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(54) **Device for adjusting the distance of a component such as a panel or the like from a supporting surface**

(57) Device for adjusting the distance, in the longitudinal direction (X-X), of a component such as a panel (1) or the like from a fixed supporting surface (P), comprising a head-piece (100), integral with said component (P), a spindle (300) associated with said component and provided with a thread (310a), and a member (400), forming a foot for resting on the fixed surface (P), the said head-piece having arranged inside it a gear mechanism (210, 220) able to be actuated in a direction (Y-Y) perpendicular to the longitudinal direction (X-X) of adjustment and act on said spindle (300), the device comprising a sleeve (500) having a female thread (502) for mating with the thread (310a) of said spindle (300) and means (501a) for constraining to the component (1) whose distance from the fixed surface (P) is to be adjusted, said constraining means being able to cause the rotational locking of the said sleeve (500).

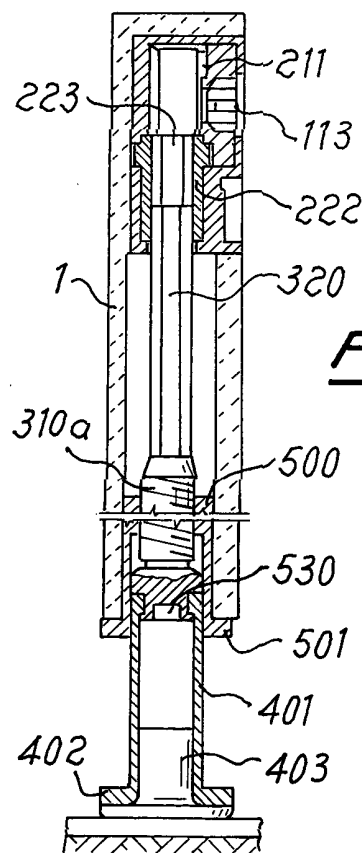


Fig. 6

Description

[0001] The present invention relates to a device for adjusting the distance, in the longitudinal direction, of a component, such a panel or the like, from a fixed supporting surface.

[0002] It is known in the furniture product sector that there exists the need to provide devices able to adjust the levelness of surfaces, furniture, and the like, with respect to a supporting surface such as, for example, the floor.

[0003] It also known that, in the latest techniques for assembling furniture from flat components such as panels and the like, which form the shoulders and the cross-pieces of the structure, the said adjusting devices must be able to be inserted concealingly inside the thickness of the panels and be able to be operated with great ease by the user.

[0004] The technical problem which is posed, therefore, is that of providing a device for adjusting the distance, in the longitudinal direction, of a component such as a panel or the like from a supporting surface, which allows operation of the actuating gear mechanism in a direction perpendicular to the direction of the adjusting movement, resulting in very easy and precise operation.

[0005] Within the context of this problem it is also required that this device should be compact and have dimensions such as to make possible insertion of the device also within the thickness of the thinner panels which form, for example, the shoulders of modular kitchen furniture and the like.

[0006] These results are obtained according to the present invention by a device for adjusting the distance, in the longitudinal direction (X-X), of a component such as a panel or the like from a fixed supporting surface, comprising a head-piece, integral with said component, a spindle associated with said component and provided with a thread, and a member, forming a foot for resting on the fixed surface, the said head-piece having arranged inside it a gear mechanism able to be actuated in a direction (Y-Y) perpendicular to the longitudinal direction (X-X) of adjustment and act on said spindle, the device comprising a sleeve having a female thread for mating with the thread of said spindle and means for constraining to the component whose distance from the fixed surface is to be adjusted, said constraining means being able to cause the rotational locking of the said sleeve (500).

[0007] Further details may be obtained from the following description of a non-limiting example of embodiment of subject of the present invention provided with reference to the accompanying drawings, in which:

Figure 1 shows an exploded view of the device according to the invention;

Figure 2 shows an exploded and cross-sectional view of the device according to Figure 1;

Figure 3 shows a partially sectioned front view of

the device inserted within the thickness of the panel 1 and in a position at a minimum distance from the supporting surface;

Figure 4 shows a cross-section along the plane indicated by IV-IV in Figure 3;

Figure 5 shows a view similar to that of Figure 3 in the position at a maximum distance;

Figure 6 shows a cross-section along the plane indicated by VI-VI in Figure 5.

