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E-28046 Madrid(ES)(54) **Mechanism for the assembly of sliding doors.**

(57) Mechanism for the assembly of sliding doors which consists of an upper rail (4) and a lower rail (5) on which an upper guide component (3) and a lower rolling component (2) move along, these being integral parts of the door (1). The rolling component (2) comprises a plaque (33) which is afixed to the door (1) and a wheel (34) with a peripheral groove (35). The guide component (3) consists of a support plaque (6) which can be attached to the door (1) and a gliding component (7) which can be anchored to the plaque (6), this being a flat piece (7) which has, at two of its opposite edges, longitudinal, central grooves (19-20) with a slightly convex outline. At least the groove (35) of the wheel (34) is slightly deeper than that of the rim of the rail (48) on which it moves along, the wings which form the groove resting in the longitudinal tracks (50) formed in the rail (2).

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This invention refers to a mechanism for the assembly of sliding doors which is particularly suitable for the assembly of cupboard doors or those of other items of furniture.

More specifically, the mechanism described in this invention is of the type which comprises an upper rail, a lower rail, a lower rolling component and an upper guide component. The upper and lower rails are attached to the surfaces or areas of the door which define the upper and lower limits of the space to be closed off, whilst the rolling component and the guide component are attached to the internal surface of the door, adjacent to its lower and upper edges.

The rolling and guide components include grooved areas which are in contact with a longitudinal rim projecting vertically from the rails.

The groove bottoms of both the rolling component and the guide component rest on the crest of the rim and this, coupled with sectional details of said rim and groove, causes the walls of the groove to rub against the rim whilst the door is moved back and forth, thereby producing the characteristic friction noise.

Moreover, both the rolling component and the guide component must be mounted on the rails very accurately to avoid the formation of gaps which would interfere with door movement. Due to the structure of said rolling and guide components, it is very difficult for the fitter to ensure that they are completely and accurately positioned, it being difficult to compensate for slight variations which might occur during the assembly process.

The aim of this invention is to produce a mechanism of the type described above, which is structured in such a way that the guide and rolling components move back and forth smoothly and quietly on the rails.

This objective is achieved by way of specially designed grooves in the rolling and guide components and the design of the rail rim, together with the structure of these components which allows for them to be positioned on the rails correctly and by means of a simple process, whilst allowing for possible variations to be compensated for.

The mechanism described in this invention is distinguished by the fact that the lower rolling component consists of an anchorage plaque which can be attached and fixed to the internal surface of the door, and a wheel with a peripheral groove which is mounted on the external surface of the plaque by means of an axle which pierces the plaque and is made fast within it.

To the rear of the upper and adjacent, lateral edges of the anchorage plaque of the lower rolling component, there is a rim, whilst there is a circular depressed area at the lower edge, this being of the same height and projecting in the same direction

as the rims, these two parts being those which will rest on the door surface to which the plaque is assembled. At the base part of the depressed area there are two screw holes in horizontal alignment, one of which is situated in a central position. In addition, these screw holes are surrounded by small conical, peripheral structures, each one projecting in a different direction; in the case of the central opening, the structure projects the interior of the depressed area, whilst in the case of the other opening, it projects towards the outside. The wheel axle is affixed in the central opening, this having an axial shank which is introduced through the opening and made fast in the concave surface of the structure which surrounds said opening. A centre pin is affixed, from the external side of the depressed area, in the eccentric opening, this centre pin also having an axial shank which is introduced through said opening and made fast in the concave surface of its structure. In this way, the assembly process with respect to the wheel axle and centre pin, is simple and rapid, without the need to use screws or other fixtures which might jut out from the side of the plaque opposite to that of the wheel and centre pin.

At the part of the anchorage plaque of the lower rolling component which surrounds the depressed area, there are three openings, two of which are oblong and located in an upper position to either side of the depressed area, and another which is in a lower side position, underneath one of the oblong openings. The oblong openings have a curved outline and are concentric to the eccentric opening in the depressed area. These openings serve the purpose of fixing the anchorage plaque to the door. The oblong openings allow for certain movements of the plaque in order to allow for height adjustment of the door in relation to the rail along which it will move.

In accordance with this invention, the upper guide component consists of a support plaque which can be attached to the interior surface of the door, and a gliding component which can be attached and fixed to the support plaque. This gliding component is a flat piece and has a more or less square outline, with central, longitudinal grooves at two of its opposite edges. These grooves and the edges on which they are made, have a slightly convex outline with a curve radius approximately equal to double the distance between these two edges. Both the plaque and the gliding component have anchorage facilities which assist in positioning of the gliding component in relation to the plaque. Moreover, these anchorage facilities are located at different distances from the grooves, in such a way that when the position of the gliding component on the anchorage plaque is reversed, the grooves are at a different height, in this way compensating for

possible height variations which might occur during construction of the door or of the furniture frame.

