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(54) **ELEVATOR CAR SLING WITH AN UPPER BEAM SYSTEM**

(57) A car sling for an elevator car, comprising at least two, preferably at least four uprights and an upper beam system, wherein the upper beam system comprises at least one continuous upper beam - preferably with a C-profile - on the side of the elevator car facing away from a trap door and/or a refuge space and two short upper beams on the side of the elevator car facing the trap door and/or the refuge space, and in that each short upper beam is connected with the continuous upper beam by means of an interconnection part.

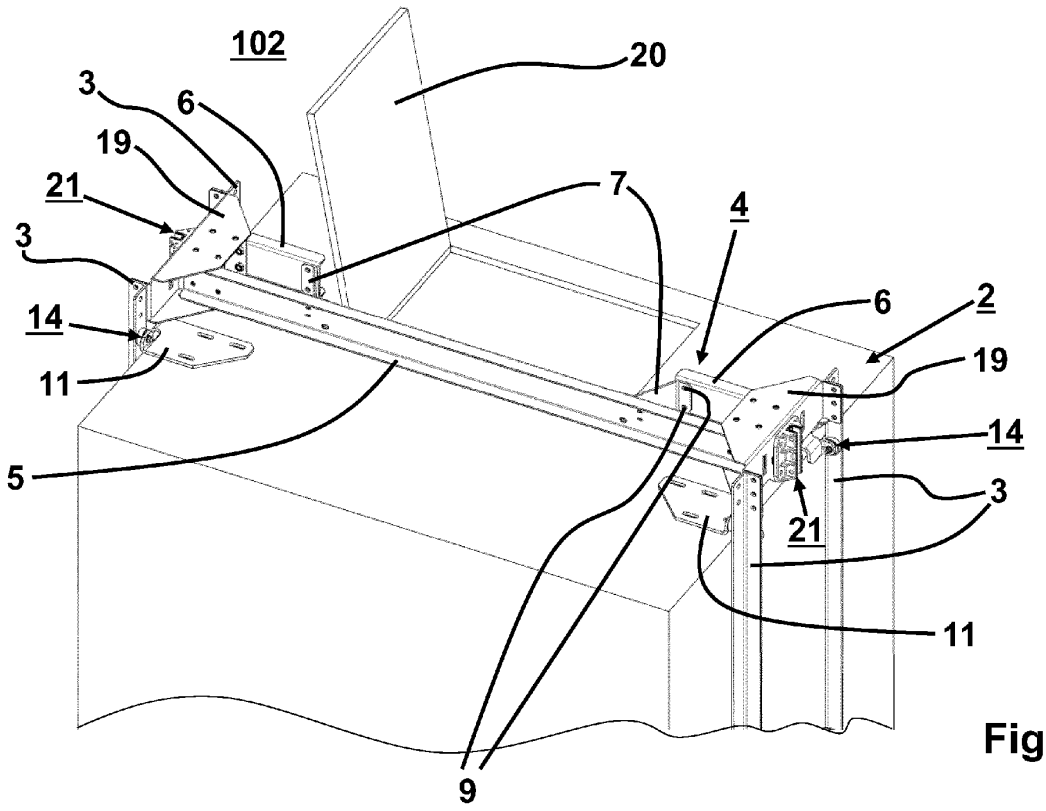

Fig. 5

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Description

TECHNICAL FIELD

[0001] The invention relates to an elevator car sling with an upper beam system according to the generic term of claim 1.

TECHNICAL BACKGROUND

[0002] The technical background of the invention will be explained with reference to Fig. 1 to Fig. 4.

[0003] The elevator car sling 1 is the construction that carries and supports the car 102. While fixing the car 102 with its lower and upper connections, the rope or belt passing through the pulley group on it, tracks the elevator car 102.

[0004] In designs where the pulleys are on the underside of the car sling 101, the upper beam or upper beams 105 structurally connect the car sling uprights 103. The car sling upper beam 105 is mostly continuous and can be one or two profiles in different shapes and sizes to provide adequate structural strength.

[0005] Many elevator cars 102 have a trap door 106. This trap door 106 is simply an emergency exit of the elevator car 102. It must exist on the elevator car roof in some special elevators such as the firefighter elevator or according to local directives of some countries. Furthermore, the trap door 106 mostly does not have to exist in an ordinary elevator. The trap door 106 should have some minimum dimensions according to the elevator standards. If the car 102 in fact has a trap door 106, there has to be enough space for the trap door 106 to be opened in any given position of the elevator, and people are not hindered from exiting (see Fig. 1).

[0006] Even at elevator cars 102 without trap doors 106, often a so called "refuge space" 107 has to be provided on the car roof (see Fig. 2). According to the standards, even if the elevator car 102 is in the highest position it can rise, there should be a certain amount of volume so that the technician can fit in it when crouching. Usually, this refuge space 107 has the shape of a rectangular prism.

[0007] When the car depth is greater than a certain size, it is possible to place the standard size trap door 106 in such a way that the car sling upper beam 105 does not interfere with the trap door 106.

[0008] Similarly, when the depth of the car 102 is large enough, it is possible to place a standard size refuge space 107 on the car 102.

[0009] In order for the car sling 101 to carry the car 102 balanced, the car 102 should be positioned on the car sling 101 at a certain distance in the direction of the car depth. Therefore, the car sling 101 must be positioned in the middle of the car 102 or close the middle.

[0010] In some cases, a small car depth due to a small shaft depth and trap door 106 are needed at the same time. In this case, the conventional upper beam 105 prevents the trap door 106 from opening or people exiting (see Fig. 3). The trap door opening style can also be different from the way shown in Fig. 1 and Fig. 3 like for example sliding, or the door can be opened another way, but it is still a problem that the upper space of the rescue door is not free.

[0011] Similarly, where the car depth is insufficient, the refuge space intersects with the car upper beam 105 (see Fig. 4).

[0012] As it can be seen in Figures 1 to 4, a car upper connection 108 is used to fix the continuous upper beam 5 to the elevator car roof.

THE TASK UNDERLYING THE INVENTION

[0013] Therefore, it is the task of the invention to provide a means by which a trap door can be used and/or a sufficient refuge space can be provided at cars with small width.

THE SOLUTION ACCORDING TO THE INVENTION

[0014] This task is solved by the car sling with the features of claim 1.

[0015] According to the invention, a car sling with a special upper beam system is proposed.

[0016] Besides said upper beam system, this car sling comprises at least two, preferably at least four uprights. Yet, it is usual that a car sling has exactly four uprights - two uprights on one vertical side of the car and two uprights on the opposite vertical side. Furthermore, it is usual that the car sling is placed symmetrically to the car's centre.

[0017] According to the invention, the upper beam system comprises at least one continuous upper beam, preferably with a C-profile. It is usual that exactly one continuous upper beam is used. This continuous upper beam is then placed on the side of the elevator car facing away from said trap door and/or said refuge space. On the opposing side and therefore the side of the elevator car facing said trap door and/or said refuge space the upper beam system comprises two short upper beams. Furthermore, each short upper beam is connected with the continuous upper beam by means of an interconnection part.

[0018] Thus, the usual two continuous upper beams are not used, but the second otherwise continuous upper beam is replaced by two short upper beams. The two short upper beams thus free up an area between and behind them that would otherwise be blocked by the continuous upper beam.

[0019] Thus, this now unblocked area can be used for the trap door and/or the refuge space.

[0020] The C-profile of the continuous upper beam, which is preferably used, also ensures a correspondingly high level of stability and, in the preferred orientation - namely in such a way that the two legs of the C-profile of the continuous upper beam face away from the short

upper beams and the straight central part faces the short upper beams - also ensures that the interconnection part can be easily attached to the continuous upper beam.

