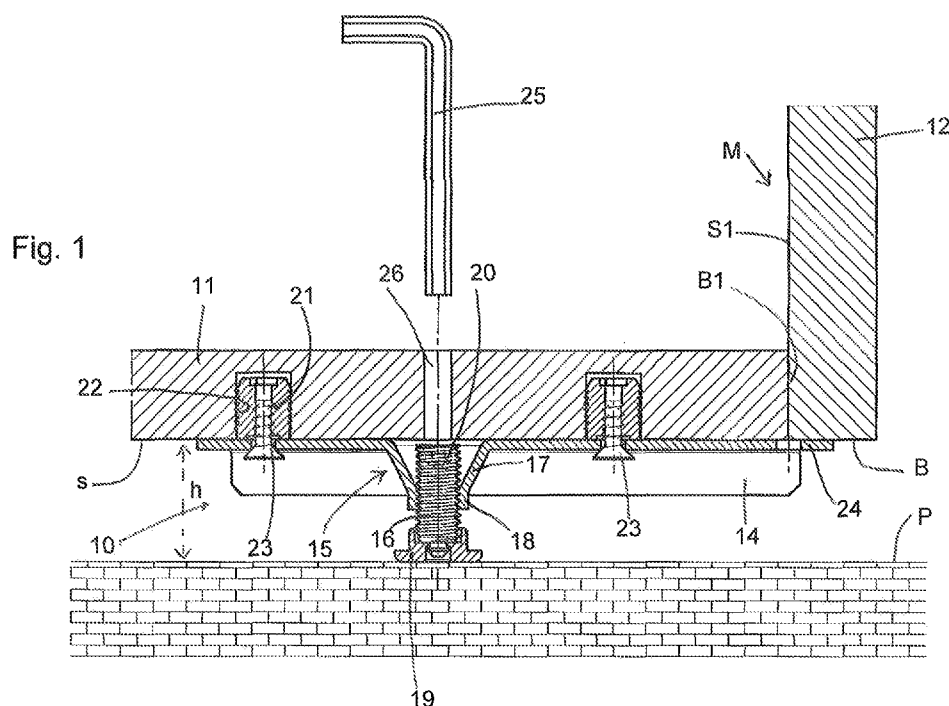




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- (71) Applicant: LEONARDO S.R.L. [IT/IT]; Via Leopardi, 8,
22060 Figino Serenza (CO) (IT).
- (72) Inventor: CATTANEO, Carlo; Via Leonardo da Vinci 5,
22060 Figino Serenza (CO) (IT).
- (74) Agent: MARTEGANI, Franco et al.; Via Carlo Alberto,
41, 20900 Monza (IT).
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(54) Title: LEVELLING DEVICE FOR FURNITURE



(57) Abstract: A levelling device (10,110,210) for levelling a piece of furniture (M), or parts of a piece of furniture, with respect to a supporting plane or floor (P), said piece of furniture (M) being composed of at least one horizontal element or base (11, 111, 211) and at least one vertical element or shoulder (12, 112, 212) which are firmly joined together, perpendicular to each other, with the lower or underlying surface (S) of said base (11, 111, 211) which is substantially coplanar with the lower edge (B) of said shoulder (12, 112, 212) and with the edge (B1) of said base (11, 111, 211) which is abutted against the inner surface (S1) of said shoulder (12, 112, 212), said levelling device being adjustable from above by means of a manoeuvring tool (25, 125, 215) which passes through a pass-through hole (26, 126, 226) formed through said base (11, 111, 211). According to the invention, the levelling device consists of a plate (13, 113, 213) fixed to said surface (S) of the base (11, 111, 211) with a section or flap (24, 124, 224) which extends beyond said edge (B1),



TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

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- *in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE*

so as to support said shoulder (12, 112, 212) which rests on said section or flap (24, 124, 224), a sleeve or seat (15, 115, 215) also extends integrally and downwardly from said plate (13, 113, 213), where it houses movably, backwards and forwards, an adjustable foot (16, 116, 216) that can be manoeuvred by said tool (25, 125, 225).

LEVELLING DEVICE FOR FURNITURE

The present invention relates to a levelling device for a piece of furniture, or for parts of a piece of furniture.

Furniture or pieces of furniture refer to at least one
5 horizontal or base element and at least one vertical or
shoulder element firmly joined together, perpendicular to each
other, whose position must be adjusted with respect to a
supporting surface or floor, even when the space between the
base of the furniture and the floor is small.

10 The levelling device according to the invention is of the
type adjustable from above and from inside the furniture and is
applied to furniture in which the lower or underlying surface
of the base is substantially coplanar with the lower edge of
the shoulder.

15 The general objective of the present invention is to
provide a levelling device having a structure which is such as
to guarantee both the support of the vertical or shoulder
element and an ample height adjustment, with a height equal to,
or even greater than the distance between the base and the
20 floor.

A further objective of the invention is to provide a
levelling device provided with an adjustable foot, which is
stably and safely guided between the two extreme positions,
i.e. fully withdrawn and completely extracted.

25 The above-mentioned objectives are achieved by a levelling

device having the characteristics specified in claim 1 and in the subordinate claims.

