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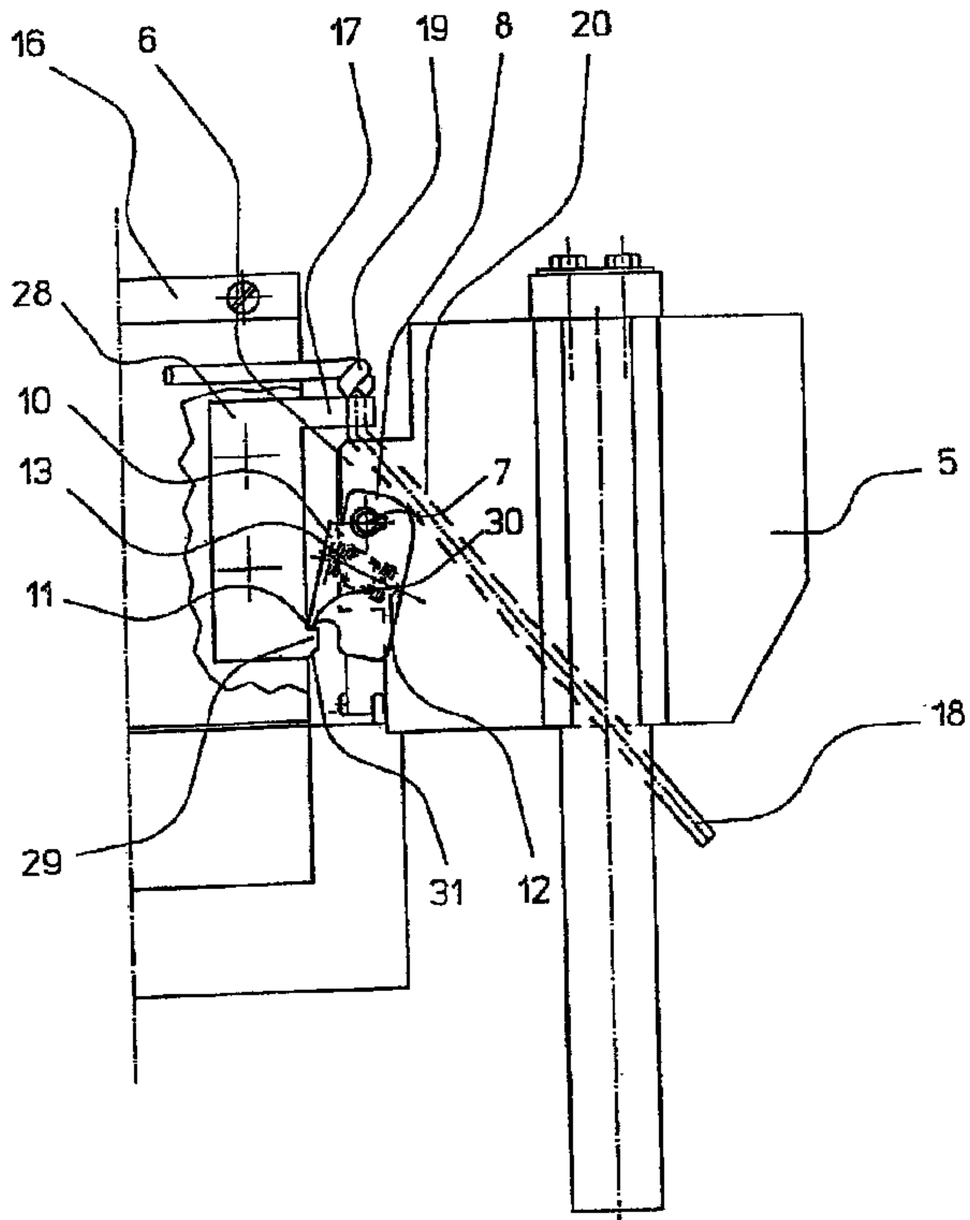

(57) Abrégé/Abstract:
A rolling door with a flexible door leaf which can be wound is rotationally mounted above the door opening and driven by a winding shaft. A closing strip whose length is smaller than the clearance width between lateral profiles at the door opening is fastened on the lower end of the leaf. A cable to tighten the door leaf has fasteners at each end and extends above reversing rollers mounted in the floor area. Carriage-like blocks move vertically guided by the lateral profiles. Holding means detachably connect the blocks to the closing strip ends and have openings for the cable extending from the reversing rollers on the floor to the closing strip. After a crash, holding means comprising catching devices release the closing strip upon exertion of lateral forces and re-engage therewith when the blocks are pressed down so the rolling door automatically and easily returns to operation.

