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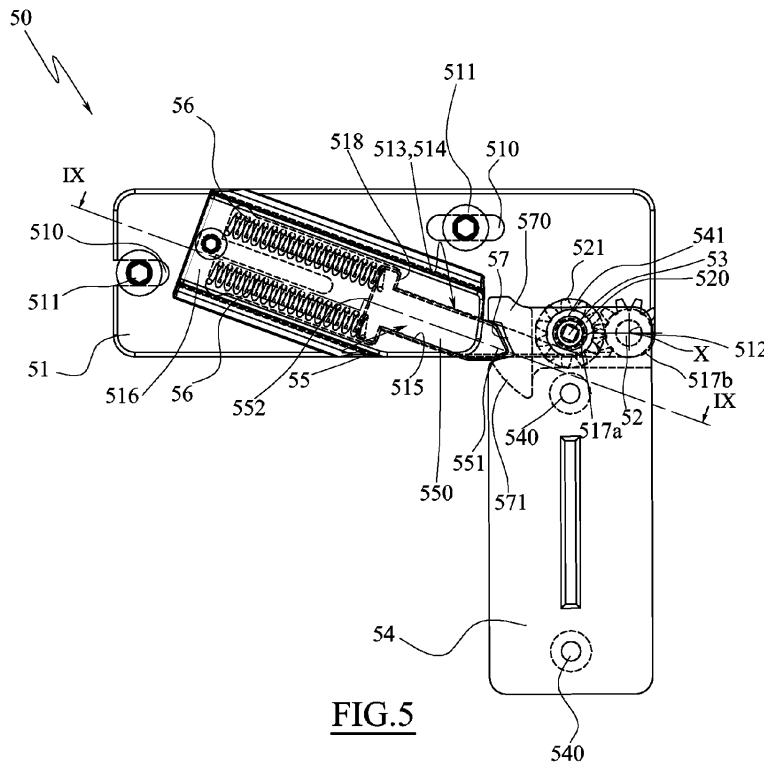
(54) **Hinge unit for refrigerator cabinet doors**

(57) A hinge unit (50) for refrigerator cabinet doors comprising:

- a first support element (51) substantially plate-like fixable to the refrigerator cabinet (10),
- a second support element (54), substantially plate-like and fixable to the panel (30) for closing an access gap (12) of the refrigerator cabinet (10), hinged to the first

support element (51) with hinging axis (X) orthogonal to the laying plane of the first support element (51), so as to rotate said panel with respect to the refrigerator cabinet (10) between a position for closing and a position for opening the access gap (12).

The distinctive characteristic of the invention lies in the fact that the hinging axis (X) is arranged at at least one edge of the second support element (54).



**FIG. 5**

**Description**FIELD OF THE INVENTION

**[0001]** The present invention regards a hinge unit for refrigerator cabinet doors. More in particular, the invention refers to a hinge unit for refrigerator cabinet doors intended to be positioned within sales points for food products or the like, for preserving and displaying such products.

PRIOR ART

**[0002]** As known, refrigerator cabinets generally comprise a parallelepiped outer body, which is adapted to delimit a refrigerated compartment for receiving the products to be preserved therein.

**[0003]** The refrigerated compartment is made accessible through a front access gap obtained on a lateral side of the outer body, which is closed by a door which can be partly or entirely transparent, so as to allow the display of the products contained therein.

**[0004]** Currently, the door of a refrigerator cabinet can be provided with a door leaf or alternatively slidable.

**[0005]** In particular, a door provided with a door leaf comprises a fixed framework adapted to delimit the access gap of the refrigerator cabinet and one or more panels adapted to close said access gap, which are hinged to the framework, so as to open the access gap rotating like a door leaf.

**[0006]** A need of such refrigerator cabinets is to increase the transparent area of the door, so as to improve the vision of the products contained therein and expand the display thereof.

**[0007]** This need requires the use of panels provided with very thin frames closed by wide transparent closing panels.

**[0008]** Regardless of the use of such panels, it was observed that a lot of non-transparent space of the door is necessarily used by the manoeuvring space required by the hinge unit for moving the panel with respect to the fixed framework.

**[0009]** Another drawback observed in the doors of known type lies in the fact that in such extensive manoeuvring space required between the fixed framework and the panel, at the hinged side thereof, there is created a relatively extensive fissure which varies the length thereof during the rotation of the panel with respect to the framework and in which there can be inserted a finger - for example of a user - which can be inadvertently crushed when opening the door of the panel.

**[0010]** An object of the present invention is to overcome the aforementioned drawbacks of the prior art, through a simple, rational and inexpensive solution.

**[0011]** Such objects are attained by the characteristics of the invention indicated in the independent claim. The dependent claims outline preferred and/or particularly advantageous aspects of the invention.

DESCRIPTION OF THE INVENTION

**[0012]** The invention, particularly, provides a hinge unit for refrigerator cabinet doors comprising:

- a first support element for example substantially plate-like, fixable to the refrigerator cabinet,
- a second support element, for example substantially plate-like and fixable to the panel for closing an access gap of the refrigerator cabinet, hinged to the first support element with hinging axis orthogonal to the laying plane at least of the first support element, so as to rotate said panel with respect to the refrigerator cabinet between a position for closing and a position for opening the access gap.

**[0013]** According to the invention, the hinging axis is arranged at at least one edge of the second support element.

**[0014]** Due to such solution, the rotation of the second support element with respect to the first substantially does not alter the lateral overall dimension of the hinge unit allowing having a door provided with a door leaf with small manoeuvring spaces between the panel and the framework of the refrigerator cabinet with ensuing greater transparent surface of the refrigerator cabinet in its entirety, as well as allow eliminating the risk of crushing between the movable parts of the door.

**[0015]** According to an aspect of the invention the hinge unit, furthermore, comprises elastic return means interposed between said first and second support element for the return from the opening position to the closure position.

**[0016]** Thus, the door is automatically brought to the closed position guaranteeing a greater efficiency and safety of the refrigerator cabinet.

**[0017]** Furthermore, the return means comprise a torsion spring whose first end is rotatably associated to the second support element and, for example, it is driven in rotation by the first support element and whose second end is associated rotatably integral with the second support element. Advantageously, the first end of the torsion spring is rotatably associated to the second support element in decentred position with respect to the hinging axis.

**[0018]** Furthermore, the hinge unit comprises transformation means of the rotary motion of the second support element with respect to the first support element in rotary motion of the first end with respect to the second end.

**[0019]** For example, the motion transformation means have a transmission ratio different from 1.

**[0020]** Advantageously, the transformation means comprise at least one meshing portion fixed to the first support element coaxially to the hinging axis and adapted to mesh a toothed wheel, rotatably associated to the second support element and comprising a seat for housing the first end of the torsion spring, said first end and said housing seat being configured so as to obtain a prismatic

coupling.