The structural and functional characteristics of the invention and its advantages with respect to the known art can
5 be clearly understood from the following description, referring to the attached drawings, which illustrate three possible embodiment examples of the invention itself. In the drawings:

figures 1 and 2 are two vertical sections illustrating a first embodiment of a levelling device applicable to a piece of
10 furniture, or to parts of a piece of furniture in two different operating positions;

figures 3 and 4 are two perspective views from above and below respectively, illustrating the levelling device alone of
figures 1 and 2;

15 figures 5 and 6 are two plan views from above and below respectively, illustrating the levelling device of figures 3 and 4;

figure 7 is a raised longitudinal view according to the arrow F of figure 6;

20 figure 8 is a raised cross-sectional view according to the arrow F1 of figure 6;

figures 9 and 10 are two vertical sections illustrating a second embodiment of a levelling device applicable to a piece of furniture, or to parts of a piece of furniture in two
25 different operating positions;

figures 11 and 12 are two perspective views from above and below respectively, illustrating the levelling device alone of figures 9 and 10;

figures 13 and 14 are two plan views from above and below
5 respectively, illustrating the levelling device of figures 11 and 12;

figure 15 is a raised longitudinal view according to the arrow F of figure 14;

figure 16 is a raised cross-sectional view according to the
10 arrow F1 of figure 14;

figures 17 and 18 are two vertical sections illustrating a third embodiment of a levelling device applicable to a piece of furniture or parts of a piece of furniture in two different operating positions.

15 Figures 1 and 2 illustrate a first exemplary and non-limiting embodiment of the invention in which a levelling device 10 is applied to a piece of furniture M which must be levelled with respect to a supporting surface or floor P.

In the drawings only the essential parts of the furniture M
20 are shown, i.e. a horizontal or base element 11 and a vertical or shoulder element 12, perpendicular to each other.

As can be clearly seen from the drawings, the lower or underlying surface S of the base 11 and the lower edge B of the shoulder 12 are substantially coplanar with each other, i.e.
25 they lie on the same plane which is parallel and interspaced

with respect to the floor P.

The base 11 and the shoulder 12 are firmly joined together by means of joining systems of known type (not shown), with the edge B1 of the base 11 abutted against the inner surface S1 of the shoulder 12.

With reference to figures 4-8 of the drawings, the levelling device 10 is structurally composed of a rigid plate 13, for example made of plastic, metal, or other material suitable for the purpose, having a substantially rectangular elongated plan configuration.

Respective reinforcing ribs (skirts) 14 are formed integrally and extend downwards at 90° from the longitudinal edges of the plate 13.

According to the invention, a sleeve or seat 15 extends downwards, integrally from the plate 13, from its underlying surface, in which a threaded adjustable foot 16 is housed, of a type known *per sé*, said foot 16 being movable backwards and forwards within said seat 15.

Said seat 15 has a first truncated-conical section 17, extending from the plate 13 which ends with a second cylindrical section 18, internally threaded, on which the above-mentioned foot 16 is threaded externally.

The foot 16 can be optionally provided at the outer end with a pad 19 for resting on the floor P, and at the inner end, opposite the pad 19, said foot 16 is provided with a run-end

stop 20 of the thread to prevent the downward extraction of the foot 16 itself from its seat 15.

The plate 13 is also provided with fixing means 21 which extend upwards in a position opposite to the seat 15, and which
5 serve for firmly fixing the levelling device 10, under the base 11, as clearly illustrated in the drawings.

Said fixing means 21 can, for example, be those known in the field as "doubels", which are radially yielding and which are forcibly pressed into complementary holes 22 and are
10 expanded radially by means of an expansion screw 23, so as to cling permanently to the base 11.

As can be clearly seen from the drawings, in the example illustrated, there are two of said fixing means 21 which are arranged laterally, at a certain distance from the seat 15 of
15 the adjustable foot 16.

In particular, figures 5 and 6 of the drawings clearly show how the seat 15 of the adjustable foot 16 and the fixing means 21 are aligned along the same longitudinal symmetry axis X-X of the plate 13.

20 The fixing means 21 are interspaced by an equal distance d from the symmetry axis Y-Y of the seat 15, said axis Y-Y however being offset (eccentric) with respect to the transverse symmetry axis Z-Z of the plate 13.

In this way, a section or flap 24 is defined on the plate
25 13 which protrudes from the base 11, the lower edge B of the

shoulder 12 resting, at least partially, on said section 24 (figures 1 and 2) when the levelling device 10 is fixed under the base 12, in an operating position.

The levelling device 10 can be operated from above using a
5 key 25 which, passing through a pass-through hole 26 of the base 12 engages with the upper free end of the foot 16 with a corresponding imprint.

In this way, the foot 16 can be screwed into its threaded seat 15 between the fully withdrawn (figure 1) and completely
10 extracted (figure 2) extreme positions; the distance h between the base 11 and the floor P can therefore be varied/adjusted, according to the stability requirements of the furniture M .

The pass-through hole 26 is coaxial with the foot 16 and with the seat 15 and has a diameter slightly greater than the
15 cross-section of the key 25.

In other words, the axes of the seat 15, of the adjustable foot 16 and of the pass-through hole 26, coincide.

The number 27 indicates an aesthetic hole-covering cap.

In the embodiment of the invention illustrated in figures
20 1-8 the internal end of the adjustable foot 16, and its completely withdrawn position, is substantially adjacent to the lower surface S of the base 11, i.e. it can in no way penetrate within said base 11.

The extension of the adjustment is consequently
25 substantially equal to the height h .

Figures 9-16 illustrate a second exemplary embodiment of a levelling device incorporating the innovative principles of the present invention.

In this second embodiment of the invention illustrated in 5 figures 9-16, components. The same as or substantially equivalent to those illustrated in figures 1-8, are indicated with the same reference numbers increased by 100.

