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## EUROPEAN PATENT SPECIFICATION

45 Date of publication of patent specification :  
**08.06.94 Bulletin 94/23**

51 Int. Cl.<sup>5</sup> : **E05D 15/52**

21 Application number : **91830391.8**

22 Date of filing : **25.09.91**

54 **A hinge for tilt-and-turn window fixtures.**

30 Priority : **25.09.90 IT 366390**

43 Date of publication of application :  
**01.04.92 Bulletin 92/14**

45 Publication of the grant of the patent :  
**08.06.94 Bulletin 94/23**

84 Designated Contracting States :  
**DE ES FR**

56 References cited :  
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**FR-A- 1 129 206**  
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**EP 0 478 519 B1**

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## Description

The present invention relates to a hinge assembly for tilt-and-turn type fixtures.

In tilt-and-turn windows, i.e., windows featuring a sash hung on side and bottom combination hinges, the most delicate part of the construction is that of the actual hinge assembly which allows the sash to rotate about two mutually perpendicular axes. Currently, the design of hinge assembly most widely fitted to fixtures of this type makes use of two components, one associated with the moving sash and the other with the fixed surround; the moving hinge component, i.e. the part associated with the sash, has a projecting lug or pivot at bottom, whilst the remaining component affords a cradle-like seating of ellipsoid geometry accommodating the pivot.

These hinges betray many drawbacks: first, the fact that sockets must be cut in the metal sections used in construction of the window in order to house the fixing brackets of the hinge components; secondly, the fact that such hinges are not effraction-proof.

In effect, the pivot rests freely in its cradle, and can be unseated simply by lifting the sash from the exterior.

A further drawback besetting this type of hinge is that of its limited strength. This stems from the fact that the point of articulation between the two components coincides with the projecting end of the pivot afforded by the moving hinge component, which is thus exposed to potentially damaging stresses; likewise the seating of the fixed component, which undergoes stress centred essentially on one point. Another type of assembly, designed to overcome such drawbacks, comprises a double hinge consisting in two bracket elements associated with the sash and the surround, and a pivot embodied with two shanks set at right angles one to another. The two shanks of the pivot are inserted into the bracket elements in conjunction with friction locking means, in such a manner that the sash can be rotated vertically about the one shank (turn) or horizontally about the other (tilt), according to the mode of use.

The friction locking means serve to restrain the open sash in a selected intermediate position, thereby countering the effect of wind or draught. In practice however, this type of hinge presents a number of drawbacks not least by reason of the fact that the friction lock requires a special type of construction to disallow its separation following continued movement of the sash.

Major drawbacks are also encountered at the moment of assembling the sash, due to the close tolerances which have to be maintained in construction, and to the fact that the final hanging operation involves locating the vertical shank of the right angle pivot in the relative bracket element while holding the sash steady; the sash is often of considerable dimen-

sions, so that alignment of the pivots is not readily achieved. This particular drawback becomes still more evident in the event that the sash needs to be removed for maintenance or repairs.

Another drawback consists in the fact that newer sections used in construction incorporate a lip, serving to carry a seal, which projects vertically into the window light from the fixed surround and therefore dictates a more elevated position of the tilt pivot, with the result that the tilt manoeuvre to open the sash can occasion interference between the bottom edge of the sash and the lip, thereby restricting the hinge assembly operationally, or at all events limiting the tilt angle of the sash.

A further other type of assembly, as proposed for instance in the Swiss Patent CH-A-563516, which corresponds to the preamble of claim 1, comprises a hinge with a vertical element encompassed by the fixed frame in which is pivoting a plate associated with a bracket element. The bracket element permit the turning of the sash frame while the tilting is obtained by the sliding of two matching concave and convex arched profiles positioned in the bottom end of the vertical element and of the plate and however internally the plate. In this assembly the limiting of the pivoting movement during the tilting is realized by two crossing arms acting on the top of the fixed and the sash frame. Besides, the left-hand and right-hand windows require different designed elements. Therefore this assembly is quite complicated and expensive.

Accordingly, the object of the present invention is to overcome the drawbacks mentioned above though the provision of a tilt-and-turn hinge that is both economical and practical, and safe and speedy in fitment and operation.

