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(54) Folding door

(57) Folding door, consisting of two leaves (1, 2) jointed to each other by hinges (5) and to frame (3) by hinges (4) by one of the leaves (2). The other leaf (1) has attached to its free comers guides (6, 7) consisting of a case in which is housed a core which partially projects out in a part which forms a shoe (25) with a lower diametrical lug (27). This core consists of two cylindrical segments of different diameters (23 and 24). Segment (23) of smaller diameter defines a lateral lever (32, 33, 34) against which rests a pin (22) attached to the guide case.

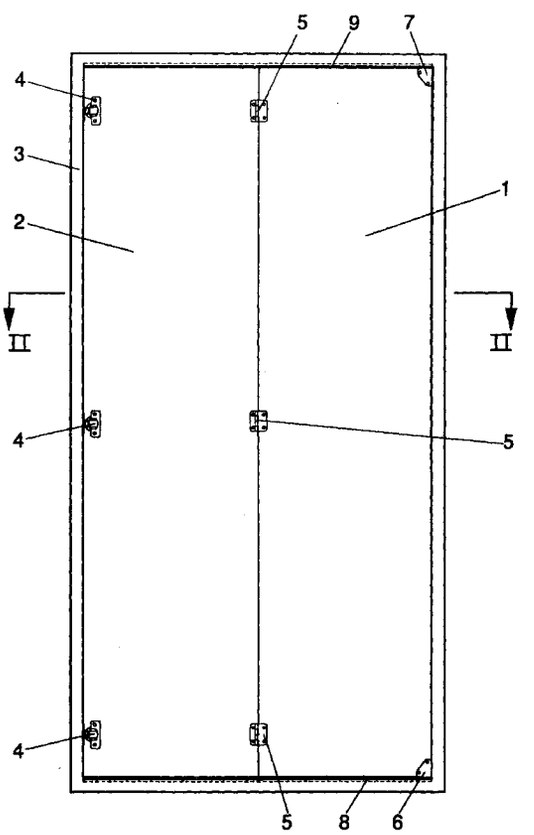

Fig. 1

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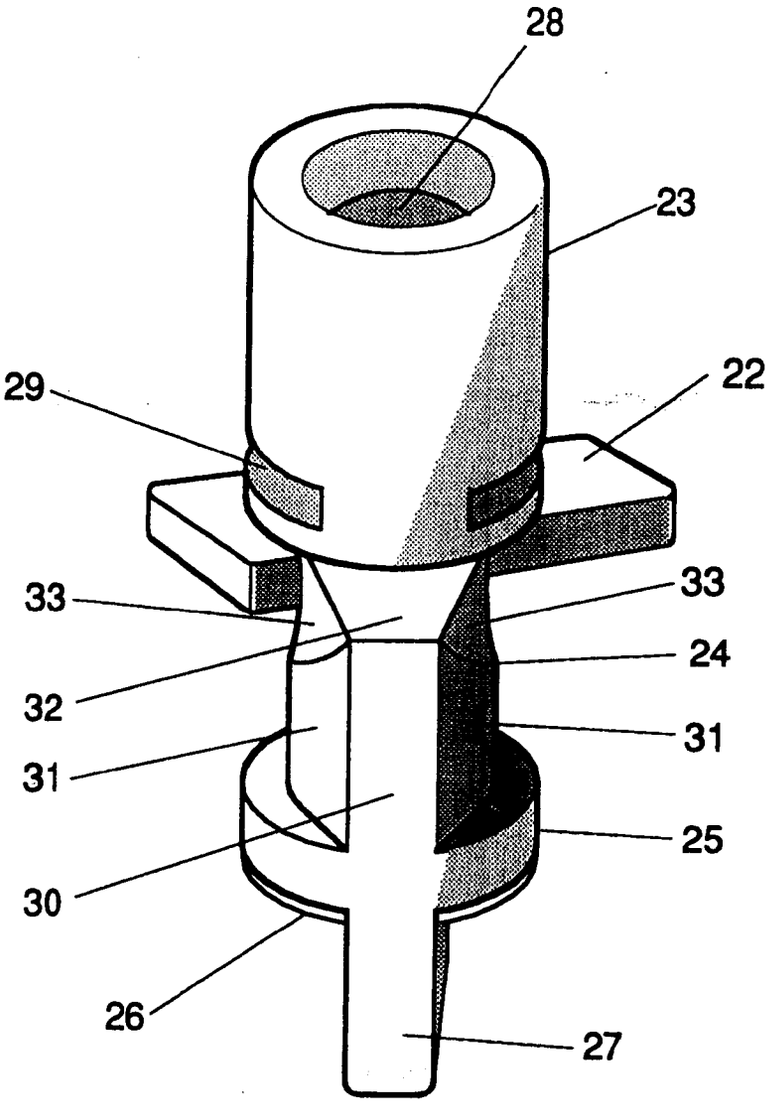


Fig. 9

Description

[0001] The present invention refers to a folding door composed of one more pairs of leaves, both pairs with the two leaves hinged to each other and one of the leaves hinged to the frame of the space to be closed.