[0008] As shown, the adjusting device according to the present invention is essentially composed of a cylindrical head-piece 100 which, during use, will be fixed to the part 1 of the furniture whose level requires adjustment relative to a supporting surface such as a floor P and which comprises two half-parts, 110 and 120, respectively, each of which houses internally a corresponding part 210 and 220 of a gear mechanism 200 suitable for engagement with a first end of a spindle 300, the other end 330 of which is in turn suitable for engagement with corresponding means 400 forming a foot for resting the furniture unit 1 on the floor P.

[0009] For the sake of convenience of the description a longitudinal axis X-X of the device and a transverse axis Y-Y perpendicular to the former will be identified below. In more detail (Fig. 2) the first half-part 110 has inside it a first coaxial seat 111 which is open towards the flat front side 110a of the half-part 110 and blind towards the opposite end, coinciding with the curved side surface of the said half-part; the front edge 111a of the seat 111 has an undercut 111b, the purpose of which will become obvious below.

[0010] The half-part 110 has, formed inside it, a second seat 112 arranged along a horizontal plane (with a direction not limited to that of the figures) intersecting the said longitudinal seat 111 so that the two cavities are open and communicate with each other in the intersecting plane along the whole axial extension of the said seats.

[0011] The said second seat 112 is open towards the outside by means of a hole 113 formed in the upper front surface of the half-part 110.

[0012] Said second cavity 112 partially houses internally a toothed wheel 210 which has teeth 211 extending from one side of the wheel 210 parallel to the axis of rotation Y-Y thereof and along the entire circumference of the wheel.

[0013] On the side of the wheel opposite to that with teeth there is a seat 212 shaped in accordance with one or more cross-like/hexagonal or similar profiles of a corresponding actuating spanner (not shown).

[0014] Said wheel 210 forms the first part of a 90° gear mechanism, the other part 220 of which is formed by a toothed rim 221 annularly formed on the external surface of the coaxial tube 222 which also has axial internal splines 223 for forming a seat which is for example hexagonal.

[0015] The toothed rim 221 is axially arranged at a

certain distance from the edge of the tube 222 so as to define an axial section 222a thereof suitable for coaxial insertion inside said first longitudinal seat 111 of the half-part 110.

[0016] The second half-part 120 in turn has a first seat 121 passing through the curved side surface of the said half-part 120 via a longitudinal hole 121a open on both sides and suitable for receiving the tube 222.

[0017] The half-part 120 has formed, inside it, a second seat 122 arranged along a horizontal plane (with a direction not limited to that of the figures) tangential with respect to the said longitudinal seat 121; said second cavity 122 extends towards the inside of the half-part 120 only over a short axial section sufficient to contain the toothed-wheel part 211 projecting from the seat 112 of the first half-part 110.

[0018] Both the half-parts 110, 120 have an opposite flat surface provided with a respective pin 115, 125 projecting axially outwards and a corresponding centring hole 116, 126 suitable for engagement with the corresponding pin of the other half-part.

[0019] The said spindle 300 comprises:

- a cylindrical central section 310 on the side surface of which a thread 310a is formed;
- a first shank 320 extending longitudinally from a part of the said cylindrical section and having a hexagonal cross-section suitable for engagement with the corresponding splining 223 of the tube 222;
- a second shank 330 extending on the opposite side to the first shank 320, relative to the central section 310, and in turn having an annular edge 330a suitable for engagement with the first end of a shank 401 of a foot 400, the other free end 402 of which forms the support on the ground, able to be engaged, if necessary, with a foot cover-piece 403 made of non-slip material.

[0020] The device is completed by a sleeve 500 which extends in the axial direction and is axially open and one of the opposite ends of which is integral with an annular edge 501 having teeth 501a projecting in the axial direction; the sleeve has a first section of its internal surface formed as a female thread 502 suitable for engagement with the thread 310 of the spindle 300 and a second section of the internal surface which is smooth and has a diameter such as to allow coaxial insertion of the shank 401 of the foot 400.