[0021] The "continuous upper beam" preferably spans the car roof and has a preferred length of at least 90% of the car width. In many cases, the continuous upper beam is even longer than the car width, wherein it preferably projects beyond the car width on both sides of the car. Thus, the length of the continuous upper beam may be between 80% to 110% of the car width. In addition, the continuous upper beam is preferably a continuous part with several holes and/or openings, preferably a steel beam with a profile.

[0022] The "short upper beam" is shorter than the "continuous upper beam" used in the respective upper beam system. The length of a short upper beam is between 40% to 5% of the length of the continuous upper beam, preferably 30% to 10%, and very preferably 25% to 15% of the length of the continuous upper beam.

[0023] The upper beam system is preferably designed in such a way that the continuous upper beam is preferably essentially perpendicular to the uprights. In addition, each short upper beam is preferably arranged essentially parallel to the respective continuous upper beam.

[0024] With the design according to the invention, a simply constructed and yet resilient upper beam system is created with which an additional space for a trap door and/or a refuge space on a car's roof is created.

PREFERRED DESIGN OPTIONS

[0025] Preferably, the two short upper beams are aligned with each other. "Aligned" in this context means that the two short upper beams show an axial alignment so that they are lined up on an essentially straight line, this line preferably being parallel to the longitudinal axis of the continuous upper beam.

[0026] Thus, it can be said that a middle part is conceptually taken out of the original continuous upper beam.

[0027] This creates a simple and cost-effective system in which the same connecting parts, such as interconnection parts or car sling connectors, can be used on both short upper beams.

[0028] Furthermore, it is preferred if the short upper beams have the same profile as the at least one continuous upper beam, preferably a C-profile. This means that the same material and/or profile can be used for the continuous upper beam and the short beams, which in turn contributes to the simplicity and cost-effectiveness of the system. In addition, the C-profile contributes to the stability of the upper beams. Furthermore, when the upper beams and the continuous upper beam are mounted back to back (so that the middle parts of the C-profile face each other), the interconnection parts can be easily attached to both the continuous upper beam and the short upper beams.

[0029] Moreover, it is especially preferred that the short upper beams are identical. This means that identical parts can be used for the short upper beams, which contributes to the simplicity and cost-effectiveness of the overall system.

[0030] In a further preferred embodiment the interconnection part comprises at least two folded legs being plane and parallel to one another, wherein preferably each leg comprises at least one hole for receiving a fixing element, preferably a screw. This provides a simple and cost-effective way of fixing the interconnection part to the respective short upper beam and to the continuous upper beam. The respective plane leg preferably rests on the middle part (or back part) of the C-profile, which has corresponding holes.

[0031] It should be mentioned here that a further type of fastening of the interconnection part is also possible in other ways. For example, it can be attached to the continuous upper beam and the respective short upper beam by means of staples or welding, wherein the holes in the leg and/or even the two legs of the interconnection part itself can be omitted and/or designed differently.

[0032] Furthermore, it is preferred that the interconnection part is a Z-shaped part having two plane folded legs and a middle section, wherein the two plane folded legs are parallel to one another. On the one hand, this contributes to the stability of the interconnection part and, on the other hand, leads to simple manufacturability, preferably as a bent sheet part.

[0033] Moreover, it is preferred that the middle section of the Z-shaped part has an inner angle α and an outer angle β to the plane folded legs, wherein the inner angle α and the outer angle added together are 360° and the inner angle is smaller than the outer angle β, wherein the inner angle α is greater than 90°, preferably in a range between 100° and 170°, most preferred in a range between 120° and 150°. This ensures good stability of the beam system.

[0034] The inner angle α and the outer angle β are preferably measured to the neutral fibre of the Z-shaped part.

[0035] Preferably, the car sling comprises at least four car top connection parts, wherein each of the four is in contact with one respective car sling upright on the one hand and on the other hand, and each car top connection part is fixed to the top of the elevator car.

[0036] For this purpose, the respective car top connection part is not firmly connected to the respective upright. Thus, the entire elevator car is mounted torsionally stiff, but under load the elevator car can sag vertically. This provides a simple and cost-effective way of securing the elevator car in the car sling, while reducing the likelihood of the car being levered out or damaged.

[0037] In a further preferred embodiment the car top connection part comprises an essentially plane connection area with at least two elongated holes for the passage of fixing elements, preferably threaded pins or screws, for the fixture of the car top connection part to the top of the car and it also comprises at least two sliding parts,

which are arranged offset from one another by essentially 90°. The plane connection area preferably lies on the car roof. The car roof preferably has corresponding holes to accommodate said fixing elements, which are inserted through the elongated holes. The elongated holes allow easy assembly and adjustability of the car top connection parts. As already mentioned, the sliding parts are in contact with the respective upright. The 90° offset arrangement of the sliding parts means that they are in contact with the respective upright at two 90° offset planes. In this way, the elevator car is supported simply and safely.

[0038] Furthermore, it is preferred that the sliding part comprises the fixing element and a buffer preferably comprising a low-friction material such as PTFE. The fixing element is used for simple fixing of the sliding part to the car top connection part. The buffer, on the other hand, is in contact with the respective upright and can be used for a possibly desired slightly resilient mounting and also for low-noise, low-wear and low-friction sliding on the respective upright.

[0039] Further modes of action, advantages and possible embodiments of the invention are apparent from the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0040]

Figure 1 shows a state-of-the-art car sling with an elevator car with a trap door; the car depth being sufficient for the trap door.

Figure 2 shows a state-of-the-art car sling with an elevator car with a refuge space; the car depth being sufficient for the refuge space.

Figure 3 shows a state-of-the-art car sling with an elevator car with a trap door; the car depth being insufficient for the trap door.

Figure 4 shows a state-of-the-art car sling with an elevator car with a refuge space; the car depth being insufficient for the refuge space.

Figure 5 shows an elevator car with trap door and a car sling according to the invention with an upper beam system and car top connection parts in a three-dimensional view.

Figure 6 shows an elevator car with trap door and a car sling according to the invention with an upper beam system and without car top connection parts in a top view.

Figure 7 shows an interconnection part according to the invention in a side view.

Figure 8 shows a car top connection part according to the invention in a three-dimensional view.

Figure 9 shows a car sling with two continuous upper beams and without car top connection parts according to the invention in a three-dimensional view.

PREFERRED EMBODIMENTS

[0041] Fig. 5 to Fig. 8 show the preferred embodiment for the car sling 1 according to the invention.

[0042] First of all, Fig. 5 and Fig. 6 show the elevator car sling 1 surrounding the elevator car 2.

[0043] As described above, the elevator car 2 may have a trap door 20 as shown in Fig. 5 und Fig. 6. The car sling 1 preferably comprises two uprights 3 on one vertical side of the elevator car 2 and two uprights 3 on the opposite vertical side. In addition, the car sling 1 comprises the upper beam system 4 according to the invention, which in turn comprises a continuous upper beam 5 and two short upper beams 6, which in turn are preferably placed as if a middle part was removed from a continuous upper beam 5.

[0044] The continuous upper beam 5 and the two short upper beams 6 preferably have a C-profile, wherein they are arranged in such a way that the legs of the continuous upper beam 5 directs away from the legs of the short upper beams 6 and vice versa. Thus, the C-sections preferably lie back to back, with a distance between them.

[0045] The two short upper beams 6 are preferably identical and arranged mirrored to each other in relation or with respect to the centre of the elevator car 2.

[0046] Each short upper beam 6 is connected, preferably screwed, to the continuous upper beam 5 by means of an interconnection part 7. For this purpose, the short upper beam 6, the interconnection part 7 and the continuous upper beam 5 have corresponding holes. The preferred shape of the interconnection part 7 will be discussed in more detail later.

