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(54) **Cable break protection mechanism**

(57) A cable break protection mechanism for an overhead door, comprising a base for mounting on a door leaf of an overhead door and a gripper connected to the base, which is movable between a normal position in which, during use, the gripper runs clear along a guide section of the overhead door, and an emergency position in which the gripper impacts the guide section, wherein

the gripper is coupled via an adjustment mechanism to a cable connection, and is biased to the emergency position, so that, during use, the gripper is maintained in the normal position through tensile force of a hoisting cable connected to the cable connection. The adjustment mechanism comprises a lever.

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Description

[0001] The invention relates to a cable break protection mechanism for an overhead door according to the preamble of claim 1.

[0002] Such a cable break protection mechanism is generally known.

[0003] Overhead doors are generally known and are often used in industrial as well as in residential uses. As a rule, overhead doors have a door leaf composed of segments that are hingedly interconnected relative to a substantially horizontal axis. The door leaf is provided, on two opposite, upstanding sides, with guide rollers. The guide rollers are included in guide sections extending along and beyond a door opening. The overhead door comprises two hoisting cables that are each coupled to the door leaf adjacent the upstanding sides. The hoisting cables cooperate with a balancing device for compensating the weight of a part of the door leaf suspended from the hoisting cables.

[0004] In order to prevent, in the event breakage of the hoisting cables, the door leaf from falling as a guillotine due to its own weight, as a rule, the hoisting cables are each connected to the door leaf via a cable break protection mechanism.

[0005] The cable break protection mechanism comprises a base, mounted, as a rule, on the door leaf, and a gripper, connected to the base. The gripper is movable between a normal position in which, during use, the gripper runs clear along the guide section, and an emergency position in which the gripper impacts the guide section.

[0006] The gripper is biased towards the emergency position, and, during use, is maintained in the normal position through tensile force of the hoisting cable connected to the cable connection.

[0007] Therefore, due to the weight of the door leaf suspended from the hoisting cables, the gripper is, normally speaking, maintained in the normal position in which it runs clear in the guide section.

[0008] When the cable tension falls away due to cable breakage, the gripper moves due to its bias to an emergency position in which the gripper impacts the guide section.

[0009] The gripper impacting the guide section blocks movement of the door leaf relative to the guide section and fixes the door leaf relative to the guide section.

[0010] In order to facilitate mounting the door leaf in the guide, the known cable break protection mechanism is provided with an adjustment mechanism. With the aid of the adjustment mechanism, a possible difference in length of the hoisting cables upon installation can be compensated so that the door leaf can be suspended in the guide in a "straight" manner. In this manner too, the tension in the two cables can be rendered substantially equal.

[0011] With the known cable break protection mechanism, the adjustment mechanism comprises a wire end coupled to the free end of the cable, and included in a

guide bush. With the aid of an adjusting nut, the wire end can be adjusted relative to the guide bush.

[0012] A drawback of the known adjustment mechanism is that it can only be set in one direction, i.e. the door leaf can only be hung somewhat lower via the adjustment mechanism. Further, also, the adjusting nut is difficultly accessible. Another drawback is that in this design, the cable end is complex, and, considering the CE-standards prevailing for such connections, is not easy to make.

[0013] In practice, setting the door leaf and adjusting the tension in the hoisting cables via the cable break protection mechanism is difficult, while further, there is the risk that the cable break protection mechanism becomes damaged by attempts to set the door leaf higher via the mechanism.

[0014] Patent publication WO 95/24541 describes a cable break protection mechanism whose gripper is adjustable between a normal position and an emergency position. The cable leans against the lever against a spring force and is attached to the door leaf. The cable is not connected via an adjustment mechanism to the gripper.

[0015] Patent publication WO 03/087506 describes a cable break protection mechanism whose gripper is adjustable between a normal position and an emergency position. The gripper comprises a lever, of which one end is connected to a cable and another end is connected to a sharp wedge. However, the gripper is not connected via an adjustment mechanism to the cable.

[0016] Patent publication US 2 095 695 also describes a cable break protection mechanism whose sharp wedge cooperates to a chain via a lever but not via an adjustment mechanism.

[0017] The object of the invention is a cable break protection mechanism of the type mentioned in the preamble, with which, while maintaining the advantages, the drawbacks mentioned can be prevented.

[0018] To that end, the invention provides a cable break protection mechanism according to claim 1. Through the use of a lever in the adjustment mechanism, via the adjustment mechanism, a sufficiently great force can be exerted for setting the door leaf higher, against gravitational force, without damaging the adjustment mechanism. With the lever, the distance can be set between gripper and the cable connection. Further, through the use of a lever mechanism, the connection of the cable end to the adjustment mechanism can be simplified.

[0019] Further advantageous embodiments of the invention are represented in the subclaims.

[0020] The invention also relates to an overhead door provided with a cable break protection mechanism.