[0021] The operating principle of the device is as follows:

- the panel 1 for example forming part of a piece of furniture is prepared with a first transverse seat 1a suitable for containing the head-piece 100 and with a second longitudinal seat 1b suitable for containing the shank 300 and provided with opposite openings respectively connected to the outside and to the said seat of the head-piece 100;

- the head-piece 100 is assembled by:

- inserting the toothed wheel 210 inside the associated seat 112 of the first half-part 110;
- inserting the tube 220 inside the associated axial seat 121 of the half-part 120;
- joining together endwise, in the longitudinal direction, the two half-parts 110 and 120 by means of the pins 115, 125 and the corresponding centring holes 116, 126, so that:

- the annular teeth 221 of the tube 222 enter axially into contact with the undercut 111b of the axial seat 111 and radially mesh with the teeth 211 of the toothed wheel 210;

- the spindle 300 is constrained to the foot 400 by means of the end 330/330a of the spindle;
- the sleeve 500 is inserted coaxially onto the spindle 300 until the annular edge 501 of the sleeve comes into contact with the annular edge 403 of the foot;
- the spindle 300 is inserted and is mounted, as above, into the longitudinal seat 1b so that:

- the hexagonal end part 320 of the spindle 300 reaches the end of its travel inside the head-piece 100 through the splined seat 223 of the sleeve 220;
- the annular edge 501 of the sleeve 500 comes into contact with the edge of the panel 1 of the furniture so that the teeth 501a engage with the edge, causing locking of the sleeve which is no longer able to rotate;

- at this point (Figs. 3 ad 4) the panel 1 is integral with the foot 400 which rests on the floor in an axial position where there is a minimum relative distance between panel and floor;
- a corresponding spanner is engaged with the actuating seat 212 of the toothed wheel 210, causing rotation thereof and transmission of the movement to the teeth 221 of the tube 222 which starts to rotate about the longitudinal axis;
- the rotation of the tube 222, which is axially fixed, transmits the movement to the spindle 300 by means of engagement between splining 223 and hexagonal seat 320 of the spindle 300, which, rotating, causes the thread 310 to act on the female thread 502 of the sleeve 500 which, locked to the panel, obliges the spindle 300 to be coaxially displaced;
- said displacement of the spindle 300 causes a corresponding axial movement of the foot 400 integral therewith and therefore a variation in the height of the entire panel 1 which may thus be arranged level.

[0022] It is therefore obvious how the device according to the invention allows operation of the gear mech-

anism actuating the spindle 300 in a direction perpendicular to the head-piece 100 of the device and therefore perpendicular to the direction of the relative displacement of the two parts to be joined together, thereby resulting in greater operating ease and precision.

[0023] In addition, it is obvious how the axial load resulting from the weight of the panel is supported by the sleeve 500 which is fixed to the panel and arranged in a position axially distant from the operating gear mechanism which is consequently relieved of the weight and therefore easier to operate and not subject to flexing of the threaded spindle as in the case of devices of the prior art.

[0024] This also makes possible, among other things, a reduction in the dimensions, allowing insertion of the device also within the thickness of thinner panels which form, for example, the shoulders of modular kitchen furniture and the like.

Claims

1. Device for adjusting the distance, in the longitudinal direction (X-X), of a component such as a panel (1) or the like from a fixed supporting surface (P), comprising a head-piece (100), integral with said component (P), a spindle (300) associated with said component and provided with a thread (310a), and a member (400), forming a foot for resting on the fixed surface (P), the said head-piece having arranged inside it a gear mechanism (210, 220) able to be actuated in a direction (Y-Y) perpendicular to the longitudinal direction (X-X) of adjustment and act on said spindle (300), **characterized in that** it comprises a sleeve (500) having a female thread (502) for mating with the thread (310a) of said spindle (300) and means (501a) for constraining to the component (1) whose distance from the fixed surface (P) is to be adjusted, said constraining means being able to cause the rotational locking of the said sleeve (500).
2. Device according to Claim 1, **characterized in that** said head-piece (100) is formed by a first half-part (110) and by a second half-part (120) which can be joined together by means of associated engaging means (115, 125) and corresponding centring seats (116, 126).
3. Device according to Claim 2, **characterized in that** the first half-part (110) has inside it a first coaxial seat (111) open towards to the flat front side (110a) of the half-part (110) and blind towards the opposite end, coinciding with the curved side surface of the said half-part.
4. Device according to Claim 3, **characterized in that** the front edge (111a) of the seat (111) has an annu-

lar undercut (111b).

