



## Description

**[0001]** The invention relates to an over-turning platform for sleeping.

**[0002]** Many multifunctional pieces of furniture include a hidden platform or bedspring. The platform is hidden in a vertical position inside the furniture and when needed it can be overturned in a horizontal position to sleep on it.

**[0003]** An example is shown in JP 6165720. From inside a cabinet a leaf or oscillating plane can be lowered around its long side to put it horizontal, thus extracting from the inside of the furniture a surface to sleep on. Above the oscillating leaf a soft pallet is fixed. At the end of the long external side of the tiltable leaf a panel is hinged. The panel, when the bedspring is vertical and hidden inside the furniture, arranges on the side of the oscillating leaf, while when the bedspring is horizontal it can rotate 90 degrees to form a vertical support leg for the bedspring.

**[0004]** The panel during the extraction operation is free to oscillate, with positioning problems or danger of hitting the user. The panel is hinged to the overturnable leaf very close to the lowering end, and it can move through rotation only in order to get closer to the ground and forming a support leg. There is not a raised containment edge for the extracted and lowered side of the bedspring. That is to say that the whole panel remains practically under the plane of the lowered platform, and it cannot be otherwise because the access to the bed would be hindered.

**[0005]** The main object of the instant invention is to enrich the state of the art, which is reached by a platform or bedspring for sleeping as defined in claim 1, that is the platform has a panel movable with respect to the short side of the platform and means for displacing the panel between two positions:

one in which the panel is substantially parallel (and not coplanar) to the platform when the latter is vertical, and

another position in which the panel is (i) substantially perpendicular to the platform when the latter is horizontal and (ii) placed next to the platform's lowered short side to form a vertical edge or raised border with respect of the platform.

**[0006]** Thus the panel acts as a containment member for any mattress or pillow and/or acts as a headboard/footboard. Clearly, a bed or platform with this new feature is more convenient and safe. In fact, a bed that can be lowered along the short side should be fenced and/or with a raised edge, which is desirable for example not to drop the pillow or, if the bed is for children, to avoid the danger of them falling by creating a fence. This problem is solved as well by a platform as defined in claim 1.

**[0007]** Note that the panel thus moved, in the position wherein it is perpendicular to the platform, can also serve as a support/resting member on the ground for the lowered side of the platform. If instead the panel stay lifted

off the ground, there will be other means (e.g. extractable legs or the fulcrum of the platform) to support the platform when horizontal.

**[0008]** Although in general, in addition to the panel, the invention envisages to use a generic flat or a structural element of a furniture, for simplicity we will refer hereafter only to a panel.

**[0009]** To have a good exploitation of the panel surface, with a good compromise for example between the height of the support portion and that of the headboard/footboard formed, see claim 3.

**[0010]** It is convenient that the platform removably supports a mattress, which must remain attached thereto in vertical position. To do this one can use e.g. as a platform a rectangular frame void in the center and having support elements for the mattress, as for example U-shaped cross-bars. The frame may surround the sides of the mattress and the support elements support its bottom. The mattress, however, increases the space occupied in depth by the platform. If the panel was simply hinged on one end of the platform and in a manner to take due account of the thickness of the mattress, it would take an exaggerated length thereof to obtain the raised edge. Moreover, a simple hinge would not be good because the mattress would occupy the space needed by the movement of the flat element (the panel). This problem is solved by the solution defined in claims 4 or 5, which allows to get around an edge of the platform having a greater thickness because of the mattress.

**[0011]** A bed that can be lowered along the short side undoubtedly has a wide stroke for the short side that lowers. One can avoid that when moving between the two said positions the panel swings banging against someone or something. Claim 6 solves this problem. E.g. one may use

- a motor or actuator mounted on the short side that lowers for making the panel rotate. With some easily reachable commands (e.g. buttons) the motor or the actuator can be controlled, or
- a guide mechanism having swinging levers or arms.

**[0012]** A very effective embodiment for the guiding means of Claim 6 is defined in Claims 7 and 8.

**[0013]** It is convenient that a user does not need to lower the bed by pulling the panel, which among other things is not always possible given the height it initially stands at. It is much easier to lower the platform standing at the side and not in front of it, which would force to go back to make room for the lowering platform. By staying aside near the rotation axis of the platform it is very easy to steer the downward and upward movements of the platform. However, one remains distant from the panel, and it cannot be moved easily between the two positions. This problem is solved by the solution defined in Claims 12-14. E.g. a motor or actuator to move the panel with respect of the platform may be used, with wired or radio-keyboard controls.

**[0014]** If the user is required to separately control both the angular position of the platform and the panel the operation of opening and closing the bed can be difficult, e.g. in the absence of experience or for elderly people. This problem is solved by the means defined in claim 9. For these means a simple but effective embodiment is defined in claims 10 and 11.