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ABSTRACT

A rolling door with a flexible door leaf which can be wound is rotationally mounted above the door opening and driven by a winding shaft. A closing strip whose length is smaller than the clearance width between lateral profiles at the door opening is fastened on the lower end of the leaf. A cable to tighten the door leaf has fasteners at each end and extends above reversing rollers mounted in the floor area. Carriage-like blocks move vertically guided by the lateral profiles. Holding means detachably connect the blocks to the closing strip ends and have openings for the cable extending from the reversing rollers on the floor to the closing strip. After a crash, holding means comprising catching devices release the closing strip upon exertion of lateral forces and re-engage therewith when the blocks are pressed down so the rolling door automatically and easily returns to operation.

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A rolling door with a flexible door panel

The invention relates to a rolling door with a flexible door panel which can be wound up on a winding shaft pivoted above the door aperture and provided with a drive, having a stop rail fixed to the bottom end of the door panel whose length is less than the clear span between the side sections limiting the door aperture and which is provided at both ends with fastenings for wires running over rollers supported in the ground area and bracing the door panel and having slide-like blocks guided vertically movably in the side sections, which blocks are detachably connected to the ends of the rails by retaining means and are provided with channels or breakthroughs for the wires running from the pulleys on the ground side to the stop rail.

In a rolling door of this type known from DE 44 14 524 C2, the slide-like blocks are enclosed between top and bottom retaining pieces connected in each case to one end of the stop rail in such a way that these can only slide off the blocks in a lateral direction in the event of an impact acting on the stop section. With this known rolling door, the blocks are thus retained between fork-like retaining pieces of the stop rail by the bracing wire. To put the door back into its operational state again after a crash, it is

necessary to push the fork-like retaining pieces at the two ends of the stop section laterally over the blocks again and to press the edge regions of the door panel back into the guide slots of the side door sections. While with the known rolling door it is relatively simple to put the door back into its operational state after a crash, a special adjustment is required for this purpose in every case which requires manual work.

It is therefore the object of this invention to provide a rolling door of the type first given which, after a crash which led to a detaching of the stop rail from the blocks, can more easily and where possible even automatically be returned to its operational state again.

This object is solved in accordance with the invention by the retaining means consisting of locking devices which release the stop rail in the event of forces acting thereon from the side and which, when the blocks are pressed on from above, again interlock with them.

According to a first broad aspect of an embodiment of the present invention, there is disclosed A rolling door having a flexible door panel which can be wound up on a winding shaft pivoted above a door aperture and provided with a drive, having a stop rail fastened to a bottom end of the door panel whose length is less than a clear span between

side sections limiting the door aperture and which is provided at both its ends with fastenings for wires running over pulleys supported in a ground region and bracing the door panel, and having slide-like blocks guided vertically slidable in two side sections which are detachably connected to ends of the stop rail by retaining means and which are provided with channels or breakthroughs for the wires running from the pulleys on a ground side to the stop rail, characterized in that the retaining means consist of interlock devices which release the stop rail in the event of forces acting laterally thereon and which interlock with these again when the blocks are pressed down again from the top.

With the rolling door in accordance with the invention, in the event of a crash the triggering of the stop rail, that is its release from the blocks, is performed in the same way as with the known rolling door. However, unlike the known rolling door, it is not necessary after a triggering of the stop rail to push its fork-like retaining pieces laterally back over the retaining parts of the blocks, which would require manual adjustment work, but rather the bracing wires pull the stop section back onto the slid-like blocks from the top so that the stop section then again interlocks with the blocks when these are traveled towards the ground by a closing movement of the door. If the operational status of the door should not be automatically reinstated by the bracing wires pulling the stop section back onto the blocks after a crash until these interlock with the block, the interlock can be effected by exerting pressure onto the stop section from above. It may also be additionally necessary after the snapping in of the interlock

connection to align the stop section manually to the blocks and to press the side edges of the door panel into the side slots of the side door sections.

