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(54) **Folding leg for a table**

(57) A folding leg (110) for a table (100). The leg comprises a rotatable axle (114) for varying between a folded position and an unfolded position of the folding leg. An engagement means (5) is movable between a first position and a second position, the engagement means being stationary relative to the axle. The engagement means cooperates with a locking means (11) in said first position to rotationally lock the leg in the unfolded position. The engagement means is guided by a guide means (7) from said first position to said second position, wherein in said second position the engagement means allows the axle to be rotated so that the leg is arranged in its folded position, wherein, subsequently, the engagement means is adapted to cooperate with the guide means to rotationally lock the leg in the folded position.

Fig 3a

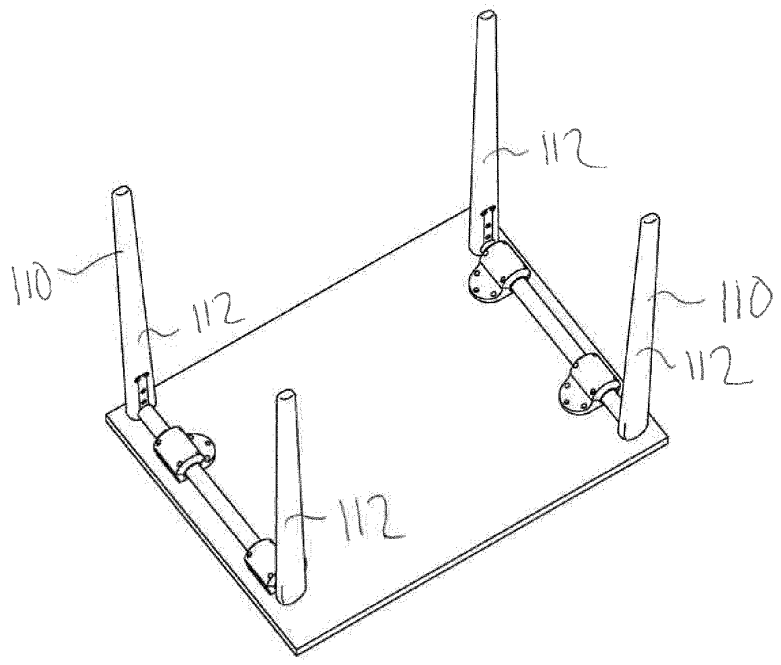

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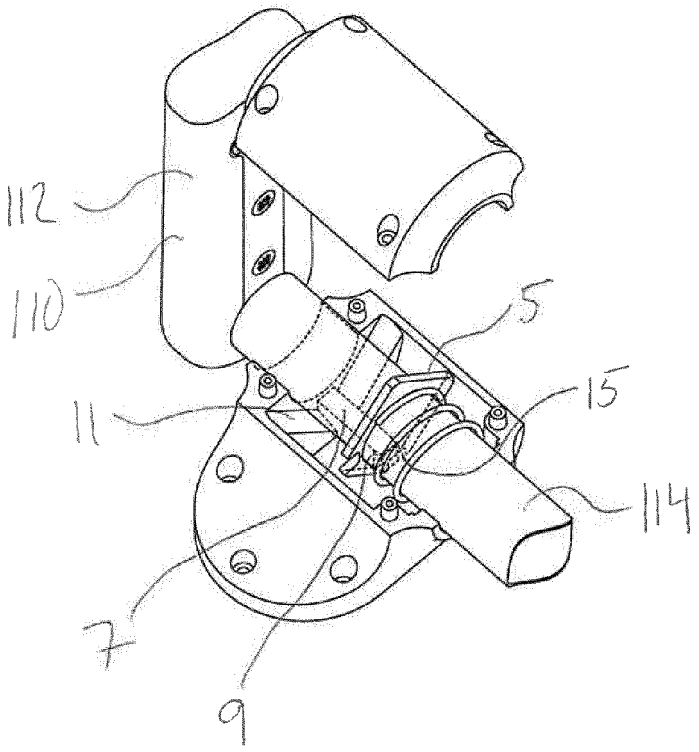
Fig. 3b



Description

Technical field

[0001] The present invention relates to a folding leg for a table, comprising a rotatable axle for varying between a folded position and an unfolded position of the folding leg. The invention also relates to a table comprising such a folding leg.

Background art

[0002] Tables having folding legs are commonly used in hotels, conference facilities, universities, etc. It may be desirable to have access to a large number of tables for meetings, lectures and conferences, but when not in used it may be desirable to store them in a space-saving manner. Therefore, tables having folding legs are particularly suitable, since the legs may be folded in towards the bottom side of the table top, thereby obtaining a folded state which requires less storage space than in the unfolded state of the table.

[0003] DE 297 01 590 U1 discloses a table having folding legs. A rotatable axle is provided with a square-shaped element, which is biased by a spring towards a mating square-shaped recess to rotationally lock the leg either in the folded or unfolded position. When the two pairs of legs are folded then, one pair of legs will be sandwiched between the bottom side of the table top and the other pair of legs. Thus, although the folded table will require less storage space than the unfolded table, but due to said sandwiching it will nevertheless require undesirably much space, especially when considering that a large number of tables will be stowed next to each other.

Summary of the invention

[0004] An object of the invention is to alleviate the drawbacks of the prior art. This and other objects, which will become apparent in the following, are accomplished by the accompanying claims.

[0005] The present invention is based on the insight that by having two different positions of rotational locking, one for a folded position and one for an unfolded position of the folding leg, sandwiching of legs may be avoided. In particular, it has been realized that a guide means may be used for guiding an engagement means between the two positions, wherein the guiding means additionally functions to rotationally lock the engagement means when the folding leg is in one of said two positions.