[0021] When, within this context, hoisting cables are involved, these are understood to include not only hoisting cables but also other types of flexible hoisting means such as, for instance, hoisting chains, ropes or toothed belts.

[0022] The invention will be further elucidated on the

basis of an exemplary embodiment which is represented in the drawing. The exemplary embodiment involves a preferred embodiment of the invention and is given by way of non-limitative illustration of the invention.

Fig. 1 shows a schematic perspective view of a cable break protection mechanism;

Figs. 2a and 2b shows a partial cross-section of the cable break protection mechanism of Fig. 1;

Fig. 3 shows a detail of the view of Fig. 2a;

Fig. 4 shows an exploded view of the cable break protection mechanism of Fig. 1; and

Fig. 5 shows a schematic perspective view of an overhead door.

[0023] In the Figure, identical or corresponding parts are represented with the same reference numerals.

[0024] With reference to Figs. 1- 5, a cable break protection mechanism 1 is represented for an overhead door 30. The cable break protection mechanism 1 comprises a base 2 for mounting on a door leaf 31 and a gripper 3 connected to the base 2. The gripper 3 is movable between a normal position, shown in the Figures, in which, during use, the gripper 3 runs clear along a guide section 35 of an overhead door 30, and an emergency position (not shown) in which the gripper 3 impacts the guide section 35. The emergency position is achieved by pivoting the gripper 3 clockwise, as shown in Fig. 2, until the gripper 3 impacts the guide section.

[0025] The gripper 3 is coupled via an adjustment mechanism 4 to a cable connection 5, and is biased towards the emergency position.

[0026] During use, the gripper 3 is maintained in the normal position through tensile force P of a hoisting cable 6 connected to the cable connection 5.

[0027] The adjustment mechanism 4 comprises a lever 7. With the aid of the lever 7, the cable connection 5 can be adjusted both in the direction of the tensile force of the hoisting cable and counter thereto, as will be further elucidated hereinbelow. For this reason, during use, the door leaf 31 can be adjusted not only in downward direction, but also in upward direction when aligning the door leaf relative to the guide. The distance between the gripper and the cable connection can be set with the lever.

[0028] The lever 7 has a first end 8 bearing the cable connection 5. Here, the cable connection 5 is designed as a pin 10 provided with a flange head 9, which pin cooperates with a loop 11 at the end of the hoisting cable 6. The loop 11 can be provided with a thimble.

[0029] The lever 7 cooperates with the gripper 3 adjacent a second end 12.

[0030] The lever 7 is connected to the base 2 for articulation between the first end 8 and the second end 12 to the base 2. In the exemplary embodiment, it is shown that two arm parts 7a, 7b of the lever reach outwards relative to a central hinge pin 13.

[0031] The gripper 3 comprises a wedge arm 14 hingedly connected to the base 2. On its free end, the

wedge arm 14 bears a sharp part, designed here as a chisel blade 15. In this exemplary embodiment, the pivots of the lever 7 and the wedge arm 14 coincide.

[0032] The second end 12 of the lever 7 is coupled at an adjustable interspace to the free end of the wedge arm 14. Here, the adjustable interspace is realized via an adjustment bolt 16. Here, the adjustable interspace can be used for adjusting the door upward or downward.

[0033] The adjustment bolt has a head 17 which is freely accessible in the normal position. To that end, the head 17 of the adjustment bolt 16 is received in a plate-shaped upper part 18 of the wedge arm 14. The adjustment bolt 16 reaches with its shaft 19 through an opening in the flat upper plate 18 of the wedge arm 14. Then, the shaft 19 reaches through an opening 20 in the second end 12 of the lever 7. A self-securing nut 21 received on the shaft 19 ensures the coupling between the lever 7 and the wedge arm 14. When loosening the adjustment bolt 16, the nut 21 moves downwards and the second end 12 of the lever 7 will follow under the influence of the tensile force exerted by the hoisting cable 6 on the cable connection on the first end 8 of the lever 7. Here, a further nut for securing the adjustment is not necessary as the nut 21 is secured against rotation in a chamber of the second end 12 of the lever.

[0034] In Fig. 2a, the adjustment mechanism 4 is represented in the uppermost position. From this position, the door leaf can be set upward relative to the hoisting cable 6 by tightening the adjustment bolt 16. Normally, the adjustment mechanism 4 is supplied in an intermediate adjusting position in which the self-securing nut 21 is situated adjacent the middle of the length of the shaft 19, i.e. farther away from the head 17 than shown in the Figures. In Fig. 2b, the adjustment mechanism 4 is represented in the lowermost position. The adjustability is limited in the lowermost position through contact of a stop on the lever 7 against the base 2 and, in the uppermost position, through contact of the lever 7 with the gripper 3.

[0035] The base 2 and the gripper 3 are provided with end stops 22, 23 cooperating in the normal position which, during use, define the normal position in that further pivotal movement of the wedge arm 14 under the influence of the tensile force exerted by the hoisting cable 6 on the lever 7 is blocked.

