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(54) BLOCKING DEVICE FOR THE CAR OF AN ELEVATOR SYSTEM

(57) A blocking device for the car of an elevator system comprising a latch, a latch guide body, a position switch and a latch receiver, wherein the latch lies displaceably in the latch guide body and, in the extended state, can engage in a latch receiving opening of the latch receiver when the latch is at a correspondingly aligned height with respect to the latch receiving opening of the latch receiver, the latch receiver being mountable on a car guide rail, and the latch guide body, which preferably carries the latch and the position switch, being mountable on the sling of the car.

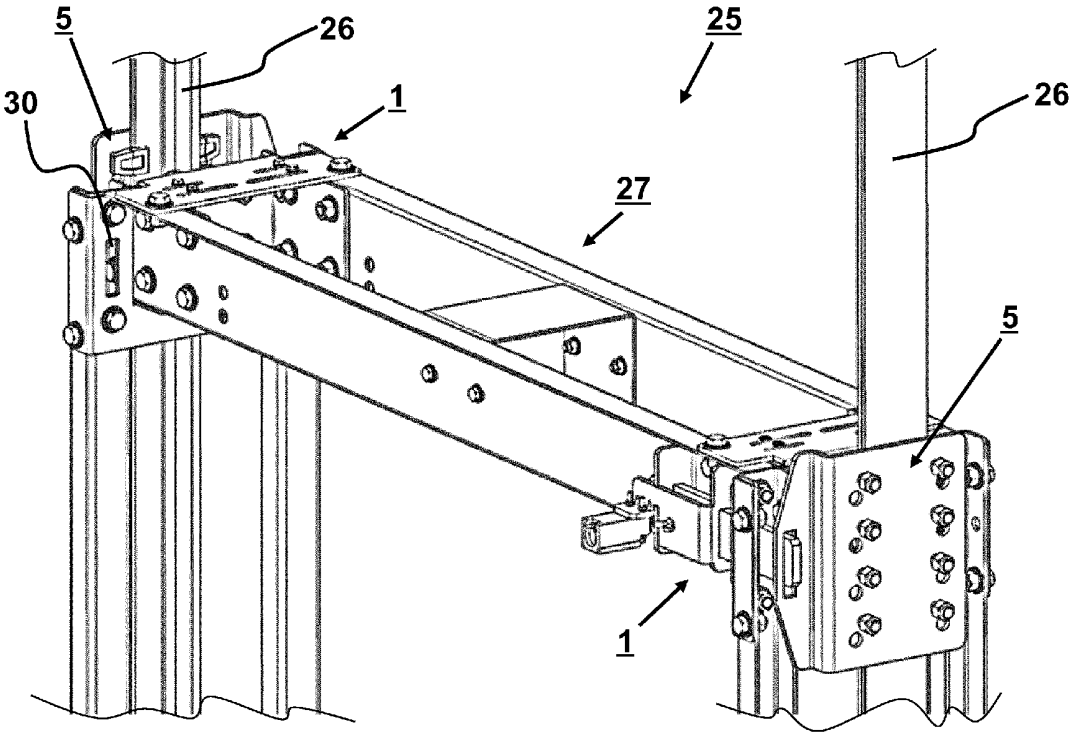

Fig. 8

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Description

[0001] The invention relates to a blocking device for the car of an elevator system according to the generic term of claim 1.

[0002] The invention further relates to the correspondingly equipped elevator system according to the generic term of claim 13.

TECHNICAL BACKGROUND

[0003] Even with modern elevator systems, manual maintenance work often has to be carried out. This occurs, for example, during regular maintenance or repairs to maintain the safety of the elevator system, such as a rope change or motor replacement.

[0004] For this purpose, the sling (sometimes also referred to as "frame") of the car and the car itself must be fixed to the car guide rails in such a way that the car and/or its sling are mechanically supported. This is necessary to protect the workers carrying out the maintenance work and/or to keep the car safe at a certain height, usually preferably in the area of the upper floors. A typical case in which such a procedure is necessary is, for example, the rope change of an elevator system already mentioned. In an assembled elevator system, the car and its sling are supported by ropes. When these ropes are replaced, the elevator car must be supported in some other way because the ropes must first be removed and can therefore temporarily no longer exert a corresponding load-bearing effect.

[0005] Currently, mostly mechanical blocking devices, which consist of many and/or complex individual parts, are used for the desired fixing or blocking of the car. Thus, current blocking devices are usually expensive and/or difficult to install. Since space in the elevator shaft is usually very limited, it is also mostly not possible to use the safety switches that are usually used as standard in elevator construction. Due to various important requirements, these safety switches are usually large, complex and/or consist of many individual parts. This contributes to the additional complexity and increased price of the overall system, since even more complex, space-saving safety switches from other technical areas have to be installed.

THE OBJECT OF THE INVENTION

[0006] In the light of this, it is the object or "task" of the invention to provide a means by which the elevator car can be stably supported in a simple manner.

THE SOLUTION ACCORDING TO THE INVENTION

[0007] This task is solved by a blocking device with the features of claim 1.

[0008] According to the invention, a blocking device for the car of an elevator system is proposed for this purpose. This is preferably a centrally guided elevator system, i.e. an elevator system in which the elevator car is suspended, so that the car guide rails are fully or at least essentially positioned in a common vertical plane that extends through the center of gravity of the unloaded elevator car.

[0009] The blocking device according to the invention comprises a latch, a latch guide body, a position switch and a latch receiver, which forms the counterpart to the latch.

[0010] The blocking device is characterized by the fact that the latch lies displaceably in the latch guide body and, in the extended state, can enter a latch receiving opening of the latch receiver when the latch is at a correspondingly aligned height to the latch receiving opening of the latch receiver.

[0011] The latch receiver is mountable to a car guide rail and therefore preferably attached to a car guide rail. The latch guide body, which preferably carries the latch and the position switch, is mountable to the sling already mentioned and therefore preferably attached to the sling. The car and its sling can thus be fixed to the guide rails in such a way that the car is completely immobilized.

[0012] The blocking device thus comprises few and easy-to-manufacture parts that contribute to the simplicity of the entire system and can be manufactured at low cost so that they can remain permanently in the elevator system in question.

[0013] With the design according to the invention, a very reliable, simply constructed and yet highly resilient blocking device for an elevator car is created. The part of the blocking device that detects the moving part(s) and the sensor system is preferably attached to the car or its sling and then usually connected to the elevator controller via the traveling cable. Only the immovable counterpart, namely the latch receiver, has to be mounted on the car rail.

PREFERRED DESIGN OPTIONS

[0014] Preferably, the latch is borne at least at three areas in the latch guide body, which are more than insignificantly spaced apart from each other as seen in the horizontal direction. In this way, a particularly high load capacity of the blocking device is achieved. Most preferred the three areas are window embrasures.

[0015] Preferably, the latch guide body comprises or consists of a U-shaped part and an L-shaped part that are connected to each other, preferably welded. The connection or welding are then ideally such that the shorter leg of the L-shaped part is perpendicular to the base area of the U-shaped part and at least one leg of the U-shaped part is perpendicular to the longer leg of the L-shaped part, the legs of the U-shaped part being substantially parallel to the shorter leg of the L-shaped part. In other words, one leg of the L-shaped part, usually the shorter one, lies between the two legs of the U-shaped part. The other leg of the L-shaped part can then form a positive

or "form fit" connection with a recess in one leg of the U-shaped part, which can also be secured by optional welding. In this way, two simple sheet metal parts are combined to form a latch guide body that is particularly resilient and therefore also particularly resistant to possible operating errors.

