

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
15.10.2014 Bulletin 2014/42

(51) Int Cl.:
A47B 1/08 (2006.01)

(21) Application number: **14161324.0**

(22) Date of filing: **24.03.2014**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR
 Designated Extension States:
BA ME

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(30) Priority: 09.04.2013 IT MI20130559

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(54) **A positioning device of auxiliary bearing planes or extensions**

(57) A positioning device of auxiliary bearing planes or extensions (1) unexpectedly capable of a simple and precise movement, comprises:

- at least one fixed bearing plane (2), said fixed bearing plane (2) forming a first bearing surface (3);
- at least one mobile extension plane or extension (4) forming, with at least one portion thereof, a second bearing surface or extension surface (10);
- a support structure (6) mobile along a predefined extension direction (X-X);
- at least one sliding structure (5) allowing said support structure (6) sliding along said predefined extension direction (X-X);
- at least one articulated quadrilateral mechanism (7);
- said articulated quadrilateral mechanism (7) being secured with at least one first connecting rod (8) thereof to the support structure (6);

- said articulated quadrilateral mechanism (7) being secured with a second connecting rod (9) thereof to said mobile extension plane or extension (4);
 - said mobile extension plane or extension (4) being connected to the articulated quadrilateral mechanism (7) so as to move from a first rest position, adapted to store said mobile extension plane or extension (4) so that the second bearing surface (10) thereof is not coplanar to the first bearing surface (3) of the fixed plane, to a second operative position in which it is with at least one part of said second bearing surface (10) coplanar to the first bearing surface (3) of the fixed plane;
- characterized in that the movement of the articulated quadrilateral occurs along a trajectory (T) that is inclined by a predefined angle (A), with respect to the extension direction (X-X), different from 0 DEG and 90 DEG.

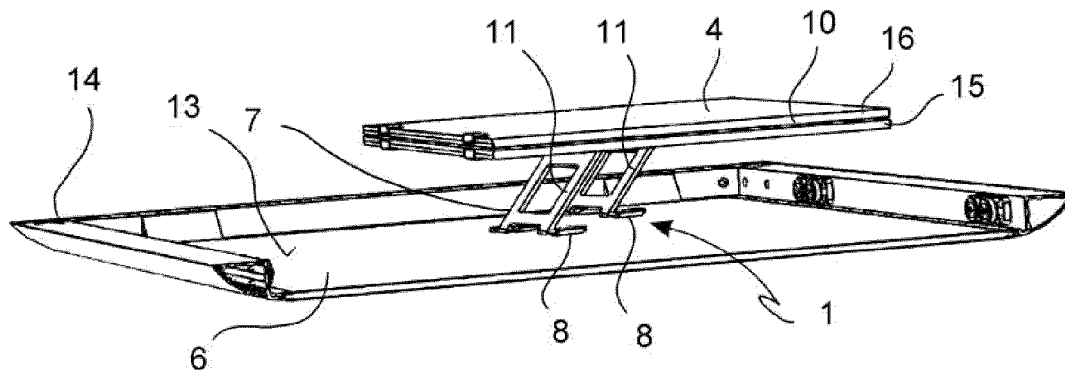


FIG. 9

Description. Field of the invention

5 [0001] The present invention relates to a positioning device of auxiliary supporting or bearing planes, which are also referred to as "extensions", as well as a table with an extension mechanism and a method for the use thereof.

[0002] In particular, the present invention relates to a positioning device of auxiliary bearing planes or extensions comprising a fixed bearing plane forming a first bearing surface, as well as a mobile extension plane or extension.

10 [0003] Said mobile extension plane or extension forms with at least one portion thereof a second supporting or bearing surface or extension surface.

[0004] This device further comprises a sliding structure allowing an extension support structure sliding along a pre-defined extension direction.

[0005] This device further comprises at least one mechanism secured with a first end thereof to the support structure and, with the opposite end, it is secured to the extension.

15 [0006] The present invention particularly relates to those solutions where the extension is handled so as to move from a first rest position, adapted to store said extension, to an operative position in which it is with a bearing surface thereof coplanar to the first bearing surface of the fixed plane.

. State of the art

20 [0007] It is known that the extension mechanisms, for example for bearing planes, such as tables, comprise systems to lift the extensions. However, such known solutions are typically very complex from both a constructive viewpoint and an end use viewpoint, as well as very bulky, especially in height in order to ensure a proper stability and precision to the table assembly.

25 [0008] The document GB156430 by ARTHUR NORMAN and HENRY GALE PARKER shows an extendable table having a sliding guide that allows mutually moving away two planes with a fixed height. A folded extension is received in a seat arranged centrally and below the planes with fixed height. This extension is guided in the extraction thereof and the opening thereof to a position that is coplanar to the planes with fixed height.

30 [0009] This state of the art is very difficult to be manufactured in order to handle both the fixed-height planes, and several operations, even very complex, are required to the user to bring the extension plane to the use position.

[0010] All these known solutions force to operate in three steps: extraction of the auxiliary plane, opening thereof, positioning thereof *in situ*.

35 [0011] The document AT500895 by TEAM 7 NATUERLICH WOHNEN GMBH shows a table having a fixed-height plane mounted on slidable guides and a pair of extension planes arranged below the fixed-height plane. One of the extension planes is provided with a pin which slides along a curved guide to rotatably guide the pair of extension planes during the extraction thereof. This solution is extremely complex to be obtained, forcing to constructive tolerances that, on one hand, have to facilitate the sliding of the pin into the guide and, on the other hand, have to limit the clearances in order to not create stickings or difficulties in the use, as well as a unsafety feel when using the extension plane.

40 [0012] Actually, no one of the known solutions suggests how to obtain a positioning device of auxiliary bearing planes or extensions that is able to bring the extension to the use position with few and simple operations, while being simple to be manufactured.

. Solution

45 [0013] Therefore, the object of the present invention is to propose a carriage or cart and a positioning device of auxiliary bearing planes or extensions that allows bringing an extension to place in a simple manner.

[0014] A further object of the present invention is to propose a positioning device of auxiliary bearing planes or extensions that is easy to be manufactured.

50 [0015] A still further object of the present invention is to propose a positioning device of auxiliary bearing planes or extensions that has reduced or very reduced overall dimensions.

