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(54) **Leveller device for furniture**

(57) There is described a levelling device, in particular for furniture intended for being hung on a plurality of hooks (40) provided in a wall (35) comprising a support (2) intended for being recessed in a predetermined portion (34) of a piece of furniture and a box-shaped body (3) turnably inserted in said support (2) so as to be angularly movable about an axis (Y), said box-shaped body having an aperture (11) facing outwards of said piece of furniture for receiving a hook (40) in a seat (30) inside said box-shaped body (3) and said aperture (11) having a substantially spiral cam-shaped profile (19).

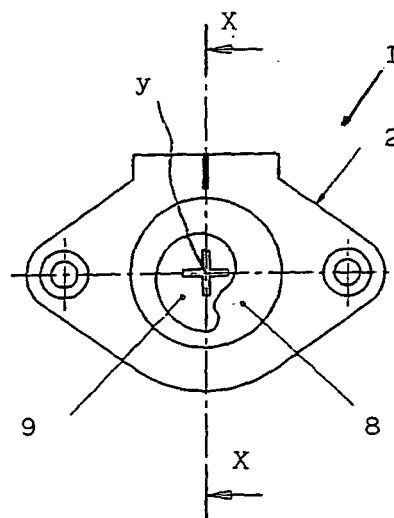


Fig. 1

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Description

Field of application

[0001] In the most general aspect thereof, the present invention relates to a levelling device for furniture.

[0002] In particular, the present invention relates to a levelling device for suspended furniture, that is to say, a levelling device of the type adapted for positioning a piece of furniture hung on hooks provided on a wall in a secure and horizontal manner.

Prior art

[0003] It is well known that in the scope of fastening a piece of furniture to appropriate hooks provided on a wall, there is the problem of compensating any differences in height between portions of the piece of furniture (for example, between a left portion and a right portion) due to the fact that such hooks are difficult to fasten to the wall at exactly the same height.

[0004] Several levelling devices have therefore been developed in the prior art to be associated to the furniture that cooperate with corresponding hooks fastened to a wall so as to bring said furniture to a horizontal position.

[0005] Such levelling devices generally comprise a pair of brackets fastened into predetermined portions of a rear panel or back of a piece of furniture that engages with respective hooks fastened to a wall on which such piece of furniture is to be located.

[0006] The position of the above brackets and therefore of the corresponding portions of the piece of furniture is adjusted by an operator by suitable screw devices associated to said brackets that act thereon so as to move them vertically, in a raising or sloping manner according to the needs.

[0007] Even though they are satisfactory from the functional point of view, the above levelling devices exhibit several disadvantages.

[0008] First, they are constructively quite complex as they require a relatively high number of parts. Consequently, the production costs of such levelling devices are high and the assembly times are relatively long.

[0009] Moreover, the above levelling devices have certain overall dimensions, so that after assembly, visible portions are left that negatively affect the aesthetic effect of the piece of furniture said devices are associated to.

Summary of the invention

[0010] The technical problem at the basis of the present invention is therefore that of providing a levelling device for suspended furniture which overcomes the disadvantages mentioned above with reference to the prior art.

[0011] Such problem is solved by a levelling device, in particular for furniture intended for being hung on a plurality of hooks provided in a wall comprising a support

intended for being recessed in a predetermined portion of a piece of furniture and a box-shaped body turnably inserted in said support so as to be angularly movable about an axis, said box-shaped body having an aperture facing outwards of said piece of furniture for receiving a hook in said seat inside said box-shaped body and said aperture having a substantially spiral cam-shaped profile.

[0012] The features and advantages of present invention will appear more clearly from the following description of a levelling device for furniture according to a preferred embodiment made by way of an indicative nonlimiting example with reference to the annexed drawings.

