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Description

[0001] The invention relates to an elevator according to the preamble of claim 1.

TECHNICAL BACKGROUND

[0002] In order to prevent the car of an elevator, together with the cabin carried by the car, from reaching an impermissibly high speed, elevators are equipped with safety gears. The cause of an impermissibly high acceleration of the car can be, for example, a malfunction of the control system of a drive or its brake or a rope break. In any case, in the case of mechanically triggered safety gears, the detection of an impermissibly high speed and the subsequent necessary triggering of the safety gear is typically carried out with the aid of a so-called overspeed governor.

[0003] The mode of operation of such an overspeed governor and the interaction of the overspeed governor with a safety gear is explained below with reference to Fig. 1 and Fig. 2 for the case of an impermissibly high downward speed of the car.

[0004] Fig. 1 shows a car 2 of an elevator.

[0005] During operation of the elevator, this car 2 moves along one or more guide rails, not shown, in an elevator shaft which is not shown as well.

[0006] The car 2 is connected to a governor rope 39 in such a way that the governor rope 39 follows the movement of the car along the elevator shaft during regular operation of the elevator. For this purpose, a deflection pulley is provided at each of the upper and lower ends of the elevator shaft, between which the governor rope 39 is tensioned and by which the governor rope 39 is deflected. The lower deflection pulley 50 is at the same time part of a rope tensioner 40, which ensures a permanent tension of the governor rope 39. The upper deflection pulley cannot be seen and is a component of the overspeed governor 7. The speed of rotation of the two aforementioned deflection pulleys is determined by the speed of rotation of the governor rope 39, and thus indirectly by the speed of the car 2. The deflection pulley of the overspeed governor 7 is connected to a centrifugal brake, which is set to brake the deflection pulley of the overspeed governor 7 above a predefined, impermissibly high speed. The braking of the upper deflection pulley has the effect that the governor rope 39 remains behind the car 2 of the elevator.

[0007] As shown in Fig. 2, the governor rope 39 is connected to an activating element 48. The activating element 48, in turn, is connected to a pivot lever 42 by a pin connection which permits rotational movement of the pivot lever 42 relative to the activating element 48. The pivot lever 42 is provided for triggering the safety gear 3 and is fastened indirectly to the elevator car 2, not shown in Fig. 2. Its attachment is such that a purely translatable movement of the pivot lever 42 relative to the elevator car 2 cannot take place. The pivot lever 42 consequently always moves with the car 2 along the elevator shaft.

[0008] As soon as the governor rope 39 is decelerated by the overspeed governor 7 and remains behind the car 2 performing a downward movement, the governor rope 39 pulls the activating element 48 upward relative to the car 2.

[0009] As a result, the activating element 48 pulls on the pivot lever 42, causing the pivot lever 42 to pivot about the pivot axis 47.

[0010] The end of the pivot lever 42 facing the safety gear 3 then performs a partially circular counterclockwise movement. Thereby, a clamping body of the safety gear 3, which is connected to the pivot lever 42 via a connecting member 43, is pulled obliquely upwards in the direction towards a guide rail of the elevator, which is not shown. In the process, the guide rail of the elevator is clamped between the clamping body and the brake linings 51 of the safety gear 3 opposite the clamping body. This leads to a braking of the car 2.

[0011] In order to achieve uniform braking of the car 2 or uniform application of force to the car 2 during braking, the pivot lever 42 is connected in a rotationally fixed manner to the synchronizing element 41, which is designed as a shaft. This synchronizing element 41 transmits the pivoting movement of the pivot lever 42 to a second pivot lever 42 arranged parallel to this first pivot lever 42 (which is not shown in Fig. 2).

[0012] This second pivot lever 42 is designed in the same way as the first pivot lever 42 and, as a result of the rotational movement transmitted to it by the synchronizing element 41, also performs a pivoting movement about the pivot axis 47. In doing so, it brings a clamping body of a second safety gear 3 into engagement with a second guide rail opposite the first guide rail in the same way as the first pivot lever 42. In doing so, the second guide rail is clamped between the second clamping body and the brake linings of the second safety gear.

STATE OF THE ART

[0013] The known prior art designs of such a triggering of two safety gears of an elevator are associated with various problems. These are explained in the following with reference to Fig. 3 and Fig. 4.

[0014] In the case of a car 2 suspended in the manner of a block and tackle as shown in Fig. 4, a plurality of deflection pulleys 45 are provided on the car 2 for deflecting the belts 44, wherein the belts 44 are for carrying and preferably hoisting. In order to ensure uniform force absorption and application of the forces occurring during regular operation of the elevator, the deflection pulleys 45 and the associated belts 44 are typically arranged symmetrically on both sides of the guide rails 46. In this respect, it is advantageous for smooth running of the car if the deflection pulleys 45 and the associated belts 44 are positioned as close as possible to the guide rails 46.

[0015] However, this has the consequence that the synchronizing element 41, which transmits the pivoting movement of the first pivot lever 42 controlled by the

activating element 48 to the second pivot lever 42, must be arranged quite far from the guide rail 46 for reasons of space, which interferes with the kinematics, in particular a balanced dimensioning of the effective length of the lever arms.

[0016] At the same time, this means that the weight forces acting on the pivot levers 42 during the pivoting movement, which are caused by the dead weight of the pivot levers 42 and the weight of the clamping bodies, have a relatively large lever arm with respect to the pivot axis 47. This results in a certain amount of torsion occurring at the synchronizing element 41. This, in turn, causes the pivot lever 42 which is not moved by an activating element 48 to have a certain amount of sag with respect to the other pivot lever 42 which is moved by an activating element 48.

[0017] This is shown by way of example in Fig. 3. This sag manifests itself in a slight angular offset of the sagging pivot lever 42 relative to the other pivot lever 42 when they perform their pivoting movement. Depending on how pronounced this angular misalignment is, in the most unfavourable case it can result in only the safety gear which is (indirectly) actuated by the activating element going into braking engagement, while the other safety gear is not or only insufficiently activated.

[0018] A further problem is that the pivot levers 42 perform a circular arcuate pivoting movement about the pivot axis 47, whereas the clamping bodies of the safety gears 3 generally perform a purely translatory movement in the direction towards the respective guide rail 46.

[0019] In conventional elevators, this problem is typically solved by means of a connecting member 43. This connecting member 43 is connected, for example by a pin connection, to the pivot lever 42 and the clamping body in such a way that a rotational movement of the pivot lever 42 relative to the connecting member 43 is possible, as well as a rotational movement of the connecting member 43 relative to the clamping body. This allows the pivot lever 42 to perform a purely rotational movement about the pivot axis 47, while the clamp body performs a purely translational movement with respect to the pivot axis 47.

[0020] The problem with that is this:

The area of the pivot lever 42, where it is connected to the connecting member 43, is always above the clamping body by an amount in length dependent on the length of the connecting member 43 and the angle prevailing between the connecting member 43 and the pivot lever 42, due to the connecting member 43 provided between the pivot lever 42 and the clamping body. Since the connecting member 43 must have a certain length so that no rotational movement about the pivot axis 47 is imposed on the clamp body at any time, this lengthwise amount is also not negligibly small. The consequence of this is that the pivot lever 42 cannot be positioned centrally above the centre of gravity of the clamping body, since the pivot lever 42 would otherwise have to protrude into the safety gear 3 and would collide with the housing of

the safety gear 3 in its maximum pivoted position.

[0021] Instead, as shown by Fig. 2, the pivot lever 42 is positioned laterally next to the safety gear 3 and thus with some offset from the center of gravity of the clamping body. This leads to shear forces when the clamping body is lifted, and in particular as a result of the braking force (occurring at the first contact of the clamping body with the guide rail 46 at the clamping body, pulling it further into the wedge gap between the guide rail 46 and the safety gear 3). Namely, to shear forces between the connecting member 43 and the clamping body as well as between the connecting member 43 and the pivot lever 42. These shear forces cause an increase in the already described sag of the pivot lever 42, which is not controlled by the activating element 48. Furthermore, they lead to losses and increased wear. Finally, the arrangement of the pivot lever 42 with an offset with respect to the centre of gravity of the clamping body affects the rigidity of the structure and, consequently, the performance of the safety gear.

[0022] US 2007/181378 A1 discloses the preamble of claim 1. It relates to an emergency stop system for an elevator. In an emergency stop system for an elevator, a governor sheave that moves in synchronism with the raising and lowering of a car is wound around a governor sheave. The car is mounted with a safety device for braking the car through displacement of the car, which is connected to the governor rope, with respect to the governor rope. A control device outputs an activation signal upon detecting an abnormality in the speed of the car. A rope catching device is provided in the vicinity of the governor sheave.

[0023] The rope catching device has an electromagnetic actuator that is activated upon input of the activation signal, and a restraining portion for restraining the governor rope upon the activation of the electromagnetic actuator.

THE PROBLEM UNDERLYING THE INVENTION

[0024] In view of the above, it is the object of the invention to provide an elevator in which the safety gears are better synchronized when they are triggered.

THE SOLUTION ACCORDING TO THE INVENTION

[0025] According to the invention, this problem is solved with the features of the main claim directed to the elevator. Accordingly, the solution to the problem involves an elevator having a car and at least two safety gears mounted remotely from each other on the car and a preferably broadly understood overspeed governor - preferably exactly one overspeed governor.

[0026] In addition, the elevator comprises an activating element controlled by the overspeed governor to apply a brake actuation force in the event of overspeed, preferably in the form of a traction force.

[0027] This brake actuating force is transmitted to the safety gears via a synchronizing device for synchronous

triggering.

[0028] The synchronizing device has a pivot lever for each safety gear. The pivot lever is hinged at one end to the clamping body of the safety gear in a hinge area. On the opposite other side, it is connected to another pivot lever via a synchronizing element. The other pivot lever is associated with another safety gear. The elevator is characterized by the fact that a translatory movement relative to its pivot axis is superimposed on the pivot levers or their rotating movement. This translatory movement causes said hinge area of the respective pivot lever to perform a resulting movement that is translatory.

[0029] The resulting movement of the hinge area of the pivot lever regularly runs at least essentially parallel to the direction of insertion of the clamping body into the wedge gap assigned to it.

[0030] The superposition of the translatory movement of the pivot lever and the pivot movement of the pivot lever about its pivot axis consequently results in the relative movement of the hinge area of the pivot lever being almost completely translatory in relation to the safety gear.

[0031] This has the advantage that a connecting member between the pivot lever and the clamping body can be dispensed with. This leads to a significant increase in the positioning possibilities of the pivot lever, so that it can also be positioned centrally above the centre of gravity of the clamping body with a corresponding design of the safety gear. This increases the stability and precision of the synchronizing device.

[0032] The two pivot levers are ideally connected to each other indirectly via one or more further elements of the synchronizing device, so that the two pivot levers together with the safety gears controlled by them can be arranged on two opposite sides of the car. This ensures a uniform application of force to the car during the triggering of the safety gears.

[0033] With an appropriately designed indirect connection of the two pivot levers to each other, a favourable transmission ratio of the forces occurring in the synchronizing device can also be achieved. This reduces the torque counteracting the pivoting movement of the pivot levers. This then reduces the sag and the asynchrony of the triggering of the safety gears.

[0034] The "car" is understood to be either an essentially non-self-supporting car which is accommodated in a supporting sling, i.e. a supporting frame, or a car with an integrated car frame, the integration of which replaces the sling, or simply a platform which can be moved in the shaft for parking the goods to be transported.

