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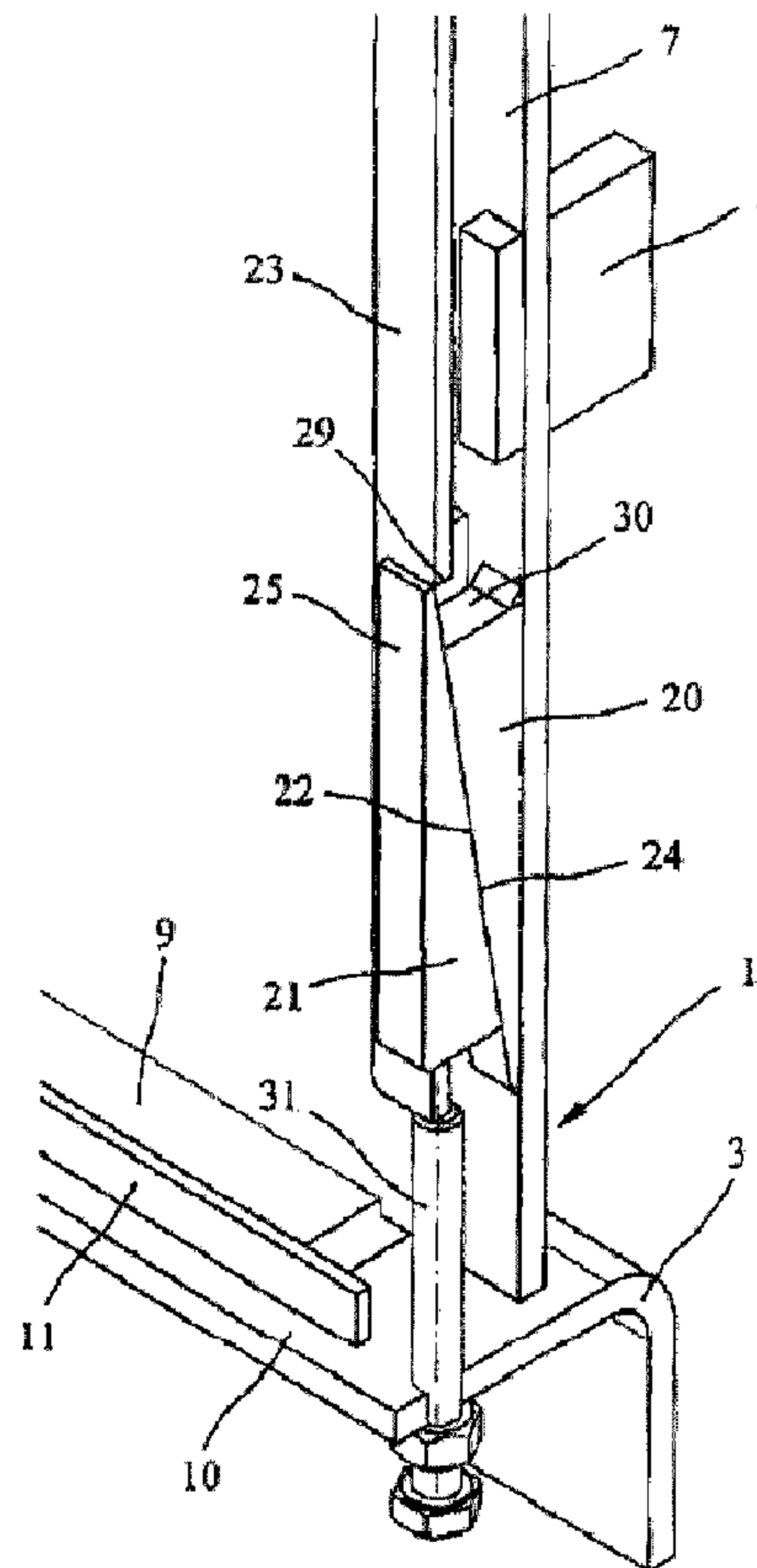
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(54) Title: GATE VALVE



(57) Abrégé/Abstract:

The invention concerns a gate valve with a valve plate (1) located in a movable manner within a holder (2), a sealing (17) for the sealing off of the valve plate (1) relative to the holder (2), and a wedge arrangement with several first wedge elements (20) located



(57) **Abrégé(suite)/Abstract(continued):**

on the valve plate (1) in its direction of movement at a distance from one another, and second wedge elements (21) belonging to the first wedge elements (20), by means of which the valve plate (1) is pressed transverse to the direction of movement of the valve plate (1) against the sealing (17) with a movement into a closing position. In order to facilitate a low-friction actuation with a reduced actuation force, also in a compact and space-saving manner, the second wedge elements (21) are supported on the holder (2), so that they can move relative to the holder (2).