Appropriately, ratchet levers are pivoted on the blocks around axes running horizontally and diagonally to the plane of the door panel which ratchet levers are biased by springs towards the door panel and which are supported on these on interlock projections of the stop section below the fastenings of the wires.

To simplify the renewed interlocking of the stop section with the blocks after a deratcheting of the stop section, the interlock projections can be provided with chamfers on their bottom sides. The ratchets then slip over these chamfers until they snap into their interlocked position behind the interlock projections.

In another aspect of the invention, a sensor, for example an inductive proximity switch, is provided which generates signals when the stop section is pushed off at least one of the blocks and when the interlock connection is reinstated between the blocks and the stop section.

In accordance with a particularly preferred embodiment of the invention, it is provided that in guides of the blocks arms or slide elements are slidably guided which have a light barrier on their lower ends which, when it responds, causes a brake to engage which stops the closing movement of the door panel or which switches over the drive of the door panel to the winding up direction. The safety device consisting of the slidable arms with a light barrier which brings the stop section to a stop with great security within a stopping length which excludes any injury to persons and/or damage to objects is known per se from EP 0 284 066 B2. In this known apparatus, the arms having the light barrier are slidably guided in guides of the stop section or the lateral sword-like protrusions, which guides are parallel to the side sections. In accordance with the present invention, the slide elements or arms with the light barrier, which are

generally designed in the same way as those described in EP 0 284 066 B2, are slidably guided in guides of the blocks so that current can be supplied to the light barriers simply, for example by means of trailing cables. The invention further provides the additional advantage of the wires providing the bracing of the stop section not being directly connected to the slide-like blocks guided in the vertical slots of the side stop sections of the door, but rather the blocks being provided with obliquely running breakthroughs or channels through which the wires are guided to their fastenings or fastening pieces on the stop sections. In this way, in the event of a crash pushing the stop section off the blocks, it is prevented that the slide-like blocks are pulled against the ground with great force by the wires and that the light barriers may be damaged thereby. For as the blocks are provided with the obliquely running guides for the bracing wires, after a crash detaching the stop section from the blocks, the blocks can only slide downwards under the effect of gravity until they are stoppingly supported on the bracing wires running obliquely from the pulleys on the ground side to the fastening points on the stop section. If now to interlock the stop section with the blocks again, the door is travelled downwards with the side blocks until the blocks are supported on the floor and the interlock is again restored, the blocks settle relatively gently on the ground so that no damage to the safety device consisting of the arms provided with the light barriers needs to be feared.

One embodiment of the invention is described in more detail below by means of the drawings in which:

Fig. 1 shows a longitudinal section through a rolling door in the region of the right door section parallel to the plane of the door panel;

Fig. 2 shows a longitudinal section through the side section of Fig. 1;

Fig. 3 shows an enlarged section of Fig. 1; and

Fig. 4 shows a horizontal section through the section of Fig. 1.

A slide-like block 5 made of plastic is guided longitudinally slidably in vertical longitudinal slots of the door section which are parallel to each other and which are formed in the manner visible from Fig. 4 between the section parts 1, 2 and 3, 4. A front part 6 being essentially rectangular of the slide-like block 5 penetrates the longitudinal gap limited by the profile parts 1, 2 towards the door centre. A ratchet 8 is pivoted on this projection 6 around a lateral axis such as axle bolt 7 which ratchet 8 consists of a sheet-metal part bent into a U shape whose legs 9 enclose the projection 6 and are provided with bearing boreholes with which these are pivoted on the axle bolt 7 held in the projection 6. The bridge part 10 of the ratchet 8, which bridge part connects the legs, possesses a front support edge 11. As shown in Figure 3, the projection 6 is provided with an obliquely running blind hole 12 in which a compression spring 13 is held which is supported with its one end on the bottom of the blind hole 12 and with its other end on the bridge part 10 of the ratchet.