**[0015]** The advantages of the invention will be more clear by the following description of a preferred embodiment, together with the attached drawing wherein

Figure 1 shows a three dimensional view of a piece of furniture with a movable platform according to the invention in a first configuration;

Figure 2 shows a section of the piece of furniture of Fig. 1 according to plane II-II;

Figure 3 shows an enlarged detail of the dashed circle C1 in Fig. 2;

Figure 4 shows an enlarged detail of the dashed circle C2 in Fig. 2;

Figure 5 shows in cross-section the piece of furniture of fig. 1 in a second configuration;

Figure 6 shows an enlarged detail of the dashed circle C3 in Fig. 5,

Figure 7 shows the in cross-section the piece of furniture of fig. 1 in an intermediate configuration;

Figure 8 shows an enlarged detail of the dashed circle C5 in Fig. 7;

Figure 9 shows an enlarged detail of the dashed circle C4 in Fig. 5;

Figure 10 shows a component of the piece of furniture in Fig. 1;

Figure 11 shows a three dimensional view of the piece of furniture of fig. 1 in the second configuration,

Figure 12 shows an enlarged detail of the dashed circle C6 in Fig. 11.

**[0016]** In the figures is indicated as a whole by 10 a piece of furniture equipped with a platform according to the invention.

**[0017]** The piece of furniture 10 has an outer frame 20, e.g. parallelepiped, whose facade is composed of a larger rectangular panel 24 and a smaller rectangular panel 26.

**[0018]** Inside the frame 20 is mounted a bed platform 22 which is rotatable about an axis X parallel and close to its short side. The platform 22 exhibits as an empty metal rectangular frame 30 with U-shaped cross-bars 32, with the function of supporting a mattress M (shown in dotted lines only in Fig. 2).

**[0019]** The platform 22 may stay vertical and hidden inside the frame 20 (position 'closed', see Fig. 1 and 2) or can be lowered to come out of the frame 20 and be disposed horizontally ('open' position, see fig. 5 and 11), so that a person can sleep on it.

**[0020]** The panels 26, 24 are integral with the platform 22. The panel 24 is fixed relative to the platform 22 and remains always parallel to and at a certain distance from

it. Thus in the 'closed' position the panel 24 forms the main part of the vertical closing wall of the piece of furniture 10. In the 'open' position the panel moves nearly horizontal, standing below the platform, 22.

**[0021]** The panel 26 is instead movable with respect of the platform 22: in the 'closed' position it is coplanar and adjacent to the panel 24 (not coplanar with respect to platform 22), forming a continuous front surface of the piece of furniture 10.

**[0022]** In the 'open' position the panel 26 becomes approximately perpendicular to the plane of the frame 30 by rotating about the outer short edge of the platform 22. The result is that the panel 26 forms for the platform 22 both a support on the ground, and a bed-headboard (or bed-footboard) consisting of about half of the panel 26, which extends vertically from the short outer edge of the platform 22. In other words, the center of panel 26 is brought about flush with the edge of the platform 22.

**[0023]** The platform 22 is equipped with a mechanism that allows the movement of the panel 26 between the two positions just described.

**[0024]** At the free end of frame 30 is a fixing bracket or box 42 (which could also be a flange integral with the bottom of platform 22) to which are hinged at one end two rods 44, 46.

**[0025]** The other end of the rod 44 is hinged to the panel 26, while the other end of the rod 46 is hinged at a midpoint of a third rod 48, which is hinged at one end to the panel 26 and at the other end to a perch 40. The length of the rod 48 is a bit greater than that of the rods 44, 46, which are equal. The hinging points of the rods 44, 46 on the box 42 are aligned on a line approximately parallel to the plane of platform 22 and frame 30. The hinging point of rod 48 with the perch 40 is sliding into a linear guide 70, approximately parallel to the plane of frame 30 and obtained e.g. as a slot in the box 42. The rod 46 is hinged about on the center of panel 26, while the rod 44 is hinged about on one end of panel 26.

**[0026]** The rods 44, 46, 48, which move on parallel planes, form as a whole with the panel 26 an articulated polygon used to rigidly guide the panel 26 along a rotation around the end of frame 30.

**[0027]** The perch 40 is connected on one side to the rod 48, extends along the whole length of the long side of the frame 30, and at the other side is hinged to the end of a L-shaped bracket 54 which is in turn hinged to a support cross-member 60 which serves as a support and rotation fulcrum for the platform 22 and frame 30.

**[0028]** The cross-member 60 comprises two side plates 62 fixable to the inner walls of frame 20, a cross tube 64 perpendicular to them, and various brackets or mounting tabs 66 extending radially from the tube 64.

**[0029]** To the frame 30, at the hinging axis X inside the frame 20, is integrally fixed a linear or straight bracket 50 equipped with a wheel 52. The bracket 50 and wheel 52 are mounted in contact with the bracket 54, so that the wheel 52 can press on the surface of the bracket 54.

**[0030]** The mechanism works this way.

**[0031]** In the closed position the platform 22 is vertical, and the panels 24, 26 coplanar for closing the frame 20. The panel 26 is parallel to the frame 30.

**[0032]** The wheel 52 is resting on or close to the bracket 54 and the perch 40 is maximally raised. Therefore, even the rod 48 is maximally pushed toward the outside of the box 42, with the result of pushing the end of the rod 48 to the outmost end of the guide 70 and keeping rods 44, 46 in a position close to each other, see Fig. 4. The rod 48 pushes the panel 26 to bring it away from frame 30, thus the rods 44, 46 remain approximately parallel to each other and to the frame 30. Or it may be sufficient the very weight of the panel 26 to keep it upright.