In accordance with another characteristic of the invention, the longitudinal rim of the rails becomes larger towards its base part, its free end having a rounded and convex form. The groove of the wheel and gliding component becomes larger towards its outlet, with a concave bottom part and slightly wider than that of the rim. At least the groove of the wheel will be slightly deeper than the height of the rim of the rail along which it moves, by which said wheel will rest on the wings which confine the groove to the rail, for which reason there are longitudinal tracks at either side of the rim. In this way, the wheel of the lower rolling component does not rest on the crest of the rail rim, but on the edge of the walls which confine the groove within the above mentioned longitudinal tracks. Due to the sectional detail and size of the rims and the grooves, the wheel of the rolling component comes into contact with the crest of the longitudinal rim (i.e. the smallest area) of the rail during its trajectory, whilst the door is moved back and forth, with the groove outlet (i.e. the largest area), in such a way that movement is produced in a smooth manner, without any rubbing and, hence, silently.

The characteristics detailed above and other related features of the invention, are described below in more detail, making reference to the attached drawings which show a possible and non-restrictive operational example of the invention:

Figure 1 is an interior elevated view of a door to which the mechanism described in this invention is attached.

Figure 2 is a front elevated view of the support plaque of the upper guide.

Figures 3 and 4 are sectional views of the stretches III-III and IV-IV, respectively, shown in figure 2.

Figure 5 is an exterior elevated view of the gliding component of the upper guide component.

Figures 6, 7 and 8 are sectional views of stretches IV-VI, VII-VII and VIII-VIII, respectively, shown in figure 5.

Figure 9 is an exterior elevated view of the anchorage plaque of the lower rolling component.

Figure 10 is a sectional view of the stretch X-X shown in figure 9.

Figure 11 is a diametric section of the wheel of the lower rolling component.

Figure 12 is a transversal section of the profile which forms the upper and lower rails.

Figure 13 is a profile view of the door shown in figure 1, with the rail and upper guide component, with a sectional view of the XIII-XIII stretch, showing one of the first assembly stages of the

gliding component.

Figure 14 is a sectional view of stretch XIV-XIV shown in figure 1, showing the final position of the gliding component.

Figure 15 is a sectional view of stretch XV-XV shown in figure 1.

Figure 1 shows the internal surface of a door where a rolling component is attached to its lower edge (2) and a guide component to its upper edge (3). These components move along the upper and lower rails (4 and 5, respectively), these being attached to the upper and lower surfaces of the door (1) which delimit the space to be closed off (see figure 13).

The upper guide component consists of a support plate (6) attached to the door (1), and a gliding component (7) which is attached to the plate (6).

The structure and characteristics of the upper guide component are described below, making reference to figures 2 to 8.

Figures 2 to 4 show the support plate (6) in detail, this being of rectangular shape and having two cylindrical projections attached to one of its surfaces, these being in transversal alignment, and at a different distance with respect to the two transversal edges. Each of these cylindrical projections has two flat, beveled edges (9) which are parallel to the longitudinal edges of the plate and are topped off by an outer butt (10). The plate (6), projections (9) and butts (10) are pierced by an axial screw hole (11), which has a conical enlargement in the area of the butt (10). At the centre of the plate (6) there are two windows (12 and 13) in axial alignment, these being slightly wider at the front or fore part of the plate (6). These two windows are separated by an intermediate, crosspiece (14) of which one edge is flat (15) slopes towards the window (13). The flat surface of this plate is attached to the surface of the door by means of screws (16) - (see figure 13) - which are introduced through the screw holes present in the cylindrical projections (9).

As shown in figures 5 to 8, the gliding component is made up from a flat piece which is thicker than the plate (6) and has a more or less square shape, its two opposite edges (17 and 18) having a slightly convex outline, with a curve radius equal to double the distance between these edges. In addition, both edges (17 and 18) have longitudinal, central grooves (19 and 20), which grow slightly wider towards their outlet and are curved at the bottom. The walls which define the groove (19) can include one central division at the front wall (21) and two outer divisions at the back wall (22). The bottom part of the grooves (19 and 20) has the same convex outline as that of the edge in which they are made, and are concentric to these edges.

In addition, the plate has two symmetrical, ver-

tical passage slots (24 and 25), which have a central, circular enlarged zone (26). At the external surface of the plate, these slots are surrounded by a peripheral depressed area (27). Between the openings (24 and 25) the external surface of the plate (7) has a vertical hollowed out area (28), which is closed off by a thin sheet (29), shaped in such a way that it forms an intermediate, transversal fold or wave (30), with side pieces (31) that curve in the opposite direction to said fold or wave (30). In addition, there are slots (32) present at the longitudinal edges of this sheet which, together with the shape of said plate, provide for elastic deformation of this latter piece.

