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(54) **FOLD-IN AND FOLD-OUT ELEVATOR BUFFER**

(57) The invention relates to an elevator buffer (1), which can be folded in and out, for mechanically securing a safety area, also called life space, for maintenance work above or below an elevator car, characterised in that the buffer (1) has a base body (3) for fastening to an elevator guide rail (23) and a stopping device (2), which is pivotably articulated thereat and which can be pivoted from a rest position, in which it does not hinder the passage of an elevator car or of a counterweight, into an active position, in which it makes the passage of the said car or the said counterweight impossible.

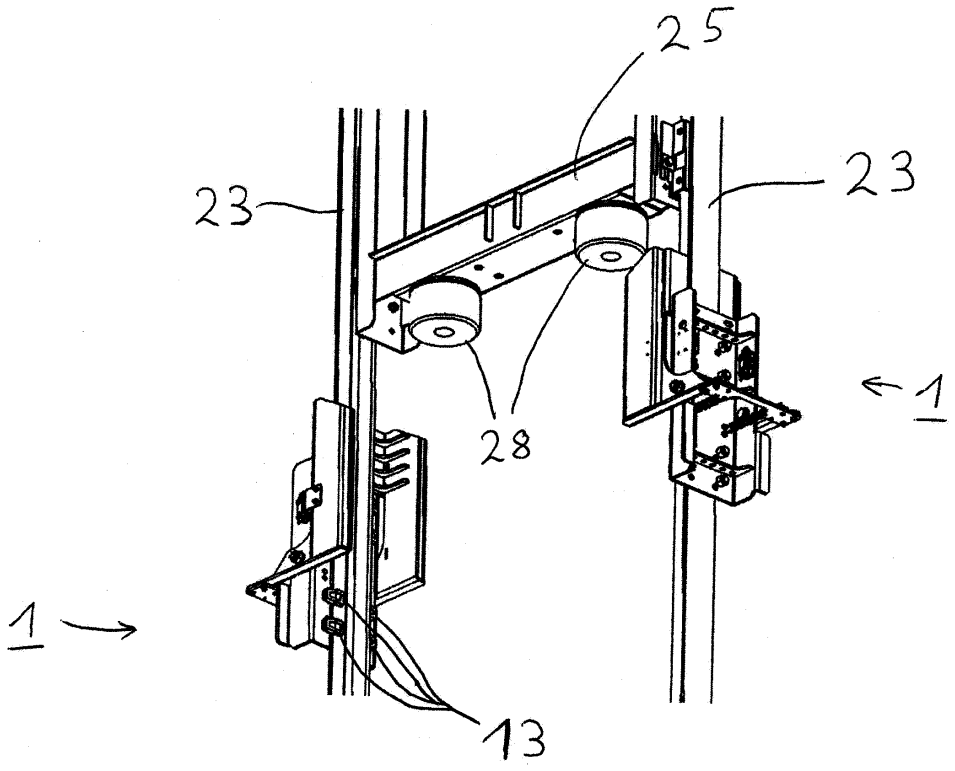

Fig. 7

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Description

[0001] The invention relates to an elevator buffer that can be folded in and out to mechanically secure a safety area called "Life space" required for maintenance work according to the generic term of claim 1. The invention also relates to an elevator equipped with a corresponding elevator buffer according to the generic term of claim 18.

TECHNICAL BACKGROUND

[0002] Installation or maintenance work on elevators often takes place in the area of the shaft bottom as well as in the upper area of the elevator shaft, called shaft head. It must be ensured that the service technician cannot be crushed by the elevator car if it starts moving up or down unintentionally or is accidentally set in motion by the service technician.

[0003] Particularly in the case of elevator which do not have a machine room and a pronounced shaft pit, supports or buffers are installed in the bottom of the shaft to create an appropriate life space or "Schutzraum", as it is called in German. These then intercept the car in the event of uncontrolled travel towards the bottom of the shaft. In order to create a corresponding safety area at the top end of the elevator shaft, buffers or supports are also installed below the counterweights. As soon as the counterweights are resting on the buffers, the elevator car cannot be moved any further up.

[0004] In order to ensure that the elevator shaft can still be accessed as completely as possible by the elevator car during normal operation, folding buffers or supports are typically used. These are brought into their folded-out position when work is actually being carried out at the bottom or top of the shaft. Only when the supports are folded out are the elevator car and/or counterweight are prevented from coming to close to the pit or the bottom of the elevator shaft. As soon as the maintenance work has been completed, the supports can be folded back in. The car and the counterweights can then be moved again completely or almost completely to the bottom of the elevator shaft or to its head.

STATE OF THE ART

[0005] Often the foldable supports are mounted on the pit of the elevator shaft. Usually the supports rest on the horizontal plane of the shaft bottom or pit when folded down and stand vertically from the shaft bottom when unfolded.

[0006] In order to allow the supports to unfold unhindered, they must be mounted in the elevator shaft in such a way that they do not collide with other elevator components during the pivoting movement during unfolding.

[0007] Since in most buildings only a limited area is provided for the elevator shaft, the components of modern elevators usually have to be installed relatively close together in the shaft. Finding a suitable position for the fold-out supports in the pit of the shaft is therefore often problematic in practice. It is important to note that the length of the supports has a significant influence on the height of the safety area called "Life space". Therefore, under certain circumstances a large area must be kept free for the swivel movement of the support.

[0008] The basic problem just mentioned is illustrated by the figures 1 to 4.

[0009] In the construction shown in Fig. 1, the fold-out support 35 for the counterweights collides with a cover plate 36, which is intended to protect the maintenance personnel from the moving counterweights.

[0010] In the construction according to Fig. 2, the support 35 collides during folding out with a bracket 37, which is to support the guide rails 23, i.e. with a rail bracket.

[0011] The construction according to Fig. 3 has the disadvantage that the support 35 collides with the guide rail 24 of the car.

[0012] In Fig. 4, the support 35 also collides with another, noncollapsible support buffer 34.

THE PROBLEM UNDERLYING THE INVENTION

[0013] In view of this, the object of the invention is to specify a support or buffer which can be mounted in the elevator shaft in such a way that, if possible, even in cramped conditions, there is no risk of collision with other components during the folding out or folding down of the buffer.

THE SOLUTION ACCORDING TO THE INVENTION

[0014] According to the invention, this problem is solved with the features of the first main claim.

[0015] Accordingly, the solution to the problem is a elevator buffer that can be folded in and out to mechanically secure a safety area called "Life space" for maintenance work above and/or below an elevator car. The elevator buffer is characterized by the fact that it has a base body for mostly immovable attachment to an elevator guide rail. In addition, the elevator buffer has a stopping device that is hinged to the base body. The stopping device can be swivelled from a rest position to an active position. In the rest position it does not hinder the passage of the car or the counterweight. In the active position, it makes it impossible for the car or the counterweight to pass.

[0016] The elevator buffer is therefore not attached to the bottom of the shaft. Instead, it is attached to a guide rail of the elevator, floating that way above the bottom of the shaft. The height at which the elevator buffer is attached to the relevant guide rail also defines the height of the safety area called "Life space" above or below the elevator car. As a rule, the elevator buffer in accordance with the invention does not require its own attachment to the shaft wall. It is then attached solely to the guide rail assigned to it.

[0017] For stabilization purposes, it may be advantageous to install a rail bracket in the immediate vicinity,

for instance directly below the elevator buffer according to the invention. The forces absorbed by the rail(s) when the elevator car or the counterweight is forcibly stopped by the stopping arm are wholly or partially dissipated into the shaft wall via this rail bracket.

[0018] This allows the elevator buffer to be designed much more compact overall. The length that the elevator buffer takes up in vertical position in its activated state is no longer determined by the height of the safety area, since the buffer does not have to extend across the whole safety area any longer. As a result, the space through which the elevator buffer moves from its passive horizontal position to its activated vertical position when folded out, and which must be kept free of colliding installations, is considerably smaller.

[0019] This means that the elevator buffer can easily be positioned in an area where it does not collide with other elements of the elevator during unfolding. This means that when designing the elevator there is no need to consider fold-out supports in the area of the pit of the shaft. At the same time, depending on the height at which the elevator buffer is installed, a significantly higher protective space can be created.

[0020] If the elevator buffer is to be used to create a safety area at the top of the elevator shaft, it must be mounted in such a way that in the active position it blocks further downward movement of the counterweight above a certain height. Ideally, the elevator buffer is mounted on a guide rail of the counterweight for this purpose.

[0021] If, on the other hand, a protective space is to be created in the bottom of the shaft, the elevator buffer must be installed in such a way that, in the active position, it blocks further downward movement of the elevator car, so that it can not intrude into the safety area below. Ideally, the elevator buffer should be mounted on a guide rail of the elevator car or counterweight. Occasionally two pairs of the inventive elevator buffers are used. One pair is then used to block the movement of the counterweight. The other pair is then used to block the movement of the car. These pairs of elevator buffers, which are responsible for creating a safety area called "Life space", are normally mounted at the same height on opposite guide rails. This prevents the guide shoes of the elevator car or counterweights from tilting with their respective guide rails when the counterweights or the elevator car come into contact with the activated elevator buffers.

[0022] Before the maintenance work is carried out above or below the elevator car, the corresponding elevator buffers must be brought into their active position. For this purpose, the stopping devices of the respective elevator buffers are swivelled into the position in which they make it impossible for the car or the counterweight to pass. They must be held there until the installation work is completed. Ideally, the elevator car or counterweight should be slowly brought into contact with the activated elevator buffer before the installation work begins. This ensures that the car or counterweight do not hit the elevator buffers in an uncontrolled manner.

[0023] While the term "buffer" is often used to describe components that are used to absorb the impact energy of an element hitting them by deforming, the term is more broadly understood here. An "elevator buffer" in the sense of the invention is an element which substantially blocks further movement of the car or counterweight in a given direction from the moment of contact with the elevator buffer. The elevator buffer may well be provided with elements which absorb the impact energy by deformation. Alternatively, such elements are attached to the car or counterweight and impact on the elevator buffer.

[0024] The term "safety area or protective space" refers to the area below or above the elevator car into which the elevator car cannot penetrate when the elevator buffer is activated. In German the said "life space" is called "Schutzraum".

ANOTHER PROBLEM UNDERLYING THE INVENTION

[0025] Furthermore, it is the object of the invention to provide an elevator equipped with elevator buffers of the inventive type.

THE FURTHER INVENTIVE SOLUTION

[0026] The solution to the above-mentioned problem is an elevator with a car and preferably also a counterweight. Preferably, the elevator also includes guide rails along which the elevator or said elevator components are guided along their travel path. The elevator is characterized in that it has at least one elevator buffer according to the invention or its preferred design. The elevator buffer limits the travel of the counterweight or the car to form a safety area for assembly or mainrenance work above or below the car. The elevator buffer can - if necessary together with a component on the car or counterweight - perform a buffering function, but this is not mandatory. The decisive factor is its function as a barrier that ensures a protective space.

PREFERRED DESIGN OPTIONS

[0027] There are a number of ways of structuring the invention in such a way that its effectiveness or usefulness is further improved. It is therefore particularly preferable that the stopping device has at least two stopping arms. The stopping arms preferably run parallel to each other and are ideally designed as tubes. Between them the stopping arms leave a free space. In the rest position of the stopping device, this space is at least partially, and as a rule predominantly, occupied by the guide rail to which the stopping device is attached. The guide rail occupies the free space or is positioned between the stopping arms, essentially parallel to the longitudinal axis of the stopping arms, in such a way that the guide shoe of the car or counterweight belonging to this guide rail can travel along the guide rail unhindered. The guide shoe

and with it the car or counterweight can thus pass the safety gear and its interceptor arms unhindered.

[0028] In the active state of the elevator buffer, the safety arms are the elements through which the impact energy or the load of the counterweights or the car are introduced into the base body.