Abstract

The invention concerns a gate valve with a valve plate (1) located in a movable manner within a holder (2), a sealing (17) for the sealing off of the valve plate (1) relative to the holder (2), and a wedge arrangement with several first wedge elements (20) located on the valve plate (1) in its direction of movement at a distance from one another, and second wedge elements (21) belonging to the first wedge elements (20), by means of which the valve plate (1) is pressed transverse to the direction of movement of the valve plate (1) against the sealing (17) with a movement into a closing position. In order to facilitate a low-friction actuation with a reduced actuation force, also in a compact and space-saving manner, the second wedge elements (21) are supported on the holder (2), so that they can move relative to the holder (2).

Figure 1

GATE VALVE

The invention concerns a gate valve according to the preamble of Claim 1.

Such a gate valve is known from DE 43 20 185 A1. There, a valve plate is conducted in a movable manner within a rack frame that can be installed on a wall in front of an outlet opening. A sealing arrangement with two ring seals situated on each side of a sealing ring is provided in the area of a passage in a wall plate of the rack frame. By means of a wedge arrangement with several wedge pieces arranged on the gate valve and the rack frame, the gate valve is pressed, transverse to its movement direction against the sealing arrangement, when the valve plate arrives at a closing position covering the passage.

With such gate valves with a wedge system, the valve plate is moved, during almost its entire stroke, with a clearance within the rack frame. Only at the end of the closing stroke is the wedging of the wedge pieces that are firmly arranged on the valve plate and the rack frame effective, so that the valve plate is pressed against the sealing only just before the complete shutoff. In this way, the friction and the actuating force can be decreased and the wear and tear, reduced. However, the valve plate lifts off relatively fast from the sealing upon opening, so that a leakage also appears quickly on the entire valve plate. Since the wedge pieces affixed on the valve plate and the rack frame must be moved, collision-free, past one another during the stroke movement, a lateral movement of the wedge pieces is also required. Especially with larger gate valve dimensions with several wedge pieces located above one another, therefore, the side sections of the rack frame must have a corresponding width and stability. For this reason, however, the use of material and the size are increased.

Therefore, gate valves are also already known, in which the valve plate, conducted almost free of play in profiled frame profiles, is pressed in a defined manner against the individual sealing profile by means of slide profiles made of plastic as a rule. With such a structure, only the actual gate valve opening is released, whereas the areas on which valve plate and sealing are in contact are tight. Furthermore, the valve plate is

conducted free of play during the entire stroke, wherein vibrations can be avoided during operation. However, since the valve plate is pressed during the entire stroke with the sealing, correspondingly higher actuation forces are needed for the movement of the valve plate. As a result of the constant pressing of the valve plate with the sealing, the friction during the actuation is also increased and thus, also the wear and tear of the sealing. If leakage occurs, moreover, the sealing force cannot be increased further.

The goal of the invention is to create a gate valve that, with a compact and space-saving design, makes possible an actuation as low-friction as possible, with a reduced actuation force.

This goal is attained with a gate valve with the features of Claim 1. Appropriate refinements and advantageous embodiments of the invention are the object of the subordinate claims.

With the gate valve in accordance with the invention, only the wedge elements located on the valve plate are firmly connected with the valve plate, whereas the associated second wedge elements are supported on the holder so that they can be moved relative to the holder, and are moved along with a shift of the gate valve plate. In this way, several wedge elements are located, in the direction of movement, in a line one behind the other and need not be moved laterally, with respect to one another. Thus, even larger gate valves can also be conducted on the entire length in relatively narrow side profiles. The entire construction and, in particular, the side guides with the wedge elements to press the gate valve plate with the sealing can thus be constructed in an extremely compact and space-saving manner. The second wedge elements located in the direction of movement of the gate valve plate in a line behind one another are situated on a common slide rail. In this way, the second wedge elements can be jointly moved. The second wedge elements can, for example, be inserted in recesses within the slide rail.

