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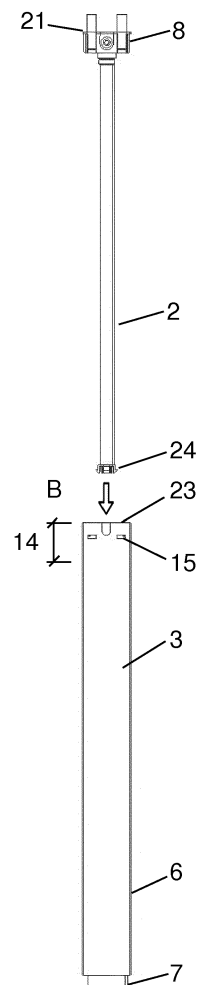
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(54) **DEVICE AND METHOD FOR ASSEMBLY AT A HEIGHT-ADJUSTABLE DISC**

(57) A device and a method for assembling and securing of a complete spindle unit (2) provided with a bevel gear (1) inside a telescopically extendable leg (3). The device is characterized by that it comprises at least one locking device (8, 24), which locks the complete spindle unit (2) provided with a bevel gear (1) in an end position inside the telescopically extendable leg (3) by a self-locking function, preferably a so called snap-function or click-function, when said complete spindle unit (2) during one single assembling step (B) is inserted into the telescopically extendable leg (3) and there finally arrives in its end position inside the leg (3), by that the device comprises at least one therefore dedicated locking device (8, 24).



**Fig. 1b**

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## Description

### Technical field

5 [0001] The present invention relates to a device and method for simplified and quick mounting and securing of a so-called spindle drive, inside a telescopically extendable leg. The spindle unit is fitted with a bevel gear, which, for example by a motor or a hand crank, transmits a rotary motion from a pinion gear to another pinion gear, which effects a threaded rod or the like, which is a central part of the spindle unit. By mounting such a complete spindle unit inside a telescopically extendable leg, it becomes possible to transfer a rotational motion to a linear motion for actuating the length of the telescopic leg. The invention is used in the assembly of said complete spindle unit inside a telescopically extendable leg, which leg is primarily intended to be used in combination with a height-adjustable disc, such as that at a desk or the like, but is also applicable to other types of height-adjustable discs, such as discs for coffee tables, kitchen counters, kitchen islands and more. For simplicity, the invention is exemplified hereinafter in relation to a height-adjustable desk.

### 15 Background of the invention

[0002] A standard model of a complete height-adjustable desk is usually composed of a number of key components such as table top, two complete telescopically extendable legs, one foot per leg, a beam or beam frame that connects the two legs to a frame, at least one lateral strut per leg, which fixes the table top to the respective leg/frame and simultaneously brace up the complete desktop, as well as some kind of drive to achieve raising/lowering of the table top, such as a motor or a crank. Added to this is a larger or smaller amount of other parts or accessories that may exist, depending on how advanced model that is desired. Due to that a fully assembled desk is bulky, the table top, possible side struts, the complete telescopically extendable legs, possible cross beam or frame and feet, etc. are delivered as loose parts, which are assembled into a complete desk by the end customer.

25 [0003] In the field of height-adjustable tables or discs there are several different techniques to accomplish the setting of the height of the table. There are for instance scissor lift solutions, but the most common solutions in the market, are solutions with telescopic adjustable legs, which normally are connected in pairs to a common table frame, on which the table top is placed. With the telescopic movement refers to a linear movement which can be achieved by for example a gas spring or the use of a so-called complete spindle unit. Gas spring solutions are completely dominating at height adjustable chairs, but for tables or discs it is more common to use various "spindle solutions". The present invention relates to the latter.

35 [0004] A spindle unit comprises for example a threaded rod or screw, also called spindle, surrounded by a housing of any shape such as a square or a round tube. The tube has at its upper end a nut where the threaded rod is screwed through, and thus the threaded rod is rotatable in the housing and screwed out of or into the housing to accomplish a linear movement. In the top of the spindle unit is any type of gear provided, usually a so called bevel gear. This bevel gear can be designed in various ways, but according to function, a rotational motion in one direction - for example, around a horizontal axis - is transferred to a rotary motion in another direction, often perpendicular to the first - for example, around a vertical axis. In this way, a user of a height-adjustable table can for example use a crank for transferring the rotational movement to a linear motion of the telescopically extendable leg/legs. The legs are motionally paired so that a rotation of the crank is transmitted to both legs simultaneously. Alternatively a motor drive used to achieve the same.

40 [0005] A common type of table leg of telescopic type in connection with height-adjustable desks consists of two or more tube fittings of different dimensions, which are arranged to run into one another, and the positioning of the complete spindle unit including the bevel gear is made inside the telescopic leg. In terms of a position of use of for example a desktop, the top part of the spindle unit is attached to the upper tube part and the lower part in the lowermost tube portion, and a rotation of the threaded rod in one direction pushes, so to say the tube portions apart, wherein said leg is extended and vice versa. In known solutions, the assembly of the complete spindle unit is done by that the spindle unit including the attached gear is brought into the tube parts and thereafter anchored via screw connection. At the upper end, the force of impact on the attachment, acts in multiple dimensions, why this attachment must be robust and may for example consist of welded steel brackets inside the upper end, for support and control of the bevel gear, and a plurality of screws anchors the bevel gear in the upper tube part. By that the bevel gear itself doesn't includes any threaded holes for the screw connection, for example a special plate must firstly be mounted between the bevel gear and the spindle unit, which plate then comprises the threaded holes arranged for anchoring to the upper part. In the lower end of the lowermost tube part is usually a welded bottom plate with a centrally located hole positioned, in which the lower end of spindle unit is secured with a screw. Taken together, existing solutions for assembly and securing of the complete spindle unit for the telescopic extendable leg, means that several details and elements such as welding steel angles to it, mounting extra screw plate and handling and installation of a number of screws at the top end of the spindle unit as well as at its lower end, which affects both the production cost and the time of assembling a complete telescopic leg.

**Disclosure of the invention**

5 [0006] With the present invention the object is achieved to simplify and shorten the assembly time and thereby obtain a lower production cost at production of telescopically extendable legs for mainly height-adjustable discs, preferably to desktops. From a first aspect of the invention the object is achieved by that a device of the kind specified, comprises at least one locking device, which is arranged to secure the complete spindle unit inside the telescopically extendable leg by a "self-locking" feature. Preferably this is done by that the complete spindle unit is fastened with a snap/click while the complete spindle unit is fitted inside the leg and there arrives at a designated final location in the leg. For example, 10 the lock/ lock devices can be a special detail arranged at the complete spindle unit or, for example, a part of the bevel gear or its casing. For products in large series where one and the same type of bevel gear is used for the same type of telescopic leg, it may be an idea to design a specially adapted bevel gear, where the locking device is a part of the bevel gear. In other cases it may be most advantageous to use specific details provided with locking devices. Furthermore, also the locking means can be a part of the leg or a particular detail of the leg, which engages with the complete spindle unit and secures the same to the leg by the snap/ click function. Through a locking device arranged for snap assembly, 15 the assembly is very fast and smooth compared to the on the market existing solutions.

