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(54) **A pivot hinge and a pivot window**

(57) The invention relates to a pivot hinge (1) with a first part (2) intended to be secured to a substantially stationary first member (20) and a second part (3) intended to be secured to a second member (30), the second hinge part being pivotable in relation to the first hinge part about a hinge axis (5). A connecting piece (4) is provided, where a first end (41) of the connecting piece is attached to the second hinge part and a second end (43) comprises means (44,45) for securing the connecting piece to the second member. The second end is arranged at a distance from the second hinge part seen in parallel with the hinge axis. The hinge may be used in a pivot window (10) with a sash (30) and a frame (20), where the sash may be turned in relation to the frame about the hinge axis (5). The hinge is secured to the surface of the frame member facing away from the sash member or in a recess (7) formed in an upper surface of the frame side member and the sash hinge part is connected to the sash side member via the connecting piece (4) spanning at least a part (25) of the frame member.

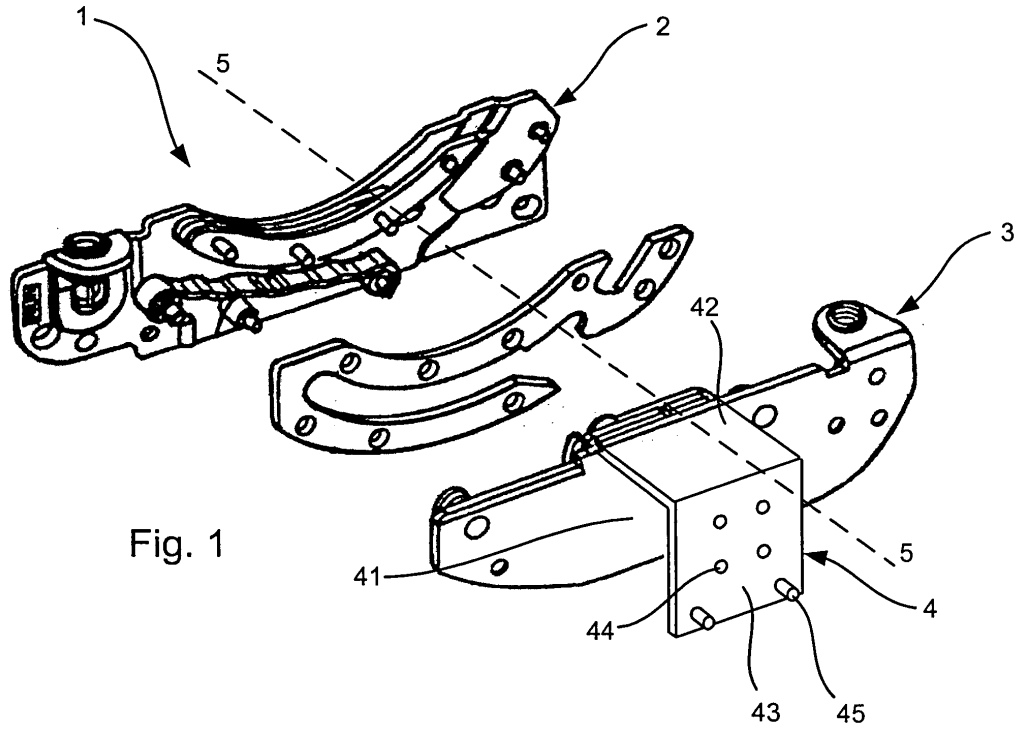

Fig. 1

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Description

[0001] The present invention relates to a pivot hinge comprising a first part intended to be secured to a substantially stationary first member and a second part intended to be secured to a second member, the second hinge part being pivotable in relation to the first hinge part about a hinge axis. The invention further relates to a window comprising such a hinge.