The edges (17 and 18) and the bottom parts of the corresponding grooves (19 and 20) are situated at different distances from the mid, transversal line of the gliding component which is assumed to pass through the centre of the circular enlarged areas (26) of the windows (24 and 25).

In order to attach the gliding component (7) to the support plate (6), the butts (10) of the cylindrical projections (9) of the support plate (6) are introduced through the circular enlarged areas (26) of the windows (24 and 25) of the gliding piece (see figure 13). At this stage, the protruding part (30) of the central hollowed out area (28) of the gliding component, will be situated in the window (13) of the support plate (6). The gliding component then moves in an upwards direction until the protruding part (30) of the gliding component moves from one window (13) to the other (12). This operation is made easier by the intermediate ramp or slope (15). The gliding component is now held against the support plate by means of introducing the protruding part (30) in the window (12) and by the elastic deformation ability of the strip (31) of the hollowed out area (28). Depending on whether the gliding component is attached to the support plate as shown in figure 5, or in its opposite position, the distance from the edge (17 or 18) will vary and, subsequently, the distance between the corresponding groove and the rail (4) will vary. This structure allows for compensation of possible errors or variations with respect to the door or furniture frame. Figure 14 shows the final position of the gliding component (7) on the anchor piece, where the protruding part (30) is inserted in the window (12).

The structure of the lower rolling component will be described below making reference to figures 9 to 11. This component consists of an anchor plate (33) - (see figure 15) - and a wheel (34) with a peripheral groove (35).

As shown in figures 9 and 10, the anchor plate (33) has a more or less trapezoidal shape and an outer rim (36) around its upper and adjacent lateral edges. At the lower edge of the plate there is a

circular depressed area (37) which follows the same outline as the rims (36) and is of the same height. The lower surface of the depressed area (37), and the rims (36) will rest on the door (1) - (see figure 15).

Within the depressed area (37) of the plate, there are two openings (38 and 39), one in the centre (38), and the other eccentric (39) and in horizontal alignment with the former (38). As can be observed in figure 10, these two openings are surrounded by conical structures (40 and 41) which project in opposite directions to each other, one (40) projecting towards the inside of the depressed area (37) and the other (41) towards the outside. Within the surface area surrounding the depressed area (37), the plate has three openings (42, 43 and 44). Two openings are of a curved oblong shape and are concentric to the eccentric opening (39). The third opening (44) is in horizontal alignment to the former openings (38 and 39). The openings (42, 43 and 44) are surrounded by a step (45).

As shown in figures 1 and 15, the support plate (33) is attached to the door (1) by means of screws (46) which are introduced through the openings (42, 43 and 44) and by a centre pin (47). This centre pin (47) and the axle (48) of the wheel (34), have an axial shank which is introduced, from opposite sides, into the openings (38 and 39) situated within the depressed area, and is made fast in the concave part of the structures surrounding these openings. This provides for a simple system of axle (48) and pin (47) anchorage. The shape of the openings (42 and 43) allows for the plaque (33) to spin around the anchor pin (47), in this way compensating for possible errors with respect to the height of the door (1) in relation to the lower rail (5).

This constitution, both with regard to the lower rolling component and the upper guide component, provides for perfect height adjustment of the door (1) and the gliding component (7), in relation to the lower and upper rails (5 and 4, respectively), whilst ensuring that the door slides back and forth smoothly.

The groove (35) of the wheel (34), becomes larger towards its outlet, as is the case with the groove (19) of the gliding component (7).

The rails (4 and 5) have the same composition, and consist of a strip or band with screw holes (47) - (see figure 13) - by means of which they will be affixed to the upper and lower surfaces of the door (1) which define the space to be closed off. This strip or band has a longitudinal wing (48) which decreases in size towards its crest or free edge, where it tops off into a convex stretch. At either side of the wing (48), the rail plaque has coplanary tracks (50). The longitudinal rim (6) is slightly smaller in height and section than the groove (35)

of the wheel (34). As shown in figure 13, this structure ensures that the wheel (34) rests in the tracks (50) via the edge of the wings which define the groove (35), without the crest (49) of the rail rim (48) touching the bottom of the groove.

In this way, when the door is moved back and forth and the wheel (34) turns and moves forward, contact between this wheel and the rail is via contact of the groove (35) outlet (i.e. widest part), with the crest (49) of the rim (48) (i.e. the narrowest part of this rim). In this way, the internal surface of the wall which forms the groove (35), does not rub against the lateral surfaces of the rim (48), thereby providing for a smoother and more silent movement of the door.