[0002] Doors of the type meant, used for example to close cupboards and the like, are supported on one side by hinges between one of the leaves and the frame, and on the other by guide elements which are attached to the inner surface of the other door leaf, matching its upper and lower external corners, and sliding on rails placed along the upper and lower sides of the frame of the space where the door is mounted.

[0003] These guide elements generally consist of a bushing in which is a core which can turn and move axially, said core being pushed out of the bushing by a spring. The core forms a sliding shoe on its outside end which slides on the corresponding rail.

[0004] During the use of the doors the hinges acquire a play which results in the doors falling slightly, from their original position, possibly even touching the lower rail with the lower edge as the door is closed.

[0005] In addition, in traditional doors the hinges which connect the two leaves are generally placed with the turning axis identical to the line of separation of the leaves, for which reason, together with the proximity of the two leaves, full opening is not achieved.

[0006] The object ofthe invention is to eliminate the problems mentioned, so that a proper working of the door is ensured throughout its lifetime, with no risk of rubbing between the door leaves and the lower rail.

[0007] Another object of the invention is to ensure the relative positions of the door at the time of assembly, by a construction and arrangement of the hinges which connect the leaves, so that a maximum opening is achieved.

[0008] In order to achieve these and other objectives, according to the invention the core of the guide elements comprises two consecutive coaxial cylindrical segments of different diameters, of which the smaller one ends in the guide shoe. This smaller diameter segment has a projection on its side which makes an axial lever directed towards the segment of greater diameter. This lever is defined by a plateau parallel and next to the segment of greater width and by two helical ramps of decreasing width, which go from said plateau in opposite senses towards the shoe. The projection which makes up the lever is placed so that the aforementioned plateau occupies an angular position agreeing with the rails on which the shoes slide.

[0009] In addition, the guide element bushing has a pin which projects internally and rests on the cylindrical surface of the segment with a smaller diameter core, between the lever and the segment of greater diameter. This pin limits the outwards motion of the core and constitutes a support element for the bushing on the core lever whenever there are deviations or vertical displacements of the door during its opening and closing with respect to its original position.

[0010] In addition the nucleus, starting from the free base of the greater diameter segment, has a blind hole inside which is partially housed the spring which shall push the core outwards. In the larger diameter segment the core has two diametrically opposite grooves which are accessible through openings made in the guide element bushing.

[0011] The characteristics described, as well as others characteristic of the invention, are described below in greater detail with the aid of the attached drawings in which a non limiting embodiment example is given.

[0012] In the drawings:

[0013] Figure 1 is a front elevation of a two-leaf folding door according to the invention.

[0014] Figure 2 is a cross section of the door along the II-II line of figure 1.

[0015] Figure 3 is a section similar to figure 2, with the door open and the leaves attached.

[0016] Figure 4 is a cross section of one of the hinges which connect the two leaves of the door.

[0017] Figure 5 is a front elevation of the lower guide element with the door open.

[0018] Figure 6 is a vertical cross section of the lower guide element along the VI-VI line of figure 5.

[0019] Figure 7 is a view similar to figure 5 of the upper guide element.

[0020] Figure 8 is a vertical cross section of the upper guide element along the VIII-VIII line of figure 7.

[0021] Figure 9 is a perspective view of the core of the guide elements for the outer leaf of the door.

[0022] Figure 10 is a lateral elevation of the core of figure 9.

[0023] Figure 11 is a cross section of the core along the XI-XI line of figure 10.

[0024] Figure 12 is a diametrical cross section of the core along the XII-XII line of figure 10.

[0025] Figures 13 and 14 are views similar to figures 10 and 12 respectively, showing a variation of the core.

[0026] Figures 15 and 16 show the lower guide element with the door closed and open, respectively, with the core shown in cross section as in figure 11.

[0027] Figure 1 shows a rear elevation of a folding door with two leaves, 1 and 2, which are jointed to one of the vertical sides of frame 3 by hinges 4 with a restoring spring, of known construction. The two leaves are also jointed to each other by hinges 5. The outer leaf 1 has, on its inner side and matching the upper and lower outer corners, guide elements 6 and 7 which can move along lower and upper rails 8 and 9 respectively, which lie along the lower and upper end of frame 3.

[0028] In the closed position leaves 1 and 2 of the door are in a coplanar position as seen in figure 2.

[0029] Hinges 5 which connect leaves 1 and 2 ofthe door consist of two blades 10 and 11, figure 4, with rings 12 through which the jointing axis passes. According to the invention, one of the blades has a lug 13 at the edge

adjacent to rings 12 of the joint axis, which projects out at a right angle on the connecting side of the door leaves, meant to be introduced between leaves 1 and 2 to ensure a set separation between the leaves and also be used as a positioning template when the hinges are placed.