[0035] "Hinged" means a connection that allows the pivot lever on the clamping body to make the movement required to engage the brake.

[0036] The "hinge area" of the pivot lever is the section of the pivot lever via which it is connected to the clamping body of the safety gear. In the case of a pin connection of the pivot lever with the clamping body, the hinge area thus corresponds to the section of the pivot lever in which the

pin is arranged.

[0037] A "safety gear" is a device which is preferably able to break and/or to catch the car of an elevator.

A FURTHER PROBLEM

[0038] Further, it is the object of the disclosure to provide a synchronizing device which permits synchronous and complete triggering of the safety gears of an elevator.

THE FURTHER SOLUTION

[0039] The aforementioned problem is solved by means of a synchronizing device which preferably has features according to the synchronizing device of an elevator according to the invention. It is used for synchronous triggering of a plurality of safety devices on an elevator car.

[0040] The synchronizing device is characterized by the fact that it has at least two pivot levers, each of which can be pivoted about at least one stationary pivot axis on the car. The pivot levers act on at least two safety gears. The safety gears are actuated by a synchronizing shaft which transmits essentially only torsion and is itself not translationally movable, the rotation of which controls the pivot levers.

[0041] The advantage of such a synchronizing device is that an elevator can be retrofitted with it in order to achieve a synchronous triggering of the safety gears and a uniform force application into the car during the deceleration process.

PREFERENTIAL DESIGN OPTIONS

[0042] There are a number of ways in which the invention can be configured to further improve its effectiveness or utility. Thus, it is particularly preferred that the pivot lever is actuated by a coupling lever during triggering. In this case, the pivot lever and the coupling lever also move translationally relative to each other in their coupling area during triggering. Preferably, the pivot lever and the coupling lever are coupled in that an axle pin of one of these levers is movably held in a straight slot of the other of these levers.

[0043] It is conceivable in principle that the pivot lever is designed in the form of a telescopic rod and the translatory relative movement is effected by the extension and retraction of the telescopic rod. However, the generation of the translatory relative movement by means of an axle pin of one lever which is held in a straight slot of the other lever is advantageous, since the translatory mobility of the one lever is particularly easily advanced. The length of the straight slot determines the maximum translatory freedom of movement. The translatory relative movement of the two levers with respect to each other can also take place simultaneously with a pivoting movement of the two levers with respect to each other.

[0044] In this context, the "coupling area" means the area where the coupling lever and the pivot lever overlap. In another preferred embodiment, the two levers always pivot in opposite directions.

[0045] This makes it possible, despite fixed pivot points, to convert the upward actuating force for actuating the safety gear also into an upward force at the clamping body. With an appropriate design of the levers, the resulting lever arm which causes the torque counteracting the rotational movement of the synchronizing element can be reduced. This in turn leads to a reduction in the sag and angular offset of the two pivot arms. The synchronizing of the triggering of the safety gears is thus increased.

[0046] Ideally, the pivot lever is pivotally mounted on a car-fixed axis in such a way that the pivot lever can additionally perform a translatory movement relative to its car-fixed axis.

[0047] Pivoting about a fixed axis ensures that the pivoting movement is always a defined pivoting movement and is therefore precise, and that the synchronizing device has a high degree of triggering accuracy.

[0048] By selecting the positioning of the pivot axis, the torque counteracting the pivot movement when the safety gear is triggered can be influenced as a function of the distance to the hinge area of the pivot lever on the clamping body. Consequently, by positioning the pivot axis relatively close to the safety gear, the torsion occurring in the synchronizing element can be reduced, which has an advantageous effect on the angular offset of the two pivot levers, and consequently an advantageous effect on the synchronism of the triggering of the two safety gears.

[0049] "Car-fixed" in this context means that the pivot axis moves along the elevator shaft with the car, i.e. there is no translational relative movement between the pivot axis and the car in or against the direction of movement of the car along the elevator shaft.

[0050] Preferably, the coupling lever rotates about a further geometric car-fixed axis without the possibility of additional translatory movement relative to this axis.

[0051] By preventing a translational movement of the coupling lever with respect to its axis of rotation, a high rigidity and precision is achieved in the triggering of the safety gear. In addition, this bearing arrangement makes it possible for this pivot lever to be mounted with a precision that does not suffer from the weight of the synchronizing element, i.e. the synchronizing rod, in the sense that one safety gear responds noticeably earlier than the other when it is triggered.

[0052] In a further preferred embodiment, the pivot axis for the coupling lever, which is car-fixed, is formed by one end of the synchronizing element, which in turn is pivotally mounted on the car or car frame. Preferably, the synchronizing element is supported by a lug which can be mounted to the car frame.

[0053] The synchronizing element is attached to the car frame by the lug in such a way that it cannot perform any translatory movement relative to the car frame in or

against the direction of travel of the car along the elevator shaft. Rotation of the synchronizing element about its longitudinal axis is thereby still possible, so that the rotational movement of the pivot lever actuated by the activating element can be transmitted to the other pivot lever. In this case, the synchronizing element is supported by a total of two lugs or is supported with the aid of two lugs. This achieves a high precision and rigidity of the synchronizing device.

[0054] Ideally, the synchronizing device can cause the safety gears to respond bidirectionally, i.e., both during downward travel and during upward travel. Preferably, this is done from a ready position by allowing the coupling lever to pivot from its ready position either clockwise or counterclockwise. As a result, the coupling lever pivots the pivot lever in a counterclockwise or clockwise direction. In the ready position, the largest central longitudinal axis of the pivot lever and the coupling lever are at least substantially aligned.

[0055] It may happen that the car performs an unintentional fast upward movement along the shaft. In such a case, the described embodiment also brings the safety gears into engagement with the guide rails so that the car is braked and brought to a standstill.

[0056] Preferably, the synchronizing element is a shaft subjected to substantially only torsion. The torsion of the shaft controls the pivot lever via the coupling levers.

[0057] The "axis" around which the coupling lever rotates then corresponds to the longitudinal axis of the synchronizing element. The synchronizing element acts as a shaft on which the coupling lever is mounted in a rotationally fixed manner, so that a rotational movement of one of the coupling levers causes a rotational movement of the shaft. In this way, the pivoting movement caused by the activation element on the first pivot lever can be transmitted over the entire width of the car to the second pivot lever.

[0058] In a further preferred embodiment, said shaft is flanged to at least one coupling lever such that the coupling lever can be fixed to the shaft in various rotational positions.

[0059] This offers the possibility of adjusting the starting position of the pivot levers so that both pivot levers or both safety gears are triggered as synchronously as possible even if the overspeed governor cable is only attached on one side.

[0060] The coupling lever on the side of the pivot lever not triggered by the activation device can then, for example, be flange-mounted from the outset at a certain angular offset to the coupling lever opposite it. This prevents the asynchronous or incomplete triggering of the safety gear located on the side of said coupling lever flanged with an offset.

[0061] An "angular misalignment" in this sense occurs when the two coupling levers, whose axes of rotation are coaxial or at least parallel to each other when assembled, are oriented in such a way that their respective main longitudinal axes do not point in the same direction,

but if the two main longitudinal axes were projected into a (hypothetical) common plane, there would be an angle between the two axes.

[0062] The "main longitudinal axis" can also be referred to as the "central longitudinal axis" and runs through the pivot axis of the respective lever in such a way that the main longitudinal axes of the two levers intersect at their common hinge point.

[0063] The "initial position" or "starting position" is a position in which the coupling lever and the pivot lever are located when the clamping body of the respective safety gear is not in contact with the guide rail and no force exerted by the governor rope is yet acting on the activating element, causing a relative movement of the activating element to the car.

[0064] Ideally, the pivot lever is directly hinged to the clamping body and for this purpose connected to the clamping body - preferably via an axle pin.

[0065] This further increases the triggering precision, as the pivot lever benefits from the linear guidance provided to the clamping body in the safety gear housing. In addition, this embodiment offers significantly greater freedom in the choice of positioning of the pivot lever.

[0066] Preferably, the pivot lever engages through an opening in the safety gear housing and into the safety gear housing to interact with the clamp body.

[0067] The pivot lever can then engage centrally above the centre of gravity of the clamping body or be arranged in such a way that the pivot lever lies - at least almost - in the same plane as the resulting braking force which acts on the clamping body when the guide rail is clamped. This further increases the precision and stability.

[0068] In another preferred embodiment, the pivot lever has arm sections extending in opposite directions from the car-fixed axis about which the pivot lever pivots. In addition or instead, the linkage lever has arm sections extending in opposite directions from the car-fixed axis about which the linkage lever pivots.

[0069] In this way, the design of the transmission ratios for converting the actuating force into a force directly at the clamping body can be adjusted very easily by selecting the arm lengths accordingly. With a favourable choice of the arm lengths, the torque counteracting the rotation of the synchronizing element can thereby be reduced. The sag of the pivoting arm resulting in an angular offset of the two pivoting arms, which is not controlled by the activation element, can thus be reduced or, ideally, completely eliminated. This increases the synchronism of the activation of the two braking devices. In addition, the wear on the synchronizing device is reduced.

[0070] Ideally, the pivot lever has a greater extension along its main longitudinal axis than the coupling lever along its main longitudinal axis.

[0071] This results in a favourable transmission ratio of the occurring torques and rotational speeds. Even the retardation of the overspeed governor cable by only a small amount causes a relatively strong displacement of the clamping body and thus a quick response of the

safety gear.

[0072] In another preferred embodiment, the coupling lever has a cross shape. Preferably, the cross shape comprises two long arms and two short arms. Both the long arms and the short arms are usually diametrically opposite to the bearing eye of the coupling lever. Preferably, one long arm has a straight slot and preferably both short arms have at least one arc slot each.

[0073] The coupling lever can then be connected to the synchronizing element via the arc slots by means of a screw connection. The arc slots offer a particularly simple and effective way of arranging the two coupling levers of the synchronizing device at an angular offset to each other. In this way, any angular offset of the two pivot levers with respect to each other during the triggering of the safety gears can be compensated for from the outset, so that the safety gears are triggered synchronously.

[0074] In a further preferred embodiment, at least one spring is provided for returning the pivot lever to its ready position. The spring is preferably suspended between the housing of a safety gear and the pivot lever.

[0075] This ensures that the elevator braking device and the synchronizing device are returned to their initial positions after the safety gears have been engaged and the safety gear has subsequently been triggered.

[0076] It is also conceivable that two at least partially oppositely acting springs are engaged between the safety gear housing and the first part lever to hold the pivot lever in a ready position from which it can move away in two opposite directions. This allows the synchronizing device to be used to engage the safety gears both during downward movement of the car along the elevator shaft and during upward movement.

FIGURE LIST

[0077]

Fig. 1 shows the arrangement of an overspeed governor and a car.

Fig. 2 shows a section of a synchronizing device known from the prior art.

Fig. 3 shows the sag occurring in a synchronizing device known from the prior art at one of the two pivot levers.

Fig. 4 shows the arrangement of a prior art synchronizing system on the car.

Figs. 5 and 6 show a section of a synchronizing device of an elevator according to the invention in the starting position.

Fig. 7 shows the movement sequences of the synchronizing device when the safety gear is triggered.

Fig. 8 shows the coupling lever in detail.

Fig. 9 shows a section of the synchronizing device in sectional view.

Fig. 10 shows a section of the synchronizing device in exploded view.

EXAMPLE

[0078] The operation of the invention is exemplified with reference to Figs. 5-10.