**[0021]** However, it cannot be excluded that the transformation means be provided by other equivalent motion transmission means.

**[0022]** Thus, the torsion spring can be easily installed within the panel moveable of the door, without interfering with the profiles that make the frame of the panel.

**[0023]** According to an aspect of the invention the hinge unit comprises locking means adapted to removably lock therebetween the first and the second support element in the open position.

**[0024]** Due to such solution, the door can be provided easily maintained in open position during the operations of filling the refrigerator cabinet, by the personnel designated to operate at the sales point.

**[0025]** Advantageously, the locking means comprise two snap-coupling elements respectively associated to the first support element and to the second support element, including a lock bolt and a retention seat adapted to provide a mutual automatic coupling following a mutual rotation between the first and the second support element.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0026]** Further characteristics and advantages of the invention will be apparent from reading the following description provided by way of non-limiting example, with reference to the figures illustrated in the attached drawings.

Figure 1 is a front schematic view of a refrigerator cabinet provided with a door provided with a door leaf provided with hinge units, according to the present invention.

Figure 2 is a front view of a hinge unit, according to the invention, in closure position.

Figure 3 is the front view of the hinge unit of figure 1 in opening position.

Figure 4 is the top view of figure 2.

Figure 5 is the top view of figure 3.

Figure 6 is the view along the line of section VI-VI of figure 2.

Figure 7 is the view along the line of section VII-VII of figure 3.

Figure 8 is the view along the line of section VIII-VIII of figure 4.

Figure 9 is the view along the line of section IX-IX of figure 5.

Figure 10 is a schematic view of the hinge unit, according to the invention in two operating positions.

#### PREFERRED EMBODIMENT OF THE INVENTION

**[0027]** It should be initially observed that over the following description, the top and bottom, upper and lower as well as left and right concepts are all deemed referred to the view of figure 1.

**[0028]** The refrigerator cabinet 10 illustrated in figure 1 comprises an outer parallelepiped-shaped body 11, which is adapted to delimit a refrigerated compartment (not visible) for receiving the products to be preserved therewithin.

**[0029]** Said refrigerated compartment is made accessible from outside through an access gap 12, which is obtained at the front part on a vertical side of the outer body 11.

**[0030]** Said access gap 12 is closed by a door which is indicated in its entirety with 20.

**[0031]** The door 20 comprises a fixed framework 21 adapted to delimit the access gap 12, which has a rectangular shape defined by two pairs of parallel profiles, including a pair of vertical profiles, left 22 and right 23 respectively, and a pair of horizontal profiles, upper 24 and lower 25 respectively.

**[0032]** The profiles 22-25 can be made of plastic material, for example PVC, to improve thermal insulation of the refrigerated compartment and prevent condensate phenomena, and they can be externally covered by an aluminium coating which improves the aesthetic features thereof.

**[0033]** The door 20 comprises furthermore two panels 30, which are generally adapted to close the access gap 12 delimited by the fixed framework 21.

**[0034]** In particular, each panel 30 has a rectangular shape substantially having the same height of the access gap 12, and width equivalent to slightly greater than half the width of the access gap 12.

**[0035]** Thus, each panel 30 is separately adapted to close a respective half of the access gap 12.

**[0036]** Each panel 30 comprises a cover panel 31, typically made of transparent material, for example glass, to allow the display of the products contained within the refrigerator cabinet 10, and a frame 32 adapted to perimetally surround said occlusion sheet 31.

**[0037]** In particular, the frame 32 is defined by a series of straight profiles that are fixed along the edges of the occlusion sheet 31.

**[0038]** Also the profiles of the frame 32 can be made of plastic material, for example PVC, and they can be externally covered by an aluminium coating.

**[0039]** As illustrated in figure 1, each panel 30 is further hinged to the fixed framework 21, so as to be able to rotate with respect thereto around a vertical rotational axis X and parallel to the laying plane of the framework 21, between a closure position and at least one opening position.

**[0040]** The outer edge (i.e. facing towards the external of the refrigerator cabinet 10) of the fixed framework 21, in particular of the right 23 and left 22 vertical profiles, and the outer edge of the frame 32 of the panel 30 are substantially flushed, i.e. coplanar, when the panel 30 is in closure position.

**[0041]** This hinge coupling is obtained through at least one hinge unit generally indicated with number 50 and shown in detail in the figures 2 - 10 and which will be

described in detail hereinafter.

**[0042]** The hinge units 50 can be two for each panel 30 respectively arranged in an upper and lower area panel 30 or alternatively one for each panel 30.

**[0043]** As observable in figure 1, the hinge units 50 of the left panel 30 are arranged at the left edge of such panel 30, vice versa, the hinge units 50 of the right panel 30 are arranged at the right edge of such panel 30.

**[0044]** Due to this solution, the panels 30 are adapted to rotate in opposite directions with respect to the framework 21, like two door leaves, each around its own rotation axis X, between the closure position shown in figure 1 towards a further opening position of the respective portion of the access gap 12, such that, when both panels 30 are in said further opening position, the access gap 12 is completely open.

**[0045]** Figures 2 to 9 show - for the sake of simplicity - only the lower right hinge unit 50.

**[0046]** The hinge unit 50 comprises a first support element 51 substantially plate-like, for example rectangular-based with rounded edges, on which there are made through holes 510 adapted to be engaged by screws 511 adapted to fix the support element to the framework 21, for example at the lower profile 25 thereof.

**[0047]** In the first support element 51, substantially in a recessed area decentred towards the right, there is provided a cylindrical seat 512 in which there is rotatably inserted - substantially fittingly - a rotation pin 52, with a vertical axis.

**[0048]** In particular, the cylindrical seat 512 is provided at the front edge of the first support element 51.

**[0049]** The hinge unit 50 comprises a second support element 54, also plate-like, for example with rectangular base having bevelled edges.

**[0050]** The second support element 54 has a plurality of through holes 540 in which there are inserted fastening screws (not shown) adapted to be fastened to the frame 32 of the panel 30.

**[0051]** To the second support element 54 there is further fixed the rotation pin 52 with a vertical axis adapted to be inserted in the cylindrical seat 512 for the rotation of the second support element 54 with respect to the first support element 51.

**[0052]** The rotation pin 52 is fixed (for example obtained in a single piece therewith) - at the lower part - with respect to the second support element 54, projecting with respect thereto, and at an edge (right front in the figure) so that the second support element 54 can rotate above the first support element 51.

**[0053]** As observable in figure 10, the positioning of the rotation pin 52 at an edge of the second support element 54 allows the latter to rotate by a 90° angle without the distance between the frame 32 and the vertical profile 23 (or 22) varying during the rotation of the panel 30.