[0029] It is therefore important that the stopping arms have the highest possible flexural rigidity and therefore the highest possible moment of inertia. Ideally, therefore, tubes are used whose cross-section in the direction of the travel path of the car has the largest possible dimension. In principle, beams made of solid material can be used instead of tubes. However, for reasons of material savings, tubes are preferably used, which are ideally produced by bending sheet metal several times and then welding it.

[0030] The free space between the stopping arms is wide enough so that the guide rail to which the base body of the elevator buffer is attached is not covered by the stopping arms when they are in the rest position. This ensures that the guide shoe can move along the guide rail between the stopping arms.

[0031] In another preferred design, when the stopping device is in its active position, the stopping arms are completely below the swivel axis provided by the elevator buffer for the stopping device. The swivel axis of the elevator buffer is the axis about which the stopping device can be swivelled from its rest position to its active position.

[0032] This has the advantage that the naturally heavy-duty bolt, which forms the swivel axis, can be used for load introduction into the base body. The torque generated by the impact of the car or counterweight can then also be absorbed by the said bolt and introduced into the guide rail via the base body.

[0033] Ideally, the safety gear should have two stopping plates running with their large areas essentially horizontally, in the activated state of the elevator buffer. The said large areas are positioned in a common plane but they are spaced apart from each other. Preferably, these plates together form an impact surface. In the event of a safety catch, a preferably one-piece spring element of the car or counterweight strikes this surface. The spring element serves to reduce the force of the impact, optionally.

[0034] This provides a significantly increased impact contact area, which allows the use of large spring elements that effectively reduce load peaks during impact. In spite of the use of large spring elements, the passability of the guide rail is not impaired in this type of design.

[0035] The spring element is usually a rubber or elastomer block. However, it is also conceivable to use one or more metal springs as an alternative.

[0036] The stopping plates are attached to the stopping arms of the stopping device. A free space remains between the stopping plates, which is taken up by the guide rail in the rest position of the elevator buffer.

[0037] The term "large area" (German: "Grossflaeche") describes those areas of the stopping plates which are at least four times larger than the remaining areas of the stopping plates.

[0038] In another preferred design, each stopping arm rests with its end face facing away from the car or counterweight against a stopper of the base body when the stopping device assumes its active position. The base body acts as a torque support. The torque generated when the car or counterweight is placed on the stopping plates is transferred to the main body and from there to the guide rail.

[0039] In addition to the support via the pivot pin already mentioned, this creates two further torque supports via which the torque generated by the car or the counterweight on the stopping arms is transmitted into the main body and into the guide rail. This makes it possible to reduce the dimensions of the individual components supporting the torque.

[0040] Preferably each of the stopping arms represents a preferably longer leg of an L-profile, the other preferably shorter leg of which preferably forms a contact actuating arm.

[0041] The contact actuating arm can be used to actuate an electrical switch contact when the elevator buffer is in the active position. The electrical switch contact can then send a signal indicating the status of the elevator buffer to the service technician and/or the elevator control system.

[0042] In order to keep harmful forces away from the area of the contact(s), the preferably shorter leg ideally does not or essentially does not serve as a torque support.

[0043] In another preferred design, the two shorter legs are connected to each other by a connecting element on the back of the base body facing away from the car or counterweight.

[0044] The connecting element connecting the two shorter legs may be fitted with a corresponding contact plug or trigger which actuates a contact or switch located inside the main body when the elevator buffer is in the active position. In this way, the assumption of the active position can be monitored and the service technician can be warned, for example, when the active position has been left and/or a signal can be given to the elevator control, for example that the elevator buffer is still in its active position and therefore regular elevator operation is not possible.

[0045] Ideally, the connecting element is a strip which is screwed or otherwise connected to the two L-profiles of the interception system.

[0046] It is also conceivable to design the connecting element in such a way that it serves as an additional torque support through which the torque generated by the car or the counterweight on the interceptor arms is transmitted to the base body. For this purpose, the connecting element must be mounted on the L-profiles in such a way that it rests against the rear of the base body when the elevator buffer is in the active position.

[0047] The "rear side" of the base body describes the side of the base body facing away from the guide rail.

[0048] Ideally, the base body should be placed against the rear of the respective guide rail facing away from the car or counterweight. The base body can then be clamped frictionally against the guide rail by means of claws that surround the guide rail.

[0049] The claws can be fixed claws which develop such high frictional forces that no temporary sliding friction occurs even in the event of an excessive impact.

[0050] However, it can also be advantageous to design the claws as sliding claws. Such claws allow the elevator buffer to move along the guide rail as a whole for a certain distance in the event of an excessive impact due to sliding friction. Ideally, the elevator buffer as a whole can move along the guide rail - before static friction is restored at the claws - over a distance of 3cm to 10 cm. This reduces the risk of damage to the elevator buffer, the guide rails, the counterweights or the car without significantly restricting the protective space.

[0051] In another preferred design, the elevator buffer has at least one spring element. The spring element influences the folding in and/or out position of the elevator buffer. The spring element is hinged on its one side to the base body and on its other side to an L-profile forming the safety gear arm or the associated connecting element of the safety gear. The line of action of the spring element lies on one side of the pivot axis of the stopping arm when the stopping arm is in its rest position. When the stopping arm is transferred to its active position, the line of action of the spring element is shifted to the other side of the swivel axis of the stopping arm.

[0052] The at least one spring element prevents the stopping arms, after being released by the operator, from permanently assuming a position other than either the fully active position or the fully rest position.

[0053] If the stopping device has already been moved into its active position, at least one spring element acts on it in such a way that the spring force must first be overcome before the safety gear can return to its rest position.

[0054] During the transfer of the stopping element to the rest position, the line of action of the at least one spring element shifts in such a way that the spring force must also be overcome before the stopping element can return to the active position.

[0055] The at least one spring element thus holds the stopping device securely in its rest or active position. This prevents, for example, any vibration-induced micro-movements of the stopping arms that could lead to a malfunction of the safety contact, so that the latter signals that the stopping arms are not in the rest position.

[0056] Ideally, at least two such spring elements are provided in a symmetrical arrangement.

[0057] In another preferred design, the base body carries a first safety contact. Ideally, the first safety contact is located on the side of the base body facing the guide rail. The safety contact signals whether the stopping device has fully assumed its rest position.

[0058] The safety contact can then send a signal to the service technician and/or the elevator control system, activate a light or generate a sound when the elevator buffer has been moved into or out of the active position. This signals whether the elevator buffer is in its active position or has left it.

[0059] Ideally, the first safety contact will cooperate with a plugin bridge attached to a stopping arm. The contact pins of the plugin bridge - attached to one of the stopping arms - close the first safety contact when the stopping device is completely in its rest position. The contact pins preferably penetrate the first safety contact for this purpose.

[0060] The plugin bridge is therefore mounted on the stopping arm in such a way that it closes the safety contact attached to the base body when the stopping arm has assumed its rest position. The closed safety contact can then transmit an appropriate signal to indicate the status of the elevator buffer

[0061] This reduces the risk that the elevator will operate normally again before the elevator buffer has fully assumed its rest position.

[0062] In another preferred design, the base body carries a second safety contact. This is preferably located on the side of the base body facing away from the guide rail and usually on the inside of one of its legs. The second safety contact is typically, although not necessarily, constructed in the same way as the first one. It signals whether the stopping device has fully assumed its active position.

[0063] This can be used to signal whether the elevator buffer is in its active position and the service technician is accordingly protected against a collision with the car. This is particularly advantageous if the service technician is carrying out work at the top of the elevator shaft, as he cannot visually check the condition of the elevator buffer from there.

[0064] Preferably, the second safety contact cooperates with a plugin bridge, which is attached to a connecting element belonging to or forming a bridge between the contact actuating arms. The contact pins of the plugin bridge close the safety contact electrically when the safety gear is completely in its active position. The contact pins preferably penetrate the safety contact for this purpose.

[0065] The connecting element to which the said plugin bridge is attached is the element connecting the two contact actuating arms. However, it is also possible to attach the plugin bridge directly to one of the two contact arms. In both cases, the plugin bridge is mounted so that it closes the safety contact as soon as the safety gear is completely in its active position. As an alternative for contacts operated by plugin bridges other similar contacts can be used, for example Reed contacts.

[0066] In another preferred design, the base body essentially has the shape of a C-profile. The C-profile is open on the side facing away from the guide rail holding

the basie body. Ideally, the C-profile is formed by a bent sheet metal part.

[0067] It is also conceivable that the base body essentially has the shape of a C-profile, but has a further orthogonally projecting sheet metal section on each of the two parallel legs of the C-profile running orthogonally to the guide rail. These can then be used as torque support for the stopping arms.

[0068] The safety contacts of the base body already described can be arranged on the legs of the C-profile running orthogonally to the guide rail.

[0069] In another preferred design, the base body is stiffened on its open side by several plates, usually with their large area lying in horizontal planes. Each of these plates is firmly connected to the legs of the C-profile and its middle section, which serves for contact with the guide rail.

[0070] This is advantageous because the torque generated by the car or the counterweight at the stopping device is transmitted to the guide rail via the base body. Therefore, a high rigidity of the base body is required.

[0071] By using stiffening plates serving as reinforcing struts, a relatively thin wall thickness can be selected for the plate forming the C-profile of the base body. This reduces the material and manufacturing costs.

[0072] The stiffening plates are preferably connected to the C-profile of the base body by means of positive-locking plug connections and/or a welded joint.

[0073] In another preferred design, the said L-profile consists of a mostly predominantly flat sheet metal plate. This is completed to form a tube in the area where it forms the stopping arm by a further bent sheet metal part, preferably welded to it. The end face of the tube is preferably in contact, usually flat, with the stop of the base body which forms the torque support.

[0074] This results in a high stiffness of the stopping arm with good manufacturability at the same time. In addition, different materials can be used for the welded-on bent sheet metal part and the sheet metal blank.

[0075] Ideally, the sheet metal blank has a lug which forms a reinforcing part of the contact arm angled at 90°, or preferably folded.

[0076] Ideally, the sheet metal lug is designed in such a way that it can be used as the contact surface of the safety gear arm on the torque support of the base body.

LIST OF FIGURES

[0077]

Fig. 1 shows a typical problem with known pivoting elevator buffers fixed to the pit (state of the art)
Fig. 2 shows another typical problem with known pivoting elevator buffers (state of the art)
Fig. 3 shows another typical problem with known pivoting elevator buffers (state of the art)
Fig. 4 shows another typical problem with known pivoting elevator buffers (state of the art)
Fig. 5 shows an inventive elevator buffer in the transition from the rest position to the active position
Fig. 6 shows an inventive elevator buffer in its rest position
Fig. 7 shows two inventive elevator buffers attached to the guide rails of the counterweight in their rest position
Fig. 8 shows the same elevator buffers as Fig. 7, whereby the counterweight has passed the elevator buffers
Fig. 9 shows the situation from Fig. 8 in top view
Fig. 10 shows the details of two inventive elevator buffers in their active position
Fig. 11 shows the situation in which the counterweight is caught by a pair of inventive elevator buffers
Fig. 12 shows two inventive elevator buffers in the rest position
Fig. 13 shows the design of the stopping device being a central part of the inventive elevator buffers.
Fig. 14 shows two inventive elevator buffers mounted on the guide rails of the counterweight in the rest position
Fig. 15 shows two inventive elevator buffers mounted on the guide rails of the counterweight in the active position

PRFERRED EMBODIMENT

[0078] The function of a preferred embodiment of the inventive elevator buffers will now be explained by means of the figures 5 to 15.

[0079] Figures 1 to 4 serve to illustrate the problems of the state of the art and have already been explained above.

[0080] For the sake of clarity and in order to avoid confusing repetition, not technical all elements in Figures 7, 8, 9, 11, 12, 14 and 15 are marked with reference numbers.