[0079] First, with reference to Figs. 5-7, the basic operation of the synchronizing device 9 is explained.

[0080] For better illustration, not all elements are provided with reference signs in Fig. 7. It should also be noted that the dashed elements shown in Fig. 7 indicate the position and orientation of the synchronizing device 9 after the safety gear 3 has been triggered.

[0081] The synchronizing unit 9 is usually connected to the overspeed governor or to its governor cable (not shown) via the activating element 8. This type of triggering is tried and tested and therefore preferred. Nevertheless, it is not mandatory that the overspeed governor be triggered by a rope braked via one of its deflection pulleys. Other types of overspeed governors are also known which generate an actuating force or actuating tractive force in the event of overspeed. Here, for example, one may think of triggering systems which could be called "rail anchor systems". These are slides that "brake" on a guide rail in the event of overspeed, thereby executing a relative movement to the car and consequently generating an actuating force.

[0082] The synchronizing device 9 as well as the two safety gears 3, of which only one can be seen, are in their initial position in Figs. 5 and 6. This means that the safety gear is not in engagement with the guide rail.

[0083] As soon as the overspeed governor detects an impermissibly high downward movement of the car 2 along the elevator shaft, which is not shown, it brakes the governor rope, which is also not shown, relative to the car 2. Consequently, the governor rope remains behind the elevator car 2. Since the activating element 8 is tensioned between two ends of the governor rope by means of the eyelets 27, the lagging of the governor rope relative to the car 2 causes the activating element 8 to make a translatable relative movement in the opposite direction of travel of the car 2.

[0084] The coupling lever 11 may be initially, in an untriggered state, in a position, in which its one arm facing the safety gear projects obliquely upwards, while its other arm facing the activating element projects obliquely downwards. The coupling lever 11 is connected by one of its arms 15 to the activating element 8. When triggered, it performs a counterclockwise rotational movement due to the upward movement of the activating element 8. The rotational movement occurs about its rotational axis 13. A translatory movement of the coupling lever 11 does not take place. The coupling lever 11 is connected to the pivot lever 18 via the axle pin 23 by means of a further arm 15 facing away from the activating element 8. For this purpose, the coupling lever and the pivot lever overlap each other.

[0085] Expediently, a straight slot 12 is provided in said arm 15 of the coupling lever 11 through which the axle pin 23 protrudes.

[0086] Due to this, a rotation of the coupling lever 11 results in a force being exerted on the axle pin 23 projecting through the straight slot 12 in the direction of rotation. This results in a movement of the axle pin 23 both in the direction of rotation of the coupling lever 11 and in the direction of the end of the straight slot 12 facing the pivot lever 18.

[0087] Consequently, the axle pin 23 performs a movement composed of a rotational movement and of a translational movement. This is illustrated with reference to the arrows 54 and 55 in Fig. 7. Since the axle pin 23 protrudes through a bore 36 of the pivot lever 18, the movement of the axle pin 23 is transmitted to the pivot lever 18.

[0088] It is preferred that the straight slot 12 is provided in the arm of the coupling lever 11. Although not preferred, there are also cases in which the straight slot 12 is instead provided in the torsion bar, in the area of one of its ends. Said straight slot causes the pivot lever 18 to perform both a rotational movement about its pivot axis 21 and a translational movement dictated by the movement of the axle pin 23. This is possible because the pivot lever 18 has an oblong hole 38 in the area where the pin 28, which predetermines the pivot axis 21 of the pivot lever 18, protrudes through the pivot lever 18. Relative to the pin 28, the pivot lever 18 thus performs both a translational movement and a rotational movement in the clockwise direction, as illustrated by the arrows 56 and 57 in Fig. 7.

[0089] At its end remote from the coupling lever 11, the pivot lever 18 is connected to the clamping body 4 of a safety gear 3 via an axle pin 25. This connection is such that the pivot lever 18 can rotate relative to the clamping body 4 about the axle pin 25, but otherwise imposes its movement on the clamping body 4.

[0090] This results in the clamping body 4 performing a purely translatable movement in relation to the rest of the safety gear 3 in the direction towards the guide rail, which is not shown. The direction of movement of the clamping body 4 is made clear in Fig. 7 by an arrow 58. As soon as the clamping body 4 has reached its upper end position, which is shown dashed in Fig. 7, the guide rail is clamped between the clamping body 4 and the brake lining 51 of the safety gear 3. This causes the car 2, to which the safety gear 3 is attached, to be braked.

[0091] In order to achieve a uniform application of force to the pivot lever 18, the pivot lever 18 projects through an opening 6 of the safety gear housing 5 into the safety gear 3. The point of application of force of the pivot lever 18 in relation to the clamping body 4 then lies centrally above the centre of gravity of the clamping body 4.

[0092] In order to achieve a uniform application of force to the car 2 when braking the car 2, the car 2 is provided with a further, not shown, safety gear. It is located opposite the first safety gear and, when triggered, enters into braking engagement with a further guide rail. The second brake device is triggered by a second pivot lever, which is also not shown.

[0093] This second pivot lever is actuated, in the same way as the first pivot lever 18, by a second coupling lever.

This second coupling lever performs the same movement as the first coupling lever 11.

[0094] However, the second coupling lever is not actuated by an activating element, although this would also be a conceivable embodiment of the synchronizing device 9 according to the invention.

[0095] Instead, the movement of the second coupling lever is generated by means of the synchronizing element 10 designed as a shaft. For this purpose, the first coupling lever 11 is flanged to the synchronizing element 10 by means of two screws 32. This causes the synchronizing element 10 to perform a rotational movement about the axis of rotation 13, which is also the longitudinal axis of the synchronizing element 10. Since the second coupling lever is flanged to the synchronizing element 10 in the same way as already the first coupling lever 11, this leads to a corresponding rotational movement of the second coupling lever, namely in synchronism with the rotational movement of the first coupling lever 11.

[0096] In this case, the second pivot lever is moved so that it engages the clamping body of the second safety gear with the second guide rail.

[0097] The synchronizing element 10 is secured to the car frame 2 by means of two tabs 24 such that it can perform a rotation about their longitudinal axis, but cannot perform a translational relative movement to the car frame 2 in or against the direction of movement of the car 2 along the elevator shaft.

[0098] In order to bring the pivot lever 18 back into its initial position after the safety gear has been triggered and to hold it there (as long as the activating element 8 is not activated by the safety gear), a tension spring 26 is provided. This tension spring is attached at one end to the safety gear 3 and at its other end to one of the through bores 35 of the pivot lever 18.

[0099] With reference to Figs. 8 to 10, the type of connection of the individual components of the synchronizing device 9 becomes clear.

[0100] The coupling lever 11 is connected to the activating element 8 by means of the screw 29. For this purpose, the screw 29 is inserted both through the bore 31 of the activating element 8 and through the bore 30 of the coupling lever 11. Then it is screwed - mostly on the side of the coupling lever 11 facing away from the activating element 8 - with a nut.

[0101] The coupling lever 11 is connected to the synchronizing element 10 by screwing the screws 32 through the arc slots 17 into the bores 34 of the flange 33. The coupling lever 11 is centred on the synchronizing element 10 by means of the shaft shoulder 52 forming a bearing seat, onto which the coupling lever 11 is pushed with its bearing eye 49.

[0102] The coupling lever 11 is connected to the pivot lever 18 by means of the aforementioned axle pin 23, which projects through a straight slot 12 of the coupling lever 11 and a bore 36 of the pivot lever 18.

[0103] In order to prevent the coupling lever 11 and the pivot lever 18 from lifting away from each other in the

direction of the longitudinal axis of the axle pin 23, the axle pin 23 is screwed with a nut on the side of the pivot lever 18 facing away from the coupling lever 11. The pin 28 forming the pivot axis 21 of the pivot lever 18 is inserted through the oblong hole 38 of the pivot lever 18 as well as a hole provided in the car frame 2, and is screwed by means of two nuts in such a way that the pivot lever 18 does not perform any translatory movement in the direction of the pivot axis 21.

[0104] Movement as a result of elastic deformation of the pivot lever 18 due to any forces acting on it is thereby neglected. At its end facing the clamping body 4, the pivot lever 18 has a bore 37 through which the axle pin 25 connecting the pivot lever 18 to the clamping body 4 projects.

[0105] An advantage of this embodiment of the synchronizing device 9 is that the two safety gears are triggered synchronously.

[0106] Since the activating element 8 engages the first coupling lever 11 and not the first pivot lever 18, it is ensured that any sagging of the second pivot lever - if it occurs - can also be observed at the first pivot lever 18. Accordingly, even in the event that the pivot levers were to sag, the triggering of the safety gears would be synchronous. However, in the embodiment of the synchronizing device 9 shown, sagging of the pivot levers does not take place anyway, or only to a negligible extent. This will be explained below with reference to the first pivot lever 18.

[0107] Due to the fact that the pivot lever 18 does not (mainly) rotate about the longitudinal axis of the synchronizing element 10 like the pivot levers known from the prior art, but about an additional pivot axis 21, the torque counteracting the pivoting movement of the pivot lever 18 is significantly reduced - i.e. the torque resulting from the dead weight of the pivot lever 18 and the weight of the clamping body 4.

[0108] In accordance with the invention, the pivot axis 21 is allowed to move closer to the resulting point of application of the weight force, so that the lever arm is smaller.

[0109] As a result, the pivot arm 18 has a lesser tendency to counteract the rotational movement of the synchronizing element 10 or the coupling lever 11, which ultimately results in a significantly reduced sag of the pivot lever 18. This applies both to the first pivot lever 18 and to the second pivot lever opposite thereto.

[0110] In addition, two arc slots 17 are provided on the coupling lever 11, through which screws 32 protrude to flange the coupling lever 11 to the flange 33 of the synchronizing element 10. These arc slots 17 offer the possibility that any sag of the pivot lever 18 with respect to the coupling lever 11, or of the second coupling lever with respect to the first coupling lever 11, or of the second pivot lever with respect to the first pivot lever 18, can be compensated for from the outset. For this purpose, the coupling lever 18 can be rotated during assembly before being fixed by means of the screws 32 on the flange 33 in such a way that the sag which occurs later and which

would lead to an asynchronous triggering of the two braking devices is compensated. In Fig. 8, the arrows 53 illustrate how the orientation of the coupling lever 11 can be varied prior to assembly.

[0111] In addition, it should be mentioned that in the illustrated embodiment, the synchronizing device 9 shown only causes the safety gears to be triggered when the car is moving downwards too fast.

[0112] However, the synchronizing device 9 can in principle also be used to trigger the safety gears when the car 2 moves upwards too quickly. For this purpose, it is only necessary to provide safety gears whose clamping body, starting from the initial position, can be brought into engagement with the guide rail both by a downward movement (relative to the rest of the safety gear) and by an upward movement. When such safety gears are used, the synchronizing device 9 can then be mounted so that the pivot lever 18 and the coupling lever 11 are arranged in their initial position such that their central longitudinal axes 22 and 14 are approximately coaxial with each other. Depending on whether the activating element 8 is then pulled upwards or downwards by the governor rope braked by the safety gear, the pivoting movement of the pivot lever 18 then takes place in clockwise or counterclockwise direction.