**[0054]** Furthermore, the distance between the frame 32 and the vertical profile 23 may be minimal allowing a wider transparent surface of the refrigerator cabinet 10 in its entirety.

**[0055]** Thus, the second support element 54 is hinged to the first support element 51, through the rotation pin 52, so as to rotate the panel 30 with respect to the framework 21 between a position for closing and opening the access gap 12.

**[0056]** In practice, the second support element 54 is superimposed - in plan view - to the first support element 51 in the closure position and it is inclined, for example by 90°, with respect thereto in the opening position.

**[0057]** The second support element 54 is provided with a substantially cylindrical cavity 541 and arranged adjacent to the rotation pin 52, in which there is inserted, rotatably associated, a torsion spring 53, of the square-shaped bar type coaxially inserted in the cavity 541.

**[0058]** In the cavity 541 there is inserted a bushing 520 projecting - at the lower part - with respect to the second support element 54 and rotatably associated to the cavity 541.

**[0059]** The bushing 520 comprises an inner cavity at whose upper portion alone there is a square-shaped section adapted to obtain a prismatic coupling with the torsion spring 53.

**[0060]** In practice, the lower end 53a of the torsion spring 53 is rotatably inserted in the bushing 520 (which has a circular section at the lower part, so as to allow the rotation of the lower end of the torsion spring 53 therein) so that to a rotation of the second support element 54 with respect to the first support element 51, as observable hereinafter, there corresponds a rotation of the lower end 53a of the torsion spring 53 with respect to the second support element 54.

**[0061]** The torsion spring 53 extends in the longitudinal direction - at the upper part - with respect to the second support element 54 and the upper end 53b of the torsion spring 53 is adapted to be inserted in a locking nut 33, as known to the man skilled in the art, and shown solely schematically in figure 2 or rotatably locked by the upper portion of the bushing 520.

**[0062]** The locking nut 33, for example, also has a square-shaped cavity adapted to be inserted - substantially fittingly - on the torsion spring 53 hindering the mutual rotation between the upper end 53b of the torsion spring 53 and the panel 30/the bushing 520 (and it is thus integral with the second support element 54).

**[0063]** The cylindrical seat 512 is provided in a cylindrical body projecting - at the upper part - to the first support element 51 (at the recessed area thereof), whose outer surface which faces inwards the first support element 51 has a toothed portion 517a, while the remaining portion 517b of outer surface (which faces outwards with respect thereto) is substantially cylindrical and defines the rounded edge of the first support element.

**[0064]** The toothed portion 517a is adapted to mesh with a toothed wheel 521 which is rotatably associated to the second support element 54 and splined on the lower end 53a of the torsion spring 53.

**[0065]** It is thus observed that the lower end 53a of the

torsion spring 53 (which is rotatably integral with the toothed wheel 521), when the second support element 54 is actuated in opening rotation by a user, rotates with respect to the second support element 54 (due to the rotatable driving action of the toothed portion 517a on the toothed wheel 521) countering the action of the torsion spring 53 so as to elastically load the same.

**[0066]** The torsion spring 53 (possibly preloaded) maintains the panel 30 closed and thus allows the automatic return of the panel 30 to the closure position once it has been opened.

**[0067]** The hinge unit 50 comprises locking means adapted to removably lock therebetween the first support element 51 and the second support element 54 in the open position, countering the action of the torsion spring 53.

**[0068]** In the represented example, the locking means comprise an automatic actuation lock bolt 55 which is slidably associated to the first support element 51.

**[0069]** The first support element 51 comprises a rectilinear guide 513 arranged adjacent to the cylindrical seat 512 and arranged with longitudinal axis laying on a plane orthogonal to the rotation axis X and inclined, in the example by 20°, with respect to the longitudinal axis of the first support element 51 (with rectangular base).

**[0070]** The lock bolt 55 is adapted to slide along the rectilinear guide 513 between an advanced position, in which it is approached to the rotation pin 52 and a retracted position, in which it is moved away therefrom.

**[0071]** In practice, the rectilinear guide 513 is provided at the left raised area of the first support element 51 and it is defined by a notch 514 with longitudinal development obtained in the first support element 51.

**[0072]** In plan view, the notch 514 is shaped to form an open channel at the ends and delimited by a pair of side frames 515 parallel with respect to each other between which the lock bolt 55 is adapted to slide.

**[0073]** The notch 514 terminates, with one of the open ends, on the recessed area decentred towards the right of the first support element 51 and, with the other open end, on a widened cavity 516.

**[0074]** In practice, the widened cavity 516 is arranged upstream of the side frames 515, in the sliding direction of the lock bolt 55 from the retracted position to the advanced position.

**[0075]** In plan view, the widened cavity 516 is perimetally closed on all sides except at the notch 514.

**[0076]** In the widened cavity 516 there are housed a pair of compression springs 56, which are compressed between the closed rear bottom of the widened cavity 516 (distal from the notch 514) and the rear wall of the lock bolt 55, so as to push the lock bolt towards the advanced position thereof.

**[0077]** In the shown preferred embodiment the compression springs 56 are of the helical type and they have respective longitudinal axes parallel with respect to each other.

**[0078]** Correspondingly, the widened cavity 516 is sub-

stantially rectangular shaped (in plan view).

**[0079]** The rectilinear guide 513 is provided with an abutment element 518, for example, defined by the connection shoulder between the side frames 515 and the widened cavity 516, which is adapted to stop the travel of the lock bolt 55 in the advanced position thereof.

**[0080]** The notch 514 and the widened cavity 516 are, then, closed - at the upper part - by a cover 519 adapted to hold - at the upper part - the lock bolt 55 and the compression springs 56.

**[0081]** The lock bolt 55 comprises a substantially parallelepiped-shaped extended body 550 adapted to slidably engage the rectilinear guide whose front end 551 (in the sliding direction from the retracted position to the advanced position thereof) is substantially pointed and whose rear end 552 defines a widened wall adapted to interfere - at the front part - with the abutment element 518 and define - at the rear part - a support area for the compression springs 56.

**[0082]** The front end 551 of the lock bolt 55 is such to protrude frontally projecting from the left raised area of the first support element 51 being positioned at least partly above the recessed area on the right side thereof.

**[0083]** In practice, the first support element 51 defines a box-shaped body in which there is inserted - therewithin - the lock bolt 55, whose front end 551 alone exits from the open end of the notch 514 which faces towards the rotation pin 52.

**[0084]** Additionally, the locking means comprise a retention seat 57 obtained in the second support element 52 and, thus, rotatably integral therewith, which is adapted to receive the front end 551 of the lock bolt 55 when the second support element 54 is in the opening position.