[0047] One of the two short upper beams 6 and the continuous upper beam 5 are held by a car sling connector 19 which may also be part of the car sling 1. For this purpose, the car sling connector 19 partially embraces the continuous upper beam 5 and the respective short upper beam 6 in the area of their respective end faces facing the vertical sides of the elevator car 2. Preferably, the car sling connector 19 and the continuous upper beam 5 as well as the short upper beam 6 are screwed together. The car sling connector 19 has preferably a C-shape or U-shape.

[0048] Thus, in the area of the car roof, two of these car sling connectors 19 are preferably attached in a way described above; preferably symmetrically to a median plane of the car 2 that stands perpendicular to the continuous upper beam. Therefore, the second short upper beam 6 and the continuous upper beam 5 are connected with a car sling connector 19 as well.

[0049] The base surfaces of the car sling connector 19 preferably have a triangular or truncated triangular shape

in order to ensure easier access to the surface below. Herein, one base surface is above the continuous upper beam 5 and the respective short upper beam 6, and the other base surface is under the continuous upper beam 5 and the respective short upper beam 6. In addition, a car sling connector 19 preferably has tabs to which an upright 3 can be attached, preferably screwed. Therefore, each car sling connector 19 preferably comprises two tabs, preferably with fastening options such as holes for screws. This creates a self-contained car sling 1 that at least partially encloses the elevator car 2. Preferably, the car sling connector 19 also carries the rail guide 21 or at least a part of the rail guide. In general, the entire car sling 1 is preferably installed symmetrically to the centre of the elevator car 2.

[0050] The uprights 3 also preferably have an L-profile, as shown in the Figures.

[0051] Fig. 5 also shows two car top connection parts 11, wherein these are preferably also arranged symmetrically on the side concealed here, which is why a total of four car top connection parts 11 are preferably arranged on a car sling 1.

[0052] On the one hand, these car top connection parts 11 are preferably firmly fastened to the elevator car roof by means of screws and, on the other hand, a car top connection part 11 is in contact with an upright 3 twice by means of sliding parts 14. This will be explained in more detail later.

[0053] First, Fig. 7 shows the preferred shape of the interconnection part 7, which is a Z-shape with two folded legs 8 and a middle section 10, wherein the two folded legs 8 are plane and parallel to one another. Preferably, in the plane legs 8 holes 9 are provided for the passage of a fixing element, preferably two holes 9 per plane leg 8. As shown in Fig. 7, the middle section 10 of the preferably Z-shaped interconnection part 7 has an inner angle α and an outer angle β to the plane folded legs 8. These angles are preferably measured to the neutral fibre. Herein, the inner angle α and the outer angle β added together are 360° and the inner angle α is smaller than the outer angle β. Furthermore, the inner angle α is preferably greater than 90°, preferably in a range between 120° and 150°.

[0054] The interconnection part 7 can therefore preferably be attached to the continuous upper beam 5 and one short upper beam 6 as shown in Fig. 6 with fixing elements such as screws, so that the middle section 10 protrudes beyond the short upper beam 6. This leads to an increased stability of the system. The interconnection part 7 shown is preferably a folded metal sheet made of steel.

[0055] It has to be addressed that this way of fixing the interconnection part 7 with fixing elements like screws is optional. The interconnection part 7 can also be attached to the continuous upper beam 5 and the respective short upper beam 6 for example by means of staples or welding. In this case the holes in the leg and/or even the two legs of the interconnection part 7 itself can be omitted and/or designed differently.

[0056] By replacing a continuous upper beam 5 with two short upper beams 6, an area is freed up that would otherwise be blocked by the upper beam 5, allowing the trap door 20 shown in Fig. 5, for example, to be opened as intended without collision and allowing the intended exit.

[0057] Fig. 8 also shows the aforementioned car top connection part 11. The installation of four of these car top connection parts 11 per elevator car 2 and the bearing already mentioned contributes to the fact that the elevator car 2 can be supported stably and safely, although no two continuous upper beams 5 are installed and the stability and balance of the car sling 1 is weakened in comparison. Thanks to the fact that these car top connection parts 11 transfer the cabin load preferably directly to the uprights 3, the upper beam system 4 is exposed to less load in comparison to car top connection parts after the state of the art, making the upper beam system 4 according to the invention possible in terms of durability.

[0058] The car top connection part 11 comprises a plane connection area 12, which preferably rests on the elevator car roof. The elongated holes 13 in this connection area 12 serve to guide through fixing elements, preferably screws, to firmly connect the connection area 12 to the elevator car 2. The elongated holes 13 help with and therefore allow an easy assembly and adjustability of the car top connection parts. Adjacent to this connection area 12, the car top connection part 11 comprises two tabs 15, which are preferably designed in such a way that their final end faces are offset by essentially 90° to one another, as shown in Fig. 8.

[0059] In the area of this final end face, each tab 15 preferably also comprises at least one hole 16 for attaching the sliding parts 14. Two sliding parts 14 are preferably attached per car top connection part 11, wherein these are also offset by essentially 90° to one another due to the positioning of the tabs 15.

[0060] An offset by 90° preferably means that an intended line corresponding to an axial line of one hole 16 crosses another intended line corresponding to an axial line of the other hole 16 at an angle of essentially 90°. However, the offset depends on the shape of the uprights 3. Therefore, an offset described above may also be between 80° and 100°, preferably between 85° and 95°. Nevertheless, an offset of essentially 90° is perfect for rectangular or L-shaped uprights or uprights with planes which the sliding parts 14 are in contact with, which are essentially perpendicular to each other. This is the case with the preferred shape of the uprights 3 like an L-profile or a rectangular profile. Therefore, the essentially 90° offset of the final end faces of the tabs 15 and/or the sliding parts 14 is necessary.

[0061] It must also be mentioned that it is possible that the design of the upright 3 may also be such that the planes with which the sliding parts 14 come into contact may not be perpendicular to each other, for example in the case of a triangular profile. Accordingly, the offset of

the sliding parts 14 to each other must be adjusted so that the respective sliding part is preferably perpendicular to the respective contact surface of the upright 3.

[0062] A sliding part 14 comprises a fixing element 17, preferably in the form of a screw or threaded pin, and a buffer 18 that can optionally work as a damper. This buffer 18 is preferably made of a low-friction material such as PTFE. Why this material is preferred becomes clear when one looks at the preferred mounting position of the sliding parts 14, which is shown mainly in Fig. 1. The buffers 18 of the sliding parts are in contact with the uprights 3 so that they can be moved vertically. For this purpose, a buffer, which in turn belongs to a car top connection part 11, rests on each of the two end faces of the upright 3. This clearly shows why the sliding parts 14 are preferably offset by 90° relative to each other. This means that they adapt to the uprights 3, preferably in the form of an L-profile, so that the buffers 18 can contact the upright 3 simultaneously at two planes offset by 90°. The buffer 18 preferably has a cylindrical shape.

[0063] As shown in Fig. 5 and Fig. 8, the connection area 12 of the car top connection part 11 does not have a symmetrical shape. In the embodiment shown, the connection area 12 preferably has a bevel which - when installed on the car roof - faces away from the continuous upper beam 5 or the respective short upper beam 6. On the one hand, this contributes to the material-saving overall system and, on the other hand, provides an orientation aid during assembly.

