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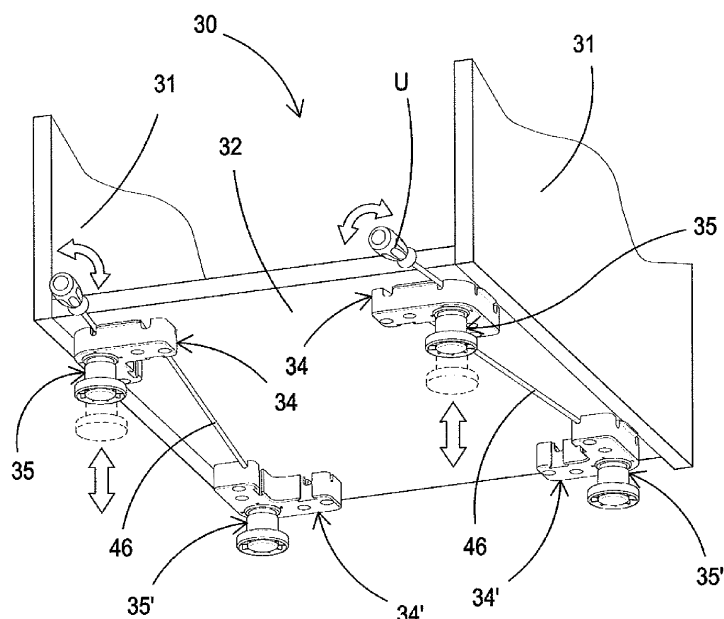
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(54) **Perfected system with adjustable levelling feet for furniture**

(57) A system with adjustable levelling feet for furniture (30) with a bottom (32) and shoulders (31) which terminate in correspondence with said bottom (32), comprises, in combination: at least one pair of feet (35,35'), front and rear, respectively, which are operatively interconnected by means of a return and regulation rod (46), and wherein each foot (35, 35') comprises a regulation

mechanism (54), said rod (46) and said mechanism (54) being accessible from the outside of the foot (35,35') and manoeuvrable by means of a tool (U) according to the invention, the foot (35, 35') is assembled on a plaque (34,34') which is fixed outside the bottom (32) of said piece of furniture (30), a plurality of passages (49,49'; 43,43';44,44') for said rod (46) and for said tool (U) being envisaged in said plaque (34,34').

Fig. 8



Description

[0001] The present invention relates to a perfected system with front and rear feet for the levelling of furniture.

[0002] The invention is particularly suitable for being applied to furniture in which the space beneath the bottom of the piece of furniture must be completely free, such as, for example, in kitchen bases, and where the distance between said bottom and the floor is minimum, making front access to the rear feet of the system impossible.

[0003] A levelling system of this type is described for example in EP1748710, in which the adjustable feet are assembled laterally with respect to the shoulder of the piece of furniture, by means of a specific support.

[0004] For a better understanding of the invention in question, when necessary, EP1748710 should be considered as being an integrant part of the present description.

[0005] The levelling system according to EP1748710, however, is only suitable for furniture, such as wardrobes, in which the shoulders extend to the floor: i.e, where the shoulders extend downwards beyond the bottom of the piece of furniture. In this type of furniture, in fact, it is not necessary to have free space beneath the bottom.

[0006] A levelling system according to EP1748710, on the contrary, is not adequate for furniture, such as for example kitchen bases, in which the shoulders do not reach the floor, but end in correspondence with the edge of the bottom. In this type of furniture, in fact, the necessity is strongly felt for having the space beneath the bottom completely free, for example for the passage of hydraulic and/or electrical systems.

[0007] The general objective of the present invention is to provide a levelling system for furniture, with adjustable front and rear feet, which is particularly suitable for furniture in which the shoulders end in correspondence with the edge of the bottom of the furniture itself.

[0008] This objective is achieved by means of a levelling system having a particular structure, suitable for being fixed beneath the bottom of the piece of furniture, instead of to the shoulder, as in the known art.

[0009] A further objective of the invention is to provide a levelling system for furniture of the type described above, in which the rear feet can be regulated from the front, also when there is a minimum distance between the floor and the bottom of the piece of furniture.

[0010] Another objective of the invention is to provide a levelling system comprising a plurality of front and rear feet, and relative supports, wherein the feet and supports can all be the same, regardless of their positioning, right or left, front or rear.

[0011] Yet another objective of the invention is to provide a system comprising front and rear feet the same as each other, wherein a base can be applied to said feet not only frontally but also laterally (on three sides), in so-called "peninsula" furniture.

[0012] The above objectives are achieved by a system having the characteristics specified in the enclosed claim

1 and subclaims.

[0013] The structural and functional characteristics of the invention and its advantages with respect to the known art will appear more evident from the following description, referring to the enclosed drawings, which illustrate an embodiment of the same invention.

[0014] In the drawings:

- figures 1 to 9 are perspective views illustrating the assembly sequence and functioning modes of a levelling system for furniture produced according to the present invention;
- figures 10 and 11 are two perspective views, from below and above respectively, illustrating the assembly plaque of the adjustable feet of the levelling system illustrated in figures 1-9;
- figures 12 and 13 are two plan views from above and below respectively, illustrating the plaque of figures 10, 11;
- figure 14 is a raised view of the plaque of figures 12, 13;
- figure 15 is an exploded perspective view illustrating the adjustable foot forming part of the levelling system according to the invention;
- figure 16 is a cross-section and sectional view similar to figure 15;
- figure 17 is a partial cross-section and sectional view of the foot of figures 15 and 16 in an assembled condition;
- figure 18 is a perspective view of the foot of figures 15-17 in an assembled condition;
- figures 19 to 23 are perspective views illustrating the assembly sequence on the plaque of the return and regulation rod of an adjustable rear foot of the levelling system according to the invention;
- figure 24 is a plan view from below illustrating the front regulation modes of an adjustable rear foot of the levelling system according to the invention;
- figures 25, 26, 27, 28 and 29 are details of the return and regulation rod of the adjustable rear foot;
- figure 30 is a plan view from below of the piece of furniture of figure 1; and
- figures 31 and 32 are two views, a plan view from below and a raised view respectively, illustrating the levelling system of the invention applied to "peninsula" furniture, equipped with a base on three sides.

[0015] With reference to the drawings, figure 1 partially illustrates a piece of furniture 30, for example a piece of kitchen furniture (base), in which the shoulders 31 (sides) terminate in correspondence with a bottom 32, i.e. they do not reach the floor (not shown).

[0016] As already specified, in this type of furniture, the space beneath the bottom must be completely free and front access to the rear adjustable feet may be impossible due to the limited distance between the floor and bottom of the piece of furniture which, in some cases,

is not higher than 5 cm.

[0017] The bottom 32 is arranged, in correspondence with the angles, with four groups of holes 33, facing downwards, for fixing characteristic front and rear plaques 34, 34' respectively (figures 2 and 3).

[0018] The holes 33 of each group are situated at the vertexes of a triangle and the groups are symmetrical with respect to each other.

[0019] As can be clearly seen in the drawings, the plaques 34, 34' produced according to the present invention are identical to each other, only the orientation changes (right, left - front, rear).

[0020] Said plaques 34, 34' are destined for receiving in a stable and oriented manner - as explained hereunder - respective adjustable feet 35, 35' also identical to each other (figures 3 and 4).

[0021] With reference to figures 10-14, said plaques 34, 34' are made of a plastic material and have a generally square or "L"-shaped configuration, and a substantially box-shaped structure, with a lower surface 36 and a perimetric edge 37. Said square configuration defines wings A substantially positioned at 90° with respect to each other. Said feet 35, 35' are assembled in the vertex defined by said wings A.

[0022] A central pin 38, and two end pins 39 extend from each plaque 34, 34', from the side opposite the surface 36, said pins 38, 39 are positioned according to the vertexes of the triangle defined by the holes 33. Said pins 38, 39 are destined for being inserted with pressure interference into the holes 33 for the stable fixing of the plaques 34, 34' to the bottom 32 of the piece of furniture 30.

[0023] The central pin 38 is hollow and defines, on the surface 36, a cylindrical seat 40 for the oriented assembly of the adjustable feet 35, 35'. For this purpose, said cylindrical seat 40 has four grooves 41 along generatrices and positioned at 90°.

[0024] In correspondence with the upper ends of the grooves 41, the seat 40 is characteristically provided with four access openings 42.

[0025] As can be clearly seen in figures 10-14 and 24 of the drawings, said openings 42 are accessible from the edge 37 of the plaque 34, 34' through two pairs of radial passages 43, 43' and 44, 44'.

[0026] As explained in greater detail hereunder, the pair of passages 43, 43' serves for regulating the front right and left feet 35, whereas the pair 44, 44' regulates the rear feet 35'.

[0027] With reference to figures 19-23, the plaque 34, 34' is also provided with a bolt 45 which serves for the blockage of a polygonal return and regulation rod 46 of the rear adjustable feet.

[0028] Said bolt 45 comprises a vertical cursor 47, manually controlled to slide within a seat 48 situated on the perimetric edge 37 of the plaque 34, 34', in correspondence with passages 49, 49' for the above return rod 46.

[0029] The sliding of the cursor 47 is controlled by

means of a command key 50 which extends perpendicularly from the same.

[0030] A cavity 51 is situated in said cursor 47, suitable for being click-inserted on a shaped end-section 52 of the rod 46.

[0031] More specifically, said cavity 51 is click-engaged, astride a plurality of annular throats 53, blocking the rod 46 in position.