**[0085]** In practice, the retention seat 57 is provided at one side (rear in figure 2) of the second support element 54 and it is obtained on a shaped tooth 570 projecting beneath the second support element, so that, rotating the second support element 54 by 90° from the closure position to the opening position, the retention seat 57 passes over the recessed area (right) of the first support element 51, from a position in which it is not aligned with the lock bolt 55 (along the sliding direction of the lock bolt) to a position in which it is aligned therewith and accessible therefrom.

**[0086]** Furthermore, the retention seat 57 has a substantially V-shaped profile - in plan view - so as to receive - substantially fittingly - the advanced pointed end 551 of the lock bolt 55, when it is in the advanced position, and guarantee the centring thereof.

**[0087]** The tooth 570 comprises at least one rounded side 571 arranged in lateral position with respect to the retention seat 57 and adapted to come to contact with the front end 551 of the lock bolt 55, during the rotary motion of the second support element 54 with respect to the first support element 51 between the opening position and the closure position.

**[0088]** The rounded side 571 serves as a cam for the lock bolt 55 moving it, countering the compression

springs 56, from the advanced position to the receded position, during the rotary motion imparted to the panel 30 by the user.

**[0089]** In practice, the compression of the compression springs 46 by the rounded side 571 allow the snap-coupling of the lock bolt 55 in the retention seat 57, when opening the panel 30, and simultaneously facilitates the exit thereof for the unlocking thereof, when closing.

**[0090]** The compression springs 56 are configured so that the rigidity thereof is greater than the rigidity of the torsion spring 53, so that when the lock bolt 55 is inserted in the retention seat 57 the torsion spring 53 is not capable, alone, of removing the constraint to the rotation of the second support element 54 with respect to the first support element 51 offered by the lock bolt 55.

**[0091]** However, it is not excluded that the lock bolt be of the manual locking type of the type known to the man skilled in the art.

**[0092]** In the light of what has been described above, the hinge unit 50 operates as follows.

**[0093]** The panel 30 is normally closed and, thus, the second support element 54 is superimposed (in the closure position thereof) to the first support element 51 pushed by the preload imparted to the torsion spring 53.

**[0094]** In such configuration (Figs. 2,4,6 and 8), the lock bolt 55 and the retention seat 57 misaligned with respect to each other and the panel 30 can be actuated in rotation for opening the door 20.

**[0095]** Following a rotation of the panel 30 by 90° with respect to the axis X (Figs. 3,5, 7 and 9), the retention seat 57 rotates with the second support element 54 moving before the lock bolt 55, which, previously pushed by the rounded side 571 of the tooth 570 in the receded position thereof against the thrust action of the compression springs 56, it is instantaneously and automatically moved in the advanced position (due to the action of the compression springs 56) snap-coupling the retention seat.

**[0096]** The fissure present between the vertical profile 23 and the edge of the second support element 54 (and thus also of the frame 32), due to the arrangement of the rotation axis X in proximity of an edge of the second support element, appears considerably small with respect to the prior art (see Figure 10 compared to the prior art illustrated above); furthermore, such fissure during the opening and closing rotation of the panel 30 substantially does not vary the dimension thereof, preventing any possible problem related to crushing.

**[0097]** In practice, due to the arrangement of the hang axis X of the hinging unit 50 and the configuration of the hinging unit the fissure present between the vertical profile 23 and the edge of the second support element 54 (and thus also of the frame 32) may be comprised between 3.5 mm and 6.5 mm (with the normal tolerance in the industry substantially amounting to +/- 0.5 mm). With the lock bolt 55 engaged in the retention seat 57 the panel 30 is forced, against the action of the torsion spring 53 to remain in open position.

**[0098]** In order to unlock the panel 30 it is thus sufficient to rotatably actuate with a minimum force, such to overcome the action of the compression springs 56, the panel 30, so that the lock bolt 55, sliding on the sides of the retention seat 57 and of the rounded side 571 of the tooth 570, moves in the receded position thereof and the panel 30 free to rotate towards the closure position by means of the return action exerted by the torsion spring 53.

**[0099]** The invention thus conceived can be subjected to numerous modifications and variants all falling within the scope of protection of the invention. Furthermore all the details can be replaced by other technically equivalent elements.

**[0100]** In practice the materials used, as well as the contingent shapes and dimensions, may vary depending on the requirements without departing from the scope of protection of the following claims.

## 20 Claims

1. Hinge unit (50) for panels for closing the access gap of refrigerator cabinets comprising:

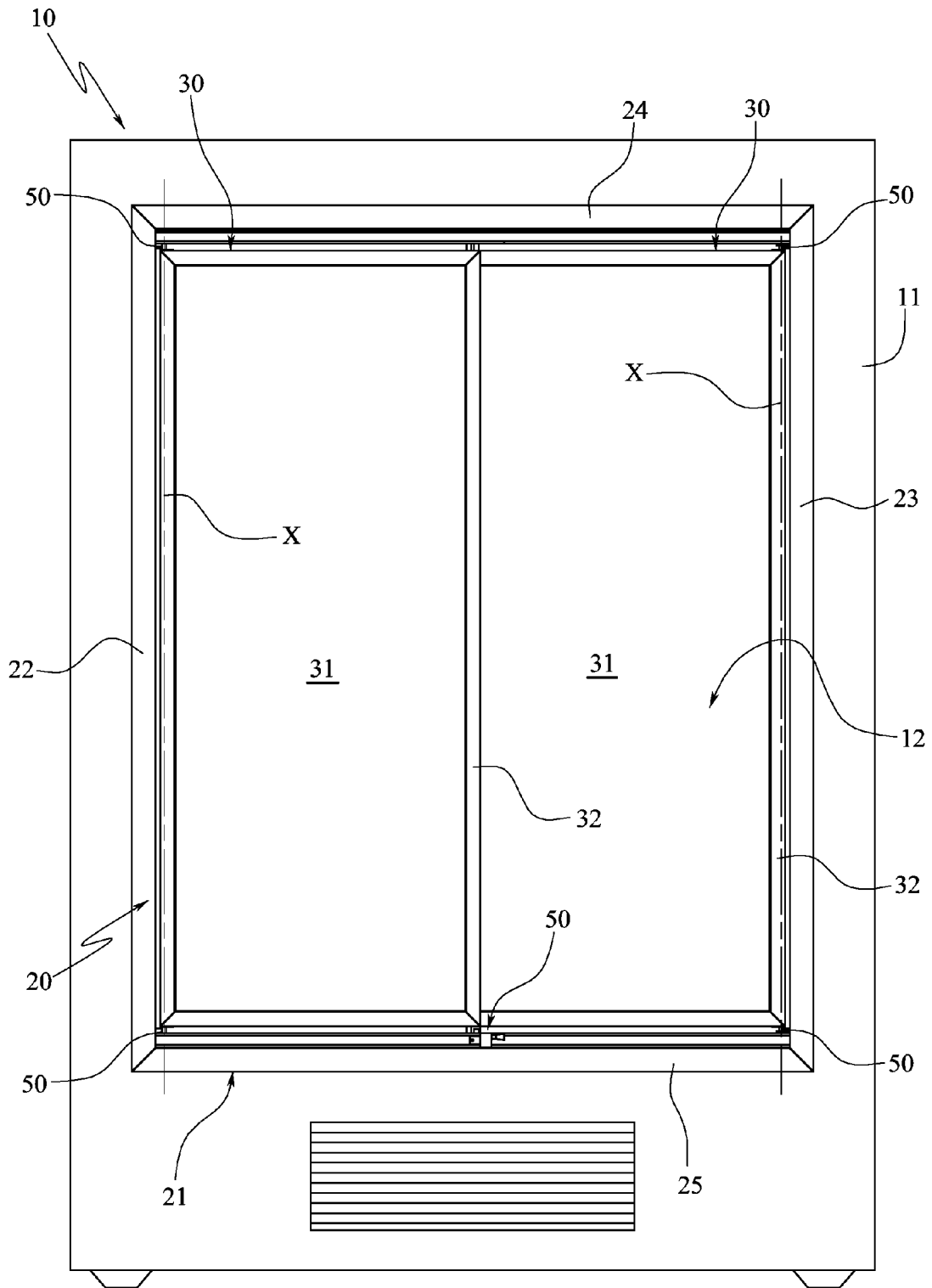
- a first support element (51) fixable to the fixed framework (21) of the access gap,
- a second support element (54) fixable to the closing panel (30), said second support element (54) being hinged to the first support element (51) with hinging axis (X) parallel to the panel (30) so as to allow the rotations of said panel (30) between a position for closing and a position for opening the access gap (12), said hinging axis (X) being arranged at one corner of at least the second support element (54) and there being provided elastic return means (53) interposed between said first and second support element (51,54) for returning from the opening position to the closing position, which comprise a torsion spring (53) substantially parallel to the hinging axis (X) and decentred with respect thereto, a first end (53a) thereof rotatably being associated to the second support element (54) and the second end thereof (53b) being associated rotably integral to the second support element (54) there being provided means (517a,521) for transforming the rotary motion of the second support element (54) with respect to the first support element (51) into a rotary motion of the first end (53a) with respect to the second end (53b) of the torsion spring (53).