Brief description of the drawings

[0013] In such drawings:

- figure 1 shows a front view of a levelling device according to the present invention,
- figure 2 shows a section of the levelling device of figure 1 traced along the lines of trace X-X,
- figure 3 shows a front view of a detail of the device of figure 1,
- figure 4 shows a section of the detail of figure 3 taken along the lines of trace A-A,
- figure 5 shows a front view of another detail of the levelling device of figure 1,
- figure 6 shows a section of the detail of figure 5 taken along the lines of trace B-B,
- figure 7 shows an enlargement of a detail of the section shown in figure 6,
- figure 8 shows a side view of the detail of figure 5,
- figure 9 shows a front view of the detail of figure 5 taken from opposite angle,
- figure 10 shows a front view of a further detail of the levelling device of figure 1,
- figure 11 shows a section of the detail of figure 10 taken along the lines of trace C-C,
- figure 12 shows an enlargement of a detail of the section shown in figure 11,
- figure 13 shows a front view of the levelling device of figure 1 mounted on the back of a piece of furniture, said view being taken from the outside of said back of the piece of furniture,

- figure 14 shows a front view of the levelling device of figure 1 mounted on the back of a piece of furniture, said view being taken from the inside of said back of the piece of furniture,
- figure 15 shows a section view of a levelling device according to the invention applied to a piece of furniture fastened to a wall,
- figures 16 to 19 show the levelling device of figure 1 in different adjustment positions.

Detailed description of a preferred embodiment

[0014] With reference to the above figures, reference numeral 1 globally denotes a levelling device for furniture according to the present invention.

[0015] The levelling device 1 comprises a support globally indicated with reference numeral 2 and a box-shaped body globally indicated with reference numeral 3. The box-shaped body 3 is turnably inserted in support 2 so as to be angularly movable about an axis Y as will be better explained hereinafter.

[0016] More in particular, the support 2 comprises a substantially cylindrical sleeve 4 provided with a flange 5 having a substantially central aperture 6 and two opposite peripheral slots 7 for the passage of fastening screws 38 as better explained hereinafter.

[0017] The box-shaped body 3 comprises a substantially cylindrical cup 8 and a cover 9.

[0018] The cup 8 exhibits a wall 10 having an aperture 11 and a skirt 12. The skirt 12 exhibits a first portion 13 that extends from said wall 10 and is externally provided with axial knurls 14 and a second portion 15 or end portion free of knurls 14 at which a plurality of slots 16 is formed. A collar 17 is further provided on the outer side of the skirt 12 between said first portion 13 and said second portion 15.

[0019] In accordance with the present invention, the aperture 11 of the cup 8 exhibits a substantially spiral cam-shaped profile 19.

[0020] More in particular, said spiral cam profile 19 exhibits a portion 19a with variable radius between a maximum radius R1 and a minimum radius R2 for an angular movement of predetermined width smaller than a round angle. The portion 19a is joined to a step profile 19b that completes said spiral cam profile 19.

[0021] In a preferred embodiment of the invention, the maximum radius R1 is comprised within the range of 8-12 mm, the minimum radius R2 is comprised within the range of 2-6 mm and the angle of said predetermined angular width is of about 300°.

[0022] The cover 9 comprises a cut 21 in a substantially central position, in the example shown in the figures it is a cross cut, for the introduction of a tool for manoeuvring the box-shaped body 3, in the example a bit of a screwdriver. The cover 9 further comprises a plurality of teeth 22 protruding from the edge thereof and formed in the

same number as that of slots 16 of the cup 8.

[0023] In the levelling device 1 according to the invention, the cup 8 and the cover 9 are constrained together by engagement of teeth 22 of the cover 9 in the corresponding slots 16 of the cup 8, thus obtaining the above box-shaped body 3.

[0024] In the levelling device 1 according to the invention, the box-shaped body 3 is inserted into the sleeve 4 of the support 2 with the aperture 11 of the cup 8 facing the central aperture 6 of the flange 5.