[0032] The click-engagement is achieved thanks to an opening of the cavity 51 which is narrower than the diameter of the polygonal rod 46 and due to the elasticity of the structure of the same cursor 47.

[0033] As can be clearly seen from figure 13 of the drawings, the passage 49 is substantially parallel to the passage 43, and substantially perpendicular to the passage 44: whereas the passage 49' is substantially parallel to the passage 43', and substantially perpendicular to the passage 44'.

[0034] With reference to figures 15-18, the adjustable feet 35, 35' are structurally composed of three components: a central regulation mechanism 54 contained between a circular base 55 and a substantially cylindrical body 56.

[0035] The mechanism 54 serves for regulating the height of the adjustable feet 35, 35' by acting between the base 55 and the body 56 inserted on the plaque 34, 34'.

[0036] The mechanism 54, shown for purely illustrative and non-limiting purposes, is that described and illustrated in patents EP733322 and EP2203089, which should be considered as being an integral part of the present description, and to which reference should be made for any necessary clarifications.

[0037] Said regulation mechanism 54 is housed in a complementary seat 57 of the body 56. The mechanism 54 has a shaped hole 58 for the access of a manoeuvring tool U, which is aligned with an opening 59 of the body 56.

[0038] The body 56 containing the mechanism 54 thus oriented, is in turn, inserted in a complementary cylindrical seat 60 which extends from the base 55. The mechanism 54 with its perforated base 61 is engaged on a protruding shank 62 inside from said base 55.

[0039] The adjustable feet 35, 35' produced as described above, are coupled with the plaque 34, 34' by the insertion of an external section 63 of the body 56 inside the complementary seat 40.

[0040] The correct orientation of the feet 35, 35', with the opening 59 aligned with the passage 43, 43'-44, 44', is determined by the selective insertion of a reference ribbing 64 inside the correct groove 41 among the four grooves at 90° present in the seat 40.

[0041] The correct insertion level of the feet 35, 35', on the other hand, is determined by a collar 65 of the body 56 which is buffered against the surface 36 of the plaque 34, 34'.

[0042] The functioning of the levelling system for furniture according to the invention is evident from what is described above with reference to the drawings and is

briefly the following.

[0043] The correct assembly sequence of the various components of the system is illustrated - with the help of the arrows - in figures 1 to 9.

[0044] It is evident from the figures how the system shown for purely illustrative and non-limiting purposes, is composed of two pairs of feet 35, 35', wherein each pair comprises a front foot 35 and a rear foot 35' which are operatively interconnected by the return rod 46 for the regulation of the rear foot.

[0045] It is also evident how the plaques 34, 34' of each pair are rotated by 90° with respect to each other (right plaque and left plaque).

[0046] Accordingly, once the plaques 34, 34' and relative feet 35, 35' have been assembled, the front and rear feet of each pair must be operatively connected. This is effected by passing the rod 46 through the passages 49, 49' of the respective plaques 34, 34', until the free end of the polygonal rod 46 becomes engaged with the complementary hollow control head 58' of the mechanism 54, passing through the passages 44, 44' of the plaques 34, 34' (figures 5- 8, 24) .

[0047] In this situation, the section 52 of the rod 46 is in correspondence with the bolt 45 which is lowered so as to allow the cursor 47 to become click-engaged inside one of the throats 53, thus blocking the rod 46 in the correct maneuvering position (figures 9-23).

[0048] The front regulation of the rear feet 35' can therefore be effected by introducing a tool U into the seat S, having a complementary shape, situated at the free end of the section 52 of the return rod 46: see figure 9.

[0049] The regulation of the front feet 35, on the other hand, is effected directly by introducing the tool U through the passages 43, 43' of the front plaques 34, 34', the control head 58' of the mechanism 54 having access through said passages: see figure 8.

[0050] In figures 30-32, 66 indicates as a whole a basic piece of furniture, so-called "peninsula", in which, thanks to the use of the levelling system according to the invention, a base 61 can be applied on the three sides of the "peninsula", using symmetrical holes 33 and feet 35, 35', with relative plaques 34, 34', all identical to each other (right, left - front, rear) and arranged specularly with respect to each other.

[0051] This is not possible using levelling systems of the known art, and where the groups of holes 33 are not symmetrical with respect to each other.

[0052] The objectives mentioned in the preamble of the description have therefore been achieved.

[0053] The protection scope of the present invention is defined by the enclosed claims.

Claims

1. A system with adjustable levelling feet for furniture (30) with a bottom (32) and shoulders (31) which terminate in correspondence with said bottom (32),

of the type including, in combination: at least one pair of feet (35, 35'), front and rear, respectively, which are operatively interconnected by means of a return and regulation rod (46), and wherein each foot (35, 35') comprises a regulation mechanism (54), said rod (46) and said mechanism (54) being accessible from the outside of the foot (35, 35') and manoeuvrable by means of a tool (U), **characterized in that** the foot (35, 35') is assembled on a plaque (34, 34') fixed outside the bottom (32) of said piece of furniture (30), a series of passages (49, 49'; 43, 43'; 44, 44') for said rod (46) and for said tool (U) being envisaged in said plaque (34, 34') .

2. The system according to claim 1, **characterized in that** said plaque (34, 34') has a square configuration defining wings (A) substantially positioned at 90°, said foot (35, 35') being situated in the vertex defined by said wings (A), whose regulation mechanism (54) is accessible through said passages (43, 43'; 44, 44') situated in said wings (A) radially with respect to said foot (35, 35') .
3. The system according to claim 1 or 2, **characterized in that** said passage (49) is substantially parallel to the passage (43), and substantially perpendicular to the passage (44), whereas the passage (49') is substantially parallel to the passage (43'), and substantially perpendicular to the passage (44') .
4. The system according to any of the previous claims, **characterized in that** a central pin (38) and two end pins (39) extend from each plaque (34, 34') : said pins (38, 39) being positioned according to the vertexes of a triangle defined by holes (33) at the bottom (32) of the piece of furniture, in correspondence with the angles, for the fixing of said plaque (34, 34') to the same.
5. The system according to claim 4, **characterized in that** said central pin (38) is hollow and defines a cylindrical seat (40) for the oriented assembly of the adjustable foot (35, 35'), said cylindrical seat (40) having four grooves (41), along generatrices, positioned at 90° in correspondence with the upper ends of the grooves (41), said seat (40) having four access openings (42) which are accessible through said wings (A) of the plaque (34, 34') through two pairs of radial passages (43, 43' and 44, 44'), said pairs of passages are destined for the regulation of the front right and left feet (35), and for the regulation of the rear feet (35'), respectively.
6. The system according to claim 1, **characterized in that** the plaque (34, 34') has a bolt (45) which serves for blocking the return and regulation rod (46) of the rear adjustable feet (35'), in position.

7. The system according to any of the previous claims, **characterized in that** said bolt (45) comprises a vertical cursor (47), manually controlled to slide within a seat (48) situated on the perimetric edge (37) of the plaque (34,34') in correspondence with said passages (49,49') for the above return rod (46), the sliding of the cursor (47) being controlled by means of a command key (50) which extends perpendicularly from the same, a cavity (51) being situated in said cursor (47), suitable for being click-inserted on a shaped end section (52) of the rod (45). 5
8. The system according to claim 7, **characterized in that** said cavity (51) is click-engaged, astride a plurality of annular throats (53), blocking the rod (46) in position, said click-engagement being effected thanks to an opening of the cavity (51) which is narrower than the diameter of the rod (46) and due to the elasticity of the structure of the same cursor (47). 10 15 20
9. The system according to claim 1, **characterized in that** said adjustable foot (35,35') is structurally composed of three components: a central regulation mechanism (54) contained between a circular base (55) and a substantially cylindrical body (56). 25
10. The system according to claim 9, **characterized in that** said mechanism (54) is destined for regulating the height of the foot (35,35') by acting between the base (55) and the body (56) inserted on the plaque (34,34'). 30
11. The system according to claim 9 or 10, **characterized in that** said mechanism (54) is housed in a complementary seat (57) of the body (56), said mechanism (54) being provided with a shaped hole (58) for the access of a manoeuvring tool U, said hole (58) is aligned with an opening (59) of the body (56), said body (56) containing the mechanism (54) thus oriented being in turn inserted in a complementary cylindrical seat (60) which extends from the base (55). 35 40
12. The system according to claim 11, **characterized in that** said mechanism (54) has a perforated base (61) which is engaged on a protruding shank (62) inside from said base (55). 45
13. The system according to any of the previous claims, **characterized in that** said adjustable foot (35,35') is coupled with the plaque (34,34') by the insertion of an external section (63) of the body (56) inside the complementary seat (40). 50
14. The system according to any of the previous claims, **characterized in that** the correct orientation of the foot (35, 35'), with the opening (59) aligned with the passage (43, 43'- 44, 44'), is determined by the selective insertion of a reference ribbing (64) inside the correct groove (41) among the four grooves at 90° present in the seat (40). 55
15. The system according to any of the previous claims, **characterized in that** the correct insertion level of the foot (35, 35') is determined by a collar (65) of the body (56) which is buffered against a surface (36) of the plaque (34, 34').
16. The system according to any of the previous claims, **characterized in that** said plaque (34,34') has a substantially box-shaped structure with a lower surface (36) and a perimetric edge (37).