[0064] In addition, Fig. 9 shows another possibility for designing an elevator car sling 1. If the car depth is sufficient for the trap door and/or the refuge space, the advantages of the upper beam system 4 according to the invention and the car top connection parts 11 can still be used. The structure of the car sling 1 is analogous to the example described above. However, instead of the two individual short upper beams, a second continuous upper beam 5 is used. The two continuous upper beams 5 then again have a C-profile and are spaced back to back. The interconnection part 7 does not have to be Z-shaped, since no blocked area has to be unblocked. In this way, the interconnection part can be designed in a C shape. The rest of the car sling 1 is analogous to the example explained above. The same car sling connectors 19 and the four car top connection parts 11 and uprights 3 can be used.

MISCELLANEOUS

[0065] In due course, protection will also be claimed for:

A car sling stabilisation system which comprises four car top connection parts that each are in contact with a car sling upright on the one hand and on the other hand are each fixed to the top of the elevator car, wherein the contact with the car sling upright is made by means of sliding parts, wherein each car top connection part comprises two sliding parts that are offset to one another by 90° and therefore are in contact with one upright simultaneously at two planes of the upright offset by 90°.

REFERENCE LIST

[0066]

1	Car sling
2	Elevator car
3	Upright of the car sling
4	Upper beam system
5	Continuous upper beam of the car sling
6	Short upper beam of the car sling
7	Interconnection part
8	Plane folded leg of the interconnection part
9	Hole in the plane folded leg
10	Middle section
11	Car top connection part
12	Connection area of the car top connection part
13	Elongated hole
14	Sliding part of the car top connection part
15	Tab
16	Hole in the tab
17	Fixing element of the sliding part
18	Buffer
19	Car sling connector
20	Trap door
21	Rail guide
α	Inner angle
β	Outer angle
101	Car sling
102	Elevator car
103	Upright of the car sling
105	Upper beam of the car sling
106	Trap door
107	Refuge space
108	Car upper connection

Claims

1. A car sling (1) for an elevator car (2), comprising at least two, preferably at least four uprights (3) and an upper beam system (4), **characterized in that** the upper beam system (4) comprises at least one continuous upper beam (5) - preferably with a C-profile - on the side of the elevator car (2) facing away from a trap door (20) and/or a refuge space and two short upper beams (6) on the side of the elevator car (2) facing the trap door (20) and/or the refuge space, and **in that** each short upper beam (6) is connected with the continuous upper beam (5) by means of an interconnection part (7).

2. The car sling (1) according to claim 1, **characterized in that** the short upper beams (6) are aligned with

each other.

3. The car sling (1) according to any one of the preceding claims, **characterized in that** the short upper beams (6) have the same profile as the at least one continuous upper beam (5), preferably a C-profile.

4. The car sling (1) according to any one of the preceding claims, **characterized in that** the short upper beams (6) are identical.

5. The car sling (1) according to any one of the preceding claims, **characterized in that** the interconnection part (7) comprises at least two folded legs (8) being plane and parallel to one another, wherein preferably each leg (8) comprises at least one hole (9) for receiving a fixing element, preferably a screw.

6. The car sling (1) according to any one of the preceding claims, **characterized in that** the interconnection part (7) is a Z-shaped part having two plane folded legs (8) and a middle section (10), wherein the two plane folded legs (8) are parallel to one another.

7. The car sling (1) according to claim 6, **characterized in that** the middle section (10) of the Z-shaped interconnection part (7) has an inner angle (α) and an outer angle (β) to the plane folded legs (8), wherein the inner angle (α) and the outer angle (β) added together are 360° and the inner angle (α) is smaller than the outer angle (β), wherein the inner angle (α) is greater than 90°, preferably in a range between 120° and 150°.

8. The car sling (1) according to any one of the preceding claims, **characterized in that** the car sling (1) comprises at least four car top connection parts (11), wherein each of the four is in contact with one respective car sling upright (3) on the one hand and on the other hand each car top connection part (11) is fixed to the top of the elevator car (2).

9. The car sling (1) according to any one of the preceding claims, **characterized in that** the car top connection part (11) comprises an essentially plane connection area (12) with at least two elongated holes (13) for the passage of fixing elements, preferably threaded pins or screws, for the fixture of the car top connection part (11) to the top of the car (2), and at least two sliding parts (14), which are arranged offset from one another by essentially 90°.

10. The car sling (1) according to any one of the preceding claims, **characterized in that** the car top connection part (11) comprises two tabs (15), each having at least one hole (16), each for receiving a fixing element (17), preferably a threaded pin or a screw, of the respective sliding part (14).

11. The car sling (1) according to any one of the preceding claims, **characterized in that** the sliding part (14) comprises the fixing element (17) and a buffer (18) preferably comprising a low-friction material such as PTFE.

12. The car sling (1) according to any one of the preceding claims, **characterized in that** the two tabs (15) of the car top connection part (11) connect to the connection area (12) in such a way that one tab (15) projects upwards from the connection area (12), preferably by essentially 90°, and the other tab projects correspondingly downwards from the connection area (12), preferably by essentially 90°.

13. The car sling (1) according to any one of the preceding claims, **characterized in that** car sling (1) comprises at least two car sling connectors (19), each carrying the continuous upper beam (5), one short upper beam (6) and at least one, preferably two, uprights (3).

14. The car sling (1) according to any one of the preceding claims, **characterized in that** the car sling connector (19) comprises two base surfaces having a triangular or truncated triangular shape, wherein one base surface is above the continuous upper beam (5) and the respective short upper beam (6), and the other base surface is under the continuous upper beam (5) and the respective short upper beam (6).

15. The car sling (1) according to any one of the preceding claims, **characterized in that** the car sling connector (19) comprises a rail guide (21).