Claims

1. Mechanism for the assembly of sliding doors, consisting of an upper rail and a lower rail, which are fixed to the surfaces or zones which delimit the upper and lower limits of the space to be closed of, and a lower rolling component and an upper guide component, fixed to the interior surface of the door, these having grooves which slide along a longitudinal rim of the lower and upper rails, respectively; distinguished by the fact that the lower rolling component consists of an anchorage plaque which can be attached and fixed to the interior surface of the door, and a wheel which has a peripheral groove and is mounted on the exterior surface of the plaque by means of an axle which juts out from and is made fast within said plaque. Also distinguished by the fact that the upper guide component consists of a support plaque which can be fixed to the interior surface of the door and a gliding component which can be anchored to the support plaque, this latter being a flat piece with a more or less square outline and having, at two of its opposite edges, central, longitudinal grooves, the grooves and edges having a slightly convex outline with a curve radius approximately equal to double the distance between said edges, the plaque and gliding component having anchorage facilities which are situated at different distances from said grooves, the longitudinal rim of the rails becoming larger towards its base part, and having a convex free end, the grooves of the wheel and gliding component becoming larger towards their outlet, with a concave bottom which is slightly wider than that of the rim; at least the groove of the wheel is slightly deeper than the height of said rim, supporting the wings which restrict the groove of this wheel within longitudinal tracks formed in the rails, at

either side of the rim.

2. Mechanism as in patent claim 1, distinguished by the fact that the anchorage plaque of the lower rolling component has, along its upper and adjacent side edges, an outer rim and, at its lower edge, a circular depressed area of the same height and projecting in the same direction as the rim, these two parts being those which will rest on the surface of the door, the bottom part of the depressed area having two screw holes in horizontal alignment, one of which is in a central position and another which is eccentric, these being surrounded by a small, conical, peripheral structure which projects in the opposite direction, in the case of the central opening towards the interior part of the depressed area and in the case of the other opening towards the exterior part, the wheel axle being fixed in the central opening by means of an axial shank which is an integral part of said axle and is introduced through the opening and made fast in the concave surface of the structure, whilst in the other opening a centre pin is fixed to the door from the opposite side by means of an axial shank which is an integral part of the pivot which is introduced through the opening and made fast in the concave surface of its structure; the area of the plaque which surrounds the depressed area has three openings, two of which are oblong and in an upper position, at either side of the central depressed area, with a curved outline and concentric to the eccentric opening of the depressed area, whilst the third opening is in horizontal alignment to the two openings of the depressed area.

3. Mechanism as in patent claim 1, distinguished by the fact that the anchorage facilities between the plaque and gliding component of the upper guide component, consist of two cylindrical projections in horizontal alignment, which jut out from the exterior surface of the head and are topped off by the outer cylindrical head, and two symmetrical, vertical, rectangular windows which include an outer track which has approximately the same depth and width as the height and diameter of the cylindrical projections of the plaque, and an exterior track which has approximately the same width and depth as the diameter and height of the head of said projections, the interior track having an central, circular enlarged area which has the same diameter as the mentioned head of the projections. Moreover the gliding component has, at its outer surface, a central projection which is elastically retractile and can be par-

tially introduced in the two central windows formed in the plaque, these windows being in vertical alignment and separated by an intermediate ramp, this projection coming to rest in the lower window when the cylindrical projections of the plaque are located in the central enlarged area of the windows of the gliding component, whilst, when the gliding component moves in an upwards direction, the projection is introduced in the other window.

4. Mechanism as in patent claim 3, distinguished by the fact that the gliding component has, on its external surface, a central, longitudinal depressed area, situated between the two rectangular windows, restricted by two longitudinal slots which form a flexible strip, in the central part of which there is a curved fold which forms the central, outer projection of the gliding component, this being elastically retractile.