Fig. 1

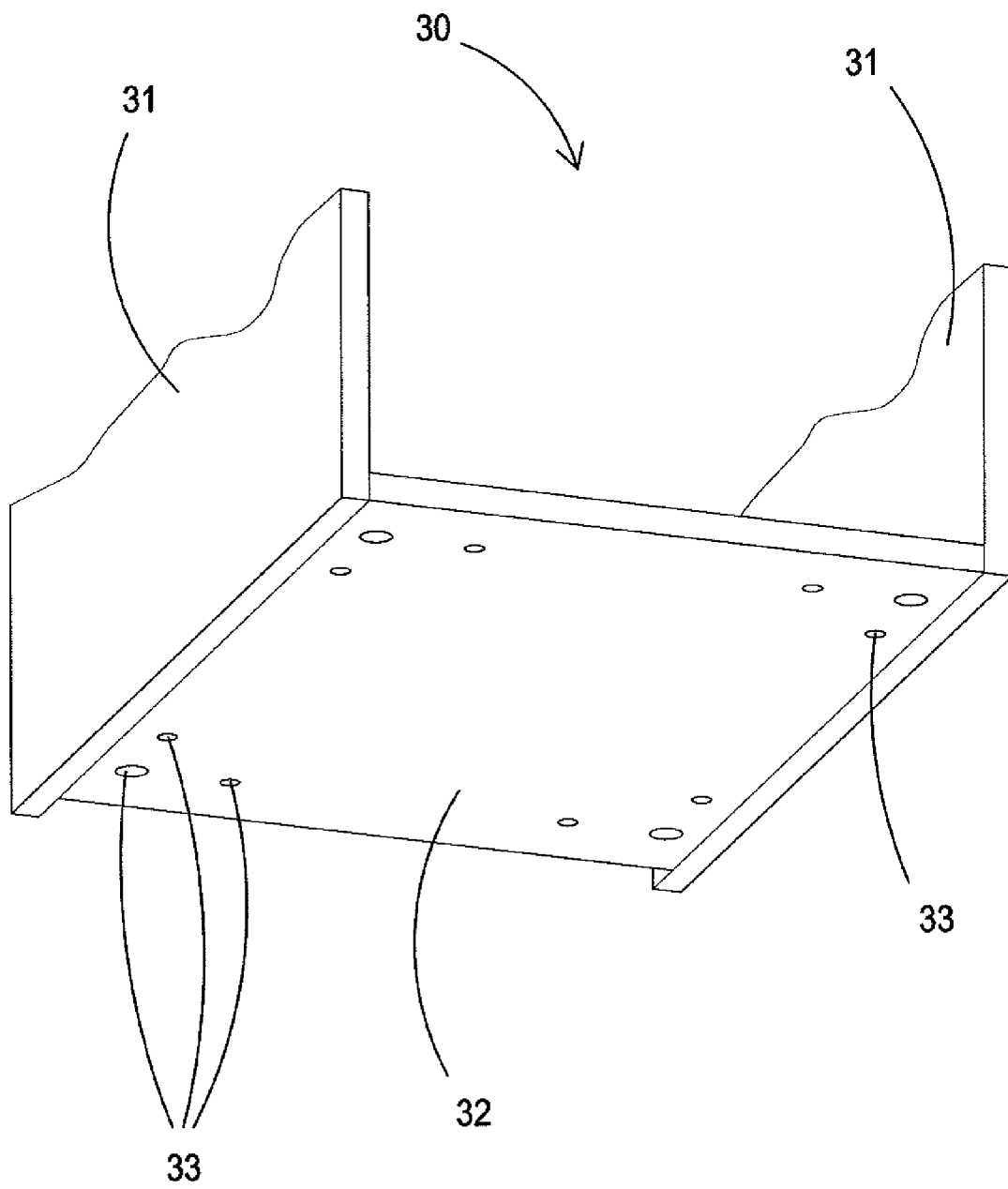


Fig. 2

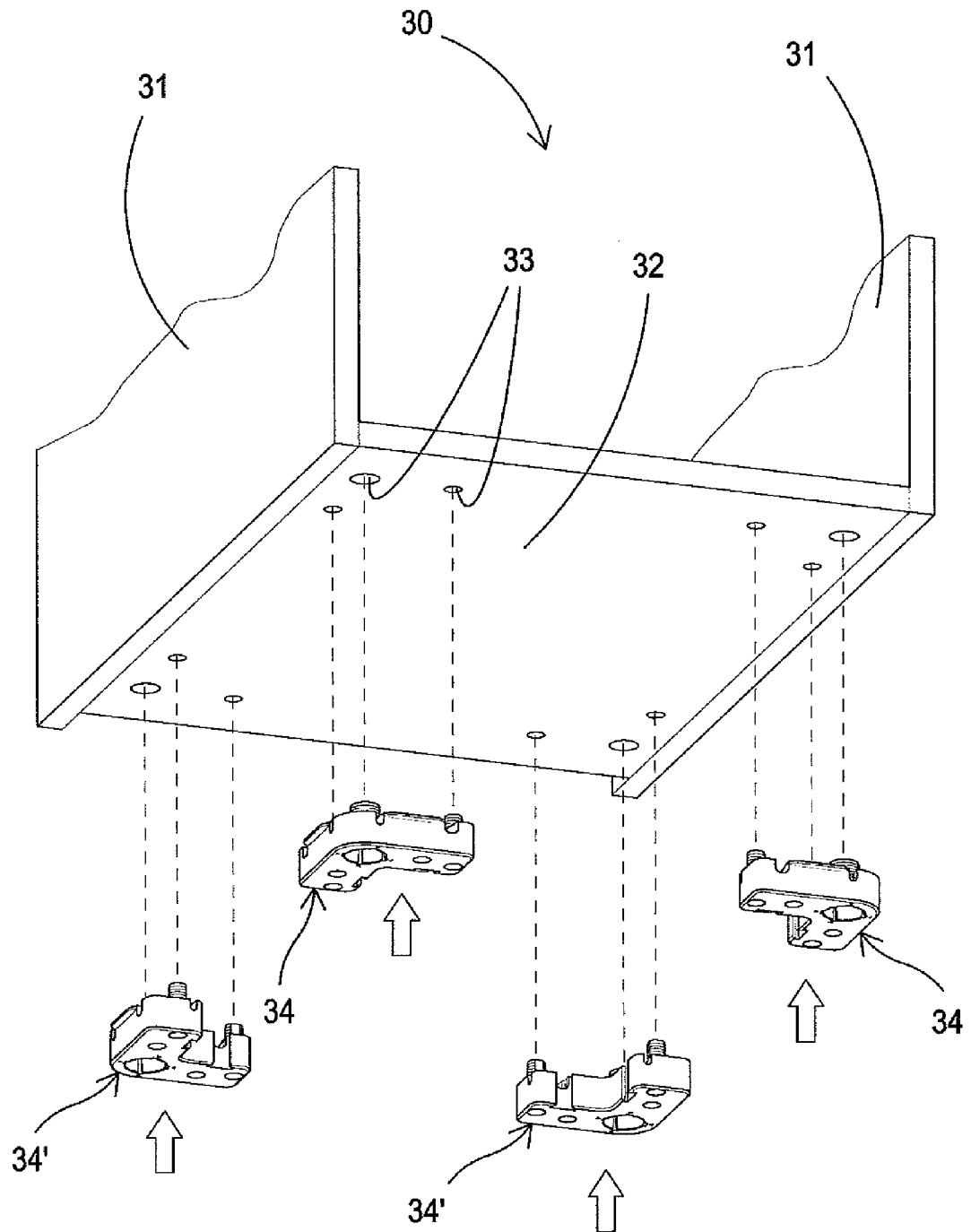


Fig. 3

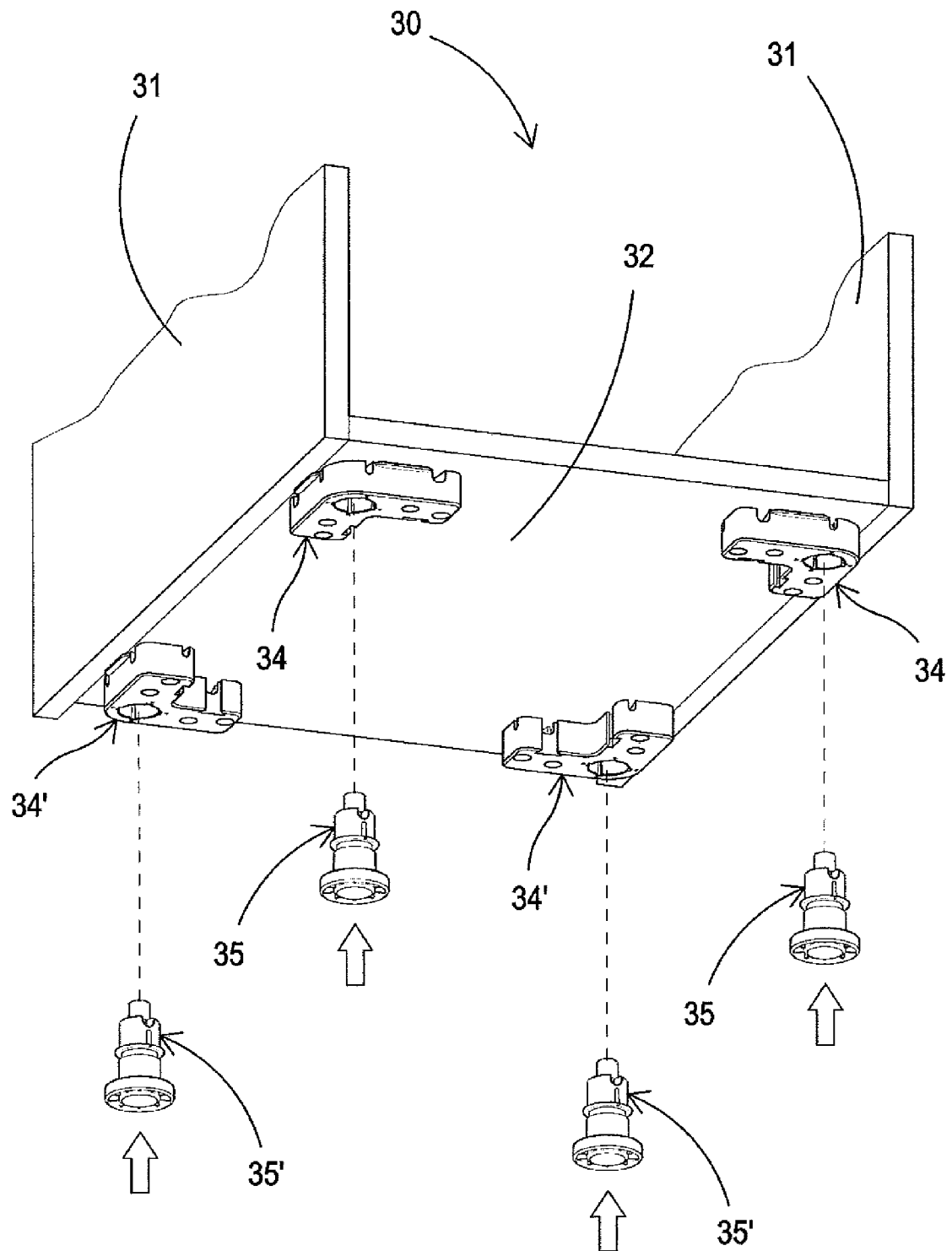


Fig. 4

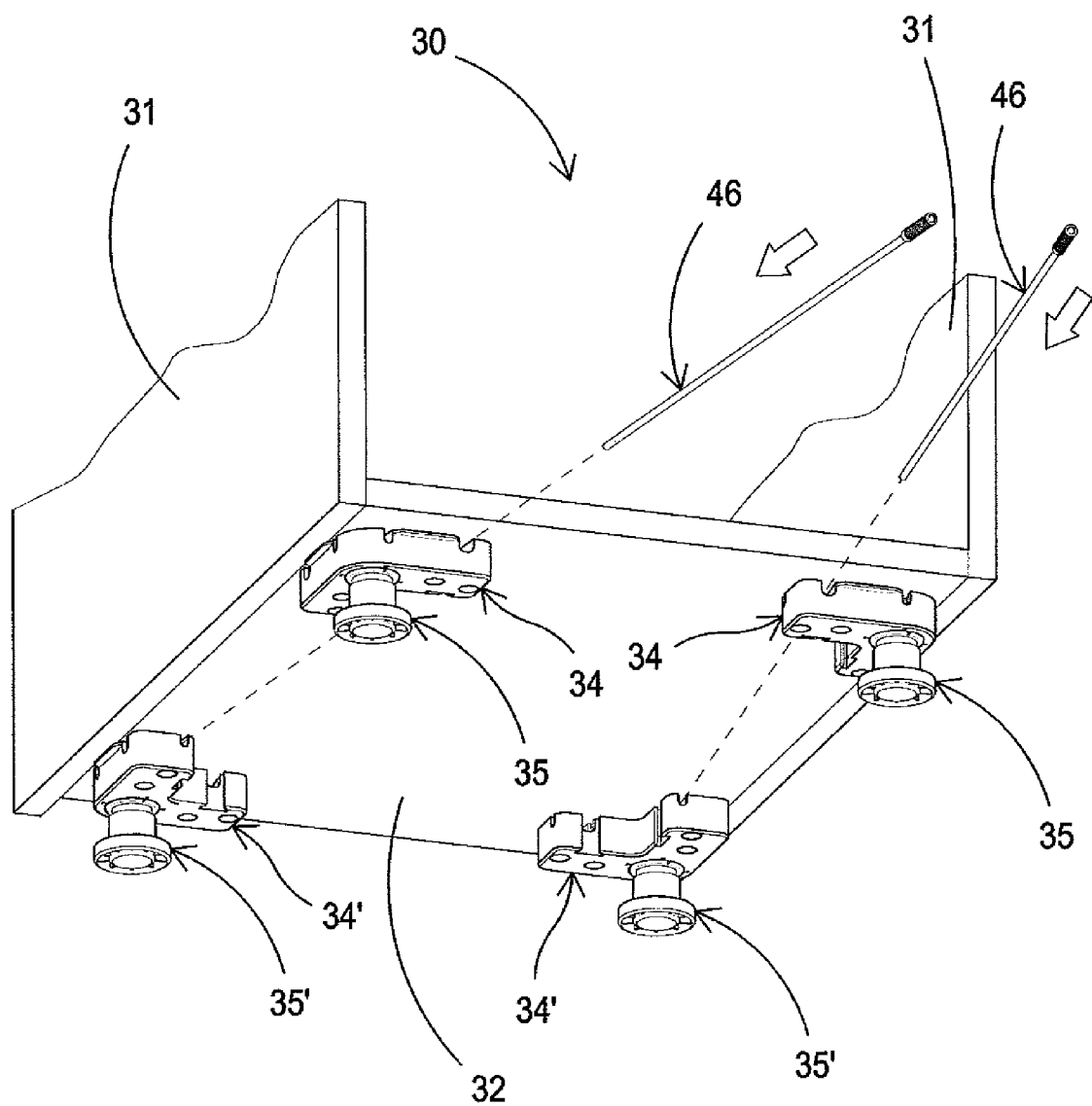


Fig. 5

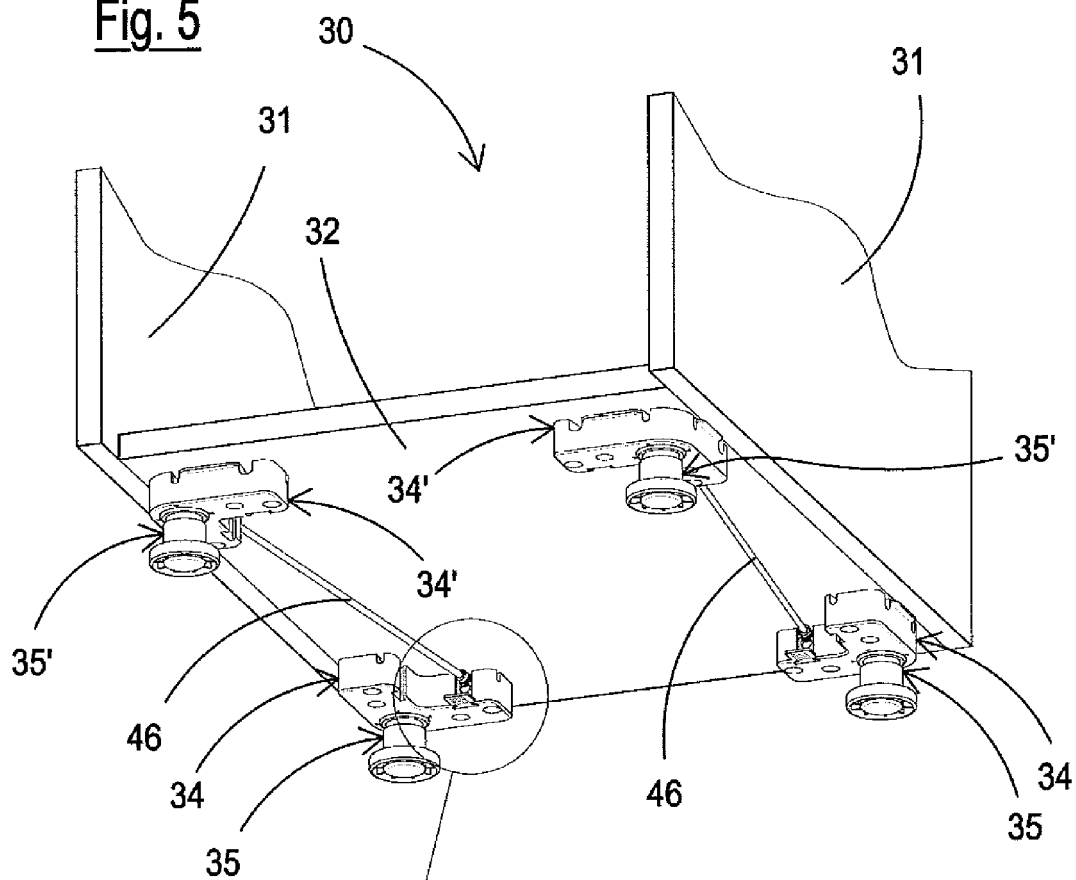