[0036] The gripper is in the normal position due to spring action. Here, the wedge arm 14 is connected via a pin joint 24 to the base 2 and the spring action is realized with the aid of a torsion spring 26 borne on the hinge pin 13 and acting between the base 2 and the wedge arm 14. In Fig. 2, the wedge arm 14 is energized clockwise under the action of the spring 26, to thus impact the guide sections 35 when the tensile force P falls away in the event of cable breakage. The base 2 comprises a substantially flat plate 27. In the normal position, the wedge arm 14 is oriented substantially transversely to the flat plate 27.

[0037] The cable break protection mechanism is further provided with a covering cap 28 covering the mech-

anism after assembly and operation of the adjustment mechanism 4

[0038] Fig. 5 shows how the cable break protection mechanism 1 is accommodated in an overhead door 30.

[0039] Fig. 5 shows an overhead door 30, comprising a door leaf 31 provided on two opposite sides 32, 33 with guide rollers 34. The guide rollers are included in guide sections 35 extending along and beyond a door opening 37. In Fig. 5, only guide rollers 34 are shown on one opposite side 32 of the overhead door 30.

[0040] The overhead door 30 further comprises two hoisting cables 6, each connected adjacent one of the opposite sides 32, 33 of the door leaf 31 to the door leaf and which form a connection between the door leaf 31 and a balancing device 39 for compensating the weight of a part of the door leaf 31 suspended from the hoisting cables 6.

[0041] The ends of the hoisting cables 6 are each connected to a cable connection 5 of a cable break protection mechanism 1 mounted with its base 2 on the door leaf 31 of the overhead door 30.

[0042] The invention is not limited to the exemplary embodiment represented here. It will be obvious to the skilled person that many variations are possible within the scope of the invention as represented in the following claims.

Claims

1. A cable break protection mechanism (1) for an overhead door (30), comprising a base (2) for mounting on a door leaf (31) of an overhead door (30) and a gripper (3) connected to the base (2), which is movable between a normal position in which, during use, the gripper runs clear along a guide section (35) of the overhead door (30), and an emergency position in which the gripper (3) impacts the guide section (35), wherein the gripper (3) is connected via an adjustment mechanism (4) to a cable connection (5) and is biased towards the emergency position, such that, during use, the gripper (3) is maintained in the normal position through tensile force of a hoisting cable of the overhead door (30) connected to the cable connection, **characterized in that** the adjustment mechanism (4) comprises a lever (7) with which the distance between the gripper (3) and the cable connection (5) can be set.
2. A cable break protection mechanism (1) according to claim 1, wherein the lever (7), adjacent a first end (8), bears the cable connection (5) and, adjacent a second end (12), cooperates with the gripper (3).
3. A cable break protection mechanism (1) according to claim 1 or 2, wherein, between a first end (8) and a second end (12), the lever (7) is hingedly attached to the base (2).
4. A cable break protection mechanism (1) according to any one of the preceding claims, wherein the gripper (3) comprises a wedge arm (14) hingedly connected to the base (2).
5. A cable break protection mechanism (1) according to claims 3 and 4, wherein lever (7) and wedge arm (14) have coinciding pivots.
6. A cable break protection mechanism (1) according to at least claims 3 and 4, wherein the second end (12) of the lever (7) is coupled by an adjustable interspace to a free end of the wedge arm (14).
7. A cable break protection mechanism (1) according to claim 6, wherein the second end (12) of the lever (7) and the free end of the wedge arm (14) are coupled via an adjustment bolt (16).
8. A cable break protection mechanism (1) according to any one of the preceding claims, wherein the base (2) and the gripper (3) are provided with end stops (22, 23) cooperating in the normal position, under the influence of a tensile force exerted by a hoisting cable (6) connected on the cable connection (5), and which define the normal position.
9. A cable break protection mechanism (1) according to claim 8, wherein the head (17) of the adjustment bolt (16) is included in a freely accessible upper part (18) of the wedge arm.
10. A cable break protection mechanism (1) according to any one of the preceding claims, wherein the base (2) comprises a substantially flat plate (27) and wherein the gripper (3) comprises a wedge arm (14) which is oriented, in the normal position, substantially transversely to the plate (27).
11. A cable break protection mechanism (1) according to any one of the preceding claims, wherein the gripper (3) is under spring action towards the normal position.
12. A cable break protection mechanism (1) according to claim 11, wherein the gripper (3) comprises a wedge arm (14) which is connected via a pin joint (24) to the base (2), and wherein the spring action is realised with the aid of a torsion spring borne on the hinge pin (13), and acting between base and gripper arm.
13. A cable break protection mechanism (1) according to any one of the preceding claims, wherein the cable connection (5) is designed for cooperation with a loop-shaped end (11) of a hoisting cable (6).
14. A cable break protection mechanism (1) according

to claim 14, wherein the cable connection comprises a pin (10) provided with a flange head (9).

