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(71) Applicant: **KLEIN IBERICA, S.A.**
Escorial, 131-133
E-08024 Barcelona(ES)

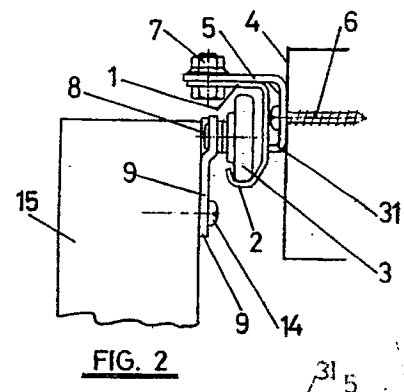
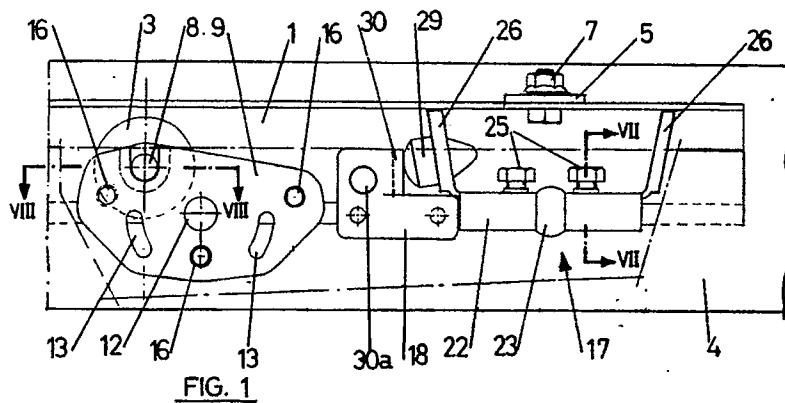
(72) Inventor: **Tarrega I Lloret, Miguel Angel**
C/Estorial, No 131-133
08024 Barcelona(ES)

(74) Representative: **Gomez-Acebo y Pombo, José Miguel**
c/o CLARKE, MODET & Co. Paseo de la
Castellana 164
E-28046 Madrid(ES)

(54) Mechanism for the hanging of sliding doors.

(57) Mechanism for the hanging of sliding doors, comprising an upper, horizontal track (1) along which a carriage having a chassis (9, 33, 40) from which the sliding door (15) hangs. This track (1) also includes buffers (17) to restrict the trajectory. A cross section of the track shows a central, curved track (2) which has a curve radius greater than that of the

wheels (3) and two straight, divergent parts (20, 21). The axle (8) of the plastic material, being situated between the wheels and the chassis (9, 33, 40). The buffers (17) consist of U-shaped bodies (22), which can be attached to the track (1), and extensions (26) serving the purpose of reinforcing said track (1). The chassis includes levelling devices (13, 36, 48).



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This invention refers to a mechanism for the hanging of sliding doors, with particular relevance to sliding doors/ blinds and similar item.

Mechanisms already exist for the hanging of sliding doors, consisting of an upper, horizontal profile, situated above the space to be closed off and covering the whole length of its upper edge. This profile contains revolving components which have a sideways trajectory along its entire length. These revolving components consist of one or more wheels, with axle chassis which are visible on the outside of the profile. The door panel(s) hang from this chassis, either directly attached to this or via vertical bolts. In order to ensure that the panels hang vertically, thereby avoiding that they swing from side to side, guides are present at the bottom, to keep the lower edge of the panels in place.

Mechanisms for the hanging of sliding doors should be constructed in such a way that the revolving components can move freely and as smoothly as possible along their path and it is, therefore, essential that the revolving component path along which the wheels will move is always horizontal. This makes it necessary for the upper, horizontal profile to be of a certain strength, this being achieved by using relatively large, specially designed sections, thus making the assembly and revolving component removal operations difficult. Moreover, it is necessary to assemble the profile on resistant supports, whilst ensuring that these do not affect or interfere with the action of the revolving components.

It is also desirable that mechanisms for the hanging of sliding doors are constructed in such a way to ensure that the opening/closing process is carried out quietly. However, due to the specifications of the upper, horizontal profile and the system whereby the chassis is mounted on the axle of the revolving components, traditional mechanisms do not achieve this aim; noise is caused by contact between the revolving components of the wheels and the upper part of the profile and, even more so, by contact between the metallic parts of the revolving component.

The aim of this invention is to develop a mechanism whereby, the upper, horizontal profile is comparable to that of traditional mechanisms whilst having a greater strength/size ratio, enabling it to be smaller and, in turn, reducing inherent costs and weight.

Another aim of this invention is to develop a mechanism which operates very quietly and where minimum effort is necessary to move the hanging panels.

A further aim of this invention is to develop a highly flexible mechanism, where the door panels can be connected to the revolving components via their upper edge or inner surface, whatever the

weight of the doors.

The mechanism described in this invention is of the type which comprises an upper, horizontal profile with an inverted "L" shaped section, of which the vertical, lower branch tops out into an inward facing track, this forming a longitudinal revolving component path along which the revolving components move, the axles of these revolving components having a chassis from which the sliding door or panel hangs. The upper, horizontal profile includes buffers to restrict the trajectory of the revolving components. This upper profile is assembled on fixed supports situated immediately above the space to be closed off by the door.

In accordance with the first characteristic of the invention, a cross section of the above mentioned revolving components path shows a central, curved track, the bend facing upwards, situated between two divergent, straight tracks on either side.

The curve radius of the central track is slightly greater than that of the profile of the wheel rolling surface of the revolving components. By means of this construction, the revolving components move along the upper, horizontal profile without the sides of their wheels making contact with the profile. In this way friction between the parts is avoided, this being the cause of noise in the case of traditional mechanisms.

Another characteristic of the invention is that attached to the axles of the revolving components, there is a plastic, separating ring, this being located between the wheel support bearing and the chassis. This ring compensates for size variances occurring during manufacture and, therefore, provides for adjustment control, ensuring that vibration does not occur during use.