[0030] These hinges between the leaves are placed as seen in figure 3, with leaves 1 and 2 slightly displaced from each other, so that the joint axis 12 of the hinge does not meet the inner edge of the two leaves.

[0031] With all of the above, when the door is opened leaves 1 and 2 can occupy the positions shown in figure 3, obtaining maximum opening.

[0032] Guide element 6 is shown in figure 5 with corresponding leaf 1 in its open position. This guide or guide element 6 consists of a case 14 which extends upwards and sideways, in one direction, in a flap 15 with holes for screws 16 to attach the door. As seen in figure 6, case 14 is connected to a recess 17 made in leaf 1 of the door in its inner face.

[0033] Case 14 is open on the bottom, and houses a core 18 which is pushed outwards by spring 19. The core projects out from case 14 in an amount which makes up a shoe 20 which can slide on corresponding rail 8.

[0034] Case 14 has a window 21 to the wall which meets the vertical free edge of leaf 1. Case 6 also has a transverse pin 22 mounted, which is secant to the internal cavity which houses core 18, as is described below.

[0035] Upper guide element 7, shown in figures 7 and 8, is of the same construction as guide element 6, as described with reference to figures 5 and 6, with the same labels used with a subscript "a" to indicate identical elements and components.

[0036] The configuration of core 18 is described below with reference to figures 9 to 12.

[0037] This core is made oftwo cylindrical segments of different diameters labeled by numbers 23 and 24. Segment 24 of smaller diameter ends in sliding shoe 25, consisting of a lower surface head 26 of approximately cylindrical shape, from which projects axially in a diametrical position a lug 27 meant to enter the corresponding rail 8 or 9, in this way being aligned with said rails.

[0038] From the upper base of the larger diameter segment 23, the core has a blind hole in which spring 19-19a, described referring to figures 6 and 8, will be partially housed. In addition segment 23 has two diametrically opposite grooves 29 for the reason later described.

[0039] Segment 24 of smaller diameter has a projection 30 which as can be seen in figure 11, is limited by converging surfaces 31, tangent to the cylindrical surface of segment 24. This projection 30 begins at the sliding shoe 25 and ends near the segment 23. In the area closest to segment 23 it makes a plateau 32 parallel and next to said segment 23, from which plateau start two helical ramps 33 in opposite senses an inclined towards shoe 25.

[0040] Pin 22 described with reference to figures 5 to 8 shown in figure 9 acts as a stop to limit the outwards motion of core 18 of bushing 14. When the door is closed pin 22 is left between plateau 32 and segment 23. When the door is open, as the bushing or case 14 turns with the leaf the core and the pin will lie in the relative position shown in figure 9.

[0041] If for any reason the doors begin to fall slightly from their original position, during the opening stage stop 22 of the guide element case, as core 18 turns, due to the door dropping will slide on one of ramps 33. When the door is being closed pin 22 shall also slide along ramp 23 upwards, forcing the leaves of the door up and so preventing the lower edges from rubbing against lower rail 8.

[0042] When the leaves reach the fully closed position pin 22 will rest on plateau 32, thus ensuring the closed position of the door

[0043] If for any reason one of the leaves were accidentally lifted during the opening or closing the same process described above would take place in the opposite direction.

[0044] Grooves 29 of segment 23 of the core are accessible through window 21-21a of the case or bushing of the guide elements to facilitate positioning the core during assembly of the doors.

[0045] Projection 30 described above, along with upper plateau 32 and ramps 33 define a lever to ensure the correct functioning of the door leaves, even if there is a play in the hinges.

[0046] Figures 15 and 16 show the relative position of pin 22 and projection 30 of segment 24 of the core, in the closed door position, figure 15, and open, figure 16.

[0047] Figures 13 and 14 show a variation of execution of the core in which the shoe consists of a rolling element 35 mounted on a notch 36 made on the lug 27 which in this case projects directly from the lower base of segment 24 of the core, in a diametrical position. The lug will enter rail 8, while the heads of rolling element 35 shall rest on and roll on the upper flaps of the rail 8 profile. Otherwise the core shown in figures 13 and 14 is identical to that described in figures 9 to 12.

Claims

1. Folding door consisting of two leaves (1, 2) jointed by hinges (5), where one leaf (2) is in turn jointed to frame (3) while the other leaf(1) has, attached to its upper and lower outer corners, corresponding guides (7, 6) consisting of a case (14) in which is housed, so that it may freely turn and partially move axially, a core (18) which is pushed outwards by a spring (19) and which partially projects out of case (14) in a segment which makes up a guide shoe (20), attached to and sliding on rails (8, 9) connected to the upper and lower edges of frame (3), char-

acterised in that the core (18) of guide (6, 7) consists of two consecutive coaxial cylindrical segments (23, 24) of different diameters, of which segment (24) of smaller diameter ends in the guide shoe (20) and has on its side a projection (30) which makes up an axial lever directed towards segment (23) of greater diameter, defined by a plateau (31) parallel and next to said larger segment (32), and of two helical ramps(33) of decreasing width which start from said plateau (31) in opposite senses towards shoe (20), and where projection (30) is placed so that the aforementioned plateau (31) is angularly in agreement with rails (6, 7) on which shoes (20) slide; and in that case (14) has a pin (22) which is secant to the recess of said case (14) and rests on the cylindrical surface of segment (24) of the core (18) of smaller diameter, between the lever and the segment (23) of greater diameter, allowing locking and unlocking of core (18) with respect to the axial displacement of said core (18).