The only significant difference between the two embodiments is that the second embodiment offers a greater height 10 adjustment than the first embodiment, thanks to the fact that the adjustable foot 116 can penetrate a pass-through hole 126 of the base 111. For this purpose, said hole 126 has a slightly larger diameter than that of the adjustable foot 116, as can be clearly seen from figures 9 and 10 of the drawings.

15 Another difference is that the levelling device 110 of this embodiment of the invention is fixed to the base 111 only by means of screws 128, there being no "doubels".

Figures 17 and 18 illustrate a third exemplary embodiment of a levelling device incorporating the innovative principles 20 of the present invention.

In this third embodiment of the invention illustrated in figures 17 and 18, components the same as or substantially equivalent to those illustrated in figures 1-16 are indicated with the same reference numbers increased by 200.

25 This third embodiment of the invention differs from the

first two embodiments in that the seat 215 of the adjustable foot 216 consists of the truncated-conical section 217 alone, the cylindrical end section being absent.

Consequently, in order to allow the adjustable foot 216 to
5 be moved downwards and viceversa (forwards and backwards) between the two positions shown in figures 17,18, the end edge of said truncated-conical section 217 is threaded, and the adjustable foot itself 216 is screwed onto said edge.

The objectives mentioned in the preamble of the description
10 have thus been achieved.

The protection scope of the present invention is defined by the enclosed claims.

CLAIMS

1. A levelling device (10,110,210) for levelling a piece of furniture (M), or parts of a piece of furniture, with respect to a supporting plane or floor (P), said piece of furniture (M) being composed of at least one horizontal element or base (11,111, 211) and at least one vertical element or shoulder (12,112, 212) which are firmly joined together, perpendicular to each other, with the lower or underlying surface (S) of said base (11,111, 211) which is substantially coplanar with the lower edge (B) of said shoulder (12,112, 212) and with the edge (B1) of said base (11,111, 211) which is abutted against the inner surface (S1) of said shoulder (12,112, 212), said levelling device being adjustable from above by means of a manoeuvring tool (25,125, 215) which passes through a pass-through hole (26,126, 226) formed through said base (11,111, 211), consisting of a plate (13,113, 213) fixed to said surface (S) of the base (11,111, 211) with a section or flap (24,124, 224) which extends beyond said edge (B1), so as to support said shoulder (12,112, 212) which rests on said section or flap (24,124, 224), a sleeve or seat (15,115,215) also extends integrally and downwardly from said plate (13,113, 213), where it houses movably, backwards and forwards, an adjustable foot (16,116, 216) that can be manoeuvred by said tool (25,125, 225), characterized in that the inner end of the adjustable foot (16,216) in its completely withdrawn position

is substantially adjacent to the lower surface (S) of the base (11,211).

2. The levelling device (10,110) according to claim 1, characterized in that said seat (15,115) has a first truncated-
5 conical section (17,117) extending from the plate (13,113) which ends with a second internally threaded cylindrical section (18,118) onto which the above-mentioned externally threaded foot (16,116) is screwed.

3. The levelling device (10,110,210) according to claim
10 1, characterized in that said seat (15,115,215) consists of a single truncated-conical section (217) extending from the plate (213).

4. The levelling device (10,110,210) according to claim
15 2, characterized in that said foot (16,116,216) is provided with a run-end stop (20,120,220) of the thread.

5. The levelling device (10,110,210) according to claim
1, characterized in that said plate (13,113,213) is provided with fixing means (21,128,221) which extend upwards in a
20 position opposite to the seat (15,115,215) through which the levelling device (10,110,210) is fixed beneath the base (11,111,211).

6. The levelling device (10,210) according to claim 5, characterized in that said fixing means (21,221) consist of "doubels".

25 7. The levelling device (110) according to claim 5,

characterized in that said fixing means (128) consist of screws.

8. The levelling device (10,110,210) according to claim 1, characterized in that said plate (13,113,213) has a substantially rectangular elongated configuration, from whose longitudinal sides respective reinforcing ribs or skirts (14,114,214) extend integrally.

9. The levelling device (10,110,210) according to any of the previous claims, characterized in that there are two of said fixing means (21,128,221) which are arranged laterally, at a certain distance from the seat (15,115,215) of the adjustable foot (16,116,216), said seat (15,115,215) and said fixing means (21,128,221) being aligned along the same longitudinal symmetry axis (X-X) of the plate (13,113,213) and being interspaced by an equal distance (d) from the symmetry axis (Y-Y) of the seat (15,115,215), said symmetry axis (Y-Y), however, being offset (eccentric) with respect to the transverse symmetry axis (Z-Z) of the plate (13,113,213), so that a section or flap (24,124,214) is defined on the plate (13,113,213), which protrudes from the base (11,111,211) whose section (24,124,224) at least partially supports the lower edge (B) of the shoulder (12,112,212) when the levelling device (10,110,210) is fixed beneath the base (12,112,212) in an operational position.

10. The levelling device (110) according to any of the previous claims, characterized in that said adjustable foot

(116) penetrates for a certain length through a pass-through hole (126) of the base (111), the adjustable foot (116) being operated by a manoeuvring tool (125) through said hole (126).

11. The levelling device (10,110,210) according to any of
5 the previous claims, characterized in that the longitudinal
symmetry axes of the seat (15,115,215) of the adjustable foot
(16,116,216) and pass-through holes (26,126,226) are
coincident.