[0007] According to a preferred embodiment, the device comprises a first adapter, which is arranged to hold and secure the bevel gear attached to the spindle unit to the upper end of the upper tube part of the telescopic leg. This is possible by that the adapter includes a receiving space, adapted to hold and secure the bevel gear, and that at least parts of the outer dimensions of the adapter housing are dimensionally coordinated with the interior dimensions of the upper tube part, in which the adapter together with the spindle unit is insertable. By this the adapter is guided during the introduction of the same in the upper tube part, and additionally the bevel gear is secured against turning, because it is held by the adapter, which in turn is guided by the upper tube part. Further, the adapter housing comprises at least one resilient first tongue, but preferably two or more, resilient first tongues. The tongue "aligns" in principle with the adapter housing dimensions, but also includes at least one wedge-shaped first locking lug, which has its sharp end closest to 20 the insertion direction of the adapter, that is it is extending from a level flush with the outside dimensions of the housing and outwards to a level outside the housing dimensions, and ends with a sharp locking edge to prevent a movement opposite to the direction of insertion. Hereby, during the insertion of the adapter into the upper tube part, the first resilient tongue will be pushed inwards, in direction towards the receiving space. Thereafter, when the adapter arrives to a designated end position in the upper tube part, the resilient first tongue snaps out to its resting position again, by that the upper tube part comprises a locking arrangement in the shape of a recess in the tube wall, which recess is arranged to receive the locking lug of the respective tongue. In this mode the locking lug secures the adapter into the upper tube part of the telescopic leg, whereby the adapter cannot be moved in length direction of the leg. The above described and preferred embodiment of the adapter can of course also be designed as an adapter which is mounted outside the upper tube part. In the same way the adapter then includes a receiving space provided to hold and secure the bevel gear, but 25 the guiding of the adapter and the locking by the resilient tongues takes place so to speak, from the outside as well as the outer dimensions of the upper tube part may conform to the interior dimensions of the adapter housing, and that the resilient tongues spring out when imposing the adapter and then snap into the recesses and locks the adapter to the upper tube part. Through the first adapter, it is thus possible to mount and secure the complete spindle unit including bevel gear in the telescopic leg, without having to weld the special plate brackets of the upper tube part, without the need to install an extra screw plate between the spindle and gear and also avoid handling and use one several screws, which older solutions require. The adapter is simply pushed into the tube until it snaps into place, which is an advantage during assembly and a simplification compared with previous solutions. 30

[0008] In a preferred embodiment of the invention, the first adapter housing comprises a locking space behind each resilient tongue. The locking space is a cavity which is sufficiently wide/deep to allow the resilient tongue to spring out when the adapter is assembled into the upper tube part. When the adapter then has arrived in its final position, and the locking lug/lugs have snapped into the recesses in the wall of the upper tube part, the resilient tongue is of course back into its resting position, whereby the locking space again holds its original size. The locking space is further arranged to receive a locking washer, which after the adapter is locked into position in the upper tube part, is inserted into the locking space with its entire length. Thus, the locking space is at least almost completely occupied by the locking washer, 35 wherein the resilient tongue is unable to change position, and thus the adapter is fully secured in the upper tube part, which makes the complete spindle unit including bevel gear is at least as securely mounted as in older solutions screwed devices. The advantage is as previously mentioned, that the assembly can be done through one single motion in which the spindle unit with adapter and the locking washers are pushed into the telescopically extendable leg and secured there, without to handle and assemble a plurality of screws. The locking washers are in a first position slightly stuck into the locking space, enough to be in position during assembly through one movement, but not more inserted than the resilient tongue can spring. The locking washers are pushed in as said, when the adapter is locked into place in the upper tube part. 40

[0009] In a further preferred embodiment, the first adapter comprises a screw plate, which is fixedly arranged in the 45

adapter by being inserted in a therefore designated recess in one of the adapter housing walls. The screw plate is preferably a plate of metal, which includes a pair of threaded holes. When the adapter is fitted and secured as described previously, by a screw connection between the upper tube part of the telescopic leg and the screw plate, an adequate stability and strength is achieved, because the adapter including spindle unit and bevel gear is screwed into the upper tube part, which is prepared with through holes for the screws of the screw plate.

**[0010]** According to a preferred embodiment, the device comprises a so-called lateral strut, which partly is arranged to be screwed to the table top and partly in the screw plate. By this, the table top is connected with the table frame, but it is also achieved that the adapter is further fixed to the leg because, instead of screwing the adapter directly into the leg as in the embodiment above when the lateral strut is fitted to the leg, the screw is also fastened to the screw plate that is integrated into the adapter. This achieves adequate stability and strength when the adapter including spindle unit and bevel gear is screwed into the telescopic leg. This happens so to speak during the final assembly of the desktop when the table frame is connected with the table top. In previous solutions, the assembly of the side strut basically only meant a fixation of the same, but did not contribute to further fixation of the complete spindle unit, while the latter was made in a separate step.

**[0011]** According to a further preferred embodiment, the first adapter comprises a corbelling at its upper edge, which in the assembled final position of the adapter rests on the upper edge of the upper tube part. By this stop, the adapter is prevented from disappearing into the upper tube part during assembly if the locking lugs for some reason would not engage with the recesses of the tube. When the assembly continues as planned and the locking lugs engage with the recesses, an upward movement of the adapter is blocked by the locking lugs and at the same time as a downward motion is prevented by the upper edge of the upper tube part along with the corbelling, whereby the adapter is fully locked in the length direction of the leg. The benefits compared to older solutions are that the exact fixation of the adapter longitudinally in the upper tube part allows the later installation to continue smoothly, because the adapter is in position and in the exact location for installing the lateral strut alternatively only screw for solutions that lacks the lateral strut.