In a particularly advantageous embodiment, the holder is constructed in the form of a frame with two side profiles designed as frame profiles to guide the valve plate on its two longitudinal sides. As a result of the not required lateral displacement of the wedge

elements, the side profiles can be constructed extremely compact and with flexural rigidity.

The slide rail expediently has at least one contact surface for the carrying of the slide rail by a first wedge element with the shifting of the valve plate into an open position. In this way, with a shifting of the valve plate into an open position by the first wedge elements via the slide rail, the second wedge elements can be carried along.

In another advantageous embodiment, the second wedge elements can contain elevated side walls. In this way, the first wedge elements can be conducted laterally within the second wedge elements.

In a particularly advantageous manner, the valve plate is conducted in a movable manner within the side profiles of the holder designed as a frame by the second element and a guide element that is located on the valve plate. By means of these two parts, a slide bearing function with little play and a defined minimum pressing between the valve plate and sealing can be guaranteed over the entire stroke. The second wedge elements and the guide elements can be made of plastic, so that low frictional torques and reduced actuation forces are produced during the stroke. In this way, the advantages of known sliding and wedge gate valve systems are combined without restrictions.

Additional special features and advantages of the invention can be deduced from the following description of a preferred embodiment example with the aid of the drawing. The figures show the following:

Figure 1, a part of a gate valve in accordance with the invention in a cross-section;

Figure 2, a part of the gate valve shown in Figure 1 in a longitudinal section;

Figure 3, a guide of the gate valve in a perspective; and

Figure 4, the guide of the gate valve in an exploded view.

Figure 1 shows a part of a gate valve, which can be used, for example, to shut off waste water in basins. The gate valve contains a rectangular, square, or round gate valve 1, which is located in a movable manner within a holder 2, which is constructed here as a frame. In the embodiment shown, the frame-shaped holder 2 comprises a lower closing profile 3 shown in Figures 2 to 4, and two parallel side profiles 4, which can be seen in Figure 1, in which the valve plate 1 is conducted laterally. The frame-like holder 2 with the horizontal, lower closing profile 3 and the vertical side profiles 4 provided with retainer pieces 5 can be sealed off, for example, with a sealing 6 and fastened on the outside of a wall of a basin, or the like, provided with a passage. On the valve plate 1, the water pressure can then act in the direction of the arrow P shown in Figure 1. The valve plate 1, however, can also be located in a movable manner as a gate in a corresponding holder of a channel or a groove or in a suitable guide of a housing.

In the depicted housing-free embodiment, the valve plate 1 is conducted in a movable manner on its two longitudinal sides 7 via guide elements 8 into the two side profiles 4, parallel relative to one another, of the holder 2, which is constructed as a frame, and in a lower closing position, is on a bottom gasket 9 situated on the lower closing profile 3. The bottom gasket 9 shown in Figures 2 and 3 is located on an upper leg 10 of the lower closing profile 3, constructed as an angular profile, between a front and back retaining strip 11 and 12. By means of a spindle drive, which is in fact known and therefore not depicted, the valve plate 1 can be moved upwards into an opening position for the clearance of a passage from the lower closing position shown in Figures 2 and 3.

The side profiles 4 are constructed in accordance with Figure 1 as open frame profiles with an inside leg 13 and an outside leg 14. Between the inside leg 13 and the outside leg 14 of the two side profiles 4, the valve plate 1 is conducted in a movable manner via the guide elements 8, shown also in Figures 2 to 3. In accordance with Figure 4, the guide elements 8, which are preferably made of plastic, can be stuck on the longitudinal sides 7 of the valve plate 1 via a slot 15, and held within a recess 16.