2. Unit (50), according to claim 1, wherein the transformation means comprise at least one meshing portion (517a) fixed to the first support element (51) coaxially to the hinging axis (X) and adapted to mesh a toothed wheel (521), rotatably associated to the second support element (54) and comprising a seat for housing

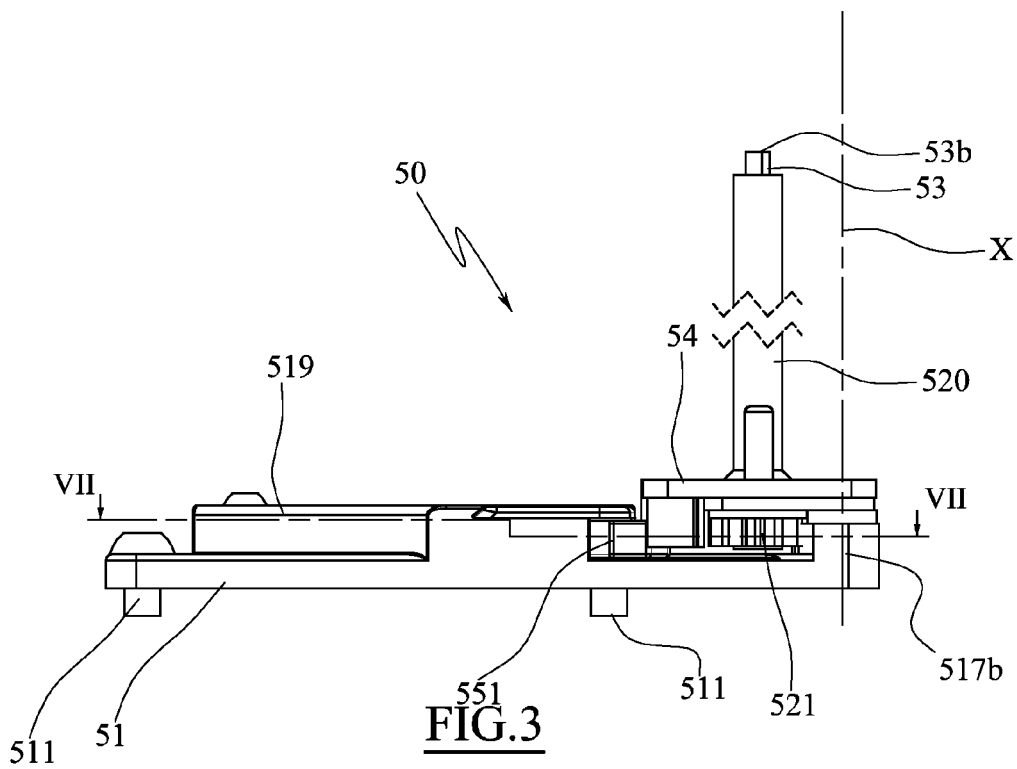
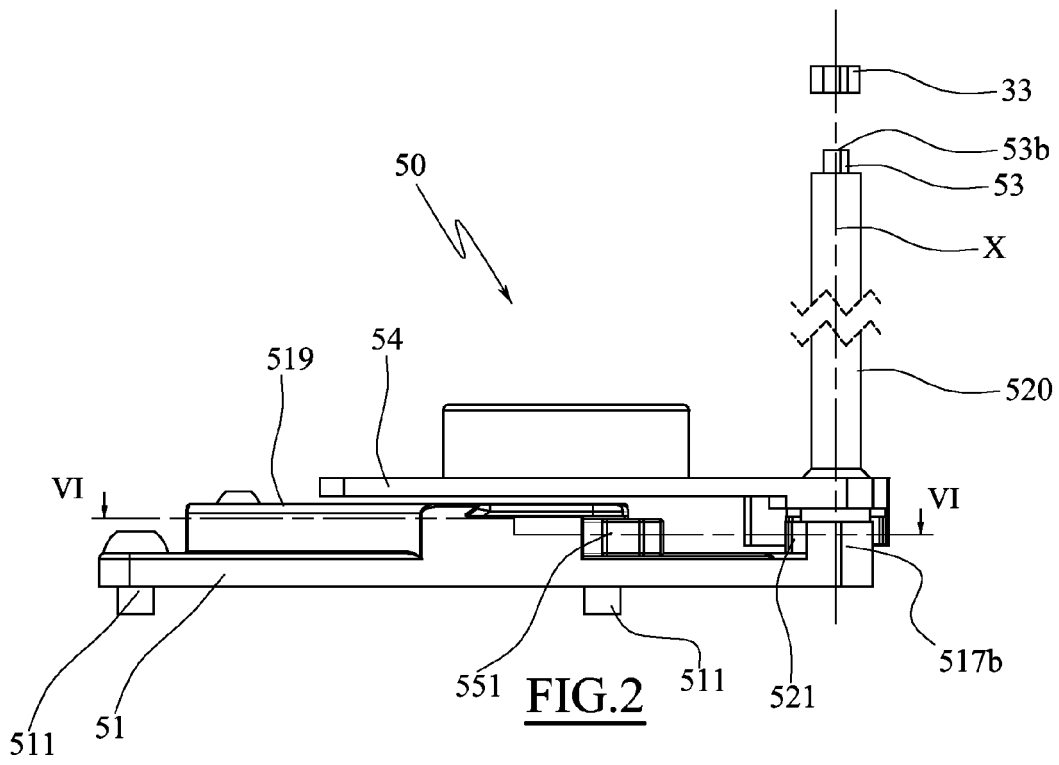
the first end (53a) of the torsion spring (53), said first end (53a) and said housing seat being configured so as to provide a prismatic coupling.