In accordance with the mechanism described in this invention, the buffers which restrict the trajectory of the revolving components, comprise one grooved piece, one of the walls of which has two extensions at its transversal borders, bent outwards in the same direction to form an angle the same or slightly greater than 90° with the wall, in such a way that the two extensions are divergent to a slight extent. The free, transversal edge of these extensions have pointed teeth and shutters are present at the vertical edges for the purpose of strengthening the assembly. These buffers are mounted in such a way on the upper, horizontal profile, that the inherent grooved piece grips the revolving component path and the extensions and wall take up a position inside the profile, whilst the other wall of the grooved piece is positioned below the revolving component path. The grooved piece extensions are of such a height that when they come to rest on the internal surface of the horizontal branch of the upper, horizontal profile, by means of the teeth on their free, transversal edge,

the wall of this grooved piece running underneath the revolving component path, comes to rest on the on the external surface of this path. The upper wall of the grooved piece has one or more threaded openings via which screws are introduced, the lower ends resting rest on the internal surface of the revolving component path. Tightening these screws causes the grooved piece to move in an upwards direction to the upper, horizontal profile, in this way ensuring that the teeth of the buffer extensions press against the internal surface of the horizontal branch of the upper, horizontal profile. In this way, the buffers are secured to the upper, horizontal profile by means of an interlock via the extensions, these serving the purpose of strengthening the horizontal profile. The buffer extensions include two strengthening flanges, and elastic central pieces which project outwards, forming elastic buffers to restrict the trajectory of the revolving components.

As indicated above, the revolving components include a chassis which, in accordance with this invention, consists of a plate mounted on the wheel axle. By simply changing the shape of this plate, or joining a bracket to its outside surface, it becomes possible to vary the door hanging and fixing system. In all cases, the plate forming the chassis or the brackets joined to it, are equipped with devices which compensate for possible levelling variations, ensuring that the door panels are positioned in such a way that they can be moved across in perfect conditions.

All the characteristics of this invention, as outlined in the patent claims, are described below in detail, making reference to the attached drawings in which possible ways of putting the invention into practice are shown, these being given by way of example only.

Figure 1 is a front elevational view of a mechanism built in accordance with the invention.

Figure 2 is a profile view of the mechanism shown in figure 1.

Figure 3 is similar to figure 1, showing another possibility with respect to the chassis of the revolving components.

Figure 4 is a profile view of figure 3.

Figure 5 is similar to figure 1, showing a third possibility with respect to the chassis of the revolving components.

Figure 6 is a cross section of the mechanism shown in figure 5, including the fixed supports on which the upper, horizontal profile is mounted (see VI-VI).

Figure 7 is a cross section, on a larger scale (see VII-VII in figure 1).

Figure 8 is a cross section of the chassis of the revolving components (see VII-VII in figure 1).

Figure 9 is a view from above of the chassis plate shown in figure 3.

Figure 10 is a cross section of the X-X lines shown in figure 9.

Figure 11 is a view from above of the chassis of the mechanism shown in figure 5.

Figure 12 is a cross section of the XII-XII line shown in figure 5.

Figure 13 is a view from above of the trajectory restricting mechanism shown in figure 1.

Figure 14 is a view from above of one of the track buffers.

Figure 15 is a cross section of the ducting support components.

Figure 16 is a front, elevational view of the ducting support components.

Figure 17 is a view from above of the ducting support components.

The mechanisms shown in figures 1 and 2, consists of an inverted "L" shaped profile (1), of which the vertical branch tops out into an inwards facing track (2) with an upper channel in which the wheels (3) of the revolving components can rest or move along.

The profile (1) is assembled, ideally, immediately above the space to be closed off by the doors and at the facade (4) which delimits the space, by means of fixed supports (5) in the form of a bracket, one of the wings of which is joined to the facade (4) by means of screws (6). The other branch is joined to the horizontal branch of the profile (1), these being fixed to one another by means of screws (7).

The above mentioned revolving components each have a wheel (3) with a vertical plate (9) located at the axle (8). At the upper edge of this plate there is a stamping (10 in figure 8) at the base of which there is an opening (11) via which the axle (8) can be inserted and fixed. The concave side of the stamping (10) faces outwards, this gap being occupied by the axle head (8), as shown in figure 2.

At the centre of the plate (9), there is a pivot (12) joining this to the door. On either side of this central pivot (12), there are two curved, oblong openings (13), concentric to the pivot (12), through which the screws (14) are inserted (figure 2), fixing this to the door. As shown in figure 1, the plate (9) has, in addition, three openings (16), the purpose of which will be explained below.

End buffers (17) are mounted to the upper, horizontal profile, these restricting the trajectory of the revolving components and, in turn, the course of movement of the doors (15). In addition, the doors (15) have a trajectory restricting device (18), this being situated on the same surface as the plate (9) of the revolving components.

A cross section of the fluting (2) of the upper, horizontal profile (1), - see figure 7 - shows an intermediate, curved track (19), the bend facing

upwards, this being contained between two divergent, end tracks (20 and 21). The curve of this intermediate track (19) has a radius and a width slighting greater than that of the rolling surface of the wheels (3). In this way, the wheels can move along without any contact or rubbing with the side tracks (20 and 21), thereby ensuring that noise is not caused when they move along the upper, horizontal profile.

The buffers (17) - see figures 1 and 7 - comprise a grooved piece (22) having an intermediate, transversal deformation (23) for reinforcement purposes. The grooved piece is situated in such a way that it grips the fluting or path of the revolving components of the upper, horizontal profile, one of its walls being situated inside this profile. This wall has two threaded openings (24), through which two screws (25) are inserted, these coming to rest and being tightened upon the interior surface of the central track (19) of the path of the revolving components. In addition, the transversal sides of this upper wall of the grooved piece (22), have extensions bent outwards to form an angle of approximately 90° , the two extensions being slightly divergent as shown in figure 1. The free edge of the extensions (26) top out into pointed teeth (27). In addition, the pats have reinforcing shutters (26a) and a central opening (28) into which elastic material is introduced (29).