[0002] Hinges of this kind are known from numerous publications such as FR-B-833752 and GB-B-647006 describing windows, where a frame member corresponds to the first member and a sash member to the second member. These hinges consist of two hinge parts, which are attached directly to the surface of the first and second member, respectively, so that the two hinge parts face each other. The hinge is thus arranged between the two members, one or both of which may be provided with recesses for housing the hinge. Such a construction makes the mounting of the hinge straight forward and ensures a good and reliable connection between the two members. Therefore, the resources spend on developing new hinges have been concentrated on optimising the interaction between the hinge parts, whereas alternative locations of the hinge within the construction have been more or less ignored.

[0003] As the insulating properties of modern windows have become better and better, even minor improvements have become of interest to design engineers. A lot of attention has been directed to the design of gaskets, isolating collars, frames and sashes, but as mentioned above the overall structure and location of the hinges have remained largely same for the last 30 years.

[0004] It is therefore the object of the present invention to provide a hinge, which may be used to optimise the insulating properties of a window structure.

[0005] This object is achieved with a hinge comprising a connecting piece, where a first end of the connecting piece is attached to the second hinge part and a second end comprises means for securing the connecting piece to the second member, said second end being arranged at a distance from the second hinge part seen in parallel with the hinge axis. The main hinge body constituted by the two hinge parts may thus be arranged on the opposite side of the first member, typically a frame ember, in relation to the second member, typically a sash member, the connecting piece spanning the width of the first member. When used in a window, the main hinge body, which is normally made primarily from metal having a high thermal conductivity, is thus arranged on the colder side of the frame member, whereby a thermal bridge is avoided as will later be explained in more detail. A further advantage is, that the first member shields the hinge from external exposure and makes the hinge virtually invisible when seen form the side of the second member towards first member, i.e. from the inside of the building when using the hinge in a roof window.

[0006] Instead, the hinge may be arranged in a recess in the first or frame member, which leads to the further advantages that the hinge is shielded from both sides and that the connecting piece need not be as long. Based on thermal consideration the recess should, however, be located as far towards the colder side of the first member as possible.

[0007] The securing means may simply be holes for the passage of nails or screws, but other means such as punched out teeth may also be used.

[0008] Formerly the use of a connecting piece of this kind would have been considered a disadvantage as the construction would have been considered to vulnerable to e.g. excessive moments. It has however been found, that by forming the connecting piece appropriately, this is not the case. In one preferred embodiment the connecting piece is made from a sheet or plate material, which is bent into shape, preferably of steel. The plate shape gives the connecting piece a relatively high resistance to bending and torsion but still allows it to be fitted into a window construction without causing much expansion of the overall size of the structure. In addition, using a plate shaped material, the connecting piece may follow the surfaces of the frame member, the bending lines of the piece being substantially parallel to the length axis of the frame member. This configuration minimises the space needed for the connecting piece between the frame and the cladding members used to shield the window from the weather in the mounted state. Any material including composites may in principle be used for the connecting piece as long as it possesses sufficient strength and stiffness to carry the weight of the window and absorb the moments occurring during opening and closing of the window. Steel conforming to European standard DIN EN 10140 is preferred as it is also weather resistant, readily available and well-proven.

[0009] The connecting piece may be formed as an integral part of the second hinge part by bending, folding, compression moulding or the like or may be secured thereto by means of bolted or riveted joints, by welding or even by gluing. The only requirement is, that the hinge unit is able to take the loads and moment occurring during operation of second member e.g. a window sash.

[0010] The shape of the connecting piece depends on the construction in which it is to be used, but for use with pivot windows it is preferred, that the connecting piece and a main hinge body constituted by the first and second hinge parts forms a unit with the overall shape of an L or a U, at least a portion of the connecting piece being substantially parallel to the hinge axis. The main hinge body constituting one leg may then be arranged on the side of or in a recess in the first or frame member, while the connecting piece spans the frame and is secured to the sash by suitable fasteners such as screws. If the L shaped connecting piece is used, it is attached to the upper surface of the sash member, which is substantially parallel to the hinge axis, and if the U shaped connecting piece is used, the second leg projects into the space between the first and second or frame and sash members.