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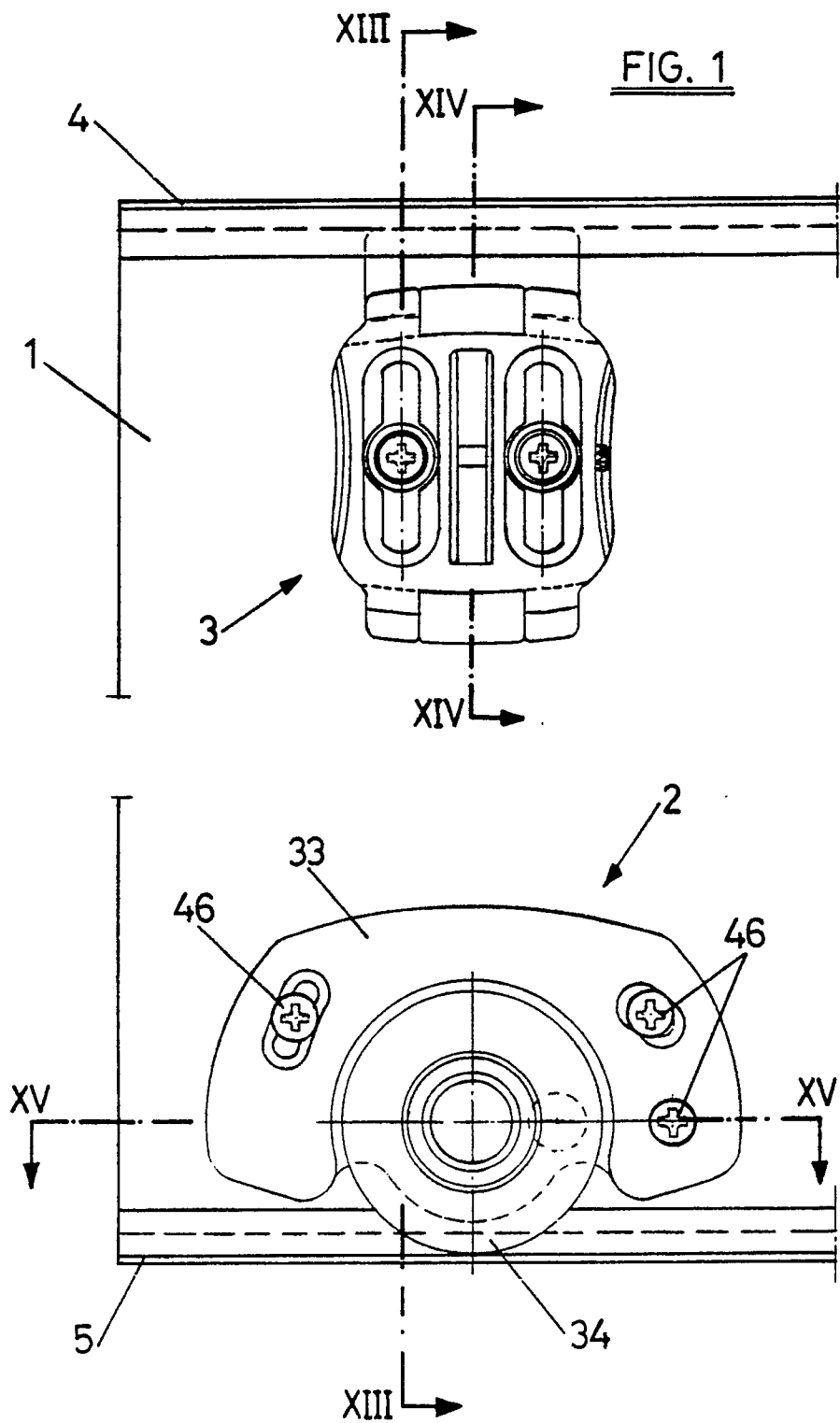
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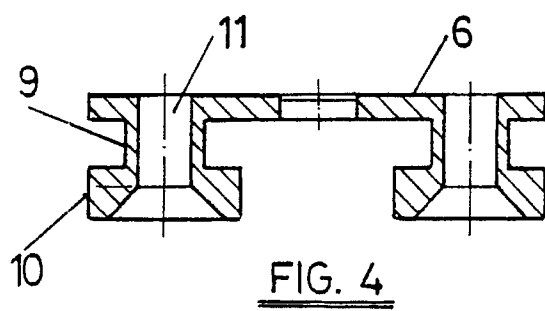
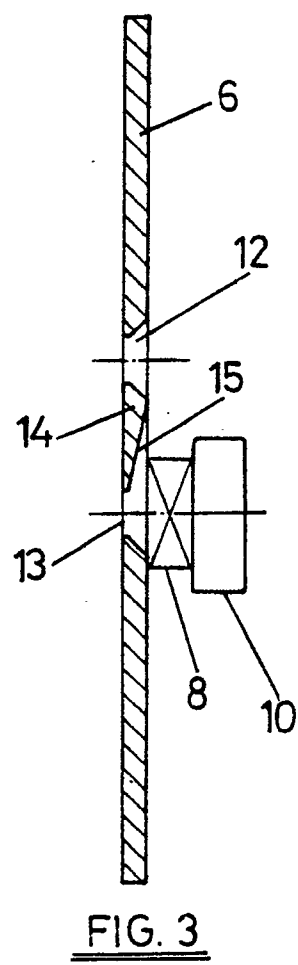