**[0033]** As the platform 22 is lowered to discover and extract the bed, the bracket 50 rotates downwards and the wheel 52 pushes the bracket 54. This makes the perch 40 lower and thus also the lower end of the rod 48 in guide 70. With simultaneous and coordinated movement, the rod 48 pulls one end of panel 26 and makes the rod 46 and 44 rotate, counterclockwise in the figures. The rod 46 rotates toward the frame 30, the rod 44 rotates approximately 100-110 degrees toward the edge of the frame 30 and rod 48 becomes about parallel to the frame 30. In particular, note that the hinging axis Y of panel 26 on the rod 48 is movable and from one position to the other it moves approximately perpendicularly to the platform 22. Other trajectories are possible, depending on the type of guiding means used to guide the panel 26.

**[0034]** In essence, the displacement of rod 40 toward the short hinged side of the platform 22 transmits a force to the system of rods 44, 46, 48, which impose a precise trajectory, in the example a rototranslation, to the panel 26.

**[0035]** When the platform 22 is lifted all the parts return in the initial position by gravity, especially e.g. thanks to the weight of panel 26 which, falling backwards or touching the frame 20, turns over around the short side of frame 30. If however the weights and dimensions do not allow it, it's easy to change the system to ensure predefined movements and trajectories during opening and closing of the platform 22. E.g. two brackets 50 for pushing the bracket 54 in two opposite directions may be used.

**[0036]** The mechanism described can optionally be motorized or servoed. In the figures is shown a linear actuator 80 hinged to tabs or flanges 66, present on the cross-member 60, and a midpoint of the frame 30. The function of the actuator 80 is to move the frame 30 from the open to the closed position and vice versa, so as not to require user's effort.

**[0037]** Optionally gas springs 86, or generally elastic means, may be inserted to support with their thrust all or part of the weight of frame 30 when it is in extracted configuration from the piece of furniture 10. A simple solution is to hinge the elastic means between one or more tabs 66 and a midpoint of the frame 30. The drawings for better understanding has sometimes shown the movable piston of actuator 80 or spring 86 disconnected from the tabs 66.

## Claims

1. Platform (22) for sleeping, rotatable around a short side of its to be disposed vertically or horizontally, comprising

- a panel (26) movable with respect to the other short side of the platform;
- means (44, 46, 48) for displacing the panel between two positions:

a first position in which the panel is substantially parallel and not coplanar to the platform when the latter is vertical, and a second position in which the panel is (i) substantially perpendicular to the platform when the latter is horizontal and (ii) placed next to said other short side to form a vertical side or raised edge with respect to the platform adapted to serve as a containment member or headboard/footboard.

2. Platform according to claim 1, wherein the means for displacing are adapted to move the panel so that its center in the second position is approximately at the level of said other side.
3. Platform according to claim 1 or 2, wherein the means for displacing are adapted to move the panel so that in the second position it acts as a support for the other lowered side of the platform.
4. Platform according to any one of the preceding claims, wherein the panel is rotatable around a rotation axis (Y) which is parallel to the platform and movable with respect to it.
5. Platform according to claim 4, comprising guiding means (44, 46, 48) adapted to guide the panel along a rototranslation around the lowerable end of the platform.
6. Platform according to claim 5, wherein the guiding means are adapted to rigidly keep the panel on a fixed trajectory when moving between the first and second position.
7. Platform according to any one of the preceding claims, comprising a plurality of rods (44, 46, 48) hinged to the panel and the platform to form an articulated polygon or quadrilateral.
8. Platform according to claim 7, wherein at least one vertex (Y, 48) of the articulated polygon or quadrilateral is included in a member (40) movable with respect to the platform.
9. Platform according to one of the preceding claims,

comprising means (40, 50, 52, 54) for synchronizing the oscillating movement of the platform with that of the panel between the two positions.

10. Platform according to one of the previous claims, comprising 5

- a rigid element or rod (40) which is placed in parallel to the platform between its short sides and axially movable, 10
- means (50, 52, 54) placed at the rotation axis (X) of the platform for converting the movement of the platform into a translation of the rigid element;
- means (44, 46, 48) mounted on said other short side for converting the translation of the rigid element into a displacement of the panel between the two positions. 15

11. Platform according to claim 10, wherein 20

- the means placed at the rotation axis of the platform for converting comprise a lever arm (50) integral with the platform mounted to push an oscillating bracket (54) connected to the rigid element, and 25
- the means mounted on said other short side for converting comprise

- an actuating rod (48) which is hinged at one end to the rigid element and at the other end is hinged to the panel, and 30
- two rods (44, 46) each hinged at one end to the platform and, at the other end, hinged one to the panel and the other to the actuating rod. 35

12. Platform according to one of the preceding claims, comprising actuator means (80) capable of autonomously moving the platform and/or the panel between the two positions. 40