. Figures

55 [0016] Further characteristics and advantages of the device according to the invention will be apparent from the description set forth below of preferred embodiment examples thereof, given by way of illustrative, nonlimiting example, with reference to the appended figures, in which:

- Fig. 1 represents an axonometric view of a table with a portion of a rest plane with a fixed height and two opposite

mobile rest plane portions;

- Fig. 2 illustrates a detail of a longitudinal section to the table of Fig. 1, so as to highlight the positioning device of auxiliary bearing planes or extensions;

- Fig. 3 illustrates a cross section of a detail of the table of Fig. 1, in which some details of the device and the extension are highlighted when the table is with the sliding structure thereof in the extended position;

- Fig. 4 represents a detail of a longitudinal section of the table of Fig. 3 in the extended position;

- Fig. 5 represents an axonometric view of a detail of the support structure in which an extension is stored where part of the device is illustrated in transparency;

- Fig. 6 illustrates an axonometric view of the detail of Fig. 5 in which the extension is in a first extraction position;

- Fig. 7 represents an axonometric view of the detail of Fig. 5 in which the extension is in a second extraction position;

- Fig. 8 represents an axonometric view of the detail of Fig. 5 in which the extension is in a fully extracted position and resting on the support structure arranged in the extended position;

- Fig. 9 represents an axonometric view from a different observation point of the detail of Fig. 7;

- Fig. 10 shows a view of a quadrilateral mechanism in a partially lifted position;

- Fig. 11 shows the detail of Fig. 10 according to the section C-C of Fig. 10;

- Fig. 12 illustrates a perspective view of a quadrilateral mechanism in the rest position;

- Fig. 13 represents a perspective view of a table with the support structure thereof in the extended position and the mobile extension plane or extension in the stored rest position arranged within the support structure seat;

- Fig. 14 represents a perspective view of the table of Fig. 13 in which the mobile extension plane or extension is in the extracted position and rested on the outer frame of the support structure with a portion thereof folded as a book;

- Fig. 15 illustrates a perspective view of the table of Fig. 13 in which the mobile extension plane or extension is the extracted position, extended and rested on the outer frame of the support structure.

Description of some preferred embodiment examples

[0017] With reference to the above-mentioned figures, a positioning device of auxiliary bearing planes or extensions 1 comprises at least one fixed bearing plane 2.

[0018] Said fixed bearing plane 2 forms a first bearing surface 3.

[0019] Said device further comprises at least one mobile extension plane, also referred to as an extension member or extension 4, forming, with at least one portion thereof, a second bearing surface or extension surface 10.

[0020] Said device further comprises a support structure 6 mobile along a predefined extension direction X-X, as well as at least one sliding structure 5 that allows said support structure 6 sliding along said predefined extension direction X-X.

[0021] Said device further comprises at least one articulated quadrilateral mechanism 7.

[0022] In accordance with an embodiment, said articulated quadrilateral mechanism 7 is secured with at least one first connecting rod 8 thereof to the support structure 6.

[0023] In accordance with an embodiment, said articulated quadrilateral mechanism 7 is secured with a second connecting rod 9 thereof to said mobile extension plane or extension 4.

[0024] In accordance with an embodiment, said mobile extension plane or extension 4 is connected to the articulated quadrilateral mechanism 7 so as to move from a first rest position, adapted to store said mobile extension plane or extension 4 so that the second bearing surface 10 thereof is not coplanar to the first bearing surface 3 of the fixed plane, to a second operative position in which it is with at least one part of said second bearing surface 10 coplanar to the first bearing surface 3 of the fixed plane.

[0025] In accordance with an embodiment, the movement of the articulated quadrilateral occurs along a trajectory T that is inclined by a predefined angle A, with respect to the extension direction X-X, different from 0 DEG (hexadecimal degrees) and 90 DEG.

[0026] In accordance with an embodiment, said trajectory T of the quadrilateral mechanism 7 has a predefined inclination so that the mobile extension plane 4 ends the trajectory thereof directly in the use position, for example, rested on said support structure 6 with at least one portion of the second bearing surface or extension surface 10 thereof coplanar to said first bearing surface 3 of the fixed plane 2.

[0027] In accordance with an embodiment, the angle A between the trajectory T of the quadrilateral mechanism and the extraction direction X-X ranges between 10 DEG and 80 DEG, preferably 75 DEG.

[0028] In accordance with an embodiment, said articulated quadrilateral mechanism 7 has connecting rods 8, 9 and cranks 11 mutually connected by hinges 12.

[0029] Said hinges have a rotational axis Y-Y inclined with respect to the extension direction X-X by an angle that is different from 0 DEG and 90 DEG.

[0030] In accordance with an embodiment, the angle that the rotational axis Y-Y of said hinges forms with the extension direction X-X ranges between -10 DEG and -80 DEG, preferably -15 DEG.

[0031] In accordance with an embodiment, said support structure 6 comprises a seat 13 and a frame 14.

[0032] In accordance with an embodiment, said mobile extension plane or extension 4 is connected to the articulated quadrilateral mechanism 7 so as to move from a first rest position, adapted to store said mobile extension plane or extension 4 in said seat 13, to a second operative position in which it is at least partially rested on said frame 14.

[0033] In accordance with an embodiment, said mobile extension plane 4 is formed by two portions 15, 16 that can be overlapped and mutually hinged to form, when they are in the extended position and mutually coplanar, a single bearing surface 10 arranged coplanar to the first bearing surface 3 of the fixed plane 2.

[0034] In accordance with an embodiment, said mobile extension plane 4 is connected to two articulated quadrilateral mechanisms 7, both forming mutually parallel trajectories T, T'.

[0035] In accordance with an embodiment, both said articulated quadrilateral mechanisms 7 have connecting rods 8, 9 and cranks 11 mutually connected by hinges 12.

[0036] In accordance with an embodiment, said hinges 12 have a rotational axis Y-Y inclined with respect to an extension direction X-X by an angle that is different from 0 DEG and 90 DEG.

[0037] In accordance with an embodiment, the articulated quadrilateral mechanism 7 comprises components 8, 9, 11 that are plate-shaped and arranged to one another so as, when they are in rest conditions, to be arranged all mutually coplanar, reducing the transversal overall dimensions of the quadrilateral mechanism 7.

[0038] In accordance with an embodiment, said device comprises a stop or end stroke member 19 that limits the stroke of the trajectory T of the articulated quadrilateral mechanism 7 when in a fully extended position so as to fully or partially unburden the weight of the mechanism itself and the mobile plane or extension 4 on the stop member 19.

[0039] In accordance with an embodiment, the articulated quadrilateral mechanism 7 comprises:

- connecting rods 8, 9 having a plate-shaped body provided with loops 17 for securing to the fixed plane 2 and the support structure 6;
- cranks 11 having a plate-shaped body forming the frame of the quadrilateral mechanism;
- hinges 12 for an articulated connection of the connecting rods 8, 9 to the cranks 11 with an hinge axis Y-Y parallel to the plate-shaped extension of the connecting rods and the cranks.