Other

[0113] Disclosed is the fact that no one-piece rigid pivot lever is to be installed or used between a safety gear 3 and the activating element 8 which activates it in the event of tripping, but rather a cascade of levers or a two-part or multi-part pivot lever which is movable in itself in the broader sense - e.g. comprising a pivot lever 18 (in the narrower sense) and a coupling lever 11 - which pivots about at least two different axes which are fixed as such to the car, of which preferably one axis is an axis with a translatory degree of freedom. Such a pivot lever designed as a "lever cascade" is suitable for bridging a large distance between the safety gear 3 and the activating element 8 without at the same time causing a significant increase in the lever arm effect. This is of particular importance for suspension belt lifts, where larger distances naturally have to be bridged without having to build special safety gears for this purpose.

REFERENCE LIST

[0114]

- 1 Elevator
- 2 Car/car frame
- 3 Safety gear
- 4 Clamping body

- 5 Safety gear housing
- 6 Opening of the safety gear housing
- 5 7 Overspeed governor
- 8 Activating element
- 9 Synchronizing device
- 10 Synchronizing element / Shaft
- 11 Coupling lever
- 15 12 Straight slot
- 13 Geometric axis of the coupling lever/axis of rotation
- 20 14 Central longitudinal axis
- 15 Long arms of the coupling lever
- 16 Short arms of the coupling lever
- 25 17 Arc slot
- 18 Pivot lever
- 30 19 Arm sections
- 20 Hinge area
- 21 Pivot axis/car-fixed axis of the pivot lever
- 35 22 Central longitudinal axis
- 23 Axle pin
- 40 24 Tab
- 25 Axle pin
- 26 Spring
- 45 27 Eyelets
- 28 Pin
- 50 29 Screw
- 30 Bore
- 31 Bore
- 55 32 Screws
- 33 Flange

34	Bores			activating element (8) controlled by the overspeed governor which, in the event of overspeed, applies a brake actuating force preferably in the form of a tractive force, which is transmitted to the safety gears (3) via a synchronizing device (9) for synchronous triggering, the synchronizing device (9) having a pivot lever (18) for each safety gear (3) which is hinged on its one end side in an hinge area (20) on the clamping body (4) of the safety gear (3), and is connected on the other side via a synchronizing element (10) to another pivot lever (18) which is assigned to another safety gear (3), characterized in that a translatory movement is superimposed on the pivot levers (18) relative to their pivot axis (21), causing said hinge area (20) of the respective pivot lever (18) to perform a resultant movement which is translatory.
35	Bores			
36	Bore	5		
37	Bore			
38	Oblong hole	10		
39	Governor rope			
40	Rope tensioner			
41	Synchronizing element of a conventional synchronizing device	15		
42	Pivot lever of a conventional synchronizing device		2.	The elevator (1) according to claim 1, characterized in that the pivot lever (18) is actuated by a coupling lever (11) during triggering, the pivot lever (18) and the coupling lever (11) also being coupled translationally relative to one another in their coupling area during triggering, and preferably in that an axle pin (23) of one of these levers (11, 18) is held movably in a straight slot (12) of the other of these levers (11, 18).
43	Connecting member of a conventional synchronizing device	20		
44	Belts			
45	Deflection pulleys of the car	25		
46	Guide rail			
47	Pivot axis of a conventional synchronizing device	30	3.	The elevator (1) according to claim 2, characterized in that the two levers (11, 18) always pivot in opposite directions.
48	Activating element of a conventional synchronizing device		4.	The elevator (1) according to any one of the preceding claims, characterized in that the pivot lever (18) is pivotally mounted on a car-fixed axis (21) in such a way that the pivot lever (18) can additionally execute a translatory movement relative to its car-fixed axis (21).
49	Coupling lever bearing eye	35		
50	Deflection pulley of the rope tensioner		5.	The elevator (1) according to any one of claims 2 to 4 when dependent on claim 2, characterized in that the coupling lever (11) rotates about a further geometric car-fixed axis (13) without having the possibility of an additional translatory movement relative to said axis (13).
51	Brake linings			
52	Shaft shoulder	40		
53	Arrow to indicate the direction of movement		6.	The elevator (1) according to claim 5, characterized in that the car-fixed axis of rotation (13) for the coupling lever (11) is formed by one end of the synchronizing element (10), which in turn is pivotally mounted on the car (2) or car frame (2), preferably by a tab (24) which can be mounted on the car frame (2).
54	Arrow to indicate the direction of movement	45		
55	Arrow to indicate the direction of movement			
56	Arrow to indicate the direction of movement			
57	Arrow to indicate the direction of movement	50		
58	Arrow to indicate the direction of movement		7.	The elevator (1) according to any one of claims 2 to 6 when dependent on claim 2, characterized in that the synchronizing device (9) can activate the safety gears (3) bidirectionally, i.e. both during downward travel and during upward travel, preferably from a
Claims				
1.	An elevator (1) with a car (2) and at least two safety gears (3) mounted at a distance from one another on the car (2), as well as an overspeed governor with an	55		

ready position in which the largest central longitudinal axes (22, 14) of the pivot lever (18) and of the coupling lever (11) are aligned, **in that** the coupling lever (11) can be pivoted out of its ready position either clockwise or counterclockwise, thereby pivoting the pivot lever (18) counterclockwise or clockwise.

8. The elevator (1) according to claim 6 or 7, **characterized in that** the synchronizing element (10) is a shaft (10) subjected substantially only to torsion, the rotation of which controls the pivot levers (18) via the coupling levers (11). 10
9. The elevator (1) according to claim 8, **characterized in that** said shaft (10) is flanged at least to a coupling lever (11) in such a way that the coupling lever (11) can be fixed to the shaft (10) in different rotational positions. 15
10. The elevator (1) according to any one of the preceding claims, **characterized in that** the pivot lever (18) is directly hinged to the clamping body (4) and for this purpose is connected to the clamping body (4) - preferably via an axle pin (25). 20 25
11. The elevator (1) according to the immediately preceding claim, **characterized in that** the pivot lever (18) engages through an opening (6) of the safety gear housing (5) up to the safety gear housing (5) in order to interact there with the clamping body (4). 30
12. The elevator (1) according to any one of claims 2 to 11 when dependent on claim 2, **characterized in that** the pivot lever (18) has arm sections (19) extending in opposite directions away from the car-fixed axis (21) about which the pivot lever (18) pivots, and/or that the coupling lever (11) has arm sections (19) extending in opposite directions away from the car-fixed axis (13) about which the coupling lever (11) pivots. 35 40
13. The elevator (1) according to any one of claims 2 to 12 when dependent on claim 2, **characterized in that** the pivot lever (18) has a greater extension along its main longitudinal axis (22) than the coupling lever (11) along its main longitudinal axis (14). 45
14. The elevator (1) according to any one of claims 2 to 13 when dependent on claim 2, **characterized in that** the coupling lever (11) has a cross shape, preferably with two long arms (15) - which are usually diametrically opposite the bearing eye (49) of the coupling lever (11) - and two short arms (16) - which are usually diametrically opposite the bearing eye (49) of the coupling lever (11) - wherein preferably one long arm (15) has a straight slot (12) and preferably both short arms (16) each have at least one

arc slot (17).

15. The elevator (1) according to any one of the preceding claims, **characterized in that** at least one spring (26) is provided for returning the pivot lever (18) to its ready position, which spring is preferably suspended between the housing (5) of a safety gear (3) and the pivot lever (18). 5

Patentansprüche

1. Ein Aufzug (1) mit einer Kabine (2) und mindestens zwei Sicherheitsvorrichtungen (3), die in einem Abstand voneinander an der Kabine (2) montiert sind, sowie einem Geschwindigkeitsbegrenzer mit einem durch den Geschwindigkeitsbegrenzer gesteuerten Auslöseelement (8), welches im Falle einer Übergeschwindigkeit eine Bremsbetätigungskraft, vorzugsweise in Form einer Zugkraft, aufbringt, die über eine Synchronisiereinrichtung (9) zur synchronen Auslösung auf die Sicherheitsvorrichtungen (3) übertragen wird, wobei die Synchronisiereinrichtung (9) für jede Sicherheitsvorrichtung (3) einen Schwenkhebel (18) aufweist, der an seinem einen Endbereich in einem Schwenkbereich (20) am Klemmkörper (4) der Sicherheitsvorrichtung (3) angelenkt ist und auf der anderen Seite über ein Synchronisierelement (10) mit einem anderen Schwenkhebel (18) verbunden ist, der einer anderen Sicherheitsvorrichtung (3) zugeordnet ist, **dadurch gekennzeichnet, dass** den Schwenkhebeln (18) relativ zu ihrer Schwenkachse (21) eine translatorische Bewegung überlagert ist, wodurch der jeweilige Schwenkbereich (20) des entsprechenden Schwenkhebels (18) eine resultierende Bewegung ausführt, die translatorisch ist. 10 20 25 30 35 40
2. Der Aufzug (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** der Schwenkhebel (18) bei der Auslösung durch einen Kupplungshebel (11) betätigt wird, wobei der Schwenkhebel (18) und der Kupplungshebel (11) auch während der Auslösung relativ zueinander in ihrem Kupplungsbereich translatorisch gekoppelt sind, und vorzugsweise dadurch, dass ein Achszapfen (23) eines dieser Hebel (11, 18) beweglich in einem geraden Schlitz (12) des anderen dieser Hebel (11, 18) gehalten ist. 45
3. Der Aufzug (1) nach Anspruch 2, **dadurch gekennzeichnet, dass** die beiden Hebel (11, 18) stets in entgegengesetzte Richtungen schwenken. 50
4. Der Aufzug (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Schwenkhebel (18) derart schwenkbar auf einer kabinenfesten Achse (21) gelagert ist, dass der Schwenkhebel (18) zusätzlich eine translatorische 55

Bewegung relativ zu seiner kabinenfesten Achse (21) ausführen kann.

5. Der Aufzug (1) nach einem der Ansprüche 2 bis 4, sofern Anspruch 2 zugrunde liegt, **dadurch gekennzeichnet, dass** der Kupplungshebel (11) um eine weitere geometrische kabinen feste Achse (13) rotiert, ohne dass dieser relativ zu dieser Achse (13) eine zusätzliche translatorische Bewegung ausführen kann.
6. Der Aufzug (1) nach Anspruch 5, **dadurch gekennzeichnet, dass** die kabinen feste Rotationsachse (13) für den Kupplungshebel (11) durch ein Ende des Synchronisierelements (10) gebildet ist, das seinerseits schwenkbar an der Kabine (2) oder am Kabinenrahmen (2) gelagert ist, vorzugsweise durch eine Lasche (24), die am Kabinenrahmen (2) montierbar ist.
7. Der Aufzug (1) nach einem der Ansprüche 2 bis 6, sofern Anspruch 2 zugrunde liegt, **dadurch gekennzeichnet, dass** die Synchronisiereinrichtung (9) die Sicherheitsvorrichtungen (3) bidirektional aktivieren kann, d.h. sowohl bei Abwärts- als auch bei Aufwärtsfahrten, vorzugsweise aus einer Bereitschaftsstellung heraus, in der die größten zentralen Längsachsen (22, 14) des Schwenkhebels (18) und des Kupplungshebels (11) ausgerichtet sind, wobei der Kupplungshebel (11) aus seiner Bereitschaftsstellung entweder im Uhrzeigersinn oder entgegen dem Uhrzeigersinn schwenkbar ist, wodurch der Schwenkhebel (18) gegen den Uhrzeigersinn bzw. im Uhrzeigersinn schwenkt.
8. Der Aufzug (1) nach Anspruch 6 oder 7, **dadurch gekennzeichnet, dass** das Synchronisierelement (10) eine Welle (10) ist, die im Wesentlichen nur einer Torsion unterliegt, deren Drehung die Schwenkhebel (18) über die Kupplungshebel (11) steuert.
9. Der Aufzug (1) nach Anspruch 8, **dadurch gekennzeichnet, dass** diese Welle (10) zumindest an einem Kupplungshebel (11) so angeflanscht ist, dass der Kupplungshebel (11) in unterschiedlichen Drehpositionen an der Welle (10) fixierbar ist.
10. Der Aufzug (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Schwenkhebel (18) direkt am Klemmkörper (4) angelenkt ist und zu diesem Zweck mit dem Klemmkörper (4) verbunden ist - vorzugsweise über einen Achszapfen (25).
11. Der Aufzug (1) nach dem unmittelbar vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** der Schwenkhebel (18) durch eine Öffnung (6) des Si-

cherheitsvorrichtungsgehäuses (5) bis in das Sicherheitsvorrichtungsgehäuse (5) hineinragt, um dort mit dem Klemmkörper (4) zusammenzuwirken.