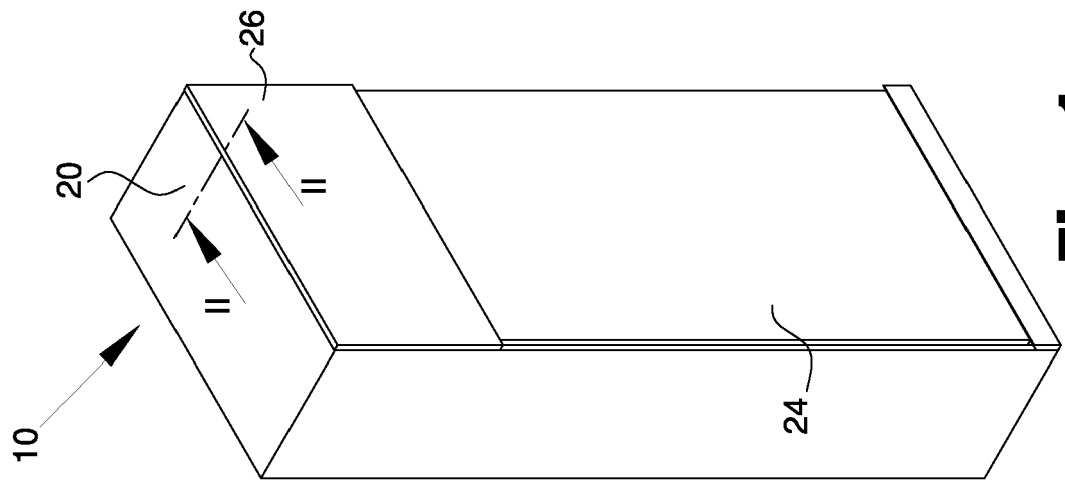
13. Platform according to one of the preceding claims, comprising elastic means (86) to support the platform. 45

14. Platform according to claim 13, wherein said elastic means comprise a gas spring (86) mounted for pushing on the platform. 50

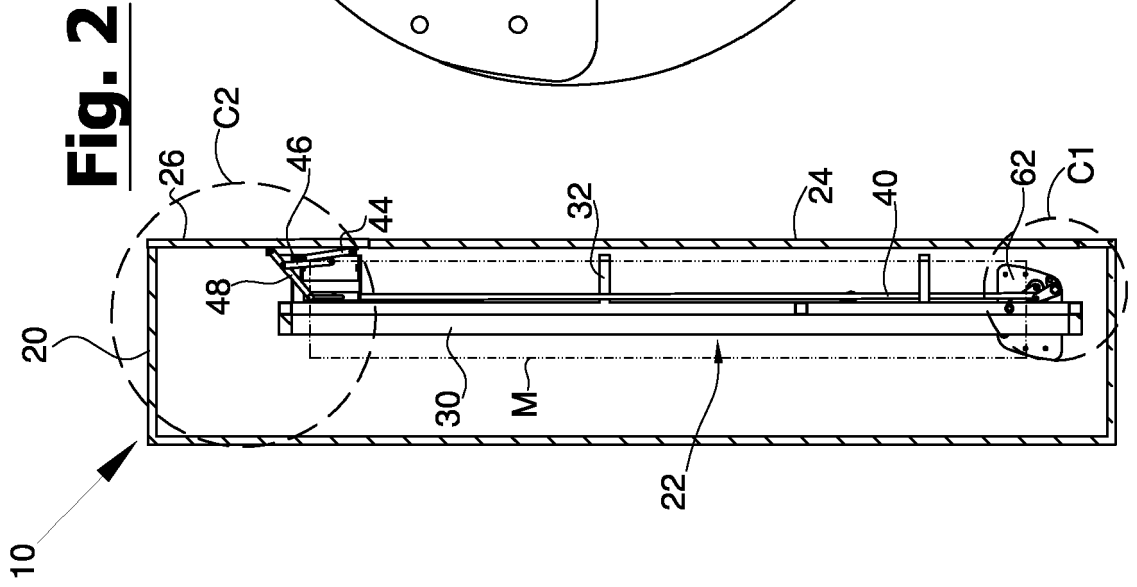
15. Piece of furniture (10) comprising

- a platform according to one of the previous claims,
- an elongated rigid element (68) which is fixed between the side walls of the piece of furniture having 55

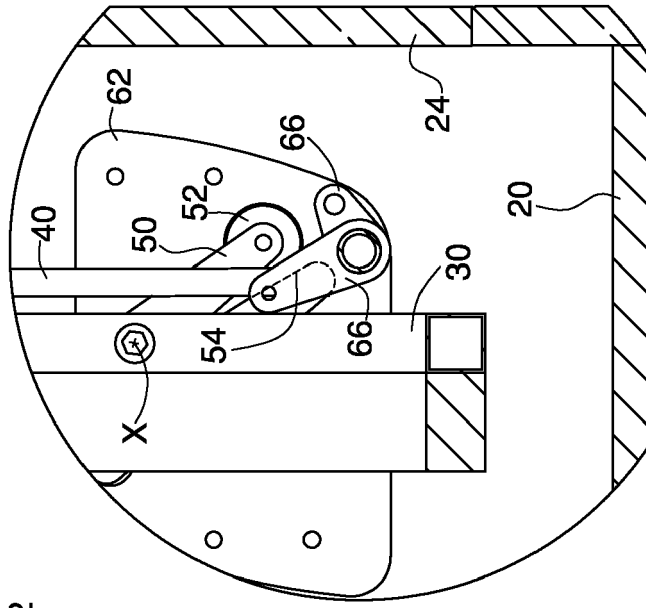
two end plates (62) adapted for attachment to the interior side walls of the piece of furniture and adapted to constitute a hinging point for the platform, and a plurality of spaced flanges (66) placed along the elongated element which extend radially with respect to it.