The latter embodiments will often be preferable, as the securing of the connecting piece is then hidden by the two members.

[0011] Seen from a purely aesthetic point of view the length of the connecting piece is immaterial as long as the main hinge body may be hidden, but as indicated above the thermal considerations may require the hinge to be located as far from the second member as possible. The connecting piece should therefore span a distance corresponding to at least 1/5 of the width of the first member, and preferably approximately half of the width of the first member. As the first member will rarely be entirely rectangular it is to be understood, that the phrase "width of the first member" is related to the overall width at the side facing the connecting piece and that the dimensions given for the distances spanned by the connecting piece are only to be considered as rough indications of size.

[0012] The invention will now be described wit reference to the accompanying drawing in which:

Fig. 1 shows a hinge according to the invention,
Fig. 2 a partial cross section of a window with a recess for receiving such a hinge,
Fig. 3 a cross section corresponding to the one in Fig. 2 but marked with isotherms, and
Fig. 4 a window with such a hinge seen from below in the opened state.

[0013] The hinge 1 in fig. 1 comprises three primary portions namely the first hinge part 2, the second hinge part 3 and the connecting piece 4, where the connecting piece secured to the sash hinge part by means of rivets.

[0014] The second hinge part is pivotable in relation to the first hinge part about a hinge axis 5. As the hinge shown is a pivot hinge intended for roof windows the hinge axis is located somewhat above the hinge parts, but the hinge may also be designed with other locations of the hinge axis.

[0015] The connecting piece 4 and the second hinge part constitute a unit having the shape of an inverted U, with a first leg 41 formed by the second hinge part 3, a centre 42 intended to span a surface of one of the members to be connected by means of the hinge, and a second leg 43 is intended for connection with the other of the members to be connected. In this embodiment the second leg is provided with holes 44 for the passage of nails or screws and with a pair of pins 45 intended to fit into corresponding holes in the member to which it is to be secured. Alternatively the connecting piece may in itself be U-shaped (not shown) with its first leg attached to the second hinge part by means of rivet, welding or the like, or the unit may be L-shaped having no second leg, the securing means 44, 45 being provided on the centre 42, which may then be somewhat prolonged.

[0016] In Fig. 2 the hinge is used in a window with a frame 20 constituting a first stationary member and a sash 30 constituting a second member, which is pivotable in relation to the first member. The frame consists of a wooden profile 21 and a steel profile 22, and the hinge main body 23 constituted by the first and second hinge parts 2, 3 is arranged in a recess 7 the steel profile. The connecting piece 4 spans the width of the wooden top surface 25 and connects the second hinge part 3 to the sash 30. In the following the second hinge part will therefore be denoted as the sash hinge part and the first hinge part will be denoted the frame hinge part.

[0017] The plate shape of the connecting piece 4 allows the hinge to be bent into a shape corresponding to the shape of the frame 20. In addition the plate shaped connecting piece takes up only little room and the cladding 6 is therefore only insignificantly more bulky than those used with windows with prior art hinges.

[0018] The steel profile 22 may extend over the entire length (not shown) of the frame member adding strength and rigidity to the frame member 21, or may be a local element providing only the pocket or recess needed for the hinge. Alternatively the steel profile may be left out all together, the frame member being a traditional wooden profile with a milled recess, or the frame member may consist of three or more different components, for example by supplementing the steel and wooden profiles of Fig. 2 with one of an insulating material. Composite materials and materials such as plastic or aluminium may also be used.

[0019] In Fig. 2 the steel profile is shown as constituting approximately half the width of the top of the frame member 21 and being arranged to the far right. It is, however, to be understood, that recess for receiving the hinge may also be arranged e.g. centrally in the frame member and that in may constitute a different percentage of the total width of the frame member.