A sealing 17, which is shown in Figure 1, is located within the side profiles 4; it contains sealing lips 18 adjacent to the valve plate 2. In the embodiment shown, the sealing 17 lies close to the inside leg 13 of the side profile 4 and is held by a retaining crosslink 19 welded onto the inside of the inside leg 13. Furthermore, inside the side profiles 4 is a wedge arrangement with several first wedge elements 20 located on the two longitudinal sides 7 of the valve plate 1 in its direction of movement in a line one behind the other, and second wedge elements 21, which engage with the first wedge elements. The first wedge elements 20, which are preferably made of metal and are welded to the valve plate 2, have a wedge surface 22 that faces the second wedge elements 21. The second wedge elements 21 are located on a movable slide rail 23. On the side pointing to the first wedge elements 20, they have a second wedge surface 24 corresponding to the first wedge surface 22, and on the side opposite the second wedge surface 24, a straight contact surface 25 for contact on the inside of the outside leg 14 of the side profile 4.

As can be seen in Figure 4, the second wedge elements 21 have a quadrangular outer contour with elevated side walls 26. The first wedge elements 20 are conducted in a movable manner between the two side walls 26 of the second wedge elements 21. The second wedge elements 21 are inserted into rectangular recesses 27 of the slide rail 23 and have on the outsides of the two side walls 26 a step 28 for retention within the recesses 27. Corresponding to the first wedge elements 20, the associated second wedge elements 21 are located in the direction of movement of the valve plate 1 in a line one behind the other and not staggered laterally relative to one another.

From Figures 2 and 3, one can see that the second wedge surface 24 of the second wedge element 21 inserted into the recess 27 of the slide rail 23 runs in such a way that at the transition to the slide rail 23 on the upper end of the recess 27, a contact surface 29 is formed for the carrying along of the slide rail 23 by the first wedge elements 20 during the movement of the valve plate 1 into the opening position. The first and second wedge elements 20 and 21 are situated in such a way that with the movement of the valve plate 1 into the opening direction, the first wedge element 20, pressed by the water pressure against the second wedge element 21, reaches with the upper end surface

30 the contact surface 29 on the recess 27 in the slide rail. On the lower closing profile 3, adjustable contacts 31 are located as a lower contact for the two slide rails 23 on the two longitudinal sides 7 of the valve plate 1. In the embodiment shown, the adjustable contacts are constructed as adjusting screws with lock nuts.

Below, the mode of functioning of the shutoff valve in accordance with the invention is explained with the aid of Figures 2 and 3.

If the valve plate 1 is moved upwards from the closing position shown in Figures 2 and 3, the first wedge elements 20 fastened on the valve plate 1 slide with their wedge surfaces 22 past the wedge surfaces 24 of the second wedge elements 21 located on the slide rail until the upper end surfaces 30 of the first wedge elements 20 acting as carrying surfaces arrive at the contact surfaces 29 of the slide rails 23. The pressing between the slide plate 1 and the sealing 17 shown in Figure 1 is thereby reduced. In another upward movement, the first wedge elements 20 carry along the second wedge elements 21 upwards via the slide rail 23 for the rest of the stroke. The valve plate 1 is conducted by the quadrangular guide elements 8, which are preferably made of plastic, and the second wedge elements 21, which are likewise preferably made of plastic, in a sliding manner almost free of play within the side profiles 4.

If, on the other hand, the valve plate 1 is moved downwards from an upper open position, then the second wedge elements 21 are carried along by means of the first wedge elements 20 until the slide rails 23, shortly before arriving at the valve plate 1 at the bottom gasket 9, reach with their lower end the contacts 31 constructed as adjusting screws. In the further downward movement of the valve plate 1 with the welded first wedge elements 20, the latter move further on the wedge surfaces 24 of the second wedge elements 21, which are likewise preferably made of plastic. The valve plate 1 is thereby pressed in the direction of the sealing lips 18 of the sealing 17, whereby the sealing effect is increased.

