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Állítószerkezet bútordarab magasságában mozgatható ajtólapjának mozgatásához

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

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ACTUATING MECHANISM FOR MOVING A HIGHLY MOVABLE FLAP OF A PIECE OF FURNITURE

Description

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[0001] The present invention relates to a furniture carcass with an actuating mechanism for moving an upwardly movable flap of an article of furniture, comprising a main body to be fixed to a furniture body, wherein an actuating arm for moving the flap is mounted, on the one hand, at a mounting axis of the main body and, on the other hand, at a mounting axis on a fitment to be fixed to the flap, and there is further provided an additional control arm for moving the flap, wherein during the movement of the actuating arm, the effective lever arm length of the control arm is variable.

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[0002] Furthermore, the invention concerns an article of furniture comprising an actuating mechanism of the kind to be described, which is provided for moving an upwardly movable flap.

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[0003] Actuating mechanisms of that kind are used for moving flaps of articles of furniture which are movably mounted between a vertical position, in which a storage compartment of the furniture body is closed, and an upwardly directed open position. When the flap is opened, the flap can perform a considerable lifting-away movement in relation to the face of the furniture carcass, which is perceived by the user as being unpleasant because on the one hand, a relatively large amount of free space has to be provided and, on the other hand, there is also the danger that the user in front of the carcass of the cupboard can suffer injuries to the head due to excessive outward pivotal movement of the flap. As a result, the operator during the opening movement of the flap will intuitively dodge rearwardly out of the way when the flap moves at the level of his head.

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[0004] EP 0 952 290 A2 and EP 1 785 565 A2 disclose fittings for upwardly moving furniture flaps, comprising a spring-loaded actuating arm and a control mechanism in the form of two hinged interconnected pivot levers, the effective lever arm length of which is increased in the opening movement of the flap. A disadvantage in this arrangement is the risk that the flap of the article of furniture can easily collide with the head of the user in the course of the opening movement.

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[0005] It is therefore an object of the present invention to provide an item of furniture with an actuating mechanism of the general kind set forth in the opening part of this specification, with improved kinematics for substantially avoiding the above-indicated disadvantages.

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[0006] In accordance with the invention, this is accomplished by the features of claim 1, wherein the effective lever arm length of the control arm is shortened when the actuating arm is opened.

[0007] The basic concept of the present invention therefore involves shortening the effective lever arm length formed by the control arm in the course of the opening movement of the flap. In that case, the

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effective lever arm length can be in the form of a function of the rotational angle of the actuating arm which supports the movement of the flap in respect of force. In this connection, it is possible to provide, in particular, a non-linear progression, Namely, the effective lever arm length of the control arm changes less in a first opening angle range of the actuating arm, adjoining the closed position, than in a second opening angle range which adjoining the first opening angle range and extending extends towards the completely open position of the actuating arm.

[0008] In that way, it is possible for the flap to be moved in a first pivotal range starting from the fully closed position in parallel relationship with itself (that is to say, substantially parallel to the face of the furniture body or carcass) and then to pivot away over the furniture carcass. In this case, the flap in a region immediately in front of the fully open position performs a relatively great pivotal movement due to a corresponding strongly pronounced change in the length of the control arm.

[0009] The proposed construction provides, on the one hand, that the lifting-away movement of the flap in relation to the face of the furniture carcass can be kept small. On the other hand, it is also possible for the flap not to reach the maximum room height by a correspondingly great pivotal movement in the region immediately in front of the completely open position so that in its open position, the flap can be still easily actuated by the operator.

[0010] A further advantage is also that, in the case of a motor-driven flap – particularly during the closing movement – the risk that the lower edge of the flap hits the user on the head is reduced. The control arm is, on the one hand, pivotally connected to a bearing axis associated with the furniture carcass, on the other hand, pivotally connected to the flap. The invention now provides that the relative spacing between the carcass-side bearing axis of the control arm and the flap-side bearing axis of the control arm is altered in the course of the pivotal movement of the actuating arm, and being shortened when the actuating arm is being opened.

[0011] In structural respects, the configuration is made such that the control arm comprises at least two portions movable relative to each other. In that respect, relative mobility is to be interpreted as meaning that all possible mounting options of the at least two portions relative to each other are embraced, which can involve a reduction in the spacing of the carcass-side and the flap-side bearing axis of the control arm during the pivotal movement of the flap.

[0012] In an possible embodiment, it can be provided that said at least two portions are connected together by way of a hinge axis. There is provided an additional intermediate lever which is operative between the hinge axis of the at least two portions and a hinge axis on the actuating arm. In that case, the additional intermediate lever takes over the function of providing positive control, by which the two hingedly interconnected lever portions are folded during the opening movement of the actuating arm. In that case, the lever portions – starting from the completely closed position of the actuating arm – are initially only slightly angled, but in a second pivotal range as far as the completely open position of the

actuating arm, they are relatively greatly folded, whereby it is possible to implement the desired opening progression for the flap.

[0013] In accordance with a further embodiment of the invention, it can be provided that the relative position of the at least two portions relative to each other can be varied by a drive device, preferably an electric drive. In a further embodiment, the electric drive performs adjustment of the relative position of the at least two portions relative to each other by way of a transmission mechanism. In that case, the electric drive for altering the spacing between the carcass-side bearing axis and the flap-side bearing axis of the control arm can be so actuated so that in a first rotary angle range of the actuating arm, starting from the completely closed position thereof, the electric drive is either not moved at all or is moved only slightly, while in an opening angle range of the actuating arm, which is right in front of the completely open position of the actuating arm, a more greatly pronounced relative reduction in length of the control arm is effected.