15. A cable break protection mechanism (1) according to any one of the preceding claims, wherein the lever (7) of the adjustment mechanism (4) is adjustable between an extreme upper position and an extreme lower position. 5
16. A cable break protection mechanism (1) according to any one of the preceding claims, wherein the adjustment mechanism (4) is adjustable in two directions. 10
17. A cable break protection mechanism (1) according to any one of the preceding claims, wherein the adjustment bolt (16) is of self-securing design. 15
18. An overhead door (30), comprising a door leaf (31) provided on two opposite sides (32, 33) with guide rollers (34), which guide rollers (34) are included in guide sections (35) extending along and beyond a door opening (37), and two hoisting cables (6) each connected to the door leaf (31) adjacent one of the opposite sides (32, 33) of the door leaf (31), which form a connection between the door leaf (31) and a balancing device (39) for compensating the weight of a part of the door leaf (31) suspended from the hoisting cables (6), wherein at least one of the hoisting cables (6) is connected to the cable connection (5) of a cable break protection mechanism (1) mounted with its base (2) on the door leaf (31) of the overhead door (31), and wherein the cable break protection mechanism (1) is designed according to any one of the preceding claims. 20 25 30 35

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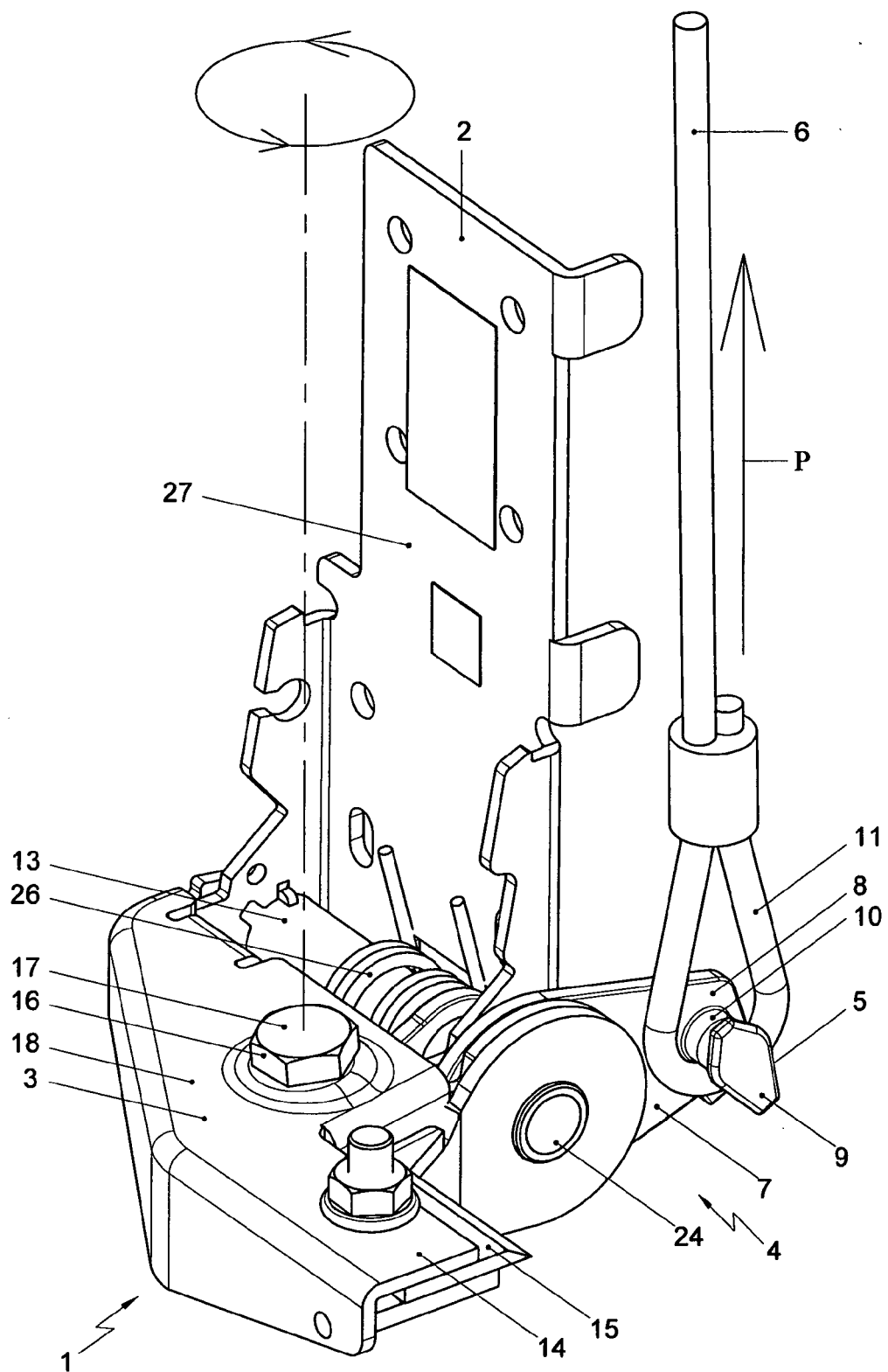