[0081] Fig. 5 shows an inventive elevator buffer 1 not yet mounted on a guide rail. The individual components of the elevator buffer 1 can be clearly seen from Fig. 1.

[0082] The elevator buffer 1 here consists of a base body 3 and a stopping device 2, with the stopping device 2 being mounted so that it can swivel about the swivel axis 6 of the base body 3. The said swivel axis is formed here by two screw-nut connections, which is preferred.

[0083] In the case shown here the base body 3 is constituted by a C-profile shaped sheet. It comprises two legs 31, which are arranged orthogonally to the middle part 32 of the base body 3. To increase the rigidity of the base body 3, the legs 31 are supported by several stiffening plates 19. They are usually firmly connected to them, in most cases by welding. These plates 19 are usually also connected to the middle part 32 of the main body 3. For fixing the stiffening plates 19 to the middle part 32 of the base body 3, the middle part 32 can have several openings 38, which can be seen in Fig. 10 and Fig. 13.

[0084] In addition, the base body 3 usually has two stops 8 in the lower area, which must be described in more detail. The stopping device 2 is supported by these in the active position.

[0085] In addition, two safety contacts 15 and 17 are mounted on the base body 3. These are used in conjunction with first and second plugin bridges 16 and 18 to check the operating status of elevator buffer 1. If elevator buffer 1 is in the active position, the plugin bridge 18 closes the second safety contact 17, leaving first safety contact 15 open. In the rest position, however, the safety contact 17 is open and the safety contact 15 is closed by the plugin bridge 16.

[0086] For the sake of clarity, only one of the safety contacts 15 and 17, and only one of the plugin bridges 16 and 18 have been marked with reference symbols.

[0087] In Fig. 1 the state-of-the-art elevator buffer 1 is neither in the rest position nor in the active position. If the inventive elevator buffer shown by Fig. 5 is in a comparable position, neither the plugin bridge 18 and the corresponding safety contact 17 are engaged, nor the plugin bridge 16 and the corresponding safety contact 15.

[0088] The plugin bridge 18 is mounted on the connecting element 12. The connecting element 12 connects the two short legs or contact actuating arms 11 of the two L-profiles 9. In the course of the swivel movement of the stopping device 2 into the active position, the connecting element 12 is brought so close to the base body 3 that the plugin-bridge 18 comes into contact with the safety contact 17, so that it is electrically closed.

[0089] In addition to their short leg 11, the two L-profiles 9 each comprise a long leg 10, which forms the stopping arm 4. Together with the two stopping plates 7, the two L-profiles 9 form the stopping device 2.

[0090] When the stopping device 2 is in the active position, the short legs 11 of the L-profile 9 are supported by the stoppers 8 of the base body 3. In this way, a further swivel movement of the stopping device 2 is blocked when the stopping plates 7 catch the counterweight or the car.

[0091] The plugin-bridge 16, which is used in conjunction with the safety contact 15 to detect the rest position of the stopping device 2, is mounted on the stopping arm 4.

[0092] As can be seen from Fig. 6, the plugin-bridge 16 closes the safety contact 15 when the stopping device 2 is in its rest position.

[0093] Once the safety gear 1 has taken up the rest position, the spring element(s) 14 act(s) on the connecting element 12 in such a way that the safety gear 1 remains in the rest position. To leave the rest position, the stopping device 2 must then be activated and swivelled in the direction of the active position by overcoming the spring force of the spring elements 14.

[0094] In contrast to this, the stopping device 2, according to the invention, when it assumes a position comparable to the position shown in Fig. 1, is caused by the spring element 14 to make a further pivoting movement in the direction of the active position. After reaching the active position, the stopping device 2 is then held in this position by the spring elements 14 until the stopping device 2 is actively swivelled in the direction of the rest position by overcoming the spring force of the spring elements 14.

[0095] This effect is achieved by shifting the line of action of the spring element(s) 14 to the other side of the swivel axis 6. The displacement of the line of action of the spring element 14 results automatically from a corresponding arrangement of the spring elements 14 on the base body 3 and the connecting element 12 in the course of the pivoting movement of the stopping device 2.

[0096] Fig. 7 shows two of the elevator buffers 1 described, which are mounted on the guide rails 23 of the counterweight. For mounting the elevator buffers 1 on the guide rails 23, each base body 3 is frictionally clamped to a guide rail 23 of the counterweight via the claws 13.

[0097] In addition, Fig. 7 shows the frame 25 of the counterweight and the two spring elements 28 of the counterweight attached to the frame 25. In the situation shown in Fig. 7 the frame 25 has not yet passed the elevator buffers 1.

[0098] In contrast, Fig. 8 shows a situation in which the frame 25 of the counterweight has partially passed the elevator buffers 1.

[0099] As can be seen at this point from Fig. 9, this is possible because the base bodies 3 are attached to the guide rails 23 in such a way that the guide rail 23 projects through the free space 5 between the stopping plates 7 in the direction of the frame 25 of the counterweight. The guide shoes 26 of said frame 25 can thus slide along the guide rails 23 as long as the elevator buffers 1 are in their rest position.

[0100] Fig. 8 clearly shows how the elevator buffers 1, which are in their inactive position here, allow the frame 25 of the counterweight (which here has the shape of a "sling") to pass unhindered as a result of their special design. The primarily vertically extending space between the two tubes, each of which forming a stopping arm, can be passed through unhindered by the frame 25 of the counterweight.

[0101] In Fig. 11, on the other hand, the situation is shown in which frame 25 cannot pass through elevator buffers 1 because they are in their active position. The spring elements 28 attached to the underside of the frame 25 of the counterweight then come into contact with the stopping plates 7. Since the stopping device 2 and thus also the stopping plates 7 are prevented from further pivoting movement in the active position, the frame 25 is thus prevented from further downward movement along the guide rails 23. The elevator car is then no longer pulled further in the direction of the upper end of the elevator shaft by the counterweight. Hence the service technician can safely carry out work in shaft head.

[0102] In order to ensure sufficient stiffness of the stopping plates 7, they are supported on the stopping arms

by stiffening plates 33, which are normally welded in. This can also be clearly seen from Fig. 12.

[0103] The composition of the stopping device 2 can be described well using Fig. 13. Here the stopping device 2 is shown together with the base body 3 in an exploded view.

[0104] It can be seen that the stopping device 2 consists of the two L-profiles 9, which in turn are connected by the connecting element 12. Each of the L-profiles 9 is formed by a long leg 10 and a short leg 11, serving in many cases as a contact actuating arm. While the short leg 11 is usually only formed by a section of the sheet metal plate 21 bent at 90° to form a sheet metal lug 22, the long leg 10 consists in the majority of cases of both the bent sheet metal part 20 and the sheet metal plate 21. The sheet metal plate 21 also forms the stopping plate 7 and is welded to the bent sheet metal part 20. The bent sheet metal part 20 is in the form of a tube and serves to increase the rigidity of the entire stopping arm 4 formed by the long leg 10. At its end facing away from the stopping plate 7, the tube formed by the bent sheet metal 20 is closed off by the sheet lug 22. Figures 14 and 15 show that the elevator buffers 1, which are in accordance with the invention, do not collide with other components in the elevator shaft when the stopping device 2 folds out. Especially the collision of a conventional buffer support 35 with the bracket 37 of the guide rails 23 shown in Fig. 1 can thus be avoided.

General notes

[0105] Irrespective of the object currently claimed, protection is also claimed for an elevator buffer for the mechanical protection of a protective space for maintenance work above or below an elevator car, which is characterized by the fact that it is permanently (not only for the maintenance period) attached to the guide rail assigned to it and is held by it - as a whole - at a distance from the bottom of the shaft, so that the elevator buffer itself has no contact with the shaft floor at any time. This subject matter, which is also claimed, may be enriched by features of the claims previously established and/or by features disclosed in the above specification.

LIST OF REFERENCE SIGNS

[0106]

1	Elevator buffer
2	Stopping device (German: "Fangeinrichtung")
3	Base body
4	Stopping arm (German: "Fangarm")
5	Free space
6	Swivel axis
7	Stopping plate
8	Stop of base body
9	L-profile
10	Long leg
11	Short leg / contact actuating arm
12	Connecting element
13	Claw (German: "Pratze")
14	Spring element
15	First safety contact
16	First plugin bridge (German: "Steckbrücke")
17	Second safety contact
18	Second plugin bridge
19	Stiffening plates
20	Bent sheet metal part completing the stopping arm
21	Sheet metal plate
22	Lug
23	Guide rail of the counterweights
24	Guide rail of the car
25	Frame for counterweight
26	Guide shoe
27	Large areas of the stopping plates
28	Spring element on counterweight
29	Not assigned
30	Not assigned
31	Leg of the base body
32	Middle part of the base body
33	Stiffening plates of the stopping plates
34	Support buffer at the bottom of an elevator shaft
35	Support from the state of the art
36	Cover plate of the counterweights
37	Mounting bracket of the guide plate
38	Openings in the base body

Claims

1. Elevator buffer (1), which can be folded in and out, for mechanically securing a safety area, also called life space, for maintenance work above or below an elevator car, **characterised in that** the buffer (1) has a base body (3) for fastening to an elevator guide rail (23) and a stopping device (2), which is pivotably articulated thereat and which can be pivoted from a rest position, in which it does not hinder the passage of an elevator car or of a counterweight, into an active position, in which it makes the passage of the said car or the said counterweight impossible.

2. Elevator buffer (1) according to claim 1, **characterised in that** the stopping device (2) has at least two stopping arms (4), preferably running parallel to one another - ideally designed as a tube - which leave a free space (5) between them which is at least partially occupied by the guide rail (23) in the rest position of the stopping device (2), in such a way that the guide shoe (26) of the car or counterweight belonging to this guide rail (23) can travel unhindered along the guide rail (23) and can thus pass the stopping device (2) and its stopping arms (4) unhindered.

3. Elevator buffer (1) according to one of the preceding claims, **characterized in that**, when the stopping

device (2) is in its active position, the stopping arms (4) are positioned completely below the swivel axis (6) about which the stopping device (2) can be pivoted from its rest position to its active position.

4. Elevator buffer (1) according to one of the preceding claims, **characterized in that** the stopping device (2) has two stopping plates (7) which extend - when being fully in active position - horizontally with their large areas (27) and are spaced apart from one another and which - preferably together - form an impact surface for a spring element (28) on the car or counterweight which, in the event of stopping, reduces the force of the impact.

5. Elevator buffer (1) according to claim 2 or 3, **characterized in that** each stopping arm (4), when the stopping device (2) takes its active position, abuts with its end face facing away from the elevator car or the counterweight against a stop (8) of the base body (3), which acts as a torque support, via which the torque arising when the elevator car or counterweight will stopped by the stopping device is diverted into the base body (3) and from there into the guide rail (23).

6. Elevator buffer (1) according to any of the preceding claims in connection with claim 2, **characterized in that** each of the stopping arm (4) represents a leg (10) of an L-profile (9), the other leg (11) of which preferably forms a contact actuating arm (11).

7. Elevator buffer (1) according to claim 6, **characterized in that** the two shorter legs (11) on the rear side of the base body (3) facing away from the car or counterweight are connected to each other by a connecting element (12).

8. Elevator buffer (1) according to one of the preceding claims, **characterized in that** the base body (3) can be placed against the rear side of the respective guide rail (23) facing away from the elevator car or the counterweight and can be clamped frictionally against the guide rail (23) by means of claws (13) engaging around the guide rail (23).

9. Elevator buffer (1) according to one of the preceding claims, **characterized in that** the elevator buffer (1) has at least one spring element (14) being hinged on its first side at the L-profile (9) or the associated connecting element (12), and being hinged on its second side at the base body (3) whereas the line of action of the said spring element (14) lies on one side of the swivel axis (6) of the stopping arm (4) when the stopping arm (4) is in its rest position and whereas the line of action of the said spring element is displaced to the other side of the swivel axis (6) as the stopping arm (4) is transferred to its active position.