2. Door as in claim 1, characterised in that core (18) has a blind hole (28) at the free base of the larger diameter segment, in which is partially housed spring (19) which pushes core (18) outwards, the position of maximum extraction being limited by pin (2) of case (14), against which the larger diameter segment of core (18) collides.

3. Door as in claim 1, characterised in that the larger diameter segment (23) of core (18) has two grooves (29) diametrically opposite each other which are accessible by a window (21) made in the case (14)

4. Door as in claim 1 characterised in that shoe (25) of core(18) consists of a head (26) which limits the segment (24) of smaller diameter whose head (26) has a free base from which projects across a flat diametrical lug (27) co-planar with the lateral projection (30) of smaller diameter segment (24) of core (18).

5. Door as in claim 1, characterised in that the shoe (25) of the core consists of a rolling element (35) mounted so that it may freely turn on a diametrical lug (27) which projects axially out of the free base of segment (24) of lesser diameter of core (18), whose rolling element (35) has an axis perpendicular to the direction of the lateral projection (30) of said segment (24) of smaller diameter of core (18).

6. Door as in claim 1, characterised in that jointing hinges (15) for the leaves (1, 2) of the door are mounted with their rotation axis slightly displaced towards the inside of leaf (2) jointed to frame (3), with respect to the separation line between the two leaves (1, 2); and in that one of the blades (10, 11) of hinges (5) has a lug (3) parallel to and adjacent to the joint axis, which projects perpendicularly towards the side attachable to leaves (1, 2) of the door and is meant to be introduced between said leaves (1, 2).

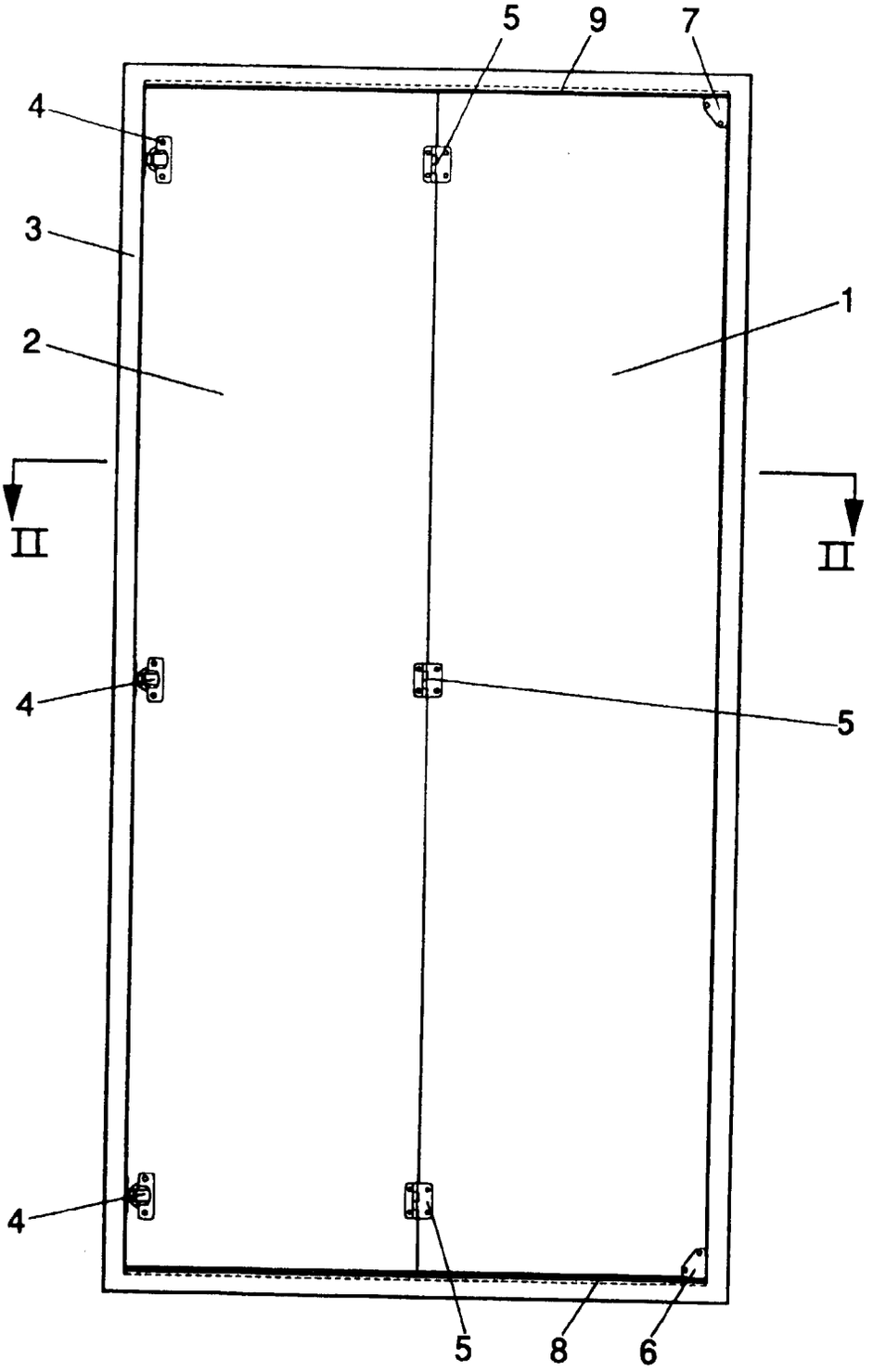
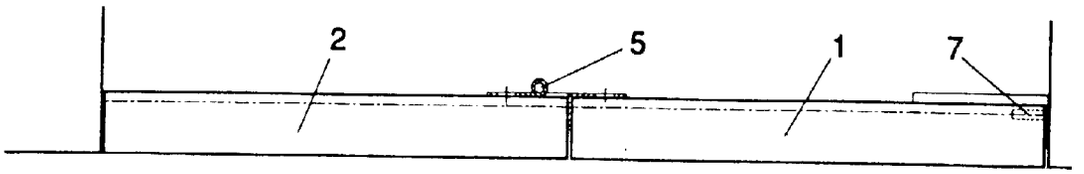


