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

(57) The hinge comprises a concealed box element (1) secured vertically inside the section utilized in construction of the fixed surround frame (2), of which the face directed toward the sash (3) affords a longitudinal housing (1a) loosely accommodating a plate (4) with concavely profiled ends (4a, 4c) associated rigidly and right angles with a hinge bracket (5) fixed to the sash frame ; the plate (4), likewise vertically disposed, rocks on a convexly profiled bearing lug (7) positioned at the bottom end (1b) of the housing and matched to the concave profile of its own bottom end (4a), and affords a centrally located socket (4b) freely accommodating a bolt (6) by which the box element (1) and the plate (4) are coupled together in such a way as allows the sash to tilt between a closed position with the plate (4) lying parallel to the housing, and an open position in which the plate is angled away from the housing.

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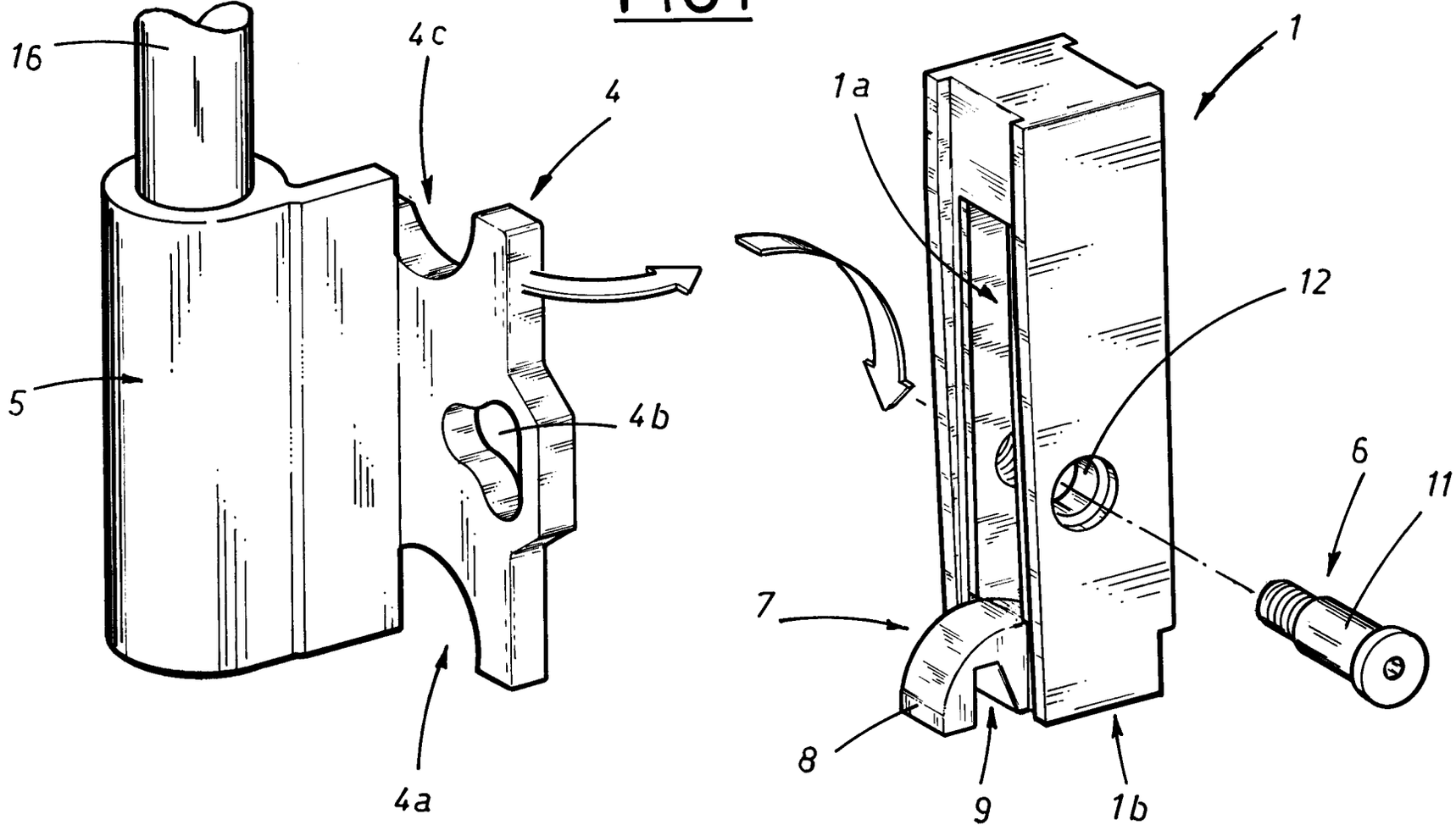
FIG1