[0014] In accordance with a first variant of the invention, the control arm can have a carcass-side bearing axis arranged at or in a main body of the actuating mechanism. Alternatively, the bearing axis of the control arm can also be arranged on a mounting portion separate from the main body of the actuating mechanism, on the article of furniture. In that case, the carcass-side bearing axis of the control arm can be arranged in the uppermost region of the carcass of the article of furniture and preferably in the region of the front face of the carcass of the article of furniture. The carcass-side bearing axis and the flap-side bearing axis of the actuating arm thus form a hinge quadrilateral with the carcass-side bearing axis and the flap-side bearing axis of the control arm. The area formed by the hinge quadrilateral can be increased by the arrangement of the carcass-side mounting axis in the uppermost and foremost region of the carcass of the article of furniture, whereby it is possible to implement advantageous lever ratios for the movement of the flap.

[0015] Further details and advantages of the present invention will be apparent from the specific description hereinafter. In the drawings:

Fig. 1 shows a perspective view of a wall-mounted article of furniture having an actuating mechanism for the movement of an upwardly pivotable flap,
Fig. 2 shows a side view of the arrangement of Fig. 1,
Fig. 3a–3d show the opening progression of the flap in time sequences,
Fig. 4a–4c show an alternative embodiment having a control arm which includes a spindle drive,
Fig. 5 shows a perspective view of the control arm with a motor-operable spindle drive,
Fig. 6 shows a diagram illustrating the curve configuration of the effective lever arm length of the control arm as a function of the opening angle of the actuating arm.

[0016] Fig. 1 shows a perspective view of an article of furniture 1 in the form of a cupboard which is fixed to a wall 2 and which in particular is used as an upper cabinet in a kitchen. The article of furniture 1 includes a body or carcass 3 which is to be fixed to the wall 2. To the side wall of the furniture piece 1 there is mounted an actuating mechanism 5 according to the invention for displacement of an upwardly pivotable flap 4. In the closed position, the flap 4 assumes a substantially vertical position and, starting from that vertical position, is movable into an upwardly displaced open position. For reasons of clarity of the drawing, only a part of the flap 4 and the furniture carcass 3 is shown. An actuating mechanism 5 can also be arranged at the inside of the oppositely disposed side wall of the article of furniture 1. The actuating mechanism 5 comprises an actuating arm 6 which can be acted upon by a drive device which is not shown in greater detail here (spring device and/or electric motor). As a result, the actuating arm 6 therefore assists with the movement of the flap 4, in respect of the force involved there. In addition to the actuating arm 6, there is also provided a control arm 7 which influences the motion characteristic of the flap 4 during its travel movement. During the opening progression of the flap 4, conventional structures can involve a considerable lifting-away movement of the flap 4 in relation to the front face of the furniture carcass 3, so that the user runs the risk of suffering injury. The invention now proposes reducing the effective lever arm length of the control arm 7 during the opening progression of the flap 4, and that is implemented by the intermediate lever 8. The intermediate lever 8 is operative between the actuating arm 6 and the control arm 7 so as to provide for positive displacement of the control arm 7, as is to be described in greater detail with reference to following Figures.

[0017] Fig. 2 shows the arrangement of Fig. 1 in a side view. Mounted to at least one side wall of the furniture carcass 3 is an actuating mechanism 5 which includes a drive device which is not shown in greater detail (spring device and/or electric motor) for actuating the actuating arm 6. The actuating arm 6 is arranged at the carcass side at or in a main body 5a at a bearing axis A, while the other distal end of the actuating arm 6 is hingedly mounted to the flap-side fitment 9 at a bearing axis B. In addition to the actuating arm 6, there is also provided a control arm 7 which, in the illustrated embodiment, includes two portions 7a and 7b which are hingedly connected together at the hinge axis F. The control arm 7 with the two portions 7a, 7b is therefore mounted at the carcass side at the bearing axis C and at the flap side at the fitment 9 at the bearing axis D. A – preferably cranked – intermediate lever 8 connects the actuating arm 6 at the hinge axis E to the control arm 7 at the hinge axis F. Starting from the fully closed position of the flap 4, the two portions 7a and 7b of the control arm 7 are only insignificantly folded, whereby substantially parallel guidance for the flap 4 is possible in relation to the front face of the furniture carcass 3. As from a given angle of pivotal movement of the actuating arm 6 (for example from 70° in relation to the vertical), a more greatly pronounced bending movement of the two portions 7a and 7b is effected by the intermediate lever 8, whereby the flap 4 performs a correspondingly great pivotal movement and is pivotable rearwardly beyond the furniture carcass 3.

[0018] Fig. 3a-3d show the opening progression of the flap 4 in time sequences. Figure 3a shows the flap 4 in the completely closed position. The actuating mechanism 5 with its actuating arm 6 for supporting movement of the flap 4 is fixed to a side wall of the furniture carcass 3. Of the control arm 7, it is possible

to see the portion 7b which is pivotally connected with respect to the bearing axis D of the flap-side fitment 9. The reference C denotes the carcass-side bearing axis of the control arm 7, which can be arranged either at the main body 5a of the actuating mechanism 5 or also separately therefrom at the furniture carcass 3. The relative spacing S, shown in Figure 5b, between the two bearing axes C and D (i.e. the effective lever arm length of the control arm 7) can be reduced in the course of the opening movement of the flap 4, is of significance.