Fig. 6

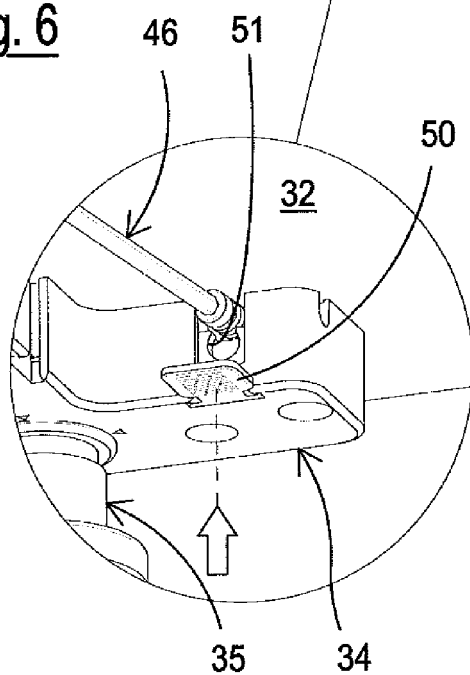


Fig. 7

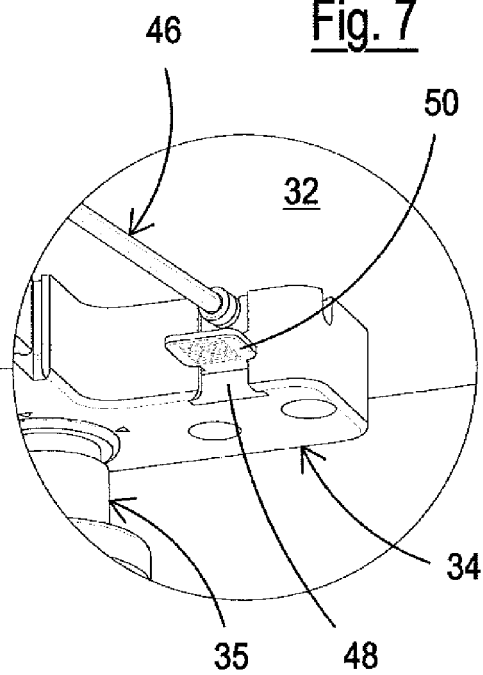


Fig. 8

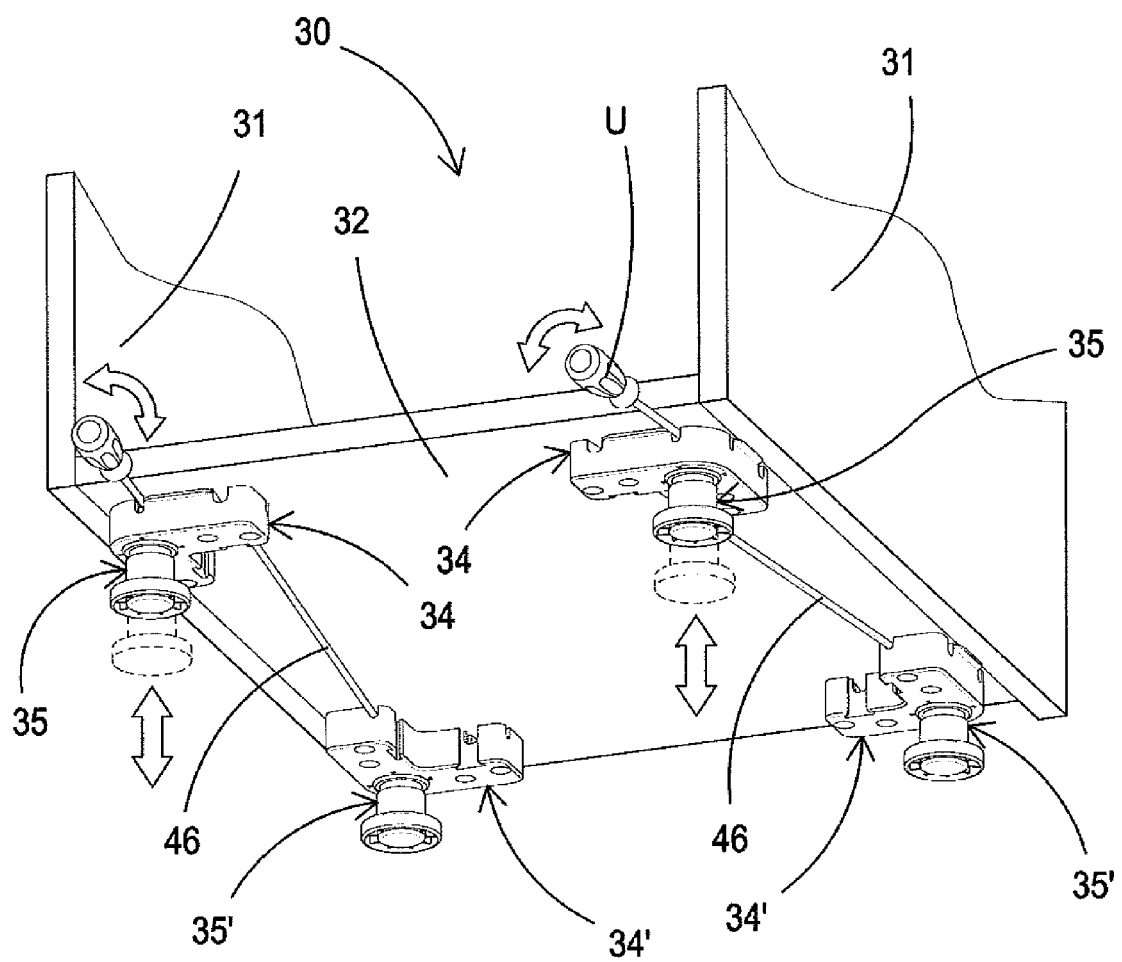


Fig. 9

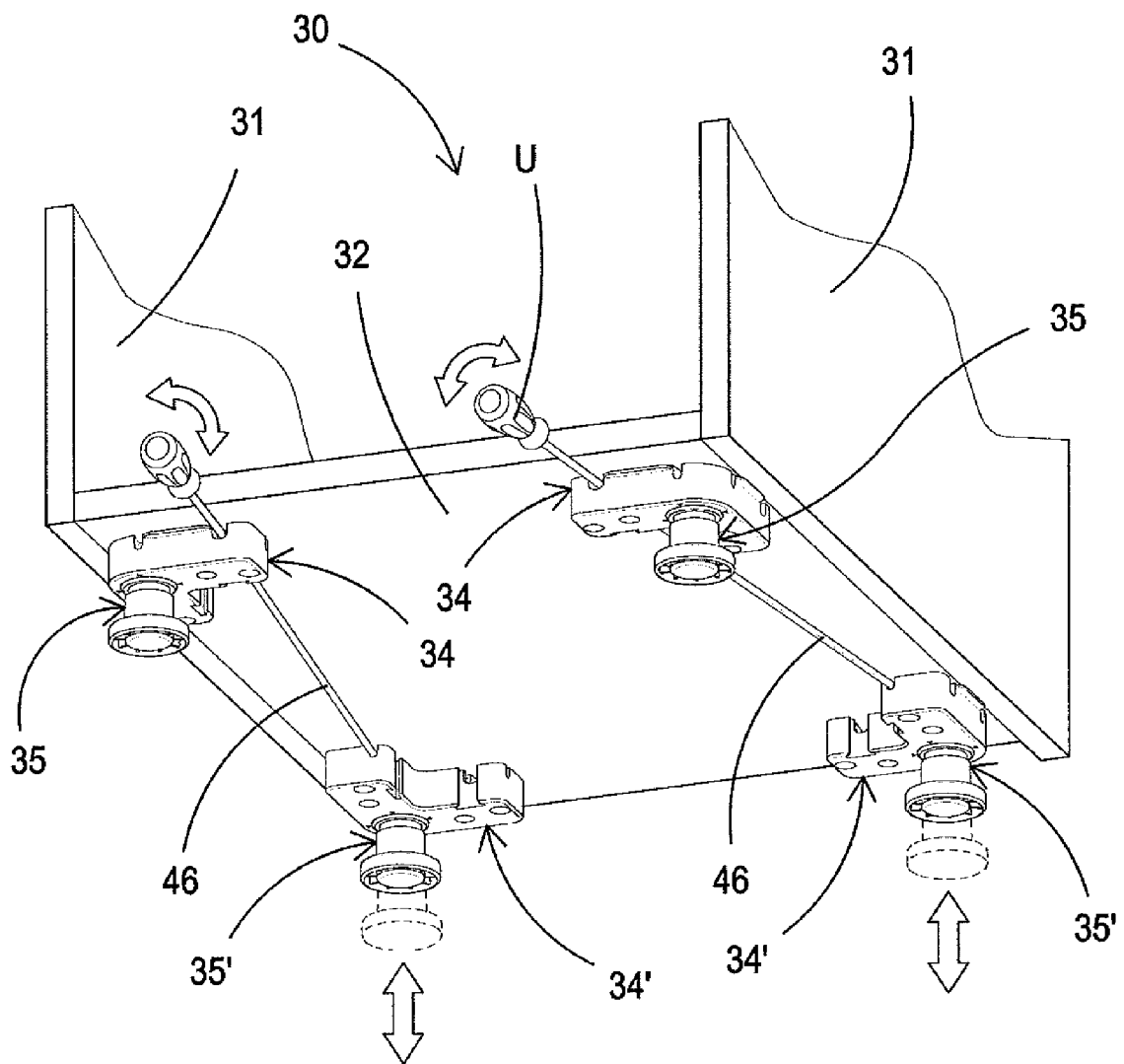


Fig. 10