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 dimensions, 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.

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 tilt-and-turn hinge assembly as characterized in the appended claims, which comprises a vertically disposed box element associated with the fixed surround frame of the fixture and retained positively by the internal profile of the relative section, of which the face directed toward the sash affords a longitudinal housing, and a vertical plate with ends shaped to a concavely arched profile, loosely accommodated by the housing and associated rigidly and at right angles with a bracket secured to the sash frame; the central part of the plate presents a socket affording passage to means by which the plate and the box element are coupled one to another, and of shape such as allows the plate to rock between a position parallel to the box element and a position angled in relation to the box element. The assembly further comprises bearing means of convexly arched profile associated with the bottom end of the box element and interacting with the concavely profiled end of the plate in such a way as enables the plate to tilt between the non-operative parallel position and the operative angled position.

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 directed 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 substantatially 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, characterized
in that it comprises:

– a vertically disposed box element (1), positively retained and substantially encompassed by the fixed surround frame (2) of the fixture, 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 and carrying the bottom vertical hinge pin (16) of the fixture;
– means (6) by which the box element (1) and the plate (4) are coupled one to another, insertable freely through a profiled socket (4b) afforded by the central part of the plate (4) 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 box element (1), and an operative position in which the plate and the bracket element are angled away from the box element;
– bearing means (7) of convexly arched profile positioned at the bottom end (1b) of the box element (1), matched to and interacting with the concavely profiled end (4a) of the plate (4) in such a way as enables the plate to rotate between the non-operative and operative positions with the concavely and convexly arched surfaces sliding in mutual contact.

2) A hinge as in claim 1, wherein the plate (4) is embodied with both 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, wherein 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 side is profiled to match and breast with the profile afforded by at least one end (4a) of the plate (4), and the downwardly directed side affords a recess (9) positioned to accommodate a corresponding lip (10) of the fixed surround frame (2) against which the appendage is locked in place.

4) A hinge as in claim 1, wherein coupling means (6) consist in at least one bolt (11) transversely disposed in and screwed into a through hole (12) afforded by the box element (1), and positioned stably with the innermost end offered frontally to the fixed surround frame (2).

5) A hinge for tilt-and-turn window fixtures, characterized
in that it comprises:

– a vertically disposed box element (1), positively retained and substantially encompassed by the fixed surround frame (2) of the fixture, 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 and carrying the bottom vertical hinge pin (16) of the fixture;
– means (6) by which the box element (1) and the plate (4) are coupled one to another, insertable freely through a profiled socket (4b) afforded by the central part of the plate (4) 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 box element (1), and an operative position in which the plate and the bracket element are angled away from the box element;
– bearing means (7) of convexly arched profile positioned at the bottom end (1b) of the box element (1), consisting in an appendage (8) rigidly associated with and projecting at right angles from the bottom end (1b) of the box element (1), matched to and interacting with the concavely profiled end (4a) of the plate (4) in such a way as enables the plate to rotate between the non-operative and operative positions with the concavely and convexly arched surfaces sliding in mutual contact.