[0016] It is particularly advantageous if the latch has at least two areas of essentially constant cross-section, which are preferably connected to one another by means of a transition area that usually produces a continuous transition. In this case, the area of the latch which faces the nearest car guide rail in the installed state has a smaller cross-section, preferably caused by a smaller height, than the area of the latch which faces away from the nearest car guide rail in the installed state. The "cross-section" of the latch mentioned here and in the following is preferably the cross-section of the latch in a plane parallel to one, preferably both, longitudinal end faces of the latch. It furthermore has to be mentioned that the aperture of the latch as well as bevels on the latch do not cause a reduction of this imaginary cross section area.

[0017] "Installed state" in this context means the state in which the respective blocking device has been mounted as intended, namely in such a way that the latch guide body with its attached components is mounted on the car sling and the latch receiver is mounted on the respective car guide rail, wherein the latch can be received by the latch receiver or rather its latch receiving opening when brought at correspondingly aligned heights and after the latch is being extended.

[0018] Advantageously, the blocking device, more precisely its said transition area is designed in such a way that on both sides - on both horizontal edges of the latch - the area of the smaller cross-section is merged in a ramp-like manner to the area of the larger cross-section. In this process, the thickness of the latch remains mostly unchanged. In this way, if an opening in the U- or L-shaped part is appropriately dimensioned, it can be quite simply prevented from being inadvertently inserted too deeply.

[0019] In many cases, the opening of the U-shaped part that is located on the side facing away from the car guide rail in the installed state has a larger cross-section, preferably caused by a greater height, than the other opening of the U-shaped part and the opening of the L-shaped part.

[0020] Further possible configurations, modes of operation and advantages result from the dependent claims and/or the subsequent description of the exemplary embodiment and/or with reference to the figures.

FIGURE LIST

[0021]

Figure 1 shows the latch guide body of the blocking device according to the invention in a three-dimensional view.

Figure 2 shows the latch of the blocking device according to the invention with coupled position switch in the retracted state of the latch.

Figure 3 shows, analogously to Fig. 2, the latch of the blocking device according to the invention with coupled position switch in the extended state of the latch.

Fig. 4 shows the latch guide body with latch and position switch in the retracted state.

Fig. 5 shows, analogously to Fig. 4, the latch guide body with latch and position switch in the extended state.

Fig. 6 shows the upper part of the sling of a car as well as the latch guide body with latch and position switch in approximate mounting position.

Fig. 7 shows both car guide rails with the latch receiver mounted on them.

Fig. 8 shows the entire elevator system (without car), with only the upper part of the car sling, part of the car guide rails and with blocking devices fitted.

Fig. 9 shows a blocking device (without latch receiver) attached to the sling of a car.

PREFERRED EMBODIMENT

[0022] Fig. 1 to Fig. 9 show the preferred embodiment for the blocking device 1 according to the invention and the elevator system 25 correspondingly equipped with preferably two blocking devices 1.

[0023] It should be emphasized that the blocking device 1 is claimed as a stand-alone device and can thus be offered for sale as a stand-alone device.

[0024] In addition, an elevator system 25 equipped with preferably two such blocking devices 1 is also claimed.

[0025] First of all, Fig. 1 shows the latch guide body 3 which comprises a U-shaped part 7 and an L-shaped part 8, these two parts being connected to each other, preferably welded. The preferably shorter leg of the L-shaped part 8 thus rests perpendicularly to the base area of the U-shaped part 7 on the very same base area, with its narrow end face. The longer leg of the L-shaped part 8 is preferably also designed in such a way that the end thereof has a tab 15. This tab 15 and the adjacent area of the leg also have at least two apertures 16, which accommodate fastening screws for the position switch 4. The L-shaped part 8 also comprises a notch in front of the tab 15, in order to be able to be guided through a notch in a leg of the U-shaped part 7. Also in the area of these notches, where the L-shaped part 8 rests on the U-shaped part 7 or its leg, both parts are preferably welded together.

[0026] The latch guide body 3 comprises at least or (preferred) exactly three aligned openings 9, 11 and 10 through which the latch 2 can be guided and held such that the latch 2 lies displaceably in the latch guide body 3. The opening 9 preferably has a larger cross-section than the openings 11 and 10. The reason for this will be described later.

[0027] In addition, the U-shaped part 7 preferably also comprises two holes 13 in the area of the base surface and one hole 14 in the area of a leg. These holes are used for fastening the latch guide body 3 to the sling of the car, which will also be described and shown in more detail later.

[0028] The L-shaped part 8 also usually has a hole 17 in the area of the longer leg. A wing screw 18 is preferably guided through this hole. In this case the hole 17 is preferably threaded.

[0029] In the shown embodiment, the openings 9, 11 and 10 have a rectangular cross-section, since the latch 2 has a rectangular cross-section.

[0030] The latch 2 with correspondingly coupled position switch 4 can be seen in Fig. 2 and Fig. 3. Here, the latch 2 comprises an area with a larger cross-section and an area with a smaller cross-section, with the cross-sections in both areas remaining essentially constant. The two areas with different cross-sections are connected by a transition area 12, which allows the two different cross-sections to merge into one another forming a ramp.

[0031] In the area with a larger cross-section, an aperture 19 can also be identified. In this preferred example, the position switch 4 comprises a roller lever 20 which at least partially passes through this aperture 19 when the latch 2 is retracted (see Fig. 2). Thus, the position switch 4 is not triggered. In the extended state of the latch 2 (see Fig. 3), the roller lever 20 of the position switch is pushed backwards by the latch 2, since the roller lever 20 moves into an area that no longer has any apertures. Thus, the position switch 4 is triggered and corresponding safety devices are released.

[0032] Fig. 4 and Fig. 5 show the latch guide body 3 already described with the latch 2 inserted and the position switch 4 attached in the retracted state (Fig. 4) and extended state (Fig. 5).

[0033] Preferably, the position switch 4 is suspended at the apertures 16 of the latch 15 by two screws or threaded pins. The aperture 19 of the latch 2 as well as the function of the roller lever 20 is concealed here, but functions according to exactly the same principle as already shown in Fig. 2 and Fig. 3.

[0034] Fig. 4 and Fig. 5 also explicitly show the preferred wing screw 18 already mentioned. When completely screwed in, this presses against the latch 2 in such a way that unintentional displacement of the latch 2 is at least made more difficult, preferably even impossible. In the long term, it is therefore impossible for the latch 2 to become acoustically noticeable during normal operation under the influence of operational vibrations or even to be gradually displaced in such a way that it eventually becomes an unintentional obstacle.

[0035] If the latch 2 is to be moved, the wing screw 18 must first be loosened. It is therefore preferable to leave the wing screw 18 screwed in at all times, both in the retracted and in the extended state, in order to make unintentional displacement even less likely in both positions.

[0036] The wing screw 18 and the thread cooperating with it are designed in such a way that the wing screw 18 - even for complete loosening - does not have to be unscrewed completely and can therefore always remain captive in place.

[0037] The two areas of the latch 2 with larger and smaller cross-sections and the connecting transition area 12 mean that the latch guide body 3 must have an opening 9 with a larger cross-section on the side through which the area of the latch 2 with a larger cross-section is guided so that the latch can be displaceably mounted there. The two other openings 10 and 11 preferably have the same, smaller cross-section, as mentioned, so that the area of the latch with a smaller cross-section can be displaceably supported there.

[0038] The cross-section of the opening 11 is selected in such a way that when the latch 2 is extended, i.e. when it is brought from the retracted to the extended state, it is in contact with the opening 11 in the transition area 12. This creates a stop that defines and limits the intended extension position of the latch 2.

[0039] Fig. 6 shows how the latch guide bodies 3 with its respective latch 2 and position switch 4 are attached to the sling 27 of a car. For this purpose, two latch guide bodies 3, which are preferably offset diagonally to each other in each case, are attached to the ends of two opposite upper horizontal beams 28 of the sling laterally outward.

