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(71) Applicant: **CEFLA SOCIETA' COOPERATIVA**
**40026 Imola (BO) (IT)**

(72) Inventor: **Passanti, Andrea**
**I-48012 Bagnacavallo, Province of Ravenna (IT)**

(74) Representative: **Porsia, Attilio et al**
**Via Caffaro 3/2**
**16124 Genova (IT)**

(54) **Metal shelving for displaying goods, and relative assembly and disassembly method**

(57) Metal shelving for displaying goods, of the kind comprising a post (1) having dimensions variable in depth and height, with engagement openings (14, 17) and lateral bores (5); a height-adjustable screw foot (7) to be mounted on the lower end of the post; a base (3) having dimensions variable in depth and height, resting on the ground with at least a height-adjustable foot (24) placed at its distal end, comprising on its proximal end a pair of hooks (12) and a couple of wings (13) having orifice bore (15), and a pin (4), the coupling between post (1) and base (3) occurring through the insertion of a couple of said hooks (12) into said engagement openings (14) of the post (1) and with the insertion of said wings (13) into the corresponding engagement openings (17) of the post (1), and wherein the solidity of the coupling is ensured by said pin (4) transversally inserted in the aligned bores (5) of the post (1) and in the orifice bore (15) of said wings (13), characterised in that said pair of hooks (12) are downwardly opened and that said hooks (12) are realized in a unique piece with opened wings (13), and in that the two resulting pieces (A, B), having hooks and wings (12, 13), are fixed on the sides of a vertical body (23), forming the supporting front (3) and the pieces (A, B) themselves are provided with respective horizontal extensions (25, 125) inserted in the longitudinal cavities of the base (3) and fixed to it with welding (27, 127).

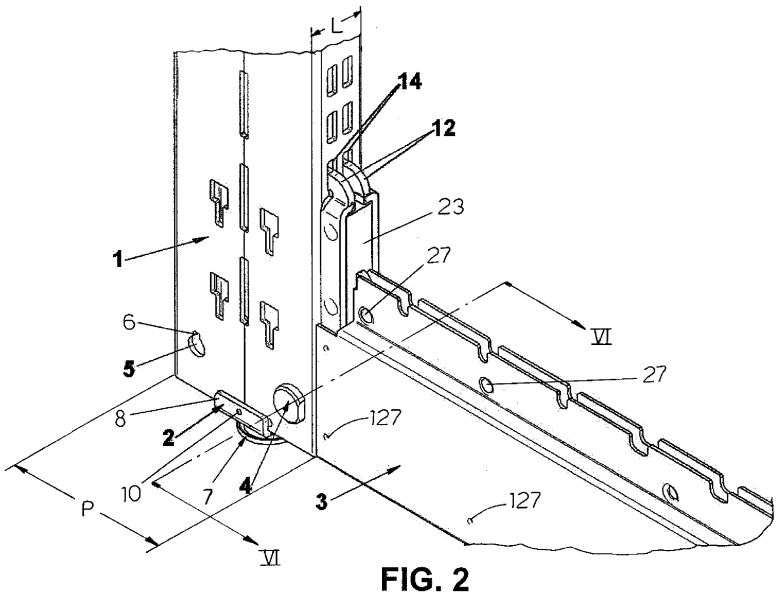


FIG. 2

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## Description

**[0001]** The invention relates to metal shelving for sale of goods, which are notoriously of modular type, typically comprising a pair of posts at whose lower end perpendicular cantilevered bases are fixed; the bases rest on the ground with interposed adjustable feet, and are also hooked and fixed to the posts; moreover at different heights and above said bases horizontal shelves transversally link the two posts; upon the shelves goods are displayed and organized. The two posts are transversally linked to each other, and stabilized with vertical back panels.

**[0002]** Usually a shelving unit has to support goods weighing around 600 kg.

**[0003]** The shelving must be able to be quickly and safely assembled and disassembled, in order to be able to adapt the displaying space to different needs, which can also change over time.

**[0004]** The assembling sequence starts with the fixing of the bases to the posts, bearing in mind that, according to different solutions of prior art, the adjustable feet can be present on bases only or on posts too, and that feet can be applied on posts, before or after the hooking of the base on the post itself.

**[0005]** A limit of the known art is that the means anchoring the base to the post are often fixed through screws or directly welded on the proximal end of the base itself, involving a surface of limited width of the base itself, which is loaded with concentrated and significant loads; this can lead to failure, with the ensuing risk.

**[0006]** At present, feet are dimensioned according to the kind of post, and often the feet possess different shapes and dimensions, e.g. designed for so-called gondola shelving, having bases and shelves on both sides of the posts, or for so-called wall shelving, having bases and shelves on only one side of the posts. A first disadvantage of the known art consists in the assembling and especially disassembling sequence, in that with the known solutions the shelving must be disassembled in all its components (posts, feet, bases) in order to reconfigure.

**[0007]** A further disadvantage of the known art comes from the fact that, having several types of feet with different shapes and dimensions, difficulties may occur in the worksite in finding the correct foot for that specific configuration of shelving. This also translates into a disadvantage for the shelving producer, who is obliged to produce and stock more than one kind of feet.

**[0008]** As prior art, patent US 5 205 421 published in 1993 in the name of R.T. BUSTOS is quoted, which teaches how to connect the base to the post of a shelving through a transversal pin having mainly the aim of forming a hinge. This patent teaches to provide above the base, in correspondence of said hinge, an adjustable supporting means with the post, so as to adjust the verticality of the post itself. This adjustment however does not counter the angular oscillations of the post when detaching the base. Even if this patent anticipates the use of a ground supporting foot at post's bottom end, this solution does not allow to safely disassemble the base while the shelving is loaded.

**[0009]** As prior art ES 2 160 501 B1 patent filed 30-6-1999 in the name of YUDIGAR is quoted, too. This patent teaches that the proximal end of base is provided at its top end with a protruding, upwardly opened, hook, to be inserted into a frontal opening of the post, which rests in the groove of the hook. In the bottom part of the base there are provided transversal bores with which corresponding bores of a pair of wings welded to the base's proximal end are aligned, and in such bores in a second time a transversal pin is inserted, in the form of a bolt or other removable means. In this solution, the post is not provided with supporting feet, which are present only on the base. Therefore, all the weight of the post, of the shelves and of the goods loaded on the shelves weighs on said hook, and especially on said pin; so that disassembling the base when the shelving is loaded is absolutely impossible. Even if there was a supporting foot on the bottom end of the post, the disengagement of the base from the post would require a wide translation toward the ground of the base itself, in order to be able to unhook the top hook from the post, meaning a difficult and cumbersome operation of neutralization of base feet.

