, and side walls extending between the bottom and the roof. The roof may comprise an outer roof and a ceiling at a distance below the outer roof. The outer roof may form the structural support part of the roof. The outer roof may be openable upwards or it may comprise an upwards openable hatch enabling maintenance work to be done from the inside of the car. The ceiling forms only a visible surface towards the inside of the car hiding mechanical parts in the roof. The ceiling does not form a structural part of the roof.

[0004] For a high-quality interior design, it is highly desirable that the interior components of the elevator car are mounted with brackets, hinges and other fixtures that are hidden from passengers, providing adequate structural strength and minimizing gaps between the components.

SUMMARY

[0005] An object of the present invention is an improved elevator car.

[0006] The elevator car according to the invention is defined in claim 1.

[0007] The hinge supports at the first edge of the roof make the roof pivotable between an open position and a closed position.

[0008] The support elements support the first edge of the roof on the roof frame structure and the locking arrangement support the second edge of the roof on the roof frame structure when the roof is in the closed position.

[0009] The roof forms thus a structural part of the elevator car when the roof is closed. The roof may be dimensioned so that service personnel may walk on the upper surface of the roof when the roof is closed. The mechanical loads will be transferred from the roof via the support elements and the locking mechanisms to the roof frame structure. The hinge supports do not have to carry mechanical loads at all when the roof is closed.

[0010] The roof may at the same time form an inner ceiling of the car. The roof closes the upper part of the car leaving a small gap between the edges of the roof and the walls of the car when the roof is in the closed position. It is possible to arrange ventilation from the interior of the car via the edges of the roof to channels arranged above the roof, said channels being obscured from the interior of the car.

DRAWINGS

[0011] The invention will in the following be described in greater detail by means of preferred embodiments with reference to the attached drawings, in which

Figure 1 shows a side view of an elevator,
Figure 2 shows a horizontal cross-sectional view of the elevator,
Figure 3 shows a cross-sectional view of the elevator car with the roof opened,
Figure 4 shows a cross-sectional view of the elevator car with the roof closed,
Figure 5 shows a first view of a support arrangement of the roof of the elevator car,
Figure 6 shows a second view of the support arrangement of the roof of the elevator car,
Figure 7 shows a hinge support of the support arrangement of the roof of the elevator car in an open position,
Figure 8 shows the hinge support of the support arrangement of the roof of the elevator car in a closed position,
Figure 9 shows a view of the upper surface of the roof of the elevator car,
Figure 10 shows a view of the roof frame structure of the elevator car,
Figure 11 shows an axonometric view form above of the elevator car.

DETAILED DESCRIPTION

[0012] Fig. 1 shows a side view of a prior art elevator.

[0013] The elevator may comprise a car 10, an elevator

shaft 20, hoisting machinery 30, a hoisting member 42, and a counterweight 41. A separate or an integrated car frame 11 may surround the car 10.

[0014] The car 10 may comprise a bottom 12 and a roof 13 positioned opposite to the bottom 12. The bottom 12 and the roof 13 may be positioned at a vertical distance from each other defining a height of the car 10. The car 10 may further comprise a front wall 14A, a back wall 14B and two opposite side walls 14C, 14D extending between the bottom 12 and the roof 13 of the car 10. The front wall 14A and the back wall 14B are shown in the following figure.

[0015] The hoisting machinery 30 may be positioned in a machine room or in the shaft 20. The hoisting machinery may comprise a drive 31, an electric motor 32, a traction sheave 33, and a machinery brake 34. The hoisting machinery 30 may move the car 10 in a vertical direction S1 upwards and downwards in the vertically extending elevator shaft 20. The machinery brake 34 may stop the rotation of the traction sheave 33 and thereby the movement of the elevator car 10.

[0016] The hoisting member 42 may be formed of a hoisting rope or of several hoisting ropes running in parallel.

[0017] The car frame 11 may be connected to the counterweight 41 with the hoisting member 42 passing over the traction sheave 33. The car frame 11 may further be supported with gliding means 27 at guide rails 25 extending in the vertical direction in the shaft 20. The gliding means 27 may comprise rolls rolling on the guide rails 25 or gliding shoes gliding on the guide rails 25 when the car 10 is moving upwards and downwards in the elevator shaft 20. The guide rails 25 may be attached with fastening brackets 26 to the side wall structures 21 in the elevator shaft 20. The gliding means 27 keep the car 10 in position in the horizontal plane when the car 10 moves upwards and downwards in the elevator shaft 20. The counterweight 41 may be supported in a corresponding way on guide rails that are attached to the wall structure 21 of the shaft 20.

[0018] The car 10 may transport people and/or goods between the landings in the building. The elevator shaft 20 may be formed so that the wall structure 21 is formed of solid walls or so that the wall structure 21 is formed of an open steel structure.

[0019] Figure 2 shows a horizontal cross-sectional view of the elevator.

[0020] The shaft 20 may be provided with a front wall 21A, an opposite back wall 21B, and two opposite side walls 21C, 21D. The front wall 21A may be provided with openings on the landings, whereby said openings are provided with landing doors. The car guide rails 25 are positioned on the opposite side walls 21C, 21D in the shaft 20 and the counterweight guide rails 25 are positioned on the back wall 21B in the shaft 20.

[0021] The car 10 may be provided with a front wall 14A, an opposite back wall 14B, and two opposite side walls 14C, 14D. The front wall 14A may have an opening provided with a car door element 19. The car door element 19 may comprise centre-opening or side-opening door panels. The car door element 19 may comprise any number of door panels.

[0022] Figures1 show a first direction S1, which is a vertical direction in the elevator shaft 20. Figure 2 shows a second direction S2, which is the direction between the guide rails (DBG) and a third direction S3, which is the direction from the back wall 21C to the front wall 21A in the shaft 20 (BTF). The second direction S2 is perpendicular to the third direction S3.

[0023] Figure 3 shows a cross-sectional view of the elevator car with the roof opened.

[0024] The figure shows the roof frame structure 15, the car 10 and the roof 13. The roof 13 is shown in an open position in which the roof 13 is folded into the car 10. There is thus a service opening O10 in the roof frame structure 15 at the upper end of the car 10. The service opening O10 may be used by service personnel in order to perform service operations on the equipment in the shaft 20 from the interior of the car 10. The figure shows further the hand rail 18 in the car 10.

[0025] The figure shows also the hinge support 100 associated with the first edge 13A of the roof 13 and the locking mechanism 300 associated with the second edge 13B of the roof 13.

[0026] Figure 4 shows a cross-sectional view of the elevator car with the roof closed.

[0027] The figure shows the roof frame structure 15, the car 10 and the roof 13. The roof 13 is shown in a closed position in which the roof 13 is closed against the roof frame structure 15. The service opening O10 between the beams of the roof frame structure 15 at the upper end of the car 10 is thus closed by the roof 13. The upper surface of the roof 13 may comprise a sealing running near the outer edges of the roof 13. The sealing may seal the roof 13 against the lower surface of the roof frame structure 15. The figure shows further the hand rail 18 in the car 10.

[0028] The figure shows also the hinge support 100 associated with the first edge 13A of the roof 13 and the locking mechanism 300 associated with the second edge 13B of the roof 13.

[0029] Figure 5 shows a first view of a support arrangement of the roof of the elevator car.

[0030] The figure shows a portion of the roof frame structure 15 of the elevator car 10. The figure shows a portion of the front beam 15A extending in the direction of the front wall 14A of the car 10 and a portion of the first side beam 15C extending in the direction of the first side wall 14C of the car 10. The roof frame structure 15 may be formed of substantially horizontal beams. The beams may form a closed perimeter. The shape of the perimeter may be substantially rectangular. The roof frame structure 15 may form an upper frame structure of the car 10. The beams in the roof frame structure 15 may have a hollow structure with a polygonal cross-section. Equipment positioned in connection with the roof of the

car 10 may be supported on the roof frame structure 15. Vertical support beams may extend in the corners of the car 10 between the bottom 12 and the roof frame structure 15 (not shown in the figures).

[0031] The figure shows further a portion of the roof 13 which may be supported with two hinge supports 100 on the roof frame structure 15. The figure shows only one of the two hinge supports 100. The hinge support 100 may comprise a first support bracket 110, a second support bracket 120, and two articulated arms 130, 140. The roof 13 may be positioned below the roof frame structure 15.