Claims

1. Gate valve with a valve plate (1) located in a movable manner within a holder (2), a sealing (17) for the sealing of the valve plate (1) relative to the holder (2), and a wedge arrangement with several first wedge elements (20) located on the valve plate (1) in its direction of movement at a distance from one another and second wedge elements (21) belonging to the first wedge elements (20), by means of which the valve plate (1) is pressed transverse to the direction of movement of the valve plate (1) against the sealing (17) in its movement into a closing position, characterized in that the second wedge elements (21) are supported on the holder (2), so they can move relative to the holder (2), and the second wedge elements (21) located in the direction of movement of the valve plate (1) in a line behind one another are located in a common slide rail (23).
2. Gate valve according to Claim 1, characterized in that the holder (2) is designed in the form of a frame with two side profiles (4), constructed as frame profiles, to guide the valve plate (1) on its two longitudinal sides (7).
3. Gate valve according to Claim 1 or 2, characterized in that the second wedge elements (21) are inserted into recesses (27) of the slide rail (23).
4. Gate valve according to Claim 3, characterized in that the slide rail (23) contains at least one contact surface (29) for the carrying along of the slide rail (23) by a first wedge element (20) with the movement of the valve plate (1) into an open position.
5. Valve plate according to Claim 4, characterized in that the wedge surface (24) of the second wedge elements (21) runs in such a way that at the transition to the slide rail (23), on the upper end of the recess (27), the contact surface (29) for an upper end surface (30) of the first wedge element (20) is formed.
6. Gate valve according to one of Claims 1 to 5, characterized in that the second wedge elements (21) include elevated side walls (26).

7. Gate valve according to one of Claims 2 to 6, characterized in that the valve plate (1) is conducted in a movable manner within the side profiles (4) of the holder (2) by the second wedge element (21) and a guide element (8) located on the slide plate (1).

8. Gate valve according to Claim 7, characterized in that the second wedge element (21) includes a sliding surface (25) for the placement on the inside of an outside leg (14) of the side profile (4).