12. Der Aufzug (1) nach einem der Ansprüche 2 bis 11, sofern Anspruch 2 zugrunde liegt, **dadurch gekennzeichnet, dass** der Schwenkhebel (18) Armabschnitte (19) aufweist, die in entgegengesetzte Richtungen von der kabinenfesten Achse (21) weg verlaufen, um die der Schwenkhebel (18) schwenkt, und/oder dass der Kupplungshebel (11) Armabschnitte (19) aufweist, die in entgegengesetzte Richtungen von der kabinenfesten Achse (13) weg verlaufen, um die der Kupplungshebel (11) schwenkt.
13. Der Aufzug (1) nach einem der Ansprüche 2 bis 12, sofern Anspruch 2 zugrunde liegt, **dadurch gekennzeichnet, dass** der Schwenkhebel (18) eine größere Ausdehnung entlang seiner Hauptlängsachse (22) aufweist als der Kupplungshebel (11) entlang seiner Hauptlängsachse (14).
14. Der Aufzug (1) nach einem der Ansprüche 2 bis 13, sofern Anspruch 2 zugrunde liegt, **dadurch gekennzeichnet, dass** der Kupplungshebel (11) eine Kreuzform aufweist, vorzugsweise mit zwei langen Armen (15) - die sich in der Regel diametral gegenüber dem Lagerauge (49) des Kupplungshebels (11) befinden - und zwei kurzen Armen (16) - die sich in der Regel diametral gegenüber dem Lagerauge (49) des Kupplungshebels (11) befinden - wobei vorzugsweise ein langer Arm (15) einen geraden Schlitz (12) aufweist und vorzugsweise beide kurzen Arme (16) jeweils mindestens einen Bogenschlitz (17) aufweisen.
15. Der Aufzug (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** mindestens eine Feder (26) zur Rückführung des Schwenkhebels (18) in seine Bereitschaftsstellung vorgesehen ist, welche Feder vorzugsweise zwischen dem Gehäuse (5) einer Sicherheitsvorrichtung (3) und dem Schwenkhebel (18) aufgehängt ist.

Revendications

1. Un ascenseur (1) avec une cabine (2) et au moins deux dispositifs de sécurité (3) montés à une certaine distance l'un de l'autre sur la cabine (2), ainsi qu'un limiteur de vitesse doté d'un élément d'activation (8) contrôlé par le limiteur de vitesse, qui, en cas de survitesse, applique une force de freinage, de préférence sous forme de force de traction, laquelle est transmise aux dispositifs de sécurité (3) via un dispositif de synchronisation (9) pour un déclenchement synchronisé, le dispositif de synchronisation (9) comportant un levier pivotant (18) pour chaque

- dispositif de sécurité (3), articulé à une extrémité dans une zone d'articulation (20) sur le corps de serrage (4) du dispositif de sécurité (3) et relié de l'autre côté via un élément de synchronisation (10) à un autre levier pivotant (18) associé à un autre dispositif de sécurité (3), **caractérisé en ce qu'un** mouvement de translation est superposé aux leviers pivotants (18) par rapport à leur axe de pivotement (21), ce qui fait que la zone d'articulation (20) du levier pivotant correspondant (18) effectue un mouvement résultant qui est translatatoire.
2. L'ascenseur (1) selon la revendication 1, **caractérisé en ce que** le levier pivotant (18) est actionné par un levier d'accouplement (11) lors du déclenchement, le levier pivotant (18) et le levier d'accouplement (11) étant également couplés de manière translationnelle l'un par rapport à l'autre dans leur zone d'accouplement lors du déclenchement, et de préférence **en ce qu'un** axe (23) de l'un de ces leviers (11, 18) est maintenu mobile dans une fente droite (12) de l'autre de ces leviers (11, 18).
 3. L'ascenseur (1) selon la revendication 2, **caractérisé en ce que** les deux leviers (11, 18) pivotent toujours dans des directions opposées.
 4. L'ascenseur (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le levier pivotant (18) est monté pivotant sur un axe fixe à la cabine (21) de sorte que le levier pivotant (18) peut également effectuer un mouvement de translation par rapport à son axe fixe à la cabine (21).
 5. L'ascenseur (1) selon l'une quelconque des revendications 2 à 4, quand dépendant de la revendication 2, **caractérisé en ce que** le levier d'accouplement (11) tourne autour d'un autre axe géométrique fixe à la cabine (13) sans possibilité d'effectuer un mouvement de translation supplémentaire par rapport à cet axe (13).
 6. L'ascenseur (1) selon la revendication 5, **caractérisé en ce que** l'axe de rotation fixe à la cabine (13) pour le levier d'accouplement (11) est formé par une extrémité de l'élément de synchronisation (10), qui est à son tour monté pivotant sur la cabine (2) ou sur le cadre de la cabine (2), de préférence par une patte (24) pouvant être montée sur le cadre de la cabine (2).
 7. L'ascenseur (1) selon l'une quelconque des revendications 2 à 6, quand dépendant de la revendication 2, **caractérisé en ce que** le dispositif de synchronisation (9) peut activer les dispositifs de sécurité (3) bidirectionnellement, c'est-à-dire aussi bien lors du déplacement vers le bas que vers le haut, de préférence à partir d'une position de repos dans laquelle les plus grands axes longitudinaux centraux (22, 14) du levier pivotant (18) et du levier d'accouplement (11) sont alignés, **en ce que** le levier d'accouplement (11) peut être pivoté hors de sa position de repos soit dans le sens horaire soit dans le sens antihoraire, pivotant ainsi le levier pivotant (18) dans le sens antihoraire ou horaire.
 8. L'ascenseur (1) selon la revendication 6 ou 7, **caractérisé en ce que** l'élément de synchronisation (10) est un arbre (10) soumis essentiellement uniquement à une torsion, dont la rotation contrôle les leviers pivotants (18) via les leviers d'accouplement (11).
 9. L'ascenseur (1) selon la revendication 8, **caractérisé en ce que** cet arbre (10) est fixé au moins à un levier d'accouplement (11) de manière à ce que le levier d'accouplement (11) puisse être fixé à l'arbre (10) dans différentes positions de rotation.
 10. L'ascenseur (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le levier pivotant (18) est directement articulé au corps de serrage (4) et, à cette fin, relié au corps de serrage (4) - de préférence via un axe d'essieu (25).
 11. L'ascenseur (1) selon la revendication immédiate précédente, **caractérisé en ce que** le levier pivotant (18) traverse une ouverture (6) du boîtier (5) du dispositif de sécurité jusqu'à l'intérieur du boîtier (5) du dispositif de sécurité afin d'interagir avec le corps de serrage (4).
 12. L'ascenseur (1) selon l'une quelconque des revendications 2 à 11, quand dépendant de la revendication 2, **caractérisé en ce que** le levier pivotant (18) comporte des sections de bras (19) s'étendant dans des directions opposées à partir de l'axe fixe à la cabine (21) autour duquel le levier pivotant (18) pivote, et/ou **en ce que** le levier d'accouplement (11) comporte des sections de bras (19) s'étendant dans des directions opposées à partir de l'axe fixe à la cabine (13) autour duquel le levier d'accouplement (11) pivote.
 13. L'ascenseur (1) selon l'une quelconque des revendications 2 à 12, quand dépendant de la revendication 2, **caractérisé en ce que** le levier pivotant (18) a une extension plus grande le long de son axe longitudinal principal (22) que le levier d'accouplement (11) le long de son axe longitudinal principal (14).
 14. L'ascenseur (1) selon l'une quelconque des revendications 2 à 13, quand dépendant de la revendication 2, **caractérisé en ce que** le levier d'accouplement (11) a une forme en croix, de préférence avec deux longs bras (15) - qui se trouvent généralement

diamétralement opposés à l'œillet de palier (49) du levier d'accouplement (11) - et deux bras courts (16) - qui se trouvent généralement diamétralement opposés à l'œillet de palier (49) du levier d'accouplement (11) - dans lesquels de préférence un long bras (15) 5 comporte une fente droite (12) et, de préférence, les deux bras courts (16) comportent chacun au moins une fente arquée (17).

15. L'ascenseur (1) selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**au 10 moins un ressort (26) est prévu pour ramener le levier pivotant (18) dans sa position de repos, lequel ressort est de préférence suspendu entre le boîtier 15 (5) d'un dispositif de sécurité (3) et le levier pivotant (18).

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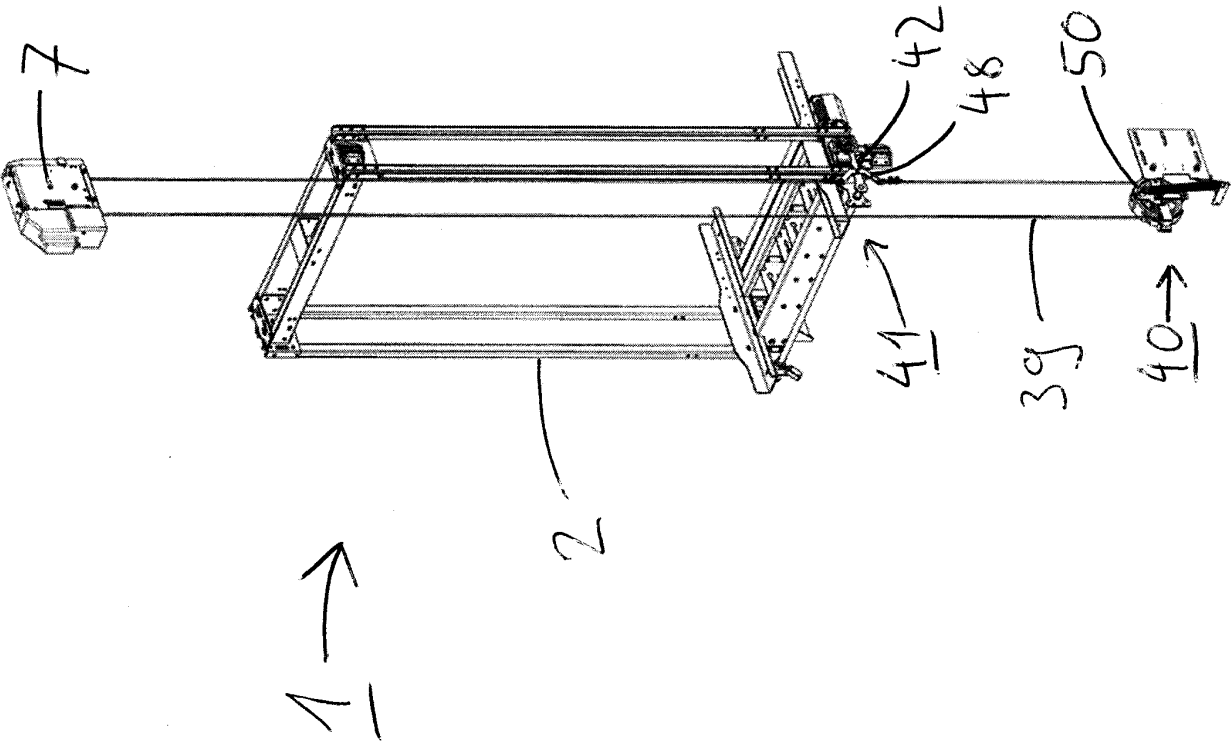