[0040] "Diagonally offset" in this context preferably means the following: On of the two latch guide bodies 3 is arranged on one first longitudinal end of one upper beam 28 and the other latch guide body 3 is attached on an longitudinal end of the second upper beam 28 which is opposite to the first end.

[0041] Fig. 9 shows a blocking device 1 in the attached state.

[0042] It can be seen that two screws are guided through the holes 13 in the base area for connection to the upper horizontal beam 28 and one screw is guided through the hole 14 in the area of the leg for connection to a vertical beam or also upright 29. In this way, the latch guide body 3 is held on two parts of the sling 27 and thus additionally stabilizes the sling 27. To ensure that the latch 2 can also pass through the upright 29, an aperture 30 must be provided in the upright 29 as a passage hole (see Fig. 8).

[0043] Fig. 7 also shows the attachment of the counterpart to the latch 2, namely the latch receiver 5. One latch receiver 5 is attached to each car guide rail 26, preferably mirrored to each other at the corresponding desired height.

[0044] The latch receiver 5 is preferably designed as a Z-profile with a shorter side that contains the latch receiving opening 21, and a longer side that has several holes 22. As shown in Fig. 7, the latch receiver 5 is frictionally clamped to the respective car guide rail 26 by means of guide rail clamps 23. The guide rail clamps 23 preferably each have a threaded pin projecting from them, which is guided through the hole 22 and locked with a nut 24. It is important that each latch receiver 5 is designed and attached to the guide rails 26 in such a way that the car can travel unhindered along the guide rails 26 even in the area of the respective latch receiver 5 as long as the latch 2 assigned to this latch receiver 5 is not extended into its blocking position.

[0045] It should be borne in mind that in individual cases it may be advantageous to take precautions for the extremely rare case of a total failure, beyond the largest accident that can actually be assumed, via the number and/or the strength and/or the intended tightening torque of the screw connections. This is the accident in which the car, with the latch extended and in full speed, collides with the latch receiver 5. If the bolted connection of the latch receiver 5 is appropriately designed, the latch receiver 5 is pushed along the guide rail 26 a short distance in such an accident, overcoming the static friction and under high sliding friction. Ideally, such a sliding way is at least just large enough to dissipate the kinetic energy of the car in such a way that neither serious injuries to passengers nor massive damage or even derailment of the car are to be feared. To put it in a nutshell, the use of the latch receiver as an energy absorber or force limiter can be considered.

[0046] Fig. 8 shows a section of the complete elevator system 25 (without car) with preferably two blocking devices 1 mounted as intended, with the latch 2 extended. Here it can be seen how the latch 2 engages through the latch receiving opening 21 of the latch receiver 5. It can be seen that the combination of the latch 2 and the latch receiver 5 according to the invention is preferably designed in such a way that the car cannot perform uncontrolled travel movements either upwards or downwards. This is because the car can neither start moving uncontrollably in the direction of the shaft head nor - for example in the event of failure or unintentional release of its brake - can it drop uncontrollably and thus possibly endanger an installer who is standing on the car roof carrying out maintenance work and is not expecting such a movement.

[0047] By means of the position control of the car, the car is thus preferably moved to the corresponding height at which the latch 2 is aligned with the latch receiver 5, and the latch 2 is preferably extended manually. In this way, the entire sling 27 and thus the car are supported. The diagonally offset arrangement of the latch guide bodies 3 results in a balanced bearing without additional bearing moments.

MISCELLANEOUS

[0048] It can be useful in terms of strength that the leg of the L-shaped part that carries the opening 11 is, in horizontal direction, more than insignificantly closer to the leg of the U-shaped part that carries the opening 10 compared to the other leg of the U-shaped part that carries the opening 9.

[0049] Moreover, it is preferred that the longer leg of the L-shaped part 8 and the latch 2 extend fully or essentially parallel, ideally with an "air gap" between them.

[0050] In most cases it is preferred that the axis along which the latch 2 is moved back and forth extends in fully horizontal direction.

[0051] Furthermore, it may be useful to dimension in such a way that the opening 11 of the L-shaped part 8 and the opening 10 of the U-shaped part 7 have essentially the same dimensions.

[0052] Moreover, it is preferred that the openings 9, 10 and 11 have the same shape as the cross-section of the latch 2 in order to provide a sufficient guidance and/or support for the latch 2.

[0053] It is particularly useful for the U-shaped part 7 to have at least or exactly two holes 13 in the area of its base area and at least or exactly one hole 14 in the area of the leg. In this way, fastening options are created in a simple manner, preferably by means of screws, with which the U-shaped part 7 and thus the latch guide body 3 can be fastened to the car and/or to the sling 27 of the car.

[0054] It is also preferred that the L-shaped part 8 has on its longer leg, preferably in the area of the rear end of the leg, a tab 15 which is perpendicular to the longer leg of the L-shaped part 8. This tab 15 and its positioning allow the simple mounting and/or the preferred positioning of the positon switch 4 thereon.

[0055] Furthermore, it may be useful that at least two apertures 16 are provided on the tab 15 and/or in the vicinity of the tab 15, which preferably each receive a screw and/or a threaded pin. So an easy way of attaching the position switch 4 to the tab 15 can be provided.

[0056] It also can be useful that the longer horizontal leg of the latch receiver 5 has preferably at least six holes 22 for receiving screws and/or threaded pins, the holes 22 preferably being arranged in two vertical rows which have a horizontal spacing from one another of at least the width of a car guide rail 26 and at most the width of a car guide rail 26 plus 50 mm. These holes 22 each preferably receive a screw and/or the threaded pin of a guide rail clamp 23.

[0057] The guide rail clamp 23 itself is preferably designed in such a way that it comprises a clamping body and a threaded pin, the clamping body partially engaging around the car guide rail 26 in the installed state and the threaded pin being guided through the hole 22 of the latch receiver 5 and, by tightening a nut 24 which is screwed onto the threaded pin, fastening the latch receiver 5 to the car guide rail 26 in a frictionally locking manner.

[0058] Overall it is furthermore preferred that the U-shaped part 7, the L-shaped part 8 and/or the latch receiver 5 are designed as folded sheets, preferably made of steel.

[0059] Moreover, it is preferred that the elevator system 25 comprises two blocking devices 1, wherein the latch receivers 5 of the blocking devices 1 are mounted mirrored to each other on the outside of a car guide rail 26 by means of guide rail clamps 23, so that the shorter side of the Z-profile of the latch receiver 5 protrudes further towards the center of the car than the longer side of the Z-profile of the latch receiver 5.

REFERENCE LIST

[0060]

1	Blocking device
2	Latch
3	Latch guide body
4	Position switch
5	Latch receiver
6	not assigned
7	U-shaped part
8	L-shaped part
9	Large opening in the U-shaped part
10	Small opening in the U-shaped part
11	Opening in the L-shaped part
12	Transition area of the latch
13	Hole in the area of the base area
14	Hole in the area of the leg
15	Tab of the L-shaped part
16	Aperture of the tab
17	Threaded hole
18	Wing screw
19	Aperture in the latch
20	Roller lever
21	Latch receiving opening
22	Hole of the latch receiver
23	Guide rail clamp
24	Nut
25	Elevator system
26	Car guide rail
27	Car sling
28	Upper horizontal beam
29	Upright
30	Aperture in upright

Claims

1. A blocking device (1) for the car of an elevator system (25) comprising a latch (2), a latch guide body (3), a position switch (4) and a latch receiver (5), **characterized in that** the latch (2) lies displaceably in the latch guide body (3) and, in an extended state, can engage in a latch receiving opening (21) of the latch receiver (5) when the latch (2) is at a correspondingly aligned height with respect to the latch receiving opening (21) of the latch receiver (5), the latch receiver (5) being mountable on a car guide rail (26), and the latch guide body (3), which preferably carries the latch (2) and the position switch (4), being mountable on a sling (27) of the car.