[0019] Fig. 3b shows the flap 4 in a slightly open position, wherein the flap 4 is movable in a first pivotal range substantially parallel to itself and performs a movement of lifting away from the furniture carcass 3. In that first pivotal range of the flap 4, the intermediate lever 8 arranged at the hinge axis E on the actuating arm 6 causes only an insignificant folding movement of the two portions 7a, 7b of the control arm 7. Reference S denotes the relative spacing (normal spacing) between the two bearing axes C and D of the control arm 7. In addition, a diagrammatically illustrated electric motor 12 can also operate on the bearing axis A of the actuating arm 6 arranged on the main body 5a.

[0020] Fig. 3c shows a movement of the flap 4, which is continued from Fig. 3b, and in which the two parts 7a, 7b of the control arm 7 were admittedly bent (i.e. angled relative to each other) somewhat more greatly by the intermediate lever 8. In comparison with Fig. 3b, that involves only an immaterial change in the spacing S between the carcass-side bearing axis C and the flap-side bearing axis D of the control arm 7.

[0021] Fig. 3d shows an open position of the flap 4, which is continued from Figure 3c. It is possible to see a relatively severe bending motion of the two portions 7a, 7b of the control arm 7, which is caused by the cranked intermediate lever 8. It is possible to see the spacing S, which is markedly reduced in comparison with Figure 3c, between the carcass-side bearing axis C and the flap-side bearing axis D of the control arm 7. Starting from the position of the flap 4 as shown in Fig. 3d, the flap 4 can be moved into the completely open position, wherein the proposed kinematics of the actuating mechanism 5 means that the upper edge 10 of the flap 4 can be moved relatively closely to the cupboard top 3a of the carcass 3 of the article of furniture 1.

[0022] Fig. 4a-4c show a side view of an alternative embodiment of the invention. As in the preceding embodiments, the actuating mechanism 5 includes an actuating arm 6 which is pivotally arranged at the carcass side at the bearing axis A and at the flap side at the bearing axis B. The control arm 7, in contrast, includes a portion 7a which is in the form of a spindle nut and which at the same time forms the bearing axis C of the control arm 7. In addition, the control arm 7 comprises a spindle 7b movable relative to the portion 7a (spindle nut). Moreover, the control arm 7 includes a mounting portion 7c which is pivotally fixed at the bearing axis D to the flap-side fitment 9. The mounting portion 7c serves to receive an electric drive by which the portion 7b (spindle) is rotatable and is thereby movable in variable-length relationship with respect to the portion 7a (spindle nut). In that case, the electric drive arranged at the mounting portion 7c can be operated again in dependence on the angular position of the actuating arm 6 so that,

starting from the completely closed position of the flap 4, there is only a slight change in length of the control arm 7, while from a predetermined or predeterminable opening angle of the actuating arm 6 towards the fully open position of the flap 4, the effective lever arm length of the control arm 7 is altered more greatly than in the first pivotal range of the flap 4.

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[0023] Fig. 4b shows a control arm 7 which is shortened in comparison to Fig. 4a, the control arm 7 having a reduced effective lever arm length, as the portion 7b (spindle) projects into the interior of the furniture carcass by virtue of the motor displacement produced. It will be appreciated that it is also possible for the electric drive integrated in the mounting portion 7c also to be arranged at the body side.

10 Equally, instead of the illustrated spindle drive, it is also possible to provide a linearly movable rack with a rotatable pinion for adjusting the lever arm length of the control arm 7. Reference 13 denotes a schematically depicted device for detecting the angular position of the actuating arm 6, by which the electric drive for displacement of the two portions 7a, 7b relative to each other is selectively actuatable.

15 **[0024]** Fig. 4c shows a view on an enlarged scale of the region circled in Fig. 4b, with a carcass-side spindle nut 7a and a spindle 7b which projects into the interior of the furniture carcass 3.

[0025] Figure 5 shows a possible embodiment of a spindle drive for implementing the control arm 7. An electric drive 14 with drive shaft 14a, which can be arranged at or in the mounting portion 7c, acts directly or by way of a transmission mechanism on the portion 7b which is in the form of a spindle. The effective lever arm length of the control arm 7 can be altered, preferably shortened by a rotary movement of the spindle, produced by the electric drive 14.

25 **[0026]** Figure 6 shows by way of example the variation in the effective lever arm length of the control arm 7 as a function of the opening angle α of the actuating arm 6. The actuating arm angle α is specified at the abscissa while the effective lever arm length L of the control arm is specified at the ordinate (in %). In a first opening angle range M1 of the actuating arm 6, starting from the completely closed position, the control arm 7 substantially retains its effective lever arm length L, a parallel movement of the flap being made possible. From approximately half the opening angle of the actuating arm α (for example from about 60°) a second pivotal range M2 adjoining the first pivotal range M1 involves a pronounced reduction in the length of the control arm 7, whereby the flap 4 folds greatly beyond the furniture carcass 3. The effective lever arm length L of the control arm 7 can be about 50% of the original effective lever arm length, in the completely open position of the actuating arm 6. It should be noted that in that case, numerous alternative configurations are possible for the person skilled in the art, for implementing the curve configuration.

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[0027] The invention is not limited to the illustrated embodiments but includes or extends to all variants and technical equivalents which can fall within the scope of the accompanying claims. The positional references adopted in the description such as for example up, down, lateral and so forth are related to the figure being directly described and illustrated and upon a change in position are to be appropriately

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transferred to the new position. In the illustrated embodiments, for reasons of simplicity and greater ease of understanding, a control arm 7 which is shortened in the course of the movement travel of the flap 4 and by which the flap 4 is pivotable beyond the furniture carcass 3 in the course of the flap opening progress was shown in each case.