Fig. 1

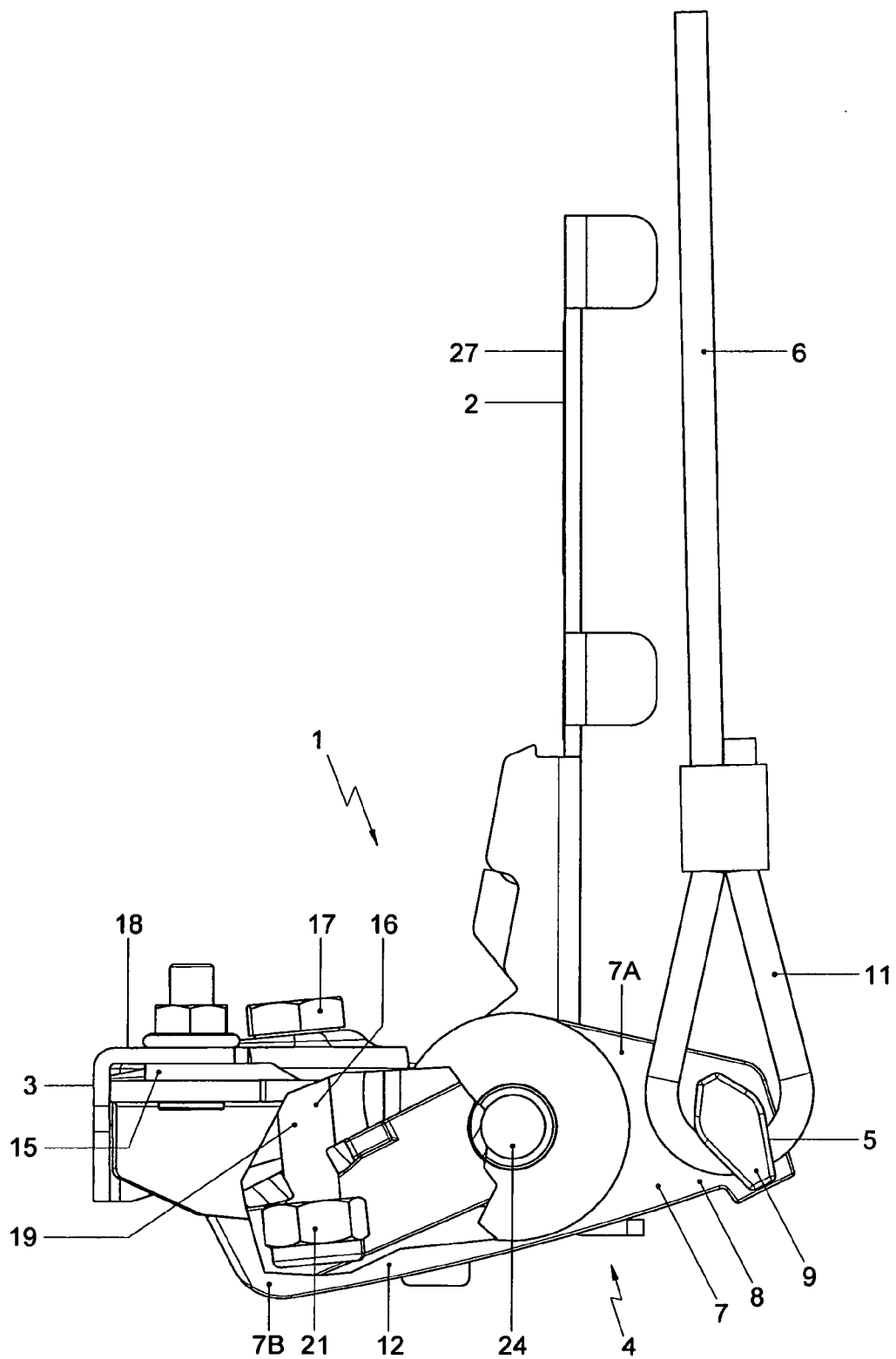


Fig. 2A

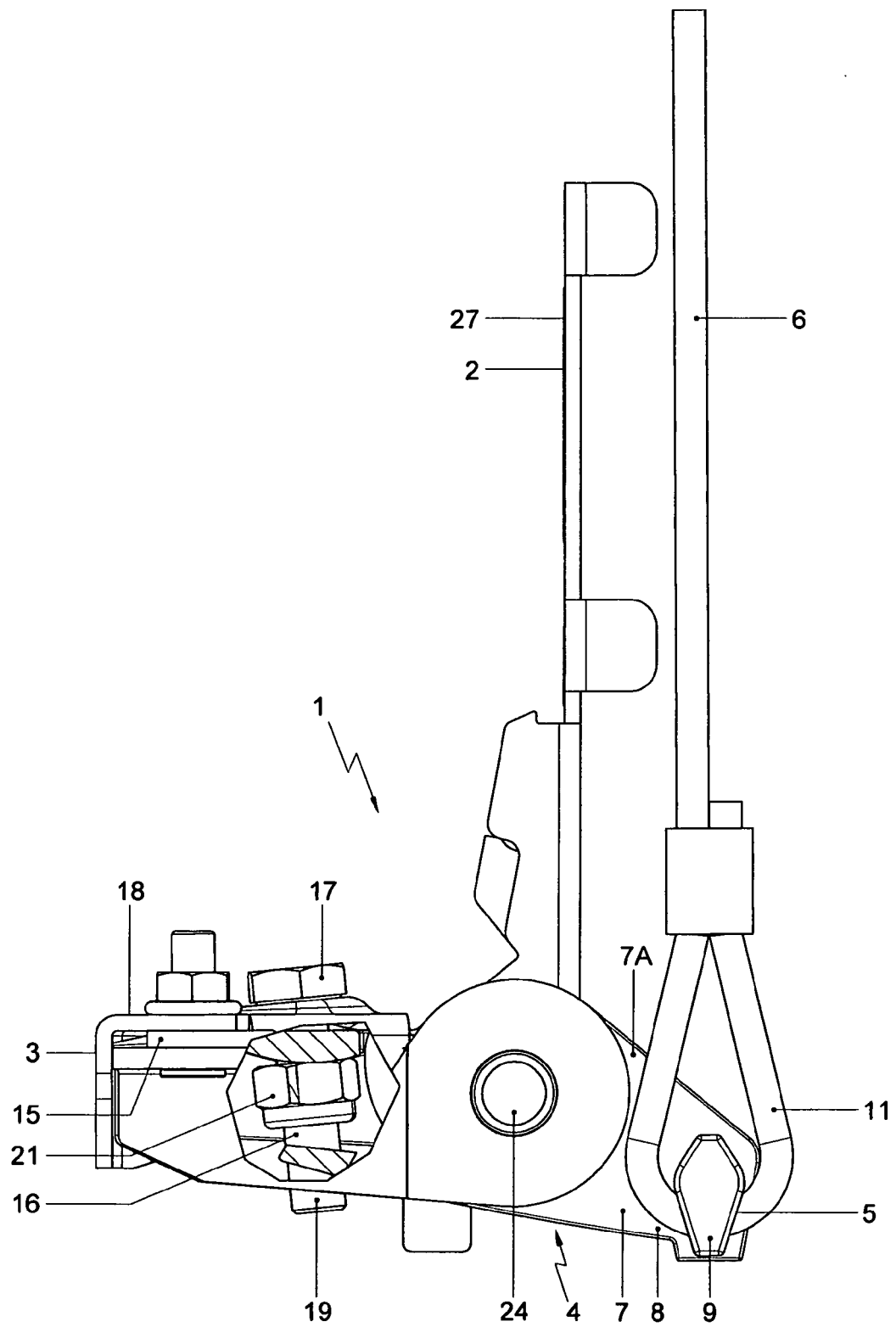