**[0012]** In a further preferred embodiment, the device comprises a second adapter which is arranged to hold, guide and secure the lower end of the spindle unit to the lower end of the lower tube part of the telescopic leg. This is possible because the second adapter is fixedly assembled to the lower part of the spindle unit and that it comprises at least two resilient second tongues, respectively provided with a wedge-shaped second locking lug. At the spindle unit's entry in the telescopically extendable leg, the locking lugs will, through its wedge shape, guide the lower end of the spindle unit into a designated second locking arrangement. This second locking arrangement is disposed inside the lower end of the lower tube part. When the spindle unit is mounted in the telescopic leg, the second locking arrangement will, because of its design, press the resilient second tongues from its rest position, when the wedge-shaped second locking lugs passing through the second locking arrangement. After the locking lugs just passed with its wedge-shaped body, they spring out again, whereby the second adapter, so to speak, snaps into the second locking arrangement by that the wedge-shaped second locking lugs ends with a sharp locking edge and thus, the lower end of the spindle unit is fixedly fastened to the telescopically extendable the leg. As mentioned earlier, older solutions only exhibits screw assembly or the like for fixing and securing of the lower part of the spindle unit to the telescopic extendable leg. The present invention now solves the assembly by a simple snap function while the spindle unit is inserted into the leg to a final position, whereby the complete spindle unit, in an assembly-friendly and secure way is snapped in position.

**[0013]** According to a preferred embodiment of the immediately foregoing embodiment, the second adapter also comprises a snap locking means, arranged for snapping of a foot portion to the telescopically extendable leg. This makes it easy to quickly and easily assemble a foot to the leg, either at the site of an end consumer or at the assembly line. Preferably the snap locking means is supplemented with an additional safety device for adequate strength, for example by screw connections between the second adapter and the foot portion.

**[0014]** From the second aspect of the invention the object is achieved by a method of mounting and securing the spindle unit provided with the bevel gear, inside the telescopically extendable leg. The main purpose of the invention is to facilitate the assembly and thus reduce assembly time and the cost of the final product. This is achieved by one single assembling step, wherein the spindle unit including the bevel gear is introduced into the telescopically extendable leg, until it arrives in a final position in the leg, whereby it automatically locks to the leg by that it preferably snaps or clicks into place. This is a considerable advantage during assembly compared with older solutions where everything is fastened by screws in different steps. Now the complete spindle unit is fixed in the leg in a fast and easy way in one single movement by a snapping function.

**[0015]** According to a preferred embodiment, the object is achieved by that the spindle unit with the bevel gear is provided with the first adapter and the second adapter, as described above. These are pre-assembled on the spindle unit in a first pre-assembling step. During assembly, the complete spindle unit is introduced into the telescopically extendable leg, which leg consists of at least two tube parts, one upper and one lower, wherein the lower runs inside the upper tube part. By that the adapters and the upper tube part are arranged as described above, briefly described as that the first adapter is arranged to be inserted in, and snap into the first locking arrangements of the upper tube part, and that the second adapter is arranged to be inserted in, and snap into a second locking arrangement in the lower tube

part, it is possible to fixedly fasten the complete spindle unit inside the leg by one single assembly step. The complete spindle unit is simply inserted inside the leg and is then pushed in until it fixedly snaps at its upper and lower end simultaneously, while the spindle unit arrives to its final position. The final position of the complete spindle unit in the telescopic leg is given by the first and the second locking arrangement, but an advantage is also if the first adapter comprises at corbelling at its upper end, which provides a stop of the insertion movement of the complete spindle unit at the final position. By this, if the assembly would be in an incorrect way, it is impossible to insert the complete spindle unit to deep into the leg. Older solutions is based on that the spindle unit with the bevel gear is provided with some form of screw plate or the like, in which the bevel gear and thus the spindle unit may be anchored by screwing in the telescopic leg. The upper tube part and the lower tube part is also provided, according to prior art, with different guiding brackets, which are welded inside the tube parts and which hold the bevel gear and the lower part of the spindle unit inside the tube parts. A number of screws are then used to secure the spindle unit to the leg. With the currently present invention, a quick, easy and secure mounting of the spindle unit in the telescopically extendable leg is achieved, with less details and steps to handle.

**[0016]** According to a preferred embodiment of the invented method, the assembly step is complemented with a securing step, which in practice is performed during the same movement as the assembly of the complete spindle unit. The first adapter, which is arranged to both hold and secure the bevel gear and the spindle unit at the upper part of the telescopic leg, also comprises two locking spaces behind respective resilient tongue, according to this preferred embodiment. This locking space is a prerequisite for the spring function of the resilient first tongue, so to speak, the free end of the resilient first tongue is pressed into this space during assembly of the spindle unit/the first adapter into the leg. At the top of the adapter locking space is a lock washer a bit inserted and thereby not affecting the locking space in this position. But during the end phase of the assembly, when the complete spindle unit including the adapters reaches its final position, the lock washer is completely inserted in the locking space, which lock washer then fills the locking space and prevents the resilient tongue from springing back, from its locking position to an unlocked position. This step can, as mentioned above, principally be performed in the same movement as the insertion of the complete spindle unit in the leg, while for example a fitter or a robot inserts the same into the tube and pushes it in position and at the same time additionally pushes the lock washers into the locking spaces as soon as the final position is reached.

**[0017]** The invention is explained further by the subsequent detailed description of embodiments of the invention with reference to the accompanying drawings.

### Short description of the drawings

#### **[0018]**

- Fig. 1a is showing a spindle unit provided with an assembled bevel gear and the first and the second adapter ready to be arranged respectively on the upper end and lower end of the spindle unit.
- Fig. 1b is showing how the complete spindle unit, with its first and second adapter, is inserted into the telescopically extendable leg.
- Fig. 2a-2c are detailed views of the first adapter.
- Fig. 3a is showing the first adapter in its assembled position on the upper end of the spindle unit, so to speak, in the position of holding and securing of the bevel gear.
- Fig. 3b is showing the position of the first adapter in the upper tube part of the telescopically extendable leg.
- Fig. 4a is showing a view of the second adapter.
- Fig. 4b is showing the second adapter in its assembled position on the lower part of the spindle unit.
- Fig. 4c is showing the position of the second adapter in the lower tube part of the telescopically extendable leg.

### Detailed description of the figures

**[0019]** Fig. 1a is showing a spindle unit 2, provided with a bevel gear 1, where the spindle unit 2 in this case comprises a threaded rod 32, enclosed by a spindle housing 33. To a top end 4 of the spindle unit is a first adapter 8 arranged, which is assembled in connection with the assembling of the bevel gear 1 to the spindle unit 2, in a pre-assembling step A. The first adapter 8 is arranged to hold and secure the bevel gear 1 to the spindle unit 2 in its assembled position, but this is explained further in connection to fig. 2a-2c. A second adapter 24 is connected to the lower end 25 of the spindle unit 2, in the pre-assembling step A. This adapter can preferably be pushed in position of the lower part of the spindle housing 33, where after for example a jolting of the wall of the spindle housing 33 secures the second adapter 24 to the spindle housing 33, see also fig. 4a-4c.