2. The blocking device (1) according to claim 1, **characterized in that** the latch (2) is borne at least at three areas in the latch guide body (3).

3. The blocking device (1) according to any one of preceding claims, **characterized in that** the latch guide body (3) comprises a U-shaped part (7) and an L-shaped part (8) which are connected to each other, preferably welded, such that the shorter leg of the L-shaped part (8) is perpendicular to the base area of the U-shaped part (7), and at least one leg of the U-shaped part (7) is perpendicular to the longer leg of the L-shaped part (8), wherein the legs of the U-shaped part (7) are substantially parallel to the shorter leg of the L-shaped part (8).

4. The blocking device (1) according to any one of preceding claims, **characterized in that** the U-shaped part (7) comprises two aligned openings (9, 10) for the passage of the latch (2), one opening (9; 10) being provided on each leg of the U-shaped part (7), said legs being preferably integrally connected.

5. The blocking device (1) according to any one of preceding claims, **characterized in that** the L-shaped part (8) comprises an opening (11) on its shorter leg for the passage of the latch (2), the opening (11) being aligned with the two openings (9, 10) of the U-shaped part (7).

6. The blocking device (1) according to any one of preceding claims, **characterized in that** the latch (2) has at least two areas of substantially constant cross-section which are connected to one another by a transition area (12), the area of the latch (2) which faces the car guide rail (26) in the installed state having a smaller cross-section, preferably caused by a smaller height, than the area of the latch (2) which faces away from the car guide rail (26) in the installed state.

7. The blocking device (1) according to any one of the preceding claims, **characterized in that** the latch (2) has a substantially rectangular cross-section.

8. The blocking device (1) according to any one of preceding claims, **characterized in that** the transition area (12) is preferably designed in such a way that on both sides - on both horizontal edges of the latch (2) - the area of the smaller cross-section is transferred in a ramp-like manner to the area of the larger

cross-section, the thickness of the latch (2) remaining unchanged.

9. The blocking device (1) according to any one of preceding claims, **characterized in that** the opening (9) of the U-shaped part (7) which, in the installed state, lies on the side facing away from the car guide rail (26), has a larger cross-section, preferably caused by a greater height, than the other opening (10) of the U-shaped part (7) and the opening (11) of the L-shaped part (8).

10. The blocking device (1) according to any one of preceding claims, **characterized in that** the latch (2) comprises an aperture (19) which is preferably located in the area with a larger cross-section and which can at least partially accommodate a position sensor of the position switch (4).

11. The blocking device (1) according to any one of preceding claims, **characterized in that** the latch receiver (5) is at least partially designed as a Z-profile or step-profile having a longer and a shorter horizontal leg.

12. The blocking device (1) according to any one of preceding claims, **characterized in that** the shorter horizontal leg of the latch receiver (5) comprises the latch receiving opening (21).

13. An elevator system (25) with at least one blocking device (1) according to any one of the preceding claims, **characterized in that** the blocking device (1) is attached to one upper horizontal beam (28) of the sling (27), particularly preferably laterally to the respective upper horizontal beam (28), so that the blocking device (1) is attached to an outside of the horizontal beam (28), said outside facing away from the between the two upper horizontal beams (28).

14. The elevator system (25) with two blocking devices (1) according to claim 13, **characterized in that** the latch guide body (3) of the respective blocking device (1) is screwed to the respective upper horizontal beam (28) via the holes (13) in the base area of the U-shaped part (7) and to an upright (29) of the sling (27) of the elevator car via the hole (14) in the leg of the U-shaped part (7).

15. The elevator system (25) with two blocking devices (1) according to any one of the preceding claims, **characterized in that** the two latch guide bodies (3) are each mounted diagonally offset from one another in the area of the end of the respective upper horizontal beam (28).