The extensions (26) are of such a height that when the screws (25) are tightened and the pointed teeth (27) come to rest and are tightened on the internal surface of the horizontal branch of the profile (1), the lower wall of the grooved piece (22) comes to rest on the external surface of the central track (19) of the path of the revolving components, in this way ensuring that the buffers (17) are completely anchored to the profile (1) and, in turn, reinforcing this profile.

The trajectory restricting device (18) - see figures 1 and 13 - comprises a plate in which a cut is made to form an extension (30), this being bent at right angles to and facing towards the inside of the profile (1) so that when the door (15) is moved as far as possible to the side, it hits against the elastic substance (29). In addition, it has a pivot (30a) so that the wood absorbs the shock.

As shown in figure 2, the vertical branch of the brackets which form the fixed supports (5), has a lower track (31), curved inwards, on top of which the vertical branch of the profile (1) is supported. The heads of the support fixing screws (6) are absorbed by this track.

Figures 3 and 4 show brackets (5) in the reverse position, whereby the vertical branch of the upper, horizontal profile comes to rest on the surface of the facade (4) on which this profile is mounted.

The revolving components of the mechanisms shown in figures 3 and 4 include a bracket (33) which is fixed to the plate (9) via one of its branches, whilst the other branch rests on the upper edge of the door (15), to which it is fixed by means of screws (34).

As shown in figures 3, 4, 9 and 10, the bracket (3) has a central opening (35) in the vertical branch which can be joined to the plate (9), it being possible for this opening to take up a position opposite the central pivot (12) of the plate (9). There are another three openings (36) around this former opening, and these can take up a position opposite the third opening (16) of the plate (9). The two upper openings (36) are curved, oblong and concentric to the orifice (37). The transversal borders of the vertical branch of the bracket (33) have extensions (39), one of which is bent outwards, facing towards the inside of the upper, horizontal profile (1), so that it acts as a support against the elastic substance (29) of the buffers (17) when the door is moved aside as far as possible.

The oblong opening (13) of the plate (9) - see figure 1 - allows for possible levelling variations or errors to be compensated for whilst hanging the door (15). This is also the case with respect to the oblong screw holes (36) of the bracket (33), this latter being fixed firstly to the door (15) and once levelled out, the screws (37) being tightened. The screws (27 and 38) situated on the horizontal branch of the bracket (33) enable the door and the upper, horizontal profile (1) to be positioned perfectly parallel to each other.

The example shown in figures 3 and 4 is the same as that shown in figures 1 and 2 and the same reference numbers are used to show identical components.

In the example shown in figures 5 and 6, each revolving component has two wheels (3). The chassis of these revolving components is made up of a vertical plate (40) which has two upper openings (41), separated from each other by a distance greater than the diameter of the wheels (3). The ends of the wheel axles are fixed in these openings. On either side of the opening (41), the plate (40) has projections which are bent backwards at right angles to form extensions (42) on either side of the wheel (3).

These extensions (42) form props for the elastic material (29) of the buffers (17), to restrict the trajectory of the revolving components and, therefore, the door.

At the lower part of the plate (40) there is a central window (43) which delimits, together with two side edges of the plate, tracks (44) which, with two consecutive slits, go backwards towards the lower border (45) situated below the upper, horizontal profile (1). This lower border (45) has an

intermediate, cylindrical shape of vertical axis, on top of which a semi-clevis (46) is attached (see figure 5) by means of screws (47), so that a vertical bolt (these are already in existence) can be attached between these two components, from which the door (15) hangs.

In figure 6, the fixed supports on which the upper, horizontal profile (1) is assembled, consist of a bracket (49) with flat branches, and to the outside of one of these an iron plate (50) is fixed by means of, for example, rivets (51). This iron plate extends underneath the bracket, the free, transversal border of this extension having a transversal structure (52) in the form of a hook which grips the channel or path of the revolving components (2) of the profile (1) from the outside. This structure (52) is separated from the horizontal branch of the bracket (49) by a distance approximately equal to the height of the profile (1). The overhanging branch of the bracket (49) is longer than the horizontal branch of the profile (1). In addition, this overhanging branch of the bracket (49) has an intermediate extension (53) formed by means of cuts, this being counter-sunk downwards to form an extension and between this and the above mentioned overhanging branch, the horizontal track of the upper, horizontal profile is introduced. The overhanging branch of the bracket (49) also has a third hole through which a screw (54) is introduced, to support and be tightened on the horizontal branch of the profile (1), in this way enabling for this to be completely supported, whilst being reinforced due to the shape of the support. The revolving components (see figure 6) include a plastic washer (55) which is mounted on the wheel axle (3 and 8), between the wheel bearing and the plate forming the chassis of the revolving components. In this way, size variances during manufacture are compensated for, providing for adjustment control and ensuring that vibration does not occur during use.

As shown in figure 4, there is a tunnel (56) which conceals the mechanism, mounted by means of brackets (57) as shown in figures 15 to 17. These brackets have longitudinal structures (58) allowing for them to be attached to the bracket (5), their branches being of varying lengths. From the transversal folds (59), rectangular windows (60) are made in these branches at the base of which there is a circular notch (61) of more than 180°, the outlet of which is partly closed off by rounded projections (62). The bracket branches also have an opening (63) through which a screw (7) is introduced (see figure 4), fixing this to the profile (1) and bracket (5). Due to the fact that the two branches of the bracket are of different lengths, the distance between the unfixed branch/tunnel (56) and the mechanisms will vary depending on which

branch is fixed to the profile (1).

The tunnel is attached to the vertical branch of the bracket by means of bushes (64) - see figure 15 - these having a conical head (65) and a cylindrical projection (66) with a diameter approximately equal to that of the notch (61). These bushes are attached to the tunnel (56) and, in turn, are slipped into the notches (61) by asserting a light pressure on the narrower part defined by the projections (62).