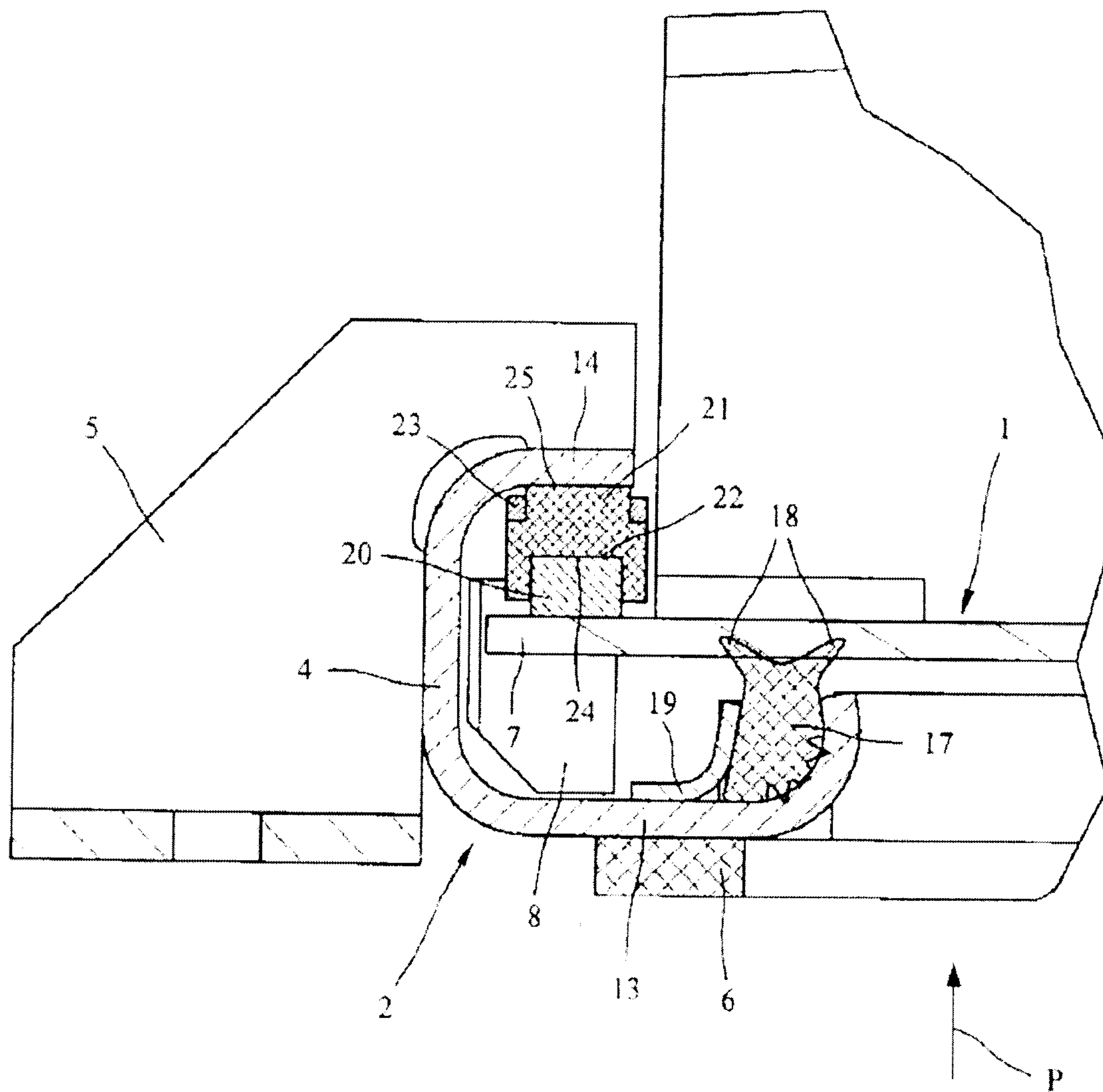


Fig. 1