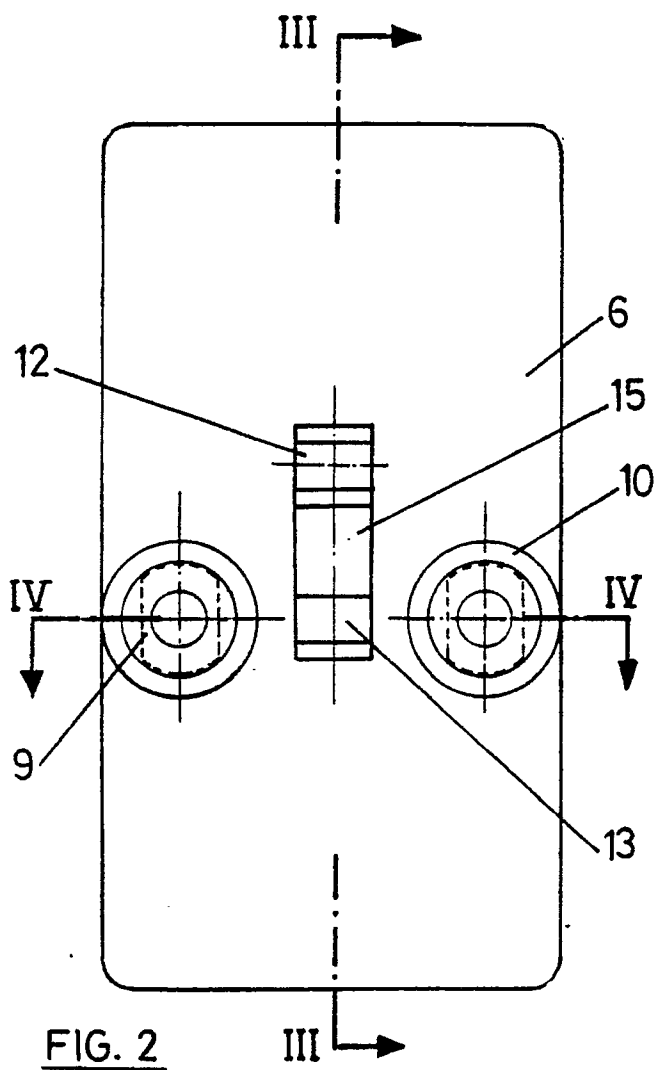
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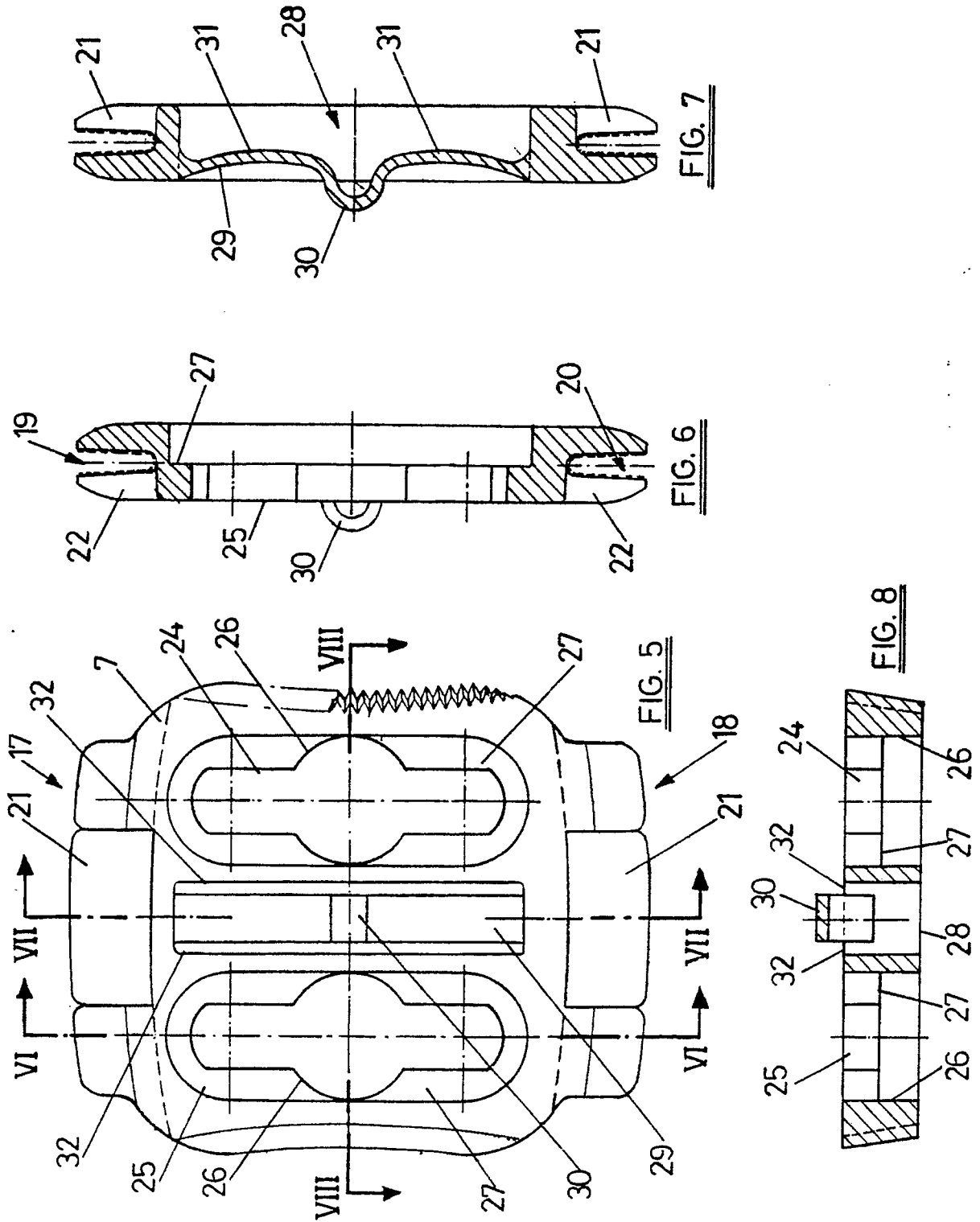
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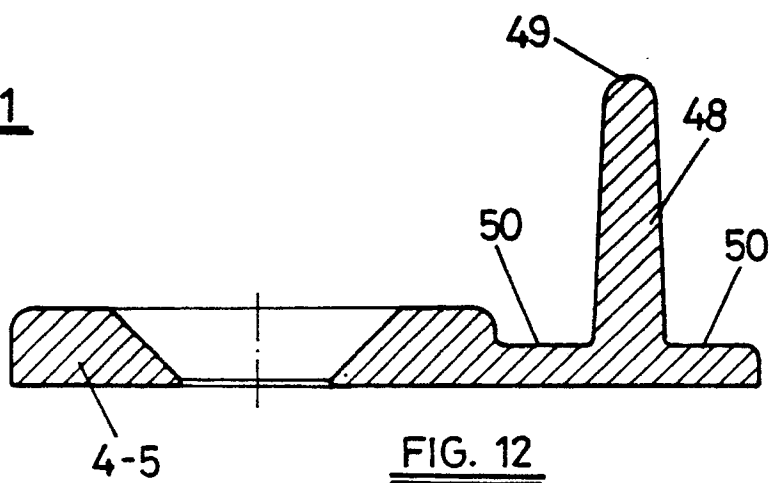