Fig. 1

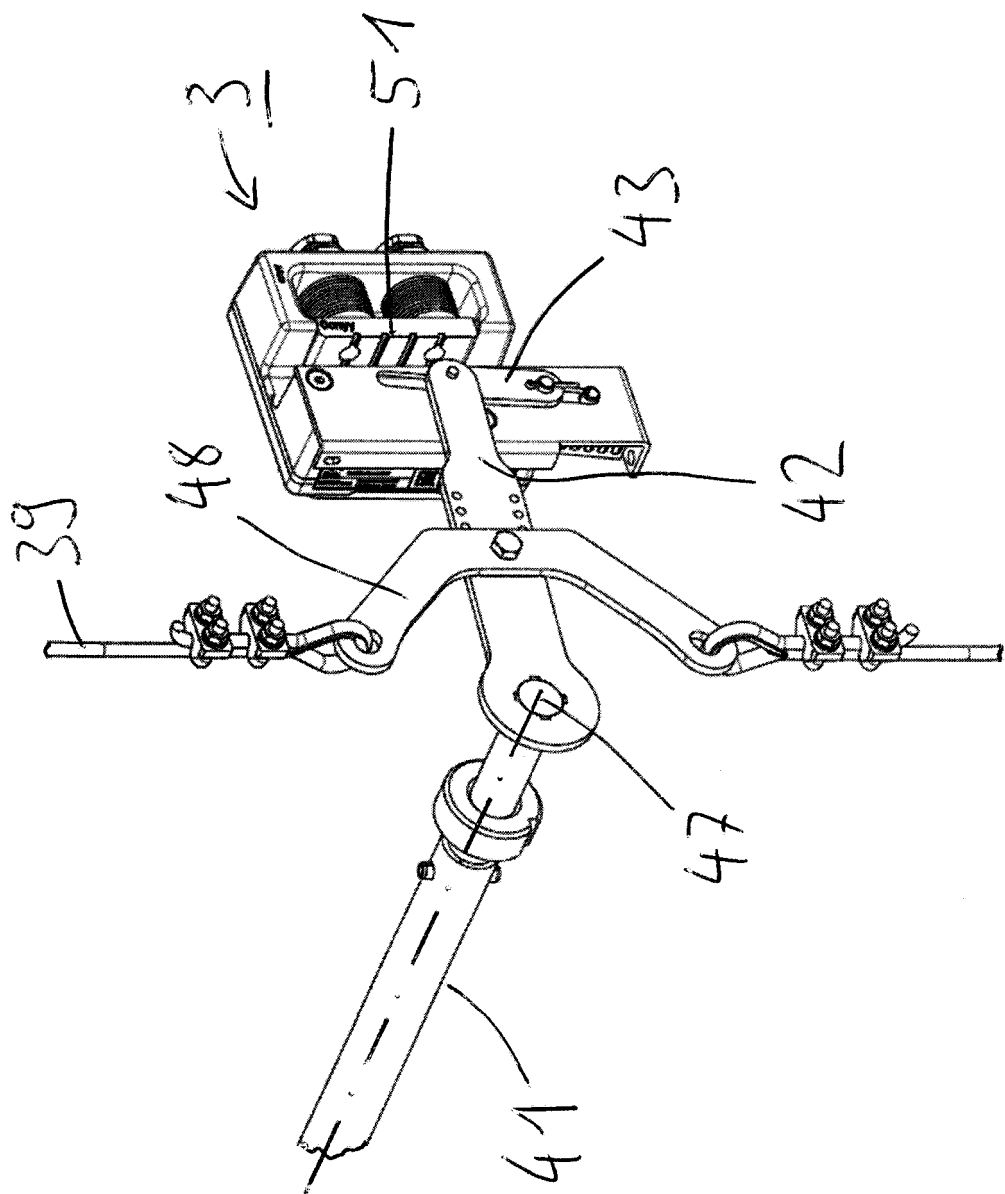


Fig. 2

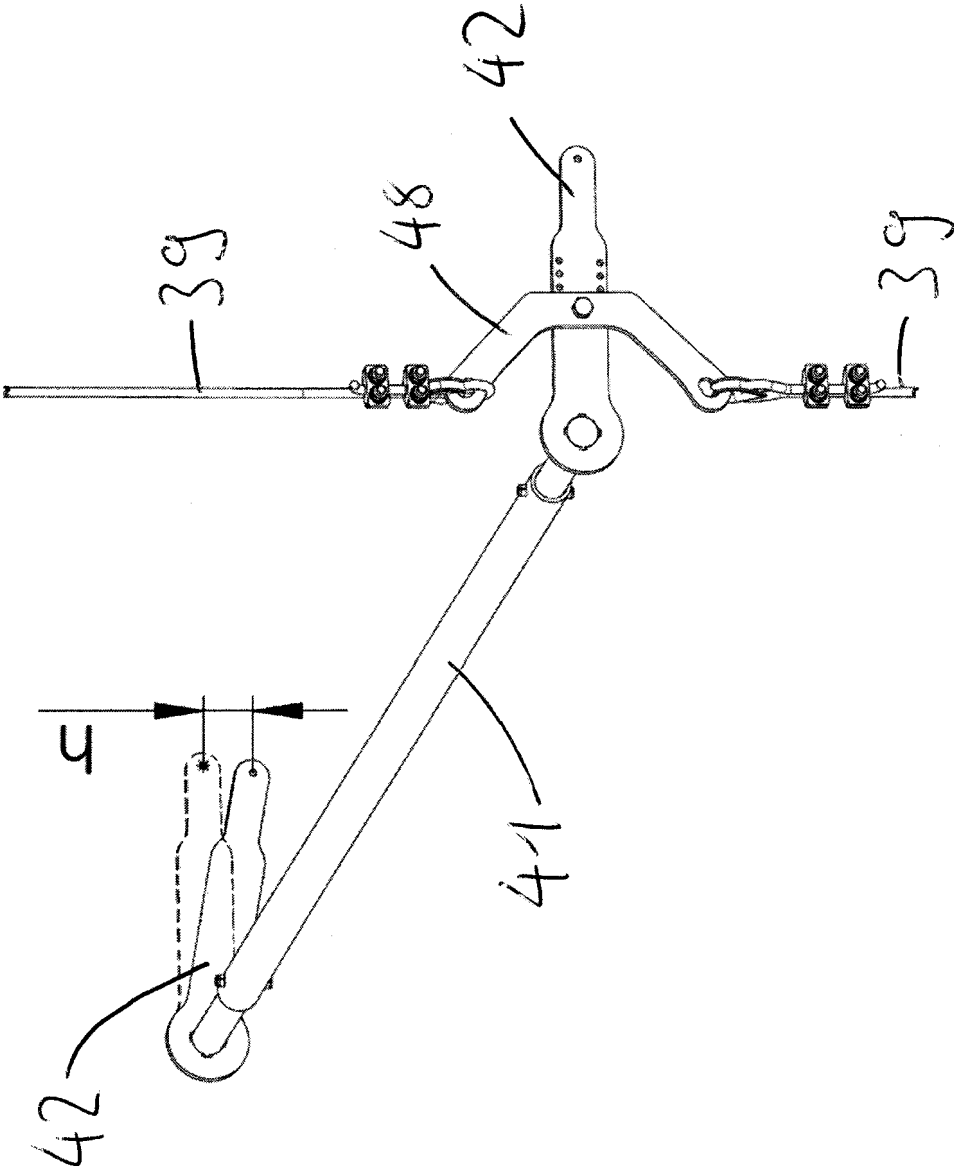


Fig. 3

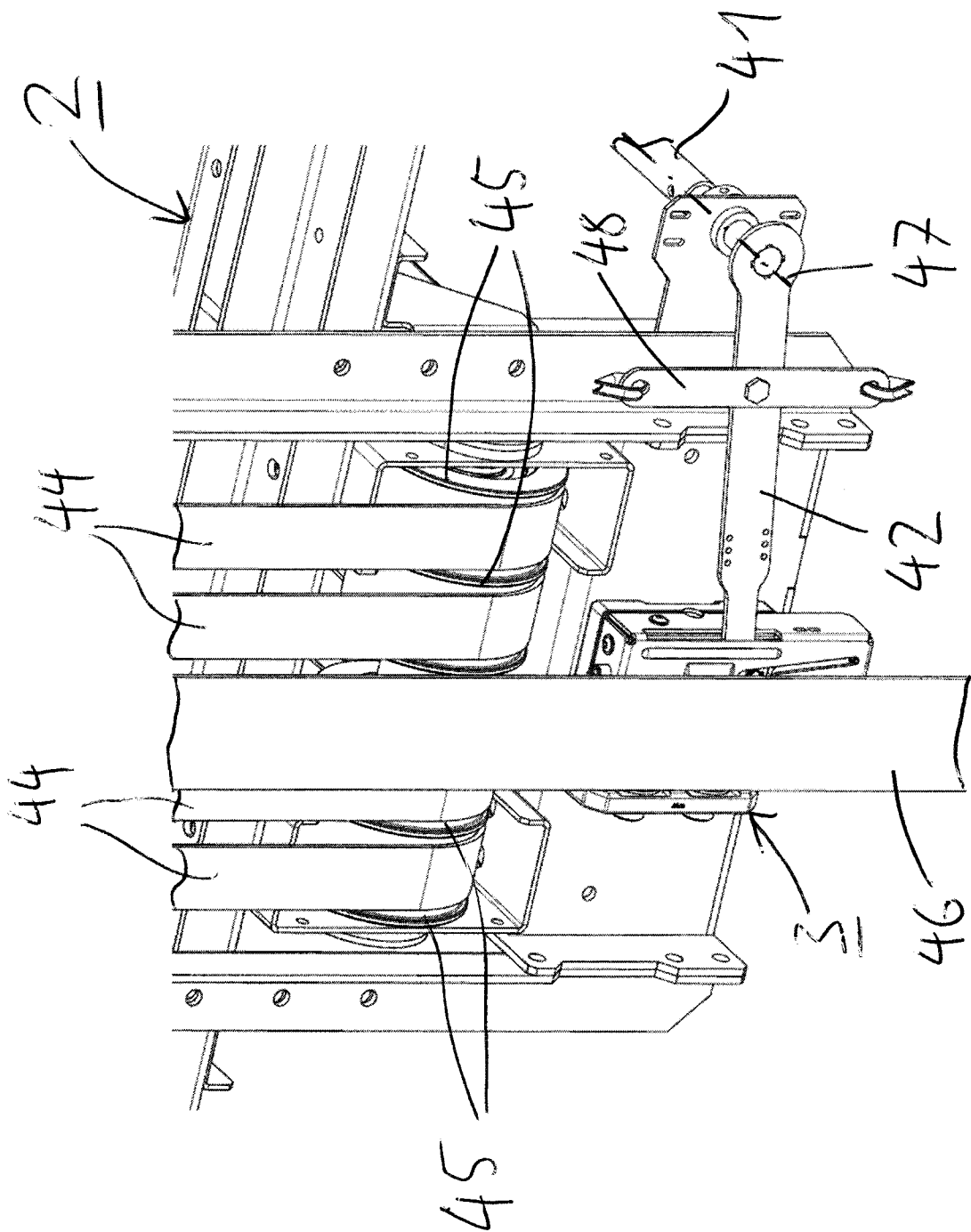


Fig. 4

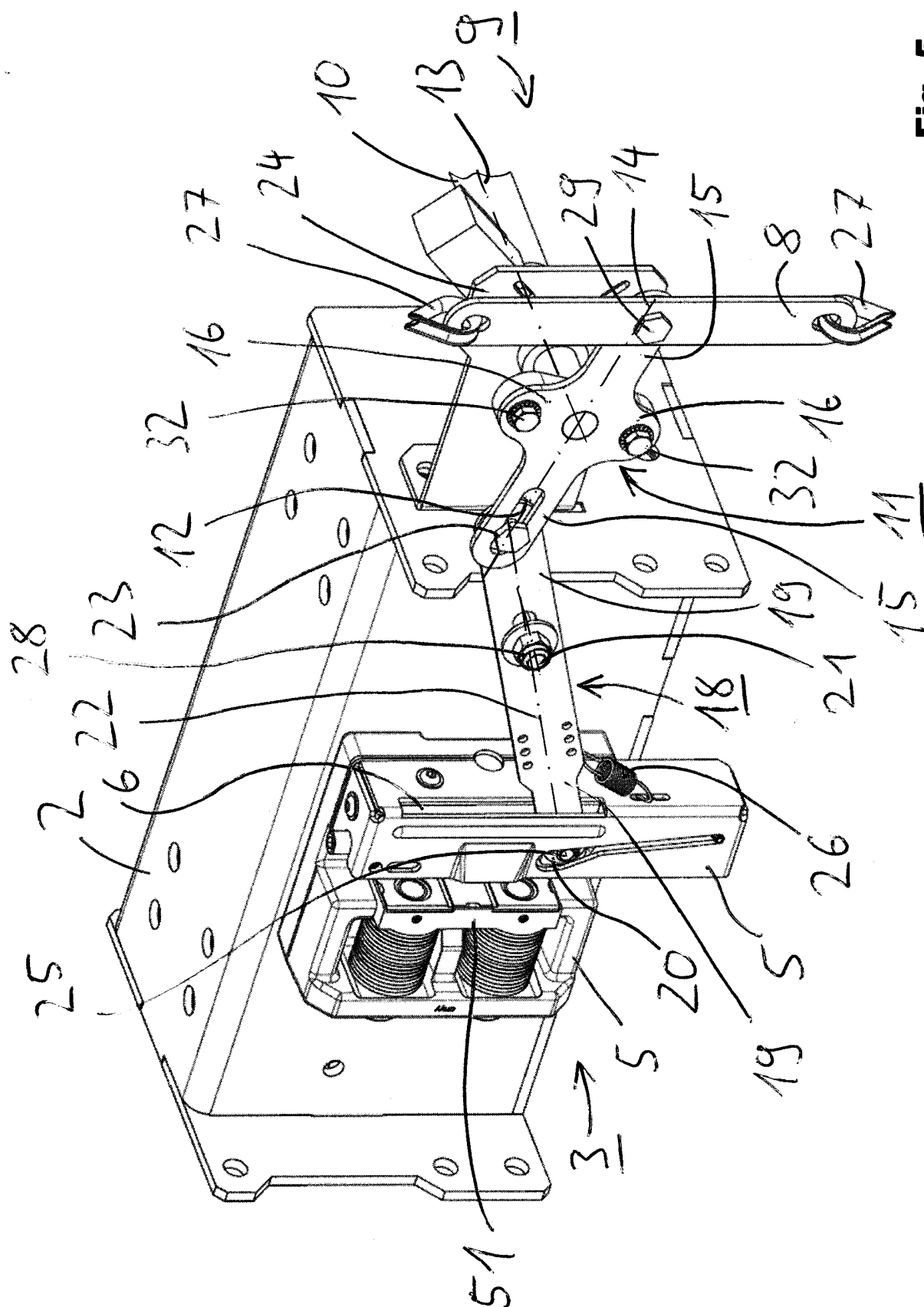