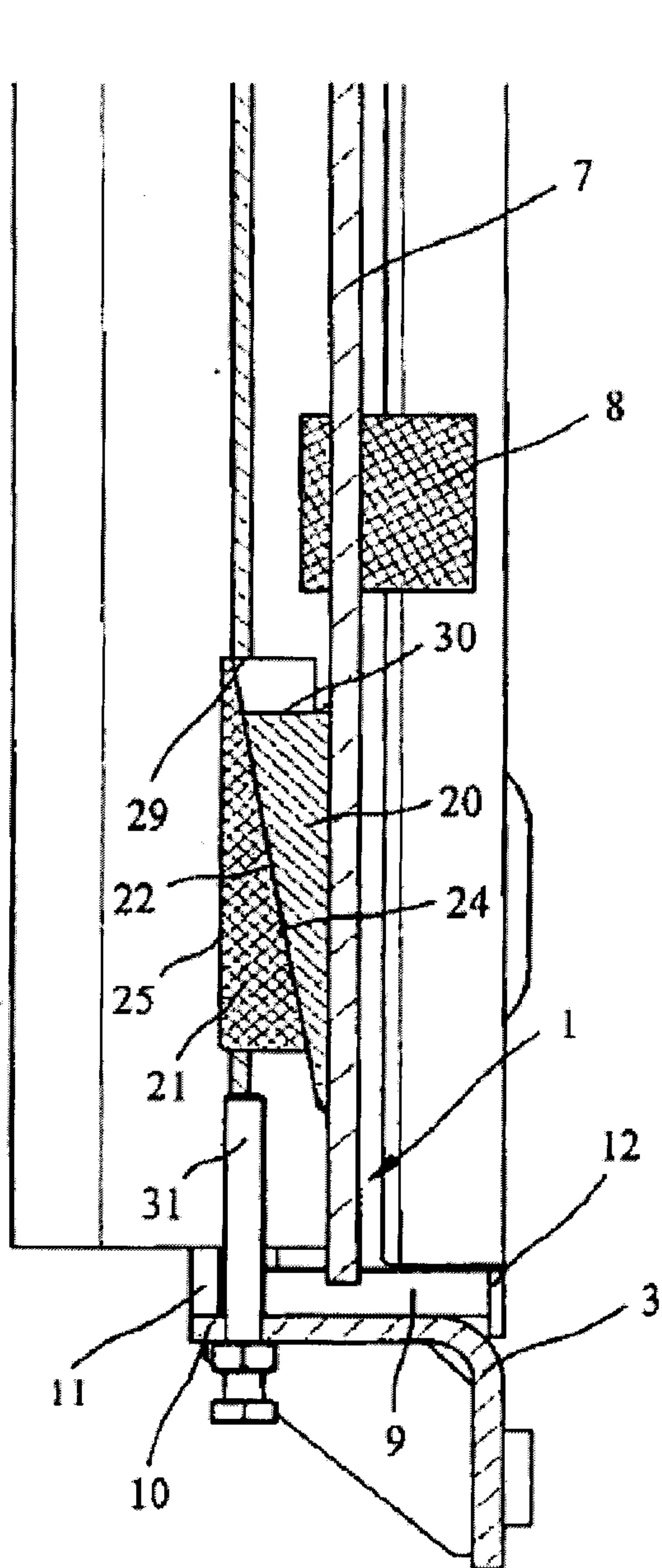


Fig. 2

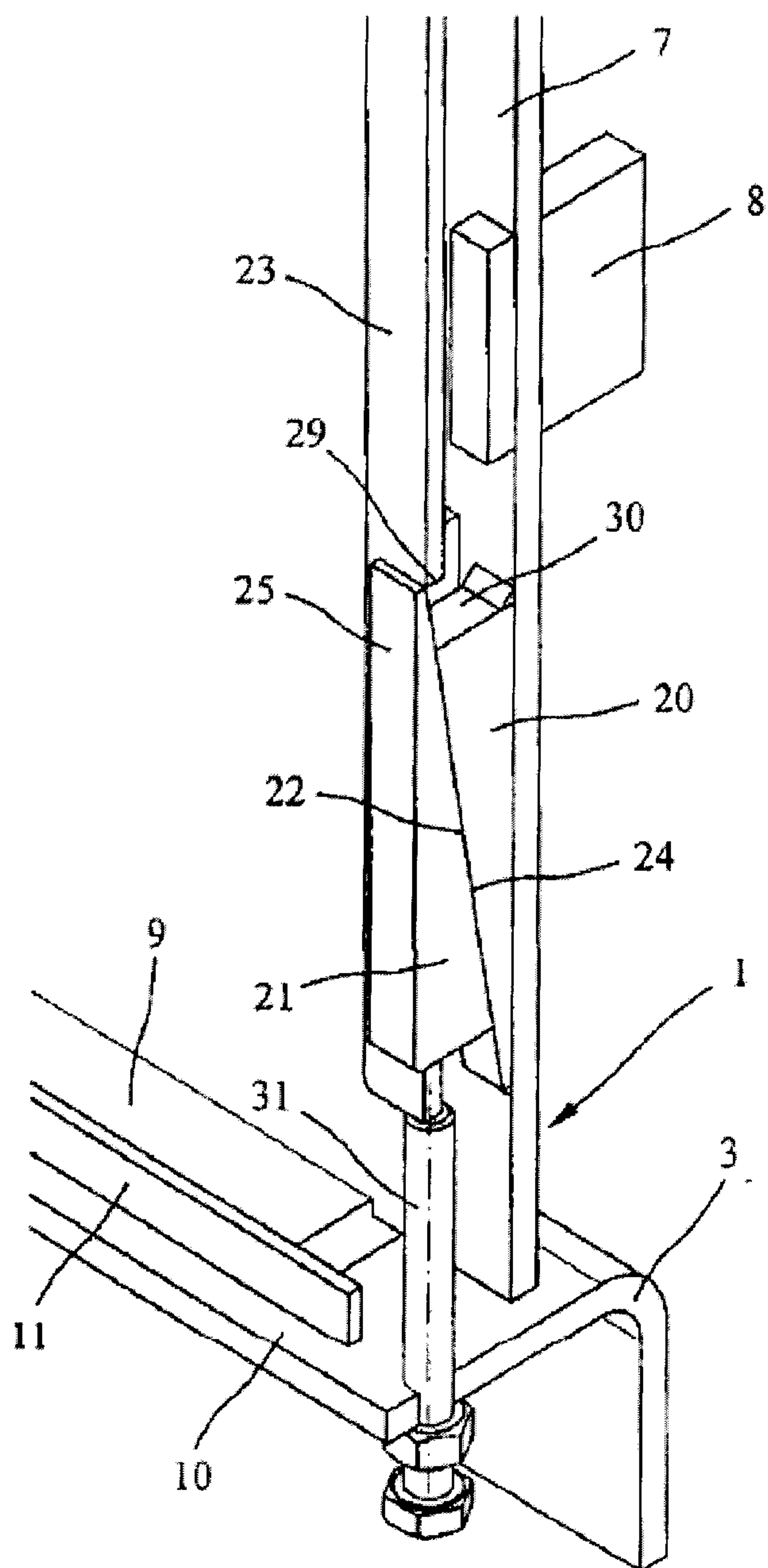