Referring to Figures 1 and 3, the flexible door panel (not shown) which can be wound up on the winding shaft 15 usually carries on its bottom end the stop section 16 which is provided on both sides with a retaining part 17 pointing at right angles to the side door sections which is provided with a borehole 20 in which the bracing wire 18 is held by a knot 19 supported on the upper edge of the borehole. The bracing wire 18 penetrates the slide-like blocks 5 in guides formed by obliquely running boreholes 20. The bracing wires 18 run from these guides to pulleys 21 supported on the ground in a fixed manner. The bracing wires 18 are edged into line in the manner of a set of pulleys between further pulleys 22 to 25 (see Figure 2), with the pulley 25 being the pulley of a lower block biased by the tension spring 26.

The stop section 16 is provided with side fittings 28 which possess lower interlock projections 29 cantilevered parallel to the retaining parts 17. The interlock projections 29 are provided with top interlock surfaces 30 parallel to the support edges 11 of the ratchets

8. On their bottom side, the interlock projections 29 possess oblique abutting surfaces 31.

In the drawings, the components are shown with the door in a position in which the stop section 16 is interlocked by the ratchet 8 with the slide blocks 5, i.e., it is located in its operating position. If, in the event of a crash, which is given, for example, when a vehicle pushes against the stop section, the stop section 16 is pushed off one of the slide blocks 5, the stop section can swing out freely with the bracing ropes 18 being pulled out. In this situation, the interlock ratchet 8 swings out into the position 10' shown by a broken line in Fig. 3. Once the cause of the crash has been removed, the bracing wires 18 again pull the stop section 16 in the direction of the slide blocks 5 so that the oblique bottom edge of the interlock projections 28 slides over the bridge parts 10 of the interlock ratchets until the lower support 11 of the interlock ratchet snaps into place behind the abutment surface 30.

The support edge 11 can be designed with a slight curve or concavely to allow engagement of the interlock projection 29 in a well centred manner.

Referring to Figure 1, the slide blocks 5 are provided with parallel boreholes on the door section in which arms 35 are guided longitudinally slidably. The arms 35 have on their lower ends light barriers 36 which cause the brake of the gear brake motor to engage which drives the winding shaft 15 in a manner not shown when the light barrier reports that a person or an object is located in the closing path of the stop section. The type of guide of the arm 35 in the slide block 5 and the effect of the light barrier 36 is known from EP 0 284 066 B2 to which reference is made for a closer description of the safety device.

If in the event of a crash, a detaching of the interlock connection is performed in a manner such that the stop section 16 of the door panel is pushed off the protrusion 6 of the slide block 5, the slide block 5 with the arm 35 which has the light barrier 36 slides so far down until the slide block 5 is held in its oblique borehole 20 on the obliquely running bracing wire 18. To put the door back into its operating status, the door panel is travelled into its closing position by its drive until the slide blocks 5 impact the floor and the arms 35 are pushed upwards in the guides. In this position, the bracing wires 18 pull the stop section against the slide blocks 5 so that the interlock connection is restored between the two and the door is put back into its operating status.

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What Is Claimed Is:

1. A rolling door having a flexible door panel which can be wound up on a winding shaft pivoted above a door aperture and provided with a drive, having a stop rail fastened to a bottom end of the door panel whose length is less than a clear span between side sections limiting the door aperture and which is provided at both its ends with fastenings for wires running over pulleys supported in a ground region and bracing the door panel, and having slide-like blocks guided vertically slidable in two side sections which are detachably connected to ends of the stop rail by retaining means and which are provided with channels or breakthroughs for the wires running from the pulleys on a ground side to the stop rail, characterized in that the retaining means consist of interlock devices which release the stop rail in the event of forces acting laterally thereon and which interlock with these again when the blocks are pressed down again from the top.

2. A rolling door in accordance with claim 1, wherein ratchet levers are pivoted on the blocks around axes running horizontally and laterally to a plane of the door panel which are biased by springs towards the door panel and which are supported on these on interlock projections of a stop section below fastenings of the wires.

3. A rolling door in accordance with claim 2, wherein the interlock projections are provided with chamferings on their bottom sides.

4. A rolling door according to any one of claims 1 to 3, wherein a sensor is provided which generates signals when the stop section is pushed off at least one of the blocks and when an interlock connection is restored between the blocks and the stop section.