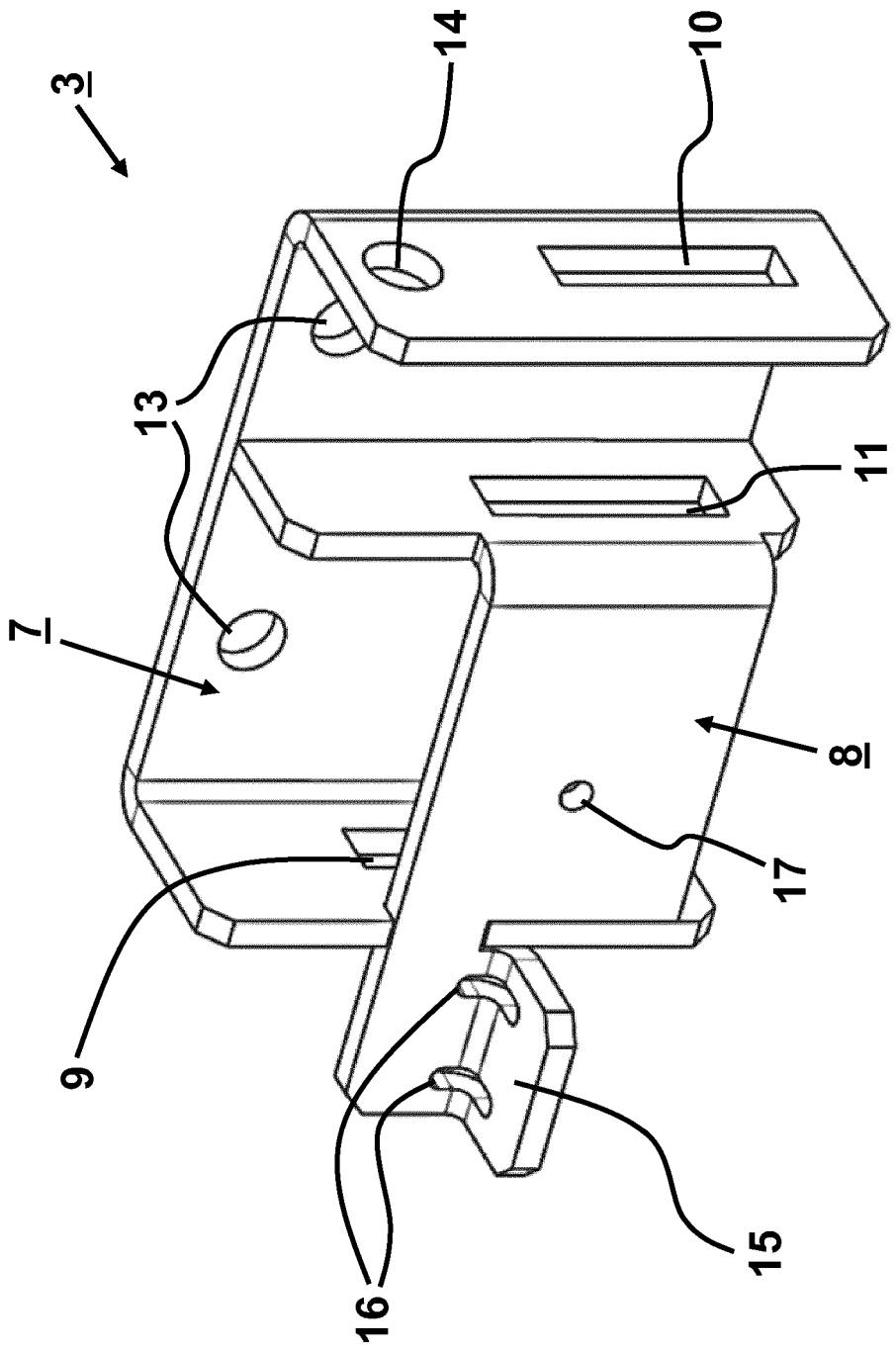


Fig. 1

Fig. 2

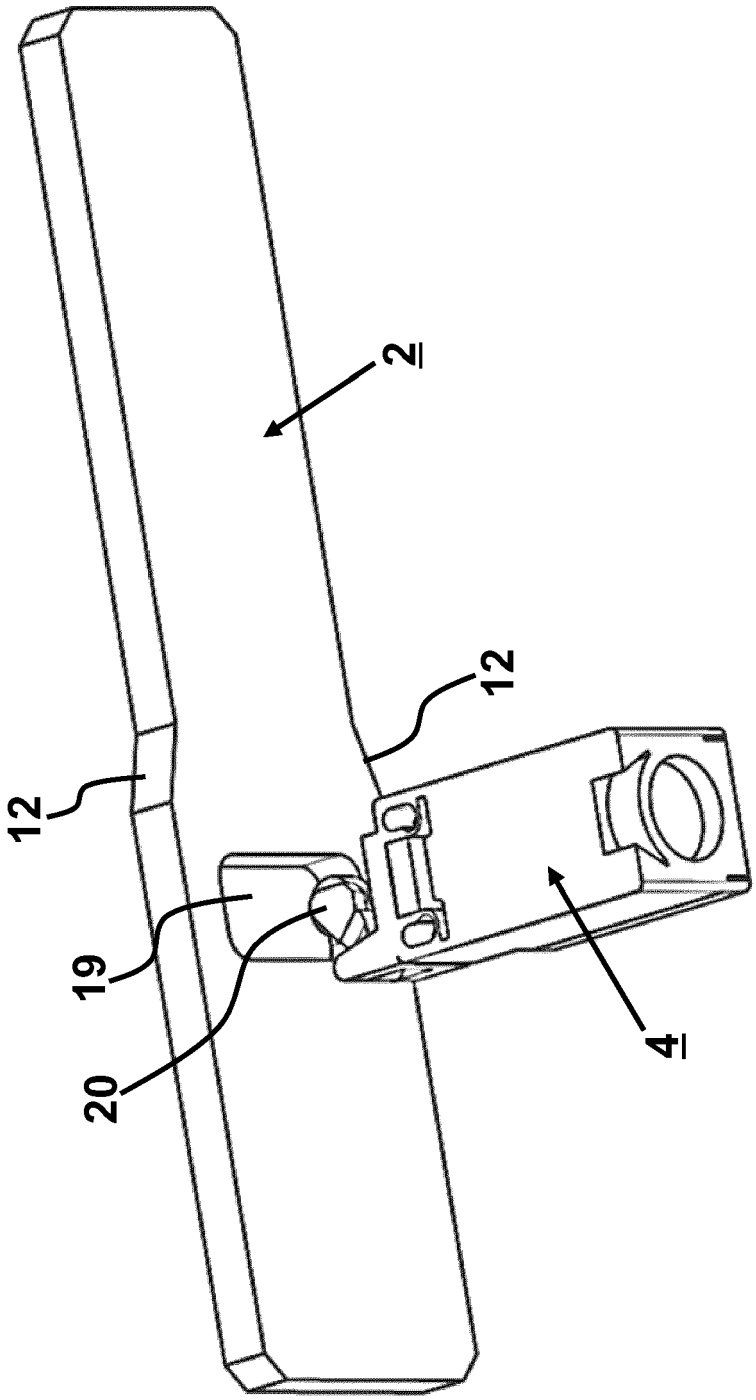


Fig. 3