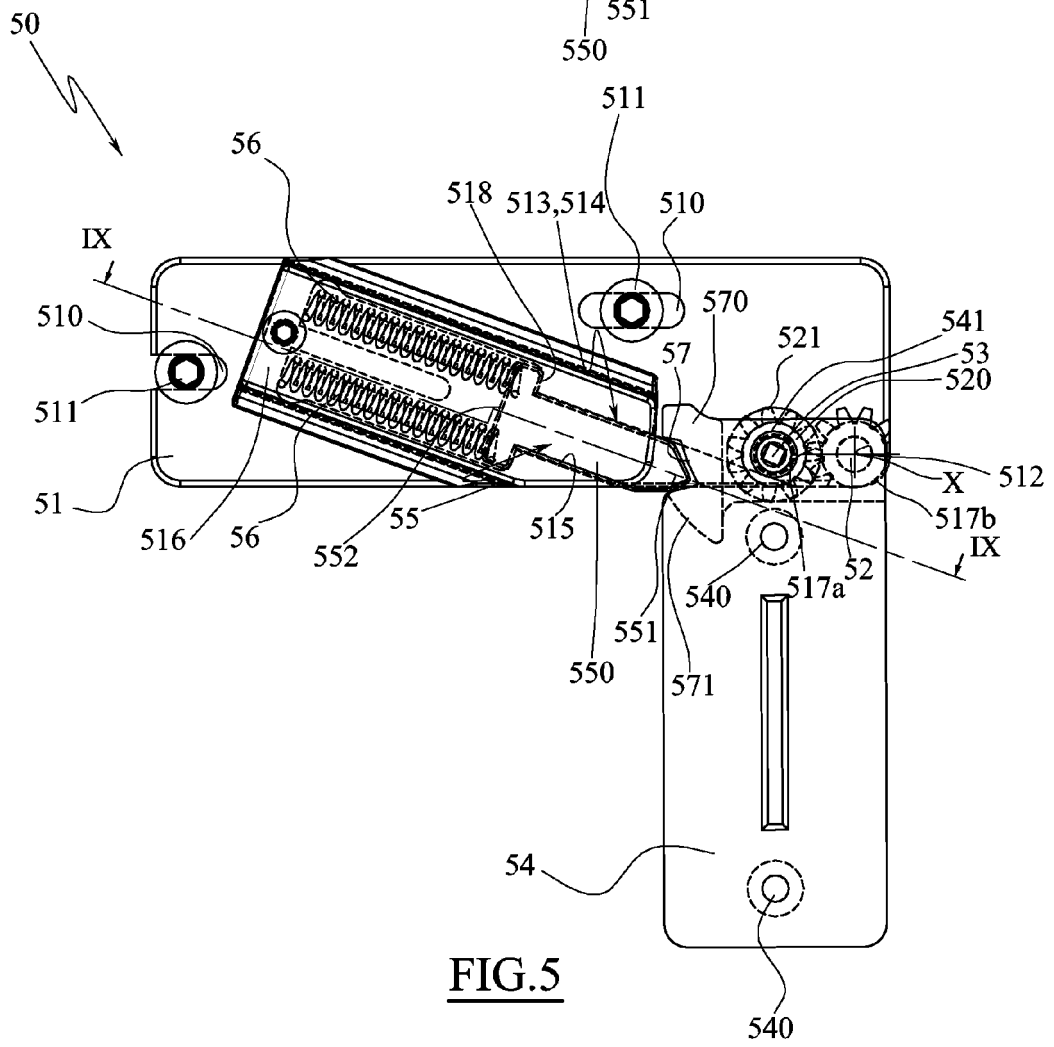
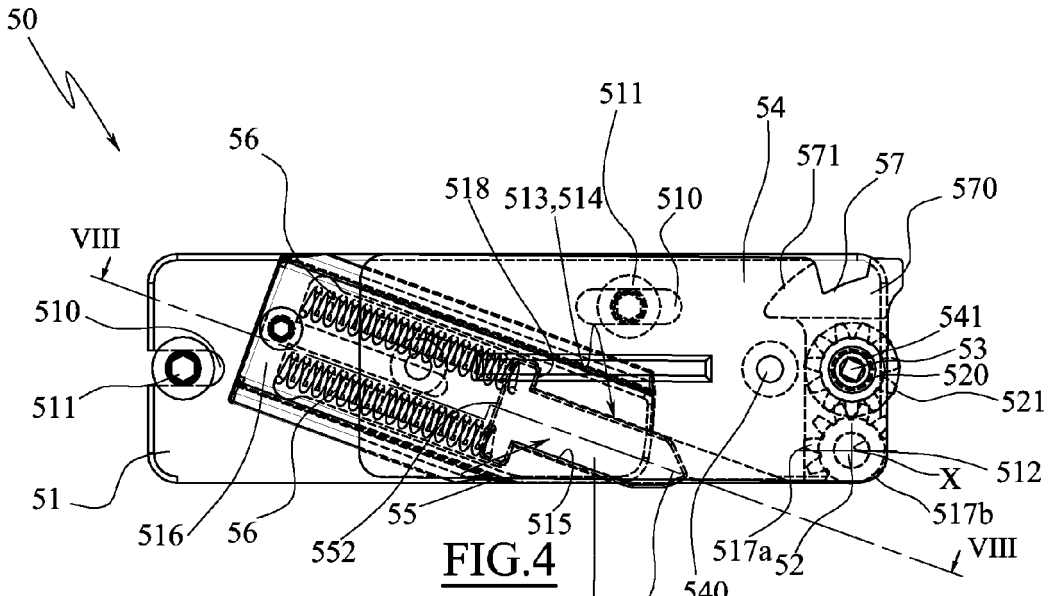
3. Unit (50), according to claim 1, **characterised in that** it comprises locking means (55,57) adapted to removably lock the first and the second support element (51,54) to each other in the open position. 5
4. Unit (50), according to claim 3, wherein the locking means comprise two snap-coupling elements respectively associated to the first support element (51) and the second support element (54), including a lock bolt (55) and a retention seat (57) adapted to provide a mutual automatic coupling following a mutual rotation between the first and the second support element (51,54). 10  
15
5. Unit (50), according to claim 1, wherein the torsion spring (53) comprises a bar with rectilinear longitudinal axis and a substantially square-shaped section. 20
6. Door (20) for refrigerator cabinets comprising a fixed framework (21) adapted to limit an access gap (12) of the refrigerator cabinet and a panel (30) for closing the access gap (12) **characterised in that** it comprises a hinge unit (50) according to any one of the preceding claims. 25  
30
7. Door (20) according to claim 6, wherein the panel (30) comprises an occlusion sheet (31) and a frame (32) adapted to perimetally surround the occlusion sheet (31), the torsion spring (53) being inserted within said frame (32). 35
8. Door (20) according to claim 6, wherein the distance between the edge of the panel (30) parallel to the hinging axis (X) and proximal to the hinging axis and the fixed framework (21) remains substantially constant during the rotation between the position for closing and the position for opening the panel. 40
9. Door (20) according to claim 5, wherein the distance between the edge of the panel (30), parallel to the hinging axis (X) and proximal to the hinging axis, and the fixed framework (21) is substantially comprised between 3.5 mm and 6.5 mm. 45
10. Door according to claim 5, wherein the outer edge of the fixed framework (21) and the frame (32) of the panel (30) are substantially coplanar when the panel (30) is in said closing position. 50