5. Device according to Claim 2, **characterized in that** the half-part (110) has, formed inside it, a second seat (112) arranged along a horizontal plane and intersecting with the said longitudinal seat (111) so that the two cavities are open and communicate with each other along the axial extension of the said seats.
6. Device according to Claim 5, **characterized in that** the said second seat (112) is open towards the outside by means of a hole (113) with an axis perpendicular to the longitudinal direction (X-X) formed in the upper front surface of the half-part (110).
7. Device according to Claim 2, **characterized in that** said second half-part (120) has a first seat (121) passing through the curved side surface of the half-part (120) via a hole (121a) coaxial with the longitudinal direction (X-X).
8. Device according to Claim 2, **characterized in that** said half-part (120) has a second seat (122) arranged along a horizontal surface tangential to the said longitudinal seat (121).
9. Device according to Claim 8, **characterized in that** said second seat (122) extends towards the inside of the half-part (120) only over a short axial section.
10. Device according to Claim 1, **characterized in that** said gear mechanism (200) comprises a toothed wheel (210) which has teeth (211) extending from one side of the wheel parallel to the axis of rotation (Y-Y) thereof and along the entire circumference of the wheel.
11. Device according to Claim 10, **characterized in that** said toothed wheel has an actuating seat (212) formed on the side of the wheel opposite to that of the teeth (211).
12. Device according to Claim 11, **characterized in that** said actuating seat (212) has a profile shaped in accordance with one or more cross-like/hexagonal or similar profiles of corresponding actuating spanners.
13. Device according to Claim 10, **characterized in that** said gear mechanism (200) comprises a toothed wheel (221) which is annularly formed on the external surface of a coaxial tube (222).
14. Device according to Claim 13, **characterized in that** said tube (222) has an internal cross-section formed as longitudinal splines suitable for coaxial engagement with a corresponding part of the spin-

dle (300).

15. Device according to Claim 14, **characterized in that** said coaxial engagement between the tube (222) and a corresponding part of the spindle (300) is suitable for preventing relative rotation of the two parts and allowing relative displacement thereof. 5
16. Device according to Claim 13, **characterized in that** said toothed wheel (221) is axially arranged at a certain distance from the edge of the tube (222) so as to define an axial section (222a) thereof suitable for coaxial insertion in said first longitudinal seat (111) of the half-part (10). 10
17. Device according to Claim 1, **characterized in that** said spindle (300) comprises a central section (310) provided with a thread (310a), a first shank (320) extending longitudinally from one side of the said central section and having a cross-section suitable for engagement with a corresponding splined seat (223) of the tube (222) and a second shank (330) extending on the opposite side to the first shank (320), relative to the central section (310). 15 20 25
18. Device according to Claim 17, **characterized in that** the free end part of said first shank (320) is formed in the manner of a hexagon.
19. Device according to Claim 1, **characterized in that** it comprises a member (403) which can be engaged with the foot (400). 30
20. Device according to Claim 1, **characterized in that** said sleeve (500) has a section of its internal surface which is smooth and has an internal diameter slightly greater than the external diameter of the shank (401) of the foot (400) so as to allow coaxial insertion of the latter inside the former. 35 40