[0020] Fig. 3 shows the same cross section described above but with isotherms 81-86 added. Prior art hinges are typically arranged as indicated by the broken line 87, crossing several isotherms 81-84 and thus having the effect of a thermal bridge. On the contrary, as may be readily seen, the hinge of the present invention is located further away from the warm side of the structure affecting in substance only the outmost isotherms 81,82. From a thermal point of view the hinge should consequently be located as far away from the sash as possible.

[0021] An entire window 10 is shown in Fig. 4 in an open state. The frame members 201,202 of this window is made of wooden profiles with milled recesses 7 for the hinges. The left hinge 1 are visible from this angle, but both hinges are is invisible from the inside, even when the window is turned 180° during cleaning. This is not only an aesthetical advantage, it also minimizes the risk of clothing or the like getting caught in the hinge and protects the hinge from any detergents used.

[0022] In the above, the hinge has been described as used with a centre hung pivot window. It is, however, to be understood, that it may also be used with windows having its hinge axis elsewhere such as midway between the centre and the top and with other structures functioning in a likely manner, without thereby departing from the

scope of the claims. The hinge may for example be used with rescue openings, where the displacement will allow the hinges to be thermally protected from the heat of fire. Likewise,

Claims

1. A pivot hinge (1) comprising a first part (2) intended to be secured to a substantially stationary first member (20) and a second part (3) intended to be secured to a second member (30), the second hinge part being pivotable in relation to the first hinge part about a hinge axis (5), **characterized in that** it comprises a connecting piece (4), where a first end of the connecting piece is attached to the second hinge part and a second end (43) comprises means (44,45) for securing the connecting piece to the second member, said second end being arranged at a distance from the second hinge part seen in parallel with the hinge axis.

2. A pivot hinge according to claim 1, **characterized in that** the connecting piece (4) is made from a sheet or plate material, which is bent into shape, preferably of steel.

3. A pivot hinge according to claim 1 or 2, **characterized in that** the connecting piece (4) is formed as an integral part of the second hinge part (3) by bending, folding, compression moulding or the like or that it is secured thereto by means of bolted or riveted joints, welding, gluing or the like.

4. A pivot hinge according to any of the claims 1-3, **characterized in that** the connecting piece (4) and a main hinge body (23) constituted by the first and second hinge parts (2,3) form a unit with the overall shape of an L or a U, at least a portion of the connecting piece being substantially parallel to the hinge axis (5).

5. A pivot window (10) with a pair of hinges (1) for connecting a sash (30) and a frame (20), the sash and frame each comprising two side members (201,202; 301,302), a top member (203;303) and a bottom member (204;304), and each surrounding a substantially rectangular opening (205;305), and where the sash may be turned in relation to the frame about a hinge axis (5), which is parallel to the top and bottom members, each of said hinges comprising a sash hinge part (3) secured to a side sash member and a frame hinge part (2) secured to the corresponding side frame member, **characterized in that** the hinge is secured to the surface of the frame member facing away from the sash member or in a recess (7) formed in an upper surface of the frame side member, where the side facing the surrounded opening is substantially unaffected by the recess, and that the sash hinge part is connected to the sash side member via a connecting piece (4) spanning at least a part (25) of the frame member substantially crosswise to the longitudinal direction of the frame member.

6. A window according to claim 5, **characterized in that** the connecting piece (4) and a main hinge body (23) constituted by the frame and sash hinge parts (2,3) constitute a substantially U shaped unit, where a first leg of the U including or constituted by the sash hinge part is substantially perpendicular to the hinge axis (5) and projects into the recess (7) or along the surface (206) of the frame facing away from the surrounded opening (205), where the centre (42) of the U is substantially parallel to the hinge axis and spans a part (25) of the frame member, and where a second leg (43) of the U is secured to the sash (20), the centre and second leg being formed by the connecting piece.

7. A window according to claim 5, **characterized in that** the connecting piece (4) and the sash part (3) of the hinge constitutes a substantially L shaped unit, where a first leg of the L including or constituted by the sash hinge part projects into the recess (7) or along the surface (206) of the frame (20) facing away from the surrounded opening (205), and where a second leg of the L formed by the connecting piece is secured to the sash (30) and is substantially parallel to the hinge axis (5).