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ÁLLÍTÓSZERKEZET BÚTORDARAB MAGASSÁGÁBAN MOZGATHATÓ AJTÓLAPJÁNAK MOZGATÁSÁHOZ

Szabadalmi igénypontok

1. Bútordarab (3), amely tartalmaz

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- korpuszt (3),
- egy a korpuszhoz (3) képest magasságában mozgatható ajtólapot (4),
- állítószervezetet (5) az ajtólap (4) mozgatásához, melynek van

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- egy a korpuszra (3) rögzített alaptete (5a),
- állítókarja (6) az ajtólap (4) mozgatásához, ahol az állítókar (6) egyrészt az alaptete (5a) csapágytengelyén (A), másrészt egy az ajtólapra (4) rögzített szerelvényrész (9) csapágytengelyén (B) van csapágyazva,
- egy további vezetőkarja (7) az ajtólap (4) mozgatásához, ahol az állítókar (6) mozgatása közben a vezetőkar (7) effektív erőkarhossza (L) változtatható,

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azzal jellemezve, hogy a vezetőkar (7) legalább két része (7a, 7b) van, melyek egymáshoz képest olyan módon mozgathatók, hogy a vezetőkar (7) effektív erőkarhossza (L) az ajtólap mozgatását erő tekintetében segítő állítókar (6) felnyitásakor csökken, ahol az egymáshoz képest mozgatható legalább két rész (7a, 7b) az állítókar (6) felett van elrendezve.

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2. Az 1. igénypont szerinti bútordarab, **azzal jellemezve**, hogy a legalább két rész (7a, 7b) csuklótengellyel (F) van egymással csatlakoztatva, ahol egy további köztes emelőkar (8) van jelen, amely a legalább két rész (7a, 7b) csuklótengelye (F) és az állítókar (6) csuklótengelye (E) között hat.

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3. A 2. igénypont szerinti bútordarab, **azzal jellemezve**, hogy a köztes emelőkar (8) csuklótengelye (E) az állítókaron (6) az állítókar (6) két csapágytengelye (A, B) között nagyjából középen lévő tartományban van elrendezve.

4. Az 1. igénypont szerinti bútordarab, **azzal jellemezve**, hogy a legalább két rész (7a, 7b) relatív helyzete hajtószervezettel, előnyösen villamos hajtással (14) változtatható.

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5. A 4. igénypont szerinti bútordarab, **azzal jellemezve**, hogy a villamos hajtás (14) közlőmű révén a legalább két rész (7a, 7b) relatív helyzetének állítását váltja ki.

6. Az 5. igénypont szerinti bútordarab, **azzal jellemezve**, hogy az közlőmű orsóhajtást tartalmaz.

7. A 4-6. igénypontok bármelyike szerinti bútordarab, **azzal jellemezve**, hogy egy az állítókar (6) szöghelyzetének rögzítésére alkalmas eszköze (13) van, ahol a két rész (7a, 7b) állításához a villamos hajtás (14) az állítókar (6) tekintett szöghelyzetétől függően vezérelhető.

8. Az 1-7. igénypontok bármelyike szerinti bútordarab, **azzal jellemezve**, hogy a vezetőkar (7) effektív erőkarhossza az állítókar (6) egy a zárt helyzethez csatlakozó első nyitási szögtartományában (M1) kevesebbet változik, mint egy ahhoz csatlakozó, az állítókar (6) teljesen nyitott helyzetéig tartó második nyitási szögtartományában (M2).

5 9. Az 1-8. igénypontok bármelyike szerinti bútordarab, **azzal jellemezve**, hogy a vezetőkarnak (7) testoldali csapágytengelye (C) van, amely a korpusz (3) lényegében legfelső tartományában és a korpusz (3) elülső oldali tartományában van.

10. Az 1-9. igénypontok bármelyike szerinti bútordarab, **azzal jellemezve**, hogy a vezetőkarnak (7) ajtólapoldali csapágytengelye (D) van, amely az ajtólap (4) szerelvényrészén (9) van elrendezve.

10 11. A 10. igénypont szerinti bútordarab, **azzal jellemezve**, hogy az állítókar (6) nyitó mozgása közben a vezetőkar (7) testoldali csapágytengelye (C) és a vezetőkar ajtólapoldali csapágytengelye (D) közötti relatív távolság (S) csökkenthető.

12. A 10. vagy a 11. igénypont szerinti bútordarab, **azzal jellemezve**, hogy a vezetőkar (7) testoldali csapágytengelye (C) és ajtólapoldali csapágytengelye (D) az állítókar (6) ajtólapoldali csapágytengelyével (A) és ajtólapoldali csapágytengelyével (B) csuklónégyszöget képez.

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13. Az 1-12. igénypontok bármelyike szerinti bútordarab, **azzal jellemezve**, hogy a vezetőkar (7) rövidülése egy első elfordulási tartományhoz (M1) csatlakozó második elfordulási tartományban (M2) egy lényegében az állítókar (6) hosszának megfelelő hosszról indul olyan módon, hogy az ajtólap (4) az első elfordulási tartományban (M1) önmagával párhuzamosan van megvezetve.