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15

20

Fig. 1

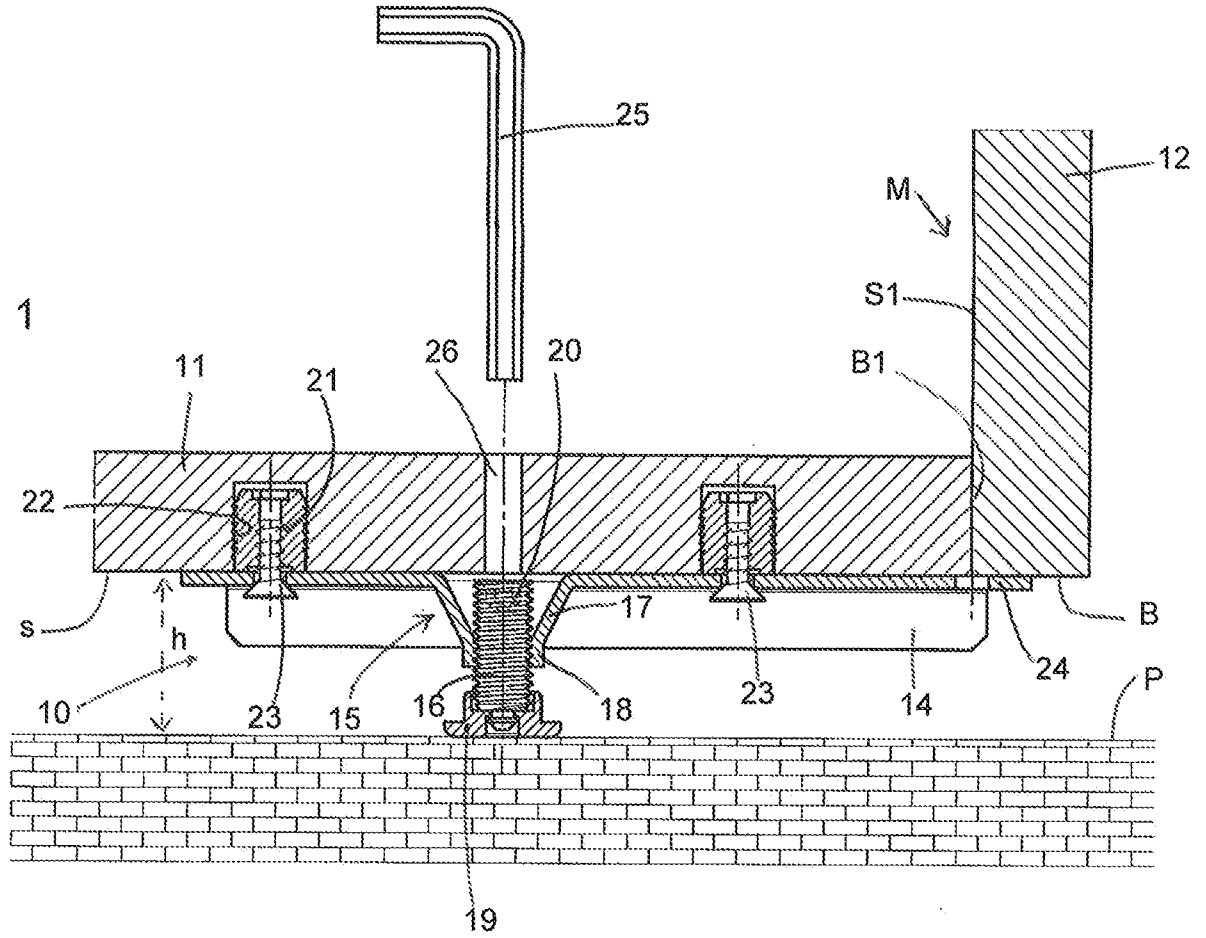
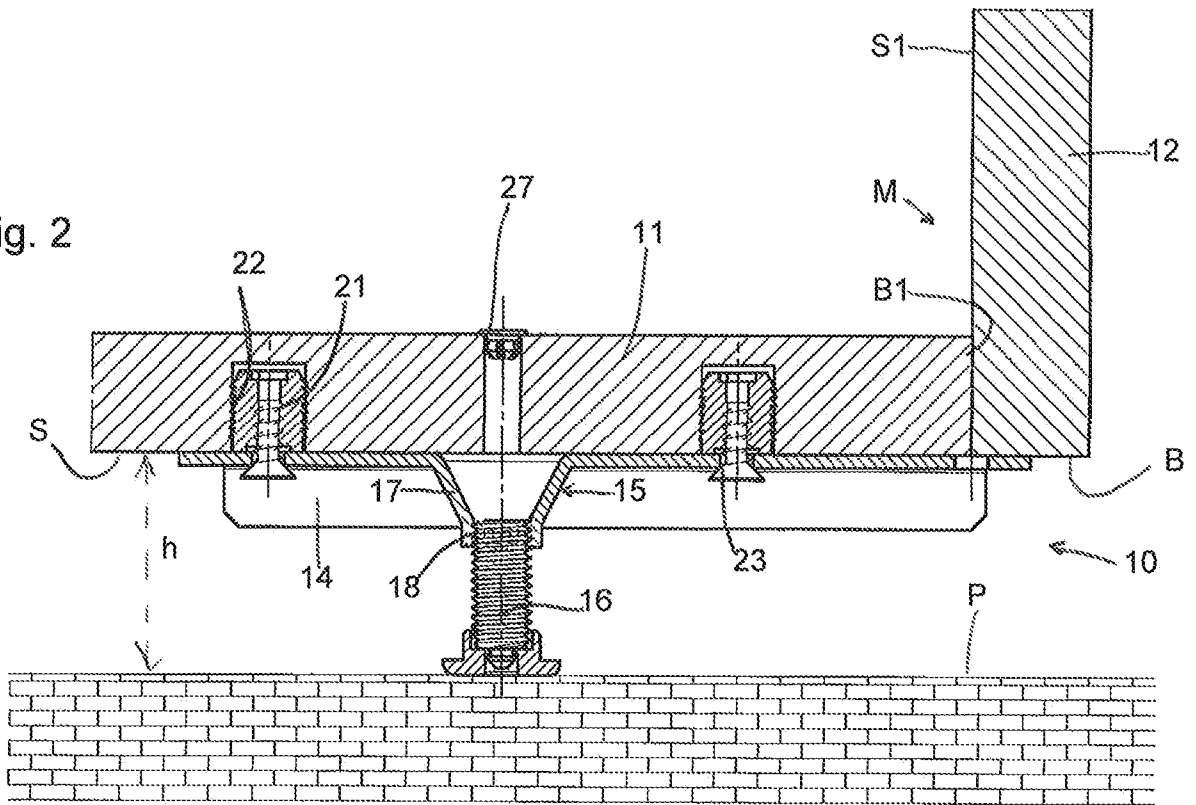