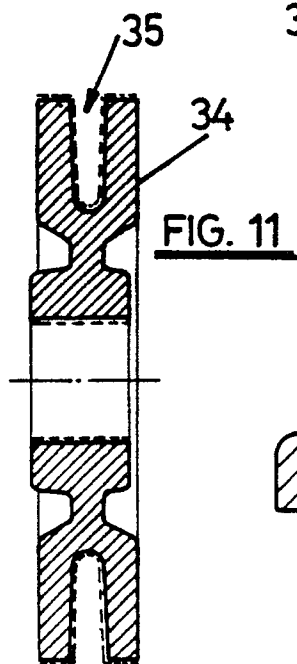
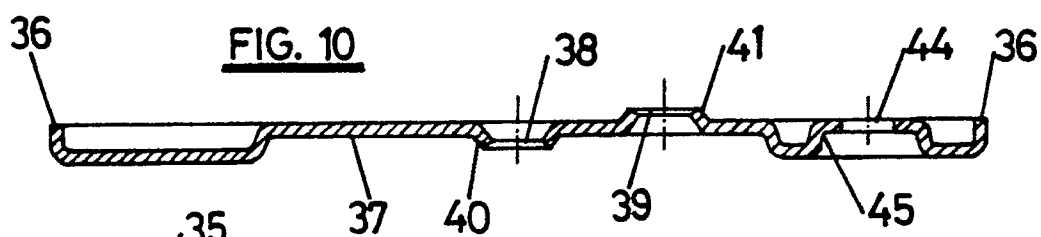
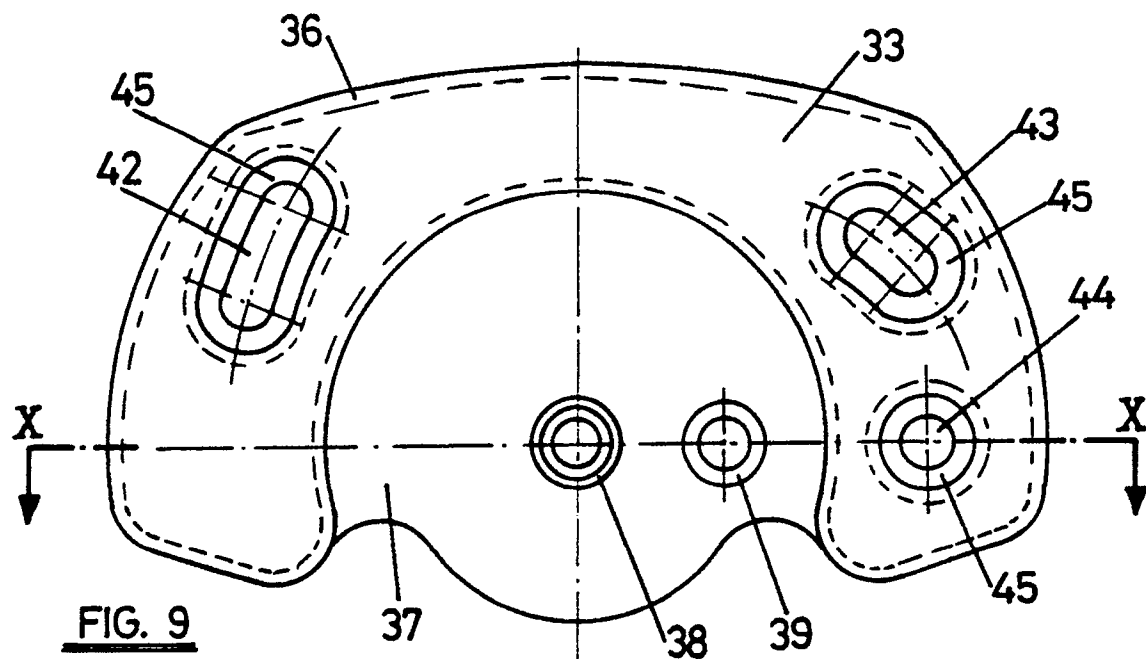
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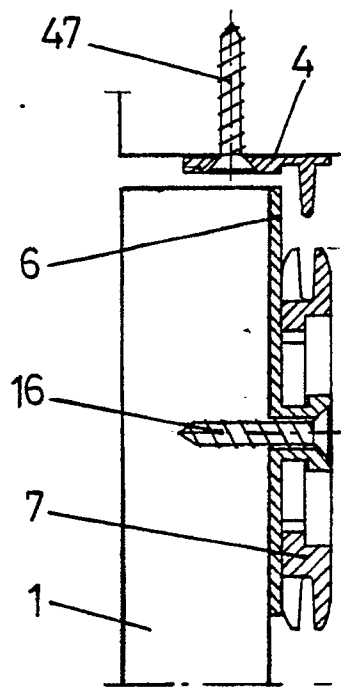