A further object of the invention is to provide a hinge assembly of which the functional capacity, in terms of obtainable tilt angle, can be guaranteed without modification of the edge or lip profiles of the section used in construction of the fixture. The stated objects are realized in a hinge for tilt-and-turn window fixtures as characterized in claim 1.

The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

- fig 1 is an exploded view of the hinge assembly according to the present invention;
- fig 2 is a side elevation showing the hinge fitted to a tilt-and-turn fixture, in which certain parts are omitted better to reveal others;
- fig 3 shows the hinge of fig 2 in plan from above, with certain parts omitted better to reveal others. With reference to the drawings, a hinge according to the invention for a tilt-and-turn type fixture essentially comprises: a box element 1 associated with the fixed surround frame 2, a vertical plate 4 associated with the

sash frame 3, and bearing means denoted 7 by which the plate is slidably supported. More exactly, the box element 1 is insertable into the relative upright member of the fixed surround frame 2, vertically disposed, and stably retained by the section in a suitable channel moulding 14; the face of the box element 1 directed toward the sash frame 3 affords a longitudinal housing 1a internally of which the plate 4 is accommodated to a loose fit.

The vertically disposed plate 4 is concavely arched at both the bottom end 4a and the top end 4c, hence reversible for assembly purposes, and associated rigidly and at right angles with a bracket element denoted 5 designed for fitment to the sash 3, which carries the pin 16 of the bottom vertical hinge.

4b denotes a socket located centrally in the plate, through which coupling means 6 are insertable to the end of linking the plate and the box element 1. In the example illustrated, such coupling means 6 consist in a bolt 11 passing transversely through and screwed into the box element 1, which affords a corresponding through hole 12 set into each flank for this very purpose (see fig 1); the bolt 11 is designed to assume a stable position, on completion of the assembly operation (fig 3), in which the innermost screw end engages frontally in contact with the channel 14 of the fixed surround frame 2.

Thus, the box element 1 remains coupled to the plate 4 and secured to the fixed surround frame 2. The same bolt 11 also serves as a pin by means of which to steady the plate 4 and limit its rotation; accordingly, the socket 4b exhibits a profile such as will allow the plate to rock between an at-rest or non-operative position (bold line of fig 2), in which the axes of the plate 4 and the box element 1 are mutually parallel, and an operative position (phantom line of fig 2) in which the plate 4 is angled in relation to the box element 1, in effect, when the sash 3 is tilted open. Naturally enough, the socket 4b will be of symmetrical geometry, for example presenting a substantially trilobed outline as in the example illustrated, so as to enable left or right hand fitment of the plate 4.

The bearing means 7 aforementioned, which exhibit a convexly arched profile, are associated with the bottom end 1b of the box element 1 and positioned to interact with the corresponding concavely arched profile of the plate 4, in this instance the end denoted 4a, in such a way as to allow rotation of the plate back and forth between the operative and the non-operative position with the two matching arched profiles sliding in mutual contact.

More exactly, such bearing means 7 consist in an appendage 8 rigidly associated with and projecting at right angles from the bottom end 1b of the box element 1, of which the upwardly directed surface is profiled to match and breast with the surface afforded by the bottom end 4a of the plate 4; the downwardly di-

rected side of the appendage affords a recess 9 positioned to accommodate a corresponding lip 10 of the fixed surround 2, against which the appendage is ultimately locked in place.

Adopting a hinge thus embodied, the final operation in assembly of the fixture is accomplished simply by inserting and securing the box elements 1 in the relative uprights of the fixed surround frame 2 and then positioning the plates 4, each with the bottom end 4a resting on the corresponding appendage 8, whereupon the respective bolts 11 can be inserted and tightened. It will be evident that tightening the bolt 11 also has the effect of securing the box element 1 in the channel 14 afforded by the section of the fixed surround frame 2, as aforementioned; finally, the sash frame 3 is fixed to the bracket element 5 by conventional means (not illustrated). The manner in which such a hinge is used requires little explanation, other than to reiterate that in the 'turn' mode, the sash is able to rotate about the vertical axis of the bracket element 5, and in the 'tilt' mode, to rock back and forth by reason of the ability of the plate 4 to rotate, its bottom concavely arched end 4a sliding over the convexly arched appendage 8.