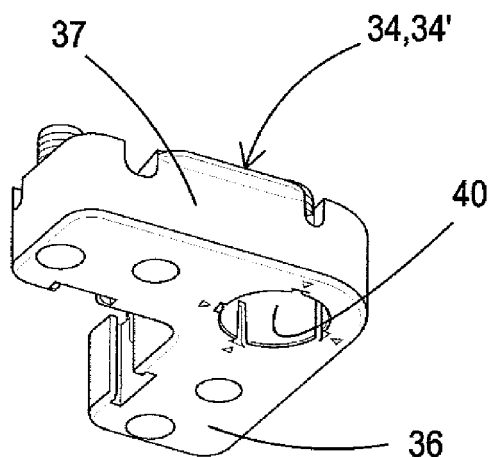


Fig. 12

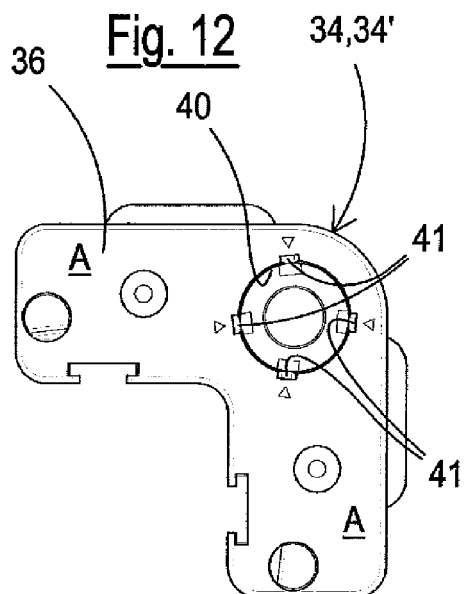


Fig. 11

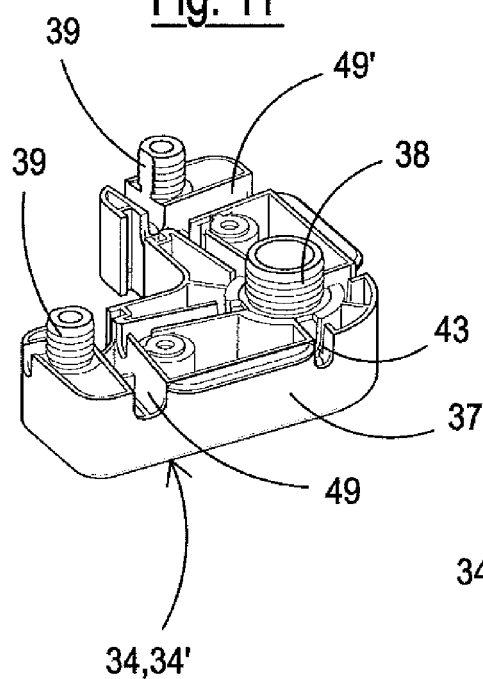


Fig. 13

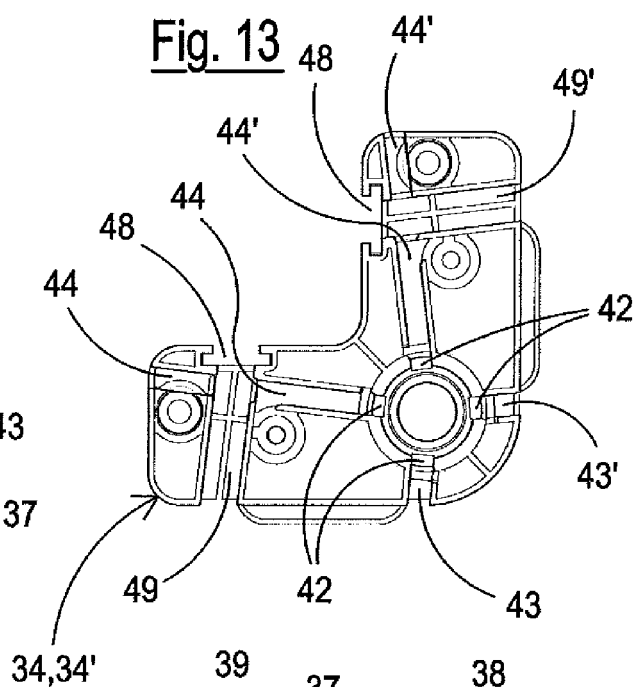
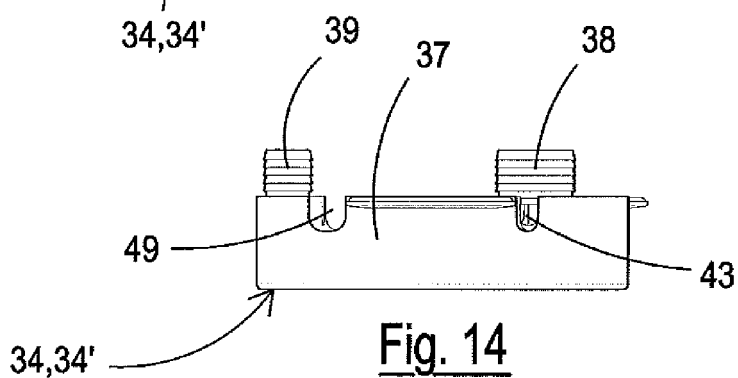