5. A rolling door according to any one of claims 1 to 4, wherein arms are guided slidably in guides of the blocks which arms have on their lower ends light barriers which, when they respond, cause a brake to engage which stops the closing movement of the door or which switches over a drive of the door panel to a winding up direction.

6. A rolling door according to claim 4 wherein the sensor is an inductive proximity switch.

Fig. 1

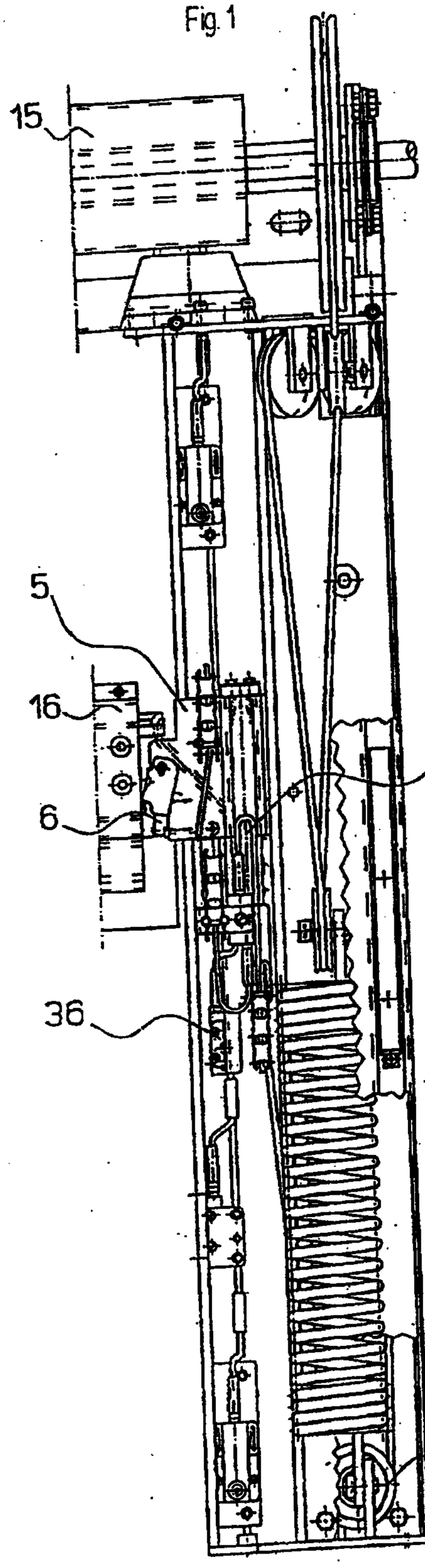


Fig. 2

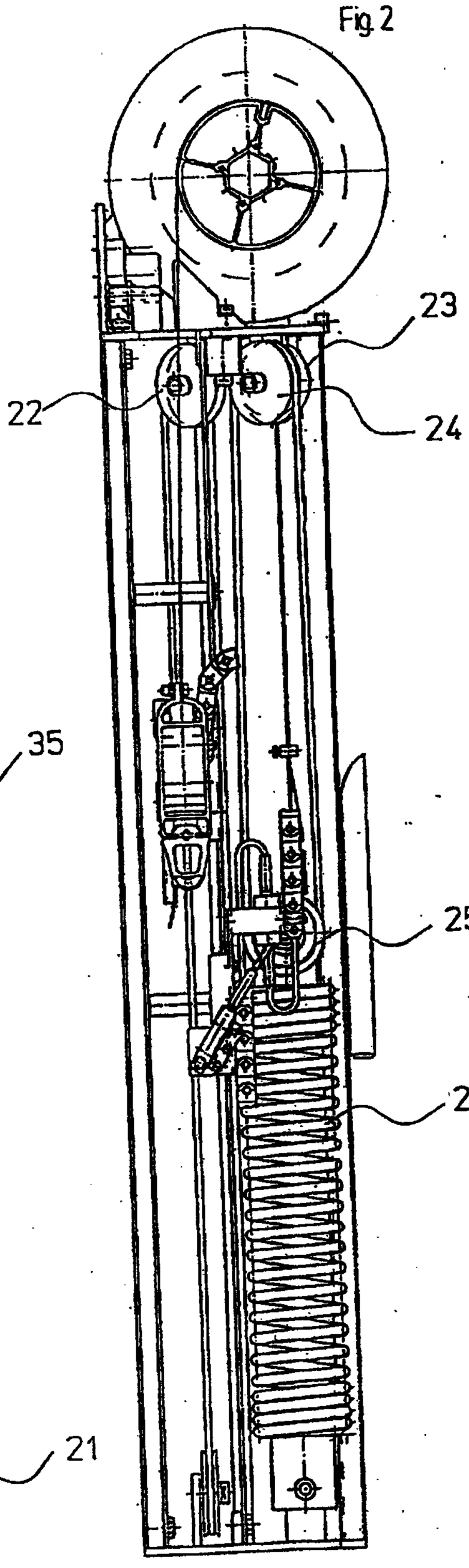


Fig 3

