



(11) **EP 3 928 663 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
18.10.2023 Bulletin 2023/42

(51) International Patent Classification (IPC):
A47C 17/52^(2006.01) A47C 17/62^(2006.01)

(21) Application number: **21179997.8**

(52) Cooperative Patent Classification (CPC):
A47C 17/62; A47C 17/52

(22) Date of filing: **17.06.2021**

(54) **FURNITURE STRUCTURE CONVERTIBLE FROM DESK TO BED**

VON EINEM SCHREIBTISCH IN EIN BETT UMWANDELBARE MÖBELSTRUKTUR
STRUCTURE DE MEUBLE CONVERTIBLE DE BUREAU À LIT

(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

(30) Priority: **22.06.2020 IT 202000014854**

(43) Date of publication of application:
29.12.2021 Bulletin 2021/52

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Description

[0001] The invention relates to a furniture structure convertible from a desk to a resting-space, in particular a bed, and vice versa.

[0002] Furniture with a dual function, such as a desk during the day and a bed at night, is well known. The purpose of such structures is to create a piece of furniture that performs different functions without taking up too much space and without requiring too much physical effort on the part of the user.

[0003] A valuable niche concerns furniture convertible from desk to bed and vice versa, having the convenient feature that the shelf of the desk always remains horizontal when the furniture is converted.

[0004] A pioneering design was described in WO2005037021, followed by designs such as that in Italian patent application MI2013A000547. Both suffer from the drawback that the levers for moving the desk shelf are very exposed and during the conversion of the furniture create dangerous scissors that can e.g. injure or crush a finger.

[0005] WO 2014/166622 A1 and KR 101 162 285 B1 disclose structures of writing desks. The main object of the invention is to improve this state of the art.

[0006] A particular object of the invention is to improve convertible furniture structures as in WO2005037021 or MI2013A000547 by making them safer for the user.

[0007] It is then proposed a furniture structure convertible from desk to resting-space and vice versa, comprising:

- a compartment bounded by walls;
- a platform which is hinged to the compartment to be rotatable between two positions:

a position wherein the platform is upright and contained in the compartment, and

a position wherein the platform is horizontal and allows to lie on it; and

- two parallel extensions that are integral to the platform and extend orthogonally to the platform's plane outward from the structure;
- a shelf supported by and hinged to the free end of the extensions to form a working surface of the desk; the shelf being able to rotate with respect to the extensions to remain always horizontal while the platform moves from one of said positions to the other,
- a driving element connected to the shelf to impart a torque to it and make it rotate, the driving element being

mounted to move linearly - more preferably only linearly - in a direction orthogonal to the plane of the platform, and

connected to the compartment so as to be moved as a result of a relative rotation between

the platform and the compartment.

[0008] The peculiar assembly and kinematics of the driving element make it possible to avoid that the organs of the shelf actuation mechanism reach positions too far away, or protruding, from the platform and/or the extensions, thus creating the above-mentioned dangerous scissors.

[0009] Hereafter are advantageous variants for the convertible furniture structure.

[0010] Preferably one of the extensions has an inner cavity, and the driving element is mounted inside the inner cavity. This arrangement avoids any contact between the driving element and the user during the conversion maneuver. More preferably, one of the extensions is a (e.g. parallelepiped) shell delimiting an inner cavity within which the driving element is mounted. This extension structure is very advantageous because it not only avoids any contact between the driving element (or in general between the moving mechanism) and the user during the conversion maneuver, but also protects the driving element (and in general the moving mechanism).

[0011] However, a variant in which the driving element is movably mounted on the outer surface of one of the extensions, is possible.

[0012] According to the invention, the platform has a hinging axis to the compartment, and one of the extensions has a dimension that lies in a plane orthogonal to the hinging axis and is bounded by edges. To facilitate the absence of contact between the user and the driving element (or generally the moving mechanism), the driving element is mounted so as to move while remaining between such edges.

[0013] In order to impart motion to the driving element, a variant envisages a rigid arm connected at a first end thereof to the compartment and at a second end thereof to a mechanism for converting the relative displacement of the second end relative to one of the extensions, during the rotation of the platform, into a displacement of the driving element. Preferably, with the advantages described above, the mechanism for converting is housed within the cavity of the one of the extensions.

[0014] To facilitate the motion transmission between the rigid arm and the driving element, the platform has a hinging axis to the compartment, and the mechanism for converting preferably comprises an element mounted rotatable about an axis parallel to said hinging axis, the rotatable element being connected with the driving element to transfer motion to it. This kinematic chain is simple, inexpensive and has all its elements moving within a plane. Therefore such elements can have a short stroke and do not make deviations that would create the aforementioned scissors.