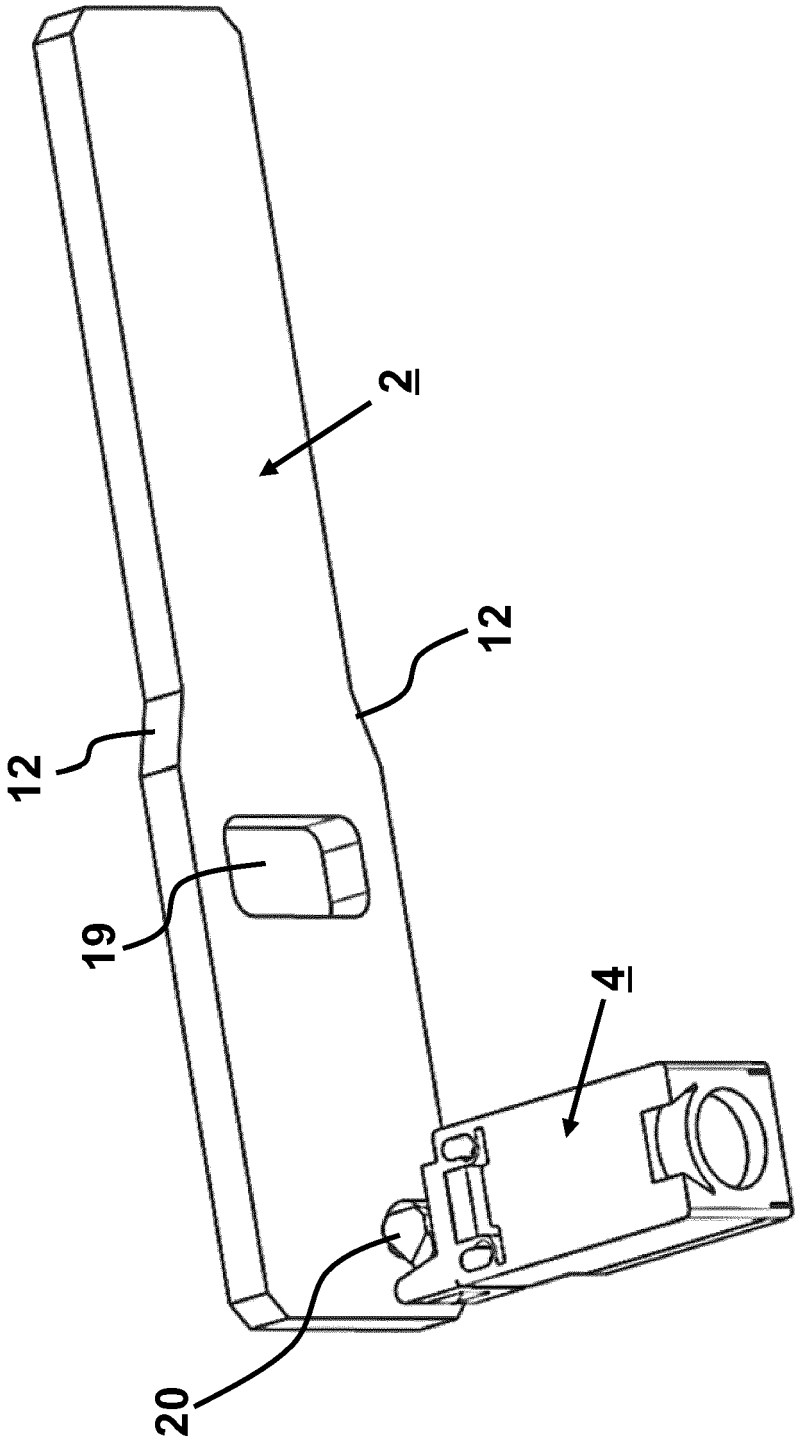


Fig. 4

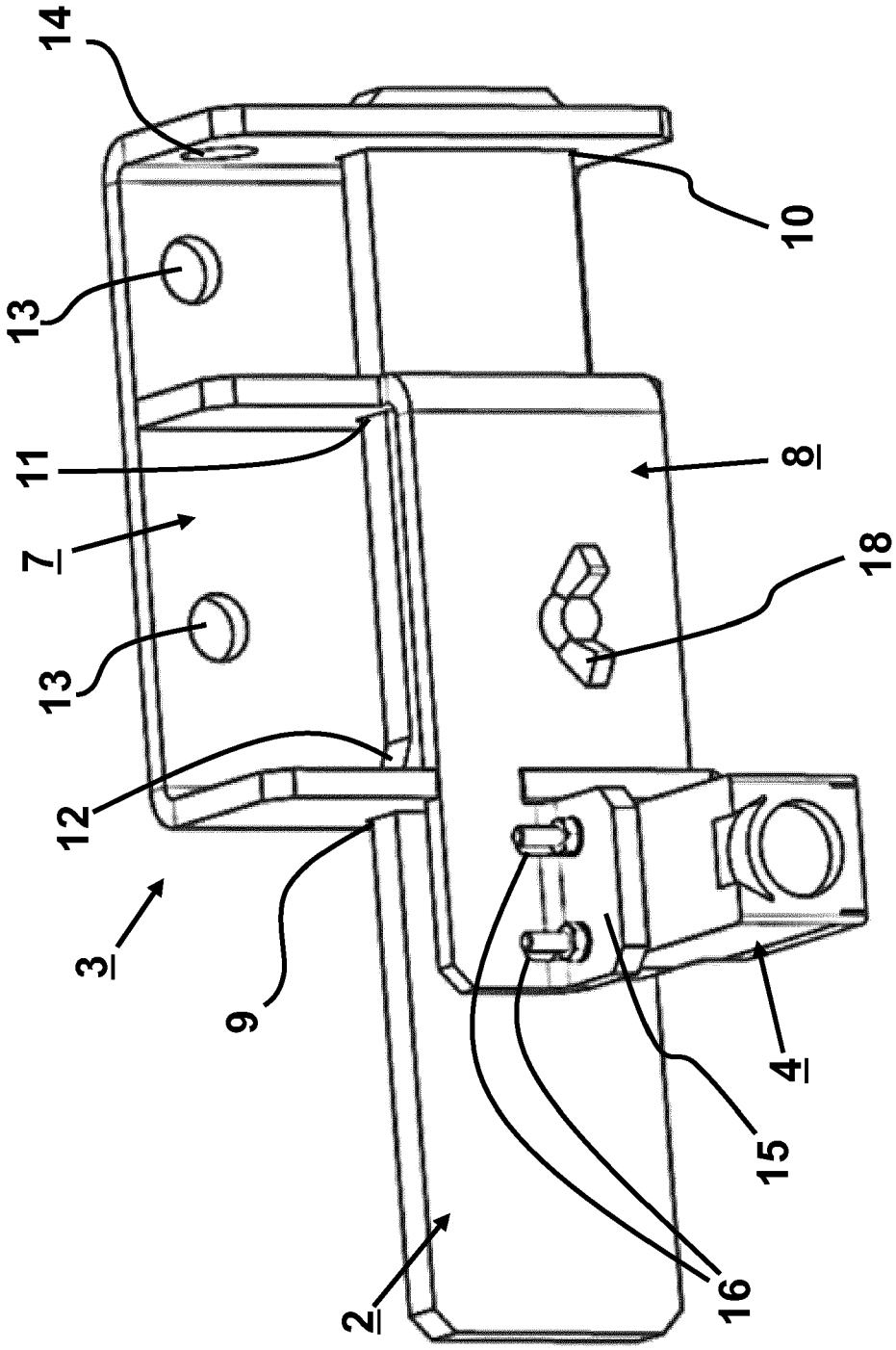
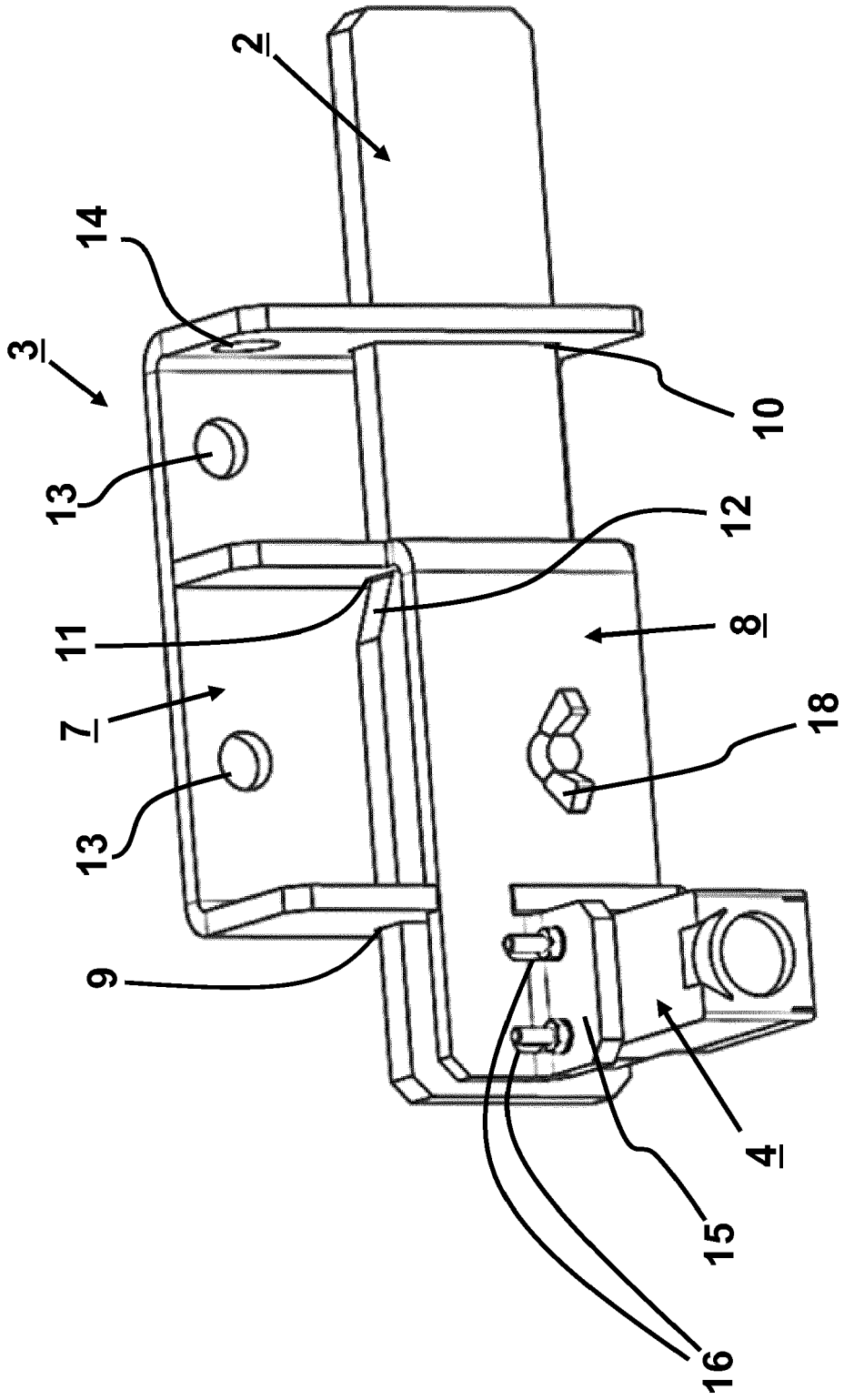