Fig. 1

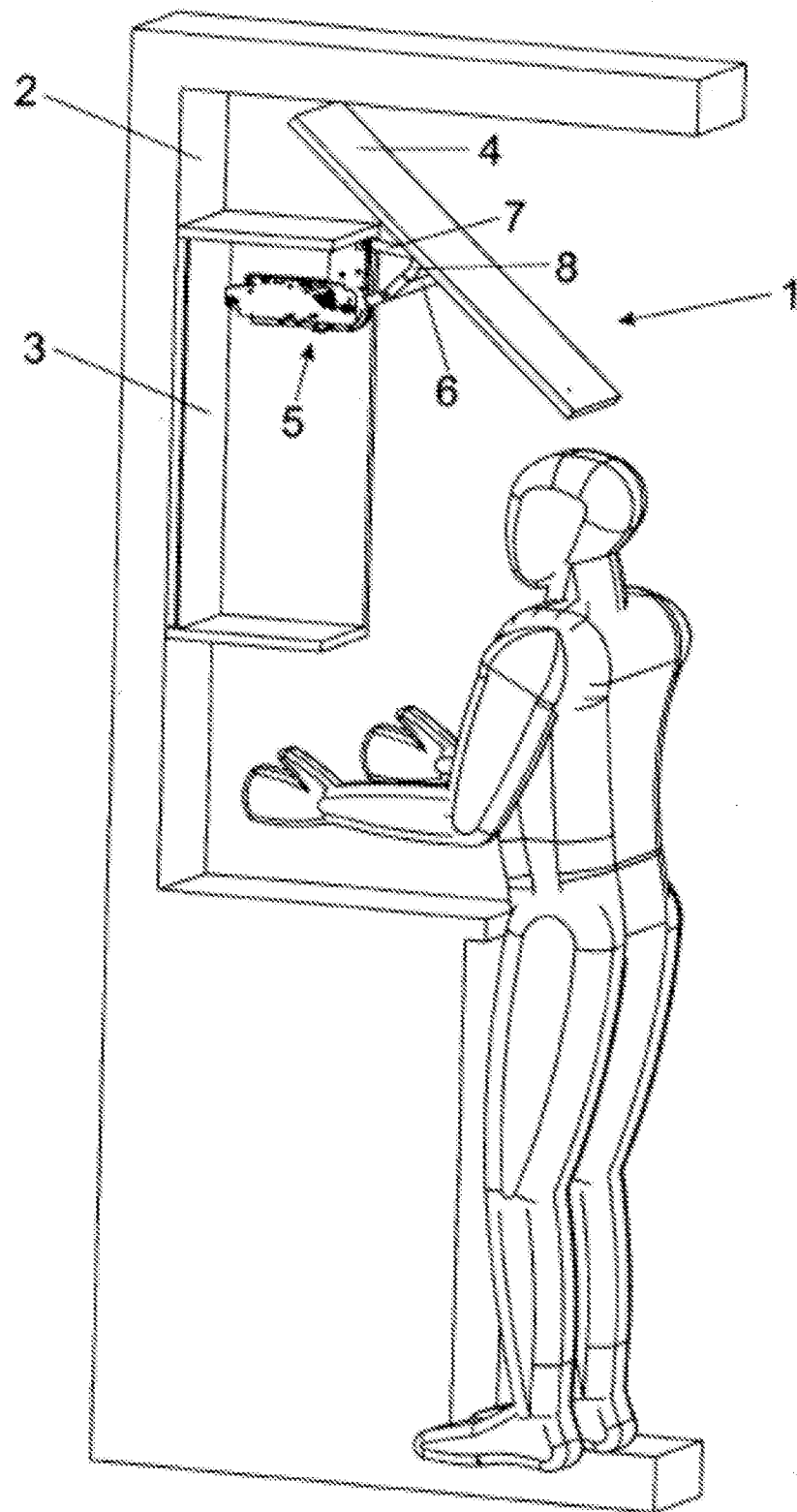


Fig. 2

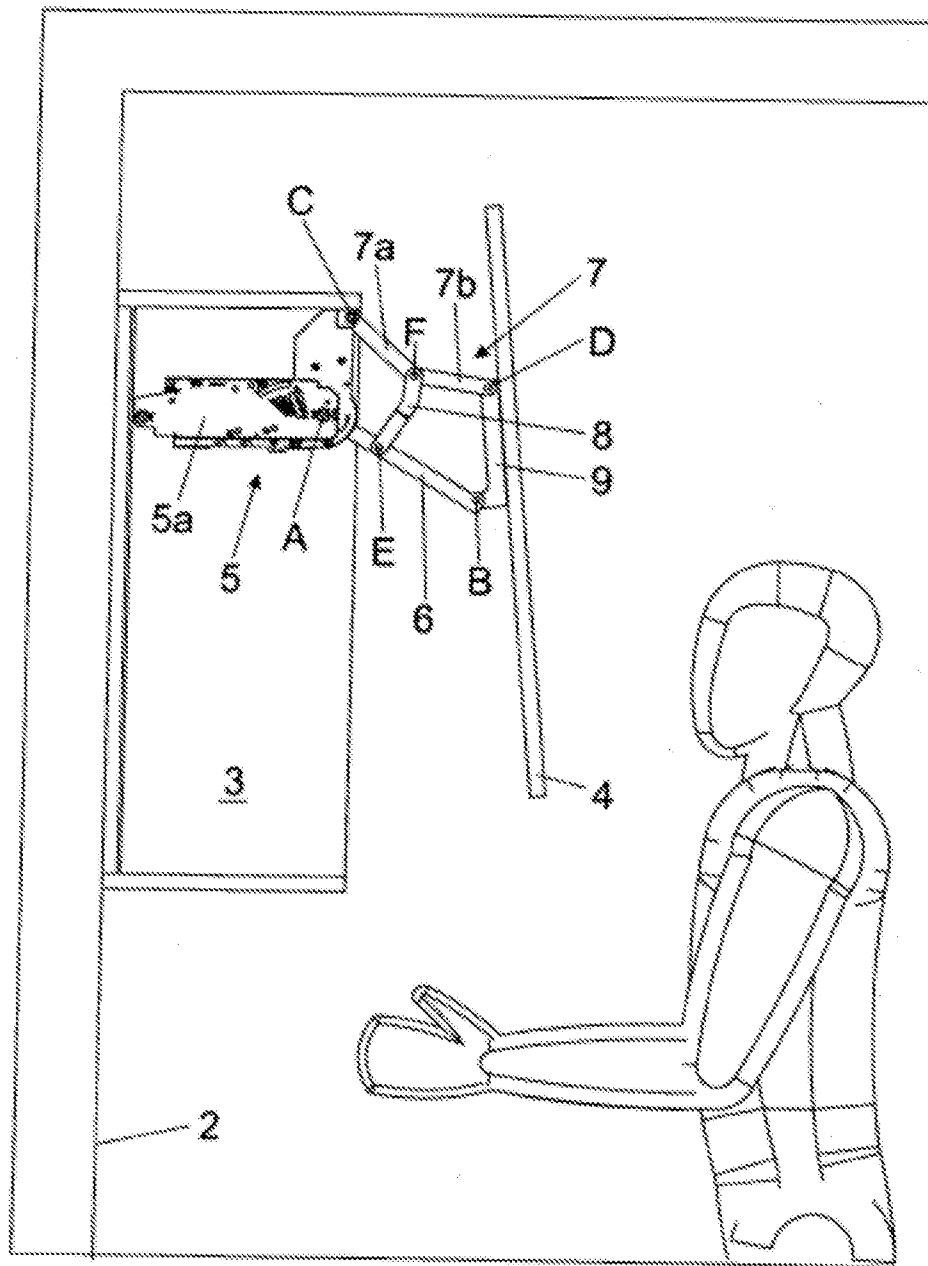


Fig. 3a