[0006] According to a first aspect of the invention, a folding leg for a table is provided. The folding leg comprises:

a rotatable axle for varying between a folded position and an unfolded position of the folding leg,
an engagement means movable between a first position and a second position, the engagement means being stationary relative to the axle,
a locking means with which the engagement means cooperates in said first position to rotationally lock the leg in the unfolded position, and
a guide means for guiding the engagement means from said first position to said second position,
wherein in said second position the engagement means allows the axle to be rotated so that the leg is arranged in its folded position, wherein, subsequently, the engagement means is adapted to cooperate with the guide means to rotationally lock the leg in the folded position.

[0007] Thus, even though a first folding leg may in its unfolded position be aligned with a second folding leg at the other side of the table, the guiding means creates an axial distance between the folded position and the unfolded position of the first leg. Thus, in the folded position the first leg will no longer be aligned with the second leg. The second leg on the other side of the table may or may not have a corresponding folding arrangement with guiding means. If a second leg on the other side of the table has a corresponding guiding means as said first leg, then the displacement when shifting from the unfolded to the folded position should be in a direction axially opposite to the direction of shifting of the first folding leg, thereby avoiding sandwiching of the legs. Instead a the folded legs will be in a dovetail formation.

[0008] The engagement means, guide means and locking means may suitably be arranged inside a housing, in which case these movable parts will not be accessible during normal use of the table. In at least some example embodiments, the locking means is made in one piece with the housing, or alternatively, as a separate piece fixedly attached to the housing.

[0009] In other example embodiments, the locking means may be movably arranged within the housing so that when the engagement means moves towards the first position it pushes the locking means in the same direction, and when the first position has been reached, the locking mean reaches an end position wherein the two components are fully engaged to lock the folding leg in its unfolded position. In at least some example embodiments the engagement means is suitably biased towards the first position by a spring means.

[0010] In further example embodiments the locking means may form part of the guide means. For instance, at one part of the guide means (typically where the first position of the engagement means is intended to be) the shape of the guide means is such that the mating engagement means can only be moved in the longitudinal direction of the guide means, i.e. no or very limited rotational movement being allowed, thus functioning as a locking means for rotational locking. Such locking may for instance be achieved by one or more grooves in the engagement means matching corresponding ridges in the guide means (or vice versa).

[0011] Thus, from the above, it should be understood

that the guide means can not only guide the engagement means from the first position to the second position of the engagement means (when folding the leg), but also in the other direction, i.e. from the second position to the first position (when unfolding the leg).

[0012] As has been described above, a rotatable axle is provided for shifting between a folded and unfolded position of the folding leg. The axle is connected to a main leg portion intended to contact a support surface, such as the ground or floor, when the leg is in its unfolded position. The rotatable axle and the main leg portion may either be formed in one piece or as two pieces that have been connected or are connectible.

[0013] According to at least one example embodiment, the engagement means is in a third position when cooperating with the guide means to rotationally lock the leg in the folded position, said third position being located between said first and second positions. Suitably, the third position is closer to the second position than to the first position. Thus, when the leg is to be folded, the engagement means is moved from the first position to the second position, then rotated to fold the leg and the move back slightly in a direction towards the first position, and finally becoming locked in the third position. In practice, a person will push the leg with its axle in the longitudinal direction of the axle, then rotate the leg so that it reaches its folded position, and then allow the folded leg to move back slightly in the opposite direction so that the folded leg becomes rotationally locked.

[0014] According to at least one example embodiment, the second position of the engagement means is reached when the engagement means has been displaced beyond a free end portion of the guide means. Thus, in these embodiments, as long as the engagement means is guided by the guide means, the axle and the engagement means are substantially prevented from rotating. However, when the engagement means has left the guide means, rotation of the axle and engagement means is enabled.

[0015] As already touched upon above, according to at least one example embodiment, a spring is biased to provide a force in a direction from said second position towards said first position. The biasing force of the spring urges the engagement means into engagement with the locking means to obtain said rotational locking of the leg in the unfolded position. However, as can understood from above, the biasing force of the spring may also urge the engagement means into engagement with the guide means (third position of the engagement means) to obtain said rotational locking of the leg in the folded position. To switch between the folded/unfolded state (or reversely) of a leg, a user provides a counter force in the opposite direction that overcomes the spring force so that the engagement means reaches its second position in which it can freely be selected whether the leg should be folded or unfolded.

[0016] According to at least one example embodiment, the engagement means comprises a first guide-mating portion adapted to slide along the guide means, and a second guide-mating portion adapted be stopped by the guide means, wherein the first guide-mating portion is adapted to mate the guide means when the leg is in its unfolded position and the second guide-mating portion is adapted to mate the guide means when the leg is in its folded position. Thus, the second guide-mating portion may in cooperation with the guide means accomplish said rotational locking in said third position of the engagement means. Suitably, said first and second guide-mating portions are, with respect to the geometrical axis of the axle, arranged at substantially 90° relative to each other.

[0017] According to at least one example embodiment, the first guide-mating portion is in the form of a first recesses in the engagement means and the second guide-mating portion is in the form of a second recess in the engagement means, wherein the guide means is in the form of an elongate ridge. According to at least some embodiments, the first recess has a larger cross section than the second recess. Thus, in the unfolded position of the leg the first recess mates the guide means and allows the engagement means to travel from the first position to the second position. When the leg is folded, and the engagement means is moved back into engagement with the guide means, it will be the smaller second recess that will mate the guide means and will due to the smaller dimension stop the engagement means at its third position, preventing further travelling to the first position. Suitably the end portion of the guide means is beveled or tapered to allow the engagement means to re-mount the guide means with the second recess and thereby reach the third position of the engagement means.