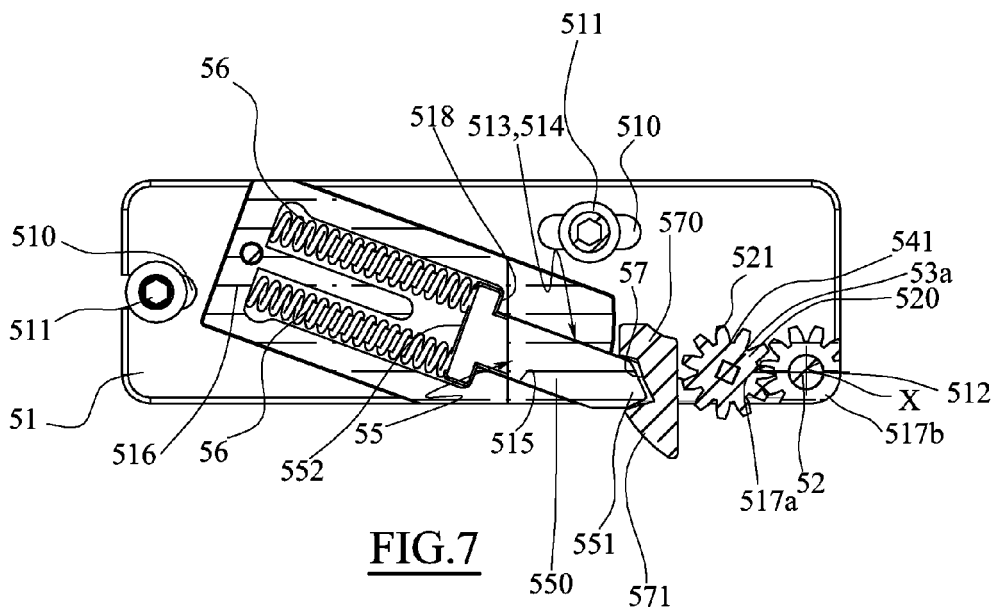
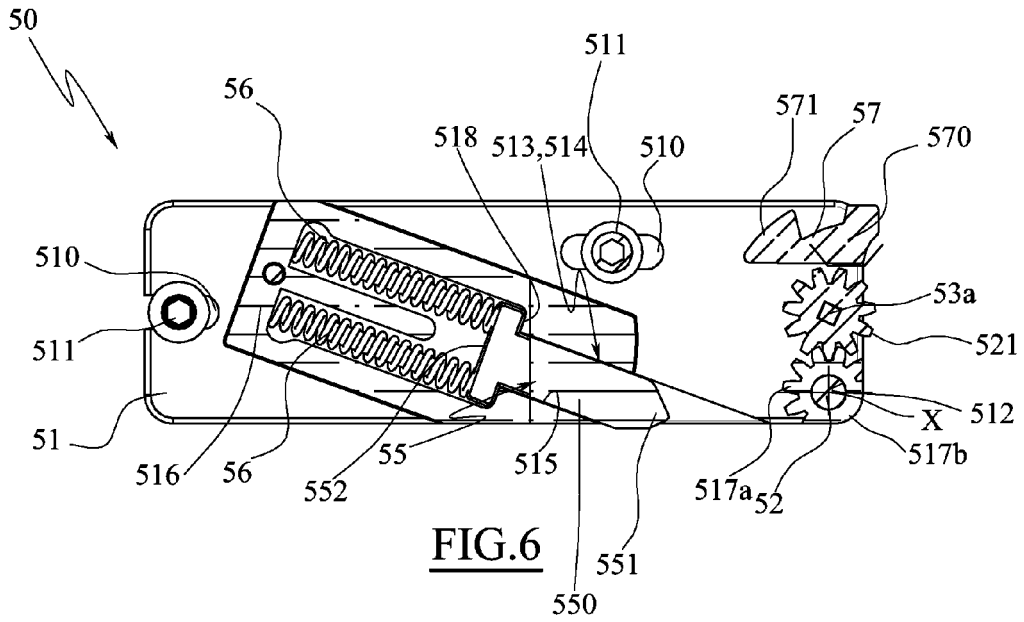
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**FIG.1**