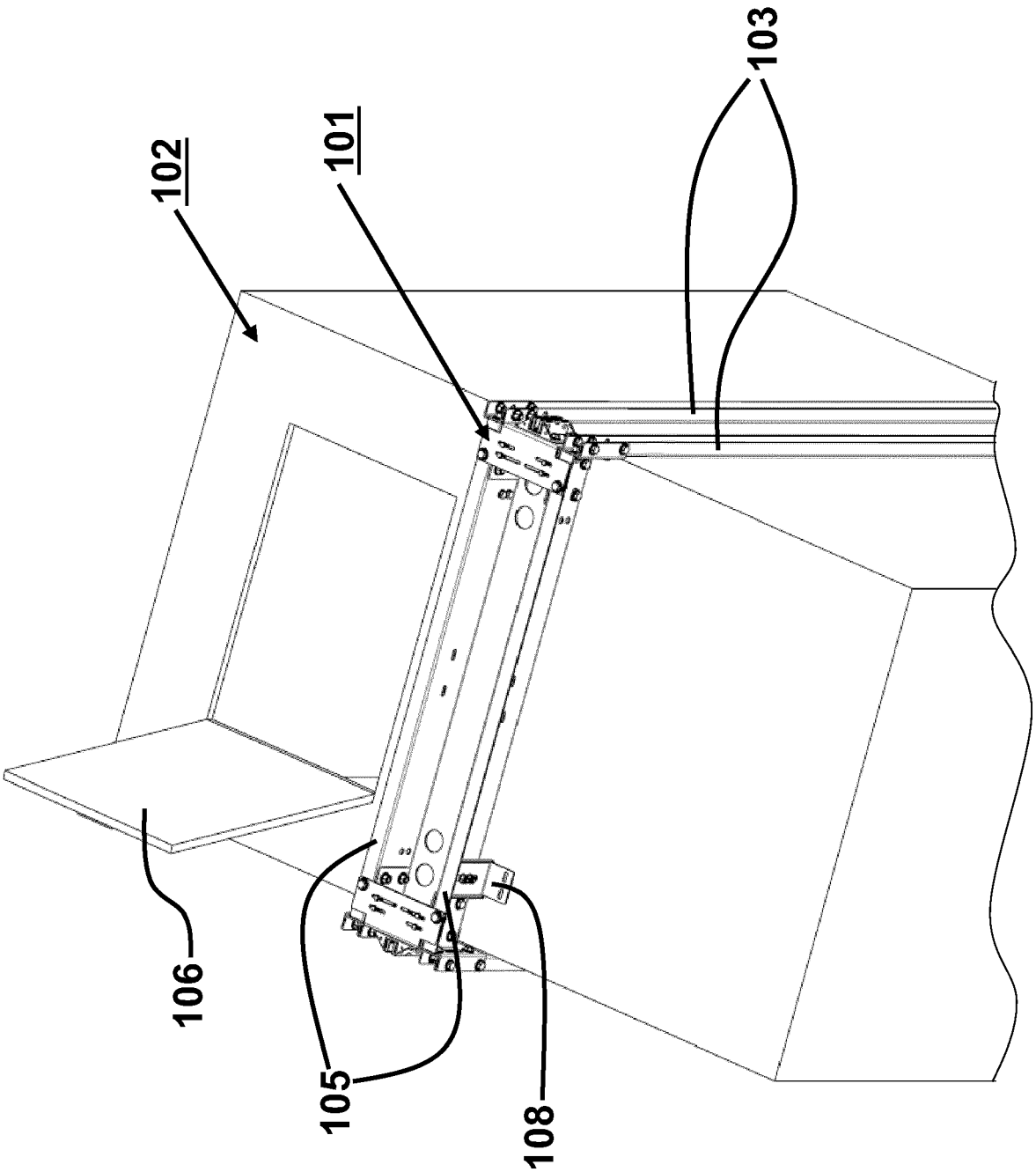


Fig. 1

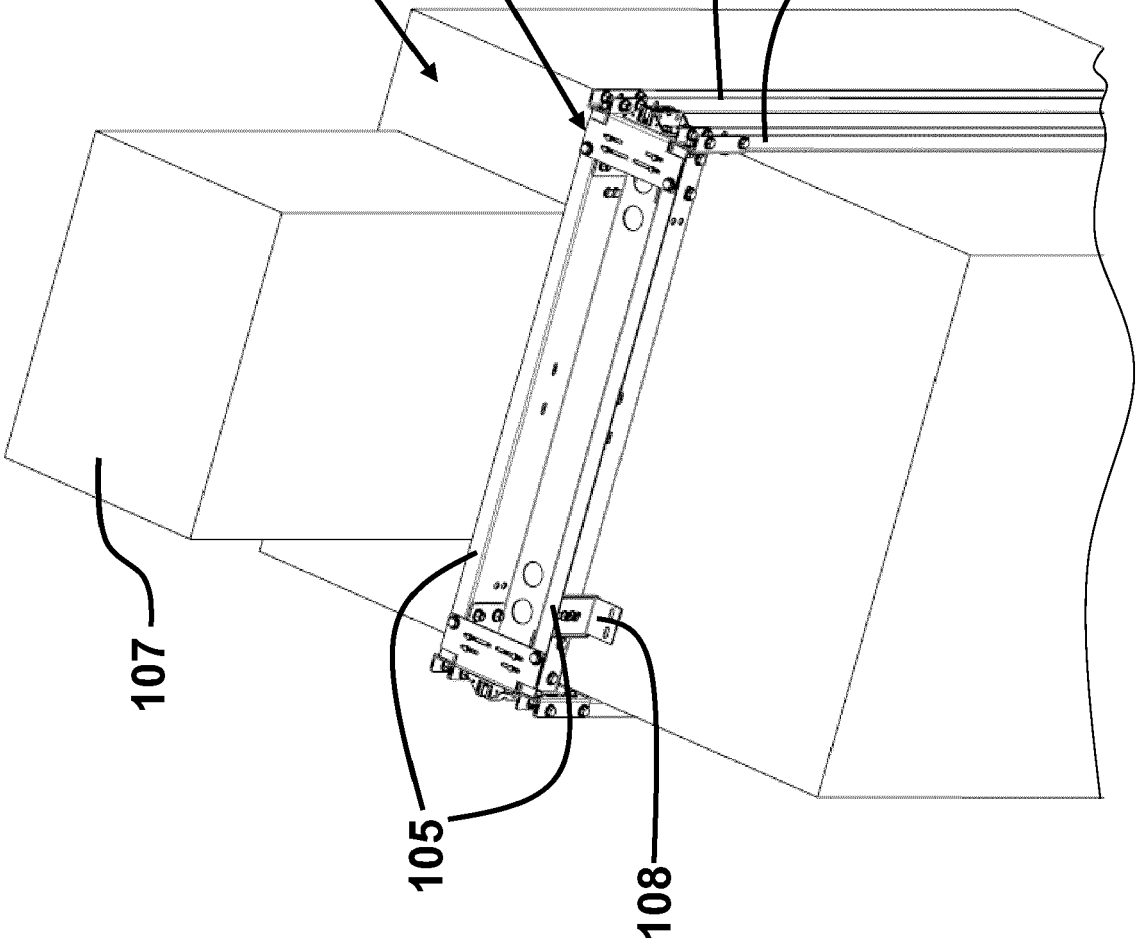