Fig. 2B

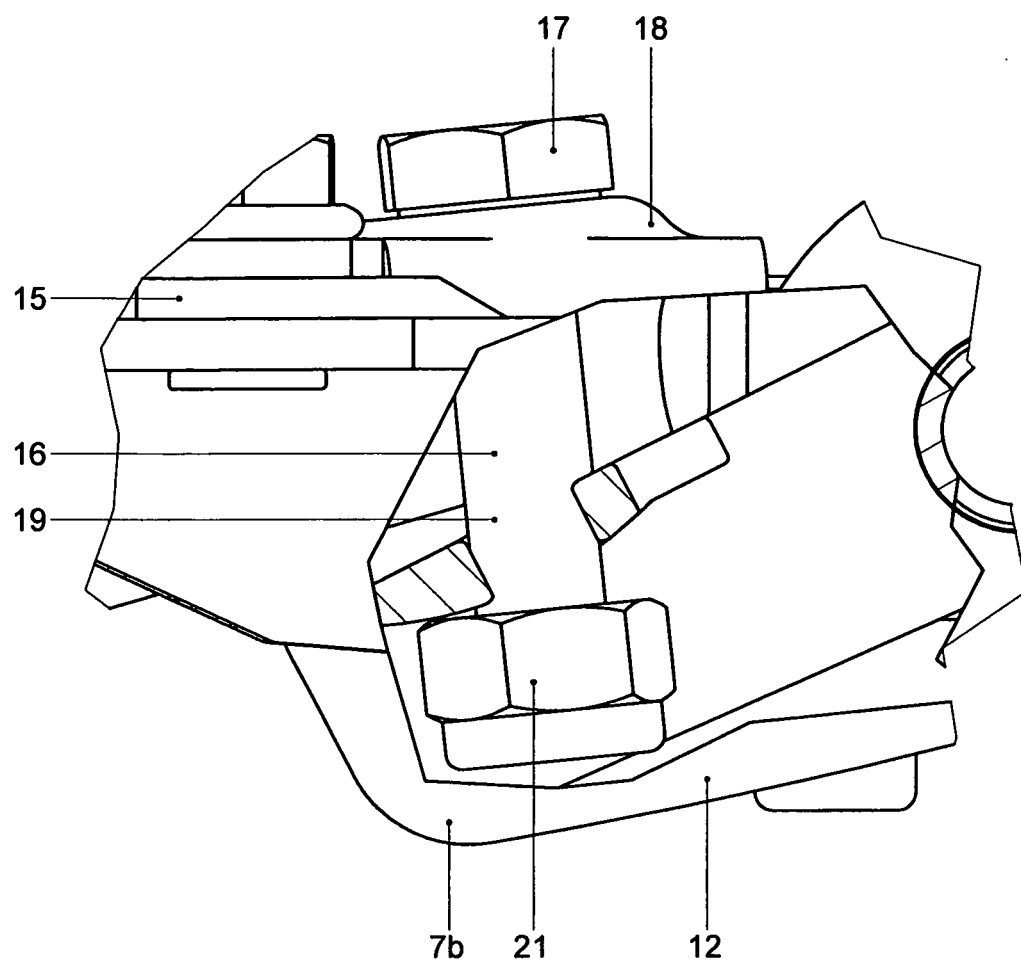


Fig. 3

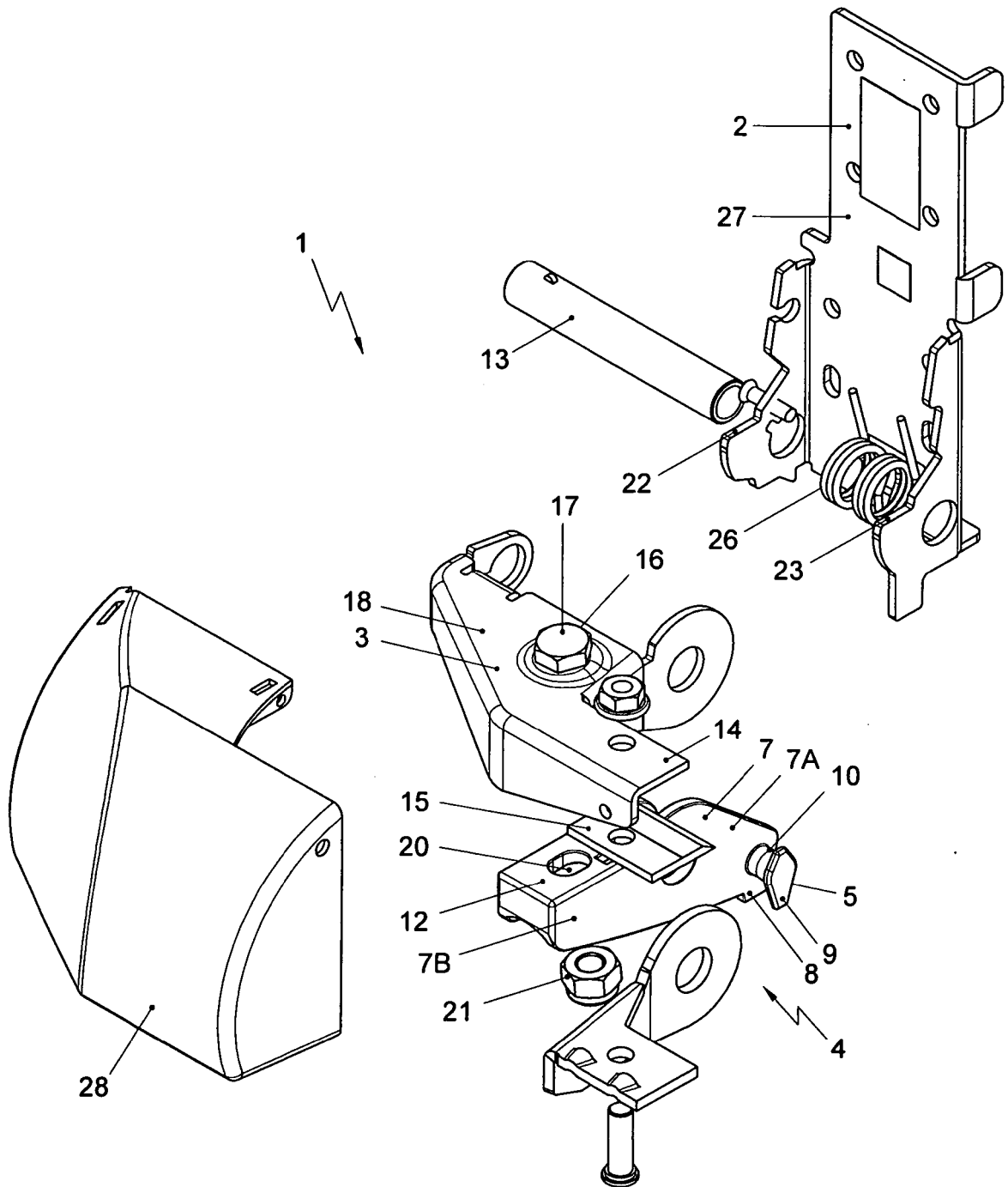