[0018] According to at least one example embodiment, the second recess has a cross section which is underdimensioned relative to a cross section of the elongate ridge, wherein the second recess is adapted to be wedged to the elongate ridge.

[0019] According to at least one example embodiment, the first recesses has a cross section which substantially corresponds to a cross section of the elongate ridge, wherein the first recess is adapted to mate with and be displaced along the elongate ridge so as to slide the engagement means along the elongate ridge.

[0020] In at least one example embodiment, the first and second guide-mating portions are in the form of projections, wherein the guide means comprises an elongate groove. In other embodiments one of said first and second guide-mating portions is in the form of a projection, while the other is in the form of a recess, wherein the guide means comprises a ridge for mating with the recess and a groove for mating with the projection.

[0021] In at least some example embodiments the engagement means may be made in one piece with the rotatable axle (for instance the axle may be provided with two radial protrusions functioning as engagement means), while in other example embodiments it may be in the form of one or more separate pieces fixed to the rotatable axle. The engagement means may in at least

some embodiments be in the form of a plate or a washer, having any suitable geometry, such as polygonal, curved, circular etc.

[0022] According to at least one example embodiment, the engagement means is annular and surrounds the rotatable axle. Suitably, the annular engagement means is fixedly attached to the axle.

[0023] According to at least one example embodiment, the outer circumference of the engagement means has a generally square shape adapted to be engaged inside a corresponding square-shaped socket of the locking means. However, it should be understood that any other suitable matching shapes are conceivable. Furthermore, it would be conceivable to provide the engagement means and locking means with a plurality of rotationally interlocking structures, such as cogs, teeth, splines etc.

[0024] According to at least one example embodiment, the engagement means has a surface portion adapted to be wedged to the locking means when said engagement means is in said first position. Thus, the engagement means may have a surface which is slightly inclined relative to a mating surface of the locking means. This, further improves the rotational locking effect.

[0025] According to at least one example embodiment, the folding leg comprises two main leg portions which are interconnected by the rotatable axle to form a general U-shape, wherein the ends of the main leg portions are adapted to rest on a ground surface, such as a floor, when the leg is in its unfolded position. The engagement means, locking means and guide means can be regarded as forming part of a folding mechanism. According to at least one example embodiment, each one of said two main leg portion is associated with a respective folding mechanism. Thus, for a U-shaped leg having two such folding mechanisms, the relative location of the first and second positions of the engagement means is the same (i.e. not mirrored). Thus, the entire U-shaped leg will move in the same axial direction when switching from the unfolded to the folded position (or vice versa).

[0026] According to a second aspect of the invention, a table is provided, wherein the table comprises at least one folding leg according to the first aspect of the invention. According to at least one example embodiment, the table comprises a table top and a U-shaped folding leg described above, wherein said U-shaped folding leg is a first U-shaped folding leg connected to the table top near one end of the table top, the table further comprising a corresponding second U-shaped folding leg connected to the table top near an opposite end of the table top, wherein for the first and second U-shaped folding legs the displacements of the respective engagement portions from the first position to the second position are in a direction opposite to each other, whereby in the folded positions of the first and second U-shaped folding legs the four main leg portions will be dovetailing. In other words, sandwiching legs are avoided.

Brief description of the drawings

[0027]

Fig. 1 is an exploded view of a folding mechanism of a folding leg according to at least one example embodiment of the invention.

Fig. 2a illustrates a table having its legs in an unfolded and locked position.

Fig. 2b is a detailed, partly exploded, view of the folding mechanism of a leg in Fig. 2a.

Fig. 3a illustrates the table having its legs in an unfolded and unlocked position.

Fig. 3b is a detailed, partly exploded, view of the folding mechanism of a leg in Fig. 3a.

Fig. 4a illustrates the table having its legs in a folded and unlocked position.

Fig. 4b is a detailed, partly exploded, view of the folding mechanism of a leg in Fig. 4a.

Fig. 5a illustrates the table having its legs in a folded and locked position.

Detailed description of the drawings

[0028] Fig. 1 is an exploded view of a folding mechanism 1 of a folding leg 110 according to at least one example embodiment of the invention. The folding leg 110 has a main leg portion 112 intended to stand on the ground or floor when the leg 110 is unfolded. The main leg portion 112 is connected to a rotatable axle 114, wherein the rotation of the axle 114 enable shifting between the folded and unfolded positions. A portion of the rotatable axle 114 is enclosed by a casing or housing having two housing halves 3a, 3b. The folding mechanism 1 is provided within said housing. The folding mechanism 1 comprises an engagement means 5, herein illustrated as an annular plate having a substantially square-shaped periphery, the plate being fixedly attached to the rotatable axle 114. Thus, the engagement means 5 is stationary relative to the axle 114 and follows the movements of the axle 114.

[0029] A guide means 7, herein illustrated as a ridge forming part of one housing half 3b, is elongate and adapted to guide the engagement means 5 between a first and a second position, as will be illustrated with reference to the other drawings. A free end portion 9 of the guide means 7 is tapering making the end somewhat narrower than other portions of the guide means 7.