[0032] The first support bracket 110 may be attached to the roof 13 and the second support bracket 120 may be attached to the roof frame structure 15.

[0033] The first support bracket 110 may comprise a bottom portion 111 and a connection portion 112 being perpendicular to the bottom portion 111. The bottom portion 111 of the first support bracket 110 may be attached to the upper surface 13U of the roof 13. The connection portion 112 of the first support bracket 110 may extend upwards from the upper surface 13U of the roof 13.

[0034] The second support bracket 120 may comprise a bottom portion 121 and a connection portion 122 being perpendicular to the bottom portion 121. The bottom portion 121 may be attached to a lower surface of the roof frame structure 15. The connection portion 122 may extend upwards from the lower surface of the roof frame structure 15.

[0035] The frame support for the hinge support 100 may in an alternative embodiment be arranged to protrude inside the front beam 15A in which case a slot will be provided for the articulated arms 130, 140 through the lower surface of the roof frame structure 15.

[0036] The two articulated arms 130, 140 may extend between the connection portion 112 of the first support bracket 110 and the connection portion 122 of the second support bracket 120. Each end of each articulated arm 130, 140 may be attached with an articulated joint to the connection portion 112, 122 of the respective support bracket 110, 120.

[0037] The figure shows only the hinge support 100 at the left hand corner of the roof 13. There is a corresponding hinge support 100 at the right hand corner of the roof 13, which is not shown in the figure. The first support brackets 110 of the hinge supports 100 may be attached to the roof 13 in opposite corners of the roof 13, near the first edge 13A of the roof 13.

[0038] The support arrangement of the roof 13 may further comprise support elements 200 attached to the roof 13. The figure shows only one support element 200 which may be attached to the upper surface 13U of the roof 13, near the first edge 13A of the roof 13. Several support elements 200 may be positioned on the upper surface 13U of the roof 13 between the two hinge supports 100. The support element 200 is in an idle position in this figure in which the roof 13 is open i.e. hanging downwards from the hinge support 100 into the interior of the car 10. The support element 200 will protrude into first openings O1 in the roof frame structure 15 when the roof 13 is closed. The outer ends of the support element 200 will seat on the inner surface of the lower portion of the roof frame structure 15 when the roof 13 is fully closed. The support elements 200 will thus support the roof 13 on the roof frame structure 15 when the roof 13 is fully closed.

[0039] The support elements 200 may have a tongue-like form. The support elements 200 may comprise a first portion with a contact surface against the upper surface 13U of the roof 13 and a second portion being parallel with the first portion, but positioned at a distance above the first portion, the second portion forming a locking tongue. The transition between the first portion and the second portion may be formed of a fold.

[0040] The upper surface 13U of the roof 13 may be provided with reinforcement elements 210. A cross-section of the reinforcement elements 210 may comprise two horizontal outer portions 211, a vertical portion 212 extending upwards from each inner end of the outer portions 211 and a horizontal portion 213 connecting the upper ends of the vertical portions 212. The outer portions 211 may seat against the upper surface 13U of the roof 13.

[0041] The support elements 200 may be integrated into the reinforcement elements 210 so that the support elements 200 form a part of the reinforcement elements 210.

[0042] Figure 6 shows a second view of the support arrangement of the roof of the elevator car.

[0043] The figure shows the roof frame structure 15, the two hinge supports 100 at each edge of the roof 13, and the reinforcement elements 210 on the upper surface 13U of the roof 13. There are four reinforcement elements 210 and four support elements 200 in this embodiment.

[0044] Figure 7 shows the hinge support of the support arrangement of the roof of the elevator car in an open position.

[0045] The figure shows the roof frame structure 15, the hinge support 100, and the roof 13.

[0046] The roof 13 is substantially vertically directed in this open position. The two articulated arms 130, 140 restrict the opening angle of the roof 10 to a maximum of substantially 90 degrees. The two articulated arms 130, 140 are further arranged so that the roof 13 is exposed to a level shift in the plane of the roof 13 in a direction from the hinge supports 100 towards the locking arrangement 300 when the roof 13 is opened 13 and back in the opposite direction when the roof 13 is closed.

[0047] The lower surface 13L and the upper surface 13U of the roof 13 is also indicated in the figure.

[0048] The hinge support 100 may comprise a first support bracket 110, a second support bracket 120, and two articulated arms 130, 140 extending between the first support bracket 110 and the second support bracket 120.

[0049] The figure shows further a support element 200, which is not a part of the hinge support 100, but which

forms a part of the support arrangement for the roof 13.

[0050] A first end of the first articulated arm 130 may be attached with a first articulated joint J1 to the connection portion of the first support bracket 110 and an opposite second end of the first articulated arm 130 may be attached with a second articulated joint J2 to the connection portion of the second support bracket 120.

[0051] A first end of the second articulated arm 140 may be attached with a third articulated joint J3 to the connection portion 112 of the first support bracket 110 and an opposite second end of the second articulated arm 140 may be attached with a fourth articulated joint J4 to the connection portion 122 of the second support bracket 120.

[0052] Each articulated joint J1, J2, J3, J4 provides only for a rotational movement of the articulated arms 130, 140 around the articulated J1, J2, J3, J4. The articulated joints J1, J2, J3, J4 will thus remain in constant positions on the respective support brackets 110, 120 in all positions of the roof 13.

[0053] The figure shows further the path P10 of the outer end of the outer end portion 201 of the support element 200 when the roof 13 is turned from the open position into the closed position. The outer end portion 201 may form a tongue of the support element 200.

[0054] The figure shows also the first opening O1 in the roof frame structure 15. The outer end portion 201 of the support element 200 passes through said first opening O1 into the roof frame structure 15 when the roof 13 is closed.

[0055] The articulated joints J1, J3 on the first support bracket 110 are positioned at a distance L1 from each other on a substantially vertical line in the open position of the roof 13.

[0056] Figure 8 shows the hinge support of the roof of the elevator car in a closed position.

[0057] The hinge support 100 have turned into a closed position. The roof 13 extend in a substantially horizontal direction and the first end 13A of the roof 13 is closed to the side wall of the car.

[0058] The first support bracket 110 has moved from the substantially vertical position i.e. the open position to the substantially horizontal position i.e. the closed position.

[0059] The articulated joints J1, J3 are positioned on a substantially horizontal line in this closed position. The distance L1 between the articulated joints J1, J3 on the first support bracket 110 remains constant in all positions.

[0060] Figure 9 shows a view of the upper surface of the roof of the elevator car.

[0061] The figure shows a second edge 13B of the roof 13. The second edge 13B is opposite to the first edge 13A of the roof 13.

[0062] The second end of the reinforcement elements 210 may be provided with first lock parts 220. The first lock parts 220 may be attached to the reinforcement elements 210 or they may form an integral part of the reinforcement elements 210.

[0063] The first lock part 220 may comprise an upper portion extending upwards from the upper surface 13U of the roof 13. The upper portion of the first lock part 220 may comprise an opening 221 passing through the upper portion of the first lock part 220.

[0064] Figure 10 shows a view of the roof frame structure of the elevator car.

[0065] A locking mechanism 300 is attached to an upper surface of the roof frame structure 15 above a second opening O2 in the second side beam 15D in the roof frame structure 15. The upper portion of the first lock part 220 passes through said second opening O2 into the locking mechanism 300 when the roof 13 is closed.

[0066] The locking mechanism 300 may comprise a rotary latch passing through the opening 221 in the first lock part 220. The first lock part 220 becomes thus locked to the locking mechanism 300. This means that the roof 13 becomes locked to the second side beam 15D in the roof frame structure 15 and thereby to the roof frame structure 15 with the locking mechanism 300. Any commercial locking mechanism 300 comprising a rotary latch may be used.

[0067] The locking mechanism 300 may be operated with an operation handle between a locked position and an open position from the inside of the car 10. The operation handle may extend from the inside of the car through a gap between the edge of the roof 13 and the side wall of the car to the locking mechanism 300. A mechanic within the car 10 may thus open and close the locking mechanisms 300 with the operation handle.