Fig. 1

Fig. 2



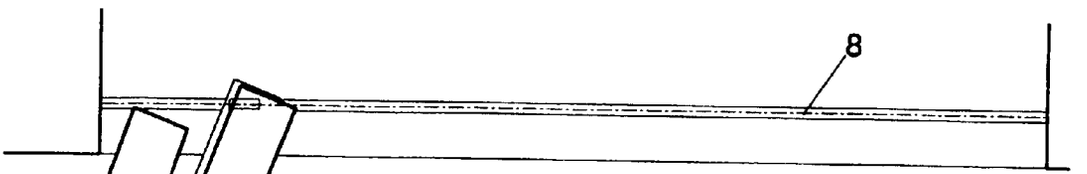
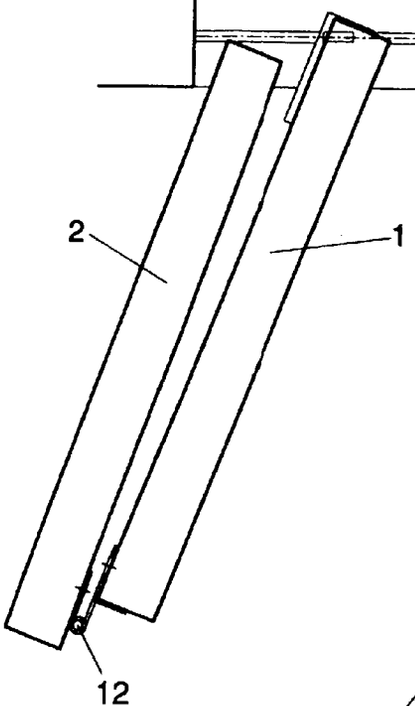