[0030] A locking means 11, herein illustrated as two substantially v-shaped shelves in the respective housing halves 3a, 3b. When the housing halves are assembled, the two v-shaped shelves will form a substantially square-shaped socket adapted to receive the engagement means 5 to accomplish a rotational locking thereof. Suitably, to further improve the locking effect, the engagement means 5 may have a peripheral surface portion adapted to be wedged to the locking means 11. For instance, one or more of the peripheral surfaces of the

engagement means 5 may be slightly inclined relative to a mating surface of the locking means 11. The relative inclination may be accomplished either by tapering the peripheral surface portion of the engagement means in the axial direction of the rotatable axle, or by tapering the mating surface of the locking means in the axial direction of the axle, or even by tapering both the mating surface of the locking means and the peripheral surface portion of the engagement means, although with different tapering angles.

[0031] A spring means 13, herein illustrated as a resilient spiral around the axle 114 (although other spring mechanisms are also conceivable), provides a biasing force onto the engagement 5 means in a direction towards the locking means 11.

[0032] Turning now to the remaining Figs. 2a-5b, it will be described how to fold the legs of a table 100 starting from its unfolded state. To unfold the legs from a folded state, the steps would be performed in the reverse order.

[0033] In Fig. 2a a table 100 is shown having two U-shaped legs 110. Each U-shaped leg comprises two main leg portions 112 for abutting a support surface, such as a ground or floor, and a rotatable axle 114 interconnecting the two main leg portions 112. It should be noted that the folding mechanism is not limited to U-shaped legs, but is also applicable to single or L-shaped legs. Furthermore, it is not necessary for all legs of a table to have the specific folding mechanism. For instance, it may be sufficient if the legs on one side of the table have the described folding mechanism while the legs of the other side have a different folding mechanism which does not displace the leg along the rotatable axle.

[0034] As can be seen in Fig. 2b the spring means 13 keeps the engagement means 5 in engagement with the mating locking means 11. This represents a first position of the engagement means 5. The matching straight, suitably flat, surfaces of the two components prevent the engagement means 5, and thus also the axle 114, from rotating. Thus, the risk of accidentally folding the leg 110 is low.

[0035] The engagement means 5 is provided with a first guide mating portion 15 (also seen in Fig. 1), herein illustrated as a first recess which substantially matches a cross-sectional shape of the guide means 7. When the user wishes to fold the leg 110, he/she will press the leg 110 against the force of the spring 13, to move the axle 114 along its geometrical axis. As the axle 114 is moved the engagement means 5 will become disengaged from the locking means 11 and slide with its first recess 15 along the guide means 7 until it leaves the free end portion 9 of the guide means 7, as illustrated in Fig. 3b. This represents a second position of the engagement means 5. In Fig. 3a it is shown that the two U-shaped legs 110 have both been moved relative to their starting positions in Fig. 2a, however they have been moved in opposite directions which, as will become clear in the following description, avoids sandwiching of the main leg portions 112.

[0036] In this second position the engagement means 5 is no longer hindered from rotating. Thus, the user may now pivot the leg 110, rotating the axle 114 and the engagement means 5 substantially 90° (or slightly above 90° to compensate for the distance between the axis of the rotatable axle 114 and the bottom side of the table top) so that the main leg portions 112 will abut the bottom side of the table top. Fig. 4a shows that legs 110 in the folded position. Since the two U-shaped legs 110 were previously (Fig. 3a) moved in opposite axial directions, the main leg portions 112 are now dovetailing rather than sandwiching. In other words, each of the four main leg portions 112 is axially (direction of the axis of one of the rotatable axles 114) displaced relative to the other three and a geometrical straight line can be drawn to cross all four main leg portions 112.

[0037] As shown in Fig. 4b after folding the leg 110, the engagement means 5 is still in said second position, but now having been rotated approximately 90°, it now has a second guide-mating portion 17 (see also Fig. 1) in the form of a second recess almost in register with the end portion 9 of the guide means 7. This second recess 17 of the engagement means 5 has a smaller cross-section than the first recess 15. As the user releases the leg 110, the spring means 13 will urge the engagement means 5 towards the locking means 11, i.e. towards the first position of the engagement means 5. However, due to the underdimensioning of the second recess 17 the engagement means 5 will be prevented from sliding all the way along the guide means 7. Nevertheless, due to the tapering or narrowing of the end portion 9 of the guide means 7, the second recess 17 can come into engagement with the end portion 9 and become wedged to the guide means 7 as the engagement means 5 reaches the wider portions of the guide means 7. This is illustrated in Fig. 5b. The engagement means 5 is now in its third position, which is intermediate to the first and second positions (suitably closer to the second position than to the first position). The engagement means 5 is now rotationally locked by the guide means 7, and prevented from easily accidently unfolding.

[0038] Thus, from the above description it should now be clear that the guide means serves to create an axial displacement between the folded and unfolded states of the leg, and that such displacement is usable, if desired, to achieve a dovetailing arrangement of the folded legs rather than sandwiching, thereby saving storage space.

[0039] To unfold the leg 110, the user will push the leg so that the engagement means moves from the third position to the second position to reach the state illustrated in Fig. 4b, then pivots the leg around the axis of the axle 114 so as to reach the state illustrated in Fig. 3b, and finally allows spring means 13 to push the engagement means 5 into locking engagement with the locking means 11 to reach the state illustrated in Fig. 2b.

Claims

1. A folding leg (110) for a table (100), comprising
a rotatable axle (114) for varying between a folded position and an unfolded position of the folding leg (110),
an engagement means (5) movable between a first position and a second position, the engagement means being stationary relative to the axle,
a locking means (11) with which the engagement means cooperates in said first position to rotationally lock the leg in the unfolded position, and
a guide means (7) for guiding the engagement means from said first position to said second position,
wherein in said second position the engagement means allows the axle to be rotated so that the leg is arranged in its folded position, wherein, subsequently, the engagement means is adapted to cooperate with the guide means to rotationally lock the leg in the folded position.