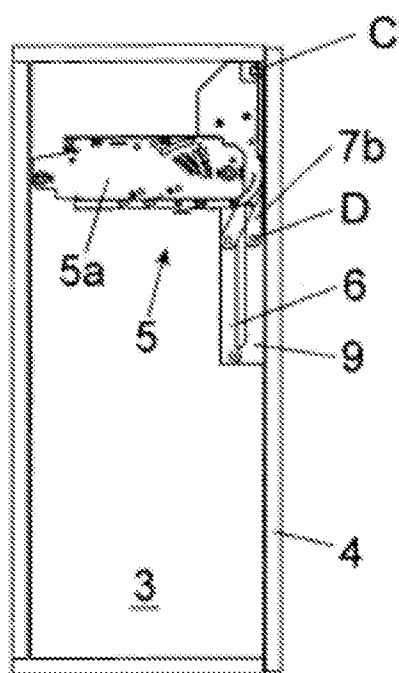


Fig. 3b

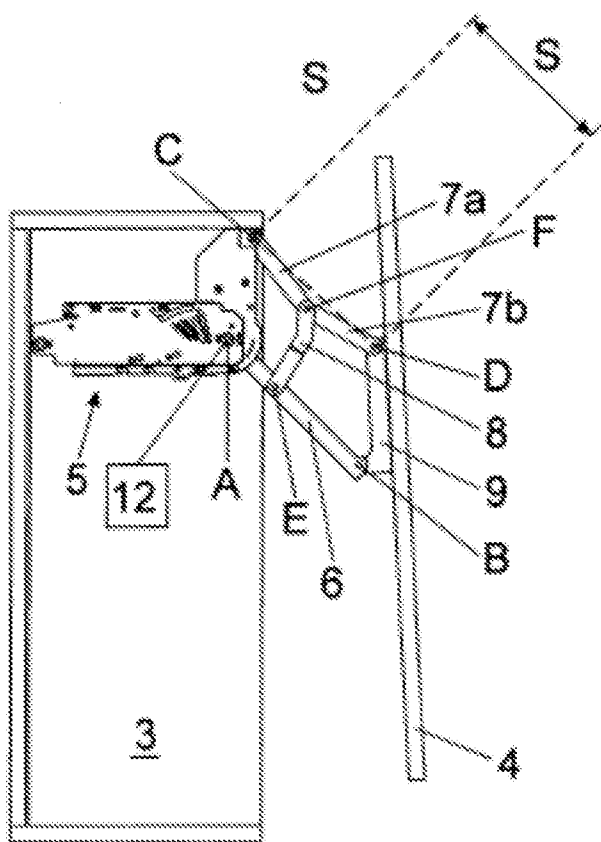


Fig. 3c

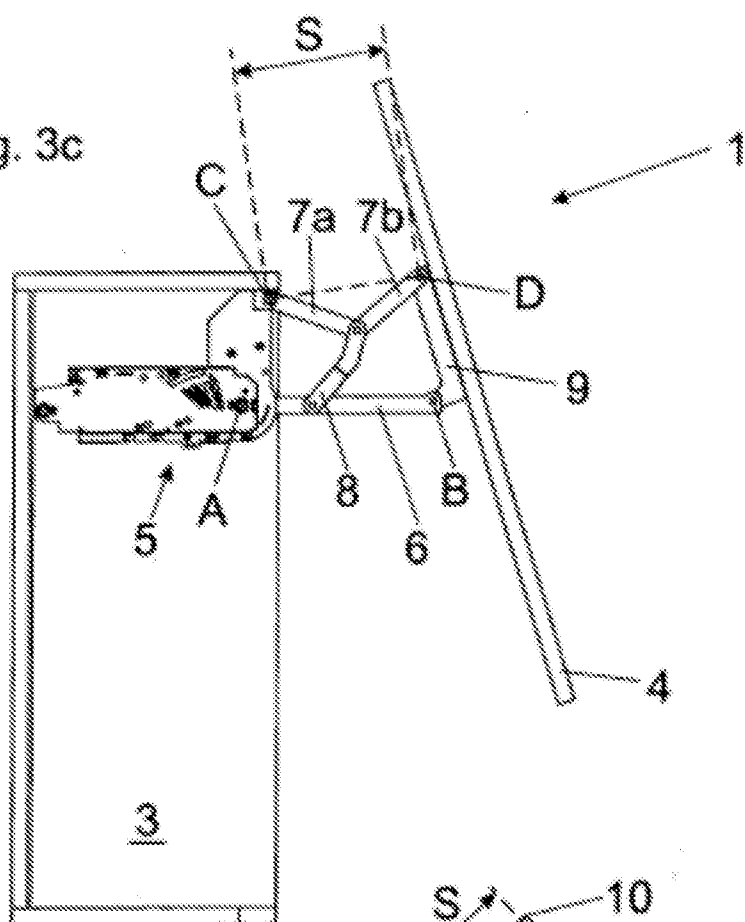