[0025] More in particular, the box-shaped body 3 and the related support 2 are made axially integral with one another by engagement of the collar 17 of the box-shaped body 3 in an annular recess 23 internally formed on the sleeve 4 of the support 2 in the proximity of the edge of said sleeve 4.

[0026] In accordance with the invention, the box-shaped body 3 is angularly movable in the sleeve 4 of the support 2 when said box-shaped body 3 is actuated by said manoeuvring tool overcoming the friction existing between the inner walls of the sleeve 4 and the knurl 14 on the skirt 12. Said friction also allows keeping the box-shaped body 3 firmly in position 3 into the sleeve 4 of the support as soon as the rotation of the box-shaped body 3 exerted through the manoeuvring tool is interrupted.

[0027] The support 2 is preferably made of a plastic material that offers the advantage of a good deformability, facilitating the introduction of the box-shaped body 3 into the sleeve 4.

[0028] The cup 8 and the related cover 9 that together form the box-shaped body 3 are preferably made of a metal material that offers advantages of higher sturdiness.

[0029] The levelling device 1 according to the invention is recessed into a piece of furniture with the aperture 11 facing outwards of the piece of furniture so as to receive a hook 40 fastened to a wall in a seat 30 inside the box-shaped body 3 wherein said hook 40 supports the levelling device 1 and said piece of furniture.

[0030] In accordance with a preferred embodiment of the present invention, the levelling device 1 further comprises stopping means for limiting the angular movement of the box-shaped body 3 relative to the hook 40 associated thereto along the variable radius portion 19a between the maximum radius R1 and the minimum radius R2.

[0031] The above stopping means is a tooth 33 formed on the cover 9 and integral in rotation with the box-shaped body 3 and a fixed counter tooth 32 formed on the sleeve 4 as extension thereof and having a predetermined angular width, said tooth 33 and said counter tooth 32 being placed in phase with one another so as to be opposed to each other in a first stopping position 50 wherein the hook 40 interacts with the portion 19a of the cam profile 19 in the maximum radius R1 zone and in a second stopping position 51 that can be reached from said first stopping position 50 by angularly moving the box-shaped body 3 relative to the hook 40 along the variable radius

portion 19a wherein the hook 40 interacts with the portion 19a of the cam profile 19 in the minimum radius R2 zone.

[0032] In this way, during the angular movement of box-shaped body 3, the hook 40 is prevented from being forced to cross the step profile 19b which would cause a sudden jump of the piece of furniture.

[0033] As can be better seen in figure 16, the first stopping position 50 will correspond to a maximum vertical distance D between the hook 40 and the rotation axis Y of the box-shaped body 3 and thus the lowest adjustment position of the piece of furniture which the levelling device 1 is associated to.

[0034] On the other hand, as can be better seen in figure 19, the second stopping position 51 achieved after angularly moving the box-shaped body 3 from the first stopping position 50 by an angle θ_3 smaller than the round angle (in the example, θ_3 is about 300°) will correspond to a minimum vertical distance G between the hook 40 and the rotation axis Y of the box-shaped body 3 and thus the highest adjustment position of the piece of furniture the levelling device 1 is associated to.

[0035] In figures 17 and 18, there are shown two intermediate adjustment positions of levelling device 1 obtained by angularly moving the box-shaped body 3 from the first stopping position by a predetermined angle θ_1 and θ_2 , both smaller than θ_3 . In the example, θ_1 is about 100° and θ_2 is about 200° .

[0036] The levelling device 1 according to the invention further comprises a small-sized tooth 41 formed on the sleeve 4 in the proximity of the above stopping position of the tooth 33 of the cover 9 against the counter tooth 32 of the sleeve 4. Such tooth 41 essentially has a function of a reference mark in the assembly of the box-shaped body 3 into the sleeve 4 so that the tooth 33 is brought in the above first stopping position 50. Such tooth 41 is easily surmounted by the tooth 33 of the cover 9 during the angular movement of box-shaped body 3 from said first stopping position 50 towards said second stopping position 51.