The longitudinal edges of both branches of the bracket also have extensions (67) which will come to rest on the longitudinal borders of the bracket (5) on which the profile (1) is mounted.

As indicated above, at the bottom of the doors (15) there are guides to avoid tilting.

Claims

1. Mechanism for the hanging of sliding doors, comprising an upper, horizontal profile with an inverted "L" shaped section, of which the vertical branch tops out into an inward facing track, this forming a longitudinal revolving component path along which the revolving components move, the axles of these revolving components having a chassis from which the sliding door or panel hangs; the upper, horizontal profile includes buffers to restrict the trajectory of the revolving components; this upper profile is assembled on fixed supports situated immediately above the space to be closed off by the door. The mechanism is distinguished by the fact that a cross section of the above mentioned revolving components path shows a central, curved track, the bend facing upwards, situated between two divergent, straight tracks on either side, the curved track having a curve radius greater than that of the wheel of the revolving components in profile, and a greater width than the wheel; also distinguished by the fact that attached to the axles of the revolving components there is a plastic, separating ring, this being located between the wheel support bearing and the chassis; also that the buffers which restrict the trajectory of the revolving components comprise one grooved piece, one of the walls of which has threaded openings to accept tension screws and two extensions at its transversal borders, bent outwards in the same direction to form an angle the same or slightly greater than 90° with the wall, these extensions having shutters for the purpose of strengthening the assembly and pointed teeth at the free, transversal edge, the grooved piece gripping the revolving component path of the upper, horizontal profile, the extensions and wall of which they form a part taking up a position inside the profile whilst the other wall is positioned below the revolving component path, the extensions being of such a height

that when they come to rest on the internal surface of the horizontal branch of the upper, horizontal profile, by means of the teeth on their free, transversal edge, on tightening the screws on the internal surface of the said revolving component path, the wall of this grooved piece running underneath the revolving component path, comes to rest on the external surface of this path, each extension having central pieces made of elastic material which project outwards between the reinforcement shutters.

2. Mechanism as in patent claim 1, distinguished by the fact that the revolving components comprise only one wheel, the chassis of these components being made up of a flat, vertical plate which can be attached and fixed to one of the vertical surfaces of the door or panel, this plate having an upper, off-centred inlaid piece, with the curve facing the door or panel, at the base of which there is an opening through which the wheel axle is fixed; a central pivot which can be hinged to the door; two lower, curved oblong openings, symmetrical and concentric to the central pivot; and three screw holes, one of which is situated between the oblong openings beneath the central pivot whilst the other two are symmetrical and above the mentioned oblong openings, on either side of the central pivot.

3. Mechanism as in patent claim 2, distinguished by the fact that a flat branched bracket is fixed to the above mentioned plate, one of the branches of which has a central opening which can be positioned opposite the central pivot of the plate, and three openings which can take up a position opposite the screw holes of this plate so that fixing screws can be introduced, the two upper openings having a curved, oblong shape, concentric to the central opening, whilst the other branch of the bracket is attached to the upper edge of the door or panel and has three, unaligned openings, with oblong, curved ends, concentric to the intermediate one, through which screws are introduced to fix it to the door edge.

4. Mechanism as in patent claim 1, distinguished by the fact that the revolving components have two wheels and that the chassis of these components is made up from a vertical plate with two upper openings, separated from each other by a distance greater than the diameter of the wheels, into which the ends of the wheel axles are fixed, whilst on the underside it forms, underneath an intermediate window, a central semi-cylindrical track of vertical axis, located outside the plane of the plate, to which a semi-clevis is attached and fixed on a vertical bolt from which the door will hang. The sides of the plate have extensions which bend at right angles in the same direction towards the convex edge of the mentioned semi-cylindrical track, these extensions acting as shock absorbers against the elastic material of the buffers.

5. Mechanism as in patent claim 1, distinguished by the fact that the fixed supports on which the upper, horizontal profile is mounted are made up of flat branched brackets, one of the branches of which is attached transversally to the outside surface of the horizontal branch of the upper, horizontal profile and has a longitudinal, oblong opening through which a fixing screw is introduced, whilst the other branch has a transversal, oblong opening through which a screw is introduced to fix it to the facade which delimits the space to be closed off by the door.

6. Mechanism as in patent claim 1, distinguished by the fact that the fixed support on which the upper, horizontal profile is mounted, consists of a flat branched bracket, an iron plate A being attached to the outside of one of the branches, extending past the other branch so that this extension of the free, transversal border becomes a transversal structure in the form of a hook, with the curve facing the bracket, having an outline the same as that of the outside of the part of the upper, horizontal profile which forms the revolving component path, this being separated from the overhanging branch of the bracket by a distance approximately equal to the height of the section of the upper, horizontal profile. The overhanging branch of the bracket has a length greater than the width of the horizontal track of the upper, horizontal profile and is equipped with a device to support this horizontal track.

8. Mechanism as in patent claim 7, distinguished by the fact that the support devices of the overhanging branch of the bracket comprise an intermediate extension of this branch, formed by means of cutting and hammer work, projecting from the lower surface or this, parallel to the side surface and facing backwards, separated from this lower surface by a distance slightly greater than the width of the horizontal track of the upper, horizontal profile, to allow for insertion of the free, longitudinal edge of this track. The overhanging branch of the bracket also has a threaded opening situated between the other branch and the above mentioned extension, through which a screw is introduced from above, this being tightened on the horizontal track of the upper horizontal profile.

9. Mechanism as in patent claim 1, which enables a concealment tunnel to be attached by means of brackets fixing this to the upper, horizontal profile by one branch, the other branch taking up a vertical position so that the tunnel can be attached to the assembly; distinguished by the fact that the two branches of the bracket are of different lengths and each has rectangular, intercommunicating windows at the fold or transversal angle which form, at the edge parallel to the fold, a circular notch, greater than 180° , the outlet of which is partly closed off

towards the mentioned window, this notch allowing for the insertion of pivots or bushes which are anchored to the tunnel, these having a cylindrical furrow with a diameter approximately equal to that of the mentioned notch.