[0015] Among the various possible options, the rotating element is, for example, a disc or a fork.

[0016] To simplify the kinematic chain of motion transmission between the rigid arm and the driving element, preferably the rotatable element is hinged directly at one

point with the driving element and at a different point directly with the second end of the rigid arm. However, less compact variants having other components between the rigid arm and the rotatable element, or between the driving element and the rotatable element, are possible.

[0017] For compactness and absence of scissors, the rotatable element is preferably hinged to one of the extensions or inside the extension's cavity. However, variants in which the rotatable element is hinged to the platform, are possible.

[0018] Preferably, the driving element is connected to the shelf by a rotatable support pivoted on one of the extensions about an axis parallel to the hinging axis of the platform to the compartment and/or to the rotation axis of the rotatable element. The rotatable support is mounted outside the one of the extensions and serves as a fixing point for the shelf, and facilitates assembly of the shelf. In particular, in a variant, the rotatable support comprises a portion mounted inside the cavity of the one of the extensions, and the driving element is connected (e.g. hinged) to said portion.

[0019] Specifically, the driving member is mounted to move linearly along a plane passing through the driving element's hinging axis to the rotatable member and through the driving element's hinging axis to the rotatable support or to the portion thereof mounted within the cavity of the one of the extensions.

[0020] The advantages of the invention will be better elucidated by the following description of an example of a convertible piece of furniture, illustrated in the accompanying drawing wherein:

- Fig. 1 shows a three-dimensional view of the piece of furniture in a first configuration;
- Fig. 2 shows a three-dimensional view of the piece of furniture in a second configuration;
- Fig. 3 shows a three-dimensional view of some parts of the piece of furniture;
- Fig. 4 shows a three-dimensional view of the parts in fig. 3 in exploded view.

[0021] In the figures equal numbers indicate equal parts, and objects are described as in use.

[0022] A furniture structure or piece of furniture MC is convertible from a desk to a resting-place and vice versa, and comprises a box-like compartment or cavity 10 and a lowerable platform 20. The compartment 10 is for example bounded by two side walls 12, a ceiling wall 14, a bottom wall 16, and a back wall 18.

[0023] The platform 20 is hinged to the compartment 10 in a known manner about a horizontal axis X1, such that the platform 20 is rotatable between a position where it is upright and contained within the compartment 10 (fig. 1), and a position where it is horizontal and allows a person to lie on it (fig. 2). For this purpose on the surface that can face the compartment 10, the platform 20 optionally comprises slats or a bedspring 22, or a mattress or cushions (not shown).

[0024] Two parallel extensions 30 extend from the platform 20 orthogonally to the plane of the platform 20 toward the outside of the structure MC. A shelf 50 is coupled to the free end of the extensions 30 to form a working surface of the desk. Because the shelf 50 is hinged to the extensions 30 about an axis X2, parallel to X1, the shelf 50 can rotate relative to the extensions 30 about the axis X2 to remain horizontal at all times while the platform 20 moves from vertical to horizontal and vice versa.

[0025] As shown in Figs. 3 and 4, each extension 30 is a parallelepiped shell 34, e.g. fixed to the platform 20 or to a rim 32 of a slatted bedframe. The shell 34 has an internal cavity 36 that contains, protects, and conceals a lever mechanism configured to move the shelf 50 synchronously with the platform 20, such that the shelf 50 remains horizontal at all times as the platform 20 moves. The lever mechanism drives a rotatable support 70 (e.g. a plate) connected to the shelf 50.

[0026] The lever mechanism comprises (Fig. 4) a driving element or arm 40, a rigid arm 42, and a rotatable swiveling element 44 rotatably mounted about an axis X3 parallel to axis X1.

[0027] In the illustrated example, the rotatable element 44 is a V-shaped fork with two segments 46, 48; the vertex of the V is rotatable about the axis X3. The fork shape of the rotatable element 44 makes it unobtrusive; however, the shape of the rotatable element 44 is not essential, and it may also be, for example, a disc. The shape of the driving element or arm 40 may also vary; but preferably the driving element or arm 40 is a straight or angled lever to better accommodate being housed within the extension 30.

[0028] The rigid arm 42 has a first and second end. Said first end is hinged to the compartment 10 about an axis X4 parallel to the axis X1. To such aim, the platform 20 and the arm 42 are preferably mounted on two plates 98, which are in turn fixed to the compartment 10. The two plates 98 reinforce the structure but direct attachment to the walls of the compartment 10 is possible. The second end of the arm 42 is hinged to the segment 46. The segment 48 is hinged to the driving element 40, which is hinged to the rotatable support 70 to impart torque to it and rotate it about the axis X2.