**[0010]** As more recent prior arte patent FR 2 956 171 B1 filed on February 10th 2008 in the name of HMY is quoted. This patent describes a solution very similar to that of the preceding Spanish patent, with a base having at its proximal end a higher, upwardly opened, hook, to support the post, and having a pair of lower wings with an opening, which are aligned to corresponding transversal bores for the post, to which they are fixed through a removable pin. This patent differs from the preceding Spanish patent in that said pair of bottom wings are provided with openings having a V profile, with the wider end oriented toward the introducing sense of the hook into the post opening, and bottom-oriented with its tip. The transversal fixing pin crossing the through hole of the lower end of the post, crossing said V-bores, can pass from a loose fixing position at the top end of said opening, when the base hook is inserted into a frontal opening of the post, to a tight fixing position at the pointed tip of the same V-bores, when the post is pushed downwardly, and the higher edge of the opening enters into the groove of said hook. In order to disassemble the base from the post, an inverse operation must be performed, in which the post must be lifted, which is certainly not safely possible when the shelving is loaded. This same patent teaches to group the higher hook and said pair of lower wings in a single metallic insert, produced from a plate sheet through shearing and bending, and provided with a flat body with bores for screws, for fixing to the front of the distal base end; the bottom end of said body is perpendicularly bent to form a bored base which rests and is fixed with another screw to the bottom part of the proximal base end. Top and bottom parts of said body are

bent so as to protrude at the front of said body to form said top, upwardly opened, hook and to form said pair of wings having V-shaped bores. The fixing of said insert body to the base, through screws or welding, does not allow to distribute stress on a wide portion of the base itself, with ensuing problems due to the presence of loads concentrated on small fixing areas. Also, said hook, wings and lower appendix of said insert, produced through perpendicular bending from plate sheet, are undermined in their resistance from the fragility and the cracks which can occur in the bent areas, with ensuing risks.

**[0011]** The present invention relates to an anchoring system of the base to the post of said shelving and has the aim of solving the above explained problems and others, with a shelving having the features of the independent claims and whose advantageous embodiments and improvement are specified in the dependent claims.

**[0012]** According to the present invention, the hook and the wings of the proximal base end are produced in a unique component from pairs of metallic plates fixed on opposing sides of a metallic body forming also the flat beat front of the base with the post; said plates have integral perpendicular extensions which engage in corresponding longitudinal cavities of the base; they are welded to the walls of the body so that a wide portion is reinforced with the proximal end of the base, and therefore this system is capable of better resisting the mechanical stress of the shelving.

**[0013]** According to the present invention, said lower wings are profiled too, so as to work as hooks, to facilitate the insertion of the transversal pin intercepting the post bores and the openings in the lower base wings, hindering movements between base and post, and ensuring the mechanical resistance necessary to oppose all the mechanical stress to which the fixing is exposed, as a result of its own weight and of that of the goods displayed on its shelves. Thanks to the anchoring of the post openings of both the top hooks and the bottom wings of the base proximal end, the mechanical stress to which the shelving is exposed is discharged also on a wide portion of the post, with the ensuing safety advantages.

**[0014]** Moreover, the present invention comprises a unique base with foot, capable of supporting the post independently of its depth varying according to wall or gondola shelving, which is integrally fixed on the lower end of the post itself, which has special reference orifices. The coupling between post and support allows to simply and easily centre the support itself with respect to the post, and allows to keep the two components paired even during shelving assembling and disassembling phases.

**[0015]** The invention will be now described with reference to the seven tables of drawings which illustrates non limiting embodiments, in which:

- Figure 1 a is a perspective exploded view of post, adjusting foot, base and fixing pin, in the assembling phase of these four shelving components;
- Figure 1b illustrates, according to a front perspective, the different components of the insert, comprising the top hooks and the lower wings in an exploded view;
- Figure 1c illustrates according to a rear perspective the insert of the preceding figure, preassembled and ready for the insertion and fixing in the proximal end of the base;
- Figure 2 is a perspective view of the four shelving components of Figure 1, assembled and fixed for their use;
- Figure 3a is a perspective top view of the support of the adjustable foot of the preceding figures;
- Figure 3b is a bottom perspective view of the support of Figure 3a;
- Figure 3c illustrates the support of Figures 3a and 3b according to a transversal section passing for the centre of the screwing seat of the foot shaft;
- Figure 3d illustrates in a perspective view the support and the foot of the preceding figures, assembled on different kinds of posts for metallic shelving;
- Figures 4a and 4b illustrate the base in a perspective view, seen from the distal end and the proximal end of anchoring and fixing to post end, respectively;
- Figures 5a, 5b, 5c illustrate the fixing pin of the base to the post, seen in a perspective, lateral and frontal view, respectively;
- Figure 6 illustrates details detected according the section line VI-VI of Figure 2.

**[0016]** In Figure 1a a perspective view of the four basic component of a shelving unit according to the present invention is shown: a post 1, a support 2 for the foot, a base 3 and a pin 4.

**[0017]** The post 1 can be of different kind and dimensions according to the differing displaying needs: indicatively, the post can have a height variable between 1 m and 3 m, a depth P variable between around 3 cm and 12 cm, and a constant width L (see also Figure 3d). Moreover, the post 1 has in the bottom portion of its side walls at least a bore 5 for hooking a base 3, and specifically for inserting a transversal pin 4. The bore 5 has a circular shape having a radial groove 6 for a key e.g. upwardly oriented. The post 1 shows under bores 5, near its lower end, at least an orifice or a cavity print 19 for joint with a rounded relief 10 present on the support 2 (see below).

**[0018]** Support 2 is produced from a unique plate piece and is shaped to receive a screw foot 7 which allows height adjustment of the post/shelving unit.

**[0019]** Figure 2 shows a perspective view of the assembled basic components: post 1, support 2, base 3 and pin 4.

**[0020]** In Figure 3a the top view of the support 2 is shown, while in Figure 3b the same support 2 is shown in its bottom view. The support 2 has a square shape, with four tongues 8 and 9 on its sides, one tongue for each side. The pairs of opposed tongues 8 and 9 show identical dimensions, different with respect to the adja-

cent side; tongues 8 are longer than tongues 9. The tongues 8 have a reciprocal internal distance which is equal to the width L of post 1 and of base 3. The tongues 8 and 9 have a distance such that the shorter tongues 9 can transversally enter into post 1, without interference, and that longer tongues 8 can be placed with friction outside the post 1 itself, which with its bottom end rests on support 2. Moreover, the tongues 8 show in the mid point of their internal face, a respective rounded relief 10 for joining with one of the corresponding lateral orifices 19 in post 1. The tongues 8 have the internal edge of their superior side opportunely bevelled in order to form a bevelling easing the insertion with interference of the tongues themselves exteriorly to post 1. The support 2 shows a drawn bottom with a re-entering peripheral trait, useful to form a recess of the supporting surface of post 1, in order to reach the maximal vertical adjustment of the post itself. The support 2 has a protruding central portion, on which a threaded central bore 11 protrudes toward the bottom; inside it the threaded shaft 107 of foot 7 is assembled.