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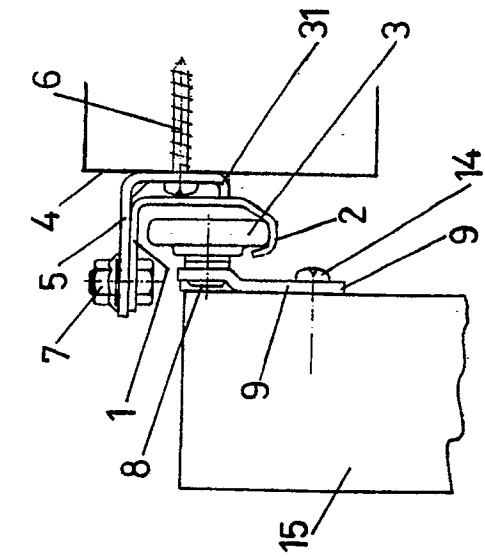


FIG. 2

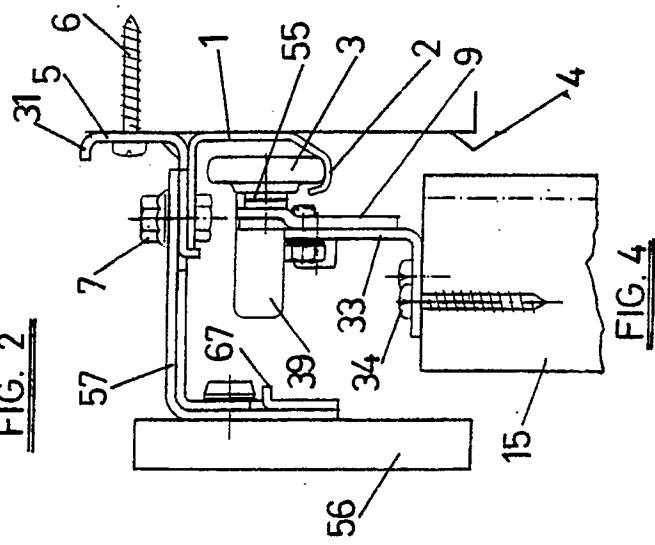


FIG. 4

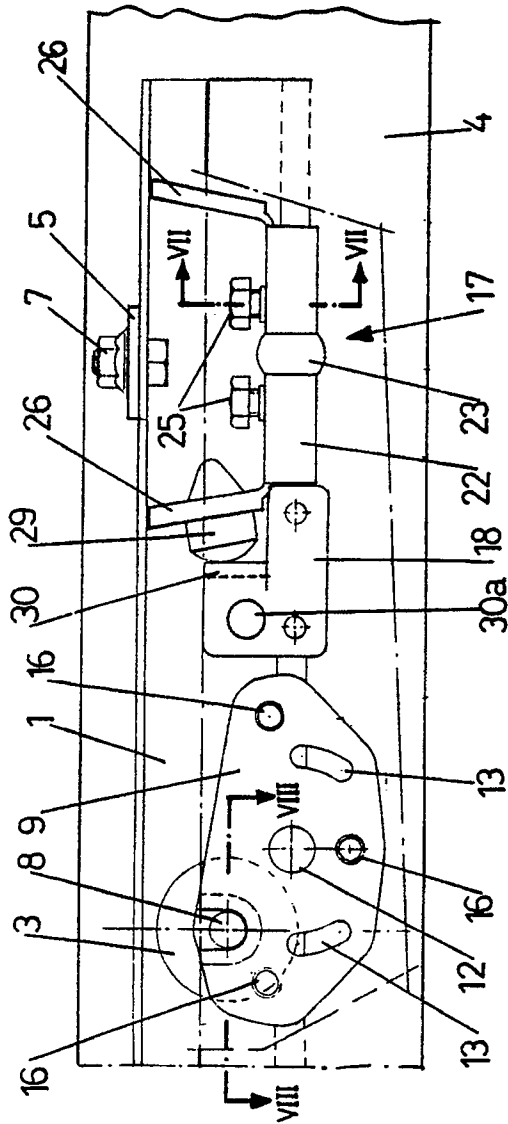


FIG. 1

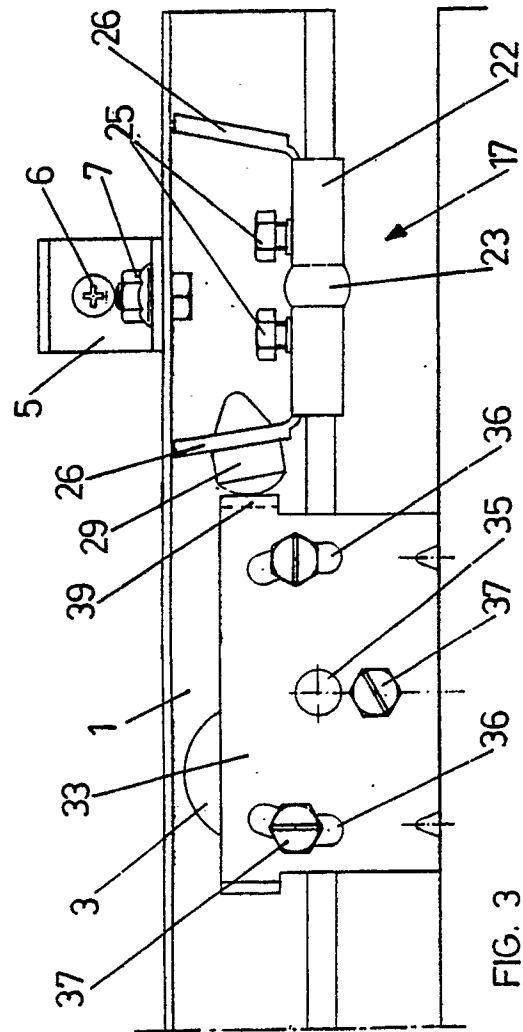