**[0020]** Fig. 1b is showing the assembly of the complete spindle unit 2, including the mounted first adapter 8 and the second adapter 24, by one single assembling step B insert the complete spindle unit 2 into a telescopically extendable leg 3. The leg 3 consists of at least two tube parts, one upper tube part 6 and one lower tube part 7, where according

to the preferred embodiment, the lower tube part 7 can run in the upper tube part 6, whereby the leg 3 achieves adjustable length. At the assembling step B the complete spindle unit 2 is inserted in the leg 3, until the spindle unit 2 arrives to a final position where it should be secured to the leg 3. An upper edge 21 of the first adapter 8 then will rest on an upper edge 23 of the upper tube part 6, and at the same time the first adapter 8 arrives in its end position 14, in which it snaps into two first locking arrangements 15. This is explained more in detail in connection to drawings 2a-c and 3a-b. Also the second adapter 24 is simultaneously snapped into a second locking arrangement 28 (not shown), which is arranged in the lower tube part 7, more precisely explained in connection to fig. 4a-c.

**[0021] Fig. 2a-2c** shows different views of the first adapter 8. According to the preferred embodiment the first adapter 8 comprises a housing 10, which encloses a receiving space 9. Said receiving space 9 is arranged to hold and secure the bevel gear 1 in a way that the form of the housing 10, and thereby also the form of the receiving space 9, is suited for the outer dimensions of the bevel gear, whereby the bevel gear 1 is held and secured in relation to housing 10. More precisely, it is two sides of the housing 10 that connects to two of the sides of the bevel gear 1, and also that the bottom of the housing 10 comprises a recess, which is designed to fit the bottom of the bevel gear 1. As earlier mentioned is the first adapter 8 assembled on the spindle unit 2 in connection with the assembly of the bevel gear 1 to the spindle unit 2. Further, the outer dimensions of the first adapter 8 is mainly coordinated with the interior dimensions of the upper tube part 6, whereby the upper tube part 6 guides and fixates the first adapter 8 rotationally in the upper tube part 6. By this is also the spindle unit 2 and the bevel gear 1 secured when the first adapter 8 is assembled in the telescopically extendable leg 3, see fig. 1a-b. The housing 10 further comprises two resilient first tongues 11, which each has a free end and a fixed end. Behind the respective resilient tongues 11 is a locking space 16 arranged, partly for the spring out of the tongue 11 inwards to the receiving space 9, and partly for a lock washer 17 to be inserted into the locking space 16. The resilient first tongues 11 are further arranged with a wedge-shaped first locking lug 12, preferably at the end of the free end of the tongue 11. At the introduction of the first adapter 8 in the leg 3, the first locking lugs 12 will guide the first adapter 8 in the upper tube part 6, which then will press the first locking lugs 12 and the resilient first tongued 11 in direction towards the free locking space 16. This happens because the locking lugs 12, with their wedge-shape, protruding with its pointed tip in the insertion direction in a level from the outer dimensions of the housing 10 and out from the same, whereby the cross-sectional dimension of the respective second edge of the locking lug 12, its locking edge 29, is greater than the interior dimension of the upper tube part 6. After this, when the first adapter 8 arrives in its end position 14 (see fig. 1 b) in the upper tube part 6, the resilient first tongues 11 snap back to their resting position, by that the upper tube part 6 in the corresponding position comprises a first locking arrangement 15, for the respective locking lug 12. At this moment it is then possible to insert the lock washer 17 into respective locking space 16, for securing of the first adapter 8 in the end position 14. Further, the first adapter 8 comprises a corbelling 22 at its upper edge 21. This is arranged to stop a continued insertion of the first adapter 8 into the upper tube part 6, by stopping at the upper edge 23 of the upper tube part 6. The housing 10 is further arranged with a plurality of recesses 34 for communication with other details, such as cranks, crank shafts and the like, which drives the telescopic movement via the bevel gear 1. The housing 10 is further arranged with a groove 35, in which a screw plate 18 is inserted. The screw plate 18 in turn comprises threaded holes 19, and the screw plate 18 is used for further anchoring of the first adapter 8 in the leg 3, to obtain full stability in the final assembled end product - the height adjustable desktop. In prior solutions, the bevel gear is both screwed to the leg during assembly of the spindle unit to the leg and later during the final assembly, often at the end consumer site, where a lateral strut is fastened by screws to the leg and thereby connects the table top and the frame. By that the first adapter 8 now only is snapped into position during the factory assembly, the further stabilization occurs at the final assembly by that the lateral strut (not shown) is screwed to the leg 3, to connect the table top and the frame, and at the same time the final stabilization is achieved by screwing the lateral strut to the screw plate 18.

**[0022] Fig.3a** is showing the first adapter 8 in its assembled position at the top end 4 of the spindle unit 2. In this position, the bevel gear 1 is arranged in the receiving space 9 of the first adapter 8, wherein the housing 10 at least partly encloses the bevel gear 1. As mention before, two sides of the housing 10 connects to the corresponding sides of the bevel gear 1, whereby the bevel gear 1 is secured in the first adapter 8. From the underside is also the threaded rod 32 (not shown) of the spindle unit 2 connected to the bevel gear 1 and is locked in the same. Further, the two lock washers 17 can be seen in their assembled "ready position", ready to be inserted in the respective locking space 16, according to earlier description.

**[0023] Fig. 3b** is showing the upper end of the upper tube part 6 with the first adapter 8 assembled in its end position 14 and the lock washers 17 in position to be inserted in the locking spaces 16. In the end position 14, the corbelling 22 of the first adapter 8 rests at the upper edge 23 of the upper tube part 6, and further the first locking lugs 12 have snapped into the first locking arrangements 15 and thereby secured the first adapter 8 in the upper tube part 6. The spindle unit 2 and the bevel gear 1 are now fixedly arranged to the upper tube part 6 and thus to the upper end of the telescopic leg 3. When the lock washers 17 then are inserted in the locking spaces 16 the complete spindle unit 2 is secured in the leg 3. In the figure can also the screw plate 18 be seen recessed into the groove 35.