10. Elevator buffer (1) according to one of the preceding claims, **characterized in that** the base body (3), preferably on its side facing the guide rail (23), carries a first safety contact (15) which signals whether the stopping device (2) has completely taken its rest position.

11. Elevator buffer (1) according to claim 10, **characterized in that** the first safety contact (15) cooperates with a plug-in bridge (16) which is attached to a stopping arm (4) and whose contact pins electrically close the first safety contact (15), preferably by penetrating into it, when the stopping device (2) is completely in its rest position.

12. Elevator buffer (1) according to one of the preceding claims, **characterized in that** the base body (3), preferably on its side facing away from the guide rail (23), usually on the inside of one of its legs (31), carries a second safety contact (17) which signals whether the stopping device (2) has fully assumed its active position.

13. Elevator buffer (1) according to claim 12, **characterized in that** the second safety contact (17) cooperates with a plug-in bridge (18) which is attached to a connecting element (12) associated with a contact actuating arm (11) and whose contact pins electrically close the safety contact (17), preferably by penetrating into it, when the stopping device (2) is completely in its active position.

14. Elevator buffer (1) according to one of the preceding claims, **characterized in that** the base body (3) has the shape of a C-profile open towards the side facing away from the guide rail (23) holding it and is ideally formed by a bent sheet metal part.

15. Elevator buffer (1) according to claim 14, **characterized in that** the base body (3) is stiffened on its open side by several plates (19), each of which is firmly connected to the legs (31) of the C-shaped profile (forming the base body) and the middle part (32) of the C-shaped profile serving to abut the guide rail (23).

16. Elevator buffer (1) according to claim 6 or one of the preceding claims in connection with claim 6, **characterized in that** the L-profile (9) consists of a predominantly flat sheet metal plate (21) which, where it forms the catch arm (4), is completed by a further sheet metal bending part (20), preferably welded to it, to form a tube, the end face of which preferably, mostly flat, rests against the stop (8) of the base body (3) forming a torque support that way.

17. Elevator buffer (1) according to claim 16, **characterized in that** the sheet metal plate (21) has a lug (22) which forms a part of the contact actuating arm (11) which is angled by 90°, or preferably folded.

18. Elevator comprising a car and preferably also a counterweight and guide rails (23, 24) guiding said elevator component or components along their travel path, **characterized in that** the elevator comprises at least one elevator buffer (1) according to one of the preceding claims, which in its active position limits the travel path of the counterweight or the car to form a temporary safety area for assembly work above or below the car.