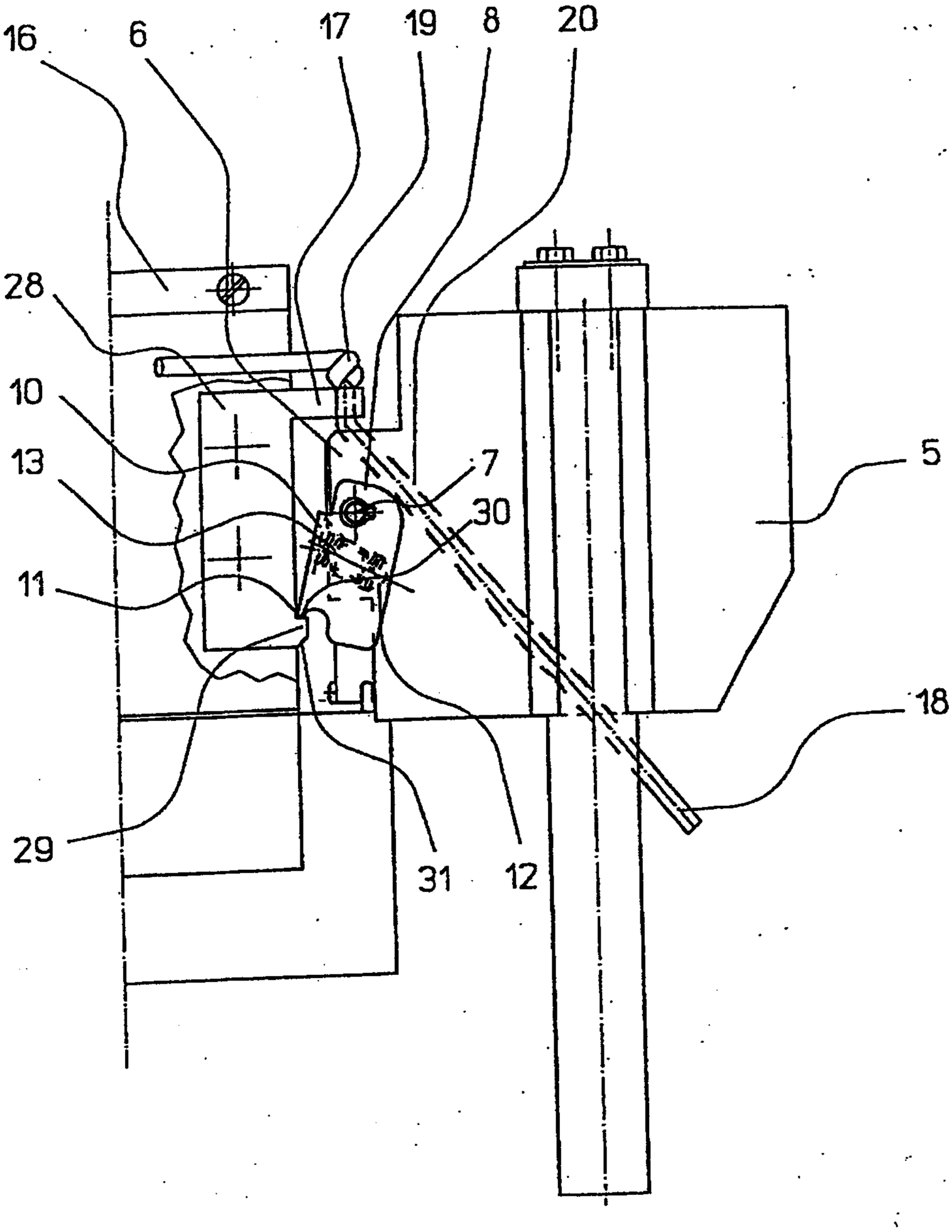
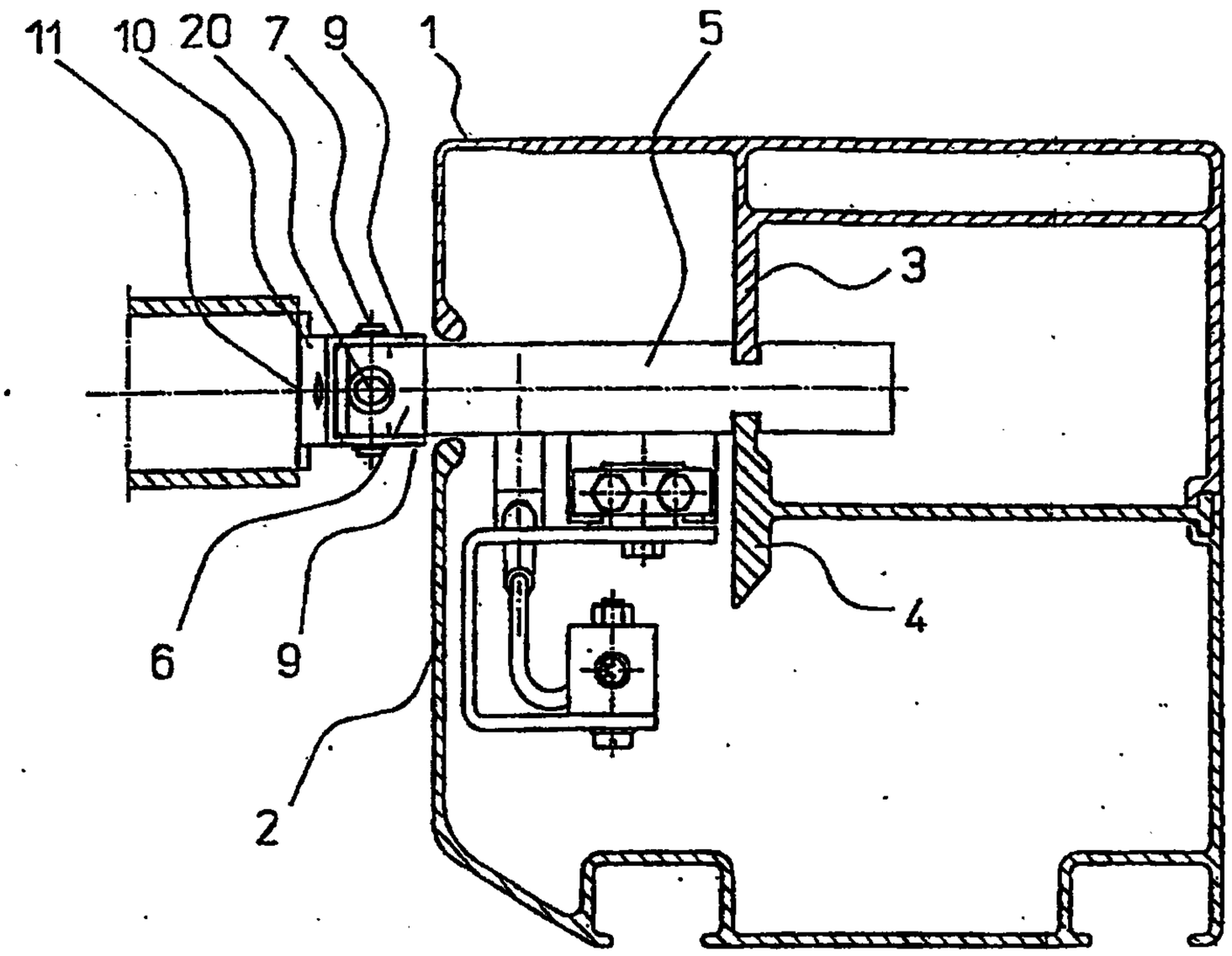
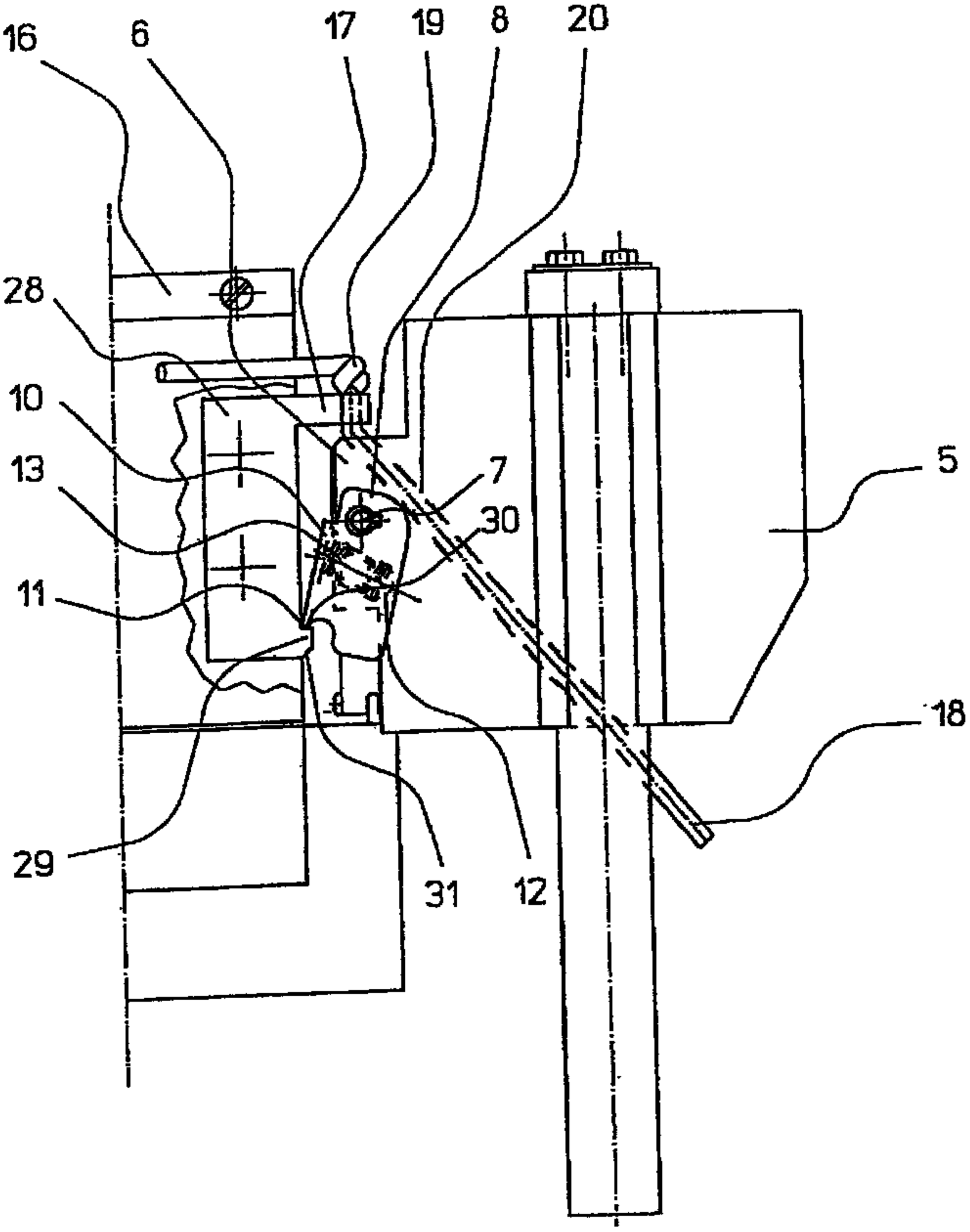


Fig. 4

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