[0040] In accordance with an embodiment, the connecting rods 8 for the connection of the articulated quadrilateral mechanism to the fixed bearing plane 2 are in a number of two and are arranged mutually parallel and mutually spaced so as to connect a wide surface of the fixed plane 2 thus increasing the mechanism stability.

[0041] In accordance with an embodiment, the connecting rods 9 for the connection of the articulated quadrilateral mechanism to the support structure 6 are in a number of two and are arranged mutually parallel and mutually spaced so as to connect a wide surface of the support structure 6 thus increasing the mechanism stability.

[0042] In accordance with an embodiment, the cranks 11 are in a number of two and are connected by crossbeams 18 so as to keep them mutually spaced and parallel.

[0043] In accordance with an embodiment, the hinges 12 are in a number of four to connect two connecting rods 8 for the connection of the fixed plane to first ends of the two cranks 11 and to connect the two connecting rods 9 for the connection to the support structure to the two opposite ends of the cranks 11.

[0044] In accordance with an embodiment, the connecting rods 8, 9 for securing to the fixed plane and to the support structure and the cranks 11 are obtained from a shaped and/or cut plate, and they are mutually suitable to be arranged in a coplanar position to reduce the overall dimensions of the device.

[0045] The present invention particularly relates to a table, or similar article of furniture, comprising a device 1 as described above according to any of the various embodiments.

[0046] A method for the positioning of auxiliary bearing planes or extensions is described herein below.

[0047] A possible positioning method of an extension comprises the steps of:

- extending a support structure 6 with respect to a fixed bearing plane 2 having a first bearing surface 3 along an extension direction X-X;
- lifting a mobile extension plane or extension 4 from a rest position;
- having the mobile plane or extension 4 follow a trajectory T that is inclined with respect to the extension direction X-X by an angle A different from 0 DEG and 90 DEG;
- ending the trajectory T by bringing the mobile plane or extension 4 to its use position so that at least one portion of the second bearing surface 10 is coplanar to the first bearing surface 3.

[0048] In accordance with a different method, the further step is provided for, of:

- opening the extension 4 bringing the entire second bearing surface thereof to be coplanar to the first bearing surface 3.

[0049] . In accordance with a different method, the further step is provided for, of:

- at the end of the inclined trajectory T, resting the mobile plane or extension 4 to the support structure 6.

[0050] In accordance with a still different method, the further step is provided for, of:

- at the end of the inclined trajectory T, at least partially resting the mobile plane or extension 4 to the stop member 9.

[0051] Of course, those of ordinary skill in the art, in order to meet contingent, specific needs, will be able to make a number of modifications and variations to the cart or mechanism according to the invention, all anyhow falling within the protection scope of the invention, as defined by the following claims.

REFERENCES

1	Positioning device of auxiliary bearing planes or extensions
2	Fixed bearing plane
3	First bearing surface
4	Mobile extension plane or extension
5	Sliding structure
6	Support structure
7	Articulated quadrilateral mechanism
8	First connecting rod
9	Second connecting rods
10	Second rest surface or extension surface
11	Articulated quadrilateral cranks
12	Hinges
13	Seat obtained in the support structure
14	Frame obtained in the support structure
15	First mobile plane portion
16	Second mobile plane portion
17	Connecting rod securing loops
18	Articulated quadrilateral crossbeams
19	Stop or end stroke member
X-X	Extension direction
T	Articulated quadrilateral movement trajectory
A	Inclination angle of the articulated quadrilateral trajectory
Y-Y	Rotational axis of the hinges
T'	Parallel trajectory of the second articulated quadrilateral

Claims

1. A positioning device of auxiliary bearing planes or extensions (1), comprising:

- at least one fixed bearing plane (2), said fixed bearing plane (2) forming a first bearing surface (3);
- at least one mobile extension plane or extension (4) forming, with at least one portion thereof, a second bearing surface or extension surface (10);
- a support structure (6) mobile along a predefined extension direction (X-X);

- at least one sliding structure (5) allowing said support structure (6) sliding along said predefined extension direction (X-X);
- at least one articulated quadrilateral mechanism (7);
- said articulated quadrilateral mechanism (7) being secured with at least one first connecting rod (8) thereof to the support structure (6);
- said articulated quadrilateral mechanism (7) being secured with a second connecting rod (9) thereof to said mobile extension plane or extension (4);
- said mobile extension plane or extension (4) being connected to the articulated quadrilateral mechanism (7) so as to move from a first rest position, adapted to store said mobile extension plane or extension (4) so that the second bearing surface (10) thereof is not coplanar to the first bearing surface (3) of the fixed plane, to a second operative position in which it is with at least one part of said second bearing surface (10) coplanar to the first bearing surface (3) of the fixed plane;

characterized in that

the movement of the articulated quadrilateral occurs along a trajectory (T) that is inclined by a predefined angle (A), with respect to the extension direction (X-X), which is different from 0 DEG and 90 DEG.

2. The device (1) according to claim 1, wherein said trajectory (T) of the quadrilateral mechanism (7) has a predefined inclination so that the mobile extension plane (4) ends the trajectory thereof directly in the use position, for example, rested on said support structure (6) with at least one portion of the second bearing surface or extension surface (10) thereof coplanar with said first bearing surface (3) of the fixed plane (2); and/or wherein the angle (A) between the trajectory (T) of the quadrilateral mechanism and the drawing direction (X-X) ranges between 10 DEG and 80 DEG, preferably 75 DEG, and/or wherein said articulated quadrilateral mechanism (7) has connecting rods (8, 9) and cranks (11) mutually connected by hinges (12), said hinges have a rotational axis (Y-Y) inclined with respect to the extension direction (X-X) by an angle that is different from 0 DEG and 90 DEG and/or wherein the angle that the rotational axis (Y-Y) of said hinges forms with the extension direction (X-X) ranges between - 10 DEG and -80 DEG, preferably -15 DEG.

3. The device (1) according to claim 1 or 2, wherein

- said support structure (6) comprises a seat (13) and a frame (14);
- said mobile extension plane or extension (4) is connected to the articulated quadrilateral mechanism (7) so as to move from a first rest position, adapted to store said mobile extension plane or extension (4) in said seat (13), to a second operative position wherein it is at least partially rested to said frame (14);
- and/or wherein
- said mobile extension plane (4) is formed by two portions (15, 16) that can be overlapped and mutually hinged to form, when they are in extended position and mutually coplanar, a single bearing surface (10) arranged coplanar to the first bearing surface (3) of the fixed plane (2).