FIG. 3

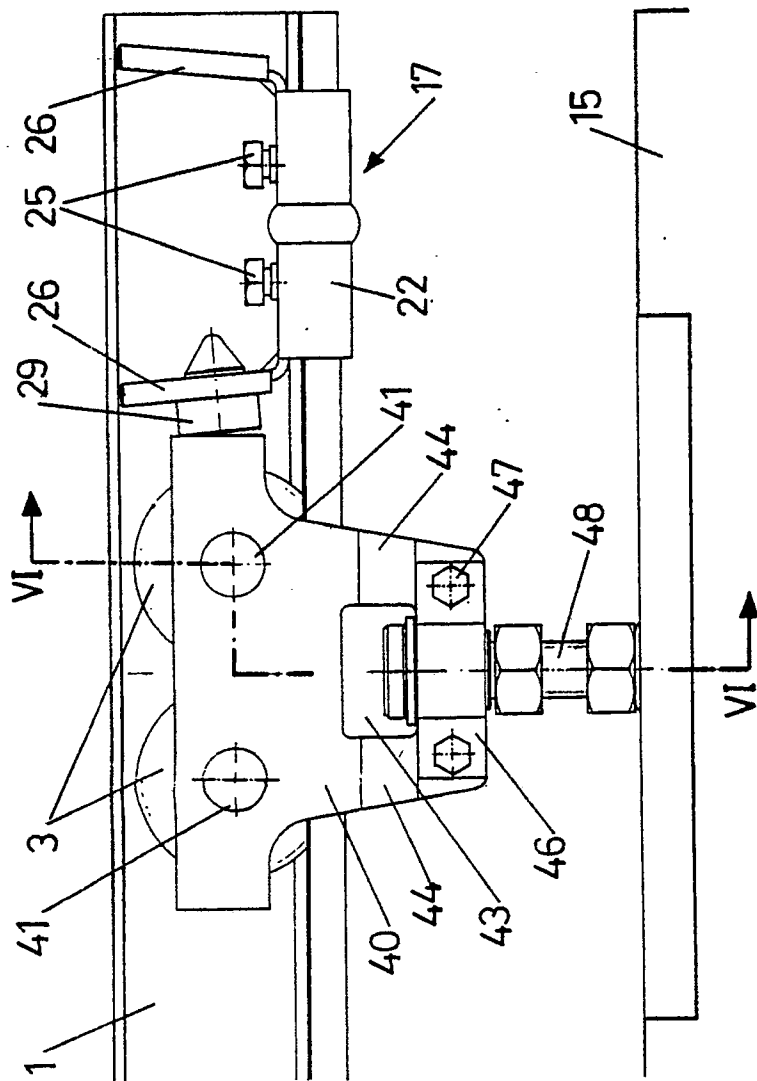


FIG. 5

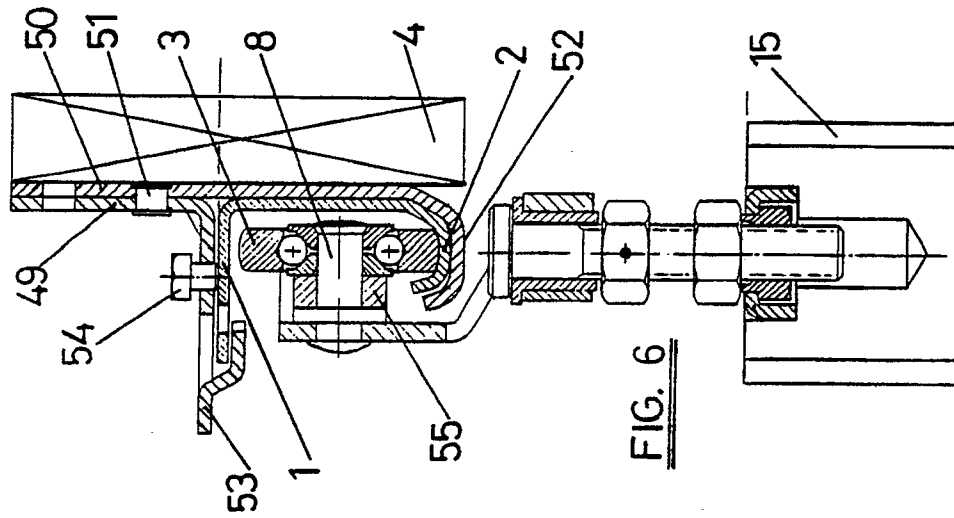
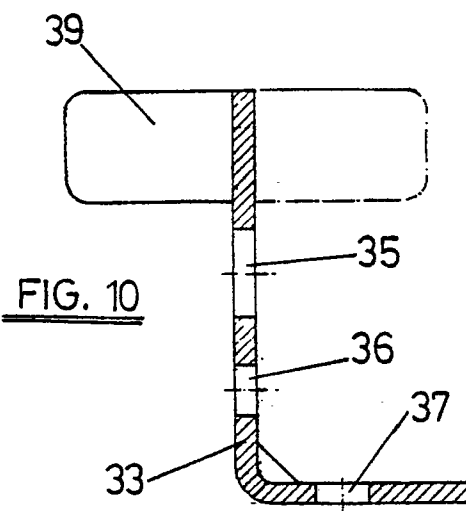
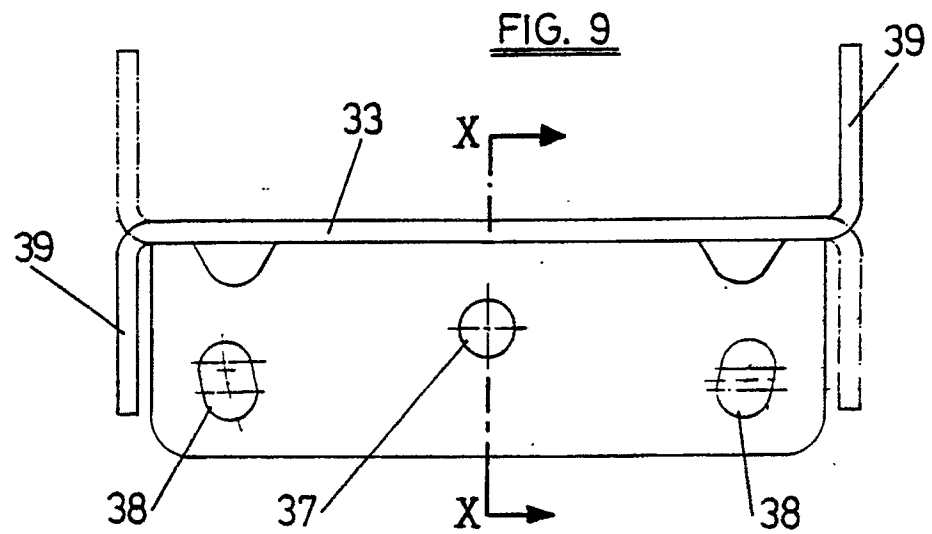
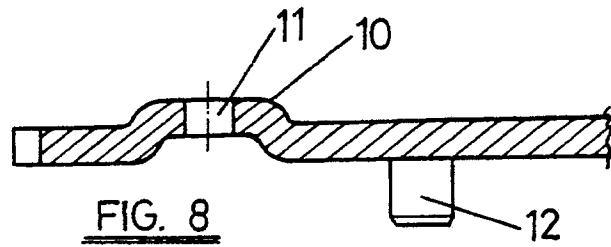