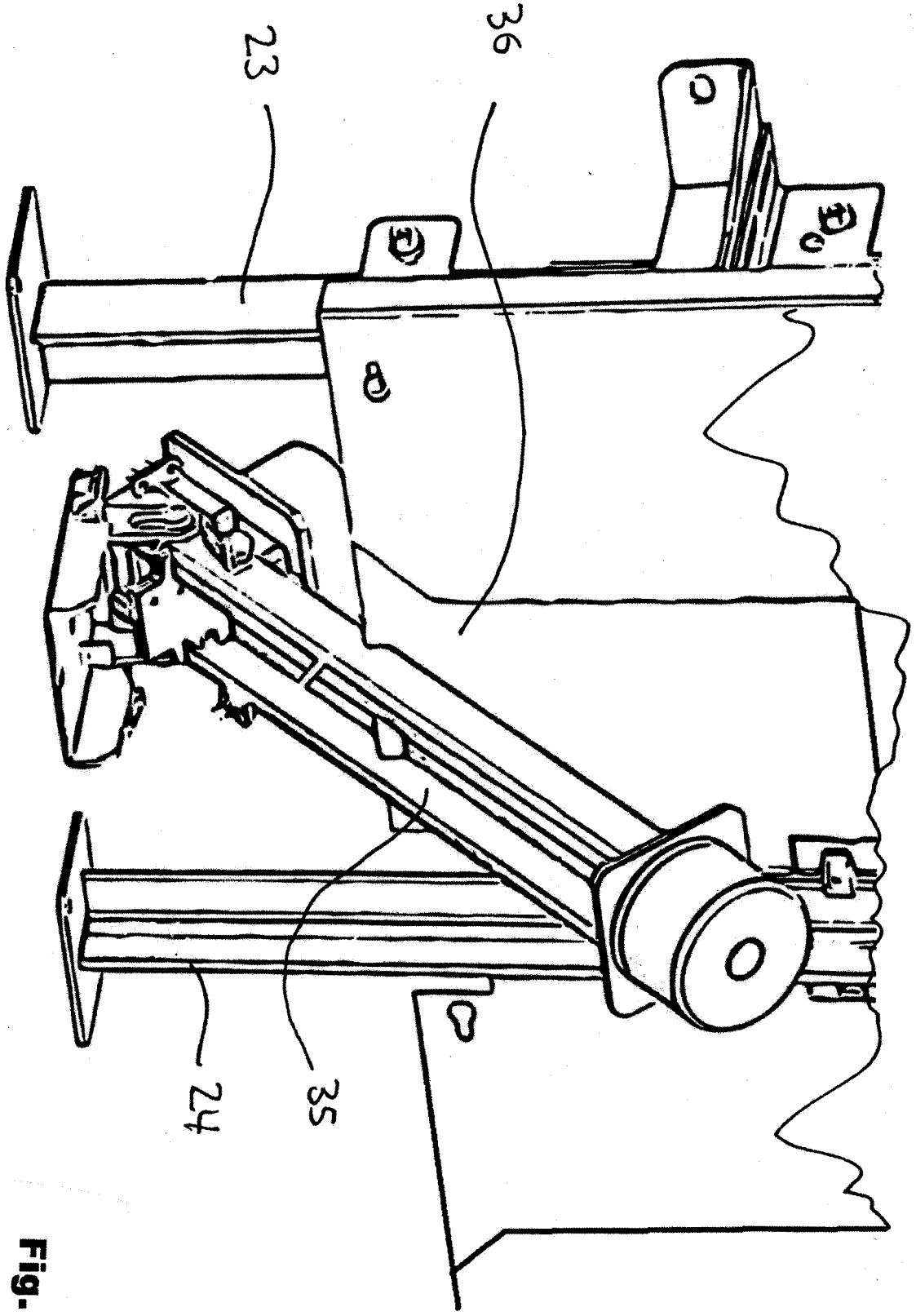

Fig. 1

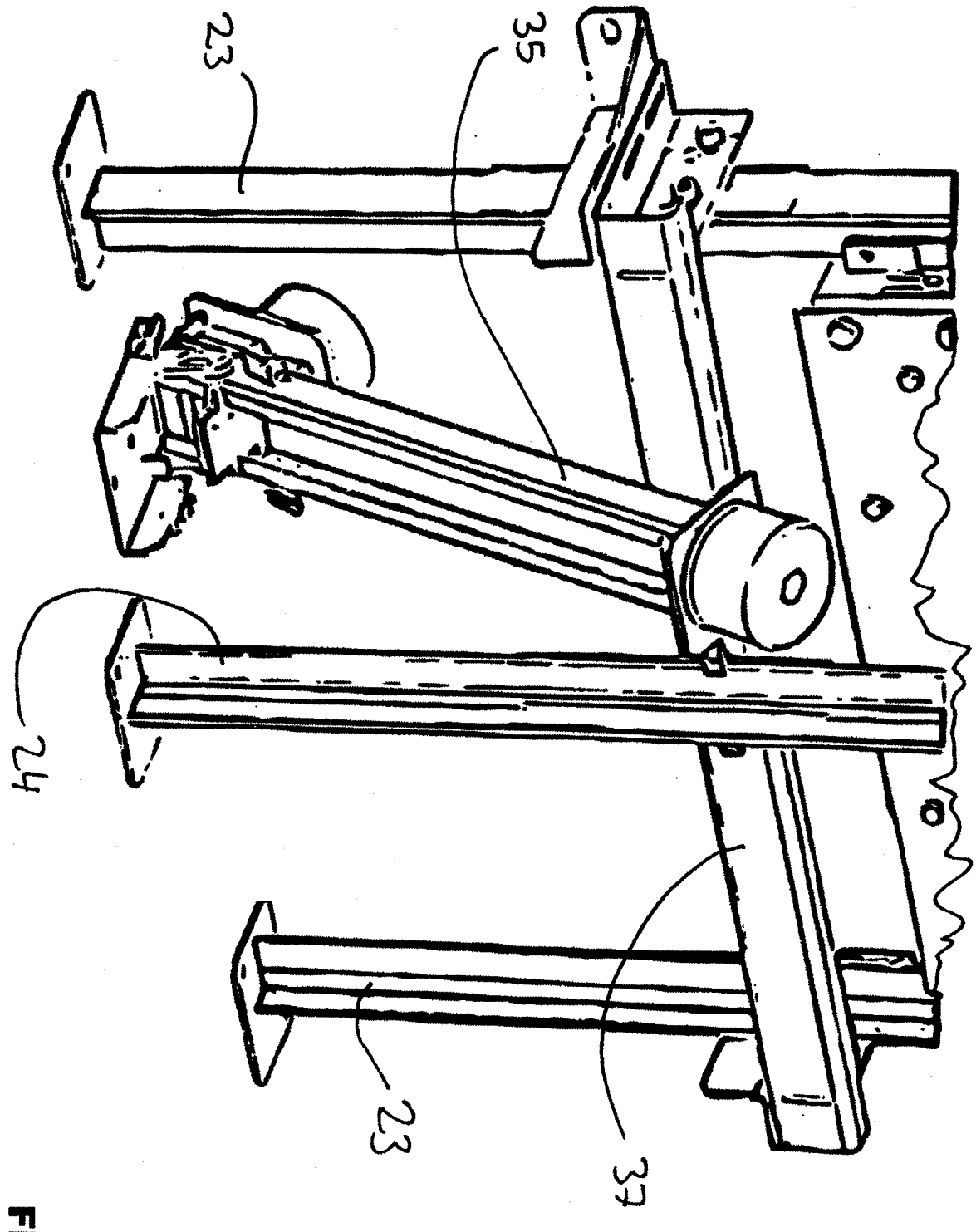

Fig. 2

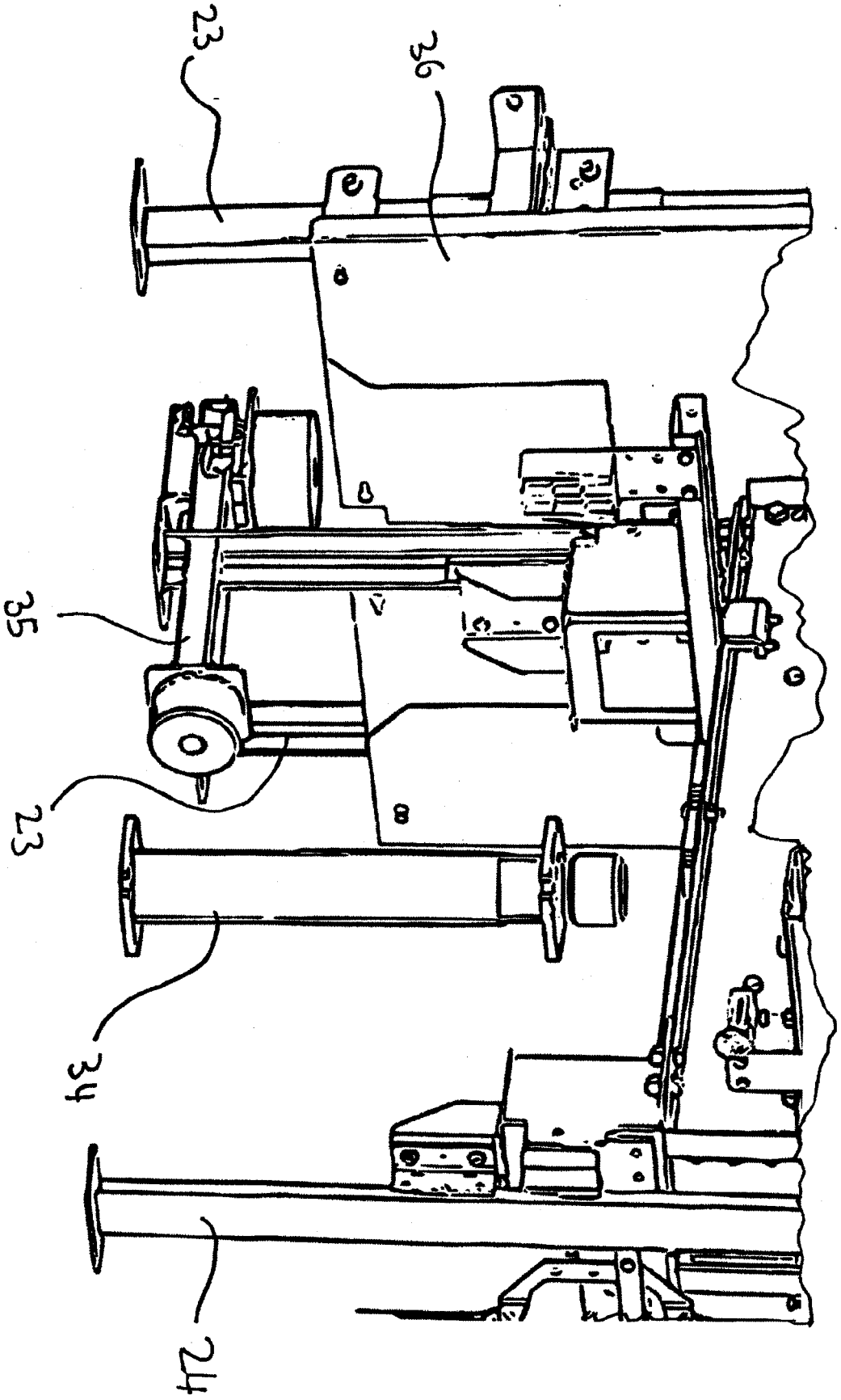

Fig. 3

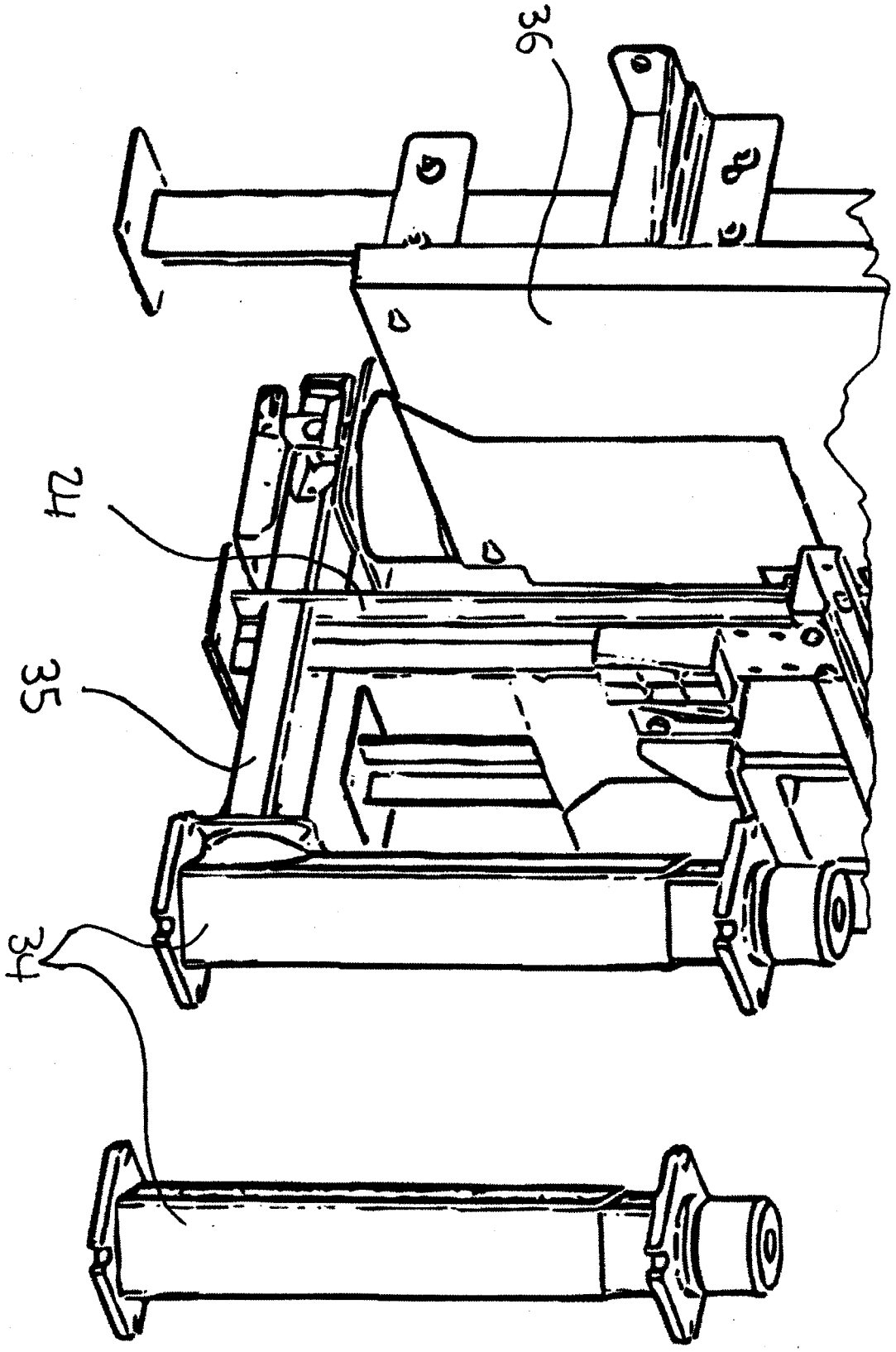

Fig. 4

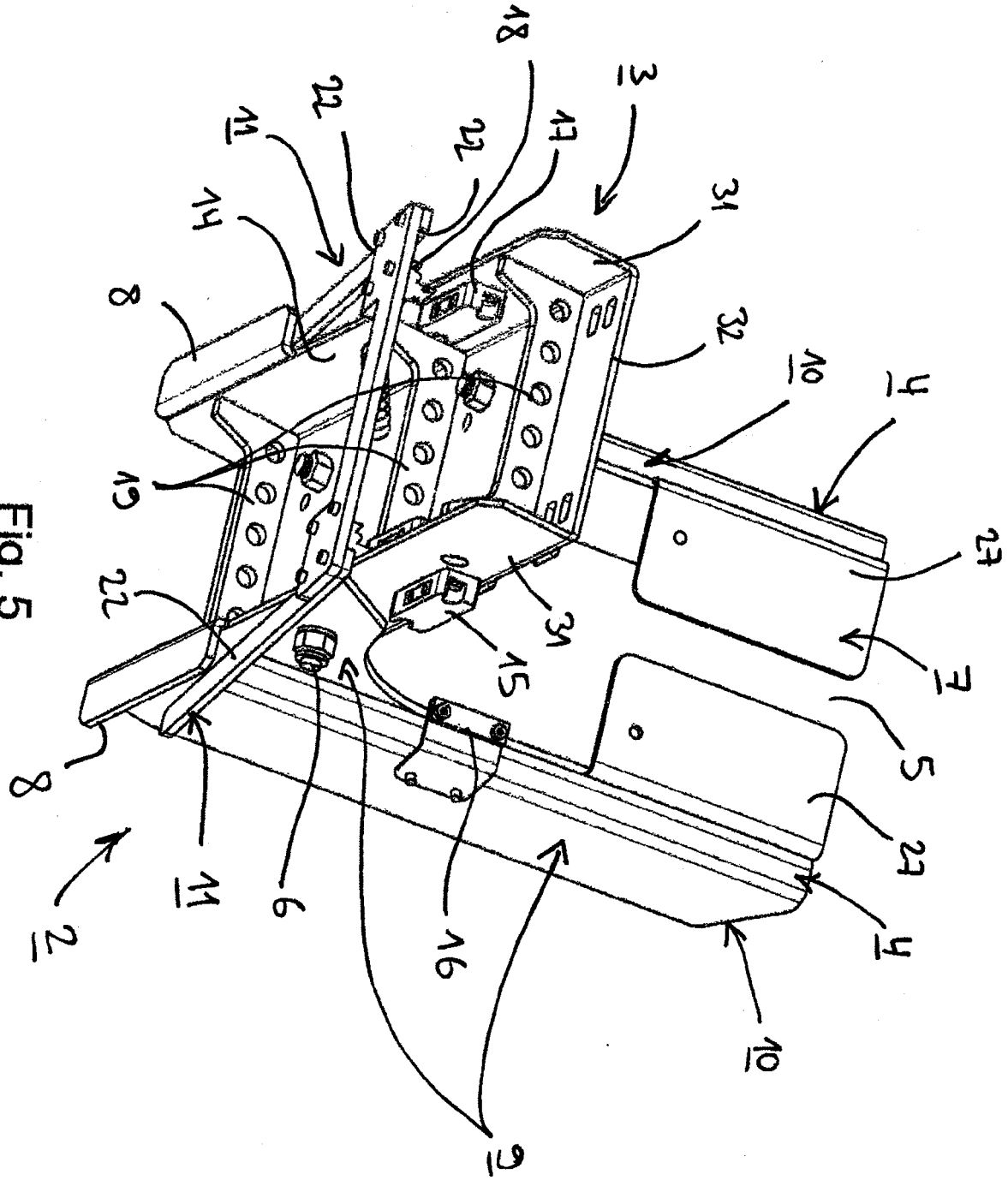