Fig. 2

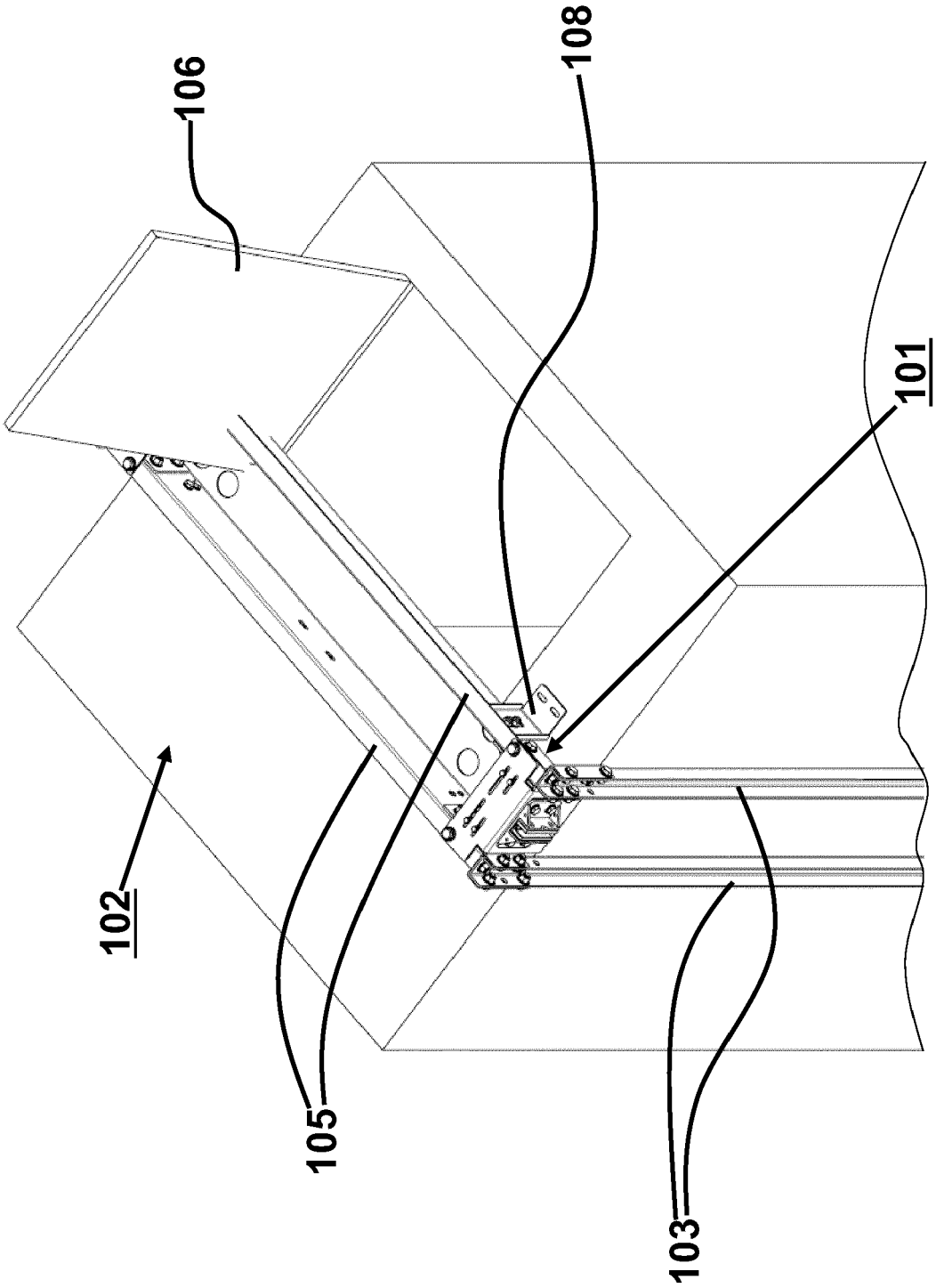
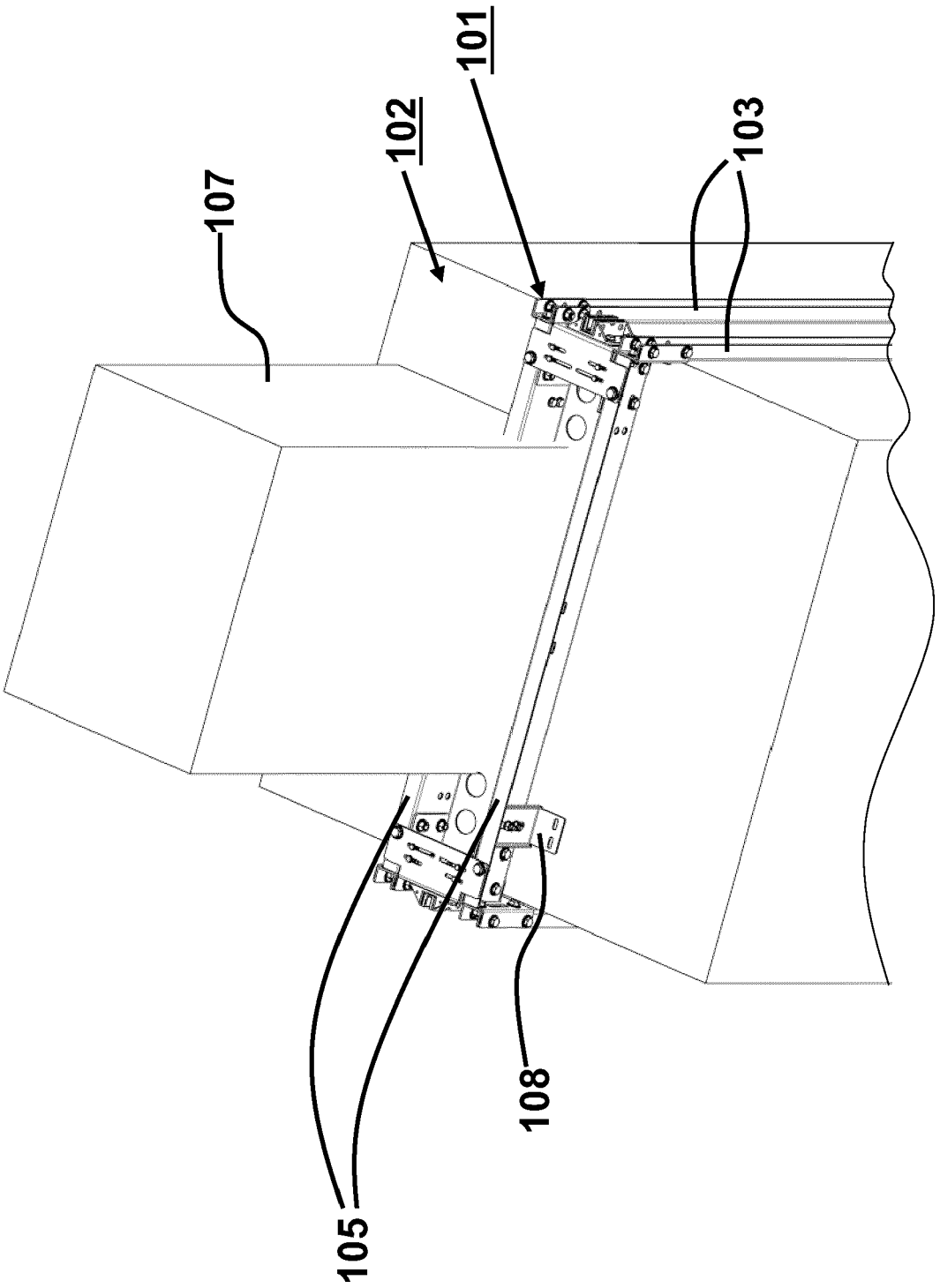