[0068] Figure 11 shows an axonometric view of the elevator car.

[0069] The figure shows the roof frame structure 15, the roof 13, the side walls 14C, 14D of the car, the hand rail 18 in the car, a reinforcement element 210 with a first lock part 220 on the upper surface of the roof 13, and lock mechanisms 300.

[0070] The roof frame structure 15 may form a substantially horizontal framework. The roof frame structure 15 may be formed of substantially horizontal beams 15A, 15B, 15C, 15D forming a closed perimeter. The perimeter may have a rectangular shape. The beams 15A, 15B, 15C, 15D may be connected to each other in the corners of the roof frame structure 15. The roof frame structure 15 may comprise a service opening O10 in the middle of the roof frame structure 15. The service opening O10 is restricted by the beams 15A, 15B, 15C, 15D forming the roof frame structure 15. The service opening O10 may be used by service personnel in order to perform service operations on the equipment in the shaft 20 from the interior of the car 10. The roof frame structure 15 may comprises first openings O1 in the side beam 15C on the left hand side and second openings O2 in the side beam 15D on the right hand side in the figure. Said side beams 15C, 15D extend in the direction of the side walls of the car 10. The upper edges of the side walls 14C, 14D may be supported on the side beams 15C, 15D. The upper edge of the front wall 14A may be supported on the front beam

15A and the upper edge of the back wall 14B may be supported on the back beam 15B.

[0071] There are first openings O1 in the first side beam 15A. Each first opening O1 receive a respective support element 200. There are further second openings O2 in the second side beam 15D. Each second opening O2 receive a respective first locking part 220. A locking mechanism 300 is positioned on an upper surface of the second side beam 15D in connection with each second opening O2.

[0072] The roof frame structure 15, the first openings O1 and the second openings O2 may be symmetrical so that the roof 13 may be installed into the roof frame structure 15 in two opposite positions. The roof 13 may be installed so that the hinge supports 100 are positioned to the left in the figure, whereby the roof 13 opens downwards into the car 10 in a clockwise direction. The roof 13 may on the other hand be installed so that the hinge supports 100 are positioned to the right in the figure, whereby the roof 13 opens downwards into the car 10 in a counter-clockwise direction.

[0073] There could further be one or more gas spring mechanisms extending between the roof 13 and the roof frame structure 15 in order to make the opening and the closing of the roof 13 easier.

[0074] The first lock part 220 and the locking mechanism 300 shown in the figures is to be seen only as an example of how locking of the roof 13 to the roof frame structure 15 may be done. The invention is not restricted to this kind of locking arrangement. The invention may be realized with any kind of locking arrangement being able to lock and unlock the second edge 13B of the roof 13 to the roof frame structure 15. The locking arrangement may be realized so that it comprises several locks which may be operated with one single operation handle.

[0075] The use of the invention is not limited to the elevator disclosed in the figures. The figure shows an elevator with a 1:1 suspension ratio, but the invention may be used in elevators with any suspension ratio of e. g. 2:1, 4:1, etc. The invention can be used in any type of elevator e.g. an elevator comprising a machine room or lacking a machine room. The counterweight could be positioned on either side wall or on both side walls or on the back wall of the elevator shaft. The drive, the motor, the traction sheave, and the machine brake could be positioned in a machine room or somewhere in the elevator shaft. The car guide rails could be positioned on opposite side walls of the shaft or on a back wall of the shaft in a so called ruck-sack elevator.

[0076] It will be obvious to a person skilled in the art that, as the technology advances, the inventive concept can be implemented in various ways. The invention and its embodiments are not limited to the examples described above but may vary within the scope of the claims.

Claims

1. An elevator car (10) comprising a roof frame structure (15) and a roof (13) having a first edge (13A), a second opposite edge (13B), an upper surface (13U) and a lower surface (13L), the roof (13) being supported on the roof frame structure (15), **characterized in that** the support of the roof (13) on the roof frame structure (15) comprises
   hinge supports (100) connecting the first edge (13A) of the roof (13) to the roof frame structure (15) so that the roof (13) is pivotable around the hinge supports (100) between an open position in which the roof (13) is directed downwards into the interior of the car (10) and a closed position in which the roof (13) seats against the roof frame structure (15),
   support elements (200) supporting the first edge (13A) of the roof (13) to the roof frame structure (15) in the closed position of the roof (13),
   a locking arrangement (220, 300) for locking and unlocking the second edge (13B) of the roof (13) to the roof frame structure (15).

2. The elevator car according to claim 1, wherein each hinge support (100) comprises a first support bracket (110) attached to the upper surface (13U) of the roof (13), a second support bracket (120) attached to the roof frame structure (15), and two articulated arms (130, 140) extending between the first support bracket (110) and the second support bracket (120), each end of each articulated arm (130, 140) being attached with an articulated joint (J1, J2, J3, J4) to the respective support bracket (110, 120).

3. The elevator car according to claim 2, wherein the first support bracket (110) and the second support bracket (120) comprise a bottom portion (111, 121) and a connection portion (112, 122) being perpendicular to the bottom portion (111, 121), whereby the bottom portion (111) of the first support bracket (110) is attached to the upper surface (13U) of the roof (13) and the bottom portion (121) of the second support bracket (120) is attached to the roof frame structure (15), the two articulated arms (130, 140) extending between the connection portion (112) of the first support bracket (110) and the connection portion (122) of the second support bracket (120).

4. The elevator car according to claim 2 or 3, wherein the two articulated arms (130, 140) are arranged so that the roof (13) is exposed to a level shift in the plane of the roof (13) in a direction from the hinge supports (100) towards the locking arrangement (220, 300) when the roof (13) is opened and back in the opposite direction when the roof 13 is closed.

5. The elevator car according to any one of claims 2 to 4, wherein the two articulated arms (130, 140) are

arranged so that the opening of the roof (13) is restricted to a maximum of substantially 90 degrees.

6. The elevator car according to any one of claims 1 to 5, wherein the support element (200) comprises a first portion with a contact surface against the upper surface (13U) of the roof (13) and a second portion being parallel with the first portion, but positioned at a distance above the first portion, the second portion forming a locking tongue.

7. The elevator car according to any one of claims 1 to 6, wherein the roof frame structure (15) comprises first openings (O1) in a side beam (15C) of the roof frame structure (15) adjacent to the first edge (13A) of the roof (13) so that the support elements (200) may pass into the roof frame structure (15) through the first openings (O1) when the roof (13) is closed in order to support the first edge (13A) of the roof (13) on the roof frame structure (15).

8. The elevator car according to any one of claims 1 to 7, wherein the locking arrangement (220, 300) comprises first locking parts (220) attached to the upper surface (13U) of the roof (13) adjacent to the second edge (13B) of the roof (13) and locking mechanisms (300) attached to an upper surface of the roof frame structure (15), whereby the first locking part (220) may be locked to and unlocked from the locking mechanism (300) with an operating handle passing from the interior of the car (10) via a gap between the second edge (13B) of the roof (13) and the adjacent side wall (13D) of the car (10) to the locking mechanism (300).

9. The elevator car according to claim 8, wherein the roof frame structure (15) comprises second openings (O2) in a bottom surface of the roof frame structure (15) adjacent to the second edge (13B) of the roof (13) so that the first locking part (220) may pass through the second openings (O2) to the locking mechanism (300) in the roof frame structure (15) when the roof (13) is closed in order to lock the second edge (13B) of the roof (13) to the roof frame structure (15).

10. The elevator car according to claim 8 and 9, wherein the roof frame structure (15), the first openings (O1) and the second openings (O2) are symmetrical so that the roof (13) may be installed either so that the first edge (13A) of the roof (13) is adjacent to the first openings (O1) or so that the first edge (13A) of the roof (13) is adjacent to the second openings (O2).

11. The elevator car according to any one of claims 1 to 10, wherein the roof frame structure (15) is formed of substantially horizontal beams (15A, 15B, 15C, 15D) forming a closed perimeter and thereby restricting a service opening (O10) in the middle of the roof frame structure (15), the roof (13) being arranged to open and close said service opening (O10).