[0037] As regards the assembly of the levelling device 1 and the application thereof to a piece of furniture, it should be noted that these operations are quite simple and do not necessarily require specialised personnel.

[0038] Firstly, the cup 8 and the cover 9 are constrained to one another by engagement of the teeth 22 of the cover 9 into the corresponding slots 16 of the cup 8, thus obtaining the above box-shaped body 3. Then, the box-shaped body 3 and the related support 2 are axially constrained to one another by engaging the collar 17 of the box-shaped body 3 into the inner annular recess 23 of the sleeve 4 while moving the tooth 33 of the cover 9 to the first stopping position 50.

[0039] Then, a pair of levelling devices 1 according to the invention is applied to predetermined zones of a portion 34 of a piece of furniture so as to cooperate with a corresponding pair of hooks 40 previously fastened to a wall 35.

[0040] The portion 34 of the piece of furniture normally

is a rear panel or back thereof. The hooks 40 are normally fastened to wall 35 in a conventional manner, for example by a screw anchor 36.

[0041] The figures 13 to 15 show the application of a single levelling device according to the invention on said portion 34 of the piece of furniture. Such levelling device 1 previously assembled with the box-shaped body 3 already inserted in the sleeve 4 of the support 2 as described above, is recessed into a hole 37 previously made on said portion 34 of the piece of furniture so as to have the flange 5 facing outwards of the piece of furniture. The levelling device 1 is then fastened to the piece of furniture by a pair of screws 38 passing through the slots 7 of the flange 5.

[0042] At this point, the piece of furniture is hung on hooks 40 making them pass through apertures 11 of the levelling devices 1 so as to locate into the respective seats 30 of box-shaped body 3. Since the box-shaped body 3 of the levelling devices 1 is with the tooth 33 in the above first stopping position 50, the hooks 40 will support the piece of furniture interacting with the portion 19a of the cam profile in the maximum radius zone R1. As a consequence, the piece of furniture will be in the lowest adjustment position.

[0043] To arrange the piece of furniture on the wall horizontally it is therefore sufficient to adjust the position of the box-shaped body 3 of devices 1 angularly moving it according to the needs from the interior of the piece of furniture with a screwdriver acting into the cut 21 of the cover 9.

[0044] Once the box-shaped body 3 has been positioned in the desired position, such position is kept thanks to the friction between the inner walls of the sleeve 4 and the knurl 14 on the skirt 12.

[0045] The main advantages of the levelling device according to the invention lie in the easiness of assembly, in the simplicity of adjustment and reliability. In fact, the assembly requires few operations totally within the reach of non-specialised personnel, too. The adjustment can be made simply with a manoeuvring tool, such as a screwdriver acting on the box-shaped body of the device according to the invention. The friction between the knurls 14 of the skirt 12 with the inner walls of the sleeve 4 allows keeping the box-shaped body 3 firmly in position, to the advantage of the reliability of device 1 according to the invention.

[0046] A further advantage of the levelling device lies in its simplicity and easiness of construction which implies limited costs as a limited number of components is required for each device.

[0047] Another advantage of the levelling device according to the invention lies in its reduced overall dimensions, limited to few centimetres. To this purpose, it should be noted that with a suitable thickness of the piece of furniture back it is possible to form a hole opened outwards of suitable dimensions for the recess of the levelling device according to the invention and a hole opened inwards of the piece of furniture of very small dimensions,

that is, as needed to access the adjustment with a manoeuvring tool (such as a screwdriver). In this way, the portions of the levelling device according to the invention left visible will be minimal to the advantage of the aesthetic effect of the piece of furniture. It is also possible to provide for a coverage within the piece of furniture for the above small-sized hole, for example a closing cap, thus making the levelling device substantially "retractable" into the piece of furniture itself.