Fig. 5



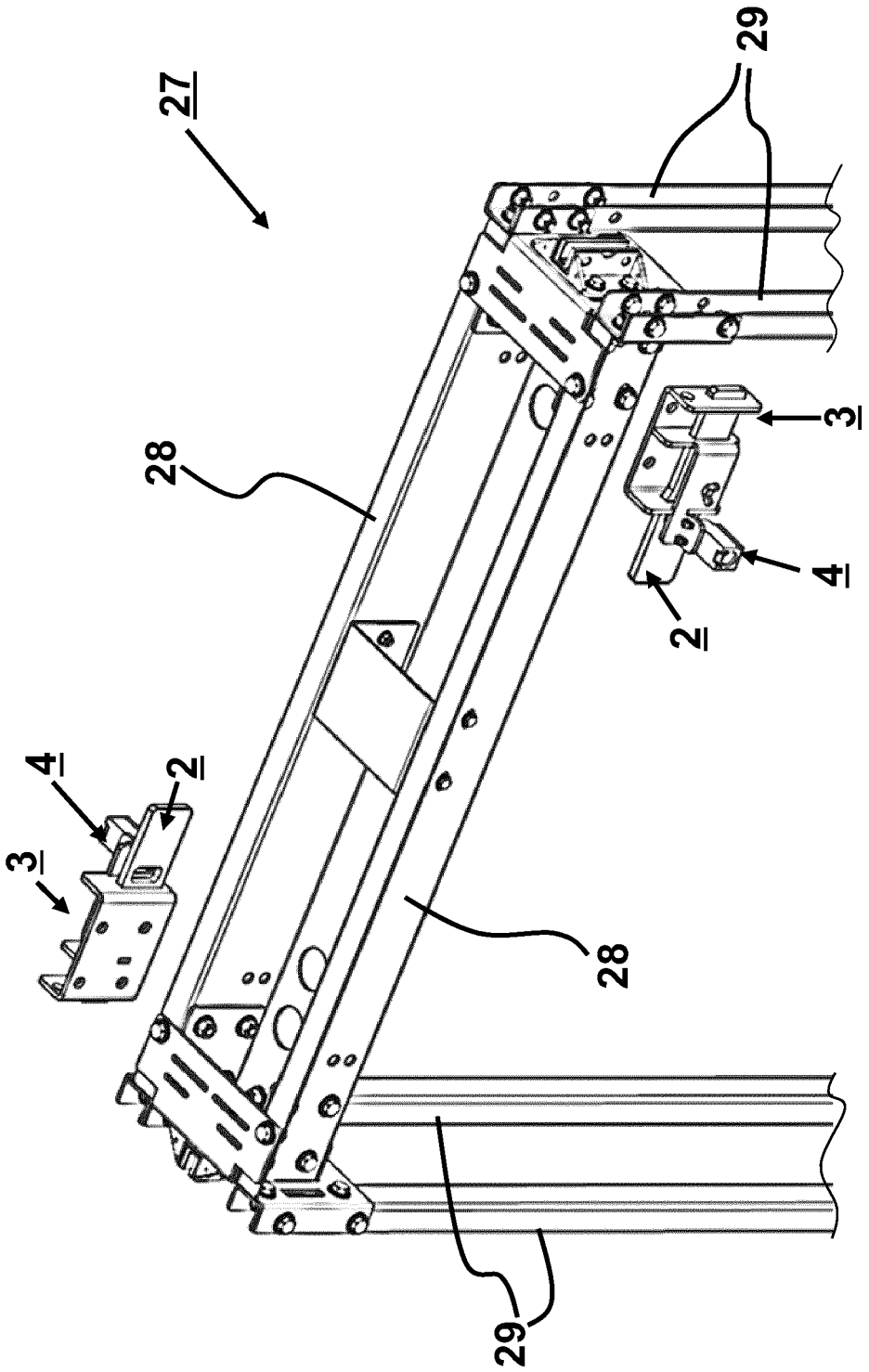


Fig. 6

Fig. 7

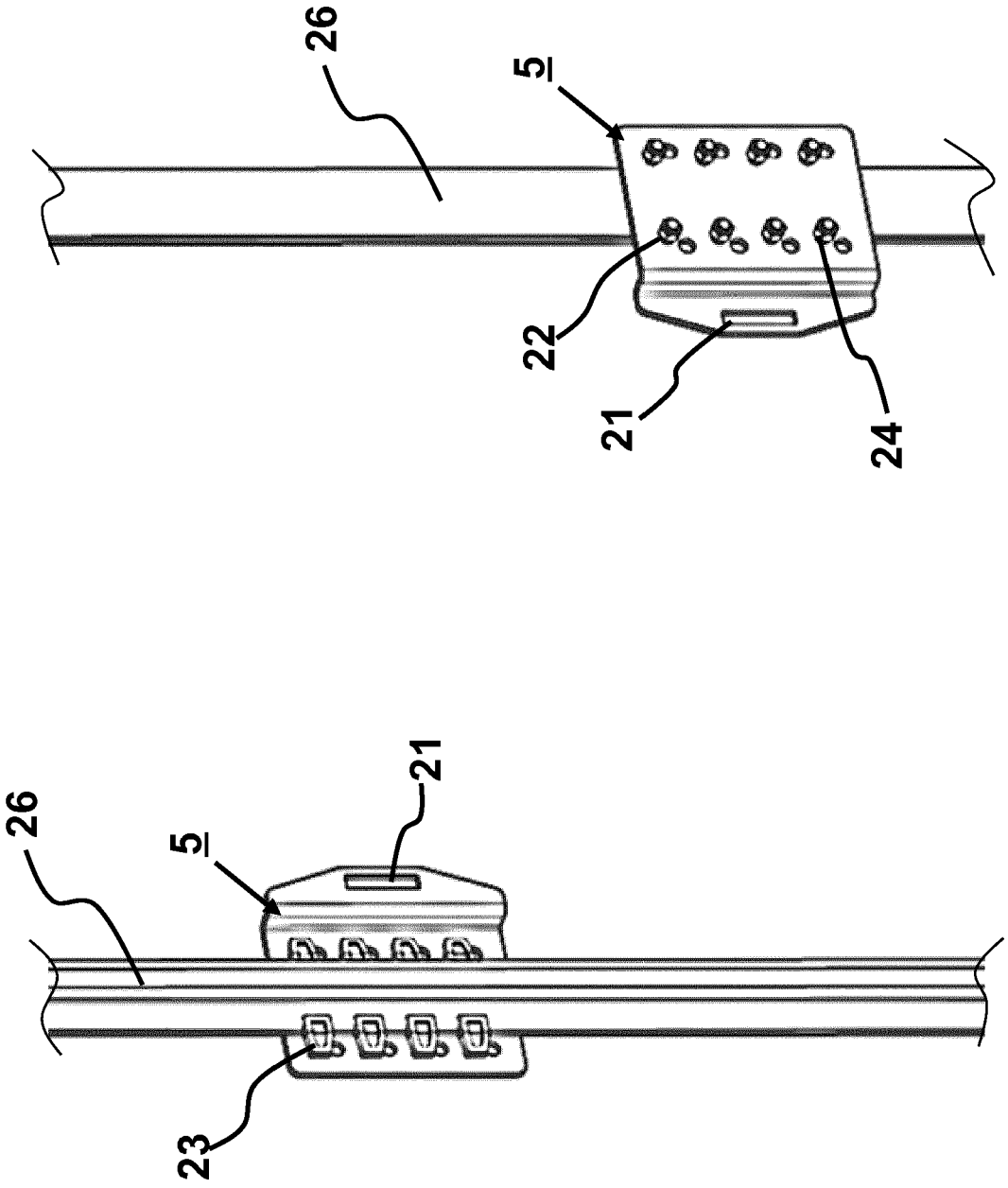
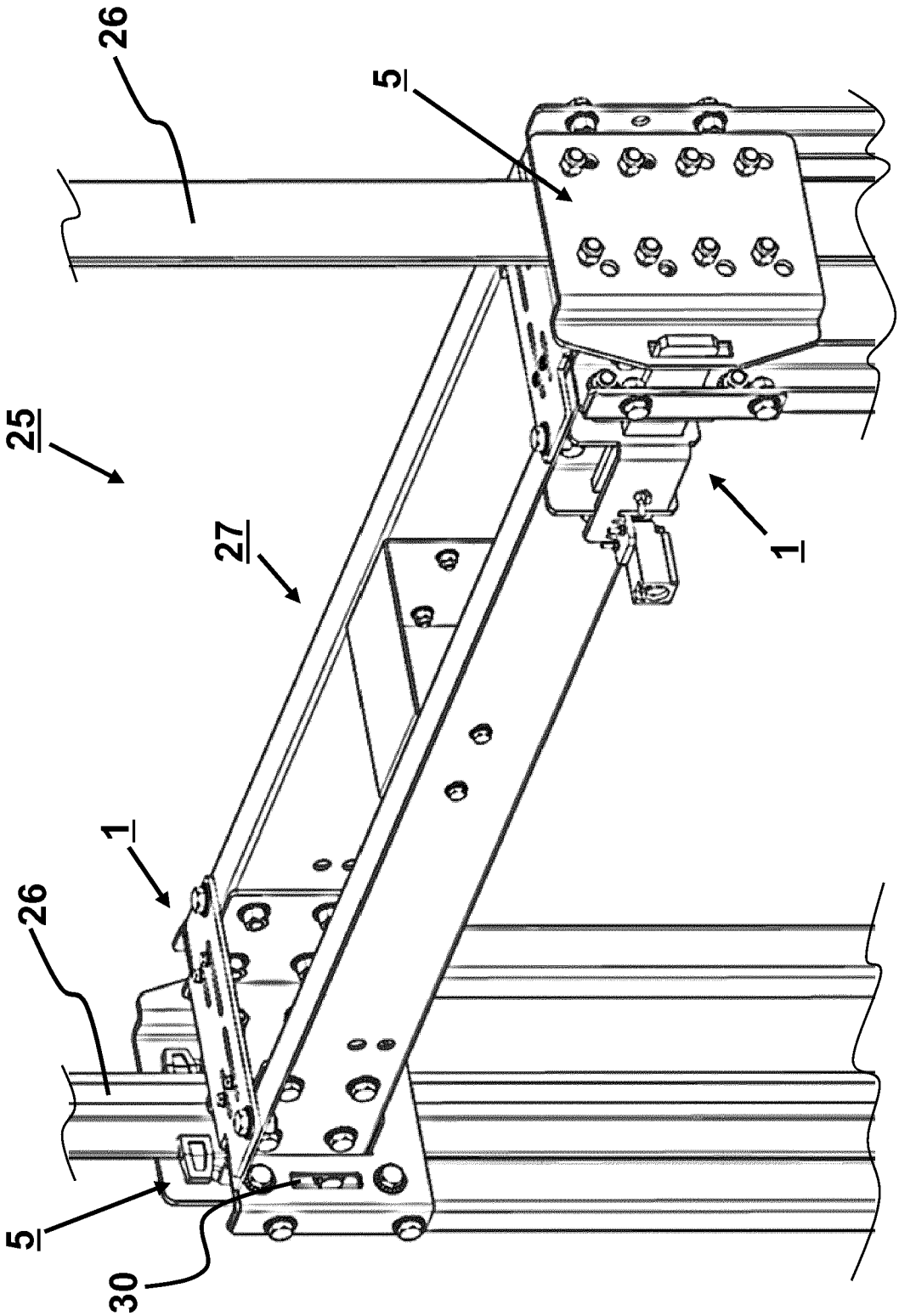