Fig. 3



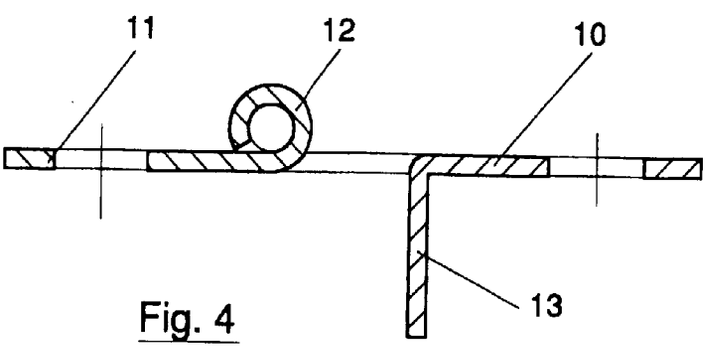


Fig. 4

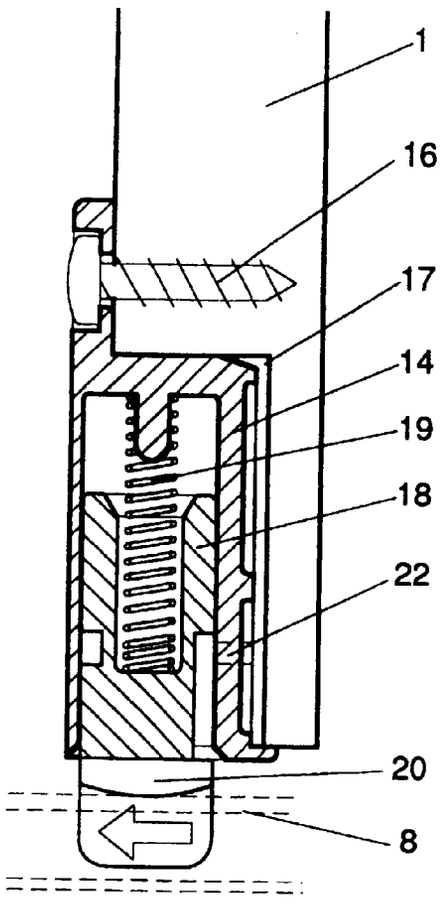


Fig. 6

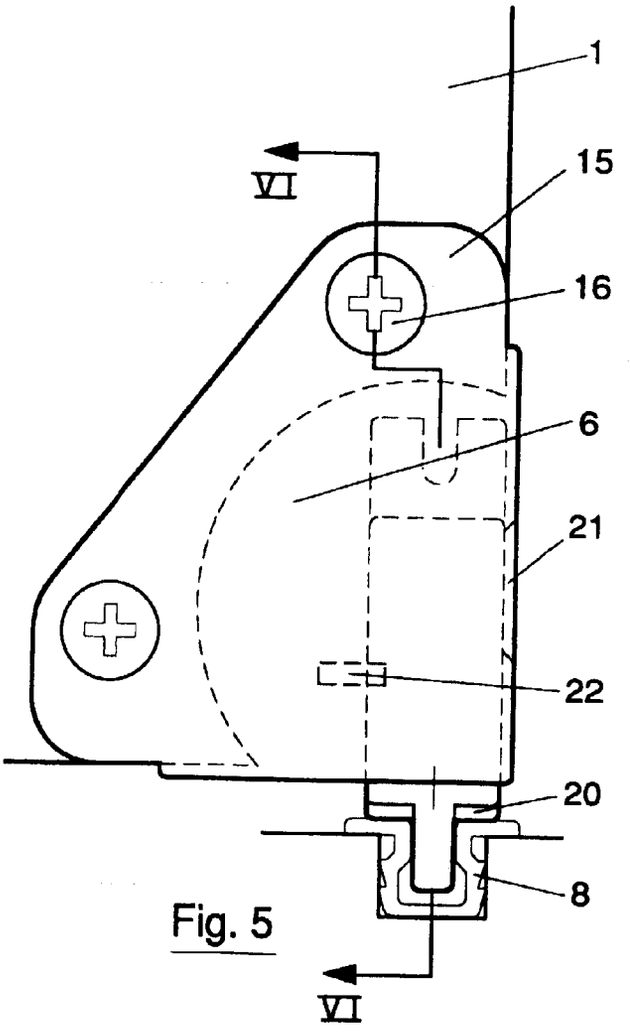


Fig. 5