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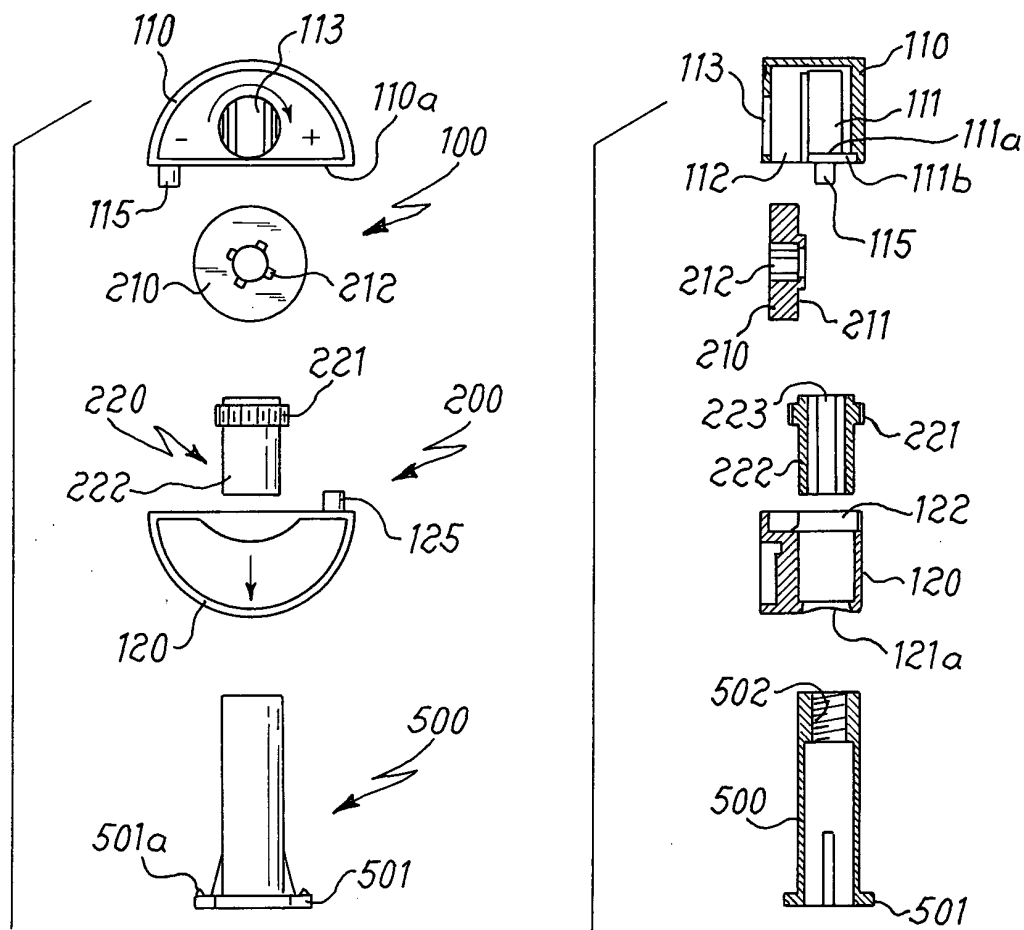