Fig. 2



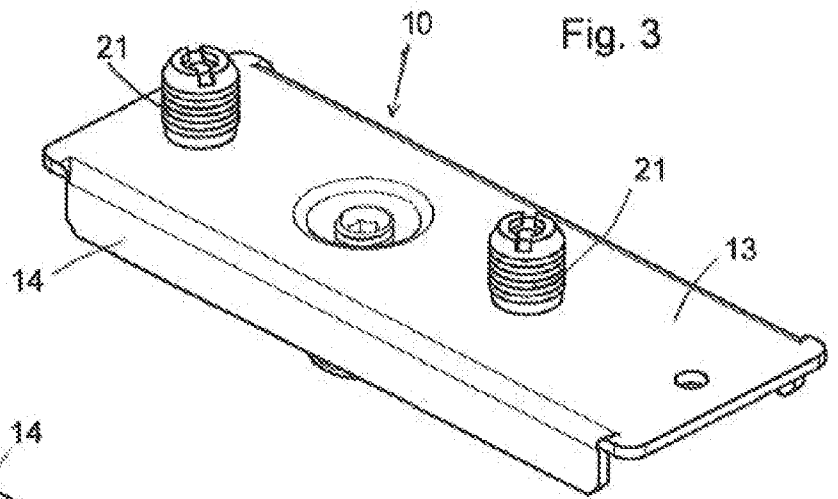


Fig. 3

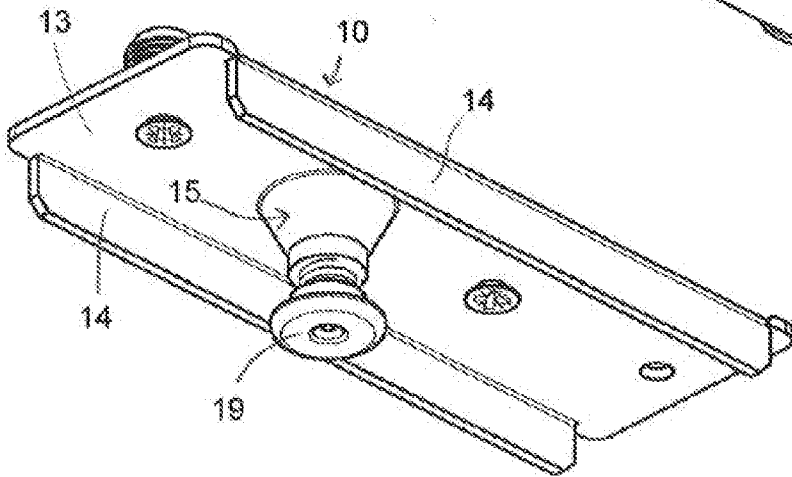


Fig. 4

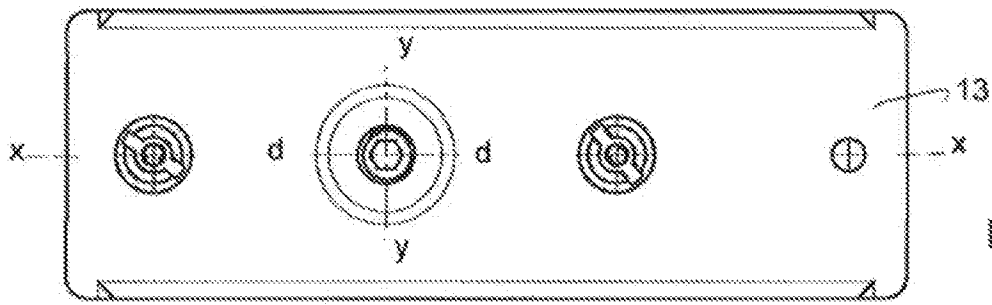


Fig. 5

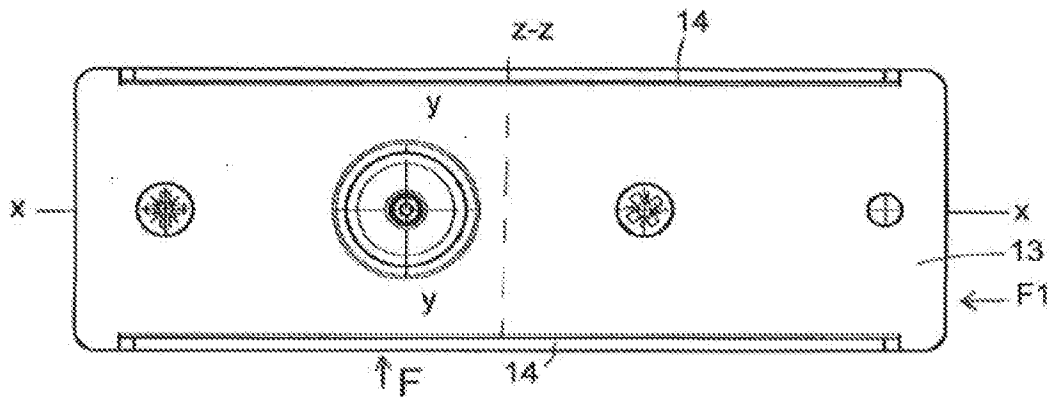