Fig. 5

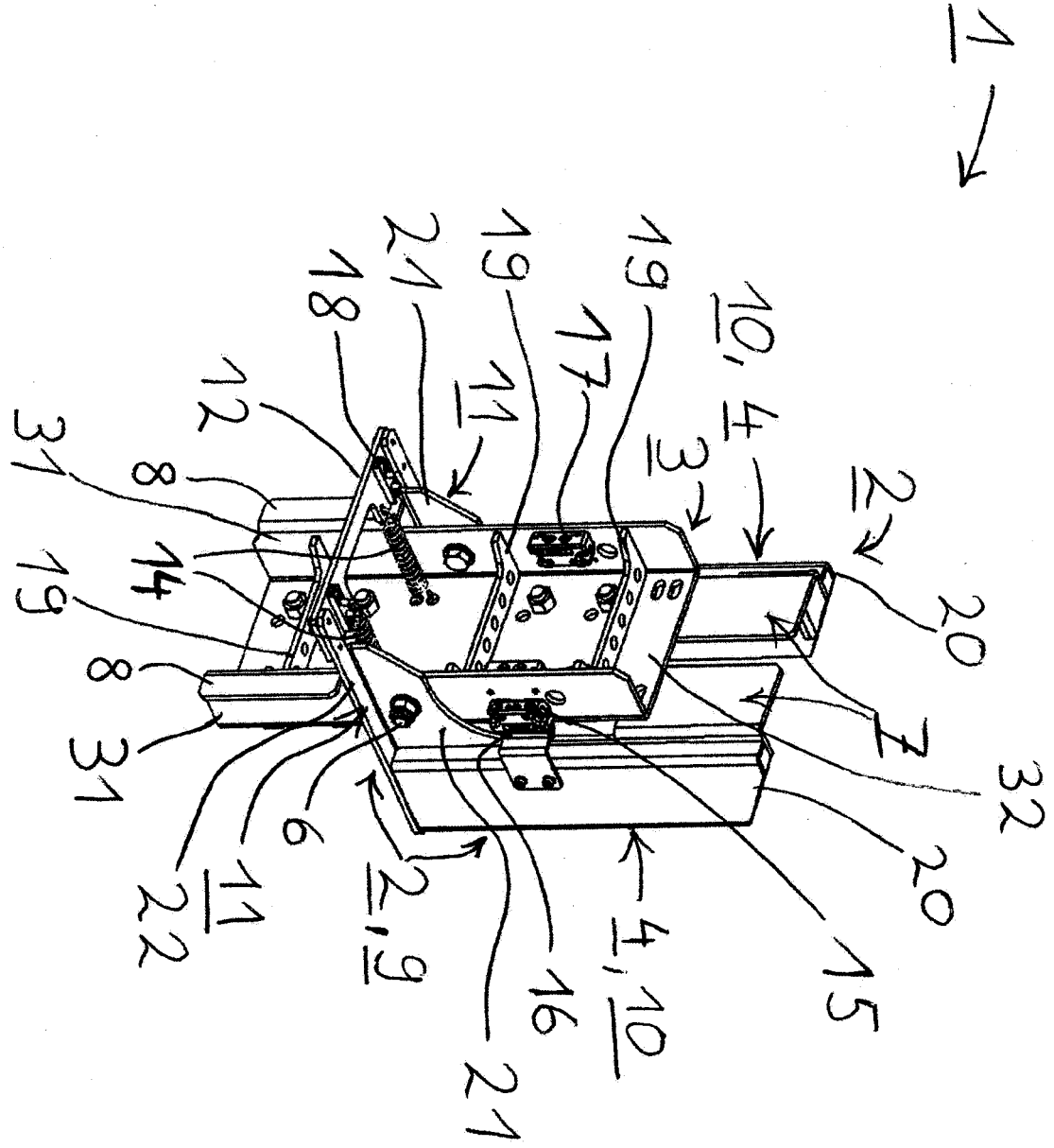
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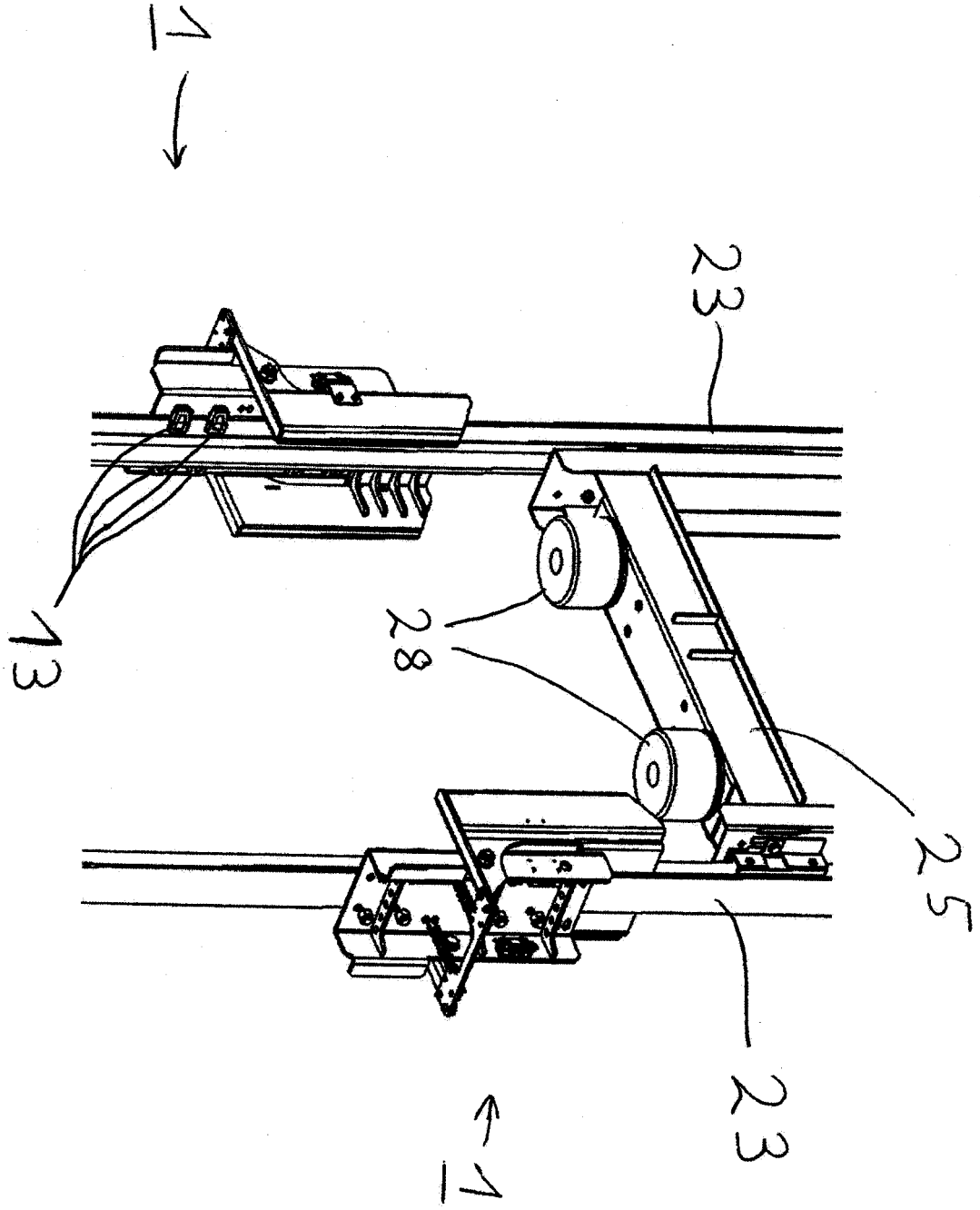
Fig. 6



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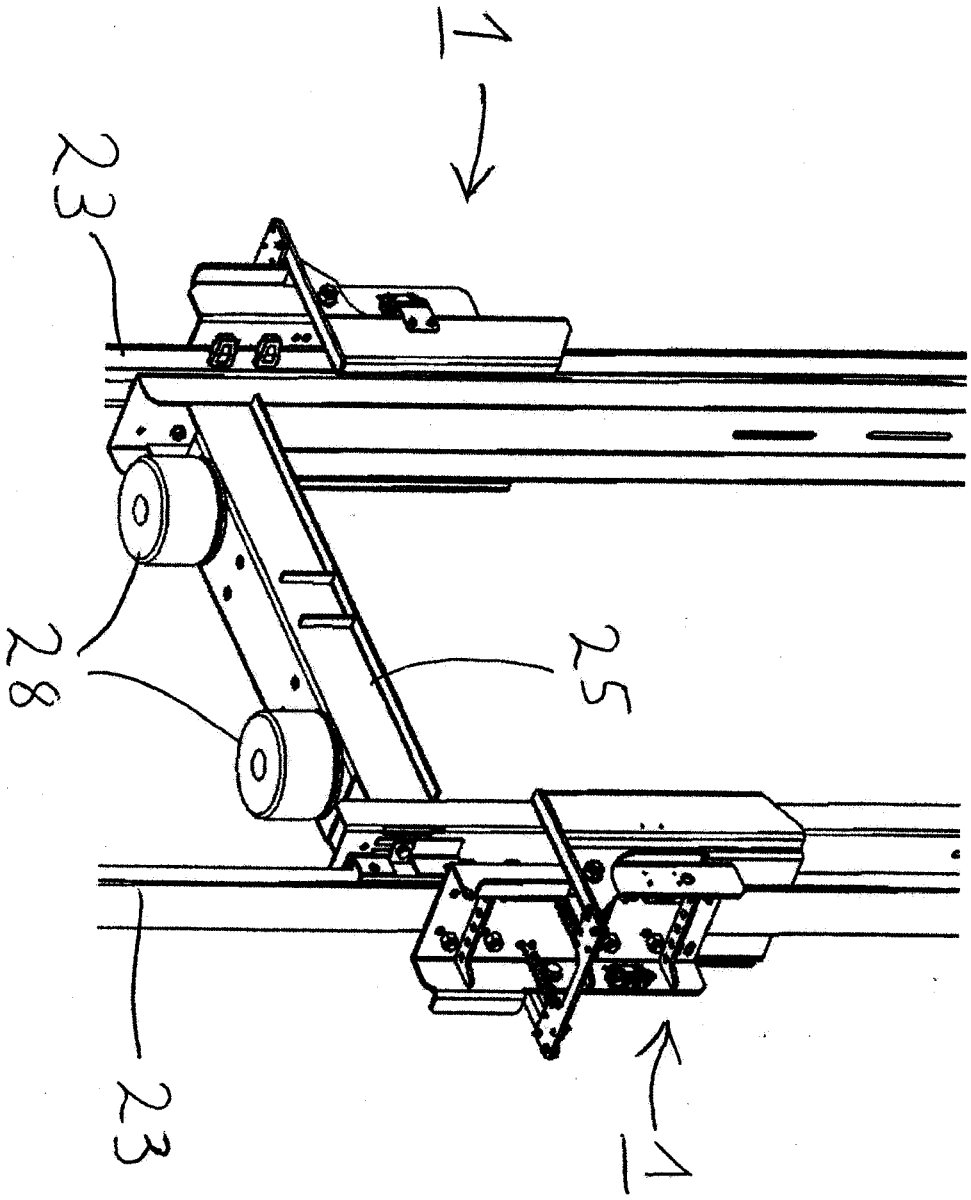