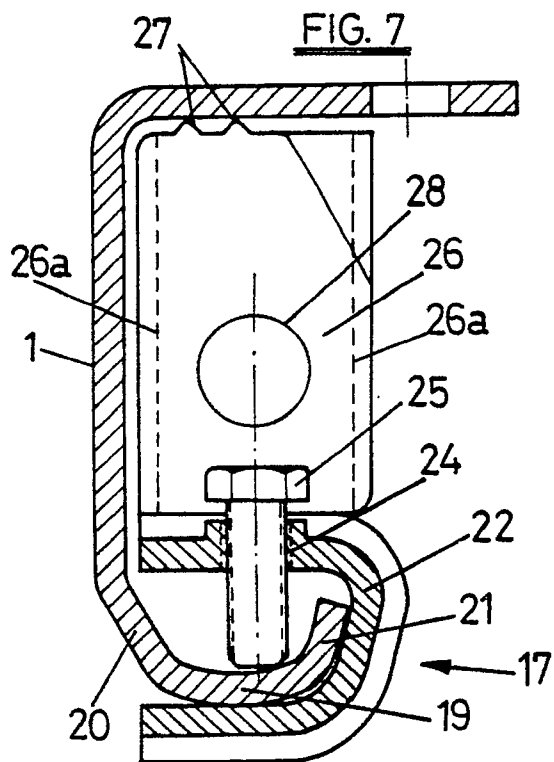


FIG. 6



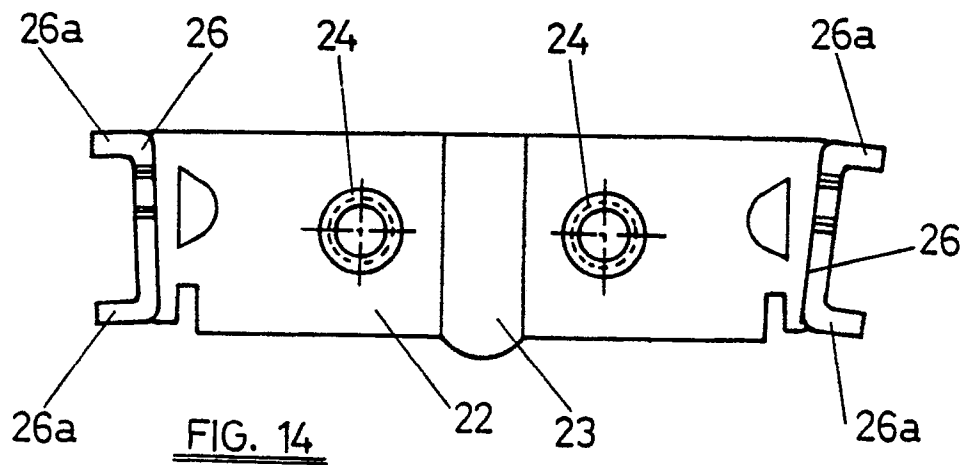
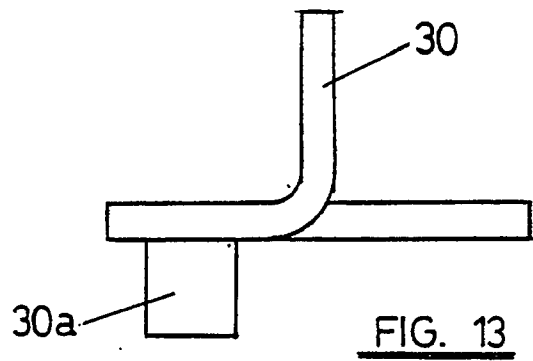
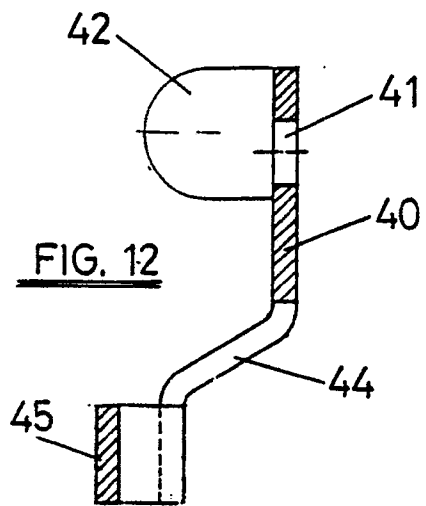
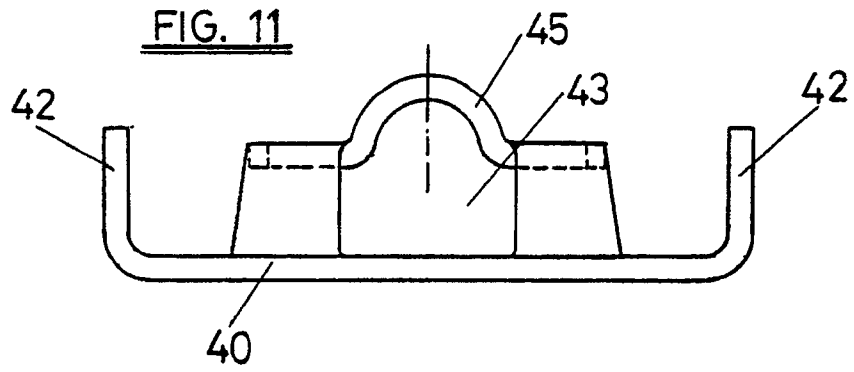