Fig. 6

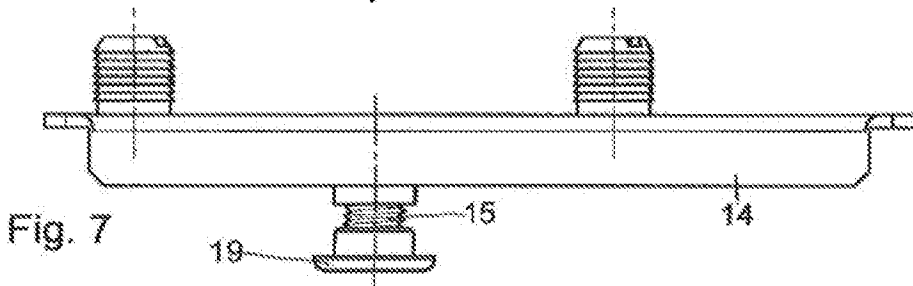


Fig. 7

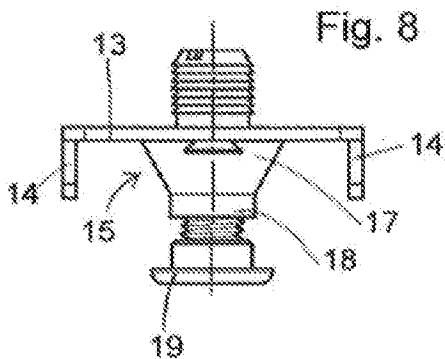
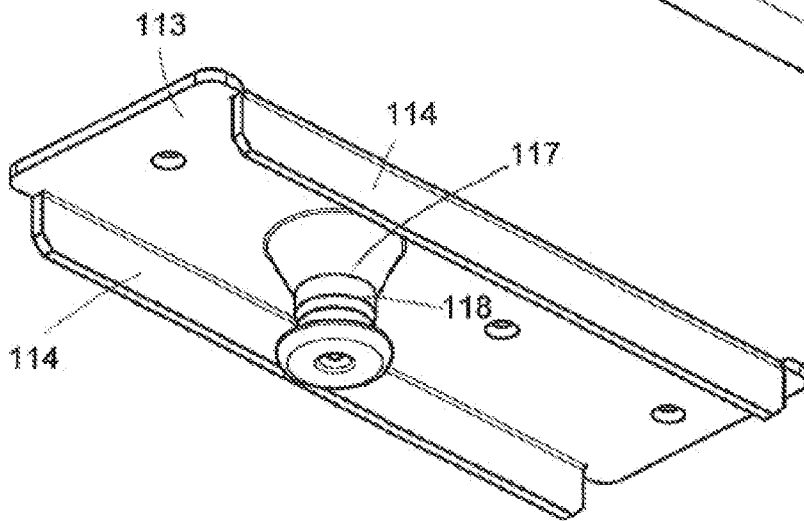
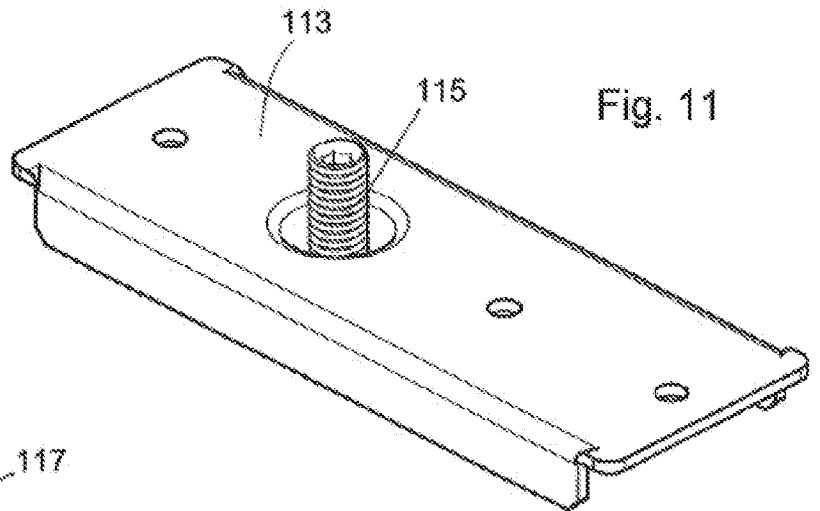