Fig. 8

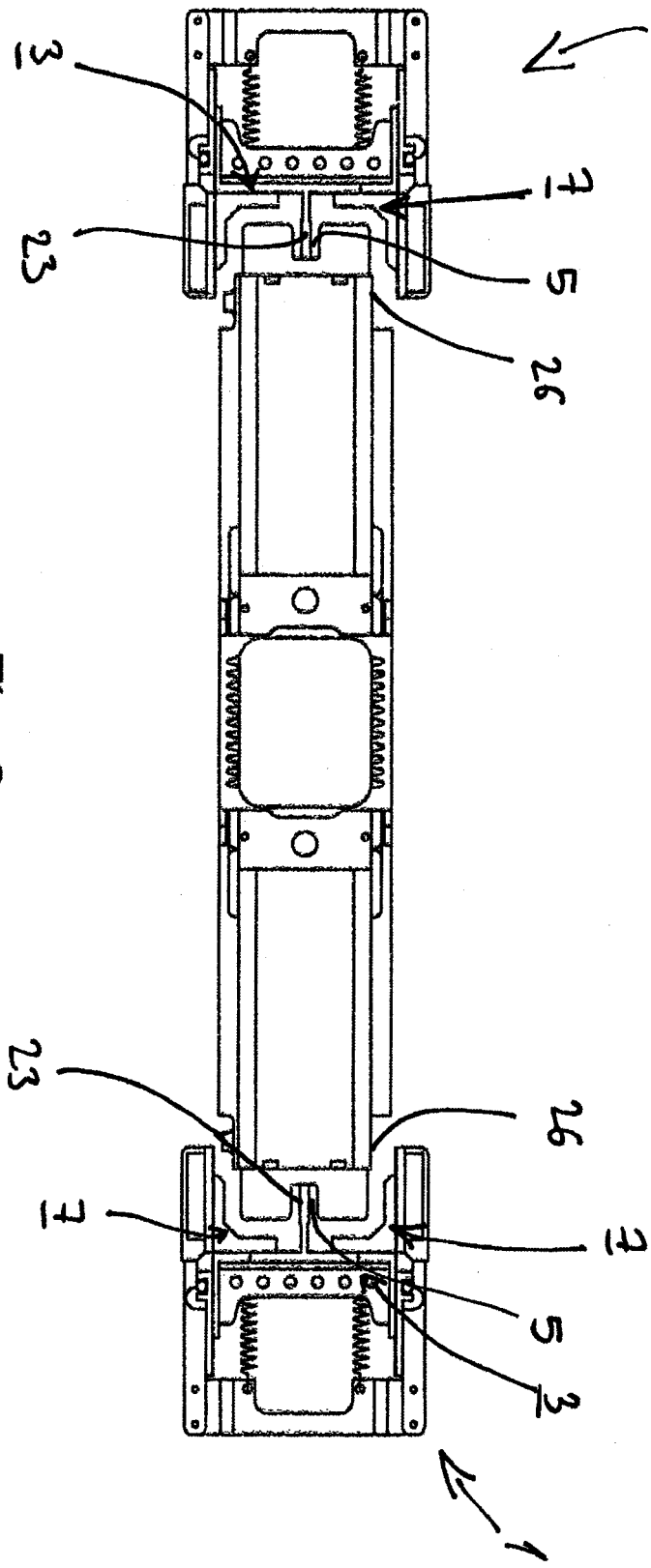

Fig. 9

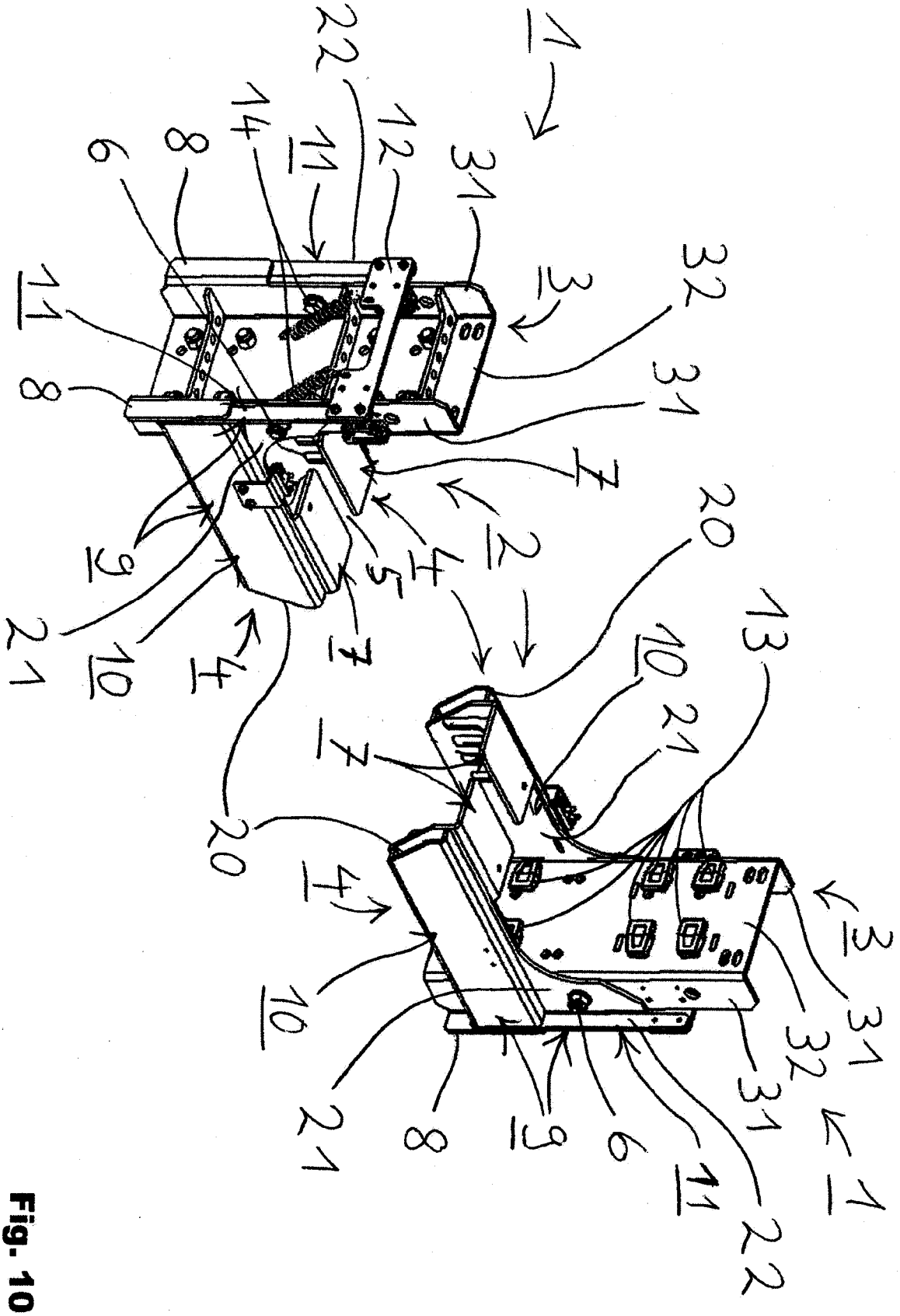
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Fig. 10