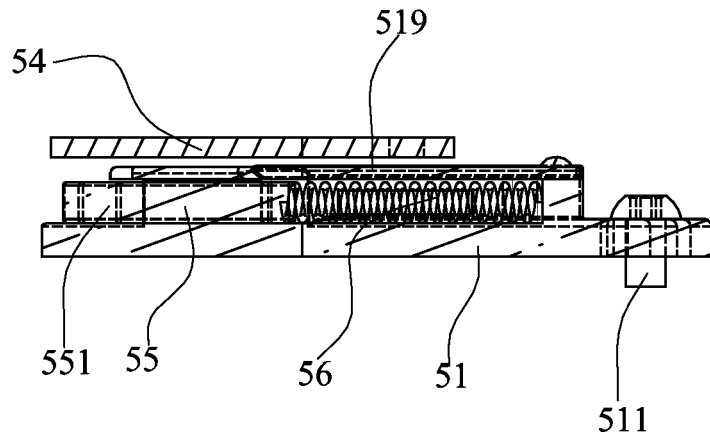


FIG. 8

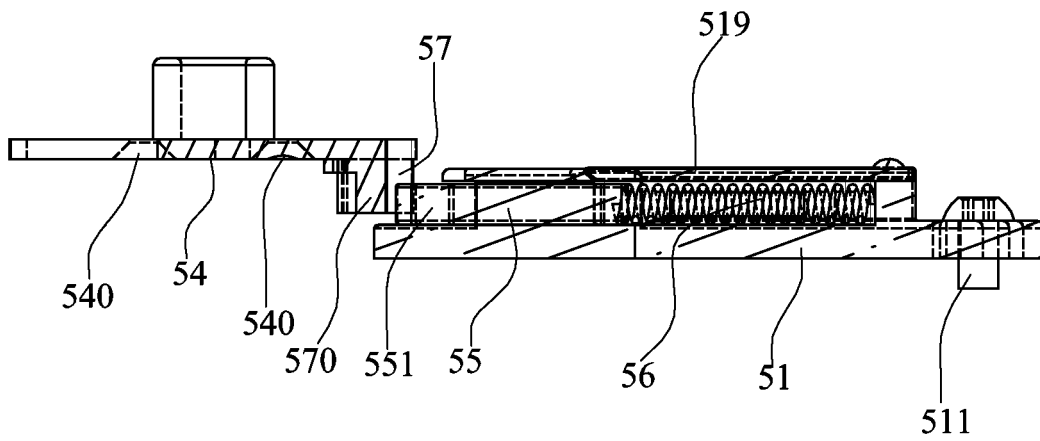
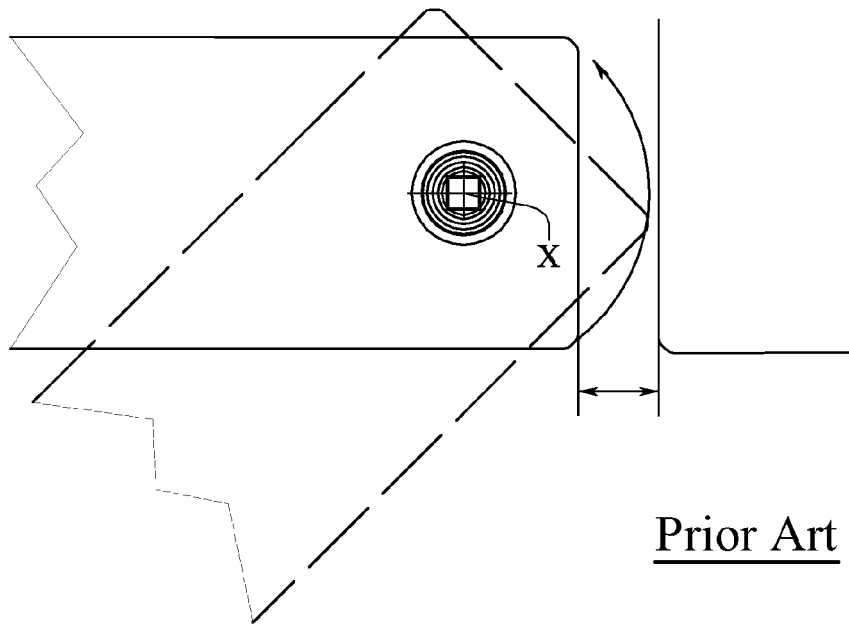


FIG. 9



Prior Art

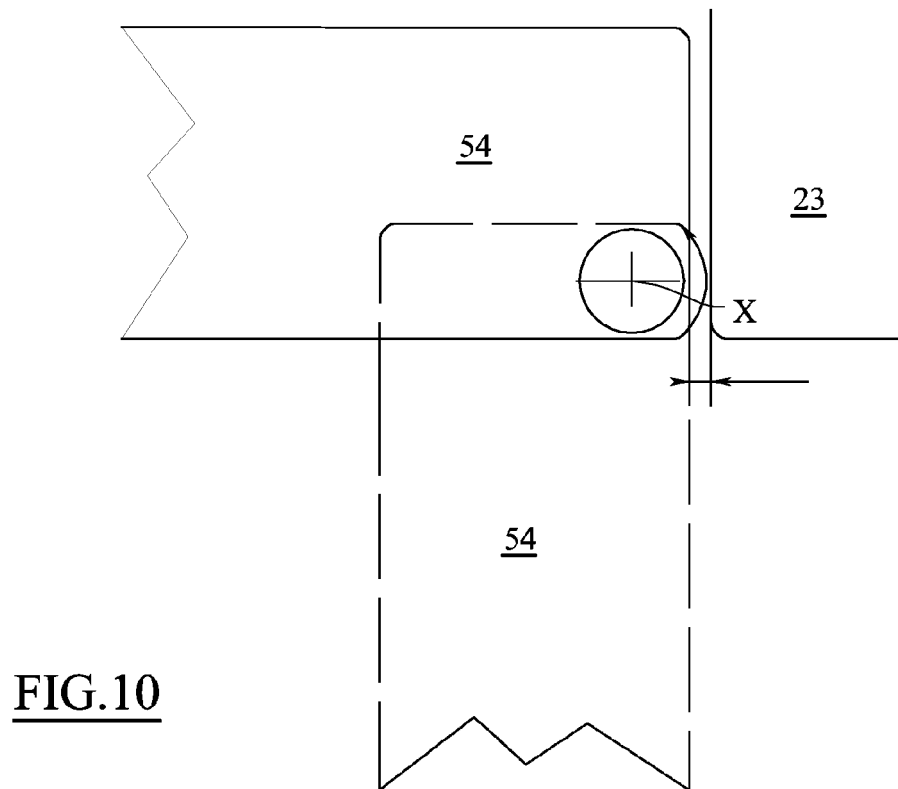


FIG. 10



EUROPEAN SEARCH REPORT

Application Number  
EP 12 17 7557

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 3 510 986 A (BERKOWITZ IRVING L) 12 May 1970 (1970-05-12) * column 3, line 42 - column 7, line 20; figures 1,2,3,4 *	1	INV. F25D23/02
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A	US 2008/168618 A1 (HOTTMANN PHILIP F [US]) 17 July 2008 (2008-07-17) * paragraph [0021] - paragraph [0037]; figures 2-6 *	1	
A	US 2005/273974 A1 (HAN JAE M [KR] HAN JAE MYUNG [KR]) 15 December 2005 (2005-12-15) * paragraph [0023] - paragraph [0045]; figures 1,2 *	1	
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 15 January 2013	Examiner Jessen, Flemming
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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                      &amp; : member of the same patent family, corresponding document</p>			

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
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