[0029] The mutual hinging axes of the rigid arm 42, the segments 46, 48, and the driving element 40 are parallel to each other and parallel to axis X1.

[0030] The rigid arm 42, the rotatable element 44, and the driving element 40 form a mechanism for rotating the shelf 50 when the platform 20 is rotated relative to the compartment 10. In particular, the rotation of the platform 20 results in a relative displacement between the second end of the arm 42 and the extension 30, and this displacement is converted into a linear displacement of the driving element 40. In fact, by lifting the platform 20, the second end of the arm 42 approaches the free end of the platform 20 (moves away from the axis X1) and pushes (clockwise in Figs. 2 and 4) the segment 46. This thrust

causes the element 44 to rotate about the axis X3 (clockwise in Figs. 3 and 4) so that the segment 48 pushes the driving element 40. Therefore the driving element 40 slides linearly inside the extension 30 towards the shelf 50 in a direction orthogonal to the plane of the platform 20. Thus the driving element 40 exerts a torque on the support 70, makes it rotate and also makes the shelf 50 rotate together with it.

[0031] In essence, with respect to the fixed axes X2, X3 the segment 48, the driving element 40 and the support 70 behave as an articulated parallelogram.

[0032] When the platform 20 is lowered, all the movements of the mechanism occur in the opposite direction, and the driving element 40 thus exerts a reverse torque on the support 70 and causes the shelf 50 to rotate in the opposite direction.

[0033] The support 70 that bears and rotates the shelf 50 may have many different embodiments. In the illustrated example, the support 70 comprises one or more plates 72 to which an end of the driving element 40 is eccentrically hinged. The plate 72 is fixed to various shims 74 packed between the ends of the extension 30 and to a block or plate 76 mounted externally to the extension 30. The shelf 50 is mounted on the block or plate 76. It is also possible to directly connect the driving element 40 to the shelf 50 or the block or plate 76.

[0034] The invention envisages that the driving element 40 and optionally the rotatable element 44 - is contained within the cavity of the extension 30, with the advantage of avoiding any dangerous accidental interaction between the levers or the moving parts and the user.

[0035] As a variant, the shelf 50's movement mechanism is mounted on only one or both extensions 30.

Claims

1. Furniture structure (MC) convertible from desk to resting-place and vice versa, comprising:

- a compartment (10) delimited by walls;
- a platform (20) which is hinged to the compartment to be rotatable between two positions:

one position wherein the platform is upright and contained in the compartment, and
one position wherein the platform is horizontal and allows to lie on it; and

- two parallel extensions (30) which are integral with the platform and extend orthogonally to the plane of the platform towards the outside of the structure;

- a shelf (50) supported by and hinged to the free end of the extensions to constitute a working surface of the desk; the shelf being able to rotate with respect to the extensions to remain always horizontal while the platform moves from one of

said positions to the other,

- a driving element (40) connected to the shelf to impart a torque to it and rotate it, the element being

mounted to move linearly along a direction orthogonal to the platform's plane, and connected to the compartment so as to be moved following a relative rotation between the platform and the compartment,

characterized in that

the platform has a hinging axis (X1) to the compartment, and one of the extensions (30) has a dimension that lies in a plane orthogonal to said hinging axis and is delimited by edges, and the driving element (40) is mounted so as to move remaining between such edges.

2. Structure according to claim 1, wherein one of the extensions (30) has an internal cavity, and the driving element is mounted inside the internal cavity.
3. Structure according to claim 1 or 2, wherein one of the extensions (30) is a shell which forms an inner cavity in which the driving element is mounted.
4. Structure according to claim 1, wherein the driving element (40) is movably mounted on the external surface of one of the extensions.
5. Structure according to any one of the preceding claims, comprising a rigid arm (42) connected at a first end thereof to the compartment and at a second end thereof to a mechanism (44) for converting the relative displacement of the second end with respect to one of the extensions, during rotation of the platform, into a displacement of the driving element.
6. Structure according to claim 5, wherein the platform has a second hinging axis to the compartment (X4), and the mechanism for converting comprises an element (44) mounted rotatable about an axis (X3) parallel to said second hinging axis (X4), the rotatable element being connected with the driving element to transfer motion to it.
7. Structure according to claim 6, wherein the rotatable element is a disk or a fork.
8. Structure according to claims 7 or 6, wherein the rotatable element (44) is hinged at one point with the driving element (40) and at a different point with the second end of the rigid arm (42).
9. Structure according to claims 6 and 2 and optionally any other previous claim, wherein the rotatable ele-

ment is hinged to an extension or inside said cavity of the one of the extensions.