4. The device (1) according to any of the preceding claims, wherein said mobile extension plane (4) is connected to two articulated quadrilateral mechanisms (7), both forming mutually parallel trajectories (T, T'); and/or wherein both said articulated quadrilateral mechanisms (7) have connecting rods (8, 9) and cranks (11) mutually connected by hinges (12); said hinges (12) have a rotational axis (Y-Y) inclined with respect to an extension direction (X-X) by an angle different from 0 DEG and 90 DEG.

5. The device (1) according to any of the preceding claims, wherein the articulated quadrilateral mechanism (7) comprises components (8, 9, 11) that are plate-shaped and arranged to one another so as, when they are in a rest conditions, to be arranged all mutually coplanar, thus reducing the transversal overall dimensions of the quadrilateral mechanism (7); and/or wherein said device comprises a stop or end stroke member (19) that limits the stroke of the trajectory (T) of the articulated quadrilateral mechanism (7) when in a completely extended position, so as to partially unburden the weight of the mechanism itself and of the mobile plane or extension (4) on the stop member (19).

6. The device (1) according to any of the preceding claims, wherein the articulated quadrilateral mechanism (7) comprises:

- connecting rods (8, 9) having a plate-shaped body provided with loops (17) for securing to the fixed plane (2) and to the support structure (6);
- cranks (11) having a plate-shaped body forming the frame of the quadrilateral mechanism;
- hinges (12) for an articulated connection of the connecting rods (8, 9) to the cranks (11) with an hinge axis (Y-Y) parallel to the plate-shaped extension of the connecting rods and the cranks;
- and/or wherein
- the connecting rods (8) for the connection of the articulated quadrilateral mechanism to the fixed bearing plane (2) are in a number of two, and are arranged mutually parallel and mutually spaced so as to connect a wide surface of the fixed plane (2), thus increasing the mechanism stability;
- and/or wherein
- the connecting rods (9) for the connection of the articulated quadrilateral mechanism to the support structure (6) are in a number of two, and are arranged mutually parallel and mutually spaced so as to connect a wide surface of the support structure (6), thus increasing the mechanism stability;
- and/or wherein
- the cranks (11) are in a number of two and are connected by crossbeams (18) so as to keep them mutually spaced and parallel;
- and/or wherein
- the hinges (12) are in a number of four to connect two connecting rods (8) for the connection of the fixed plane to first ends of the two cranks (11) and to connect the two connecting rods (9) for the connection to the support structure at the two opposite ends of the cranks (11); and/or wherein
- the connecting rods (8, 9) for fixing to the fixed plane and to the support structure and the cranks (11) are obtained from a shaped and/or cut plate, and they are mutually suitable to be arranged in a coplanar position to reduce the overall dimensions of the device.

7. A table comprising a device (1) as described in any of the claims 1 to 6.

8. A method for positioning auxiliary bearing planes or extensions, comprising the steps of:

- extending a support structure (6) with respect to a fixed bearing plane (2) having a first bearing surface (3) along an extension direction (X-X);
- lifting a mobile extension plane or extension (4) from a rest position;
- having the mobile plane or extension (4) follow a trajectory (T) that is inclined with respect to the extension direction (X-X) by an angle (A) different from 0 DEG and 90 DEG;
- ending the trajectory (T) by bringing the mobile plane or extension (4) in its use position, so that at least one portion of the second bearing surface (10) is coplanar to the first bearing surface (3).

9. The method according to claim 8, wherein the further step is provided, of:

- opening the extension (4) bringing the entire the second bearing surface thereof to be coplanar to the first bearing surface (3).

10. The method according to claim 8 or 9, wherein the further step is provided, of:

- at the end of the inclined trajectory (T), resting the mobile plane or extension (4) to the support structure (6);
- or
- at the end of the inclined trajectory (T), at least partially resting the mobile plane or extension (4) to the stop member (9).