The benefits of a hinge according to the invention are reflected above all in the notable simplicity of its assembly in association with the fixture, inasmuch as the component parts are essentially two only in number, i.e. the box element and the plate. Thanks to the particular geometry of the plate, moreover, the hinge affords considerable strength in everyday use, in both tilt and turn modes, as well as ensuring a smooth and faultless tilting movement of the sash by reason of the fit between the plate and the box element, whereby the axis of rotation of the sash is displaced almost to the farthest extremity of the sash frame 3, though without affecting the profile of the sections used in construction (see position of lip 10).

At all events, the advantages in question are realized without any need to utilize conventional stays, thanks to the presence of the locking screw internally of the box element.

Last and not least of the advantages which derive from the hinge disclosed is that of the undoubted improvement in appearance of the fixture as a whole when compared with previous embodiments; in effect, the assembly of box element and plate is positioned substantially in its entirety within the fixed surround frame and therefore requires no external modification of the fixture whatever.

## Claims

1. A hinge for tilt-and-turn window fixtures comprising:
  - a vertically disposed first element (1), positively retained and substantially encom-

- passed by the fixed surround frame (2) of the fixture when mounted thereon, of which the face directed toward the moving sash frame (3) of the fixture affords a longitudinal housing (1a);
- a vertical plate (4) having at least one end (4a) shaped to a concavely arched profile, loosely accommodated by the longitudinal housing (1a), which is associated rigidly and substantially at right angles with an axially vertical bracket element (5) secured to the sash frame (3) and carrying the bottom vertical hinge pin (16) of the fixture;
  - means (6) by which the first element (1) and the plate (4) are coupled one to another in such a way as to enable rocking movement between a non-operative position in which the plate (4) and the associated bracket element (5) are disposed parallel to the first element (1), and an operative position in which the plate (4) and the bracket element (5) are angled away from the first element (1);
  - bearing means (7) of convexly arched profile positioned at the bottom end (1b) of the first element (1), matched to and interacting with the concavely profiled end (4a) of the plate (4);
  - said bearing means (7) projecting at right angles from the bottom end (1b) of the vertically disposed first element (1), of which the upwardly directed side is profiled to match and breast with the profile afforded by at least one end (4a) of the plate (4) in such a way as to enable the plate (6) to rotate between the non-operative and operative position with the concavely and convexly arched surfaces sliding in mutual contact;
- characterised in that:**
- the means (6) by which the first element (1) and the plate (4) are coupled one to another are insertable freely through a profiled socket (4b) afforded by the central part of the plate (4),
  - the first element (1) is a box element,
  - the bearing means (7) consist of an appendage (8) rigidly associated with the bottom and (1b) of the first element (1) and being locked in place against the fixed surrounding frame (2),
  - the downwardly directed side of the appendage affords a recess (9) positioned to accommodate a corresponding lip (10) projecting vertically into the window light from the fixed surrounding frame (2) and facing the bottom vertical edge of the sash frame (3),

- a part of the convexly arched profile of the appendage (8) is protruding from the face of the first element (1) which, when mounted, is directed toward the moving sash frame (3) so that there is no interference between the bottom edge of the sash frame (3) and the lip (10) of the surrounding frame (2) during the tilt manoeuvre.
2. A hinge as in claim 1, characterised in that the plate (4) is embodied with the bottom end (4a) and the top end (4c) shaped to a concavely arched profile, and thus reversible for the purposes of assembly.
  3. A hinge as in claim 1, characterised in that the element (1) has a box form and affords a longitudinal housing (1a) in which the plate element (4) is freely insertable.
  4. A hinge as in claim 1, characterised in that the socket (4b) provided centrally in the plate (4) is of symmetrical geometry presenting a substantially trilobed outline, so as to enable left or right hand fitment of the plate (4).