Fig. 8



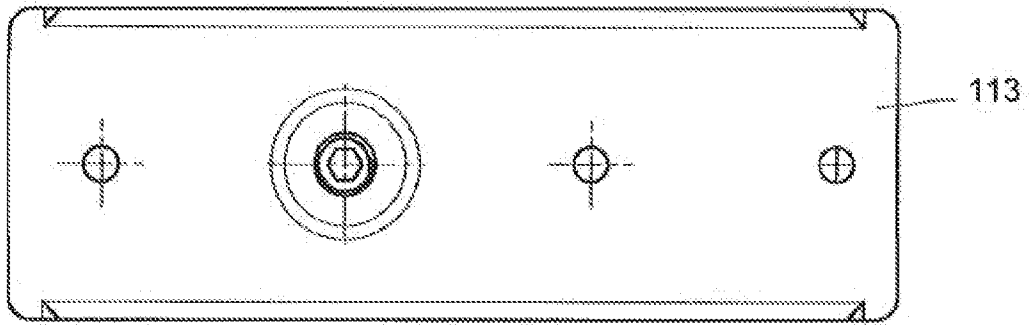


Fig. 13

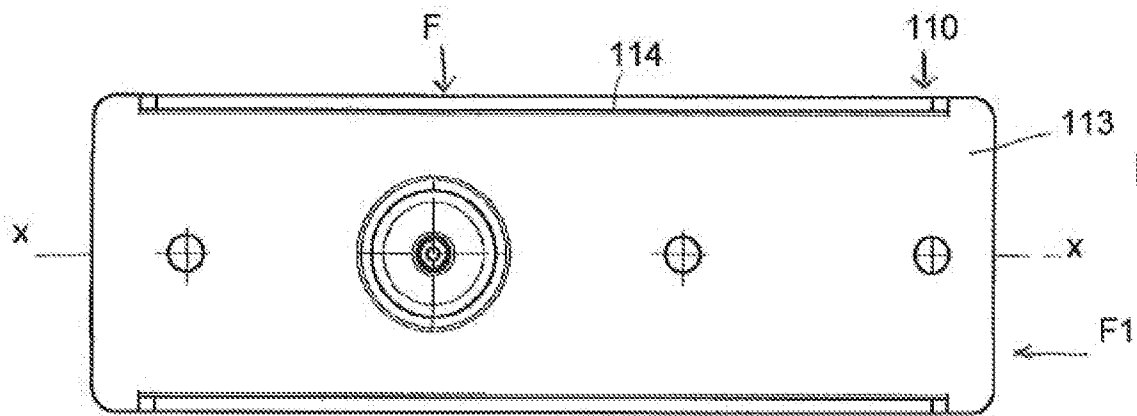


Fig. 14

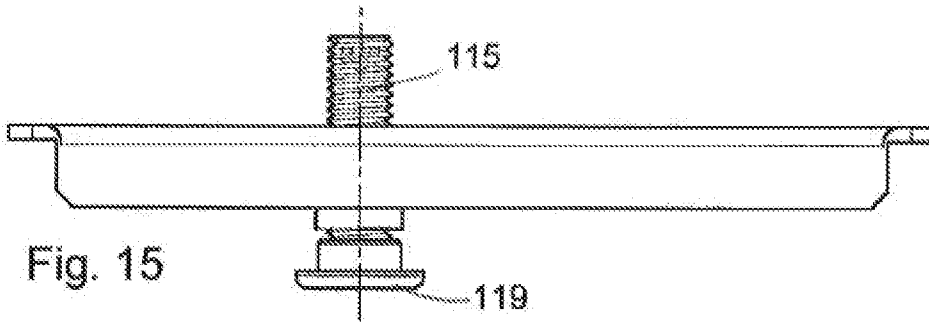


Fig. 15

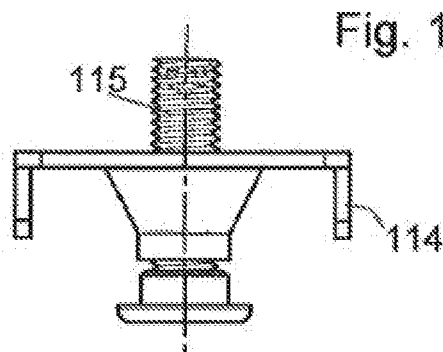


Fig. 16

Fig. 17

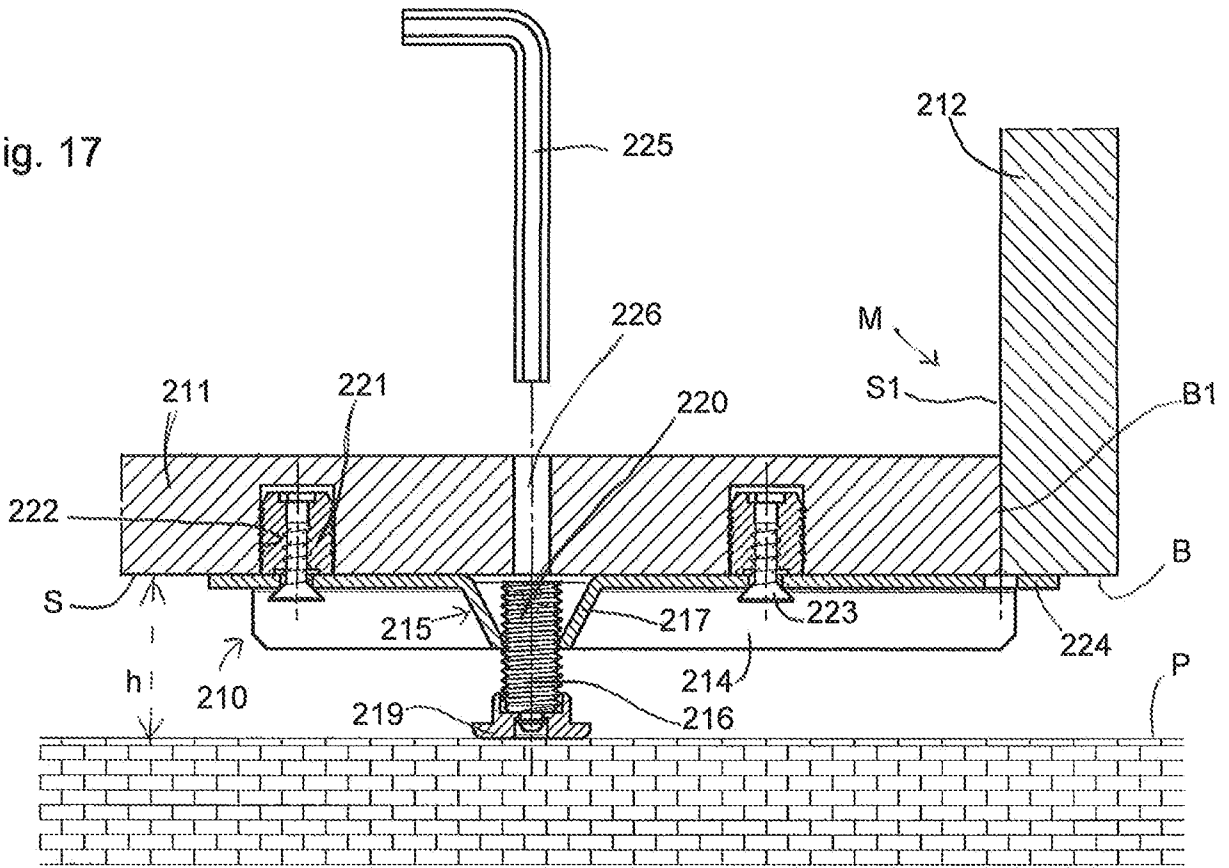
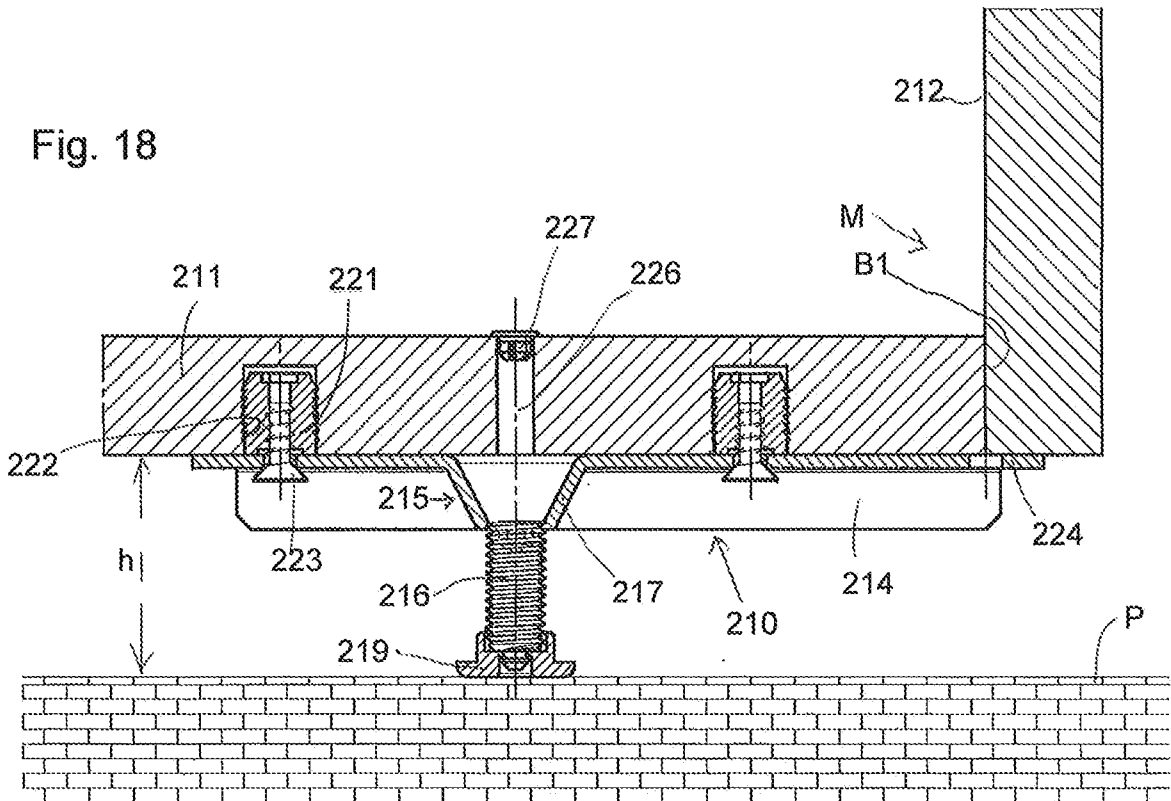


Fig. 18



INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2020/056298

A. CLASSIFICATION OF SUBJECT MATTER
 INV. A47B91/02
 ADD.
 According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
 Minimum documentation searched (classification system followed by classification symbols)
 A47B
 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2015/102276 A1 (PARK SEOK GON [KR]) 9 July 2015 (2015-07-09) abstract; figures 1-3 -----	1-8, 10, 11
A	WO 99/11160 A1 (SALVI ROBERTO [IT]) 11 March 1999 (1999-03-11) page 1 - page 10; figures 1-8 -----	1

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>
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Date of the actual completion of the international search 10 August 2020	Date of mailing of the international search report 20/08/2020
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer <p style="text-align: center;">Kohler, Pierre</p>
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2020/056298

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2015102276 A1	09-07-2015	KR 200476510 Y1	11-03-2015
		WO 2015102276 A1	09-07-2015

WO 9911160 A1	11-03-1999	AU 9184198 A	22-03-1999
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