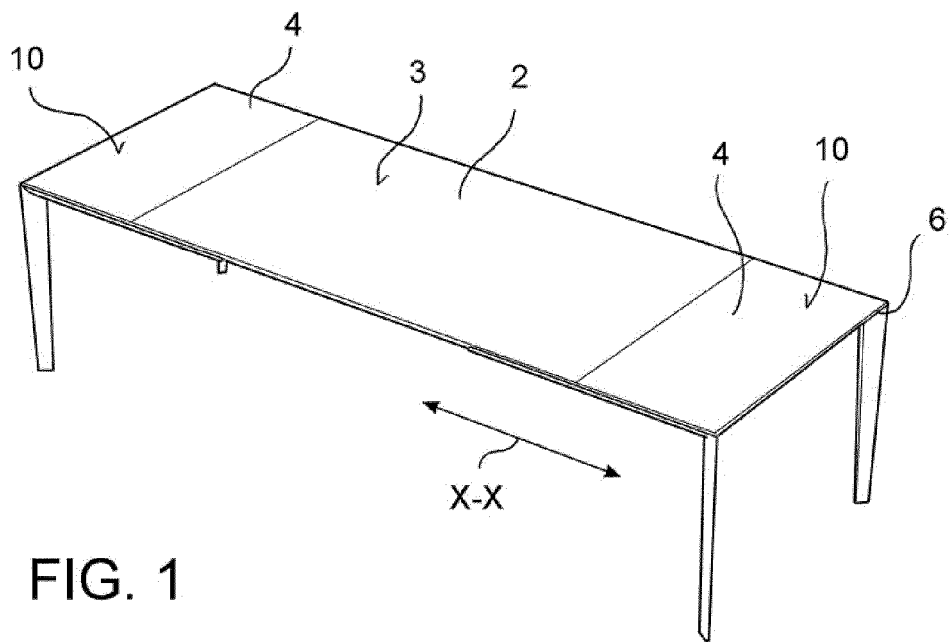


FIG. 1

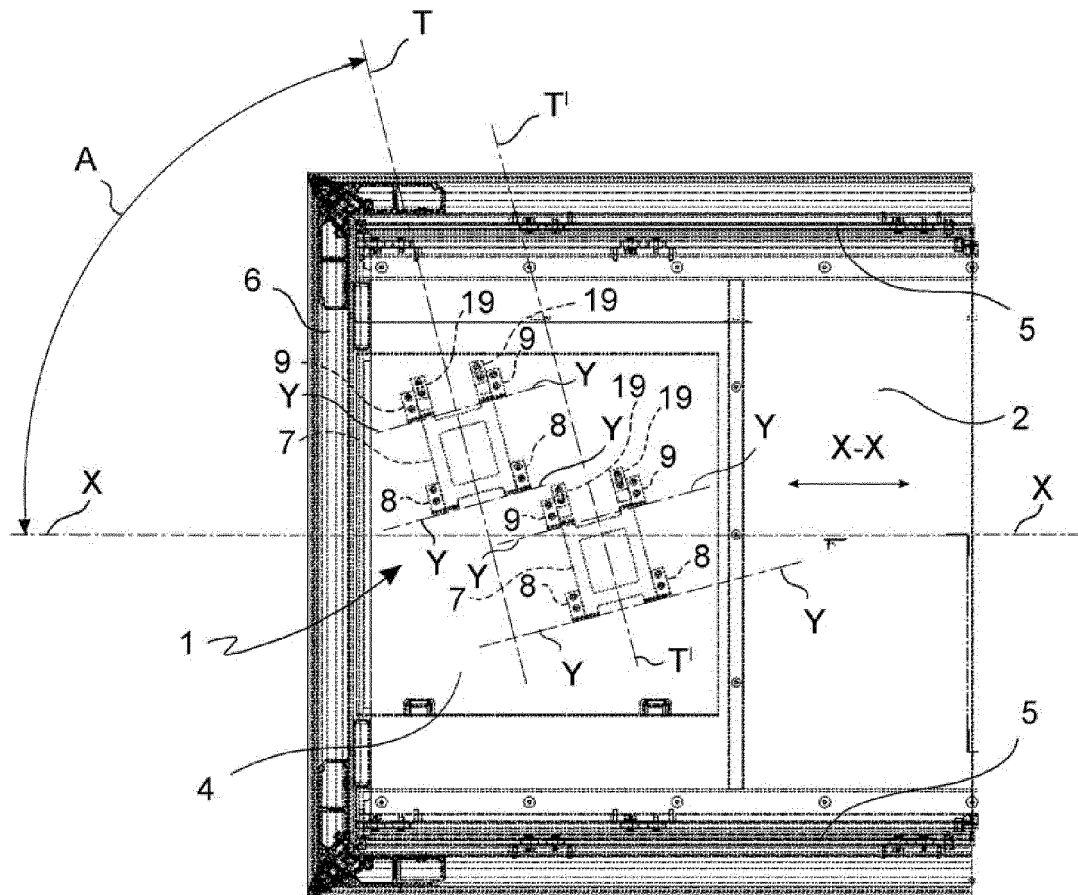


FIG. 2

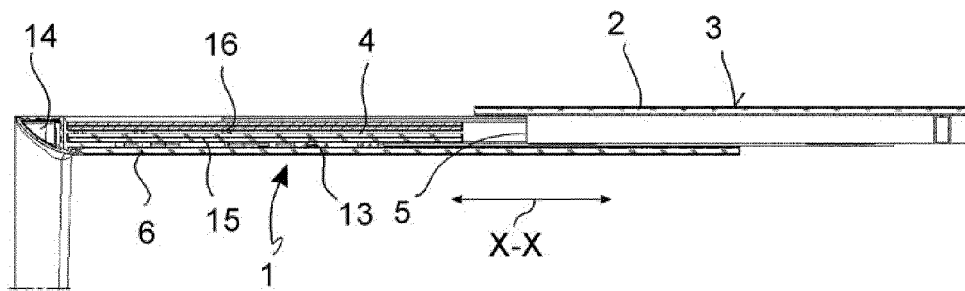


FIG. 3

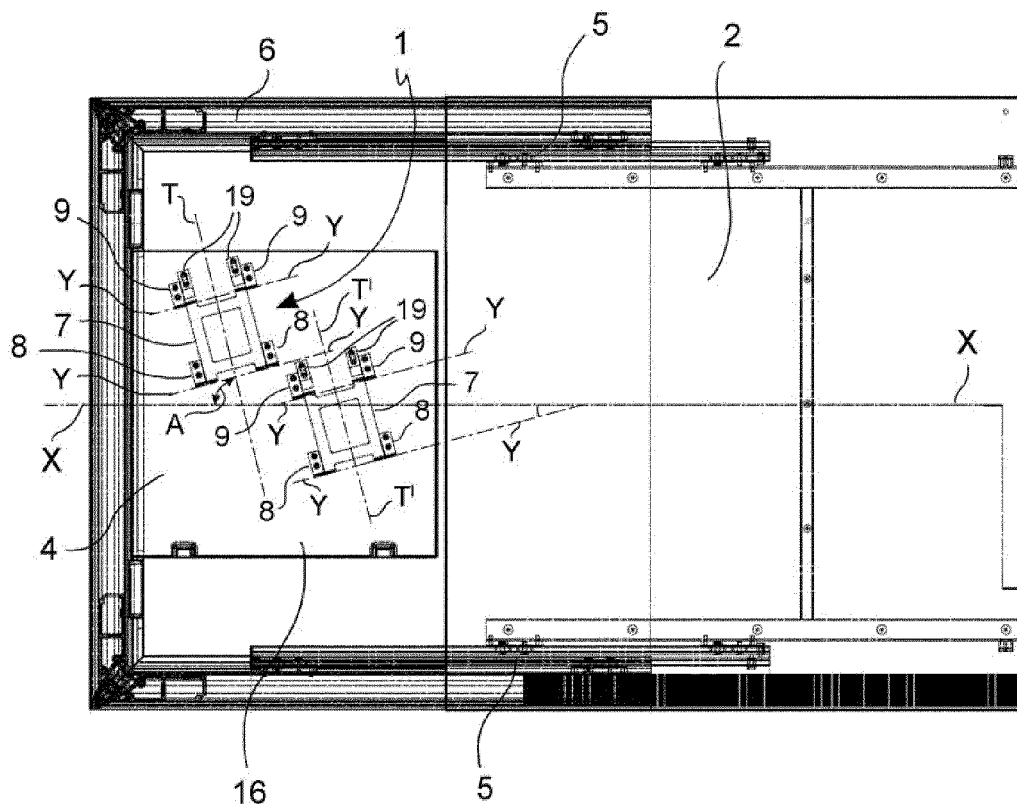


FIG. 4

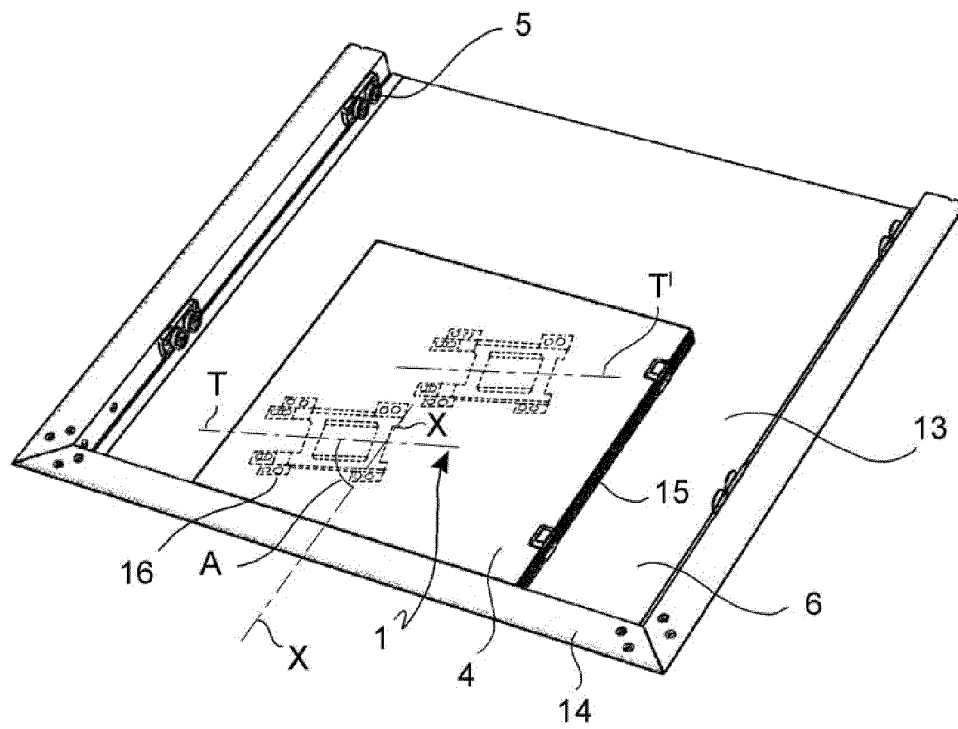


FIG. 5

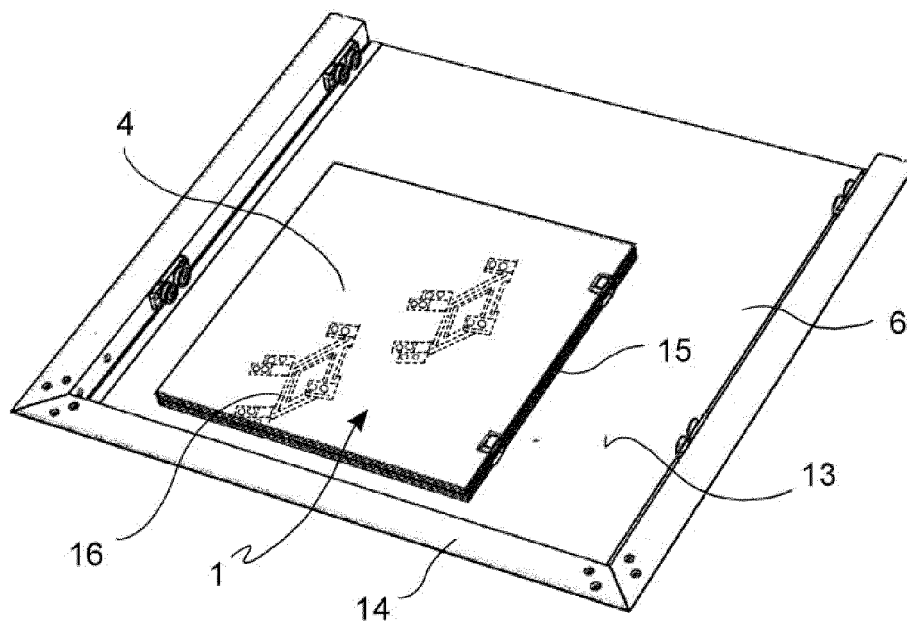


FIG. 6