[0048] It is clear that a man skilled in the art may make several changes and variations to the levelling device according to the invention in order to meet specific and incidental needs, all falling within the scope of protection of the annexed claims.

Claims

1. A levelling device, in particular for furniture intended for being hung on a plurality of hooks (40) provided in a wall (35) comprising a support (2) intended for being recessed in a predetermined portion (34) of a piece of furniture and a box-shaped body (3) turnably inserted in said support (2) so as to be angularly movable about an axis (Y), said box-shaped body having an aperture (11) facing outwards of said piece of furniture for receiving a hook (40) in a seat (30) inside said box-shaped body (3) and said aperture (11) having a substantially spiral cam-shaped profile (19). 20
2. A levelling device according to claim 1, wherein said aperture (11) having a spiral cam profile (19) exhibits a portion (19a) with variable radius between a maximum radius (R1) and a minimum radius (R2) for an angular movement of predetermined width smaller than a round angle. 25
3. A levelling device according to claim 2, wherein the angle of said predetermined width of the angular movement is equal to about 300°. 30
4. A levelling device according to claim 2 or claim 3, wherein said minimum radius (R2) is comprised within the range of 2-6 mm and said maximum radius (R1) is comprised within the range of 8-12 mm. 35
5. A levelling device according to any one of the previous claims, wherein said support (2) comprises a substantially cylindrical sleeve (4) provided with a flange (5), said sleeve (4) being intended for being recessed into the predetermined portion (34) of a piece of furniture. 40
6. A levelling device according to any one of the previous claims, wherein said box-shaped body (3) comprises a substantially cylindrical cup (8) and a cover (9), said cup (8) having a wall (10) wherein said aperture (11) having a spiral cam profiled is formed, and a skirt (12). 45
7. A levelling device according to claim 6, wherein said skirt (12) exhibits a portion (13) that extends from said wall (10) and is externally provided with axial knurls (14), an end portion (15) free of knurls (14) at which a plurality of slots (16) is formed and a collar (17) on the outer side of said skirt (12) between said portion (13) that extends from said wall (10) and said end portion (15). 50
8. A levelling device according to claim 6 or 7, wherein said cover (9) comprises a plurality of teeth (22) protruding from the edge thereof engaged in said slots (16) of the cup (8) and a cut (21) for the engagement of a manoeuvring tool of said box-shaped body (3). 55
9. A levelling device according to any one of claims 6 to 8, further comprising stopping means (32, 33) for limiting the angular movement of the box-shaped body (3) relative to said hook (40) along said portion (19a) with variable radius between the maximum radius (R1) and the minimum radius (R2).
10. A levelling device according to claim 9, wherein said stopping means (32, 33) comprises a mobile tooth (33) formed on said cover (9) of the box-shaped body (3) and a fixed counter tooth (32) formed on said sleeve (4) of predetermined angular width, said mobile tooth (33) and said fixed counter tooth (32) being placed in phase with one another so as to opposed one another in a first stopping position (50) wherein said hook (40) interacts with said portion (19a) of the cam profile (19) in the maximum radius zone (R1) and in a second stopping position (51), that can be achieved from said first stopping position (50) by angularly moving said box-shaped body (3) relative to the hook (40) along said variable radius portion (19a) by said predetermined angular width smaller than the round angle, wherein said hook (40) interacts with said portion (19a) of the cam profile (19) in the minimum radius (R2) zone.
11. A levelling device according to any one of the previous claims, wherein said support (2) is of a plastic material and said box-shaped body (3) is of a metal material.