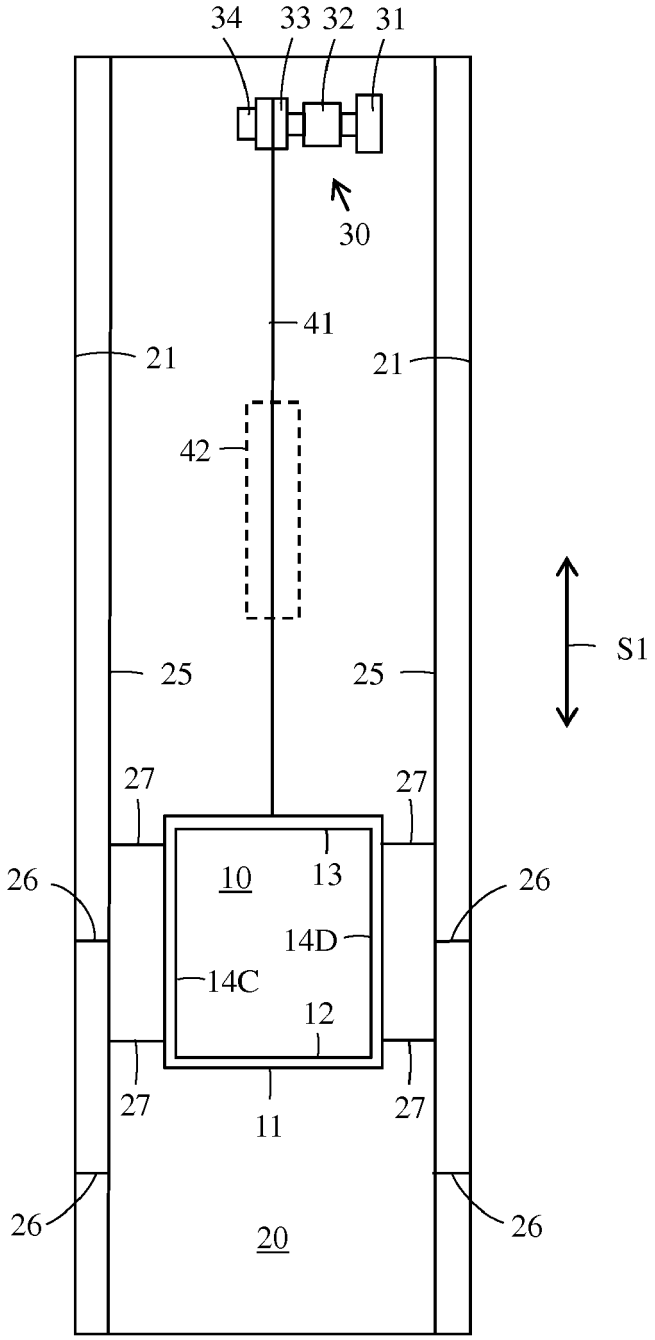
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FIG. 1

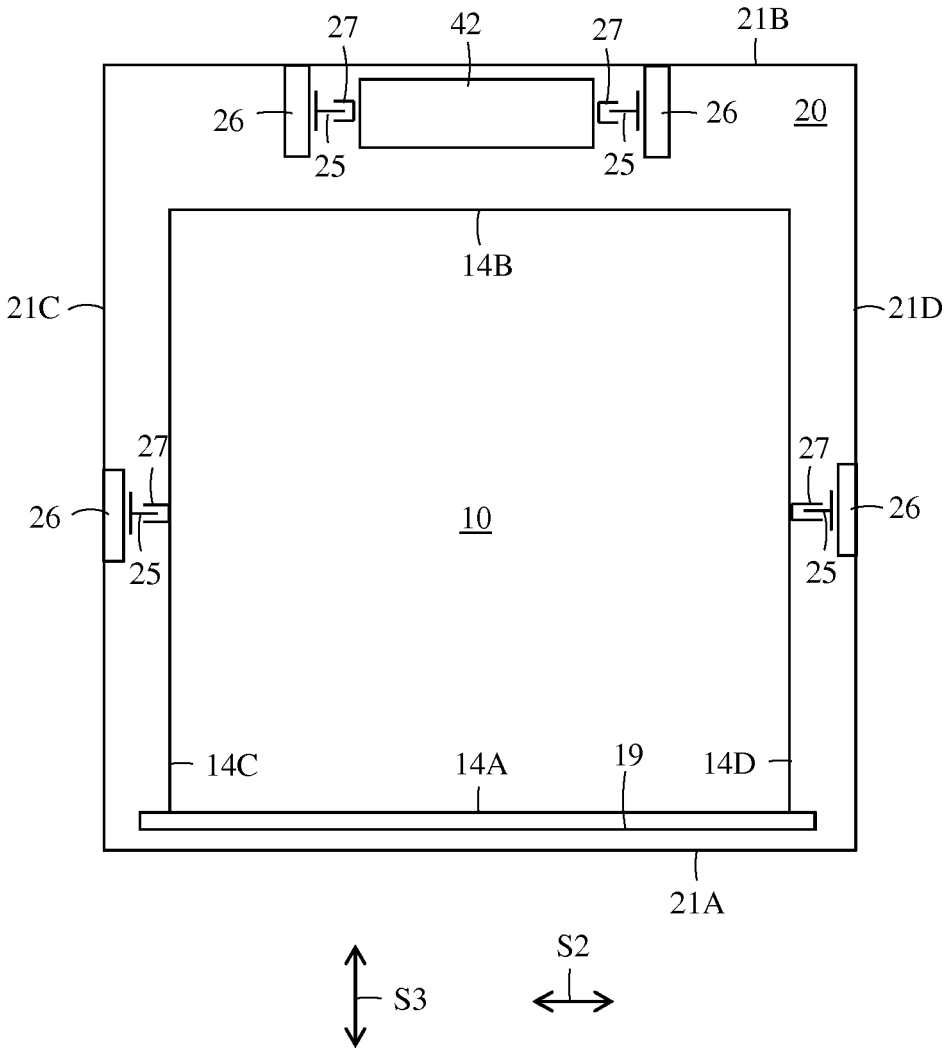
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FIG. 2