FIG. 13

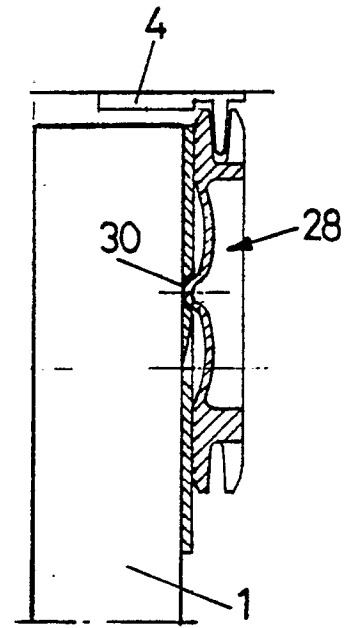


FIG. 14

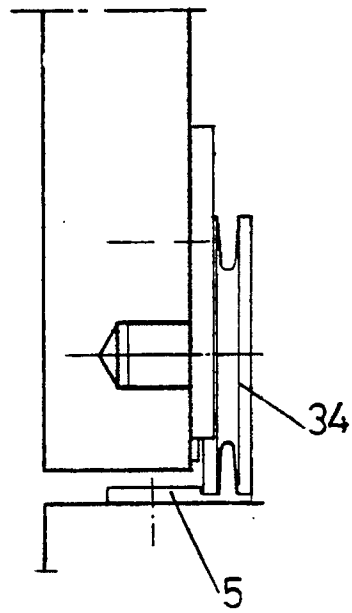
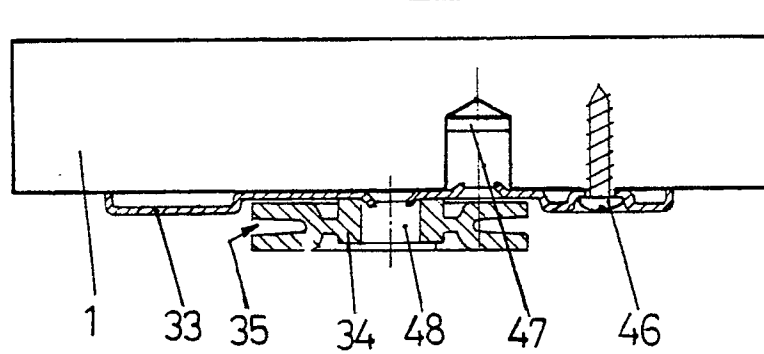


FIG. 15





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EUROPEAN SEARCH REPORT

Application Number

EP 90 50 0128

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	EP-A-0 285 540 (KLEIN IBERICA) * column 2, line 56 - column 3, line 21 ** column 3, line 35 - line 61 @ figures 1,2 *	1,2	E 05 D 15/06

A	AU-B-4 736 72 (CLIVE INVESTMENTS PTY) * page 3, last paragraph - page 4, paragraph 2 ** figures 1,2 *	1	

A	FR-A-7 954 77 (SION) * page 2, line 18 - line 21 ** figure 6 *	1	

			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E 05 D
The present search report has been drawn up for all claims			
Place of search		Date of completion of search	Examiner
The Hague		07 May 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			