10. Structure according to any one of claims 6-9, wherein the driving element (40) is connected to the shelf by a rotatable support (70) pivoted on one of the extensions about an axis parallel to the hinging axis of the platform to the compartment and/or to the rotation axis of the rotatable element (44), the rotatable support (70) being mounted outside the one of the extensions and serving as a fixing point for the shelf and facilitates assembly of the shelf. 5
11. Structure according to claim 10 and claims 2 or 3, wherein the rotatable support (70) comprises a portion (74) mounted inside the cavity of the one of the extensions, and the driving element (40) is connected to said portion. 10
12. Structure according to claim 11, wherein the rotatable support (70) is hinged with said portion (74). 15
13. Structure according to claim 10 when dependent on claim 2 or 3, claim 11 or claim 12, wherein the driving element (40) is mounted to move linearly along a plane passing through the driving element's hinging axis to the rotatable member (70) and through the driving element's hinging axis to the rotatable support (70) or to the portion thereof mounted within the cavity of the one of the extensions. 20

Patentansprüche

1. Möbelstruktur (MC), umwandelbar vom Schreibtisch zum Ruheplatz und umgekehrt, bestehend aus:
- ein durch Wände begrenztes Fach (10);
 - eine Plattform (20), die an der Kammer angelehnt ist, um zwischen zwei drehbar zu sein Positionen:
 - eine Position, in der die Plattform aufrecht steht und im Fach enthalten ist, und
 - eine Position, in der die Plattform horizontal ist und es ermöglicht, darauf zu liegen;
 - zwei parallele Verlängerungen (30), die fest mit der Plattform verbunden sind und sich orthogonal zur Ebene der Plattform zur Außenseite der Struktur erstrecken,
 - ein Regal (50), das von dem freien Ende der Verlängerungen getragen wird und daran angelehnt ist, um eine Arbeitsfläche des Schreibtisches zu bilden; wobei sich das Regal in Bezug auf die Verlängerungen drehen kann, um immer horizontal zu bleiben, während sich die Plattform von einer der genannten Positionen in die

andere bewegt,
- ein Antriebselement (40), das mit dem Regal verbunden ist, um ihm ein Drehmoment zu verleihen und es zu drehen,

wobei das Element

montiert, um sich linear entlang einer Richtung orthogonal zur Plattformebene zu bewegen, ist, und verbunden, um einer Relativdrehung zwischen der Plattform und dem Fach folgend bewegt zu werden, ist,

dadurch gekennzeichnet dass

die Plattform hat eine Gelenkachse (X1) zum Fach, und eine der Verlängerungen (30) hat eine Abmessung, die in einer Ebene orthogonal zu der Gelenkachse liegt und durch Kanten begrenzt ist, und das Antriebselement (40) ist so montiert, dass es sich zwischen diesen Kanten bewegen kann.

2. Struktur nach Anspruch 1, wobei eine der Verlängerungen (30) einen Innenhohlraum aufweist und das Antriebselement im Inneren des Innenhohlraums montiert ist. 25
3. Struktur nach Anspruch 1 oder 2, wobei eine der Erweiterungen (30) eine Schale ist, die einen inneren Hohlraum bildet, in dem das Antriebselement montiert ist. 30
4. Struktur nach Anspruch 1, wobei das Antriebselement (40) beweglich an der Außenfläche einer der Verlängerungen montiert ist. 35
5. Struktur nach einem der vorhergehenden Ansprüche, umfassend einen starren Arm (42), der an einem ersten Ende davon mit dem Fach und an einem zweiten Ende davon mit einem Mechanismus (44) zum Umwandeln der relativen Verschiebung des zweiten Endes verbunden ist bezüglich einer der Verlängerungen, während der Drehung der Plattform, zu einer Verschiebung des Antriebselements. 40
6. Struktur nach Anspruch 5, wobei die Plattform eine zweite Gelenkachse zum Fach (X4) aufweist und der Umwandlungsmechanismus ein Element (44) umfasst, das drehbar um eine Achse (x3) parallel zur zweiten Gelenkachse (X4) montiert ist, wobei das drehbare Element mit dem Antriebselement verbunden ist, um eine Bewegung auf dieses zu übertragen. 45
7. Struktur nach Anspruch 6, wobei das drehbare Element eine Scheibe oder eine Gabel ist. 50