FIG. 15

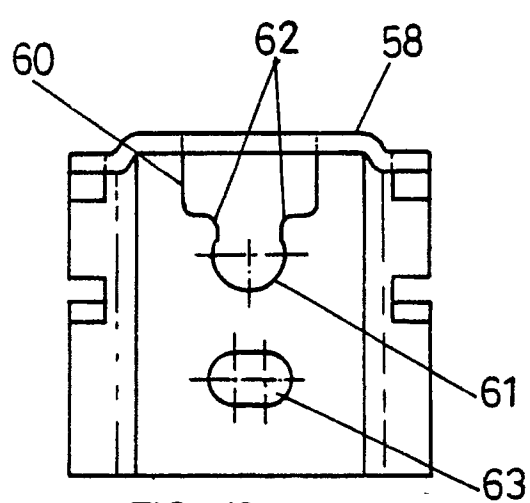
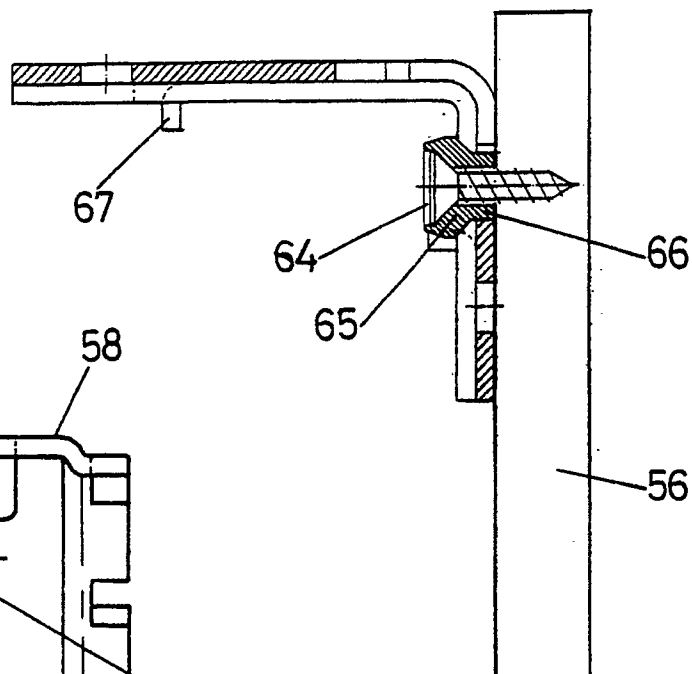


FIG. 16

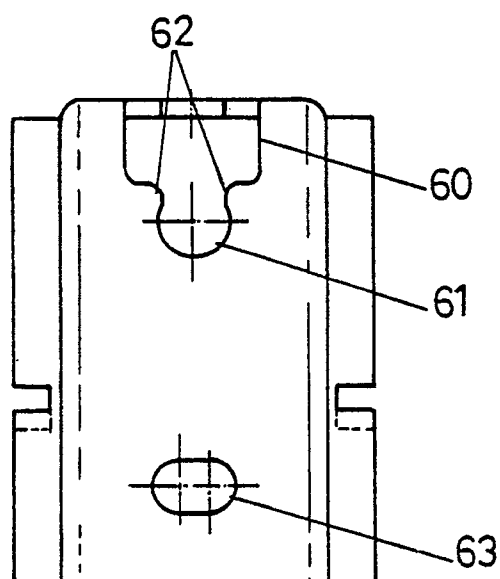


FIG. 17



European
Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 50 0047

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-3 289 243 (MILETTE) * column 2, line 19 - line 22 ** column 2, line 28 - line 38 ** figures 1-7 * - - -	1,3	E 05 D 15/06 E 05 F 5/06
A	GB-A-5 319 50 (KUHNLEIN) * page 1, line 84 - line 90 ** figures 1-5 * - - -	1	
A	EP-A-0 285 540 (KLEIN IBERICA) * column 3, line 48 - line 61 ** figures 1,2 * - - -	2	
A	AU-B-5 041 70 (INGLEBY) * page 7, line 1 - line 7 ** figures 1-3 * - - -	3	
A	DE-U-8 605 369 (TECKENTRUP) * page 12, line 31 - line 33 ** figures 11-13 * - - -	4	
A	GB-A-2 951 38 (ALDAM) * page 3, line 3 - line 7 ** page 3, line 25 - line 28 ** figures 1,2 * - - -	6,7	
A	DE-A-3 212 640 (RIEXINGER) * page 11, line 6 - line 33 ** page 13, line 34 - page 14, line 10 @ figure 1 * - - - - -	6-8	TECHNICAL FIELDS SEARCHED (Int. Cl.5) E 05 D E 05 F
The present search report has been drawn up for all claims			
Place of search		Date of completion of search	Examiner
The Hague		25 April 91	VAN KESSEL J.J.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document			