**[0024] Fig. 4a och 4b** is showing a view of the second adapter 24 and its fixedly assembled position at the spindle unit 2. The second adapter 24 comprises two resilient second tongues 26, which in turn shows a wedge-shaped second

locking lug 27, at its lower end. The locking lugs 27 are sharp in the first end of the insertion direction, in terms of the complete spindle unit 2 assembly in the leg 3, and in the opposite end the wedge-shape is ended with a sharp locking edge 29. The second adapter 24 further comprises a corbelling 36, which flanges outside the adapter body. The reason for this is because after that the second adapter 24 is inserted in the spindle housing 33, the spindle housing 33 is slightly jolted in the area below the corbelling 36, whereby the second adapter 24 is securely locked in the lower end 25 of the spindle unit 2 (the jolting is not shown in the figures).

**[0025]** Fig. 4c is showing a section through the lower part of the lower tube part 7 where the second adapter 24 is snapped into the second locking arrangement 28. In the figure it can be seen that the second adapter 24 is fixedly arranged in the spindle housing 33 of the spindle unit 2, by that the adapter body is inserted into the spindle housing 33, whereafter it has been secured in this position by slightly jolting of the spindle housing 33, just below the corbelling 36. Further the both resilient second tongues 26, which respectively comprise the second locking lug 27, can be seen. During assembly of the spindle unit 2 within the leg 3, the complete spindle unit 2 and thereby also the second adapter 24, arrives to the second locking arrangement 28. The second locking arrangement 28 consists of a steel sheet welded inside the lower end of the lower tube part 7, and the steel sheet comprises a square hole, centrally positioned in the steel sheet. When the second adapter 24 arrives to the locking arrangement 28 it is guided into the hole, and by the wedge-shape of the second locking lugs 27, the resilient second tongues 26 are pressed inwards in direction towards the central axis, whereafter the resilient second tongues 26 spring out to their resting position, after that the both locking lugs 27 have passed the hole, and the thereby the second adapter 24 is fixedly arranged in the second locking arrangement 28. A movement opposite the insertion direction is prevented by the sharp locking edge 29 at the end of the second locking lugs 27. By this also the complete spindle unit 2 is fixedly arranged to the lower tube part 7.

## PARTS LIST

### [0026]

1= bevel gear	21 = upper edge (adapter)
2= spindle unit	22= corbelling
3= leg	23= upper edge (upper tube part)
4= top end	24= second adapter
6= upper tube part	25= lower end (spindle unit)
7= lower tube part	26= second tongues
8= first adapter	27= second locking lug
9= receiving space	28= second locking arrangement
10= housing	29= locking edge
11= first tongue	32= threaded rod
12= first locking lug	33= spindle housing
13= wall	34= recess
14= end position	35= groove
15= first locking arrangement	36= corbelling
16= locking space	37= lower end (lower tube part)
17= lock washer	
18= screw plate	
19= hole	
A= pre-assembling step	
B= assembling step	
C= securing step	

## Claims

1. Device for assembling and securing of a complete spindle unit (2) provided with a bevel gear (1) inside a telescopically extendable leg (3), wherein the said bevel gear (1) is arranged at a top end (4) of the spindle unit (2) given its position of use, and the telescopically extendable leg (3) is useful at a height-adjustable disc, and which leg (3) comprises at least two tube parts, which given a position of use of the leg (3) is termed upper tube part (6) and lower tube part

(7), **characterized by** that the device comprises at least one locking device (8, 24), which is arranged to lock the complete spindle unit (2) inside the telescopically extendable leg (3) by a self-locking function, preferably a so called snap-function or click-function, when said complete spindle unit (2) during assembly arrives at an end position in the telescopically extendable leg (3).

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2. Device according to claim 1, **characterized by** that the device comprises a first adapter (8), which comprises a receiving space (9), arranged to hold and secure the bevel gear (1), and a housing (10) of the first adapter (8) is substantially dimensionally coordinated to the cross sectional dimensions of the upper tube part (6) of the leg (3), wherein the first adapter (8) is mountable at said upper tube part (6) and guided by the same through the coordinated dimensions between them, and the housing (10) of the first adapter (8) comprises at least one resilient first tongue (11) provided with a wedge-shaped first locking lug (12), which wedge-shaped first locking lug (12) protruding from a level of a wall (13) of the housing (10) and away to a level apart from the wall (13) of the housing (10), wherein the locking lug (12), at the insertion of the spindle unit (2) into the leg (3) and thereby the assembly of the first adapter (8) at the upper tube part (6), is arranged to press the resilient first tongue (11) out of its resting position, and when the first adapter (8) arrives to an end position (14) in the upper tube part (6), the locking lug (12) is arranged to snap the adapter (8) at the upper tube part (6) by that the upper tube part (6) comprises a first locking arrangement (15), preferably a recess, in which the locking lug (12) is arranged to snap into.
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3. Device according to claim 2, **characterized by** that the housing (10) of the first adapter (8) comprises a locking space (16) arranged behind respective resilient first tongue (11), and the locking space (16) is arranged to receive a lock washer (17), which is insertable in the locking space (16), and which lock washer (17) in its inserted position in the locking space (16) prevents the respective resilient first tongue (11) to spring.
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4. Device according to any of the claims 2-3, **characterized by** that the housing (10) of the first adapter (8) comprises a fixedly arranged screw plate (18) which in turn comprises threaded holes (19), and said screw plate (18) is arranged for further securing of the first adapter (8) to the upper tube part (6) of the telescopically extendable leg (3), by screwing.
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5. Device according to claim 4, **characterized by** that the further securing of the first adapter (8) to the upper tube part (6) is achieved by a lateral strut, which is arranged to be screwed to the upper tube part (6), wherein the same screw joint simultaneously provides a further securing of the first adapter (8) to the upper tube part (6), via the screw plate (18).
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6. Device according to any of the claims 2-5, **characterized by** that the housing (10) of the first adapter (8) comprises a corbelling (22) at its upper edge (21), which in the assembled end position (14) of the first adapter (8) rests on an upper edge (23) of the upper tube part (6).
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7. Device according to any of the preceding claims, **characterized by** that the device comprises a second adapter (24) arranged to be fixedly anchored at a lower end (25) of the spindle unit (2) given its position of use, and which second adapter (24) comprises at least two resilient second tongues (26) respectively arranged with a wedge-shaped second locking lug (27), which by their wedge-shape are, at the insertion of the spindle unit (2) into the telescopically extendable leg (3), arranged to guide the lower end (25) of the spindle unit (2) into a therefore designated second locking arrangement (28), which is fixed at a lower end (37) of the lower tube part (7), and the second locking lugs (27) are arranged to press the resilient second tongues (26) out of their resting position while said locking lugs (27) passes through the second locking arrangement (28), whereafter the second adapter (24) snaps into the second locking arrangement (28) by that the wedge-shaped second locking lugs (27) ends with a sharp locking edge (29), and thereby is the lower end (25) of the complete spindle unit (2) fixedly secured to the telescopically extendable leg (3).
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8. Device according to claim 7, **characterized by** that the second adapter (24) further comprises snap-locks arranged for snapping a foot portion to the telescopically extendable leg (3).
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9. Method for assembling and securing of a complete spindle unit (2) provided with a bevel gear (1) inside a telescopically extendable leg (3), wherein the said bevel gear (1) is arranged at a top end (4) of the spindle unit (2) given its position of use, and the telescopically extendable leg (3) is useful at a height-adjustable disc, and which leg (3) comprises at least two tube parts, which given a position of use of the leg (3) is termed upper tube part (6) and lower tube part (7), **characterized by** an assembling step (B) in which the complete spindle unit (2) provided with a bevel gear (1) is inserted into the telescopically extendable leg (3) and there finally reaches an end position in the leg (3), and in which end position said complete spindle unit (2) is locked inside the telescopically extendable leg (3) by a self-
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locking function, preferably a so called snap-function or click-function.