2. The folding leg as claimed in claim 1, wherein the engagement means is in a third position when cooperating with the guide means to rotationally lock the leg in the folded position, said third position being located between said first and second positions.

3. The folding leg as claimed in any one of claims 1-2, wherein the
second position of the engagement means is reached when the engagement means has been displaced beyond a free end portion (9) of the guide means (7).

4. The folding leg as claimed in any one of claims 1-3, comprising a
spring (13) being biased to provide a force on the engagement means in a direction from said second position towards said first position.

5. The folding leg as claimed in any one of claims 1-4, wherein the engagement means (5) comprises a first guide-mating portion (15) adapted to slide along the guide means, and a second guide-mating portion (17) adapted be stopped by the guide means, wherein the first guide-mating portion is adapted to mate the guide means when the leg is in its unfolded position and the second guide-mating portion is adapted to mate the guide means when the leg is in its folded position.

6. The folding leg as claimed in any one of claims 5, wherein the first guide-mating portion is in the form of a first recesses (15) in the engagement means and the second guide-mating portion is in the form of a second recess (17) in the engagement means, wherein the guide means is in the form of an elongate ridge (7).

7. The folding leg as claimed in claim 6, wherein the first recess has a larger cross section than the second recess.

8. The folding leg as claimed in any one of claims 6-7, wherein the first recesses has a cross section which substantially corresponds to a cross section of the elongate ridge, wherein the first recess is adapted to mate with and be displaced along the elongate ridge so as to slide the engagement means along the elongate ridge.

9. The folding leg as claimed in any one of claims 6-8, wherein the second recess has a cross section which is underdimensioned relative to a cross section of the elongate ridge, wherein the second recess is adapted to be wedged to the elongate ridge.

10. The folding leg as claimed in any one of claims 1-9, wherein the engagement means has a surface portion adapted to be wedged to the locking means when said engagement means is in said first position.

11. The folding leg as claimed in any one of claims 1-10, wherein the
engagement means is annular and surrounds the rotatable axle.

12. The folding leg as claimed in any one of claims 1-11, wherein the
outer circumference of the engagement means has a generally square shape adapted to be engaged inside a corresponding square-shaped socket of the locking means.

13. The folding leg as claimed in any one of claims 1-12, comprising two main leg portions (112) which are interconnected by the rotatable axle (114) to form a general U-shape, wherein the ends of the main leg portions are adapted to rest on a ground surface, such as a floor, when the leg is in its unfolded position.

14. A table (100) comprising a folding leg (110) as claimed in any one of
claims 1-13.

15. The table as claimed in claim 14 when dependent on claim 13,
comprising a table top, wherein said U-shaped folding leg is a first U-shaped folding leg connected to the table top near one end of the table top, the table further comprising a corresponding second U-shaped folding leg connected to the table top near an opposite end of the table top, wherein for the first

and second U-shaped folding legs the displacements of the respective engagement portions from the first position to the second position are in a direction opposite to each other, whereby in the folded positions of the first and second U-shaped folding legs the four main leg portions will be dovetailing.