Fig. 1

Fig. 2

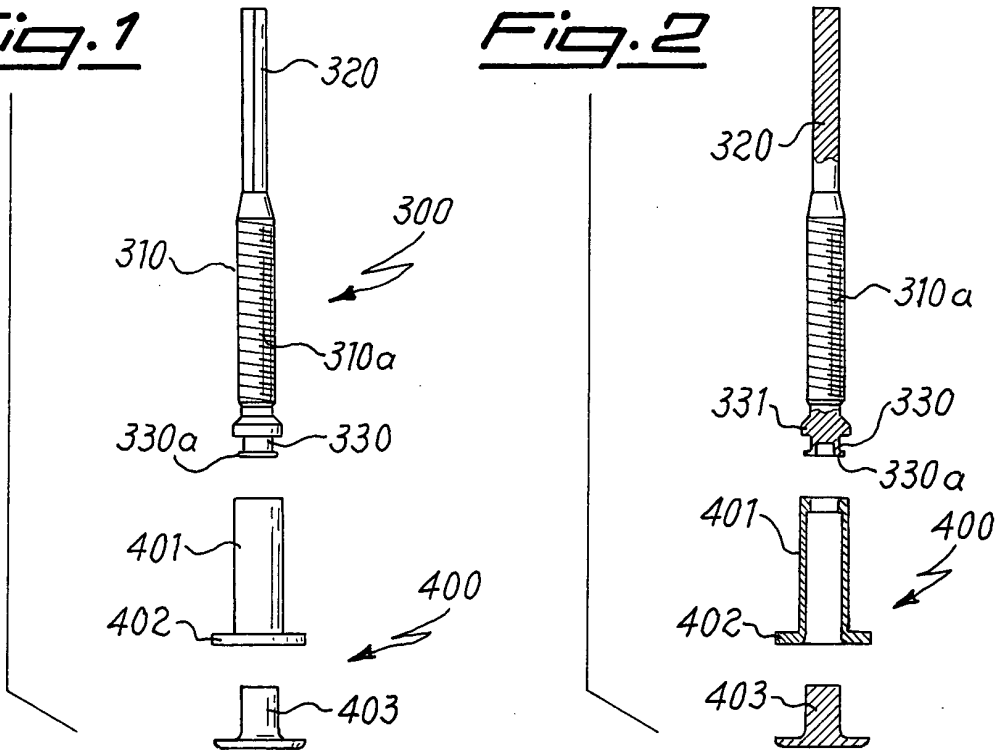


Fig. 3

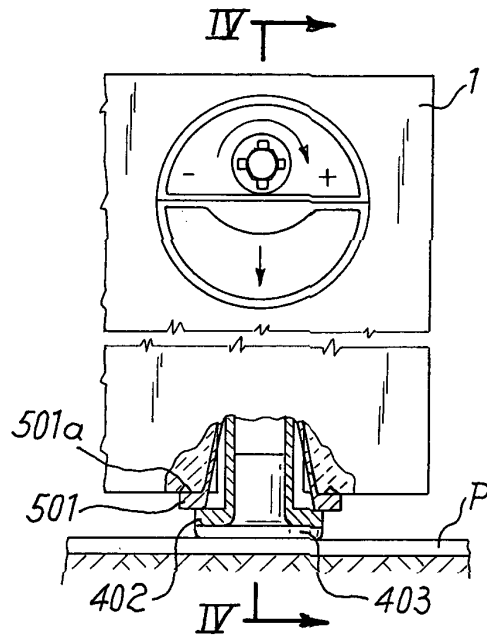


Fig. 4

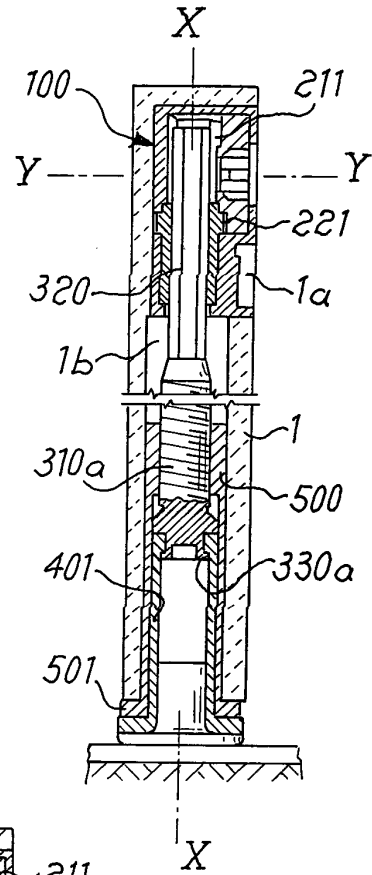


Fig. 5

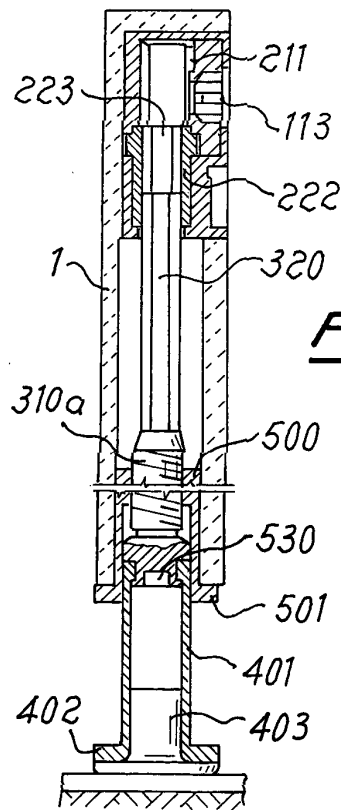
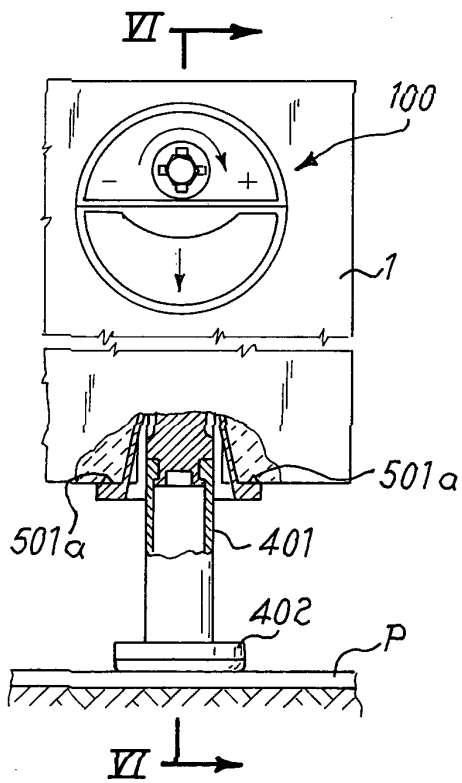


Fig. 6



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 05 07 5291

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.7)
X	EP 0 503 701 A (CAMAR SPA) 16 September 1992 (1992-09-16) * the whole document * -----	1-20	A47B91/02
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			A47B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 May 2005	Examiner Noesen, R
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 05 07 5291

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