8. A window according to any of the claims 5-7, **characterized in that** the connecting piece (4) is made from a sheet or plate material, preferably of steel.

9. A window according to any of the claims 5-8, **characterized in that** the recess (7) is milled in a substantially solid part of a wooden frame side member.

10. A window according to any of the claims 5-9, **characterized in that** each frame side member (201,202) comprises a metal or plastic profile (22) having a depression or pocket (7) constituting the recess.

11. A window according to any of the claims 5-10, **characterized in that** the distance between sash hinge part (3) and the sash side member (301,302) as seen along the hinge axis (5) is at least 1/5 of the width of the frame side member (201,202), preferably approximately half of the width of the frame side member.

12. A window according to any of the claims 5-11, **characterized in that** the recess (7) housing the frame hinge part (2) is formed in the outer surface (206) of the frame side member (201,202) facing away from

the surrounded opening (205).

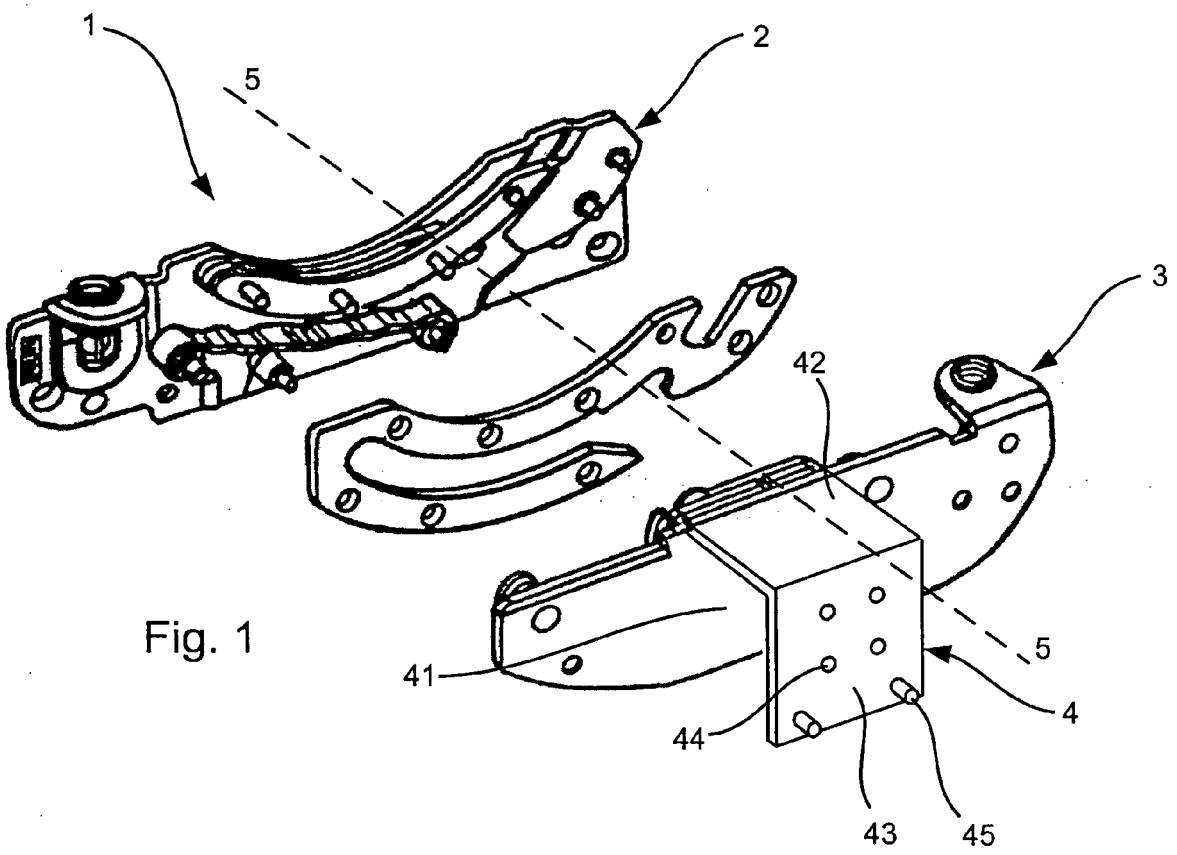

Fig. 1

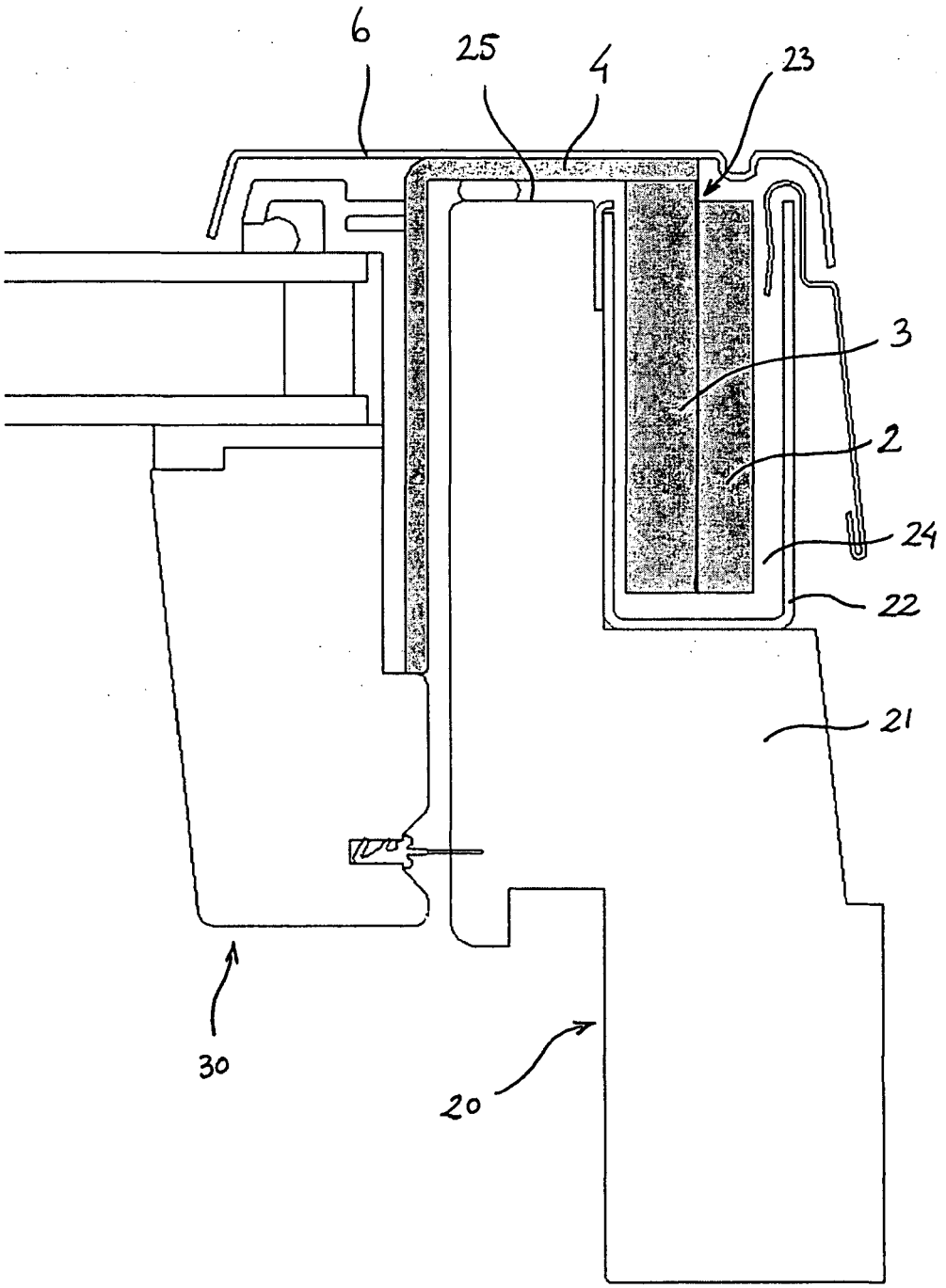

Fig. 2