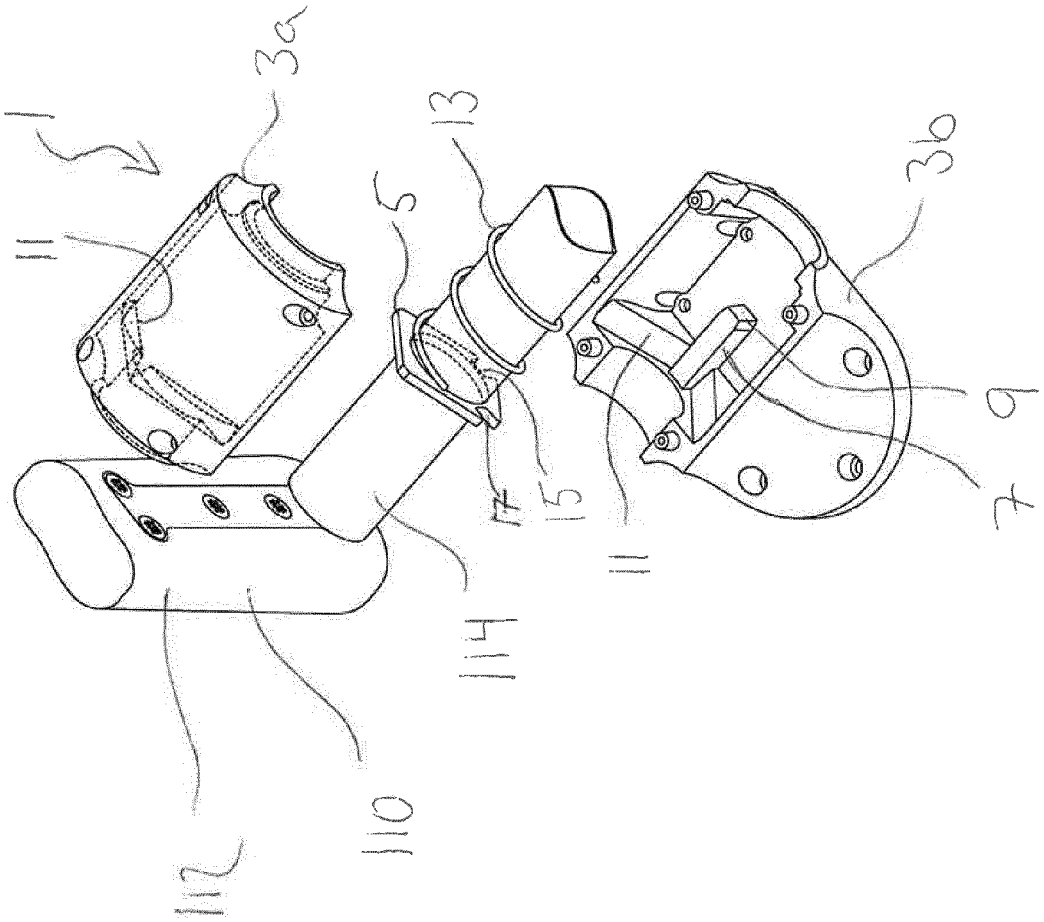


Fig. 1

Fig. 2b

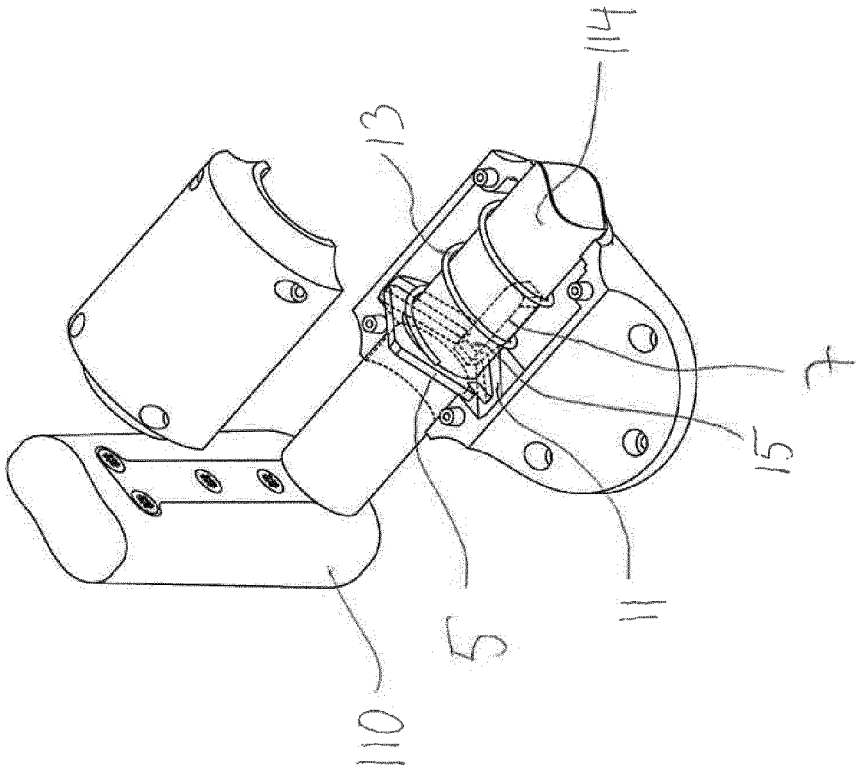


Fig 2a

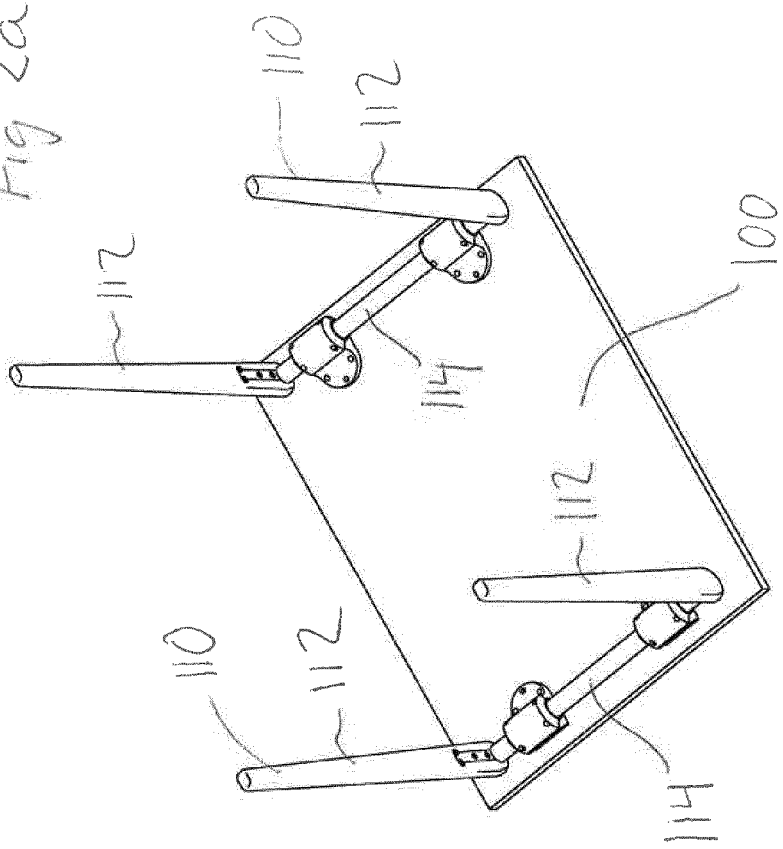


Fig. 3b

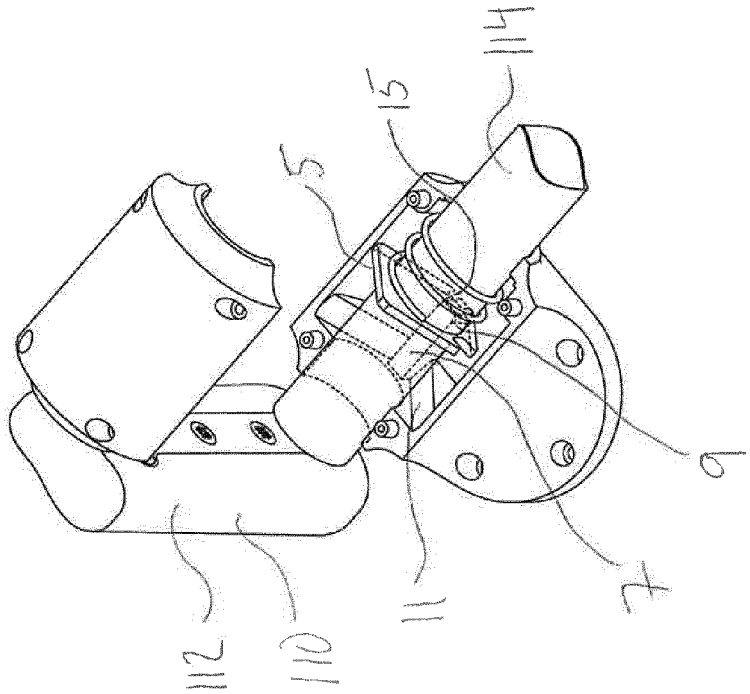


Fig. 3a

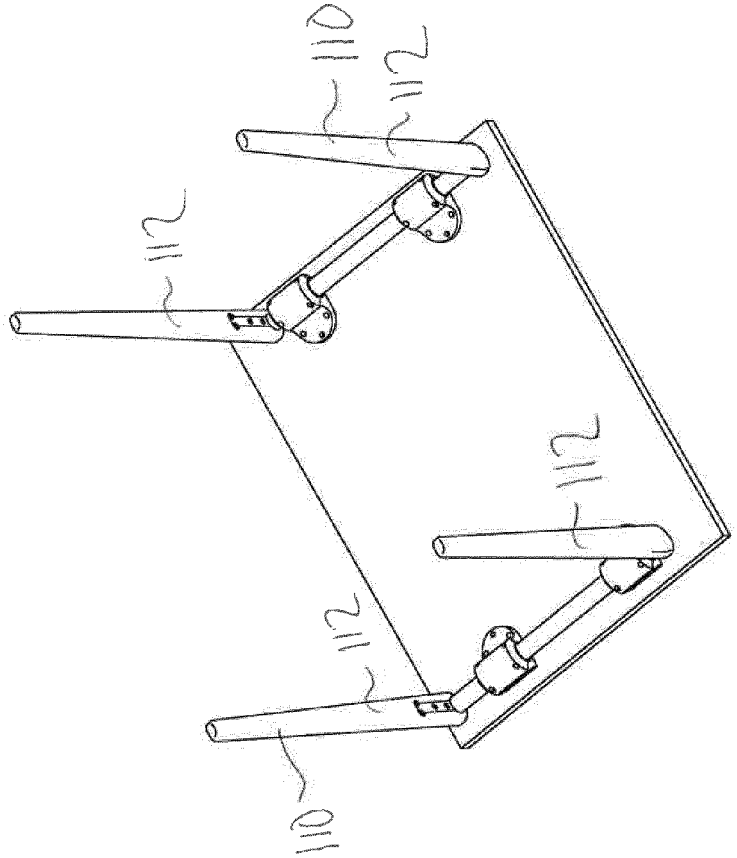


Fig. 4b

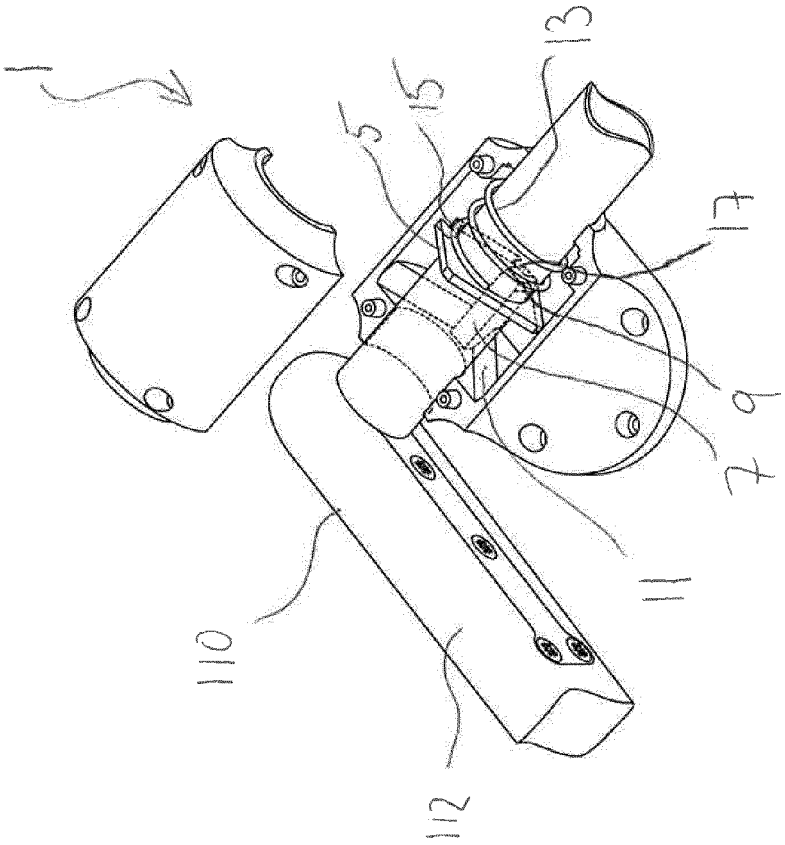


Fig. 4a

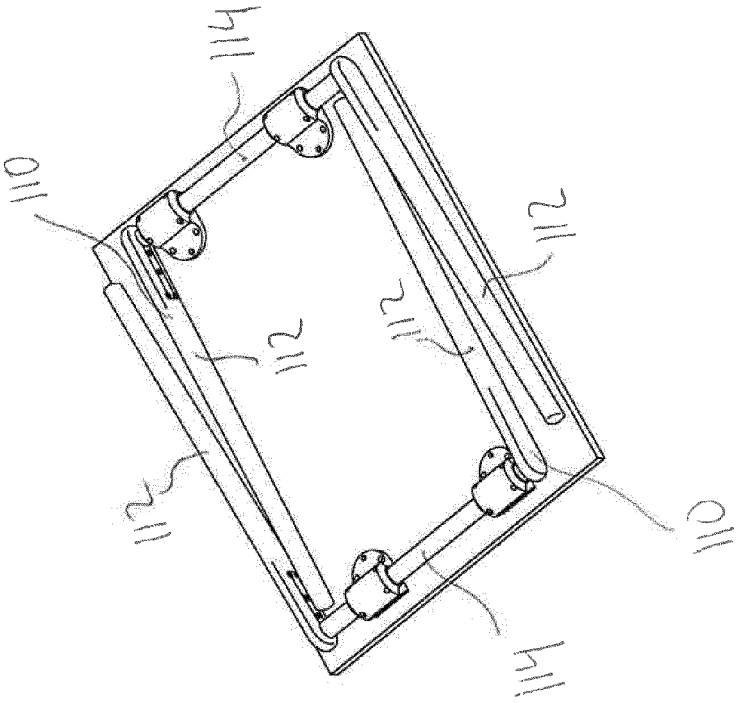


Fig. 5b

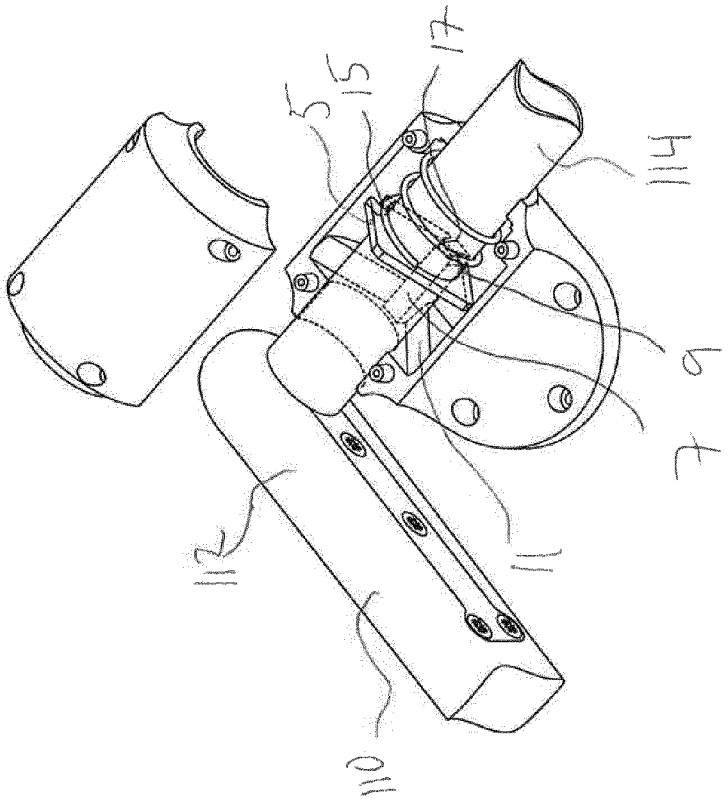