8. Struktur nach Anspruch 7 oder 6, wobei das drehbare Element (44) an einem Punkt mit dem Antriebselement (40) und an einem anderen Punkt mit dem zweiten Ende des starren Arms (42) angelenkt ist.
9. Struktur nach den Ansprüchen 6 und 2 und optional einem anderen vorhergehenden Anspruch, wobei das drehbare Element an einer Verlängerung oder im Inneren des Hohlraums einer der Verlängerungen angelenkt ist.
10. Struktur nach einem der Ansprüche 6-9, wobei das Antriebselement (40) mit dem Regal durch eine drehbare Stütze (70) verbunden ist, die an einer der Verlängerungen um eine Achse parallel zur Gelenkachse der Plattform schwenkbar ist dem Fach und/oder zur Drehachse des drehbaren Elements (44), und die drehbare Stütze (70) außerhalb einer der Verlängerungen montiert ist und als Befestigungspunkt für das Regal dient und die Montage des Regals erleichtert.
11. Struktur nach Anspruch 10 und den Ansprüchen 2 oder 3, wobei die drehbare Halterung (70) einen Abschnitt (74) umfasst, der im Hohlraum einer der Verlängerungen montiert ist, und das Antriebselement (40) mit dem Abschnitt verbunden ist.
12. Struktur nach Anspruch 11, wobei die drehbare Stütze (70) gelenkig mit dem Abschnitt (74) verbunden ist.
13. Struktur nach Anspruch 10 in Abhängigkeit von Anspruch 2 oder 3, Anspruch 11 oder Anspruch 12, wobei das Antriebselement (40) ist montiert um sich linear entlang einer Ebene zu bewegen, die durch die Gelenkachse des Antriebselements zum drehbaren Element (70) und durch die Gelenkachse des Antriebselements zum drehbaren Träger (70) oder zu dem Abschnitt davon verläuft, der im Hohlraum einer der Verlängerungen montiert ist.

Revendications

1. Structure d'ameublement (MC) transformable de bureau en lieu de repos et inversement, comprenant:
- un compartiment (10) délimité par des parois;
 - une plate-forme (20) qui est articulée au compartiment pour pouvoir tourner entre deux positions:

une position dans laquelle la plate-forme est verticale et contenue dans le compartiment, et

une position dans laquelle la plateforme est horizontale et permet de s'allonger dessus; et

- deux extensions parallèles (30) solidaires de la plateforme et s'étendant orthogonalement au plan de la plateforme vers l'extérieur de la structure,
- une étagère (50) supportée et articulée sur l'extrémité libre des rallonges pour constituer un plan de travail du bureau; la étagère pouvant pivoter par rapport aux rallonges pour rester toujours horizontale pendant que la plateforme passe de l'une desdites positions à l'autre,
- un élément d'entraînement (40) relié à la étagère pour lui transmettre un couple et la faire tourner, l'élément étant

monté pour se déplacer linéairement selon une direction orthogonale au plan de la plateforme, et