Fig. 5

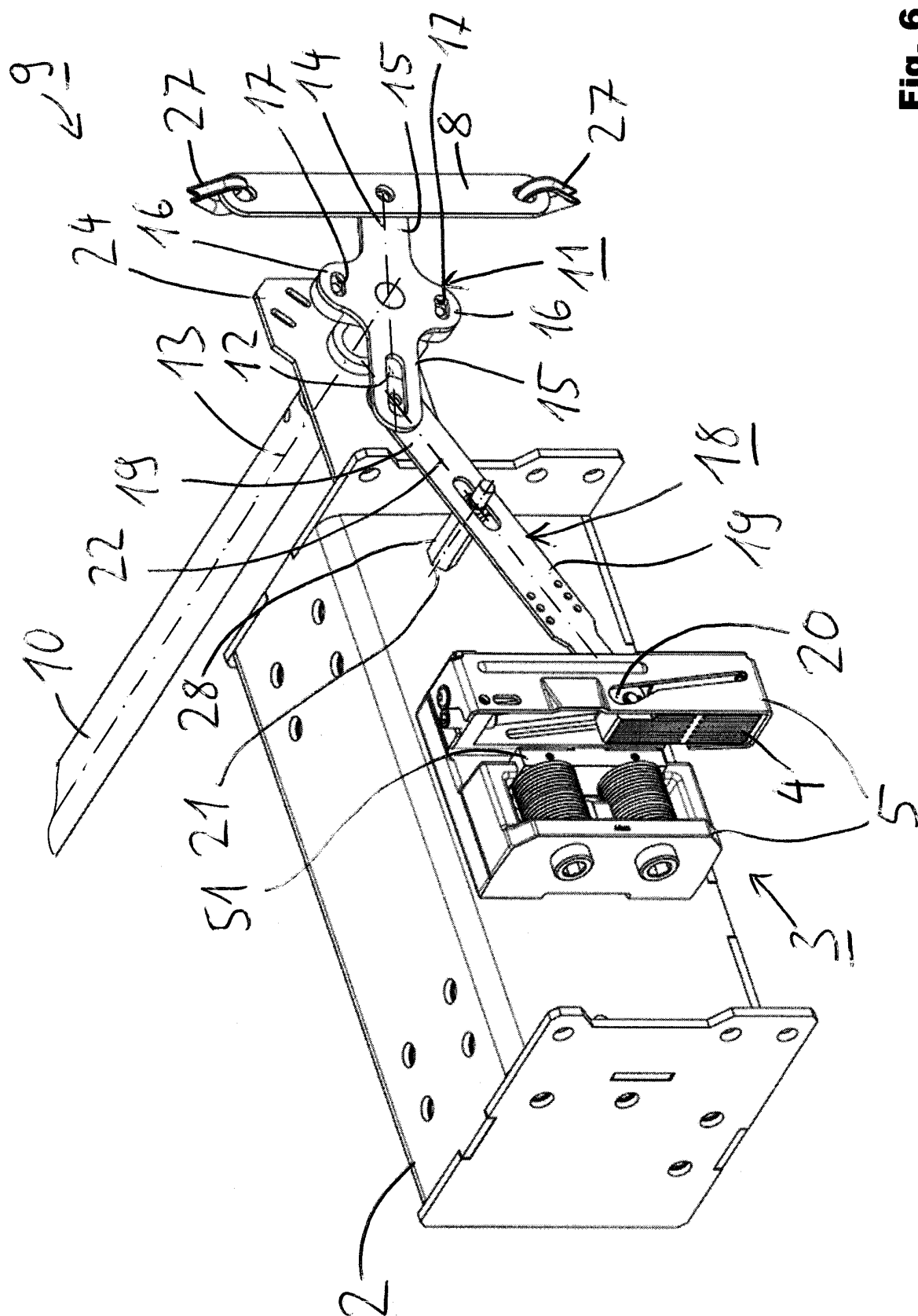


Fig. 6

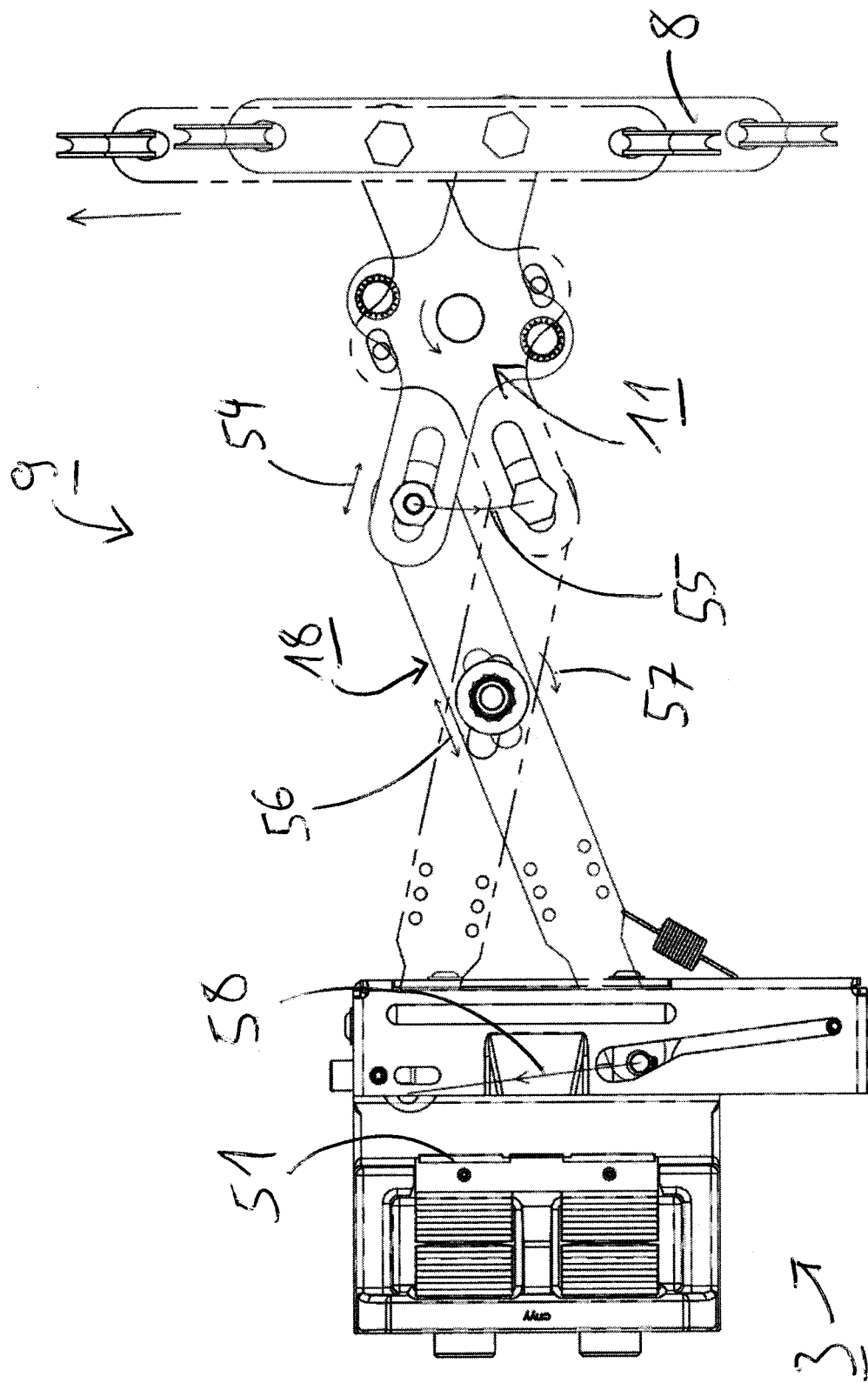


Fig. 7

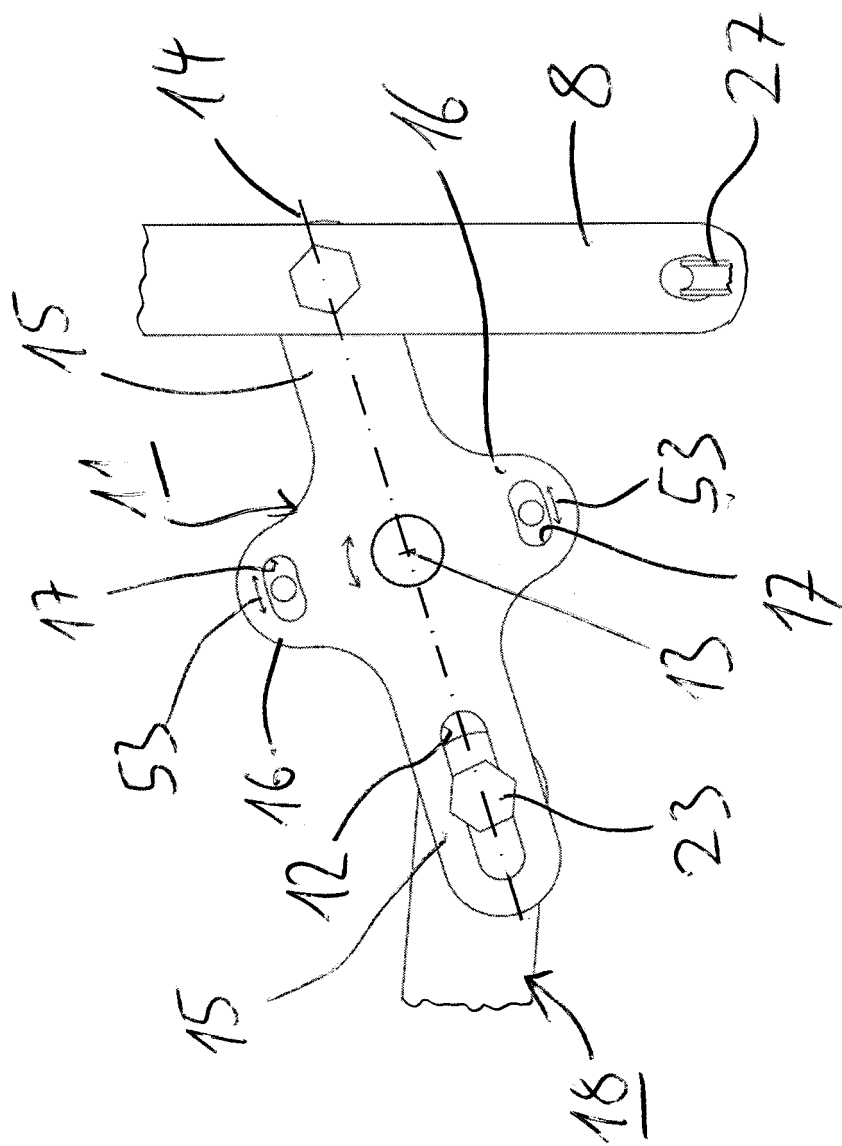


Fig. 8