Fig. 3

Fig. 4



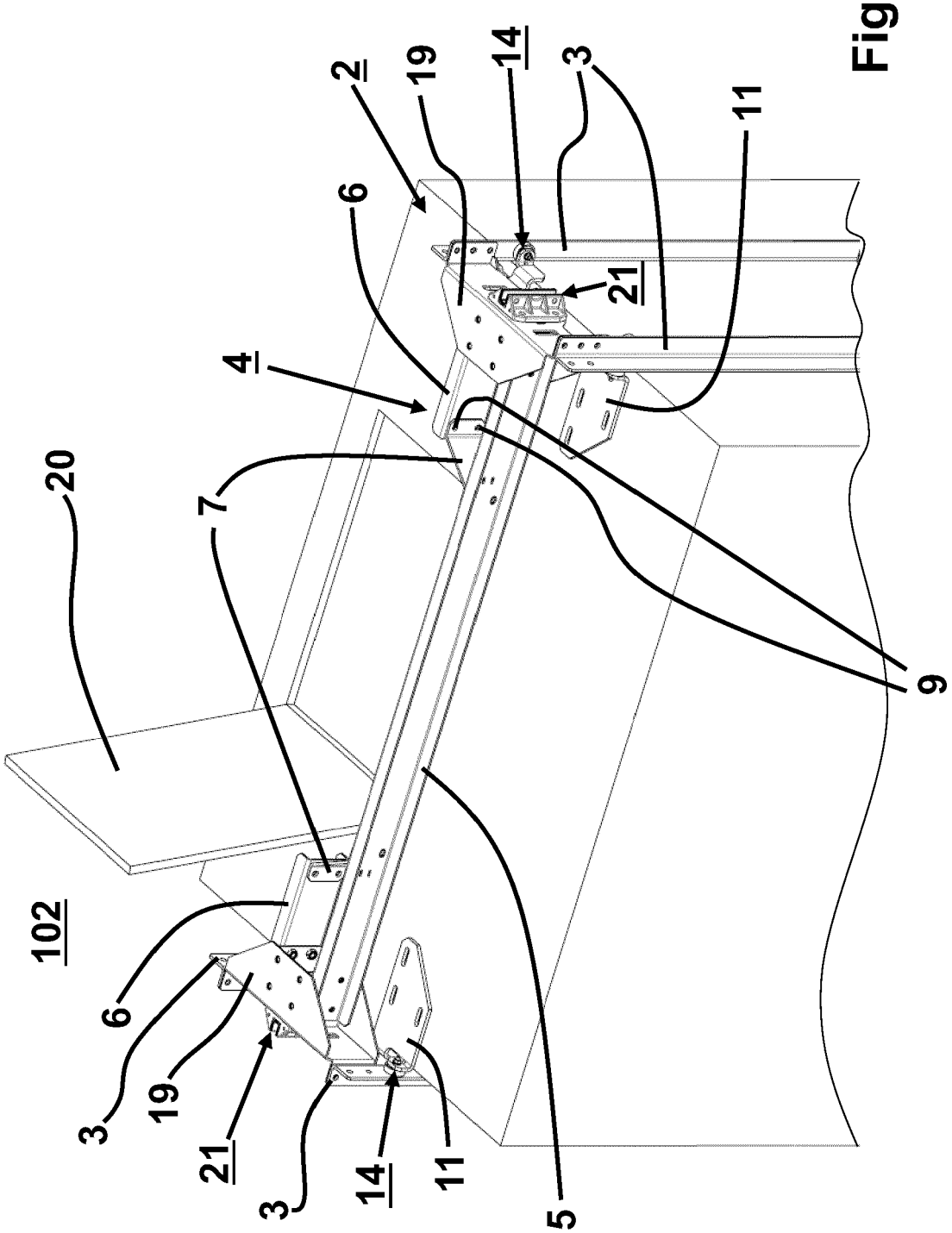


Fig. 5

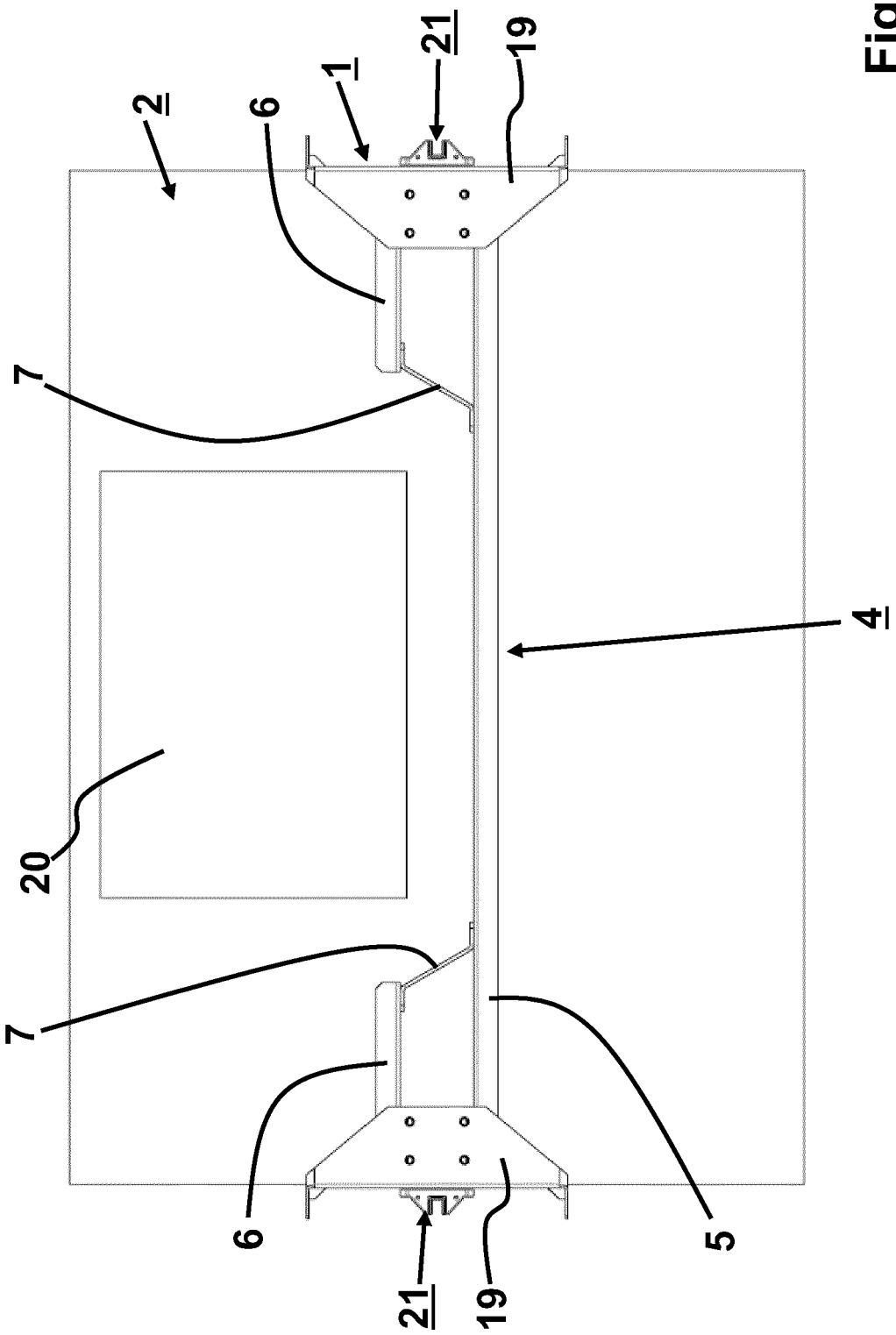


Fig. 6

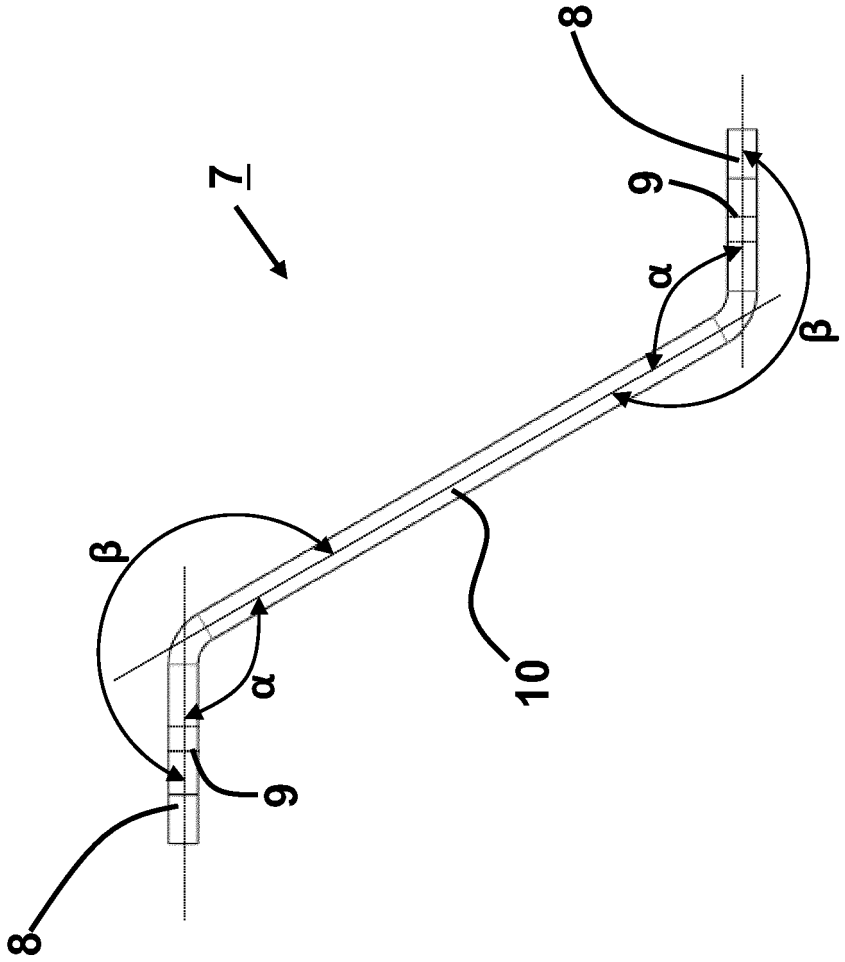


Fig. 7

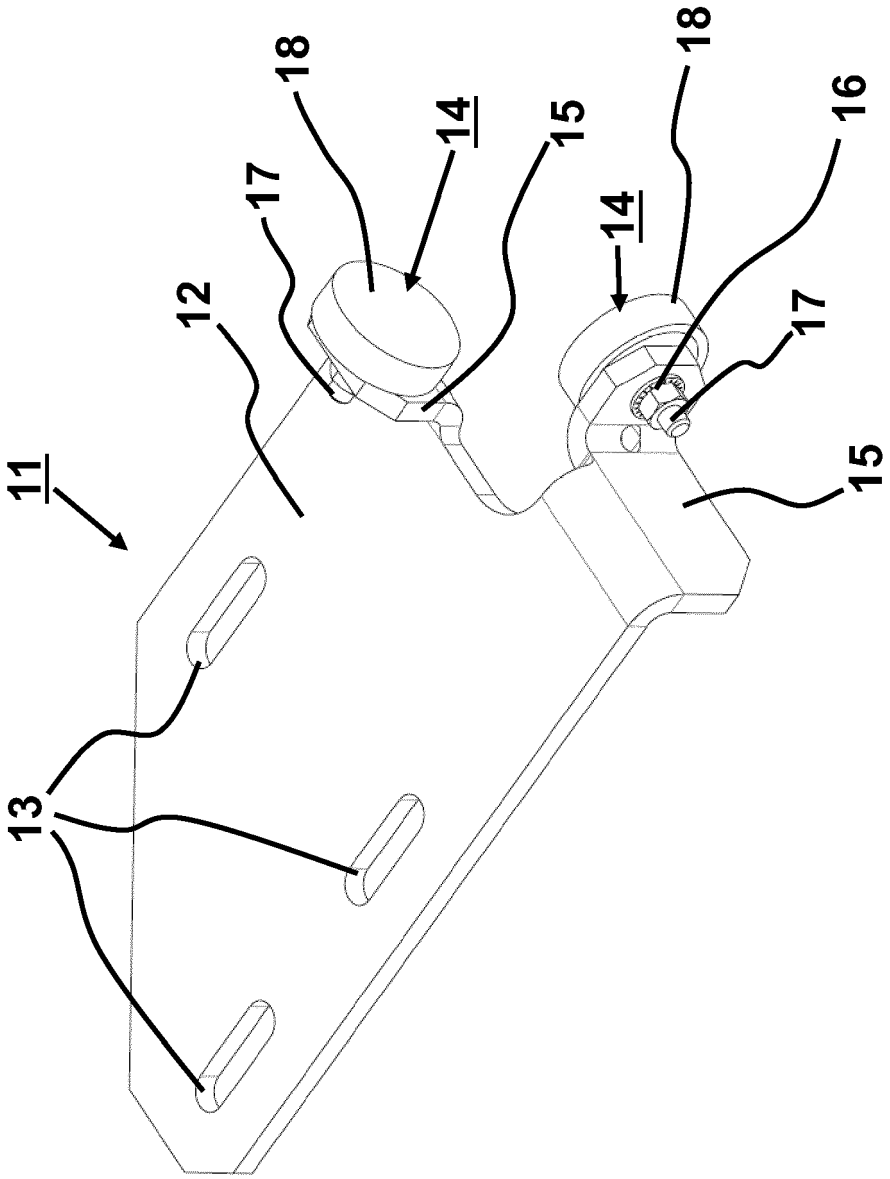


Fig. 8

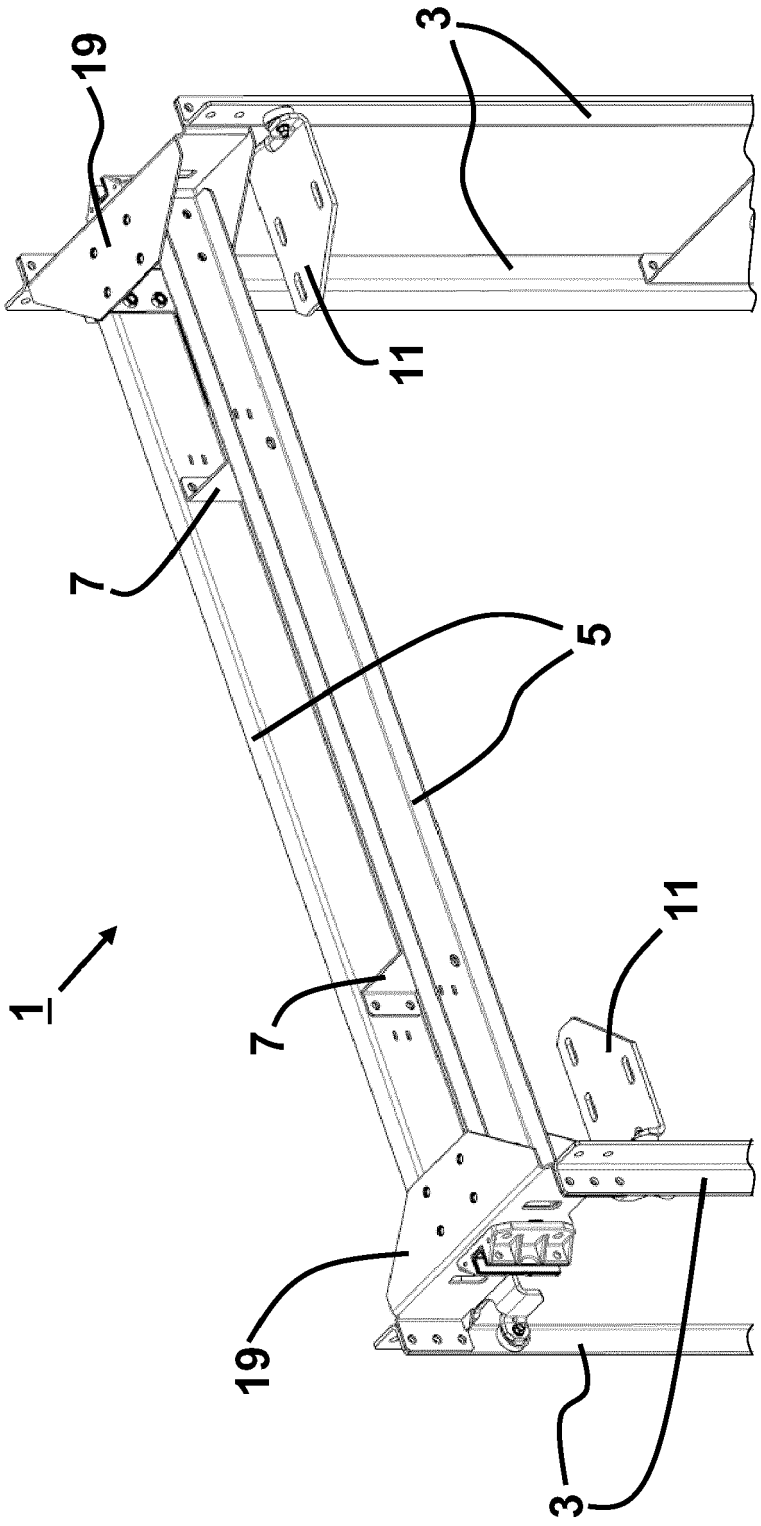


Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 22 20 4172

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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 March 2023	Miklos, Zoltan

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28-03-2023

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