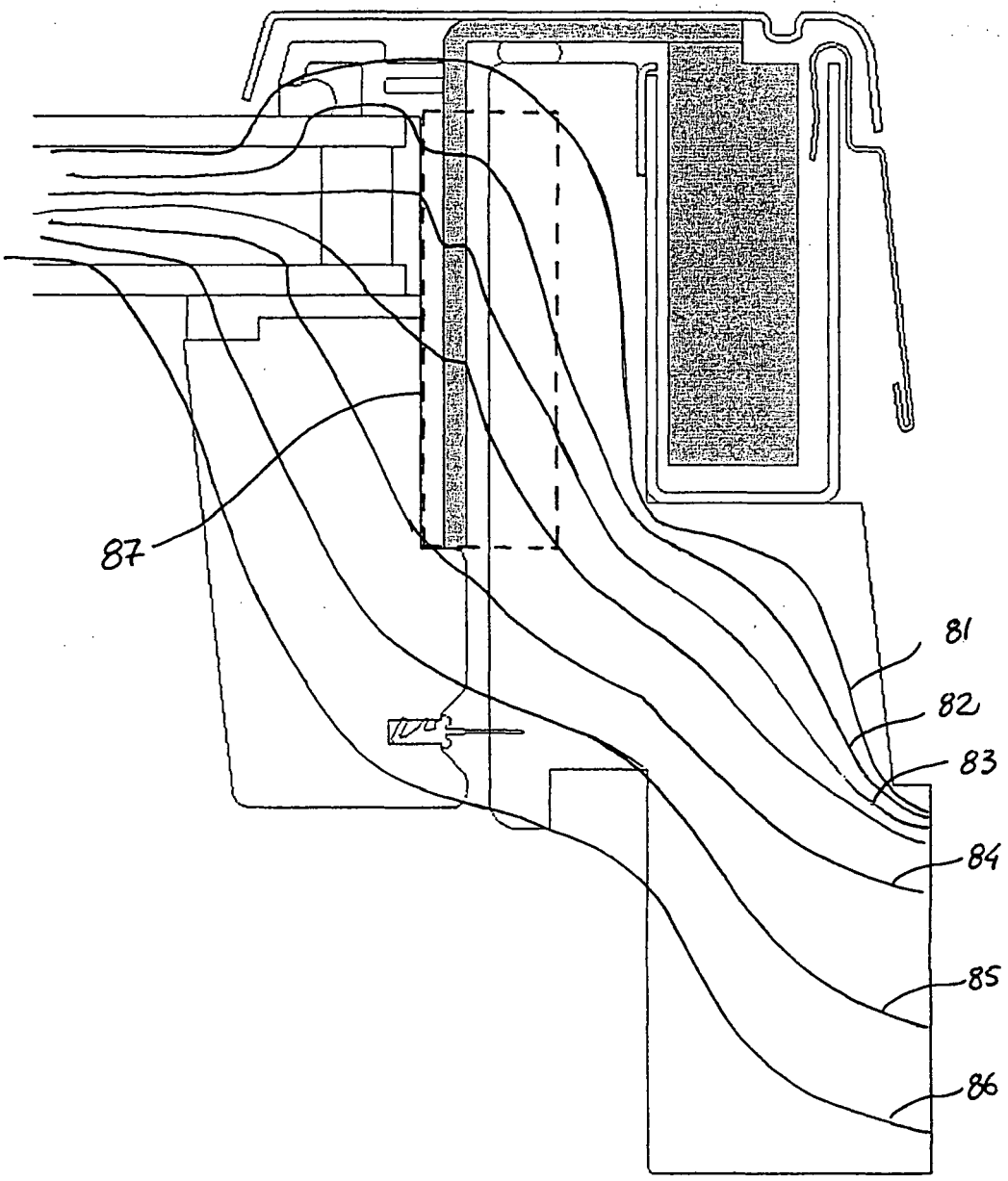

Fig. 3

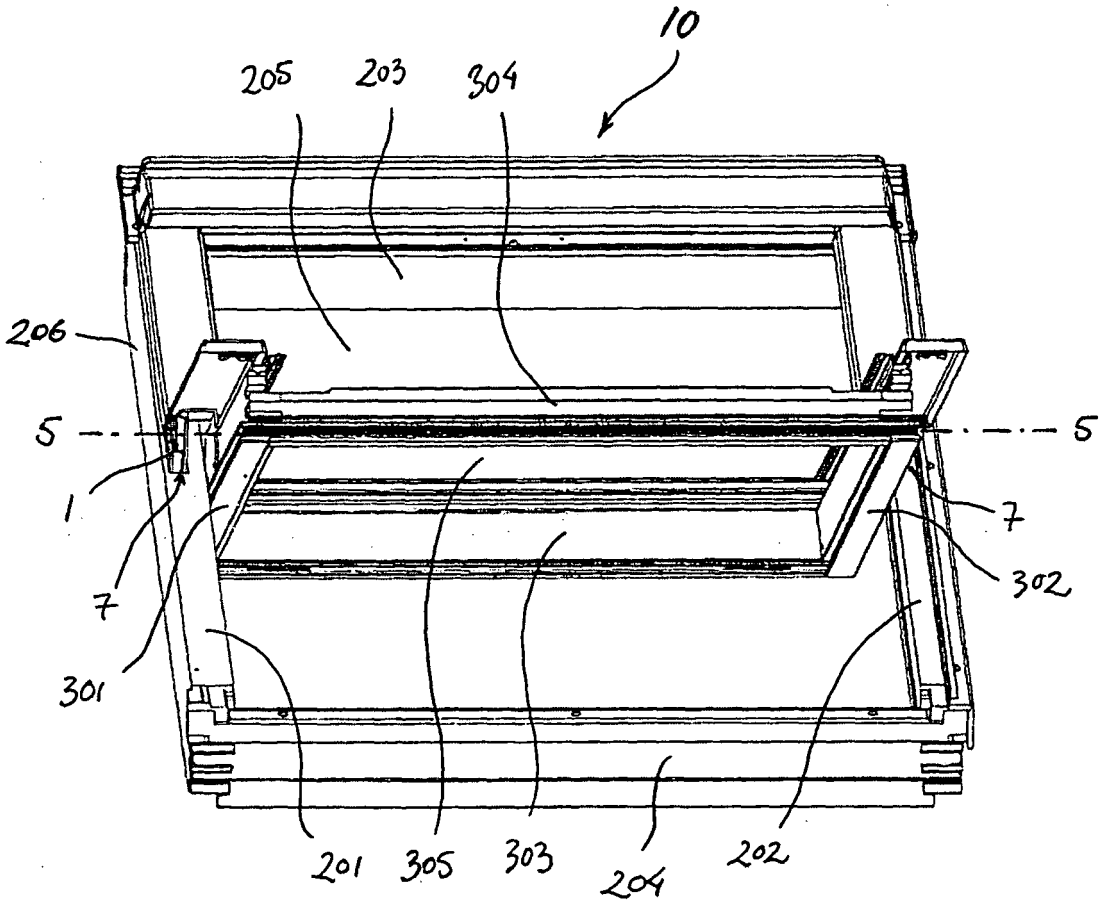

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 05 38 8076

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	19 January 2006	Mund, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 38 8076

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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