Fig. 8



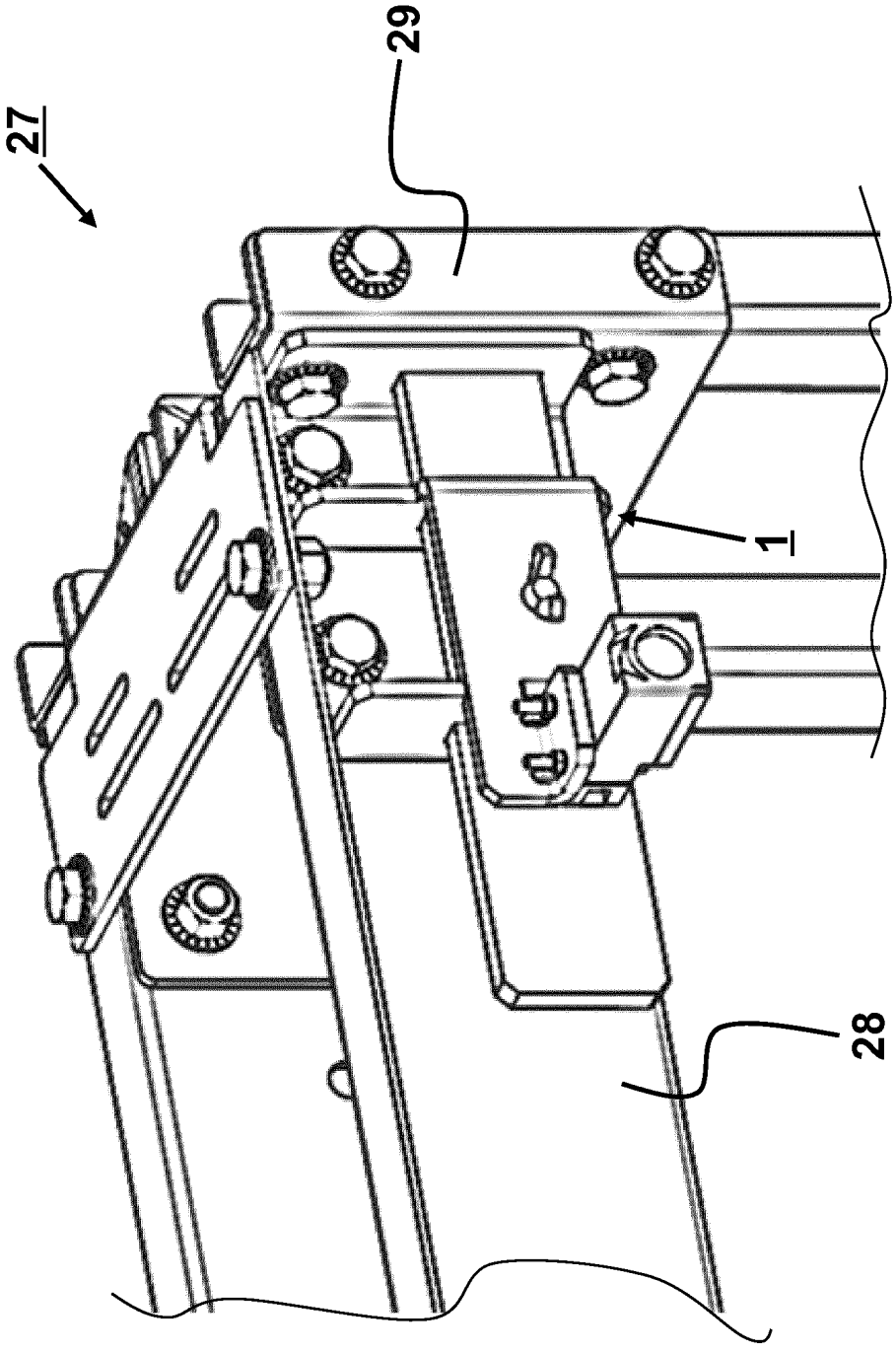


Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 22 20 2528

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 112 125 106 A (FUJIAN RES INST SPECIAL EQUIPMENT TESTING) 25 December 2020 (2020-12-25) * abstract * * paragraphs [0042] - [0084] * * figures 1, 2 *	1-7	INV. B66B5/00
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TECHNICAL FIELDS SEARCHED (IPC)

B66B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 April 2023	Dogantan, Umut H.

CATEGORY OF CITED DOCUMENTS

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09-04-2023

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US 5773771 A	30-06-1998	NONE	

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