**[0021]** Figure 3c shows the support 2 according to a lateral section, from which the position of threaded bore 11 can be appreciated, which firstly re-enters and then protrudes with respect to the supporting plan of the post, so that the final length is such that it can safely cooperate with a long portion of the shaft 107 of foot 7.

**[0022]** Figure 3d shows that the assembly formed by support 2 and foot 7 can be assembled on different kind of posts 1, 1', 1" having different depth P but identical width L.

**[0023]** Figures 4a, 4b show perspective views from opposed ends of base 3, which can have differing depths, indicatively from 20 cm to 95 cm, and differing heights, indicatively from 10 cm to 15 cm. These differing depths and heights are necessary for the different displaying needs. The base 3 shows on the whole a parallelepiped shape, with protrusions on the proximal end to be hooked to post 1. In particular, the base 3 shows on the top portion of its proximal end a pair of hooks 12 upwardly extending, and which are downwardly opened, and in the bottom portion of the same end shows a pair of wings 13, each having a bore 15 internally provided with a groove 16 for a key. The bores 5 of the post 1, and the bores 15 of the wings 13 of base 3, have the same dimensions and have the key grooves 6 and 16 having the same dimensions and the same angular position.

**[0024]** With reference to Figure 1b too, hooks 12 and wings 13 are produced through shearing from plate sheets so that they are integral to each other, and the two pieces A and B which result from this shearing, having each one hook 12 and one wing 13, are welded on the sides of a vertical body 23, to be supported against the post 1 forming the front of the proximal end of base 3. Said perpendicular pieces A and B are provided with a portion having horizontal extensions 25, 125, respectively, which are inserted into corresponding portions of top and bottom longitudinal cavities of the proximal end of base 3. Said extensions 25, 125 and, in case, other parts of the three portions with hooks 12 and wings 13 are fixed through welding and/or other suitable means to the walls of the longitudinal cavities. To this aim, a point, wire, or laser electrical welding can be applied. In Figures 1a and 2, 27 and 127 indicate welding marks as above explained.

**[0025]** Figure 1c shows that the three components A, B, 23 carrying hooks 12 and wings 13 can be pre-assembled before being inserted into the proximal end of base 3. It is apparent that the present solution allows a wide distribution on base 3 of the stress that hooks 12 and wings 13 undergo.

**[0026]** Figures 1b and 1c show that wings 13 have rounded angles, that their bottom side is slightly tilted with a front lift, and that said side is provided on its rear of a recess 26 vertically aligned to the downward opening of hooks 12. These details facilitate the assembling of base 3 to post 1, in that it is easy firstly inserting wings 13 in the respective long engagement openings 17 of the post and then press the base 3 towards the post itself, with the certainty that hooks 12 will enter into their respective short engagement openings 14. When the wings 13 have been completely inserted into the engagement openings 17 and the bottom side of these abuts recesses 26, the base lowers thank to its own weight, while wings 13 anchor to the bottom side of relative engagement openings 14. Thanks to these anchoring, the base 3 is correctly perpendicularly positioned with respect to post 1, and the bores 15 of the wings are correctly aligned to the bores 5 of post 1, so facilitating the insertion of pin 4 crossing said bores 5, 15, ensuring the solidity of the joint between base 3 and post 1.

**[0027]** Figure 5 shows the pin 4, that, according to a known solution, has a small plunger 18 protruding from its profile, thank to the presence of a not illustrated internal spring. The plunger 18 has dimensions suitable for key grooves 6 and 16, so as to allow an easy extraction during disassembling, once that plunger 18 is in phase with the two grooves 6 and 16 (see below).

**[0028]** The solidity of base 3 - post 1 assembly is further ensured through the presence of a washer 20, hindering the accidental extraction of pin 4, if ever plunger 18 happens to be in phase with grooves 6 and 16 (see Figure 6).

**[0029]** Moreover, the head 21 of pin 4 has a faceted shape, with two parallel surfaces 22, facilitating the grip of head 21 itself with a tool for rotating said pin 4 or for extracting the pin itself from its seat during the disassembling of base 3 (see below).

**[0030]** The assembling of a shelving unit according to the present invention takes place with the following steps:

- insertion and anchorage of support 2 in the lower end of post 1. This step is facilitated by the presence of the internal relief 10 on the tongues 8 of support 2 which engage with friction the corresponding orifices 19 of post 1;
- to the assembly comprising post 1 and support 2,

base 3 is anchored through hooks 12 and wings 13. The proximal end of base 3, with said portion 23, adheres to the front part of post 1, inserting the pair of wings 13 into the long engagement openings 17 and the pair of hooks 12 into short engagement openings 14;

- base 3 is translated towards the ground so that hooks 12 anchor to the bottom side of engagement openings 14 and that wings 13 anchor to the bottom side of engagement openings 17, aligning bores 15 to bores 5 of post 1;
- in the transversal seat formed by bores 15 of wings 13 and by bores 5 of post 1, which show grooves 6 and 16 aligned to each other, the pin 4 of Figure 5 is inserted, without any phase constraint, in that the plunger 18 withdraws into pin 4 itself, contrasting the action of its antagonist spring;
- when the head 21 of pin 4 is adjacent to post 1, on the opposed end of pin 4 a washer 20 is inserted, which overcomes with a release plunger 18 and is held against the post, to ensure the impossibility of an accidental extraction of pin 4 from its seat;
- lowering and unscrewing of foot 24 from base 3 to bring it in contact with the ground and to adjust the verticality of post 1.

**[0031]** The disassembling of the shelving according to the present invention occurs according to the following steps:

- manual backing of plunger 18 into the pin 4 and consequent extraction of the pin from safety washer 20;
- if plunger 18 is not aligned with key grooves 6 and 16, pin 4 is rotated with a tool to realize said alignment among parts 18, 6, 16;
- extraction of pin 4 from its seat 5, 15;
- unhooking of base 3 from post 1 with ensuing steps of uplifting to unhook hooks 12 from short engagement openings 14, and wings 13 from relative engagement openings 17, successively moving away from base of the post to extract the same hooks 12 from engagement openings 14 and wings 13 from long engagement openings 17.

**[0032]** One of the advantages of the present inventions comes from the fact that the disassembling of a base 3 from its relative post 1 can safely occur even when the shelving is loaded with goods or is assembled. This is possible thanks to the downward opening of hooks 12 and of recesses 26 of wings 13, which allows an easy extraction of base 3 simply lifting it after having freed it from the transversal constraint of pin 4, and it is also allowed by the fact that the post 1 does not rest on the base, but rests directly on the ground through its bottom assembly formed by support 2 and foot 7.