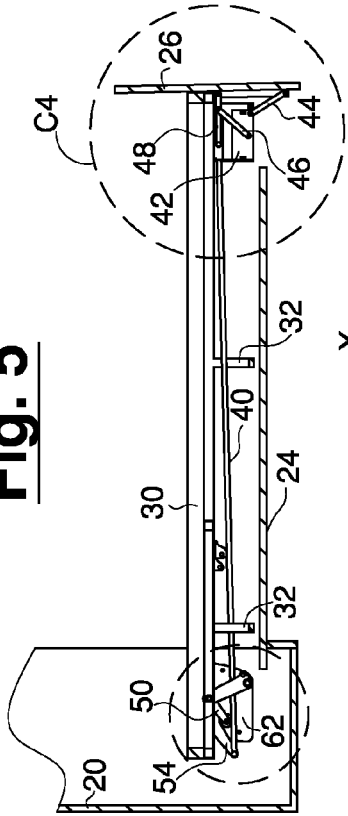
**Fig. 1**



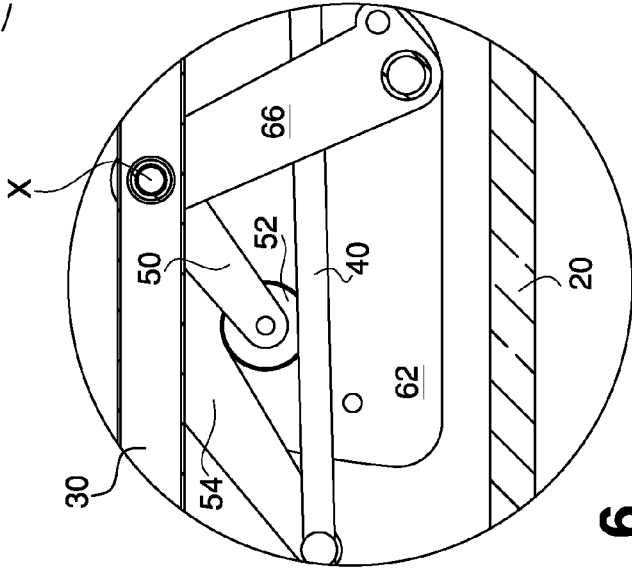
**Fig. 2**



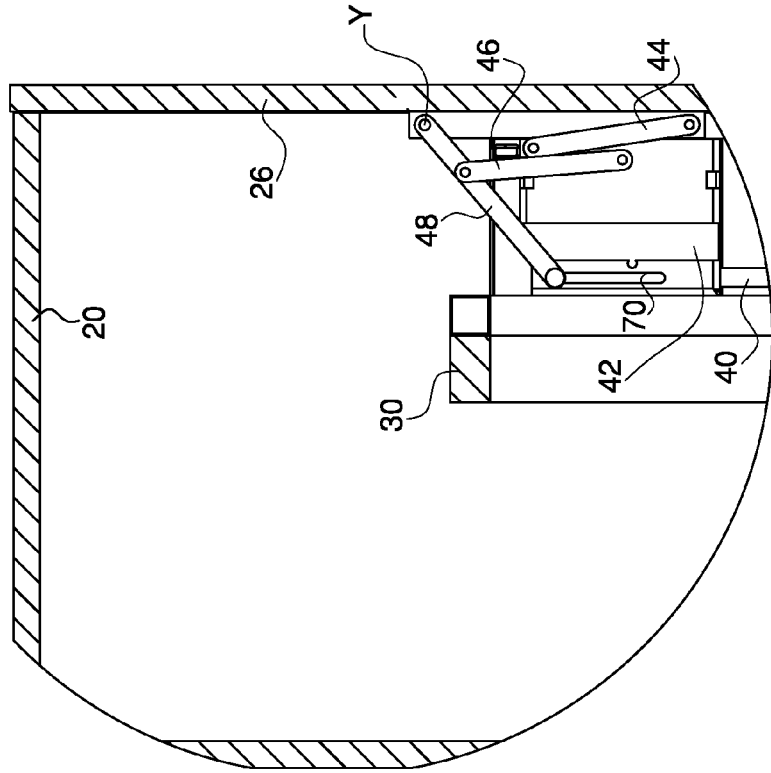
**Fig. 3**

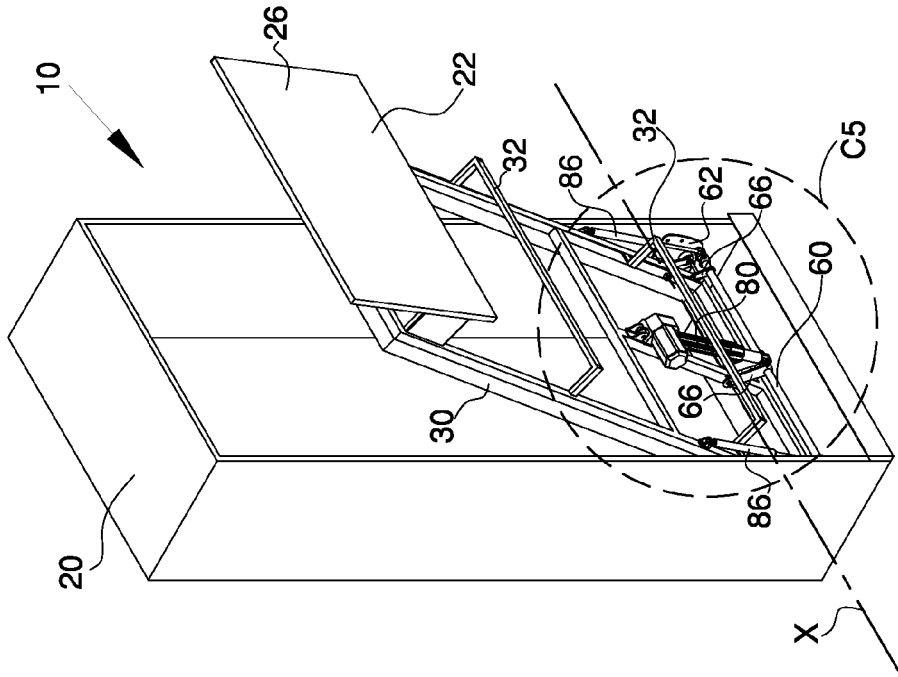


**Fig. 5**

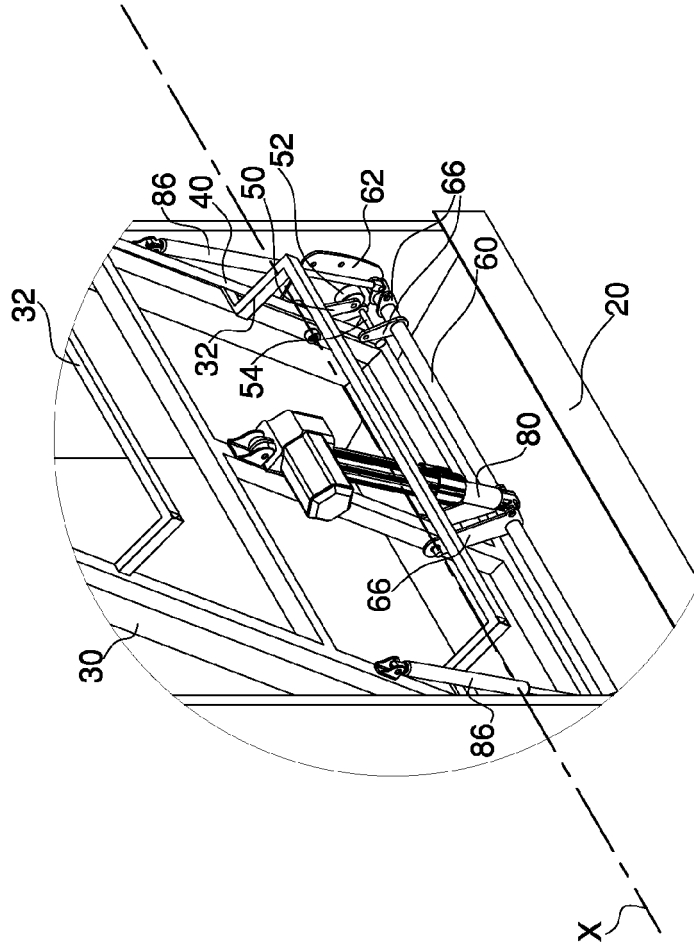


**Fig. 6**



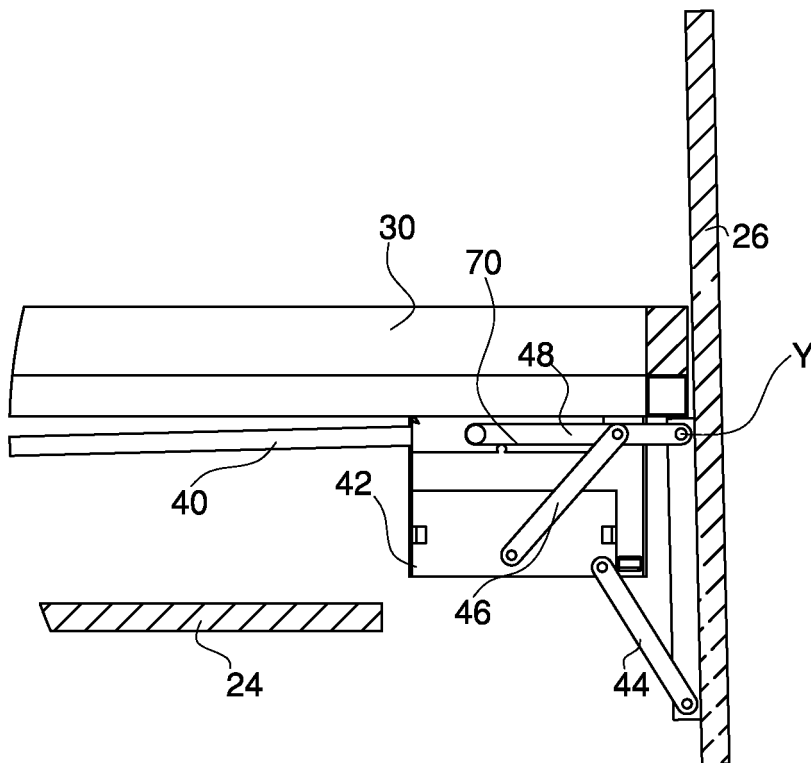


**Fig. 7**

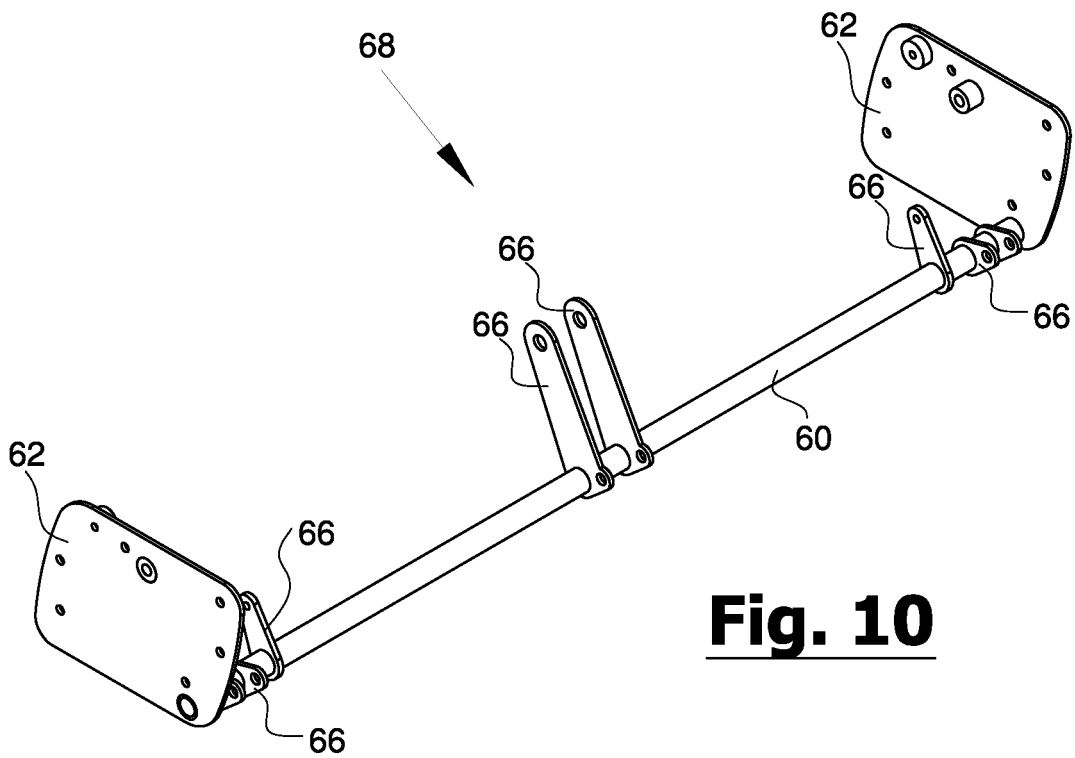


**Fig. 8**

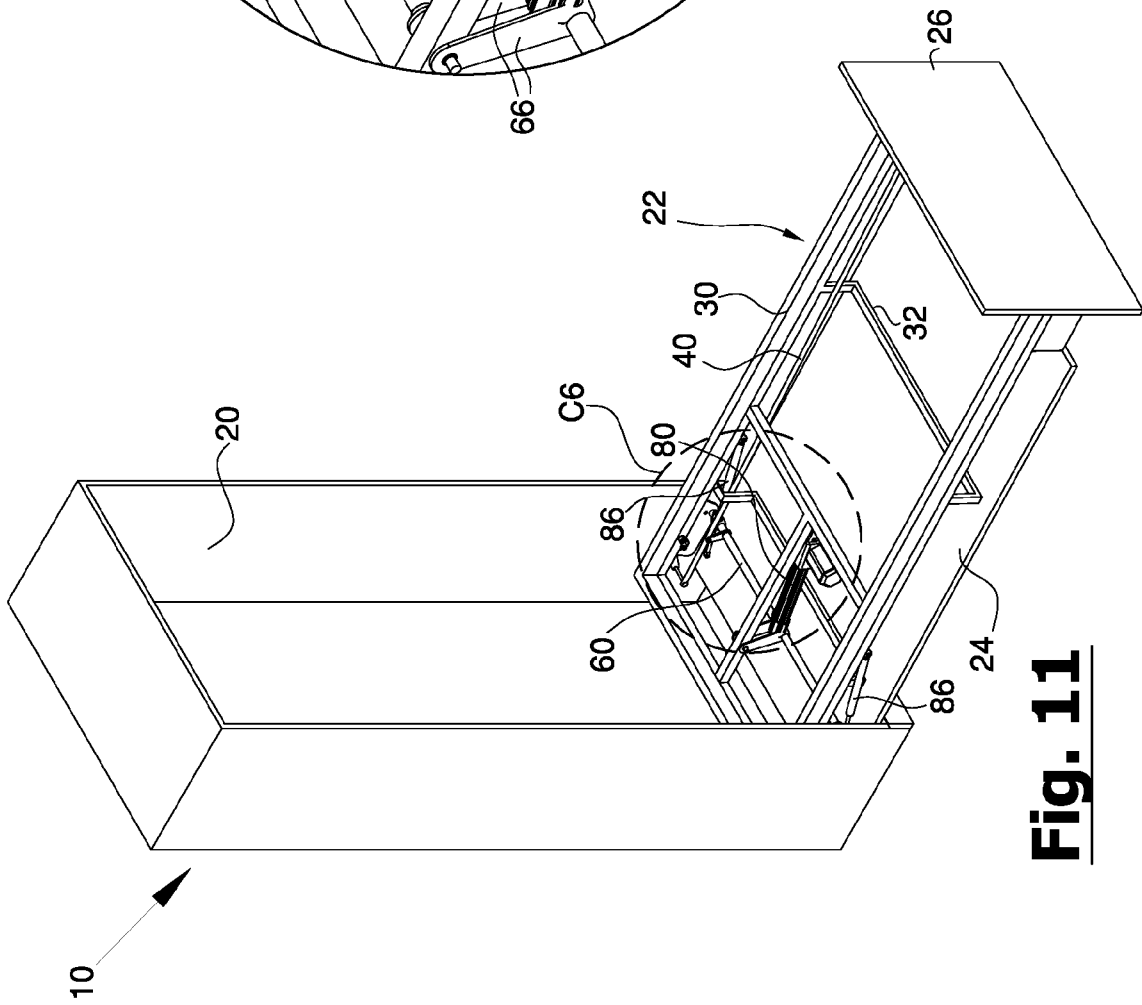




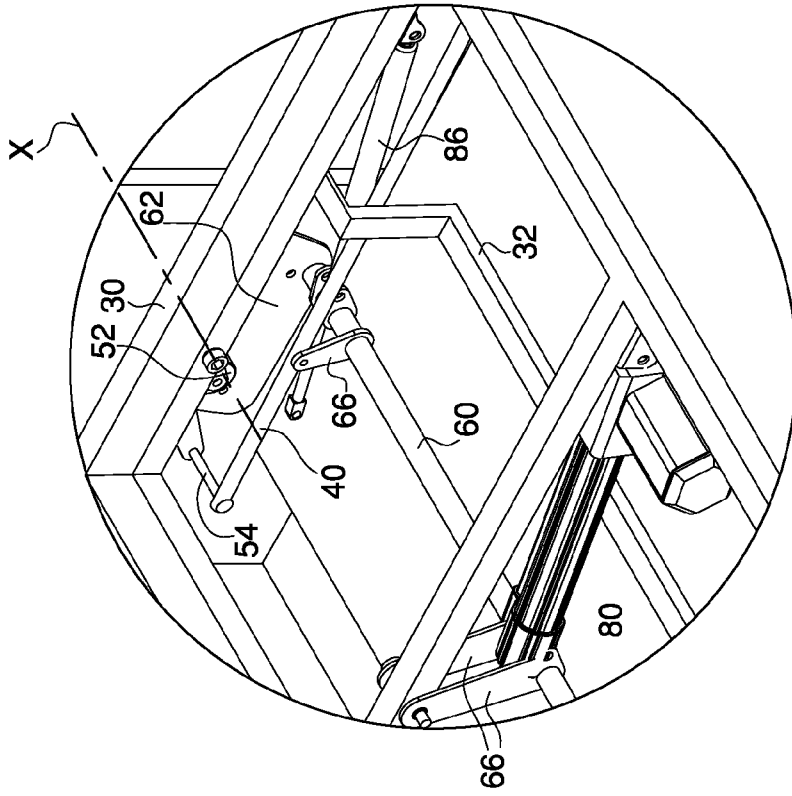
**Fig. 9**



**Fig. 10**



**Fig. 11**



**Fig. 12**



## EUROPEAN SEARCH REPORT

Application Number  