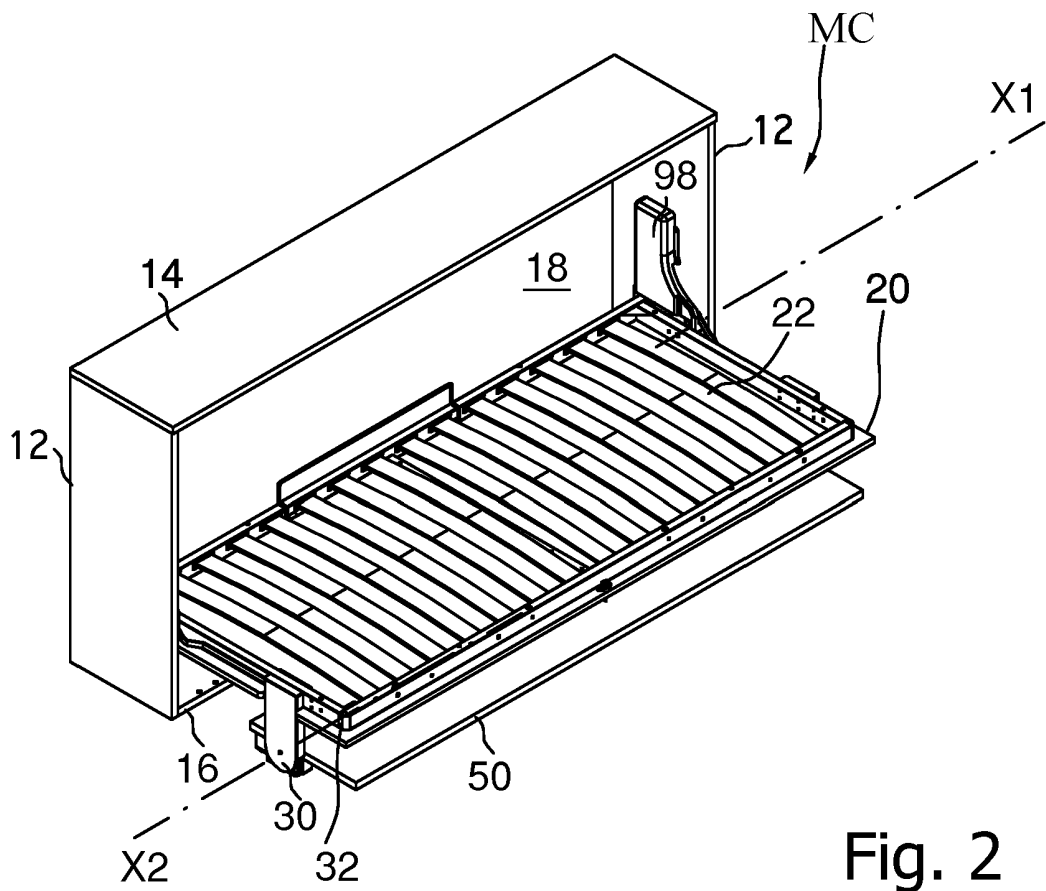
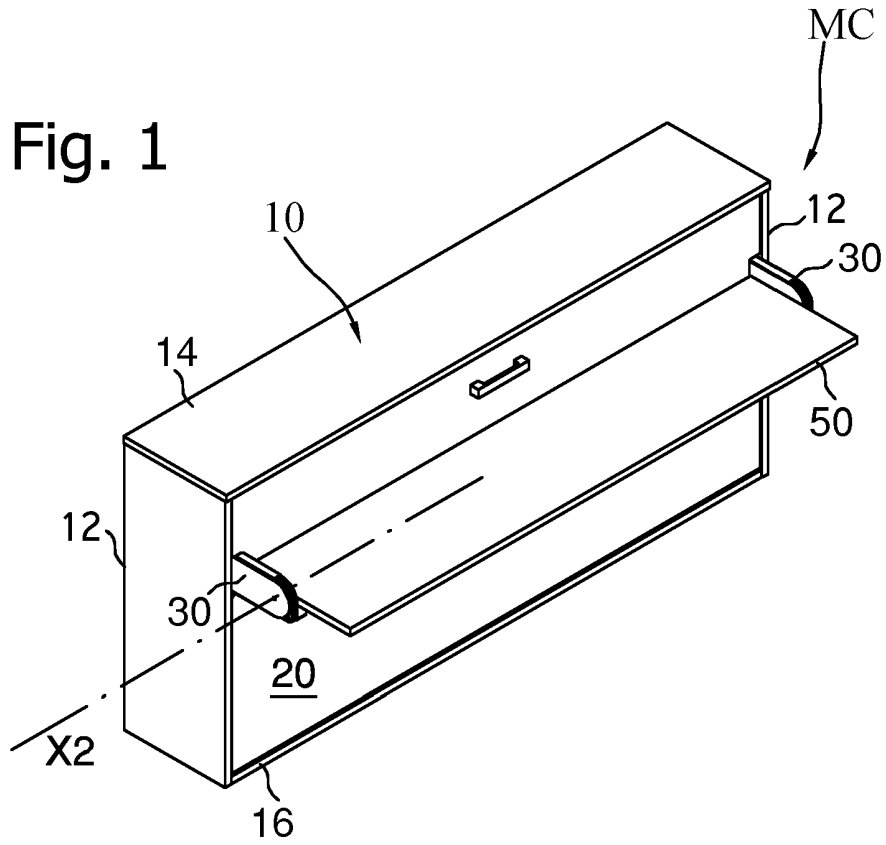
relié au compartiment de manière à être déplacé suite à une rotation relative entre la plateforme et le compartiment,

caractérisé en ce que

la plateforme présente un axe d'articulation (X1) avec le compartiment, et l'une des extensions (30) a une dimension située dans un plan orthogonal audit axe d'articulation et délimitée par des bords, et l'élément d'entraînement (40) est monté mobile en restant entre ces bords.

2. Structure selon la revendication 1, dans laquelle l'une des extensions (30) présente une cavité interne, et l'élément d'entraînement est monté à l'intérieur de la cavité interne.
3. Structure selon la revendication 1 ou 2, dans laquelle l'un des extensions (30) est une coque qui forme une cavité intérieure dans laquelle est monté l'élément moteur.
4. Structure selon la revendication 1, dans laquelle l'élément d'entraînement (40) est monté mobile sur la surface externe d'une des extensions.
5. Structure selon l'une quelconque des revendications précédentes, comprenant un bras rigide (42) relié à une première extrémité de celui-ci au compartiment et à une seconde extrémité de celui-ci à un mécanisme (44) de conversion du déplacement relatif de la seconde extrémité avec par rapport à l'une des extensions, lors de la rotation de la plateforme, en un déplacement de l'élément moteur.