Fig. 3d

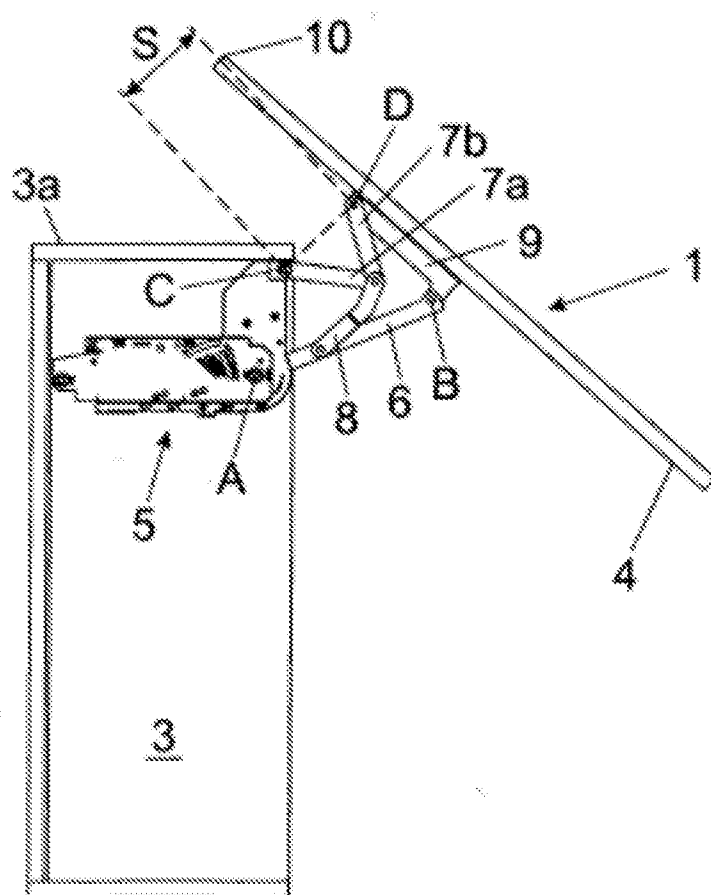


Fig. 4a

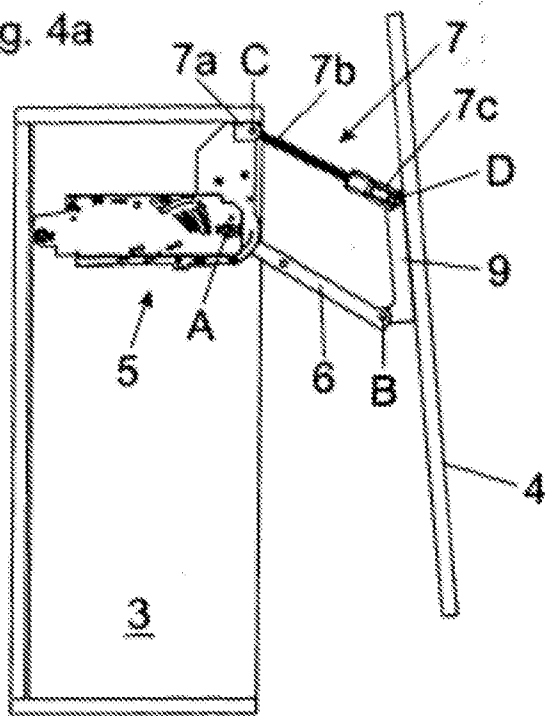


Fig. 4c

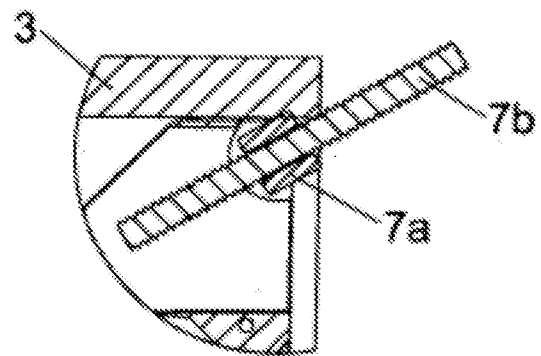