**[0033]** In the present invention the modification comprising the substitution of pin 4 and safety washer 20 with equivalent means is comprised, for instance a bolt or other means capable of forming a bolt releasable constraint, with safety means hindering the accidental extraction.

**[0034]** The present description is referred to a preferred embodiment of the invention, to which modifications can be applied without departing from the basic principles of the invention as described, illustrated and claimed. In the claims, the reference in parentheses are purely indicative and not limiting of the protection scope of the claims themselves.

LEGEND:

**[0035]**

1. post
2. support for screw foot
3. base
4. pin
5. bore
6. key groove
7. screw foot
8. long tongues
9. short tongues
10. relief
11. threaded bore
12. hooks
13. wings
14. short engagement openings
15. bore
16. key groove
17. long engagement opening
18. plunger
19. orifice for relief 10
20. safety washer
21. head
22. prehensile walls of head 21
23. vertical body joining parts A and B;
24. adjustable foot of base 3
25. 125 horizontal extensions of pieces A and B with hooks 12 and wings 13;
26. recess of wings 13 which allows their hook function;
27. 127 welding marks on base 3 for fixing components A, B and 23.

## Claims

**1.** Metal shelving for displaying goods, comprising:

- a post (1) having dimensions variable in depth and height, with frontal engagement openings (14, 17) and lateral bores (5);
- a height-adjustable screw foot (7) to be mounted on the bottom part of the post;
- a base (3) having dimensions variable in depth and height, resting on the ground with at least

one height-adjustable foot (24) at its distal end, comprising on its proximal end a couple of hooks (12) and a couple of wings (13) with bores (15), and
- a pin (4);

wherein the assembling between post (1) and base (3) occurs through the insertion of a pair of said hooks (12) into said engagement openings (14) of post (1) and with the insertion of said wings (13) into engagement openings (17) of post (1), wherein the solidity of the coupling is ensured by said pin (4) transversally inserted in the aligned bores (5) of post (1) and bores (15) of said wings (13),
**characterised in that**
said pair of hooks (12) are downwardly opened and that said hooks (12) are produced in a single piece with the open wings (13) from plate sheets, and the two resulting pieces (A, B) with hooks and wings (12, 13), are fixed on the sides of a vertical and linear body (23), forming the leaning front of the proximal end of base (3), and pieces (A, B) themselves are provided with respective horizontal extensions (25, 125), inserted in the longitudinal cavities of base (3) and fixed to it through welding (27, 127) and/or with other suitable means.

**2.** Shelving according to claim 1, wherein wings (13) have rounded angles and on their bottom side are provided of respective recesses (26) downwardly opened and aligned to the grooves of top hooks (12), to allow the hooking of the wings into the respective engagement openings (17), in order to allow a wider distribution of stress on post (1) and to correctly align bores (15) of wings (5) of post (1), to ease the insertion in said bores (5, 15) of said fixing pin (4).

**3.** Shelving according to claim 1, wherein bores (15) in wings (13) of base (3) and bores (5) in post (1), to be crossed by said fixing pin (4), have respective in phase key grooves (6, 16).

**4.** Shelving according to claim 3, wherein said fixing pin (4) has a spring plunger (18) to ease its assembling and disassembling.

**5.** Shelving according to claim 4, wherein the head (21) of fixing pin (4) has at least two lateral sides parallel to each other to ease its grip with a tool.

**6.** Shelving according to claim 4, wherein fixing pin (4), once assembled, is secured through the presence of a pull-resistant washer (20) which blocks plunger (18).

**7.** Shelving according to claim 1, wherein a unique type of base (2) is present, with quick and stable mounting on the bottom end of different kind of post (1), said base (2) being provided with a threaded bore (11) to house screw foot (7).

**8.** Shelving according to claim 7, wherein support (2) shows two pairs of opposed tongues (8, 9) protruding toward top with different heights, whose consecutive end are not in contact, whose free angles are rounded and are dimensioned so that shorter tongues (9) can be inserted without interference and transversally in the bottom end of post (1), which with its lateral walls lean against longer tongues (8), which internally have respective protrusions (10) for joining with corresponding orifices (19) on the external side walls of post (1), on which said tongues are inserted with friction.

**9.** Shelving according to claim 7, wherein support (2) shows a recess of the resting surface of post (1), made so as to have the maximal vertical adjustment of post itself, support 2 showing a central threaded bore (11) protruding toward the ground, for mounting threaded shaft (107) of foot (7), so that said the position of threaded bore (11) is slightly re-entering with respect to the support surface.

**10.** Method for assembling the shelving according to one or more of the preceding claims, **characterized by** the following steps:

- insertion/anchoring of support (2) in post (1), eased by the presence of rounded protrusions (10) on support (2) and of corresponding orifices (19) in post (1) which are release-engaged by said protrusions;
- coupling of base (3), through hooks (12) and wings (13), to the assembly comprising post (1) and support (2); the proximal end of base (3) is adhered to anterior part of post (1), firstly introducing the couple of wings (13) in long engagement openings (17) and successively pushing base (3) toward post (1) so that hooks (12) enter into short engagement openings (14) to which they are aligned, and;
- hooking of base (3) to post (1); at the end of the abutting travel to post, thank also to its weight, base (3) is translated towards the ground so that hooks (12) hook on the bottom side of short engagement openings (14) and that wings (13) hook to long engagement openings (17), with final perpendicularity of base (3) with respect to post (1) and with alignment of bore (15) of wings (13) to lateral bores of (5) of post (1) itself;
- insertion of pin (4), without phase constraint for its plunger (18), into the seat comprising bores (5) of post (1) and bores (15) of wings (13) which have in phase key grooves (6, 16);
- insertion of safety washer (20) on the distal and

protruding end of pin (4), with interposition of the washer between spring plunger (18) which reverts to active position, and post (1), to hinder accidental extraction of pin (4) from its seat.

**11.** Method for disassembling the shelving according to one or more of the preceding claims, comprising the following steps:

- neutralization of plunger (18) of pin (4) to allow its extraction from safety washer (20);
- if necessary, pin (4) rotation to bring its plunger (18) in phase with key grooves (6, 16);
- extraction of pin (4) from its seat;
- lifting of base (3) and subsequently leaving from post (1) to unhook and extract hooks (12) from short engagement openings (14) and to unhook and extract wings (13) from long engagement openings (17);

and **characterised in that** said disassembling can occur even when shelving is loaded with goods or anyhow assembled.