6. Structure selon la revendication 5, dans laquelle la plateforme présente un deuxième axe d'articulation au compartiment (X4), et le mécanisme de conversion comprend un élément (44) monté rotatif autour d'un axe (x3) parallèle audit deuxième axe d'articulation (X4), l'élément rotatif étant relié à l'élément d'entraînement pour lui transférer un mouvement. 5
7. Structure selon la revendication 6, dans laquelle l'élément rotatif est un disque ou une bifurcation. 10
8. Structure selon les revendications 7 ou 6, dans laquelle l'élément rotatif (44) est articulé en un point avec l'élément moteur (40) et en un point différent avec la deuxième extrémité du bras rigide (42). 15
9. Structure selon les revendications 6 et 2 et éventuellement toute autre revendication précédente, dans laquelle l'élément rotatif est articulé sur une extension ou à l'intérieur de ladite cavité de l'une des extensions. 20
10. Structure selon l'une quelconque des revendications 6 à 9, dans laquelle l'élément d'entraînement (40) est relié à la étagère par un support rotatif (70) pivoté sur l'une des extensions autour d'un axe parallèle à l'axe d'articulation de la plateforme pour le compartiment et/ou à l'axe de rotation de l'élément rotatif (44), le support rotatif (70) étant monté à l'extérieur de celle des extensions et servant de point de fixation pour l'étagère et facilite l'assemblage de l'étagère. 25
30
11. Structure selon la revendication 10 et les revendications 2 ou 3, dans lequel le support rotatif (70) comprend une partie (74) montée à l'intérieur de la cavité de l'une des extensions, et l'élément d'entraînement (40) est relié à ladite partie. 35
40
12. Structure selon la revendication 11, dans laquelle le support rotatif (70) est articulé avec ladite partie (74).
13. Structure selon la revendication 10 lorsqu'elle dépend des revendications 2 ou 3, de la revendication 11 ou de la revendication 12, dans laquelle l'élément d'entraînement (40) est monté pour se déplacer linéairement le long d'un plan passant par l'axe d'articulation de l'élément d'entraînement jusqu'à l'élément rotatif (70) et par l'axe d'articulation de l'élément d'entraînement jusqu'au support rotatif (70) ou à la partie de celui-ci montée à l'intérieur de la cavité de l'une des extensions. 45
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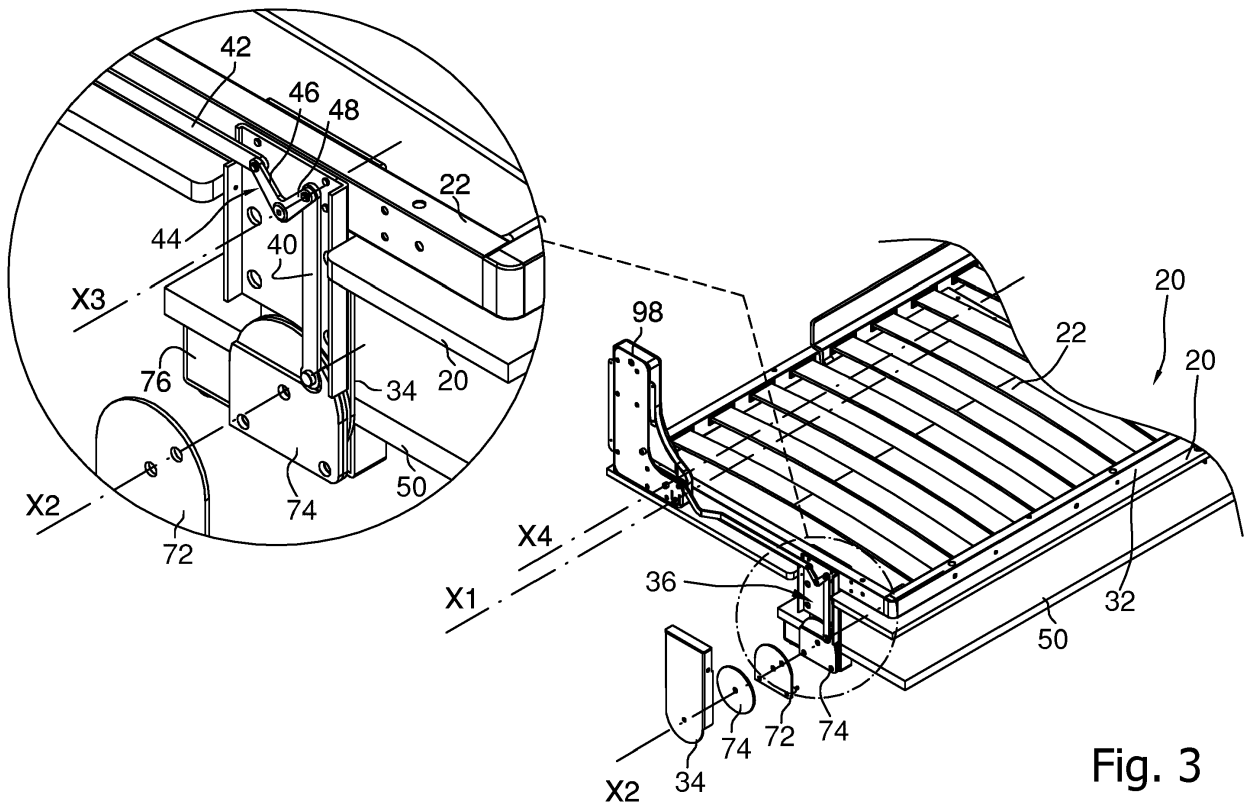