Fig. 4b

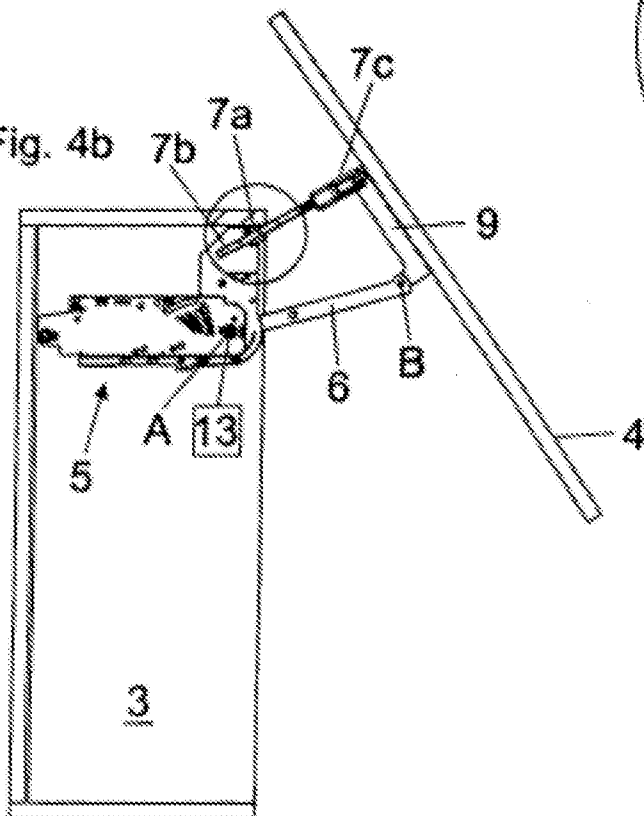


Fig. 5

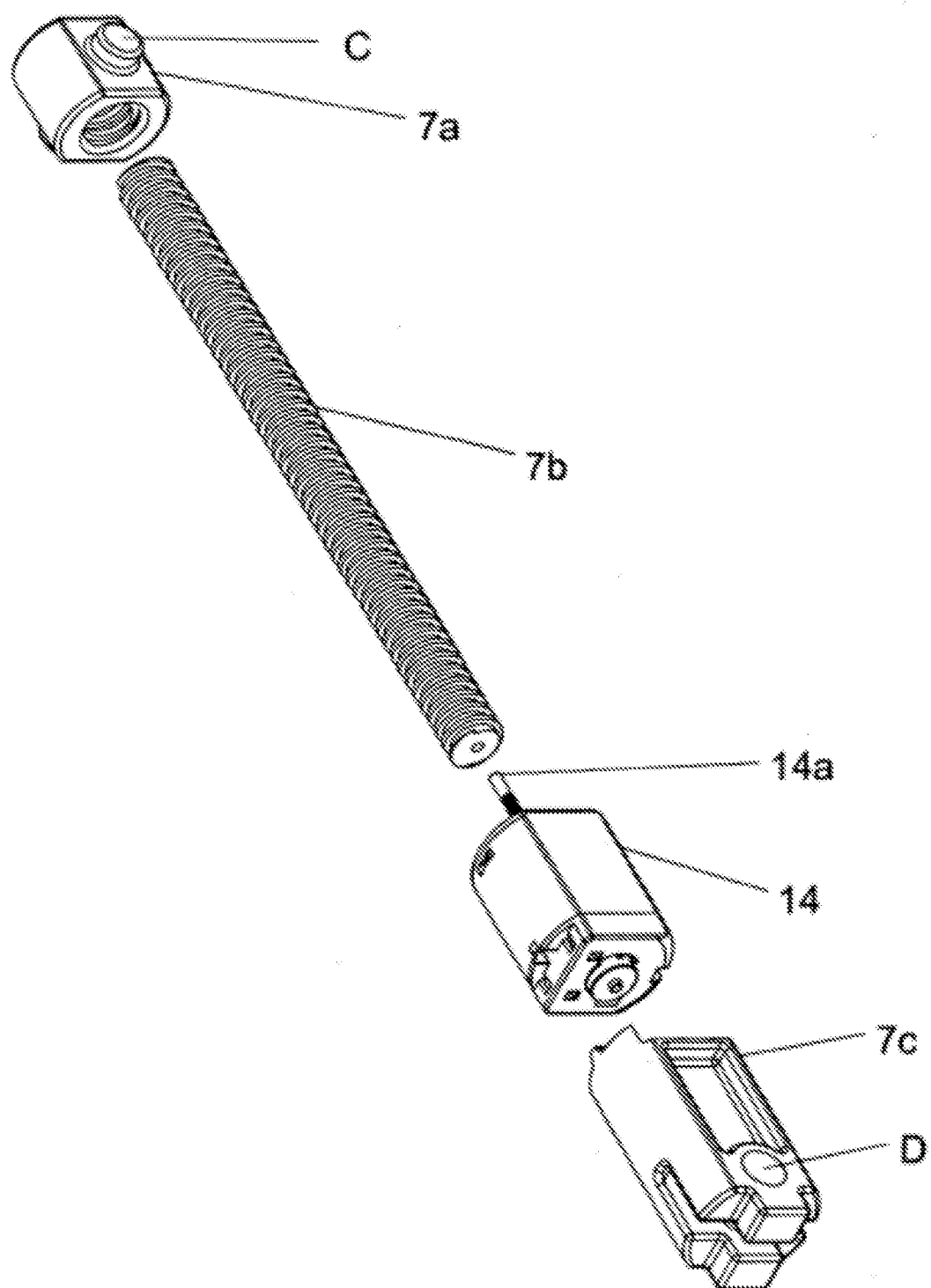


Fig. 6