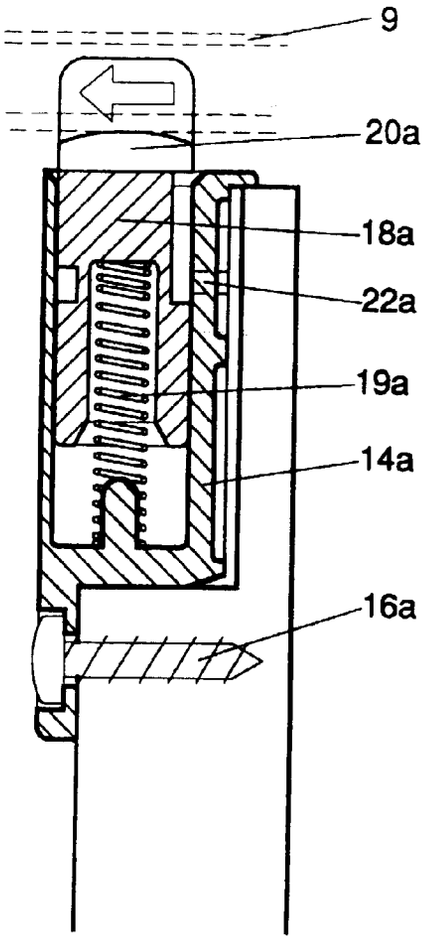


Fig. 8

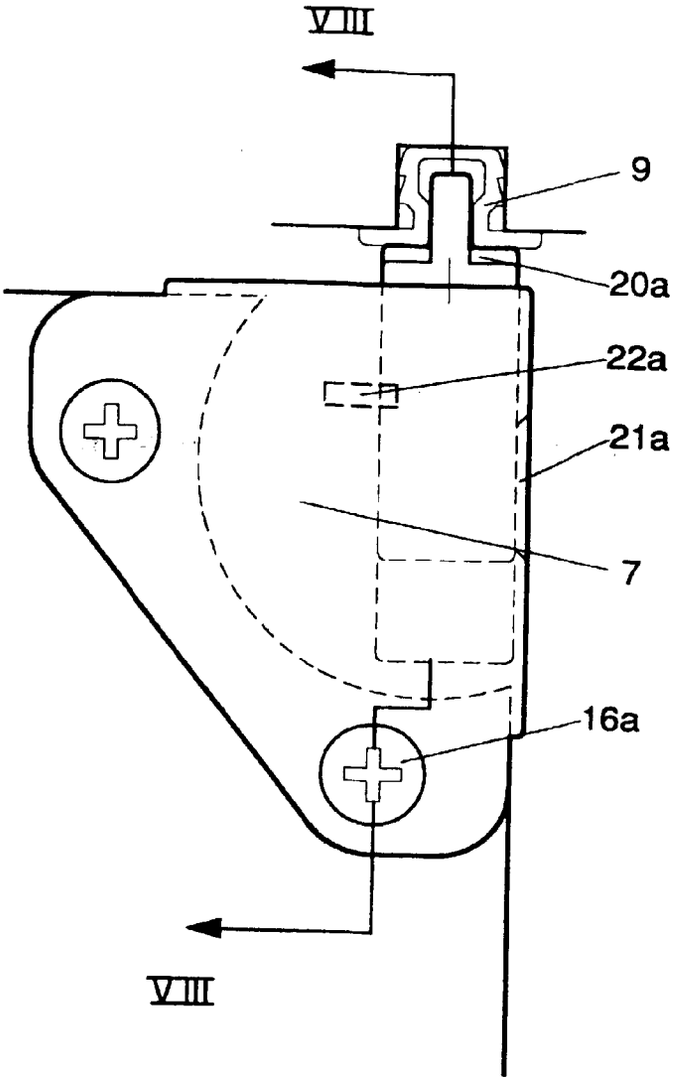


Fig. 7

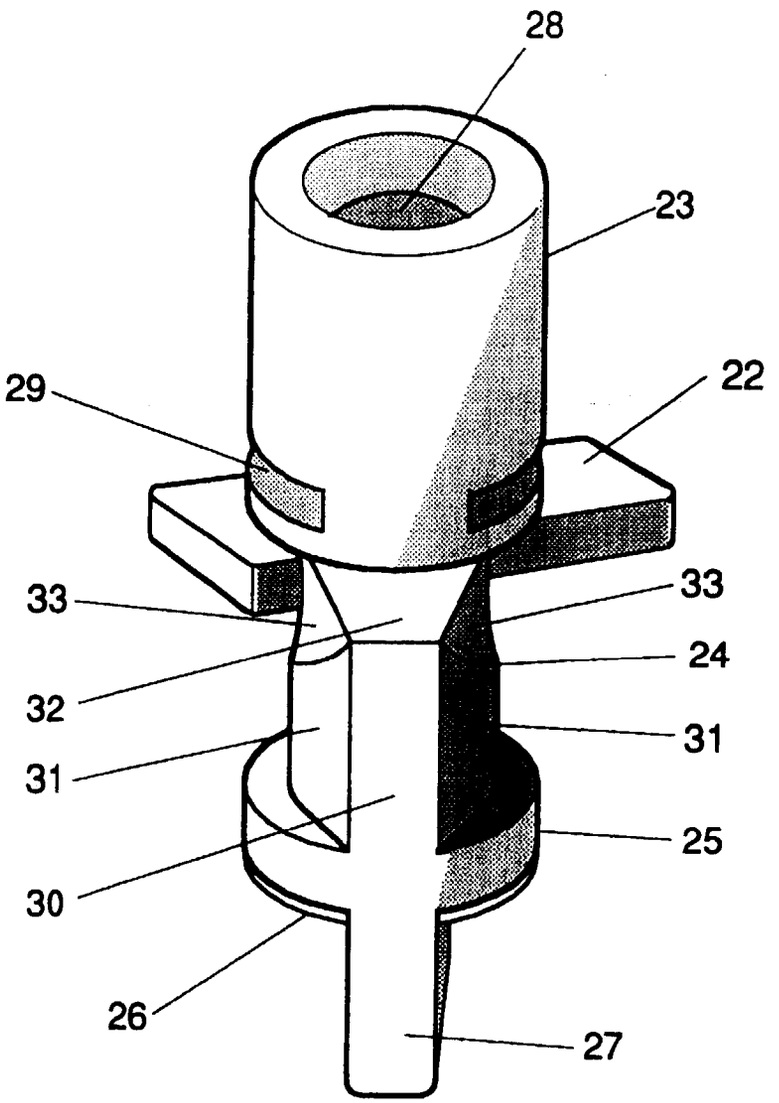
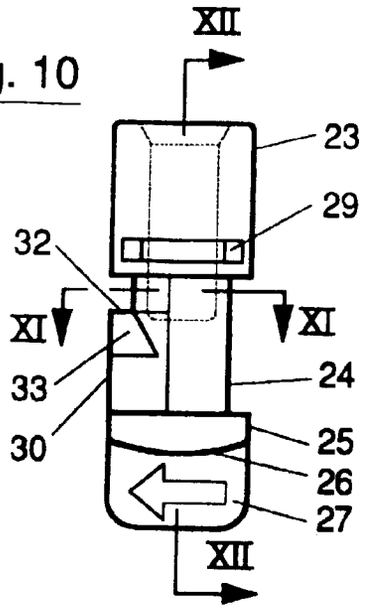