Fig. 14



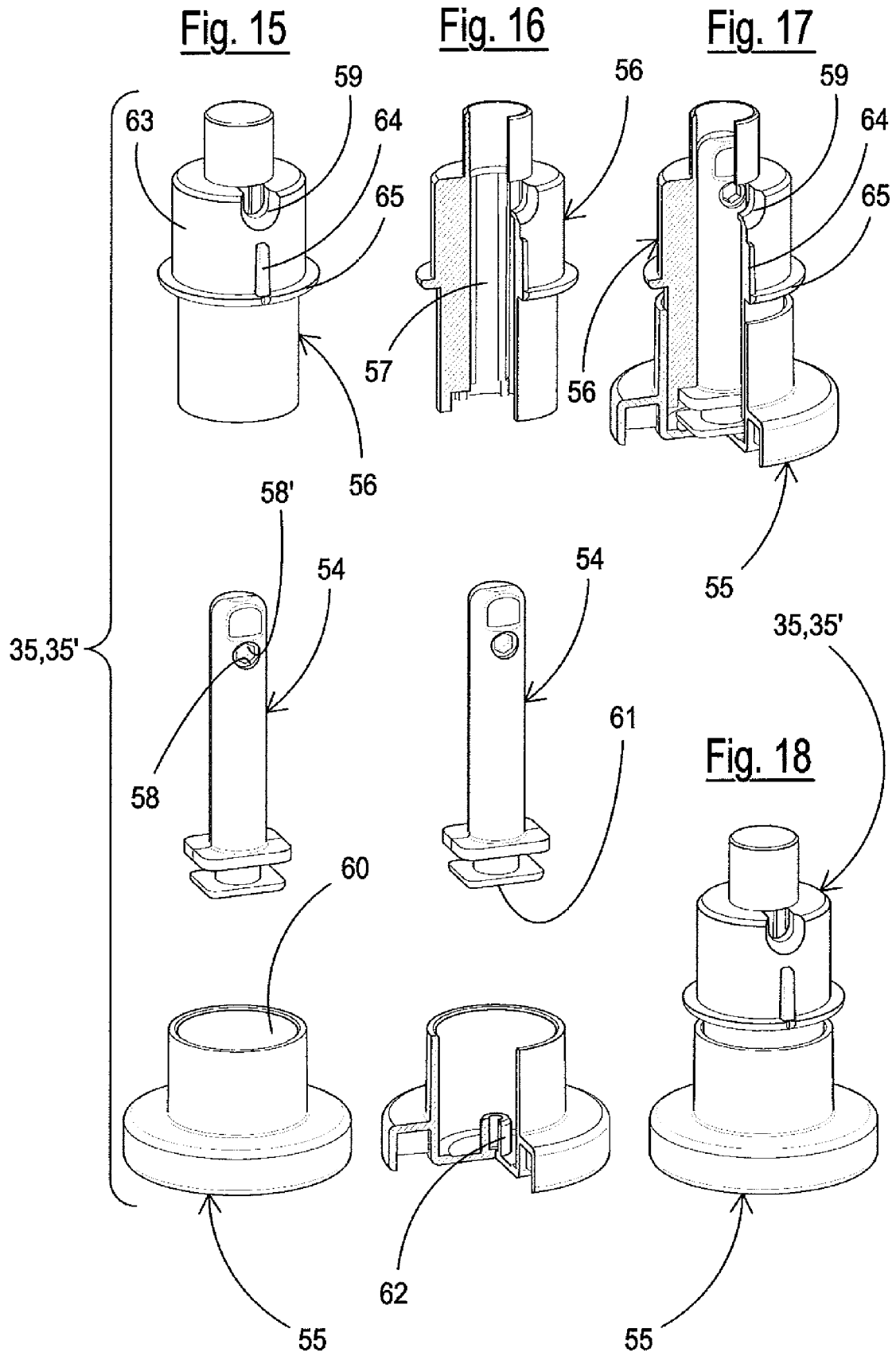


Fig. 19

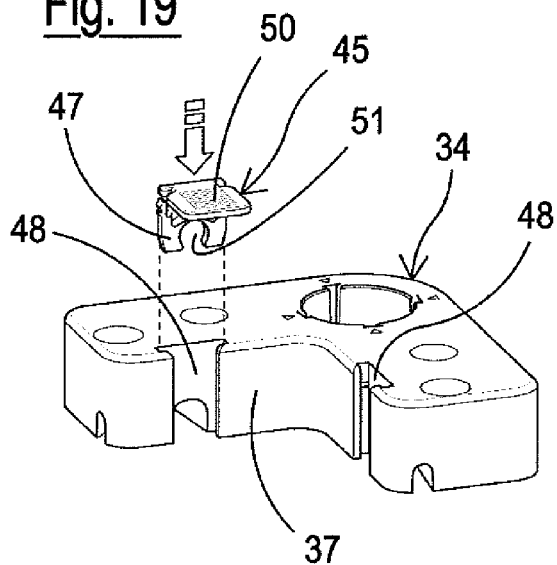


Fig. 20

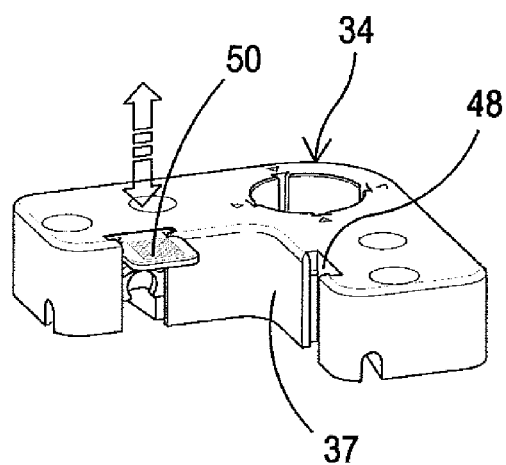


Fig. 21

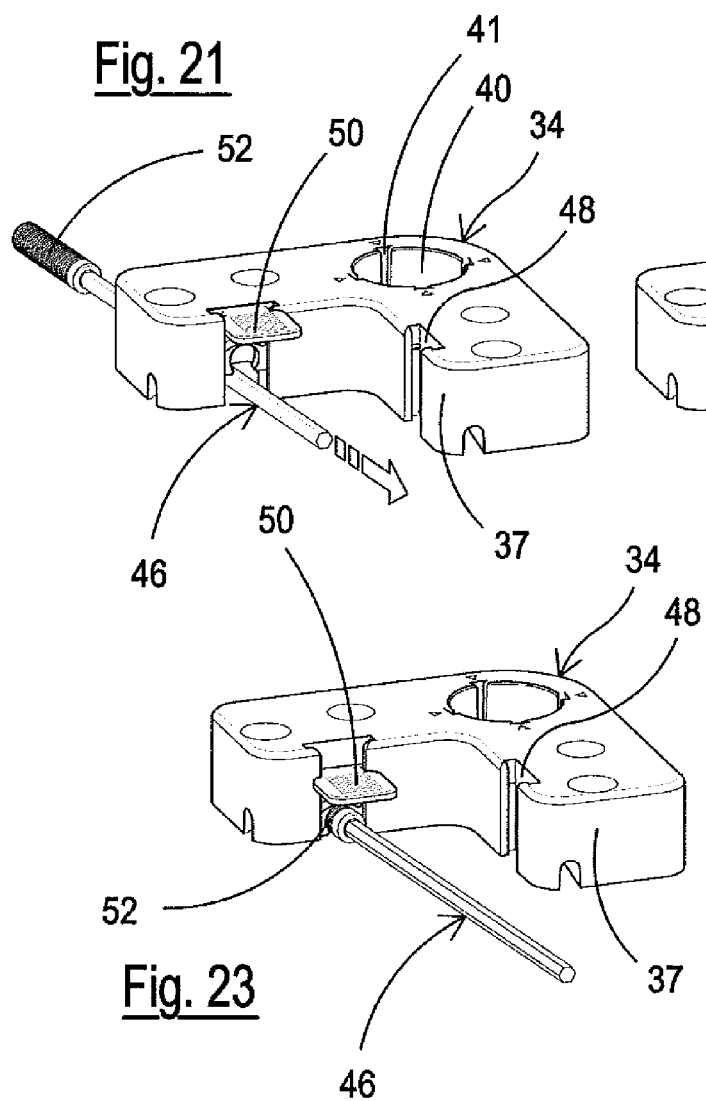


Fig. 22

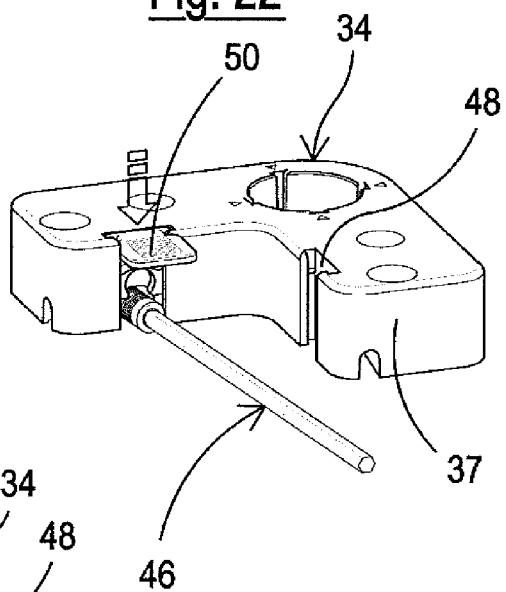


Fig. 23

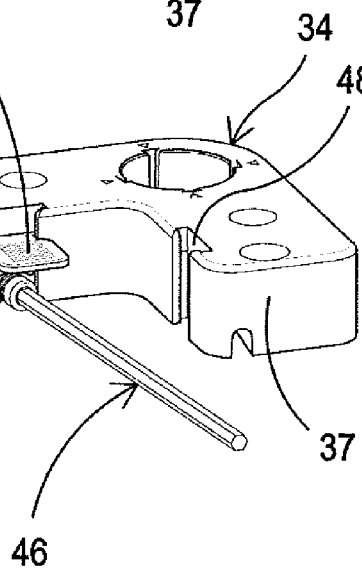


Fig. 24

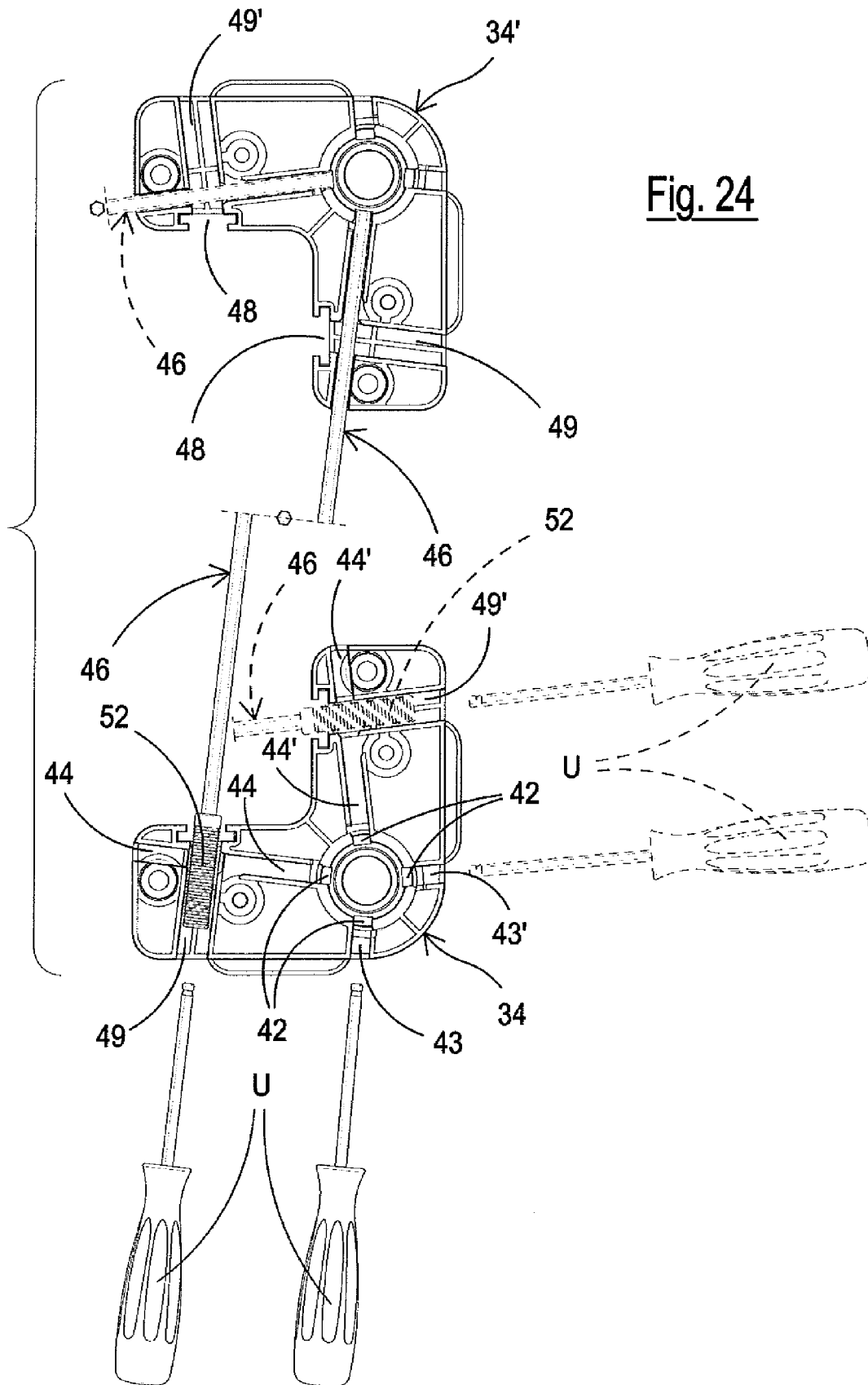


Fig. 27



Fig. 25

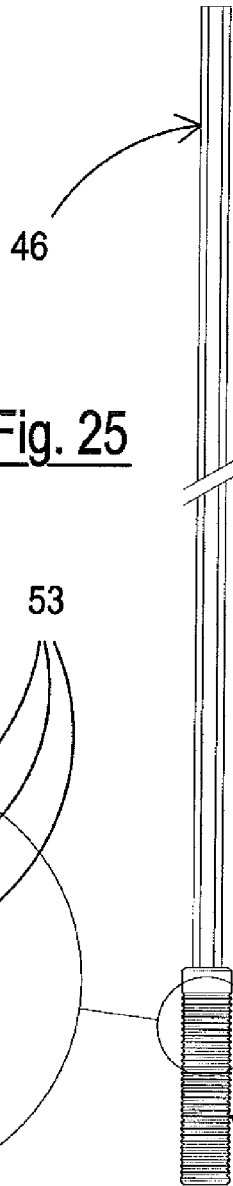


Fig. 28

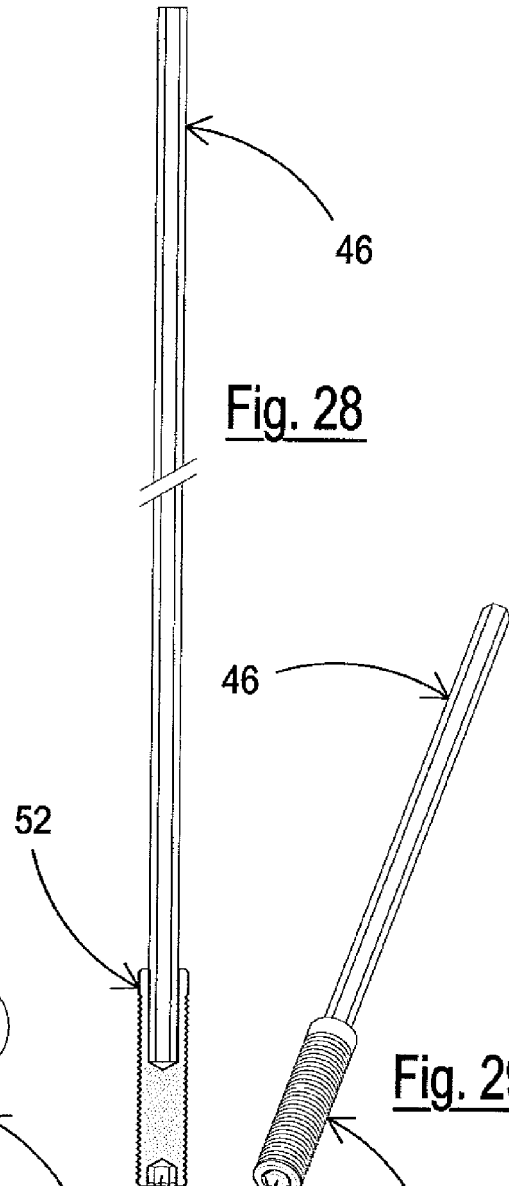


Fig. 29

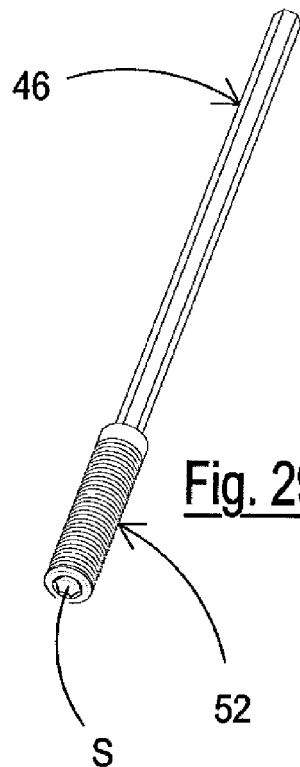