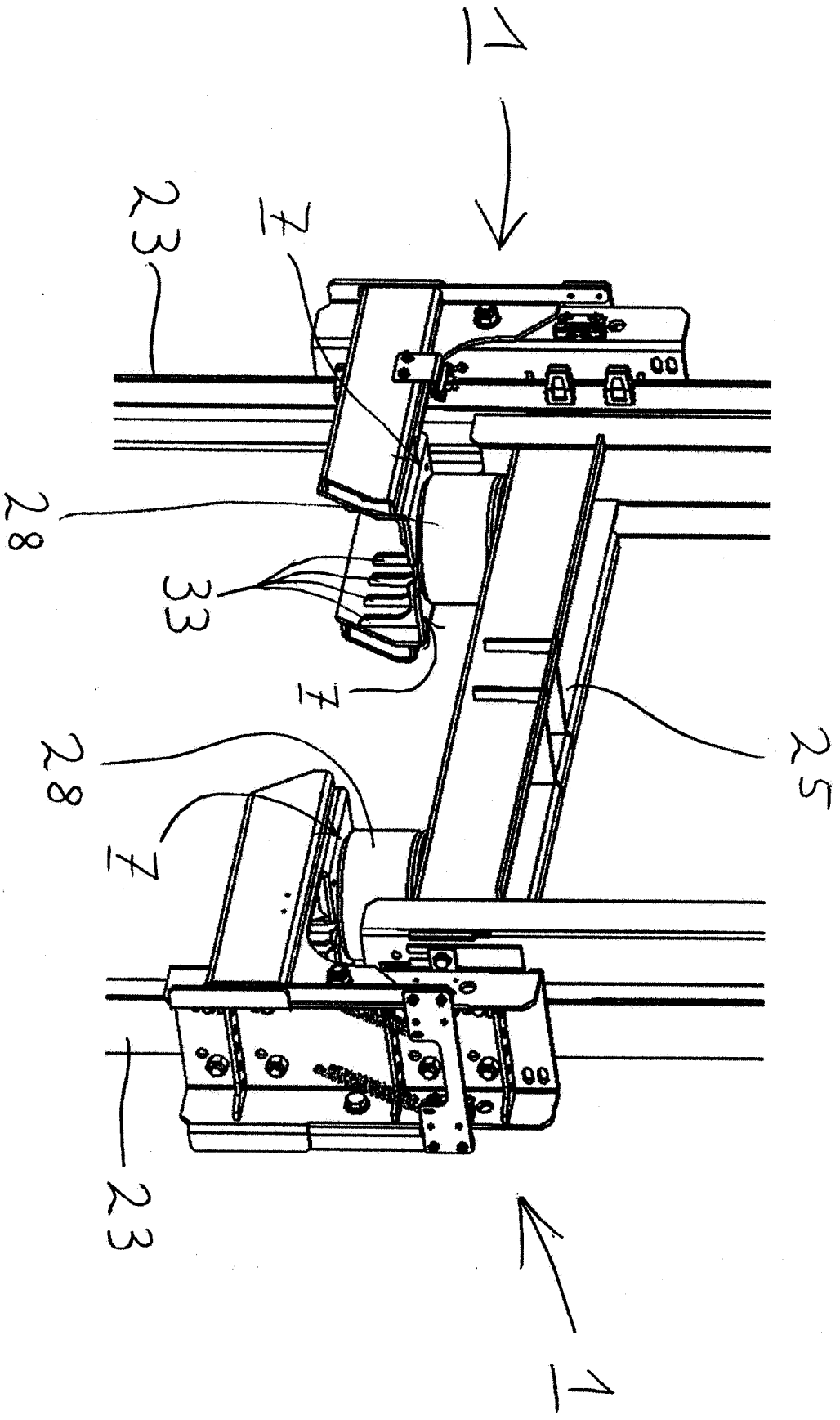

Fig. 11

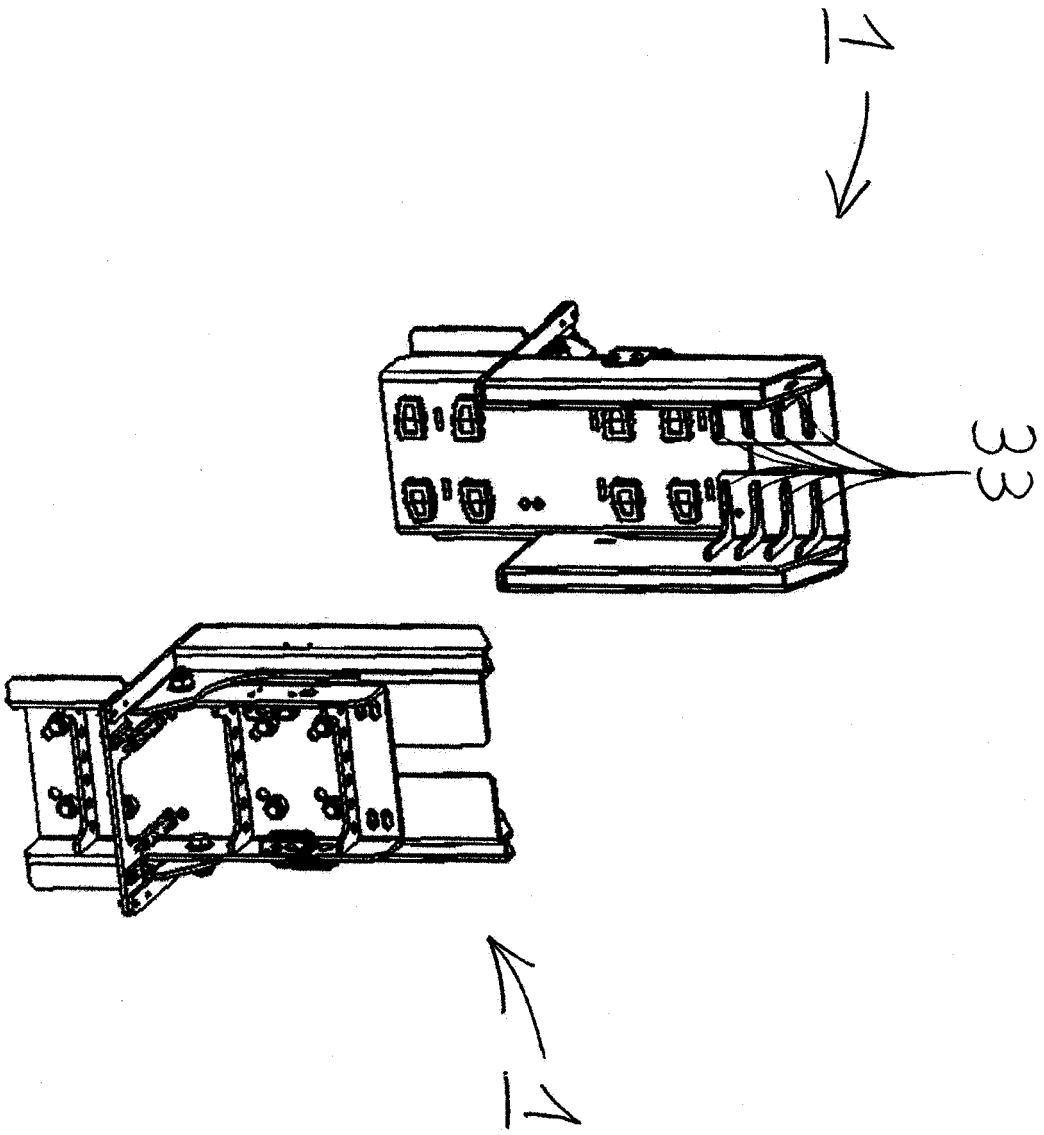

Fig. 12

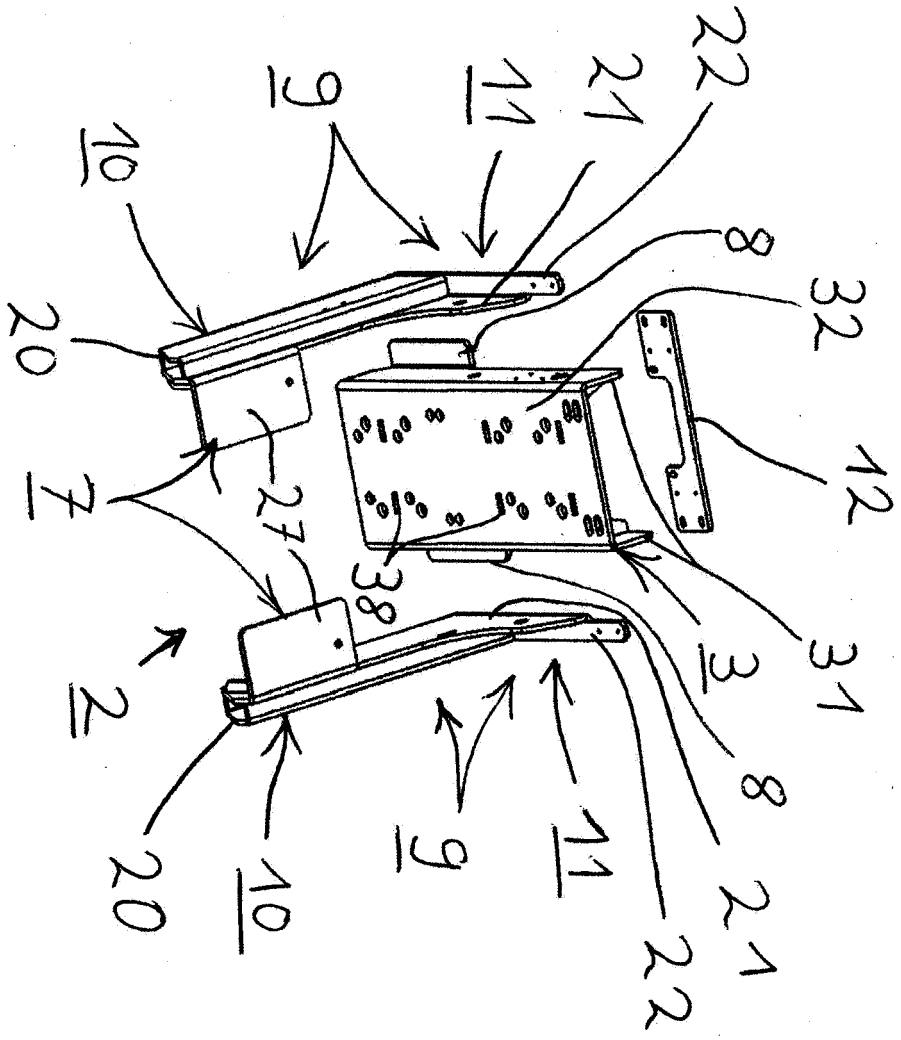

Fig. 13

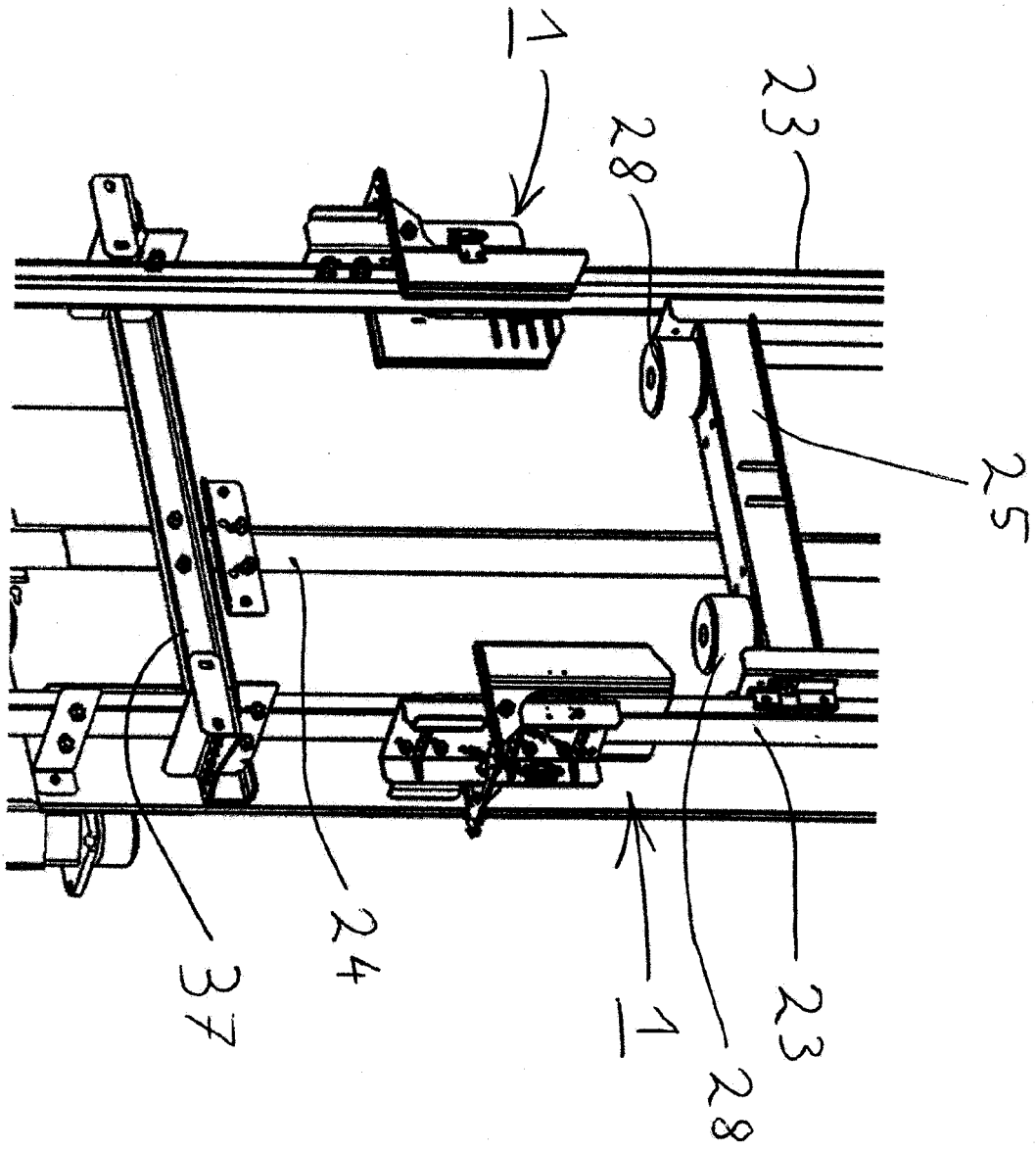

Fig. 14

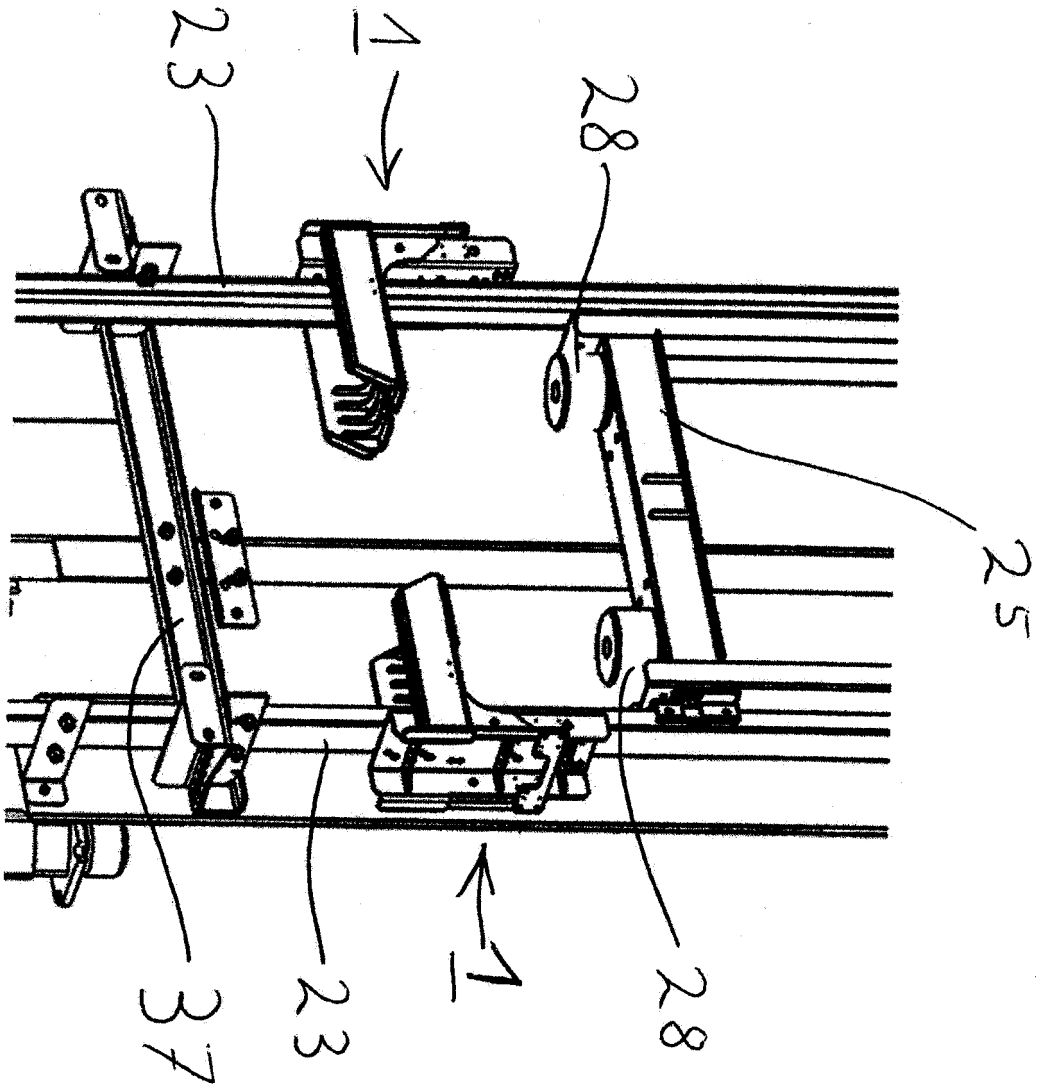

Fig. 15

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EUROPEAN SEARCH REPORT

Application Number
EP 21 18 8329

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	DE 20 2018 004562 U1 (MATTHIAS SCHERNIKAU GMBH [DE]) 16 October 2018 (2018-10-16) * abstract; figure 1 * * paragraph [0055] *	1,2,4-8, 10-15,18 3,9,16, 17	INV. B66B5/00
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X A	CN 109 179 144 A (HITACHI ELEVATOR CHINA CO LTD) 11 January 2019 (2019-01-11) * abstract; figures 1-4 *	1,8, 10-14,18	

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	27 November 2021	Bleys, Philip

CATEGORY OF CITED DOCUMENTS

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27-11-2021

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82