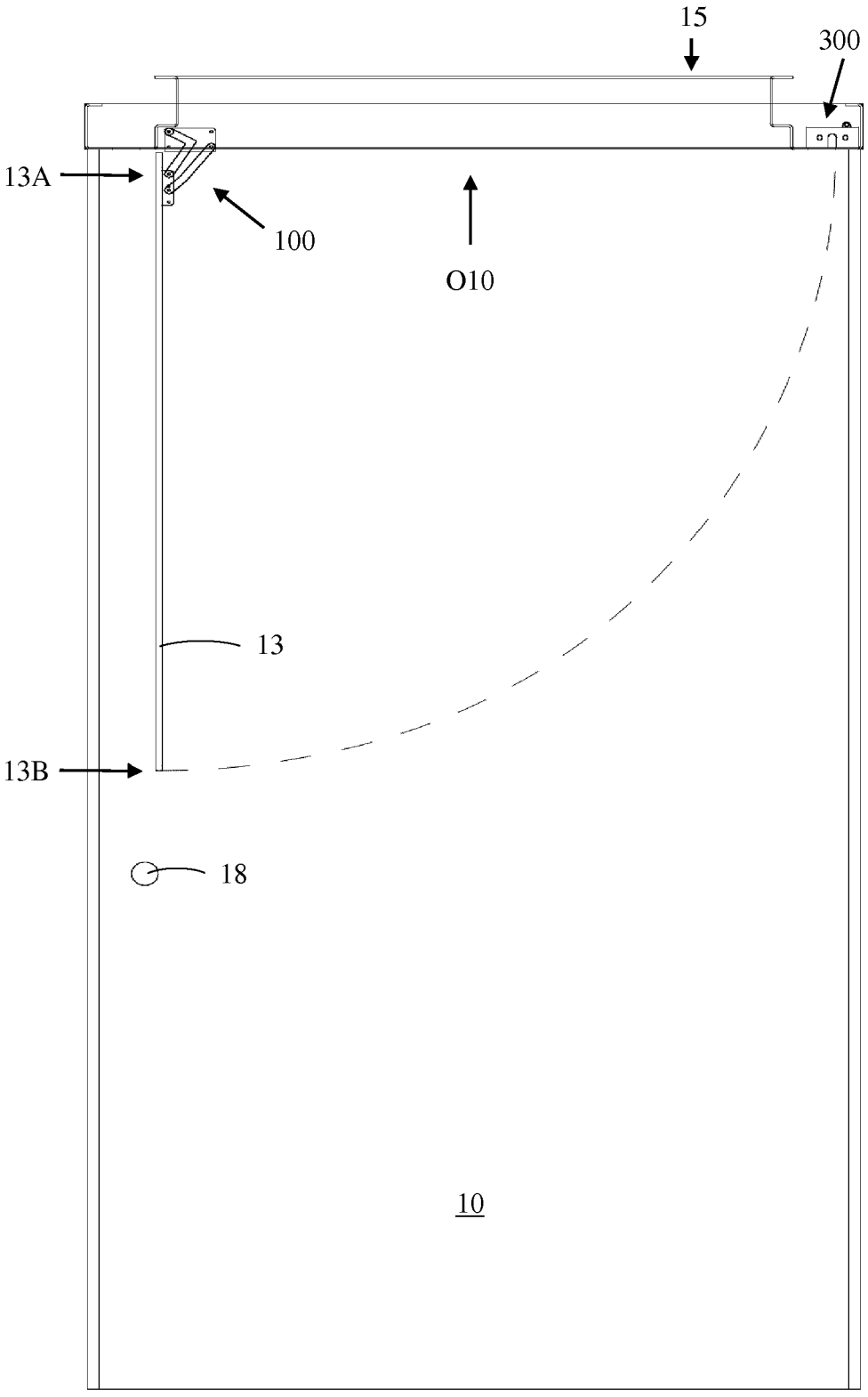

FIG. 3

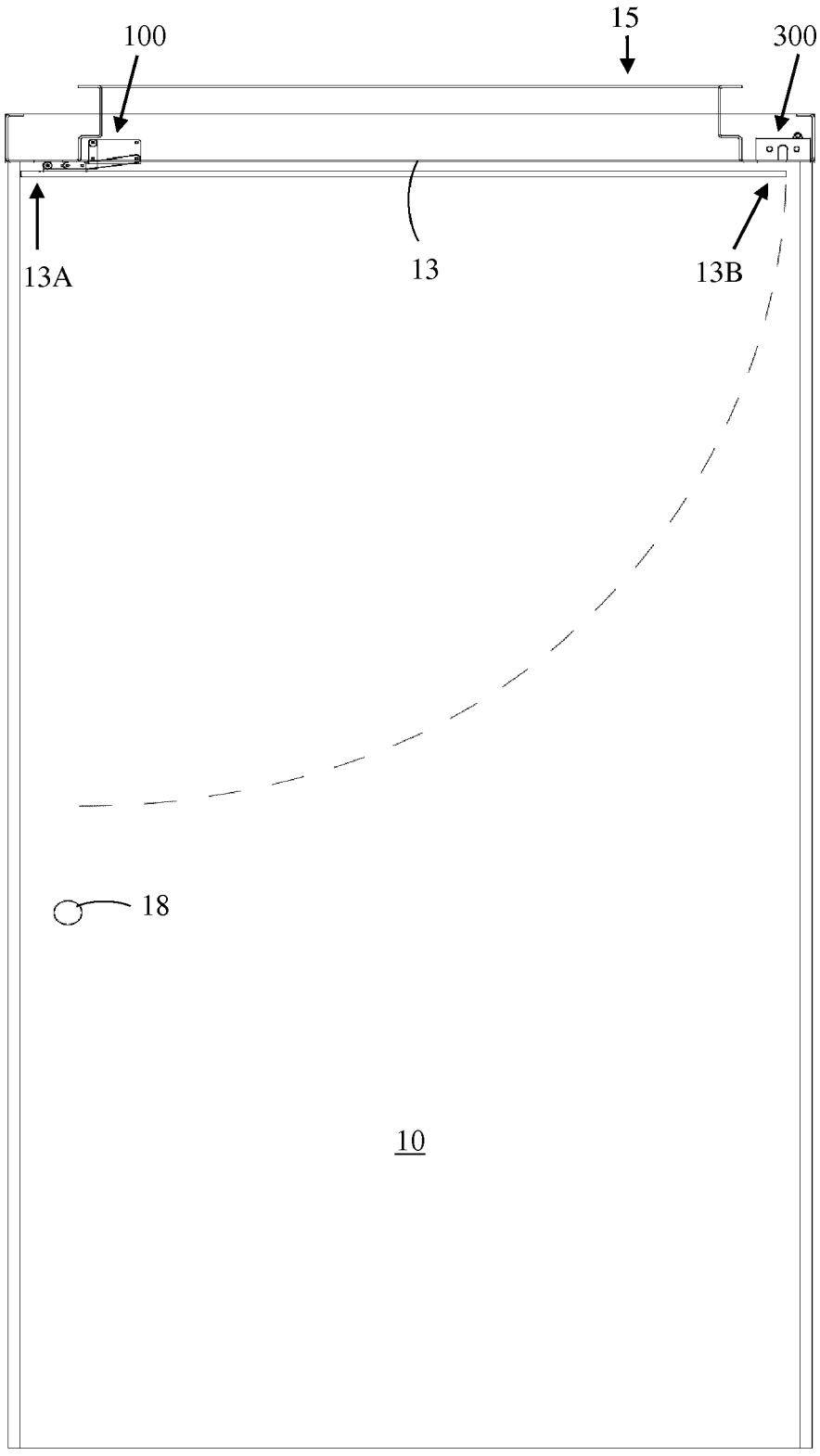

FIG. 4

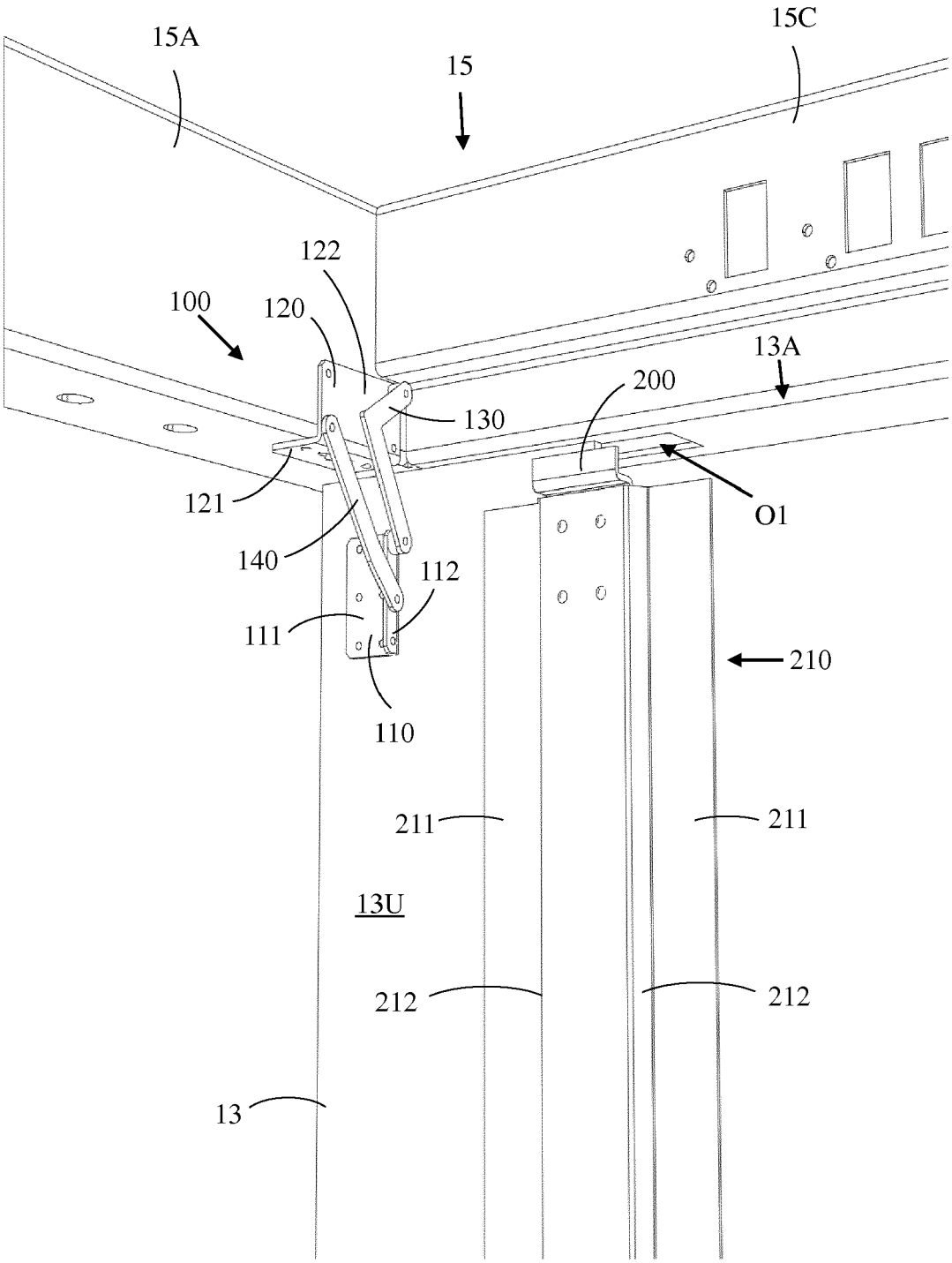
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FIG. 5