Fig. 26

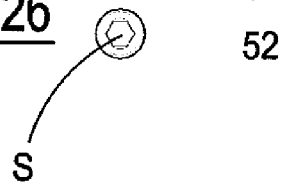


Fig. 30

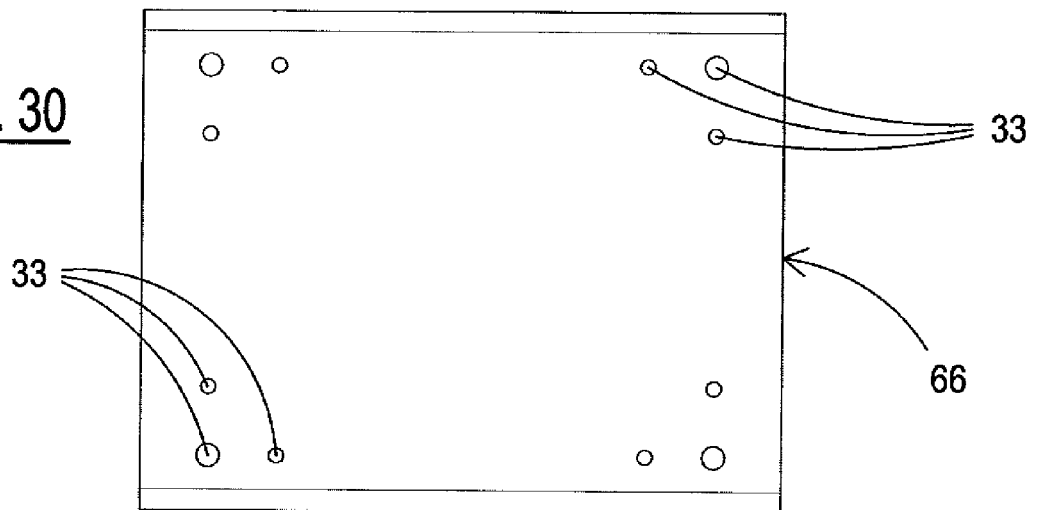


Fig. 31

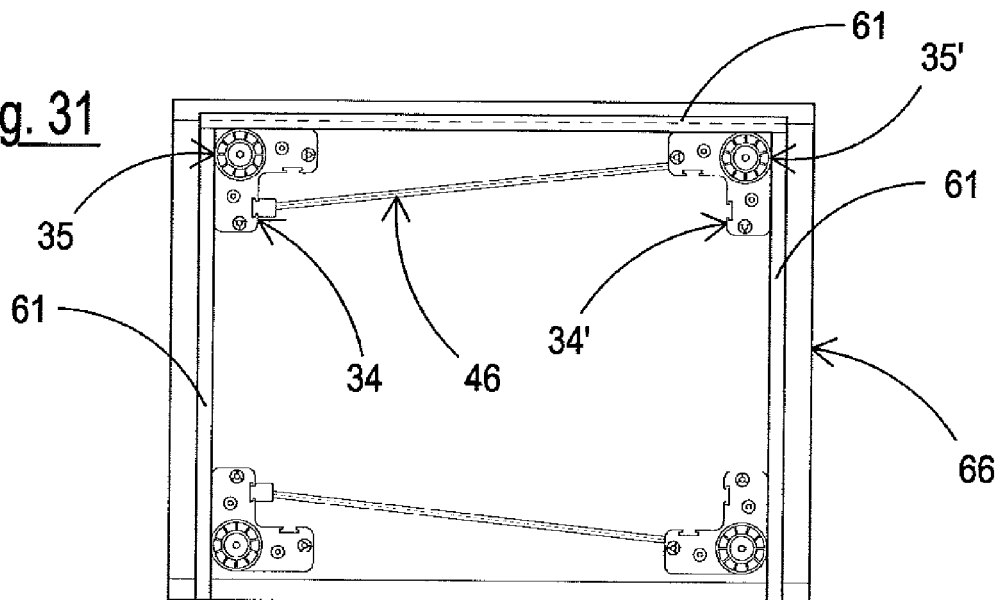
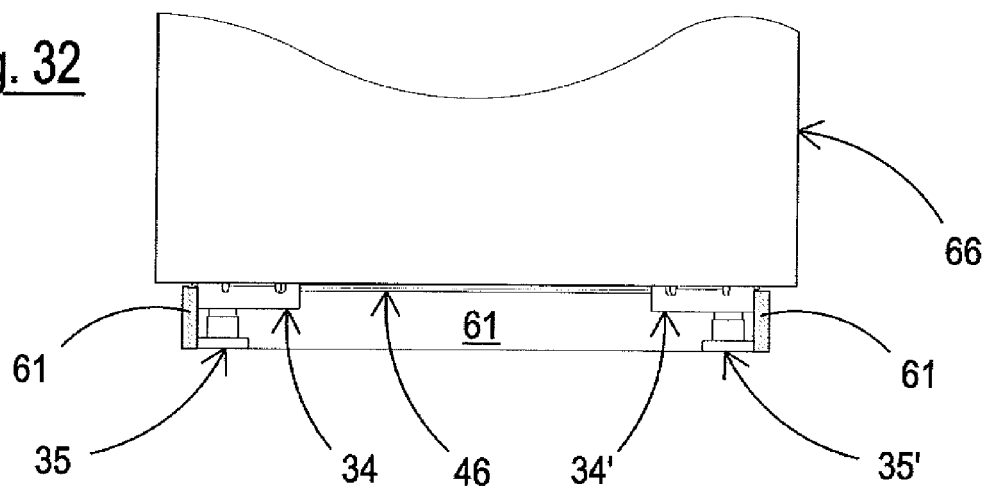


Fig. 32





EUROPEAN SEARCH REPORT

Application Number
EP 13 16 2252

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	AU 2009 227 484 A1 (ROMANY MARK) 6 May 2010 (2010-05-06) * the whole document *	1-16	INV. A47B91/02
A	DE 86 18 790 U1 (SIEMATIC MÖBELWERKE GMBH & CO.) 28 August 1986 (1986-08-28) * the whole document *	2	
A	DE 87 07 258 U1 (FRANKE GMBH & CO KG) 9 July 1987 (1987-07-09) * the whole document *	4	
			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 27 August 2013	Examiner Ottesen, Rune
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			

1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 13 16 2252

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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27-08-2013

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