#### Patentansprüche

1. Scharnier für Dreh-Kipp-Fensterbeschläge, enthaltend:
  - Ein vertikal angeordnetes erstes Element (1), dass von dem feststehenden umgebenden Rahmen (2) des Beschlages eingeklemmt gehalten und im wesentlichen umfasst wird, wenn es an diesem montiert ist, und dessen dem beweglichen Flügelrahmen (3) des Beschlages zugewandte Fläche einen Längssitz (1a) aufweist;
  - eine vertikale Platte (4), die wenigstens an einem Ende (4a) ein konkav ausgebildetes Bogenprofil aufweist, lose aufgenommen von dem Längssitz (1a), welche starr und im wesentlichen im rechten Winkel mit einem Halteelement (5) mit vertikaler Achse verbunden ist, das an dem Flügelrahmen (3) befestigt ist und den unteren vertikalen Gelenkzapfen (16) des Beschlages trägt;
  - Mittel (6), durch welche das erste Element (1) und die Platte (4) miteinander befestigt werden, und zwar auf solche Weise, dass eine Schwingbewegung zwischen einer Ruhestellung, in welcher die Platte (4) und das zugeordnete Halteelement (5) parallel zu dem ersten Element (1) angeordnet sind, und einer Betriebsposition, in welcher die Platte (4) und das Halteelement (5) von dem ersten Element (1) abgewinkelt sind,

möglich ist;

- Haltemittel (7) mit einem konvex ausgebildeten Bogenprofil, angeordnet am unteren Ende (1b) des ersten Elementes (1), welche passrecht zu dem konkav ausgebildeten Ende (4a) der Platte (4) sind und mit diesem zusammenwirken;
  - wobei die genannten Haltemittel (7) mit einem rechten Winkel von dem unteren Ende (1b) des vertikal angeordneten ersten Elementes (1) hervorstehen, und deren nach oben gerichtete Seite so profiliert ist, dass sie mit dem von wenigstens einem Ende (4a) der Platte (4) aufgewiesenen Profil zusammenpasst und bündig abschliesst, und zwar auf solche Weise, dass es der Platte (4) möglich ist, sich zwischen der Ruhestellung und der Betriebsposition zu drehen, wobei die konkav und konvex ausgebildeten Flächen in gegenseitigem Kontakt miteinander gleiten;
- dadurch gekennzeichnet, dass**
- die Mittel (6), durch welche das erste Element (1) und die Platte (4) miteinander verbunden sind, frei durch einen profilierten Sitz (4b) einsetzbar sind, der von dem mittleren Teil der Platte (4) aufgewiesen wird;
  - das erste Element (1) ein Kastenelement ist;
  - die Haltemittel (7) aus einem Ansatz (8) bestehen, der starr mit dem unteren Ende (1b) des ersten Elementes (1) verbunden ist und an dem feststehenden umgebenden Rahmen (2) blockiert wird;
  - die nach unten gerichtete Seite des Ansatzes eine Vertiefung (9) aufweist, dazu bestimmt, eine entsprechende Lippe (10) aufzunehmen, die von dem umgebenden Rahmen (2) aus sich vertikal in die Fensterweite erstreckt und der unteren vertikalen Kante des Flügelrahmens (3) zugewandt ist;
  - ein Teil des konvex ausgebildeten Bogenprofils des Ansatzes (8) sich von der Fläche des ersten Elementes (1) aus erstreckt, welches, wenn es montiert ist, zu dem beweglichen Flügelrahmen (3) hin ausgerichtet ist, so dass kein Eingreifen zwischen der unteren Kante des Flügelrahmens (3) und der Lippe (10) des umgebenden Rahmens (2) während der Kippbewegung entsteht;

2. Scharnier nach Patentanspruch 1, **dadurch gekennzeichnet**, dass die Platte (4) an ihrem unteren Ende (4a) und an ihrem oberen Ende (4c) mit einem konkaven Bogenprofil ausgebildet und somit zum Zwecke des Zusammenbaus umdrehbar ist.

3. Scharnier nach Patentanspruch 1, **dadurch gekennzeichnet**, dass das Element (1) eine Kastenform hat und einen Längssitz (1a) aufweist, in welchen das Element in Form einer Platte (4) frei einsetzbar ist.