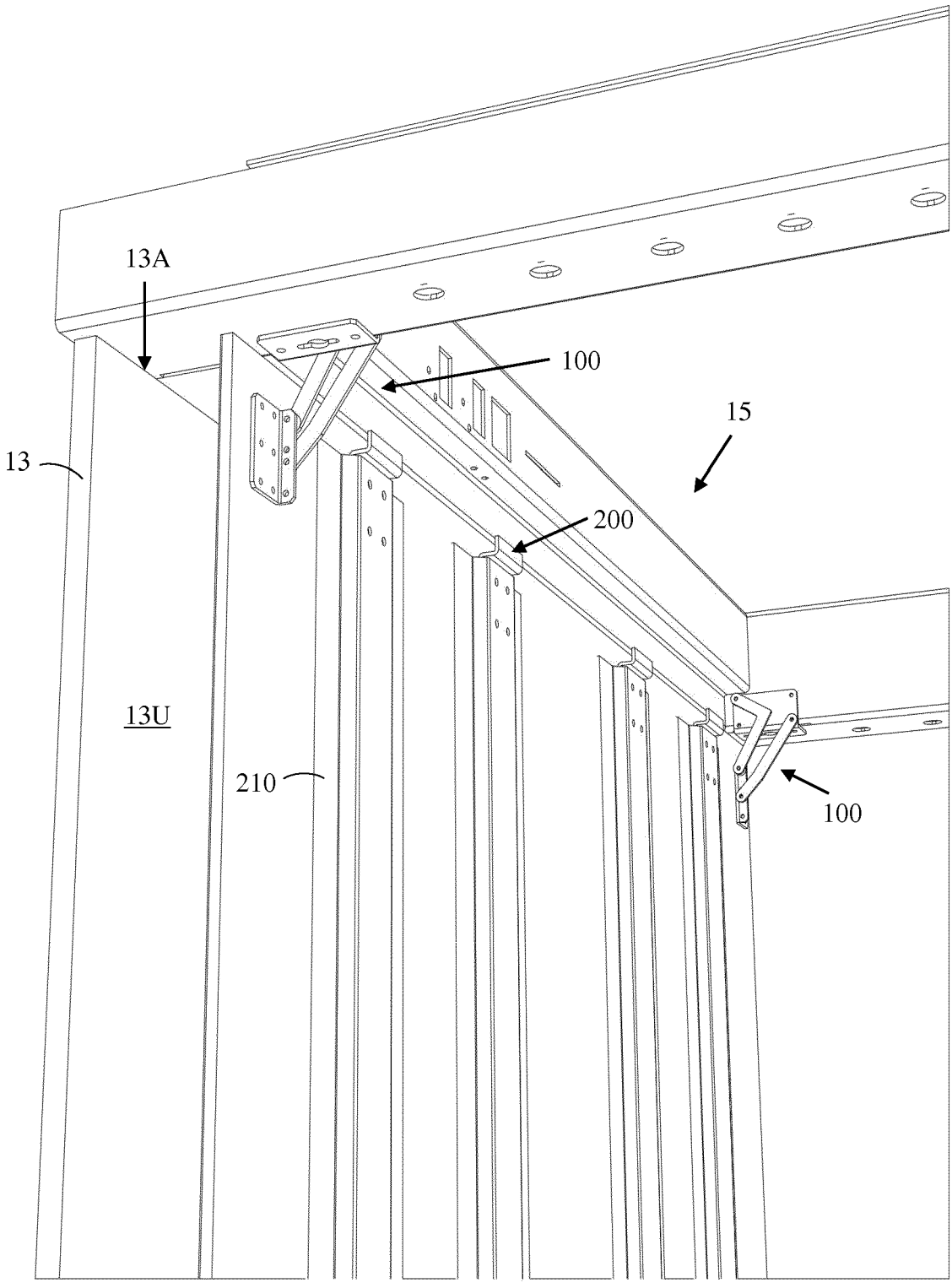

FIG. 6

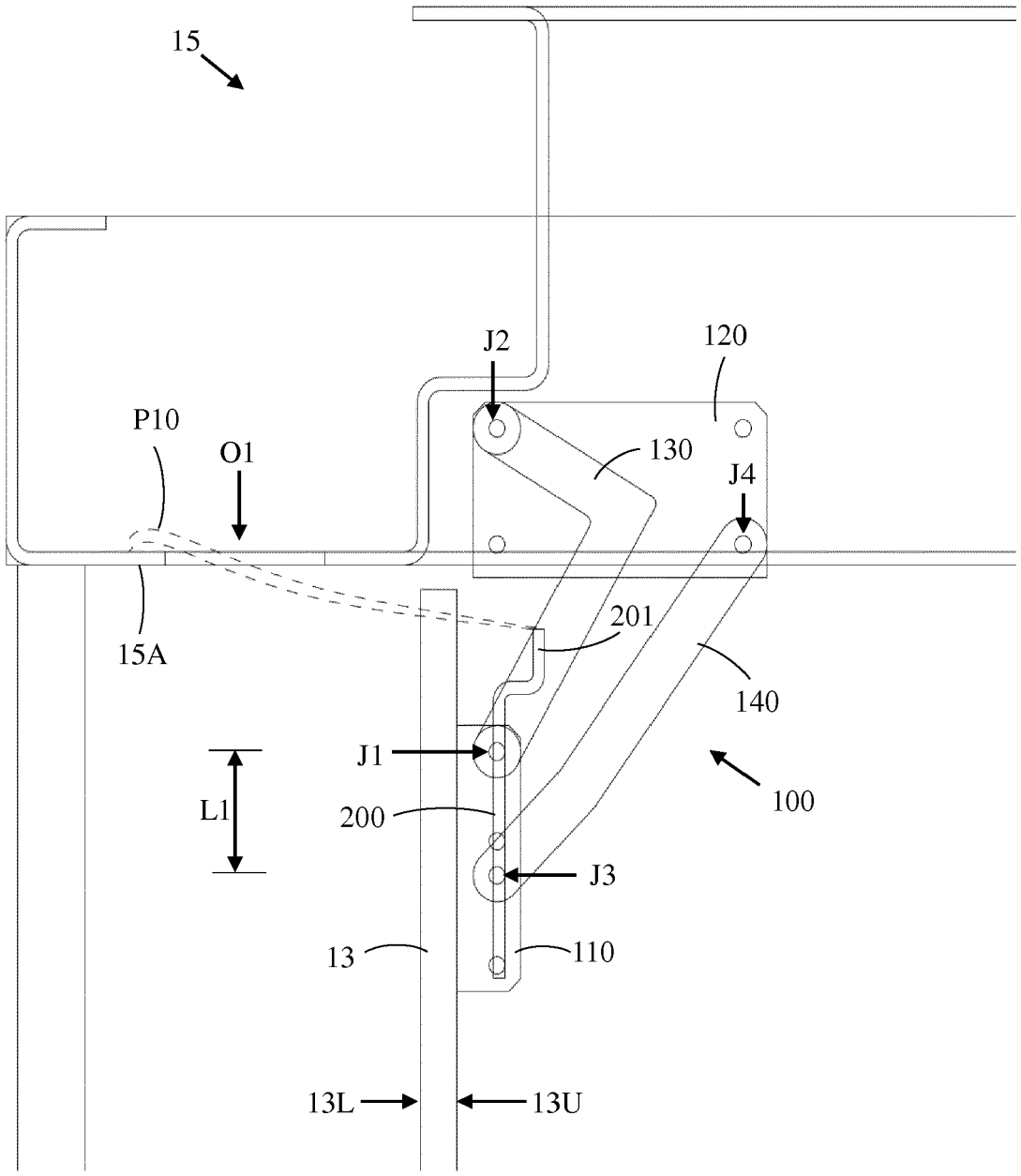

FIG. 7

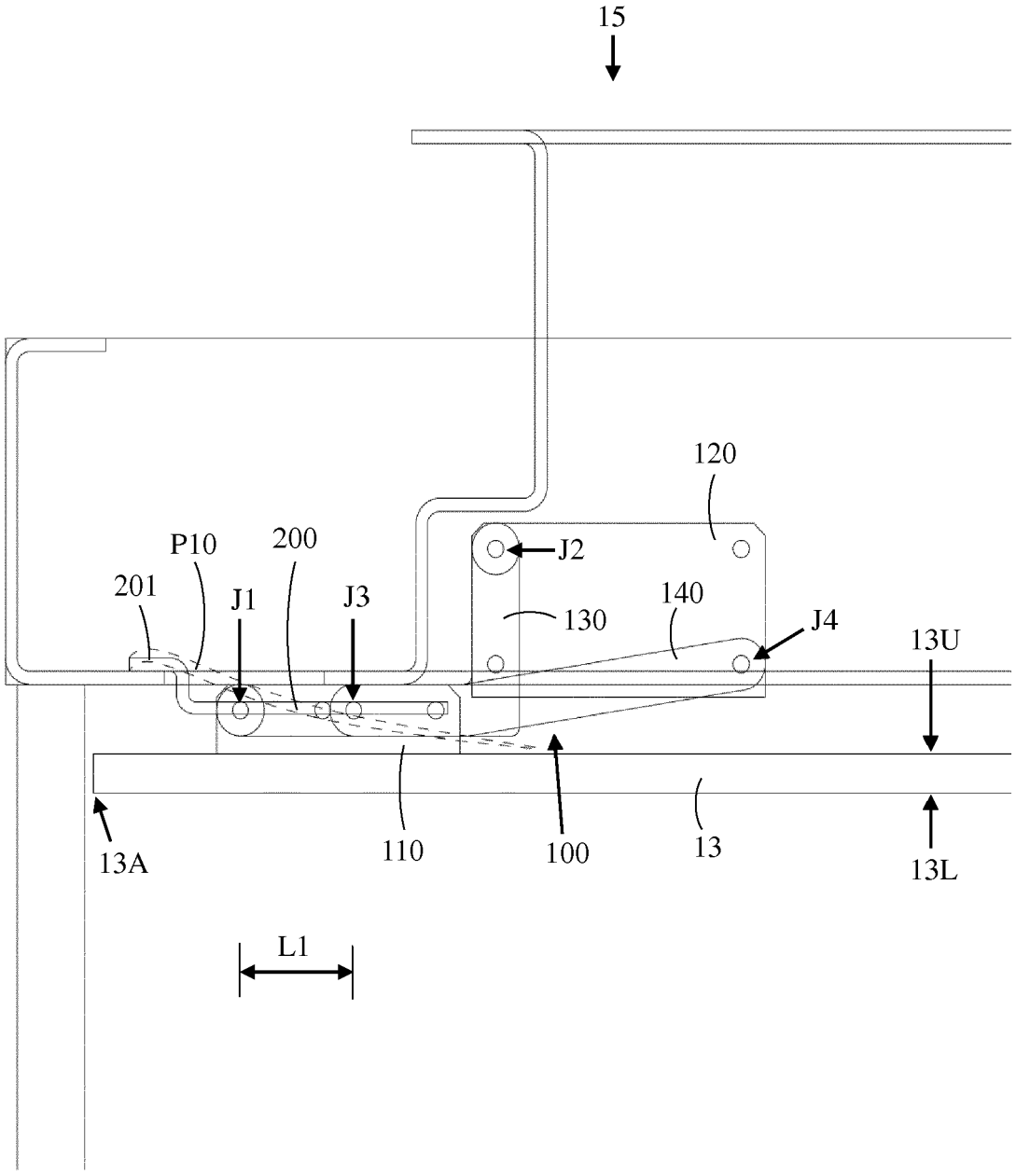

FIG. 8