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10. Method according to claim 9, **characterized by** that a first adapter (8) and a second adapter (24) are pre-assembled, in a pre-assembling step (A), at the spindle unit (2) - the first adapter (8) is assembled at the bevel gear (1) by that the first adapter (8) comprises a receiving space (9) which holds and secures the bevel gear (1) to the first adapter (8) and the second adapter (24) is fixedly anchored at a lower end (25) of the spindle unit (2), and a housing (10) of the first adapter (8) is substantially dimensionally coordinated to the cross sectional dimensions of the upper tube part (6) of the leg (3), and the housing (10) of the first adapter (8) further comprises at least one resilient first tongue (11) provided with a wedge-shaped first locking lug (12), which wedge-shaped first locking lug (12) protruding from a level of a wall (13) of the housing (10) and away to a level apart from the wall (13) of the housing (10), and the second adapter (24) comprises at least two resilient second tongues (26) respectively arranged with a wedge-shaped second locking lug (27), and the spindle unit (2) comprising the first and the second adapter (8, 24) is inserted into the telescopically extendable leg (3), whereby said upper tube part (6) through the coordinated dimensions guides the first adapter (8), and during insertion, the first locking lug (12) further presses the resilient first tongue (11) out of its resting position, and when the first adapter (8) arrives to an end position (14) in the upper tube part (6), the locking lug (12) snaps the first adapter (8) at the upper tube part (6) by that the upper tube part (6) comprises a first locking arrangement (15), preferably a recess, in which the first locking lug (12) snaps into, and simultaneously, during the insertion of the spindle unit (2) into the telescopically extendable leg (3), the second adapter (24) arrives to a second locking arrangement (28), which is fixed at a lower end (37) of the lower tube part (7), whereby the second locking lugs (27), through their wedge-shape, guides the second adapter (24) and thereby the lower end (25) of the spindle unit (2) into the second locking arrangement (28), and the resilient second tongues (26) are pressed out of their resting position while said locking lugs (27) passes through the second locking arrangement (28), whereafter the second adapter (24) snaps into the second locking arrangement (28) at the same time as the first adapter (8) snaps into its end position (14), and thereby is the complete spindle unit (2) fixedly secured to the telescopically extendable leg (3) in a single assembling step (B).
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11. Method according to claim 10, **characterized by** that a securing step (C) is performed in close connection after the assembling step (B), in which at least one lock washer (17) is inserted into a locking space (16) which is arranged behind respective resilient first tongue (11), and which lock washer (17) in its inserted position in the locking space (16) prevents the respective resilient first tongue (11) to spring.
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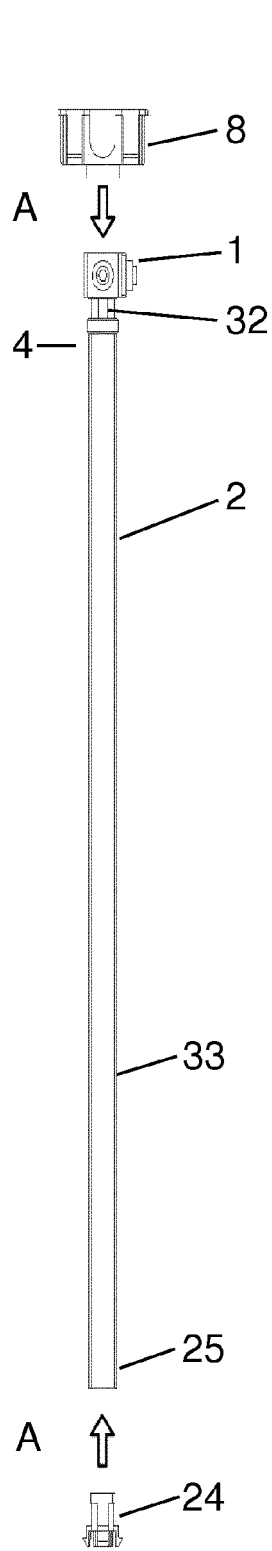