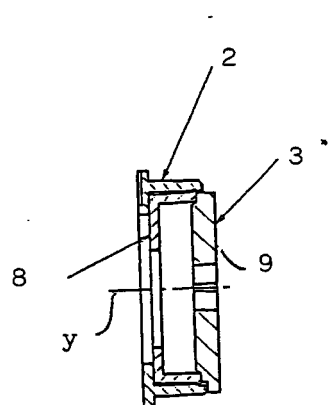


Fig. 2

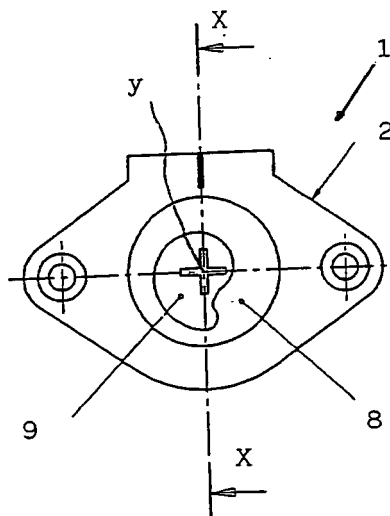


Fig. 1

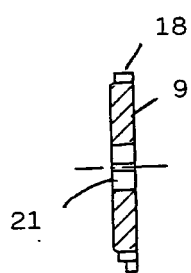


Fig. 4

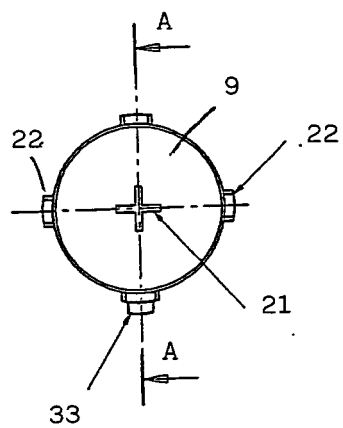


Fig. 3

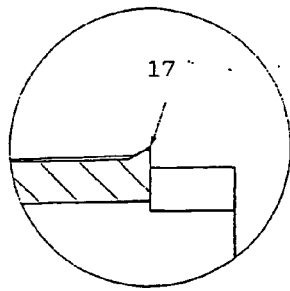


Fig. 7

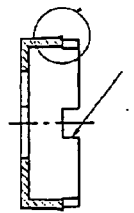


Fig. 6

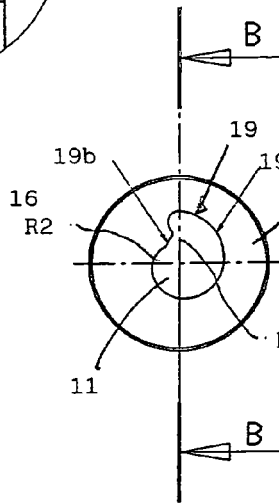


Fig. 5

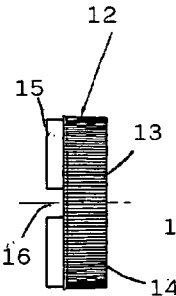


Fig. 8

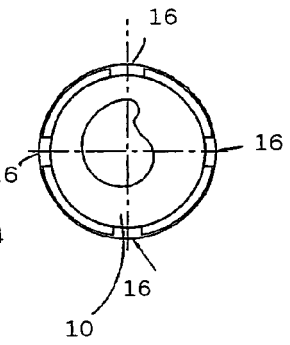


Fig. 9

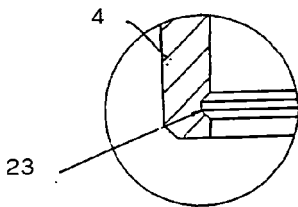


Fig. 12

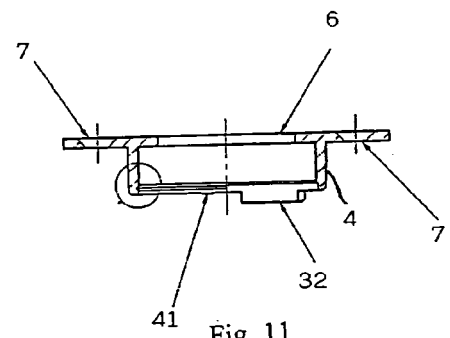


Fig. 11

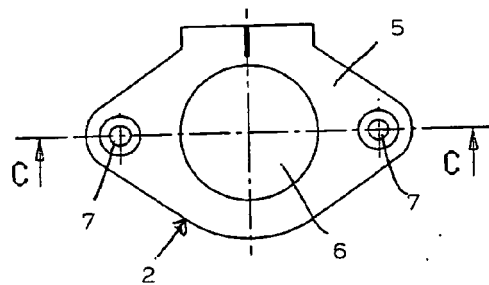


Fig. 10

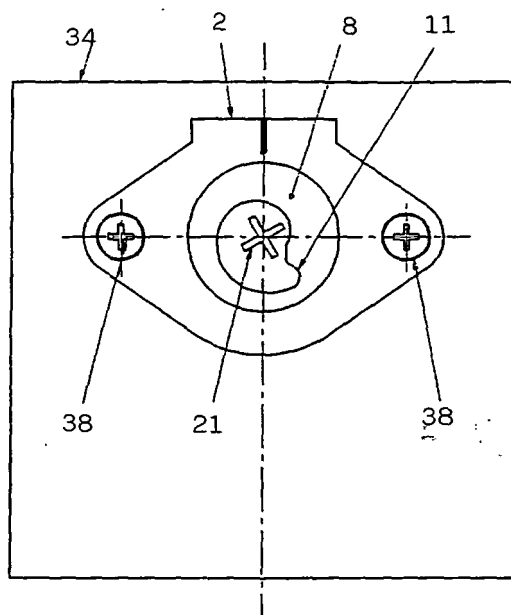