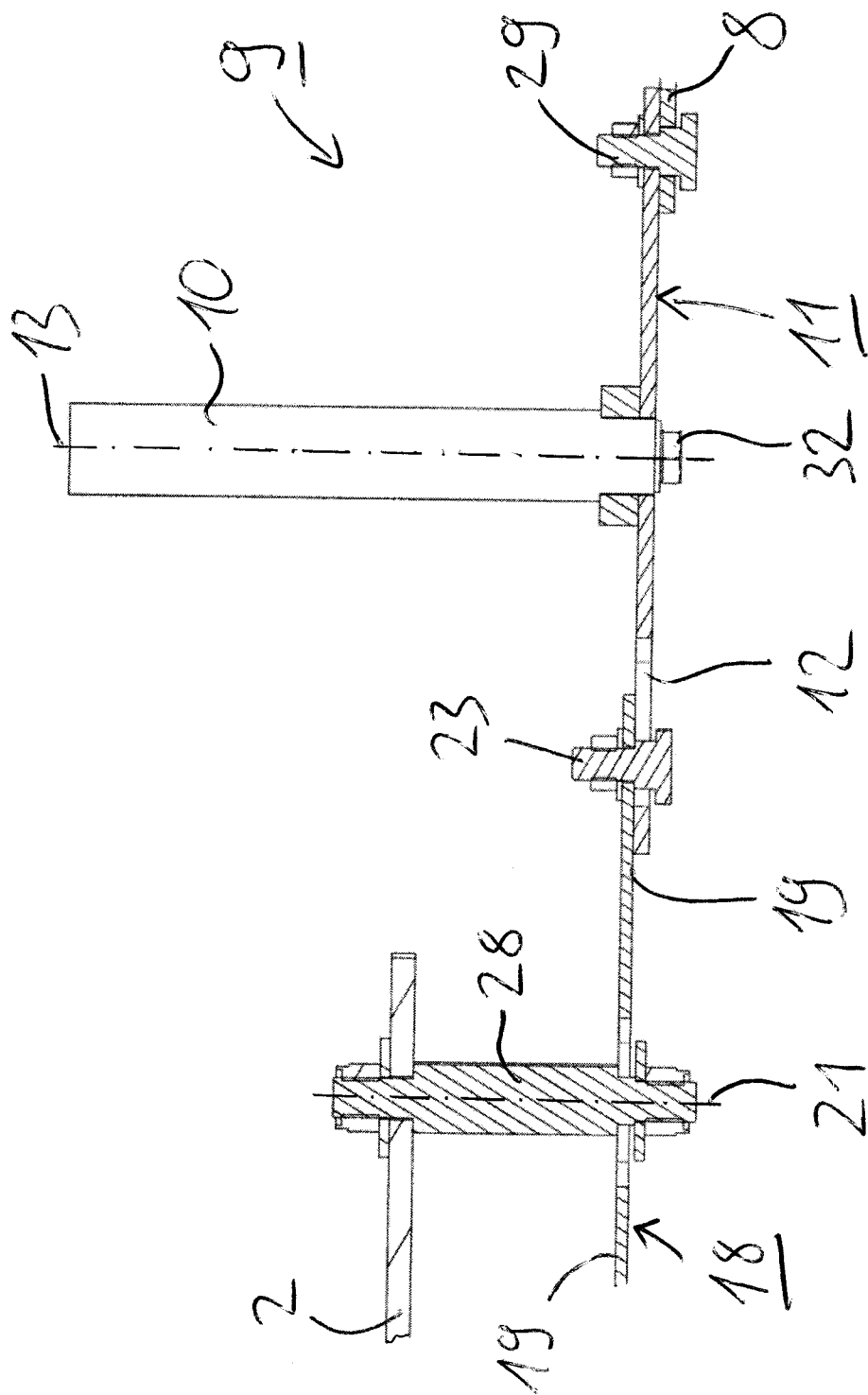


Fig. 9

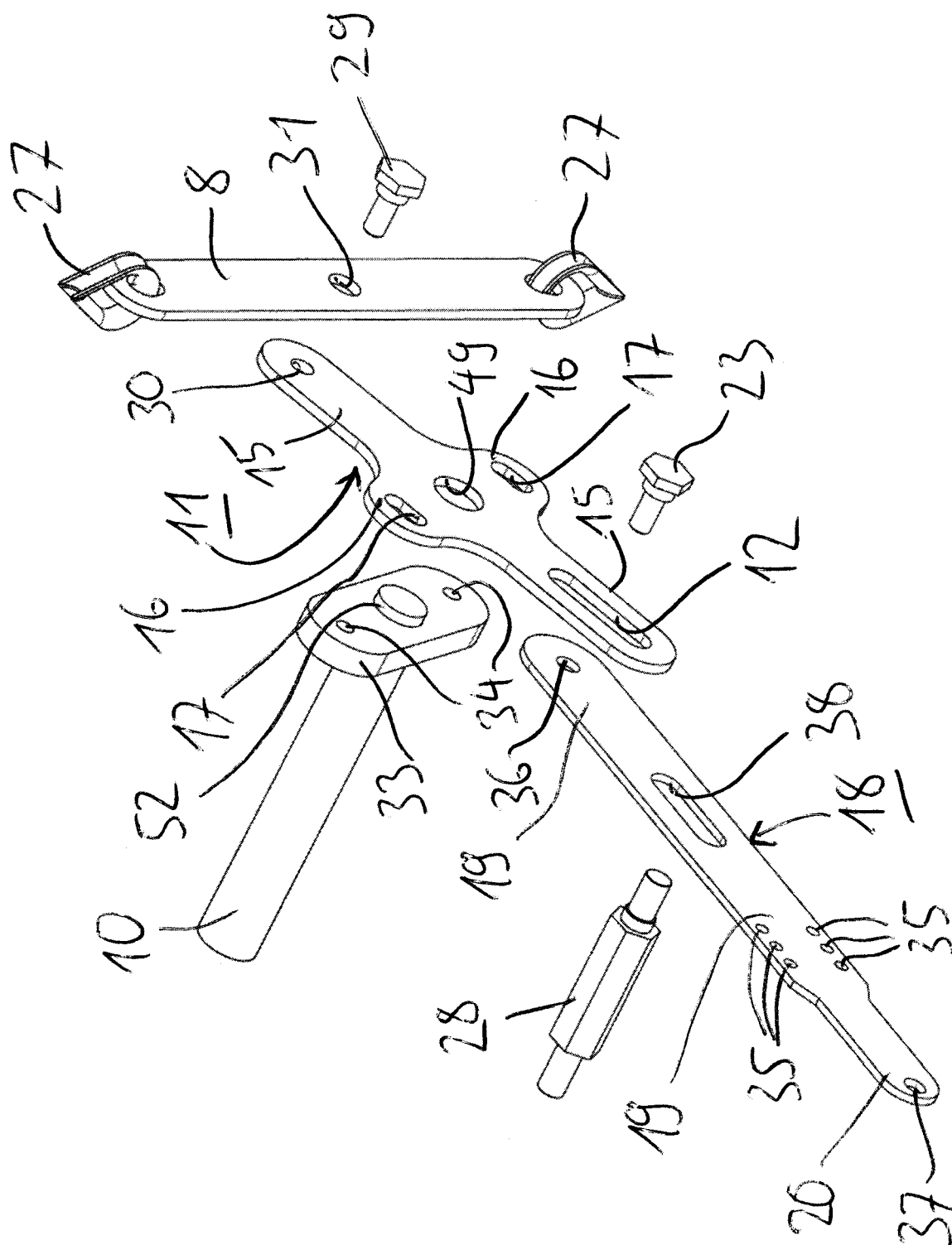


Fig. 10

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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