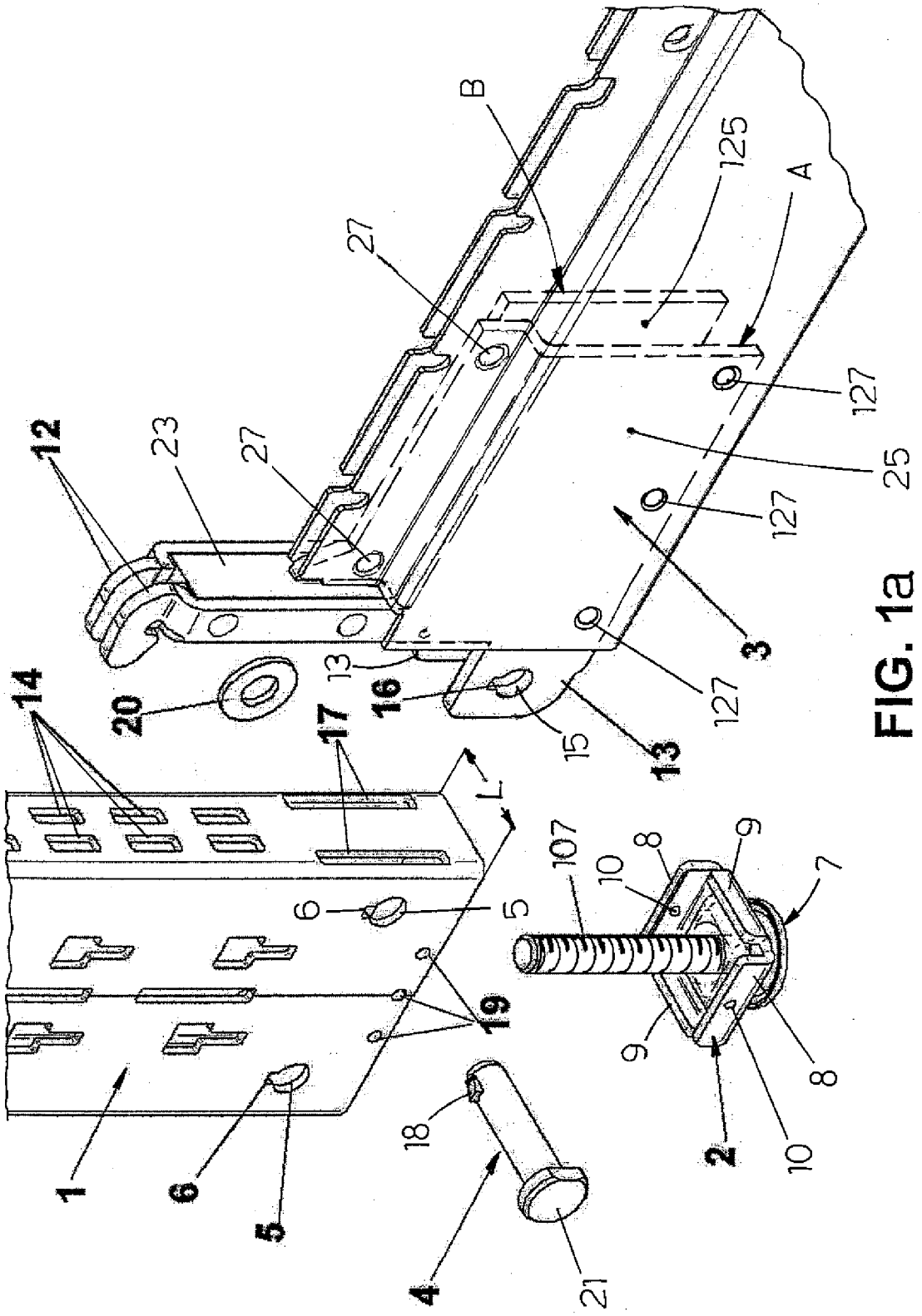
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FIG. 1a