Fig. 3

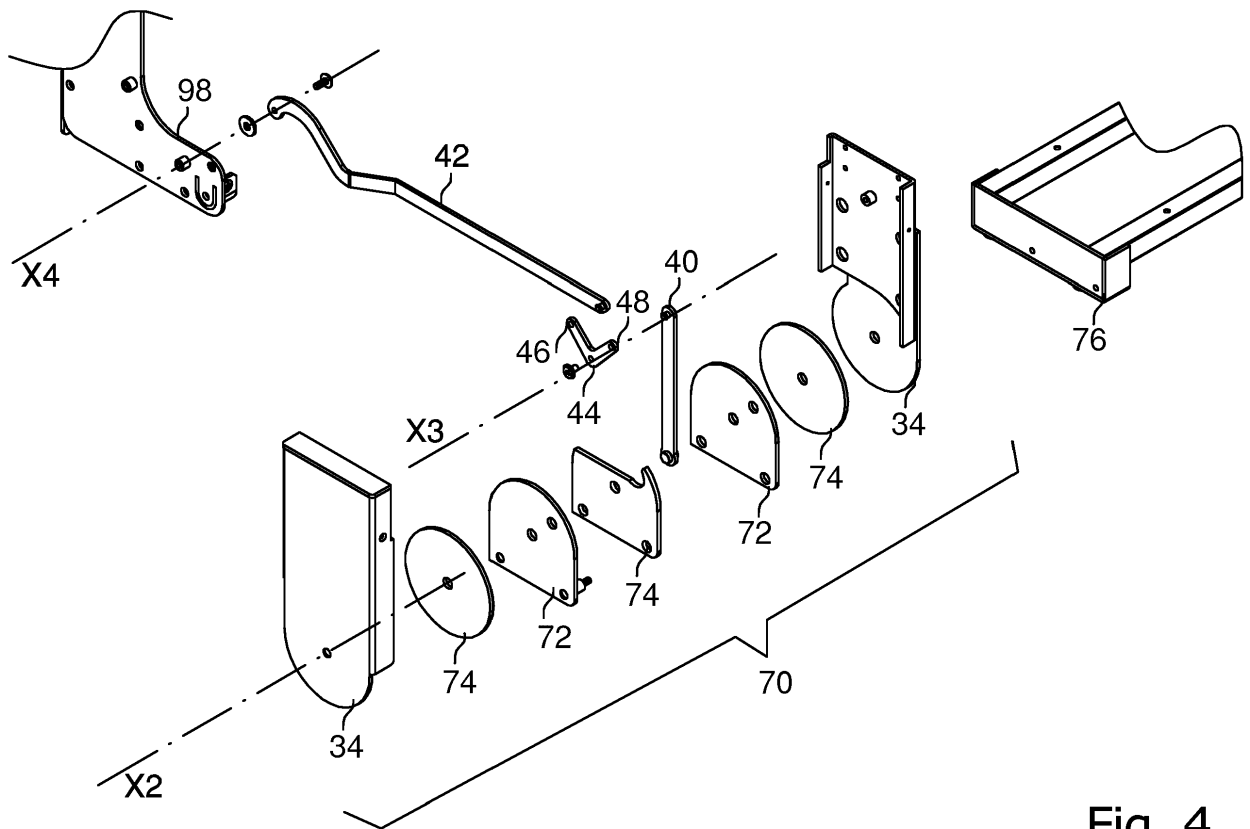


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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