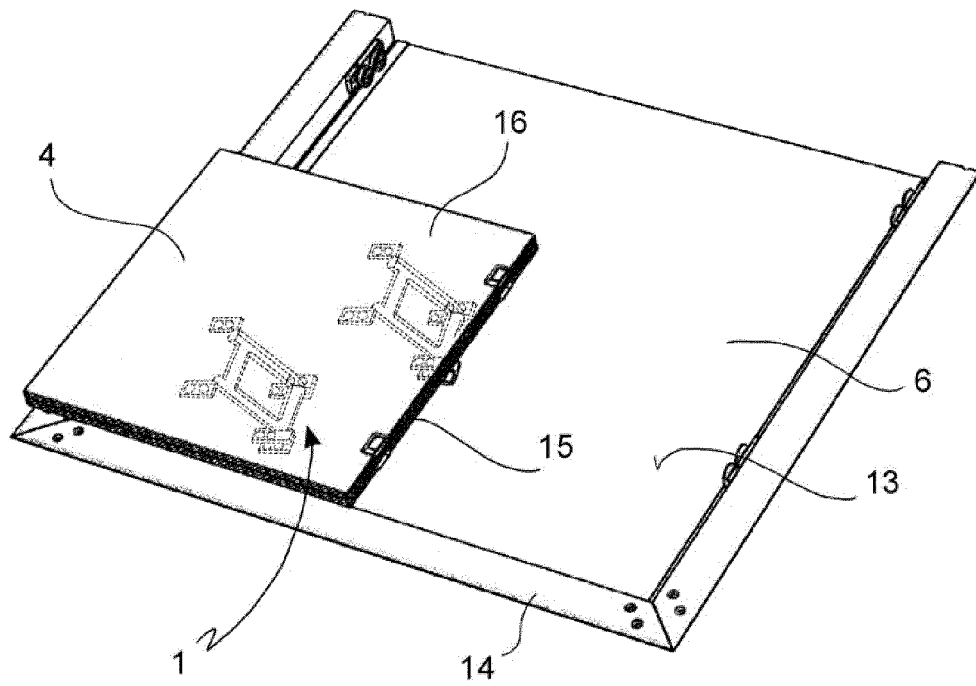


FIG. 7

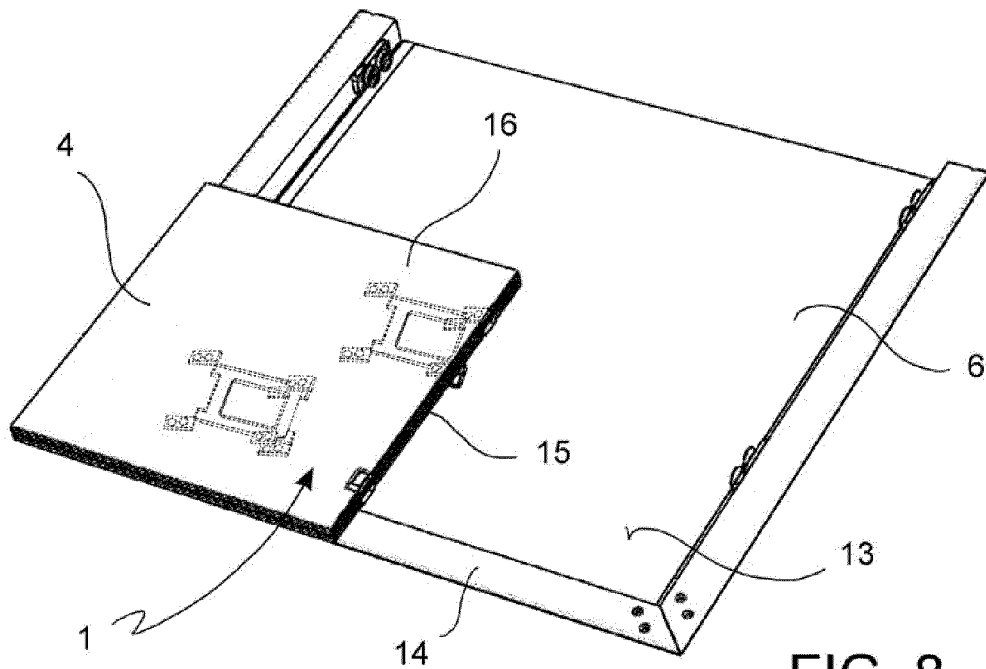


FIG. 8

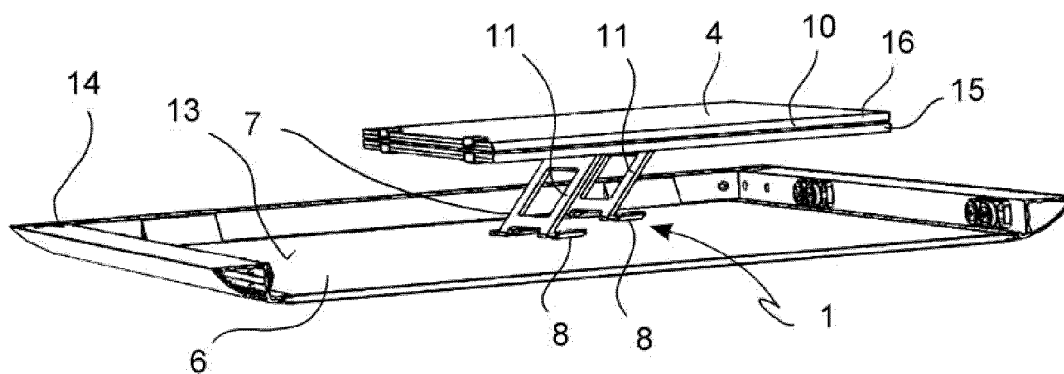


FIG. 9

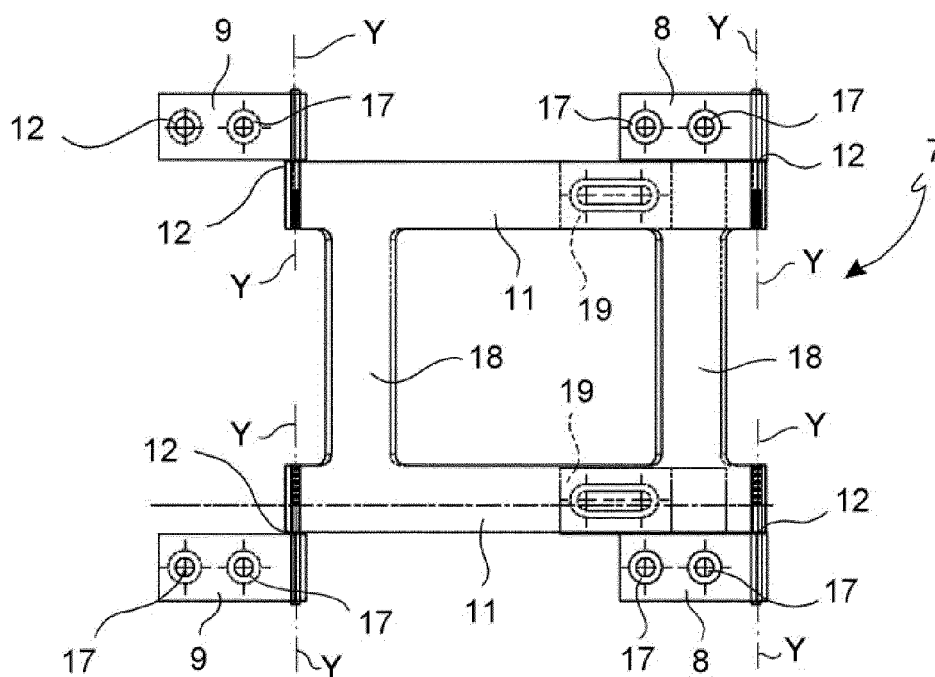


FIG. 10

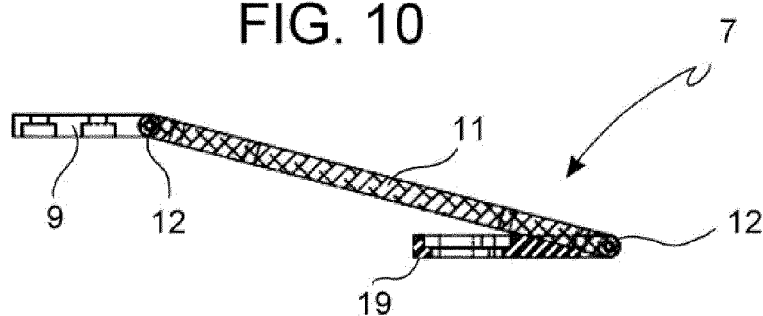


FIG. 11

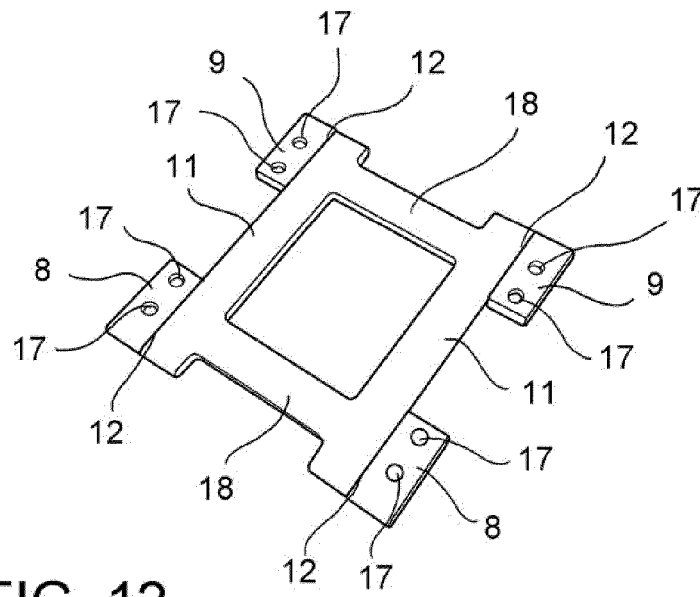


FIG. 12

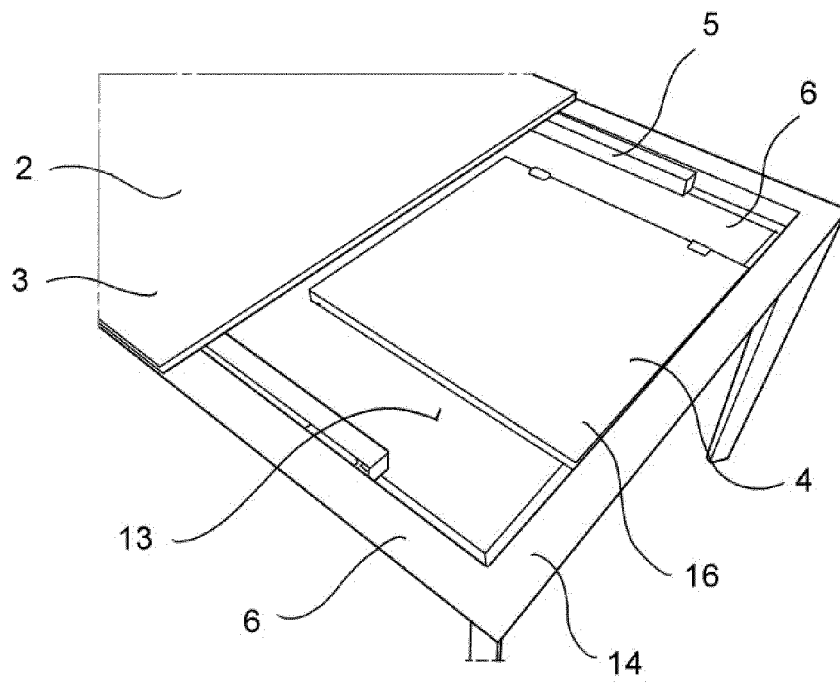