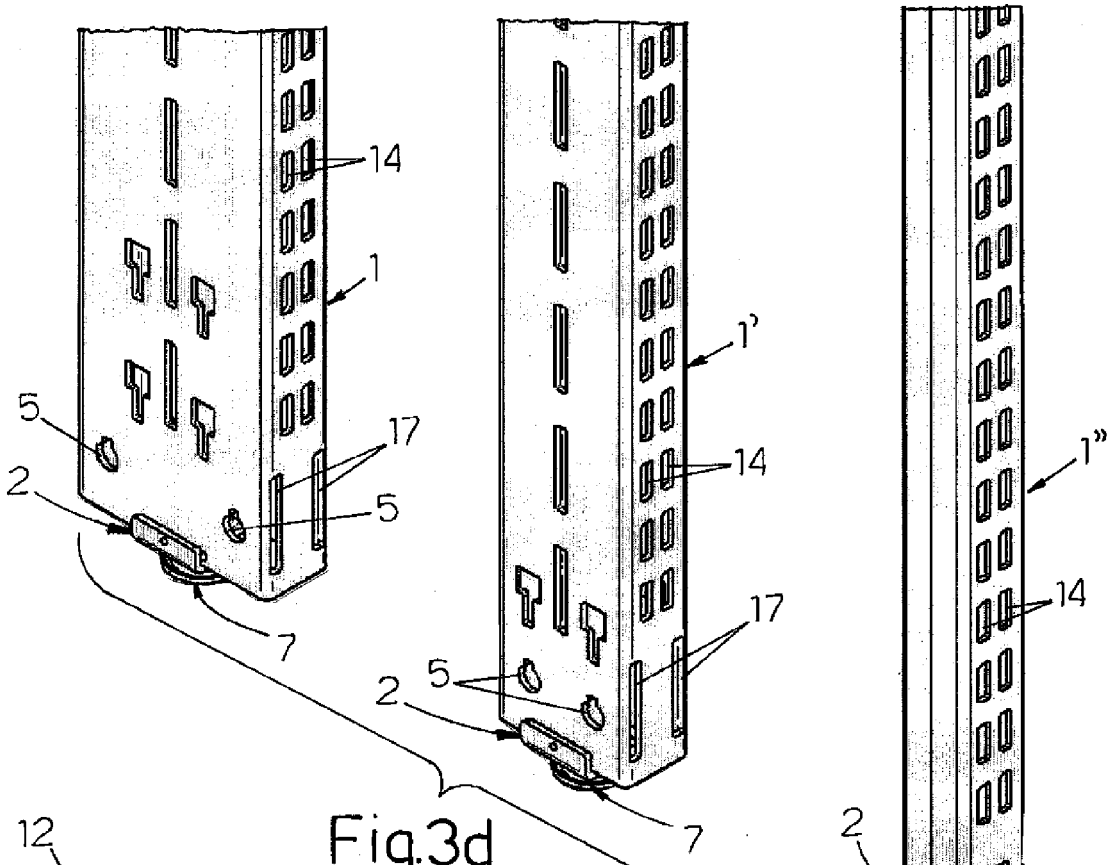


Fig.3d

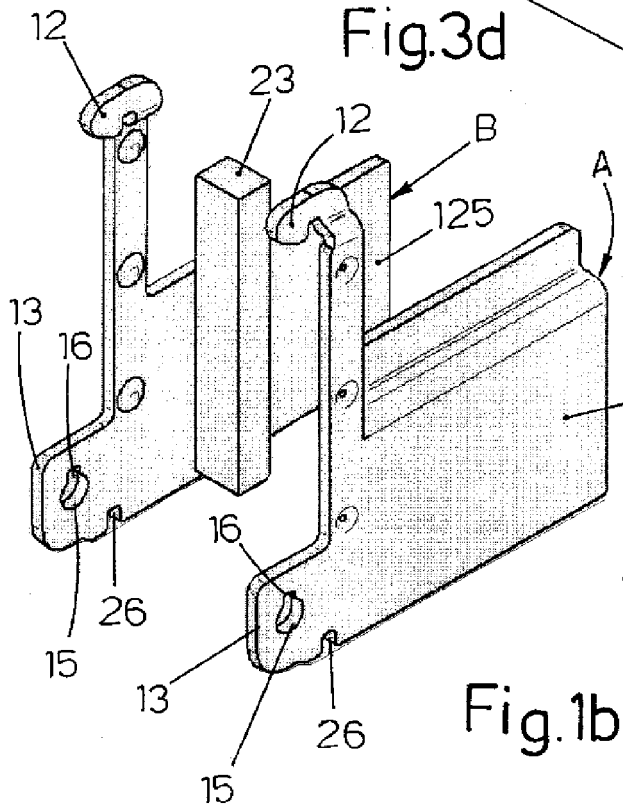


Fig.1b

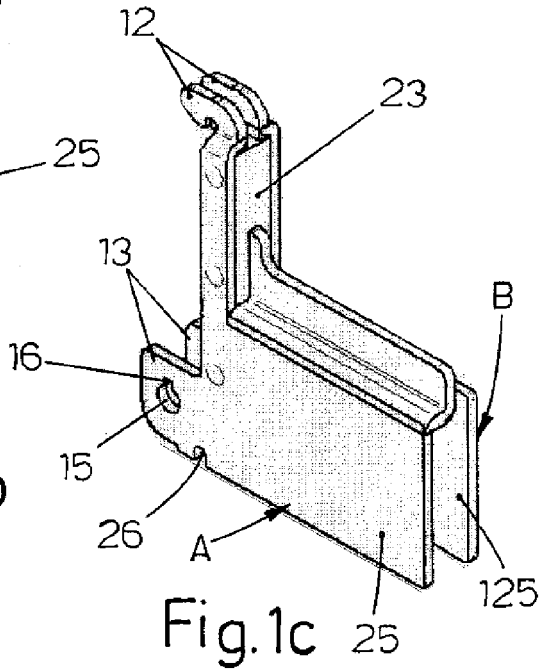


Fig.1c

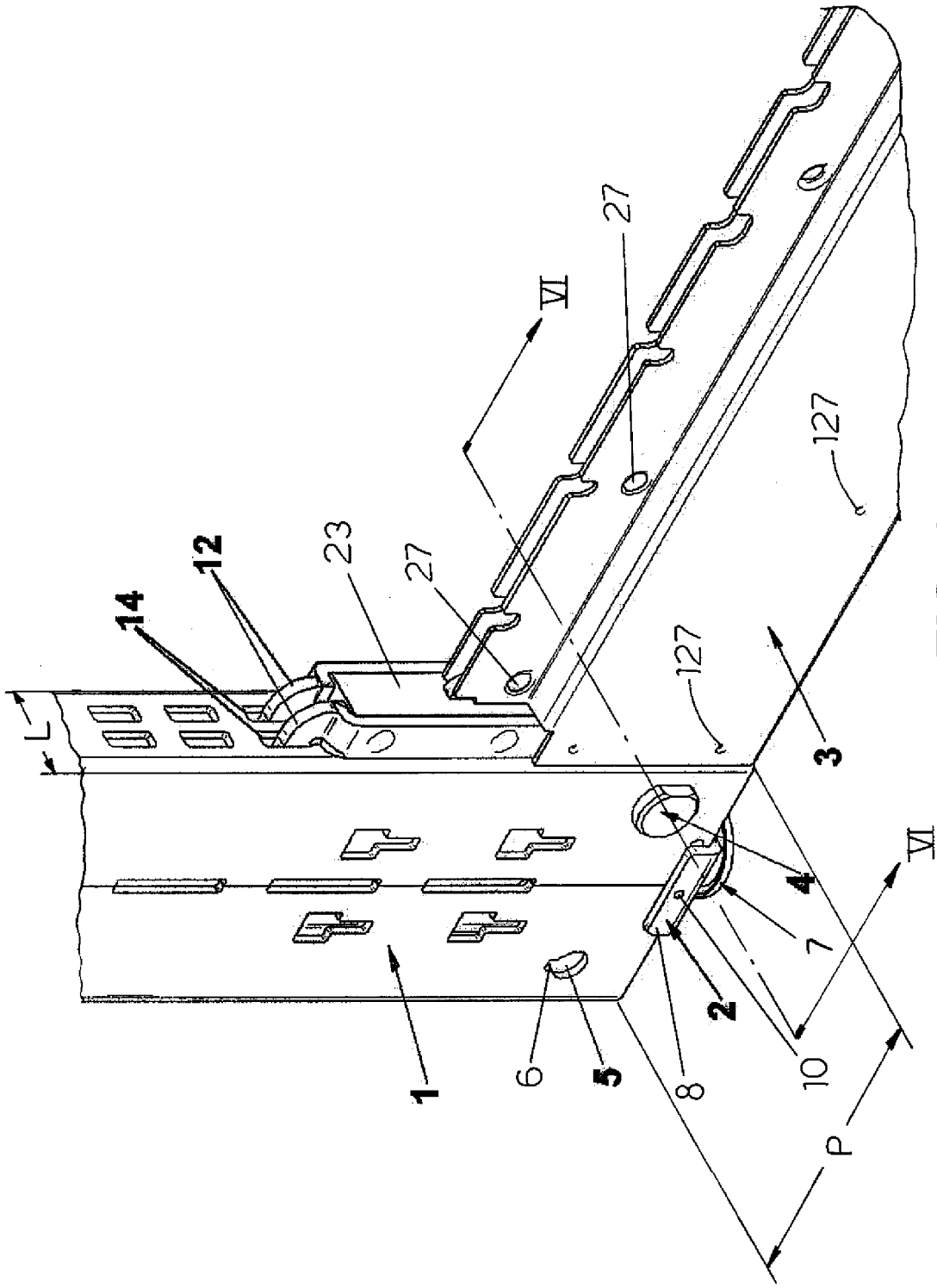


FIG. 2

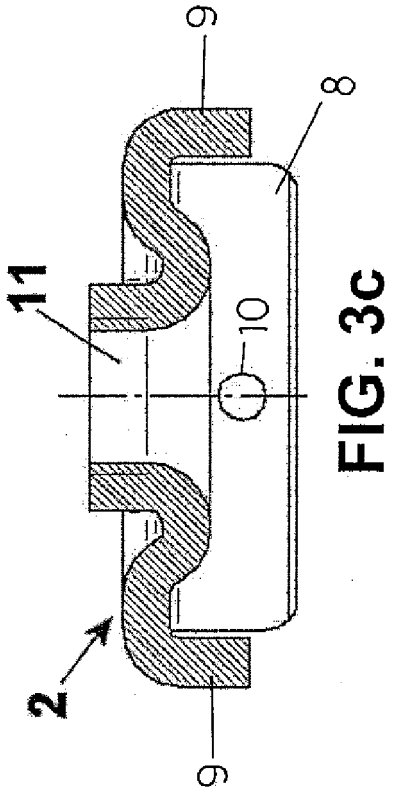


FIG. 3c

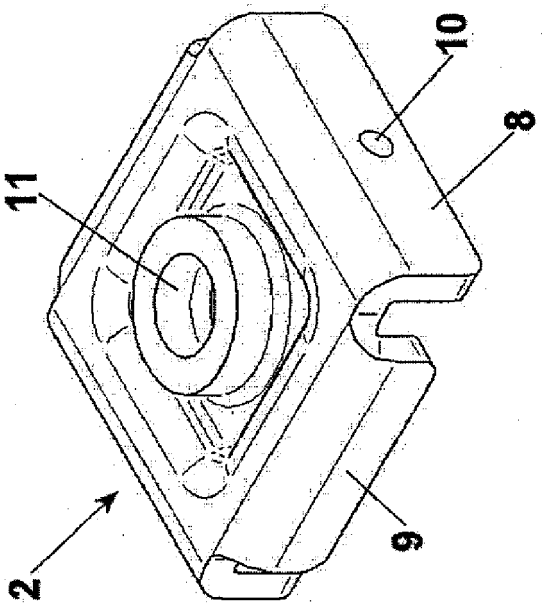