Fig. 1a

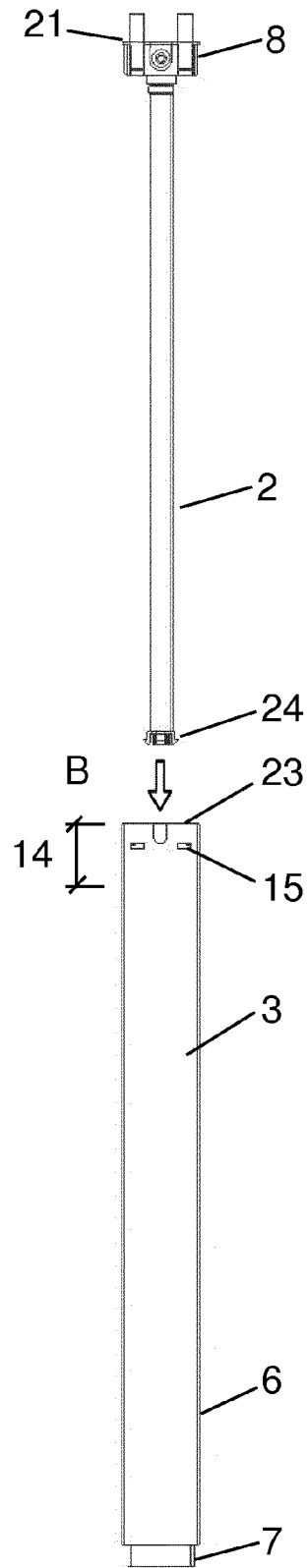


Fig. 1b

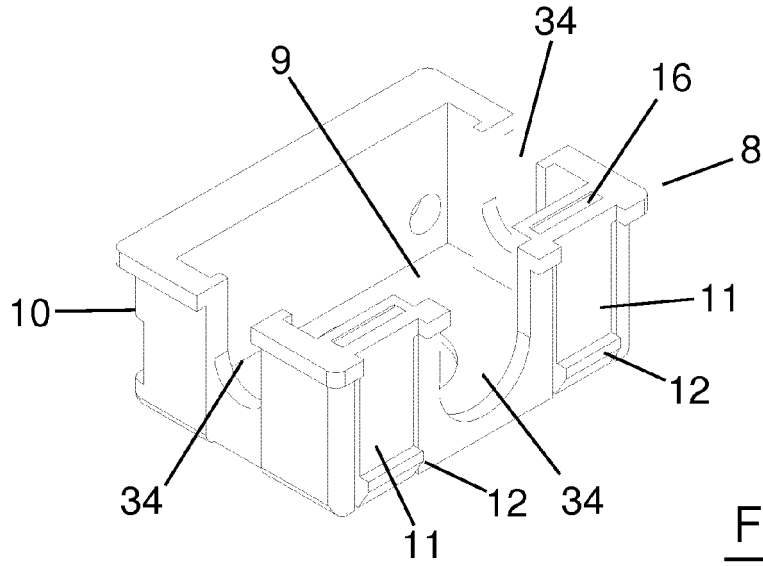


Fig. 2a

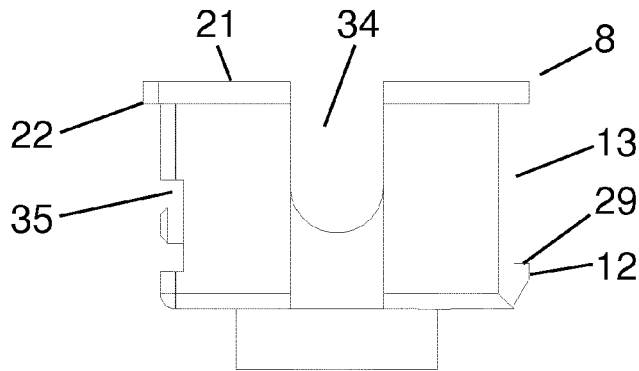


Fig. 2b

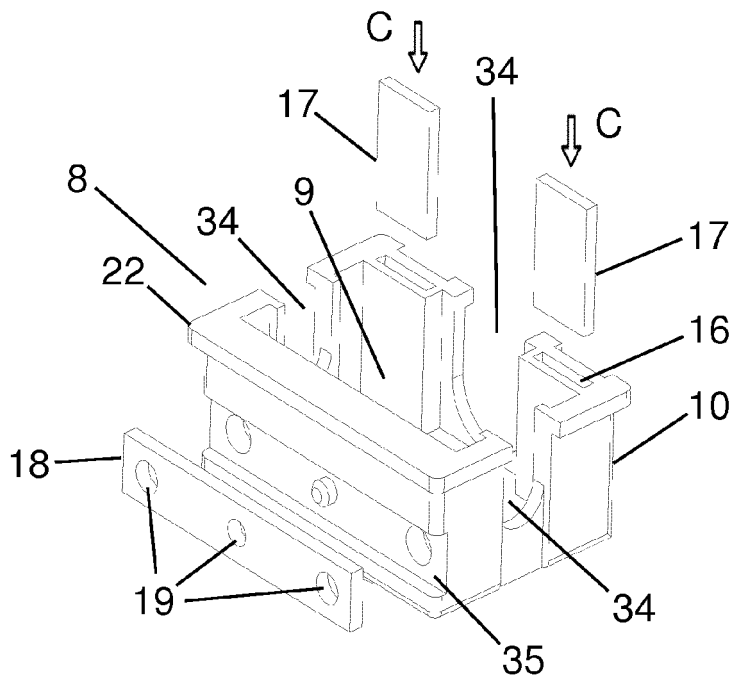


Fig. 2c

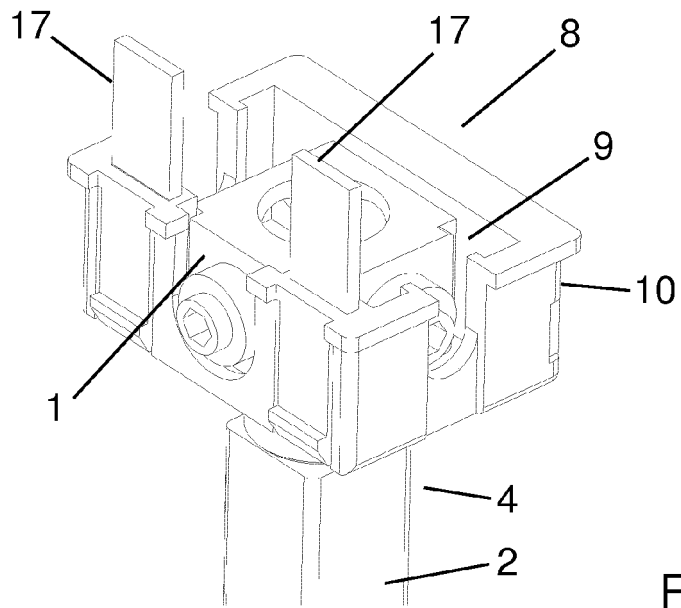


Fig. 3a

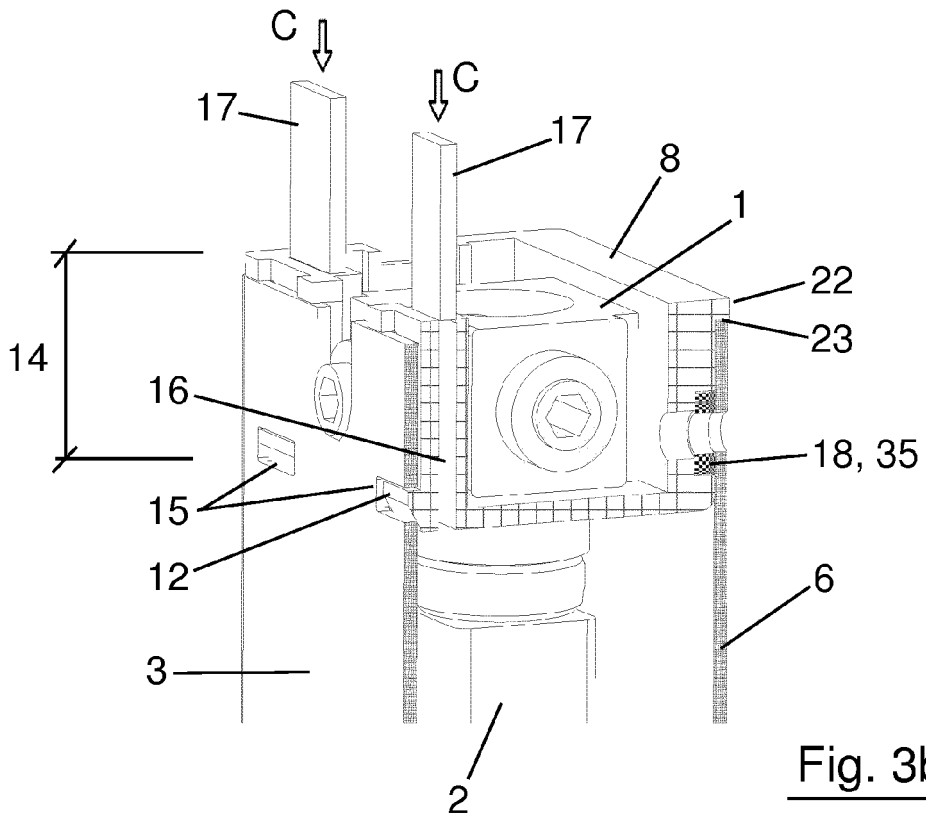


Fig. 3b

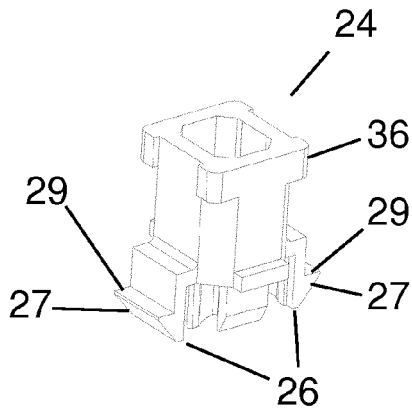


Fig. 4a

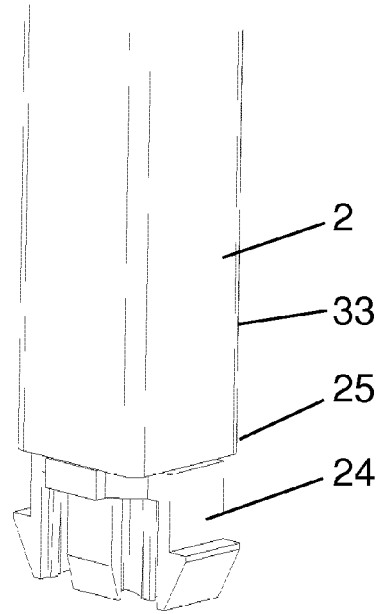


Fig. 4b

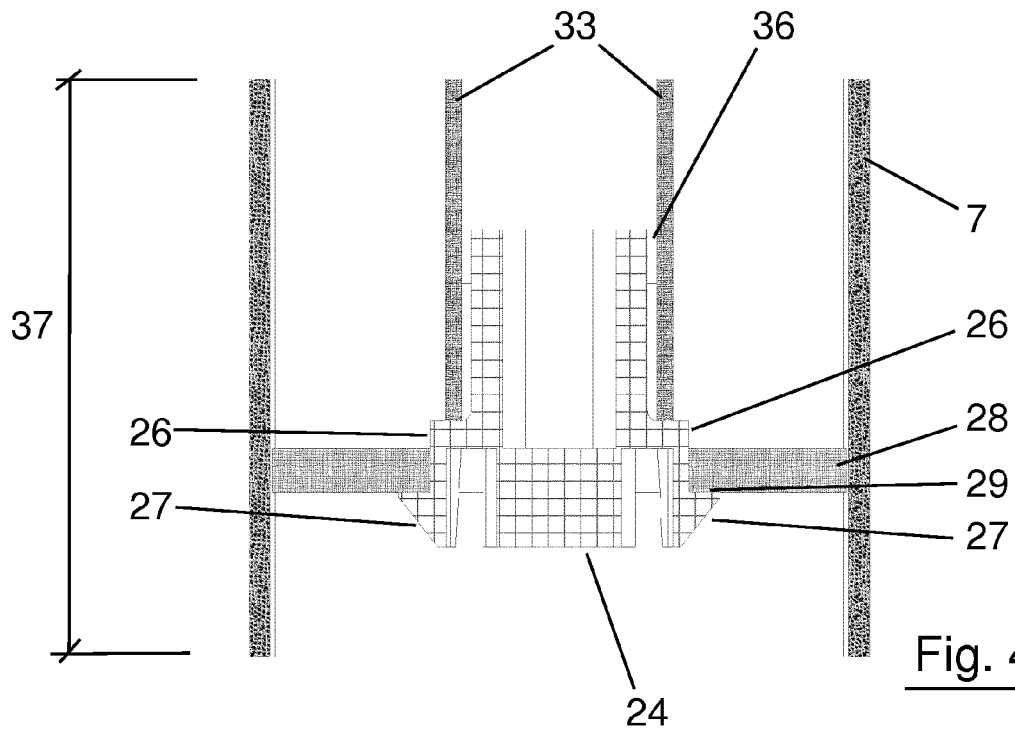


Fig. 4c



EUROPEAN SEARCH REPORT

Application Number  
EP 15 17 2518

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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	EP 2 684 488 A1 (LOGICDATA ELECT & SOFTWARE ENT [AT]) 15 January 2014 (2014-01-15)	1,2,9,10	INV. A47B9/04 A47B9/20
A	* paragraph [0033] - paragraph [0035] * * figures 1-5 *	3,11	
A	----- CN 203 182 305 U (ZHEJIANG JIECHANG LINEAR MOTION TECHNOLOGY CO LTD) 11 September 2013 (2013-09-11) * figures 1,8,16 * -----	1,9	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			A47B
Place of search		Date of completion of the search	Examiner
The Hague		12 November 2015	Bitton, Alexandre
CATEGORY OF CITED DOCUMENTS		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	
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			

EPO FORM 1503 03.02 (P04C01)

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

EP 15 17 2518

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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 The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-11-2015

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 2684488	A1	15-01-2014	DE 102012013979 A1	16-01-2014
			EP 2684488 A1	15-01-2014
			US 2014020488 A1	23-01-2014
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CN 203182305	U	11-09-2013	NONE	
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82