FIG. 13

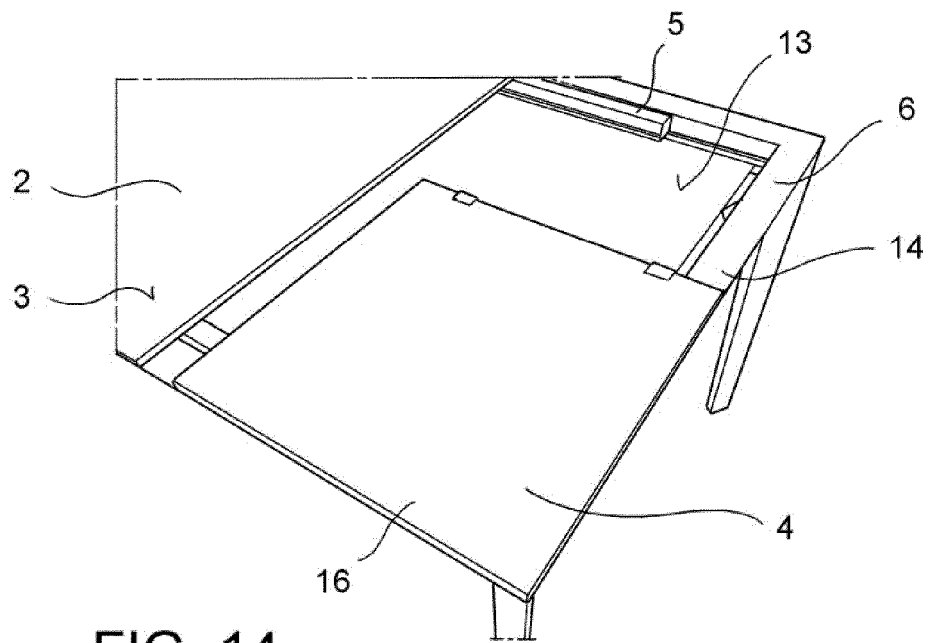


FIG. 14

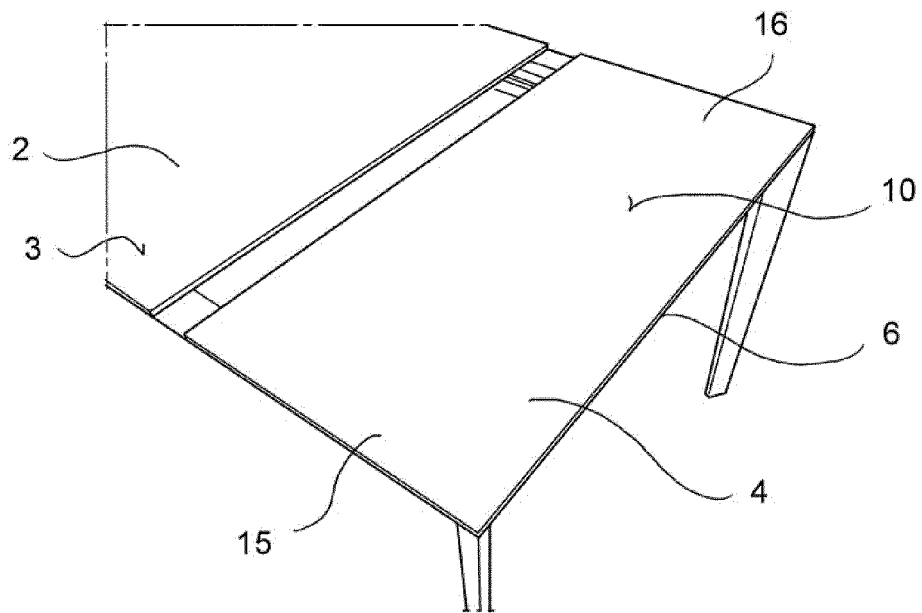


FIG. 15



EUROPEAN SEARCH REPORT

 Application Number
 EP 14 16 1324

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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)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			A47B F16C
Place of search		Date of completion of the search	Examiner
The Hague		25 August 2014	Ottesen, Rune
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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REFERENCES CITED IN THE DESCRIPTION

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