FIG. 3b

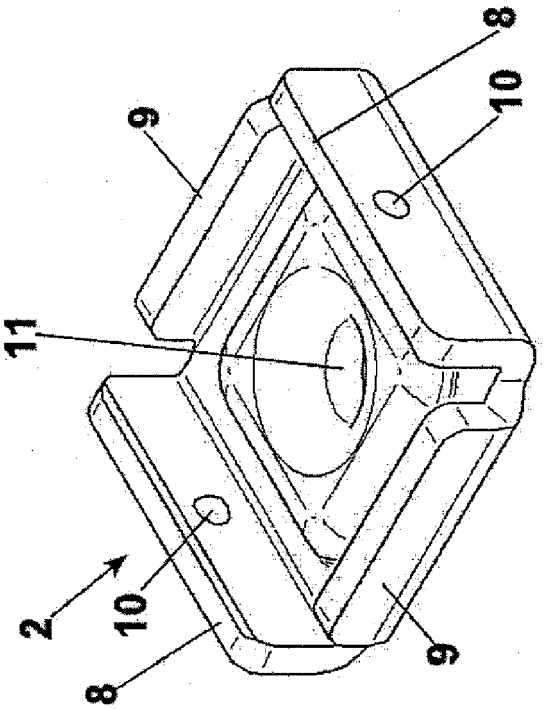


FIG. 3a

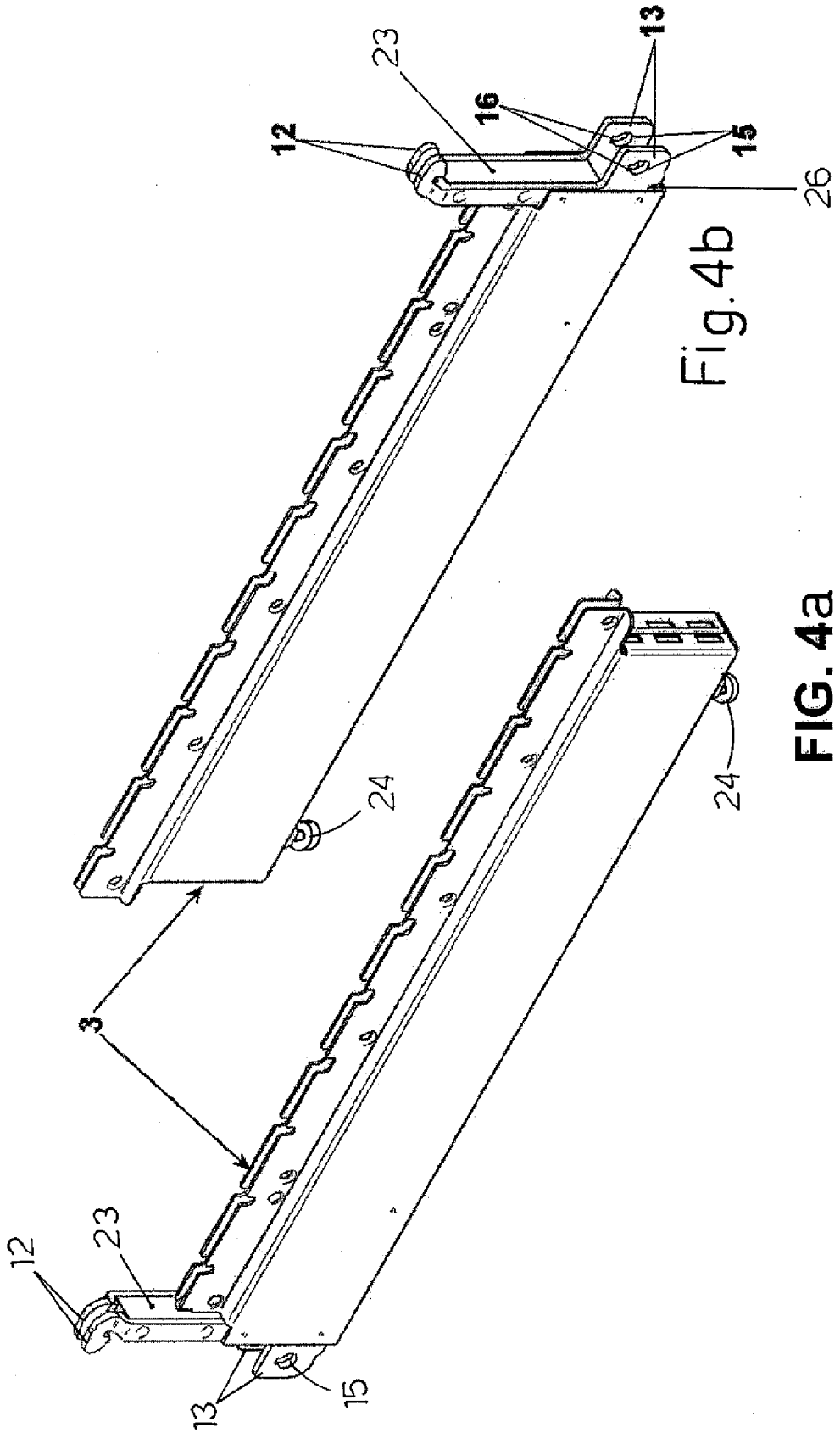


Fig.4b

FIG. 4a

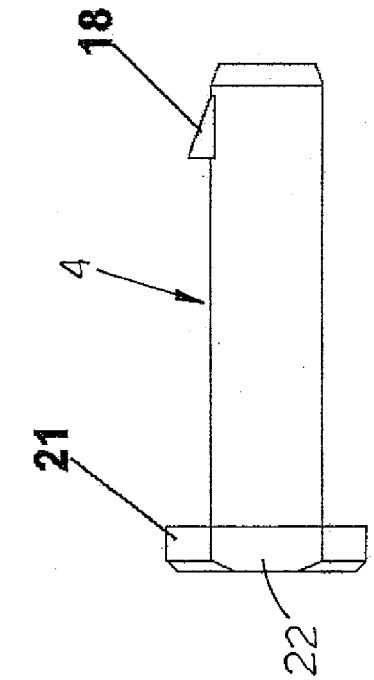


Fig.5b

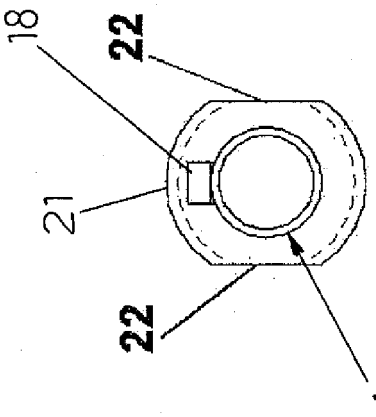


Fig.5c

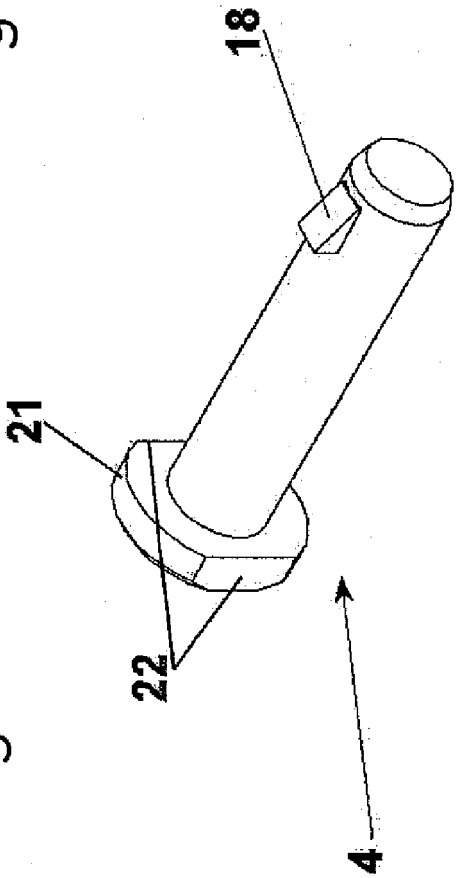