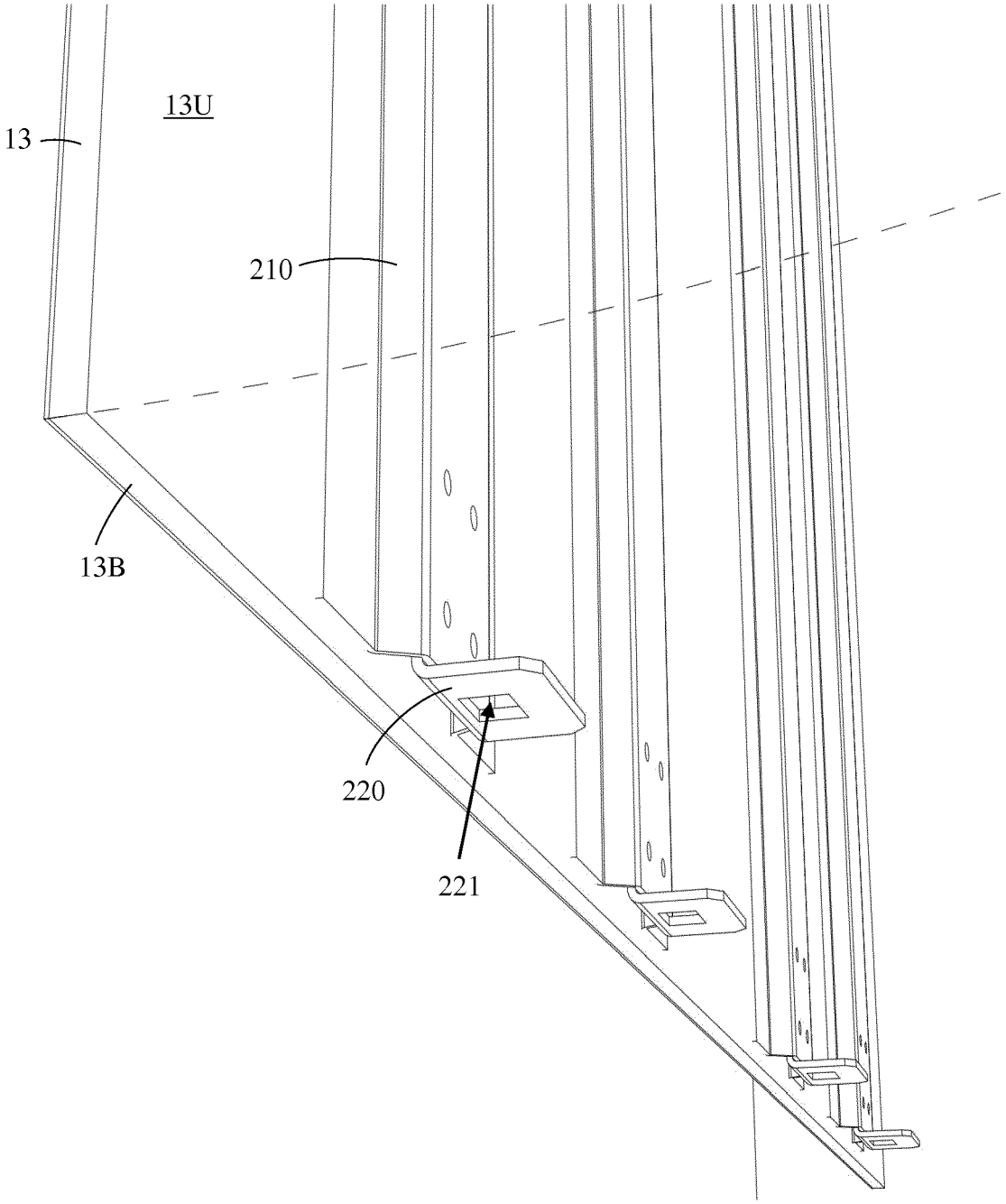

FIG. 9

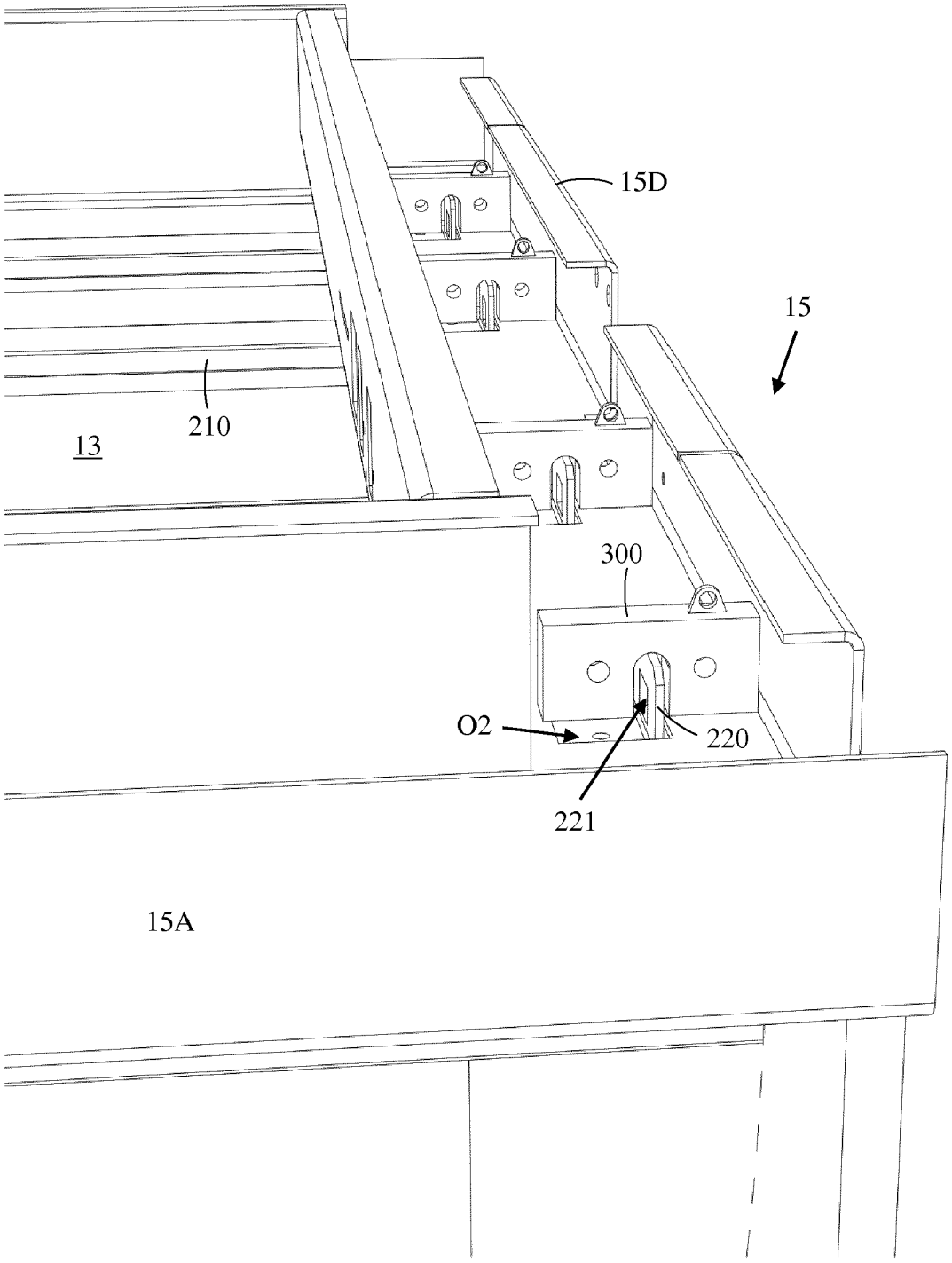

FIG. 10

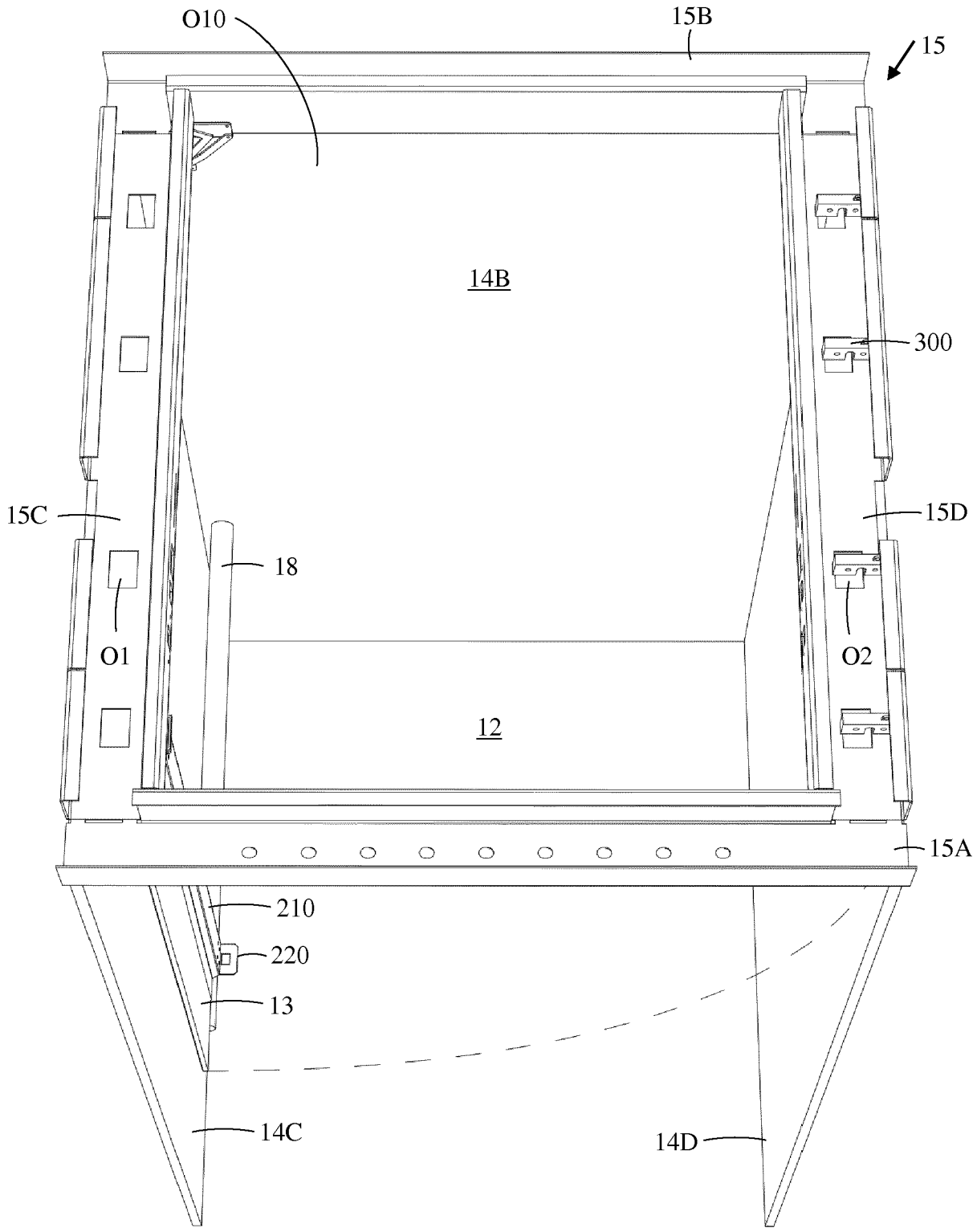

FIG. 11

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EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	28 April 2020	Janssens, Gerd

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