Fig. 4

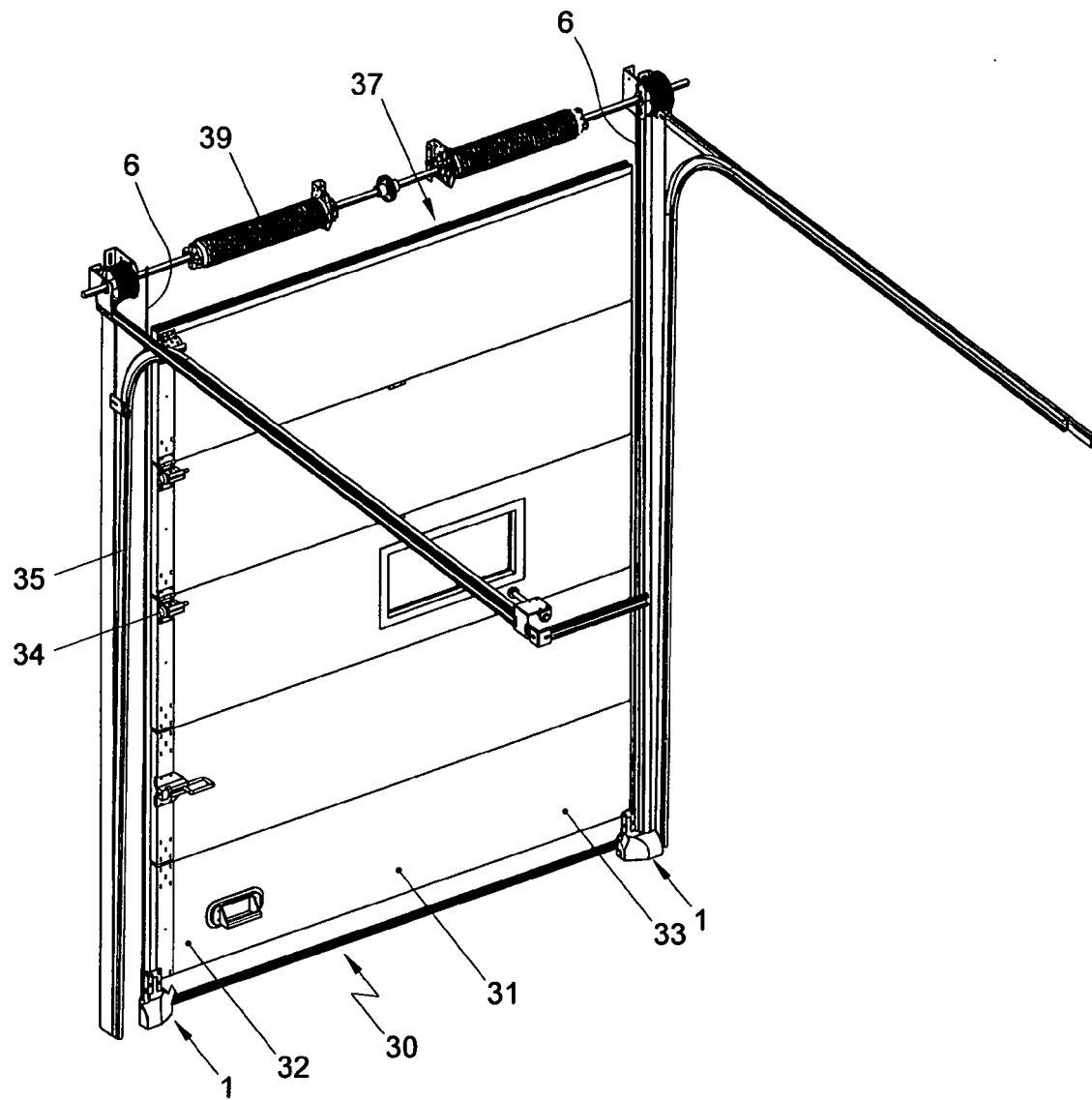


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 9524541 A [0014]
- WO 03087506 A [0015]
- US 2095695 A [0016]