FIG. 5a

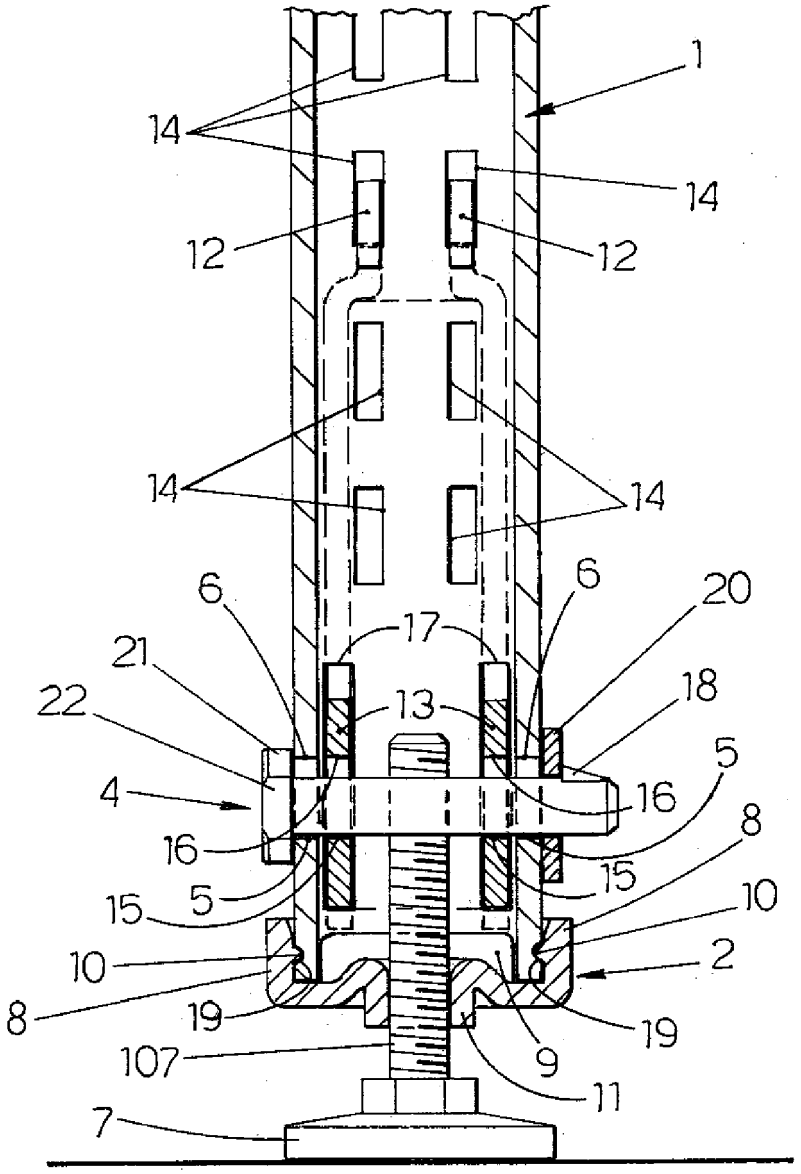
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Fig.6

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# EUROPEAN SEARCH REPORT

Application Number
EP 14 17 0501

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