4. Scharnier nach Patentanspruch 1, **dadurch gekennzeichnet**, dass der in die Mitte der Platte (4) eingearbeitete Sitz (4b) von einer symmetrischen Geometrie ist und einen im wesentlichen dreinockenförmigen Umriss aufweist, so dass eine linke oder rechte Befestigung der Platte (4) erlaubt ist.

## Revendications

1. Charnière pour ferrures de fenêtres oscillo-batantes, comprenant:
- un premier élément (1) disposé verticalement, retenu positivement sensiblement à l'intérieur du cadre dormant (2) de la ferrure par lequel il est entouré quand il est monté sur ce dernier, et dont la face orientée vers le cadre ouvrant (3) de la ferrure présente un logement longitudinal (1a);
  - une plaque verticale (4) ayant au moins une extrémité (4a) conformée selon un profil en arc concave, et reçue librement dans le logement longitudinal (1a) qui est associé rigidement et de manière sensiblement perpendiculaire à un élément en forme d'étrier (5) axialement vertical, fixé au cadre ouvrant (3) et portant le pivot d'articulation (16) inférieur vertical de la ferrure;
  - des moyens (6) par lesquels le premier élément (1) et la plaque (4) sont couplés l'un à l'autre de manière à permettre un mouvement basculant entre une position non opératoire dans laquelle la plaque (4) et l'élément en forme d'étrier (5) associé sont disposés parallèles au premier élément (1) et position opératoire dans laquelle la plaque (4) et l'élément en forme d'étrier (5) sont inclinés vers l'extérieur par rapport audit premier élément (1);
  - des moyens de support (7) ayant un profil en arc convexe, disposés à l'extrémité inférieure (1b) du premier élément (1) et agissant sur l'extrémité (4a) de profil conjugué de la plaque (4);
  - lesdits moyens de support (7) faisant saillie perpendiculairement de l'extrémité inférieure (1b) du premier élément disposé verticalement (1), dont le côté orienté vers le haut a un profil épousant le profil présenté par au moins une extrémité (4a) de la plaque (4), de telle sorte que ces moyens per-

- mettent la rotation de la plaque (4) entre une position non opératoire et une position opératoire, lesdites surfaces en forme d'arc respectivement concave et convexe coulissant en contact réciproque; 5  
caractérisée en ce que:
- les moyens (6) par lesquels le premier élément (1) et la plaque (4) sont couplés l'un à l'autre sont librement insérables à travers une cavité coformée (4b), présentée par la partie centrale de la plaque (4), 10
  - le premier élément (1) est en forme de boîte, 15
  - les moyens de support (7) comportent un appendice (8) associé rigidement à l'extrémité inférieure (1b) du premier élément (1) et fixé en position contre le cadre dormant (2), 20
  - le côté orienté vers le bas de l'appendice présente un évidement (9) destiné à loger une aile correspondante (10) faisant saillie verticalement du cadre dormant (2) dans l'ouverture de la fenêtre et se trouvant en regard du bord vertical inférieur du cadre ouvrant (3), 25
  - une partie du profil en arc convexe de l'appendice (8) fait saillie de la face du premier élément (1) qui, quand cet élément est monté, est tourné vers le cadre ouvrant (3), de telle sorte qu'il n'y a aucune interférence entre le bord inférieur du cadre ouvrant (3) et l'aile (10) du cadre dormant (2) pendant la manoeuvre d'oscillation. 30
- 35
2. Charnière selon la revendication 1, caractérisée en ce que la plaque (4) est réalisée de manière que son extrémité inférieure (4a) et son extrémité supérieure (4c) sont conformées selon un profil en arc concave, cette plaque pouvant ainsi être renversée lors de l'assemblage. 40
3. Charnière selon la revendication 1, caractérisée en ce que l'élément (1) est en forme de boîte et présente un logement longitudinal (1a) dans lequel est librement insérable la plaque (4). 45
4. Charnière selon la revendication 1, caractérisée en ce que la cavité (4b) prévue au centre de la plaque (4) présente une géométrie symétrique comportant un profil sensiblement trilobé, ce qui permet d'adapter la plaque (4) soit à gauche soit à droite. 50

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**FIG1**