Fig. 9

Fig. 10



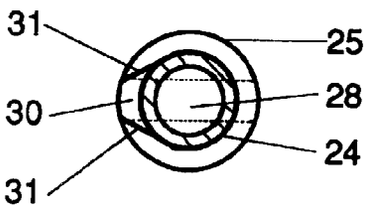


Fig. 11

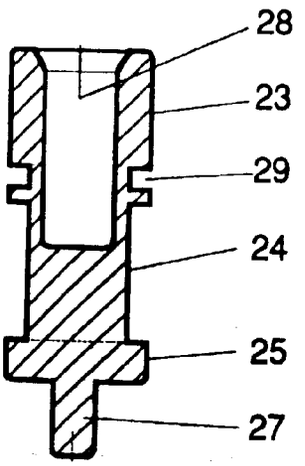


Fig. 12

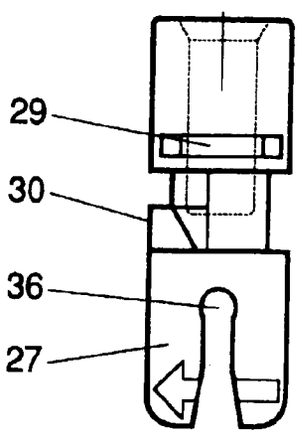


Fig. 13

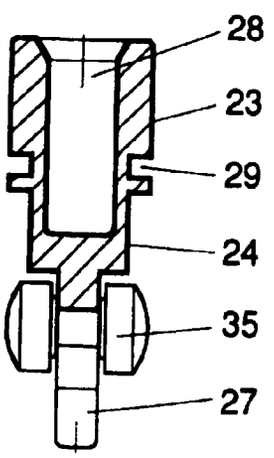


Fig. 14

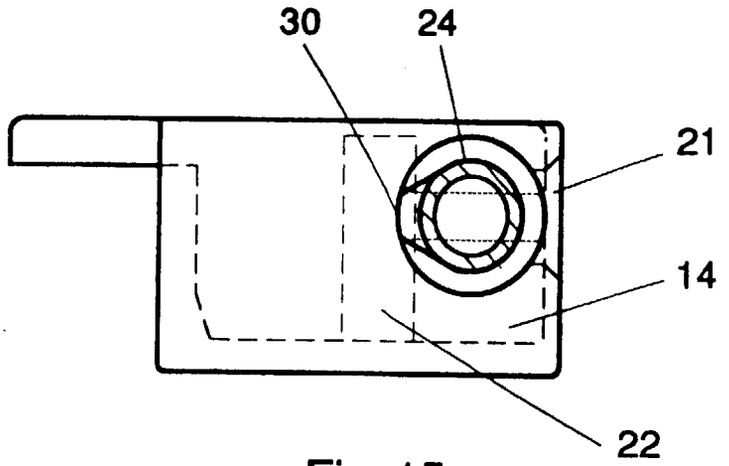


Fig. 15

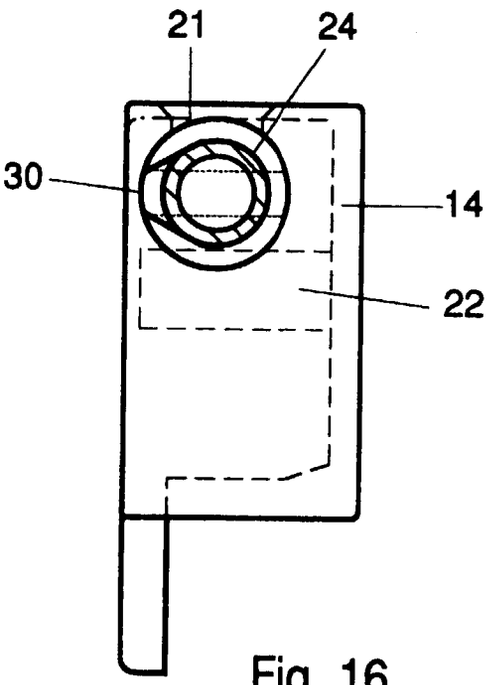


Fig. 16