EP 10 16 9192

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	US 1 624 222 A (DUVALL WILLIAM J) 12 April 1927 (1927-04-12)	1-10, 15	INV. A47C17/40
Y	* page 2, line 10 - line 109; figures 1-3	12-14	A47C17/44
A	*	11	
Y	----- AT 400 094 B (HOPPE KG HODRY METALLFAB [AT]) 25 September 1995 (1995-09-25) * claim 1; figures 1,2 *	12	
Y	----- US 5 353 452 A (RULIS ROBERT A [US]) 11 October 1994 (1994-10-11) * column 4, lines 5-32; figures 4,5 *	13,14	
X	----- FR 1 375 015 A (MINVIELLE SES FILS ET CABANNE) 16 October 1964 (1964-10-16) * claims 1,4,5; figures *	1,2,4-6	
X	----- FR 2 166 663 A5 (RIGAL GASTON; VIAL ANTOINE) 17 August 1973 (1973-08-17) * claims; figures 1,3,5 *	1,13	
X	----- US 2 161 958 A (GILSON ARTHUR G) 13 June 1939 (1939-06-13) * claims; figures 1,2,5 *	1	TECHNICAL FIELDS SEARCHED (IPC) A47C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 13 January 2011	Examiner Amghar, Norddin
CATEGORY OF CITED DOCUMENTS 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		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	

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EPO FORM 1503 03.82 (P04C01)

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

EP 10 16 9192

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The members are as contained in the European Patent Office EDP file on  
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13-01-2011

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AT 400094	B	25-09-1995	NONE	
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US 2161958	A	13-06-1939	NONE	

**REFERENCES CITED IN THE DESCRIPTION**

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