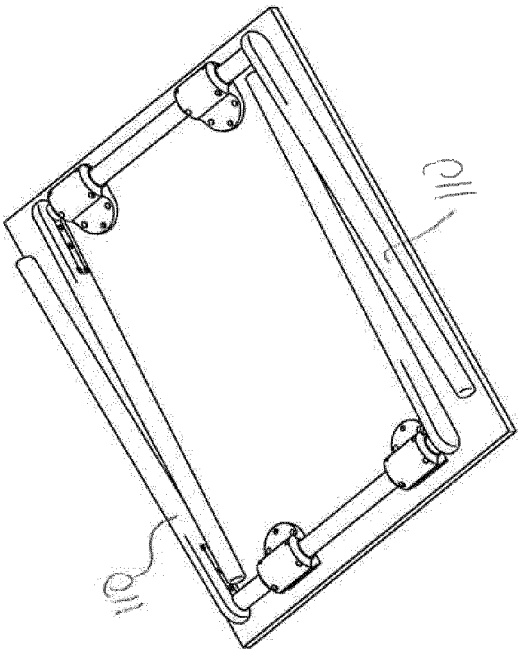


Fig. 5c



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EUROPEAN SEARCH REPORT

Application Number
EP 13 15 2875

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,D	DE 297 01 590 U1 (NIELSEN SOEREN [DK]; LASSEN THORE [DK]) 30 April 1997 (1997-04-30)	1-4, 10-15	INV. A47B3/08
A	* the whole document *	5-9	
X	US 2003/172493 A1 (CHRISTIANSEN POUL [DK] ET AL) 18 September 2003 (2003-09-18) * the whole document *	1-15	
X	US 3 491 706 A (GLASS HENRY P) 27 January 1970 (1970-01-27)	1-12,14	
A	* the whole document *	13,15	

TECHNICAL FIELDS SEARCHED (IPC)

A47B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12 June 2013	Ottesen, Rune

CATEGORY OF CITED DOCUMENTS

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