Fig. 13

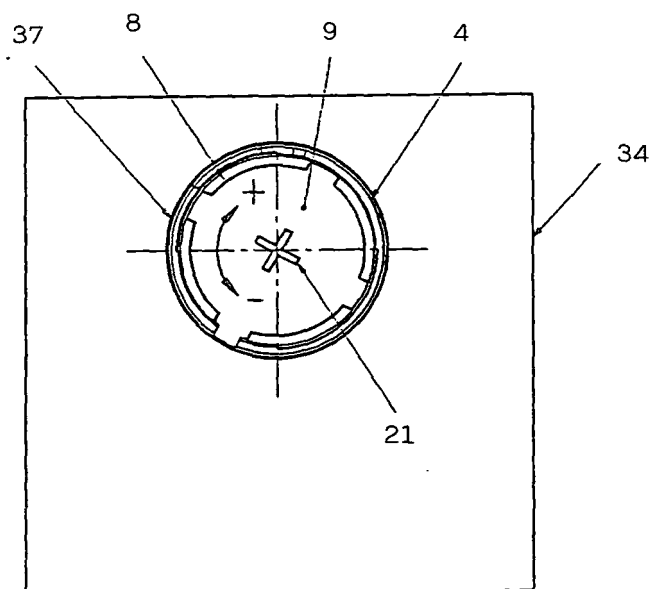


Fig. 14

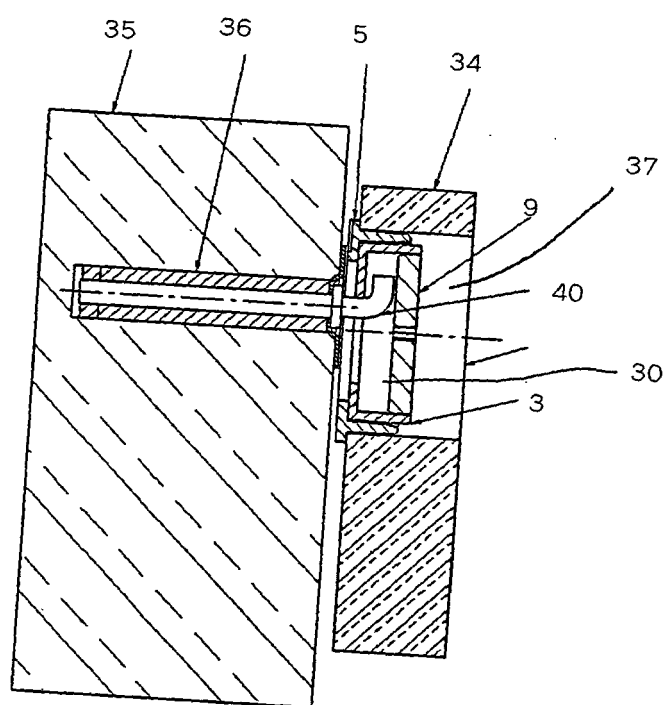


Fig. 15

Fig. 16

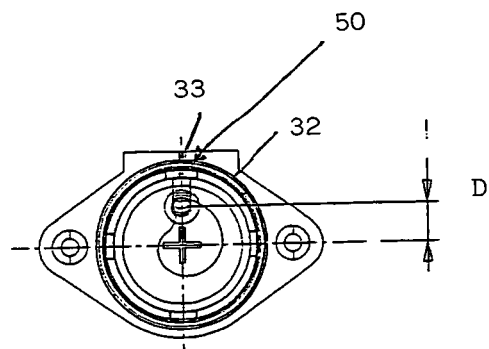


Fig. 17

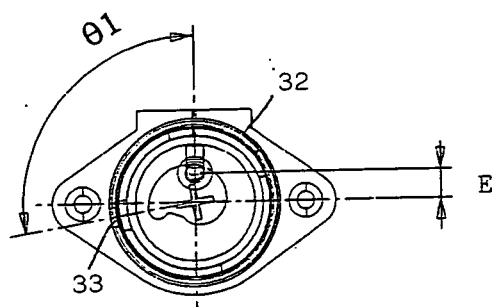


Fig. 18

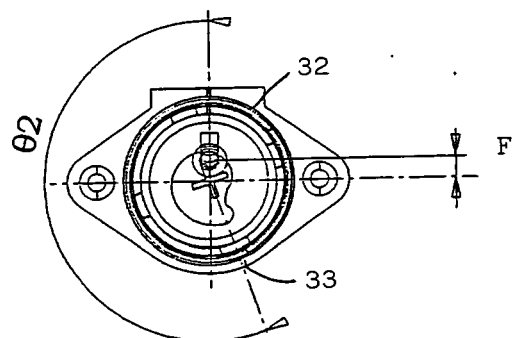
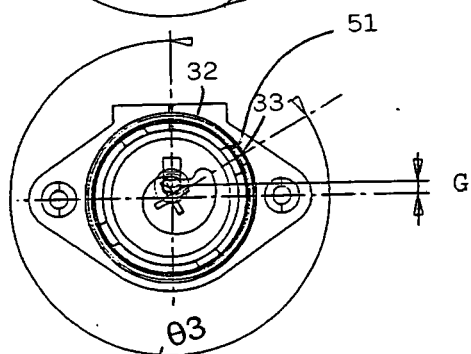


Fig. 19





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 06 00 9793

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 18 64 110 U (GESELLSCHAFT FUER PATENTVERWERTUNG UND BETEILIGUNG G.M.B.H) 20 December 1962 (1962-12-20) * figures *	1-11	INV. A47B95/00
A	DE 29 42 946 A1 (RICHARD HEINZE GMBH & CO KG; RICHARD HEINZE GMBH & CO KG, 4905 SPENGE,) 26 March 1981 (1981-03-26) * figures *	1-11	
A	DE 26 01 501 A1 (E-NORM BESCHLAG GMBH & CO KG) 28 July 1977 (1977-07-28) * figures *	1-11	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 5 September 2006	Examiner Ottesen, R
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 00 9793

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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05-09-2006

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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DE 2942946	A1	26-03-1981	DE 7930056 U1	24-01-1980
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