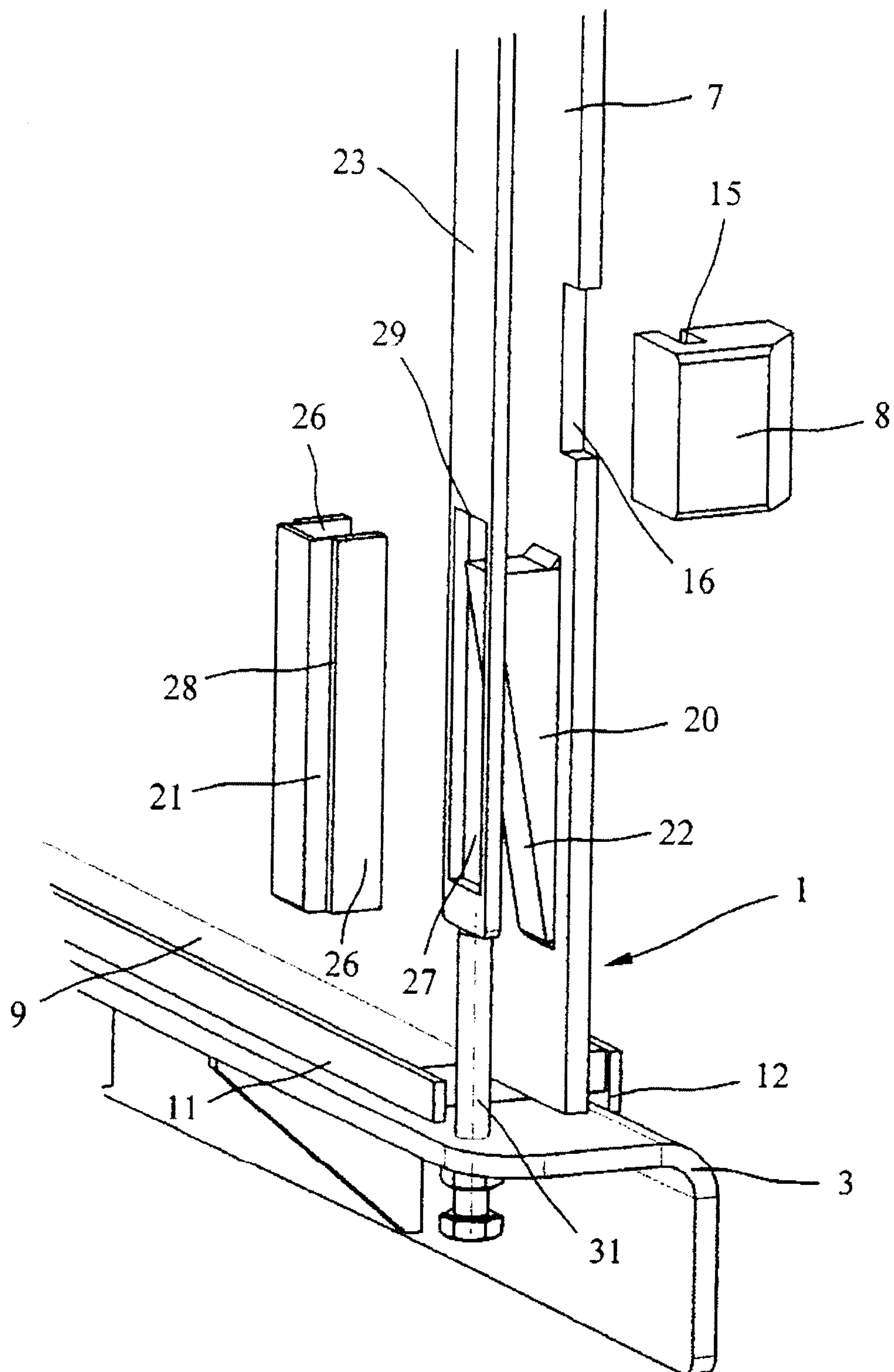


Fig. 3

**Fig. 4**