FIG1

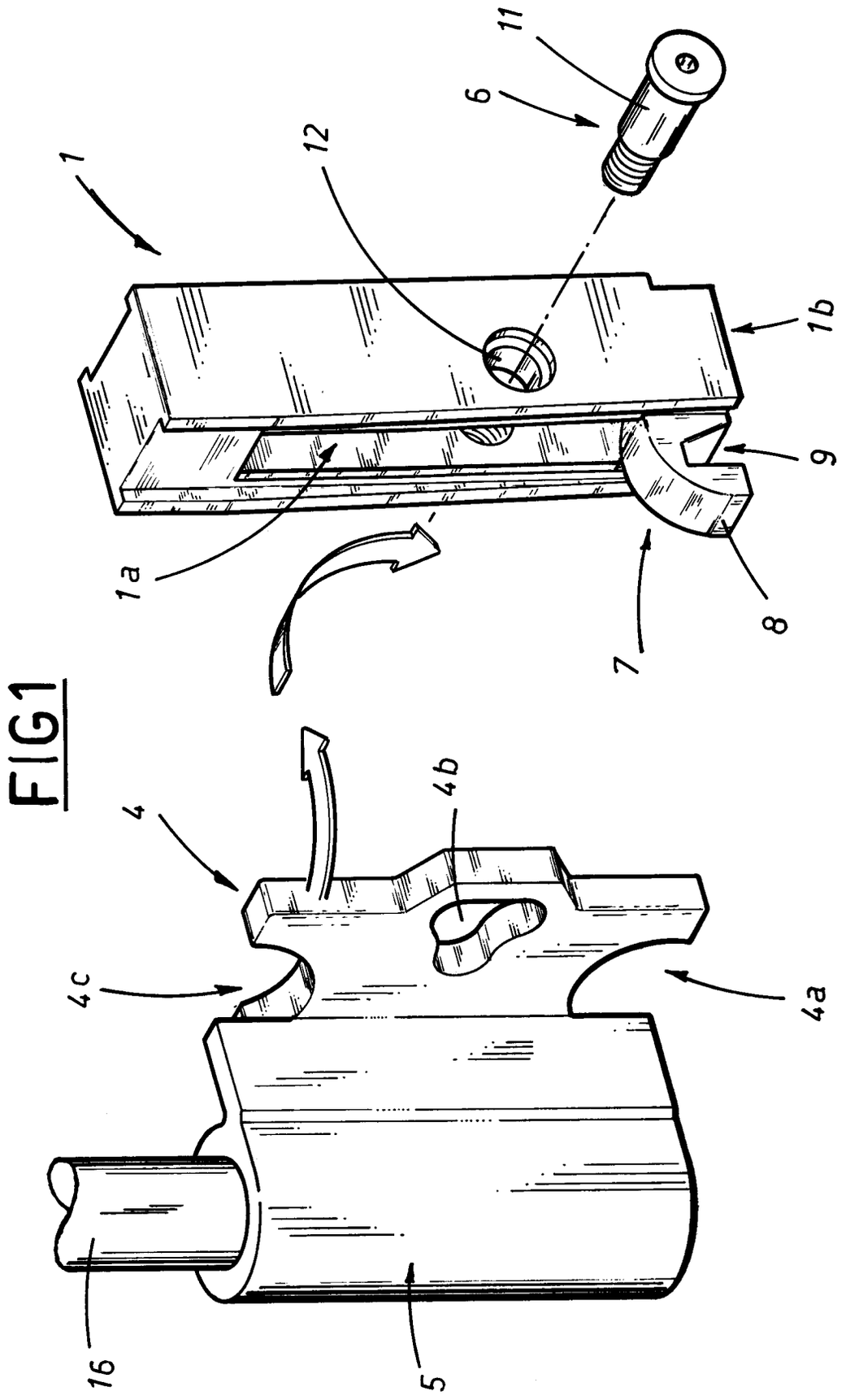


FIG2

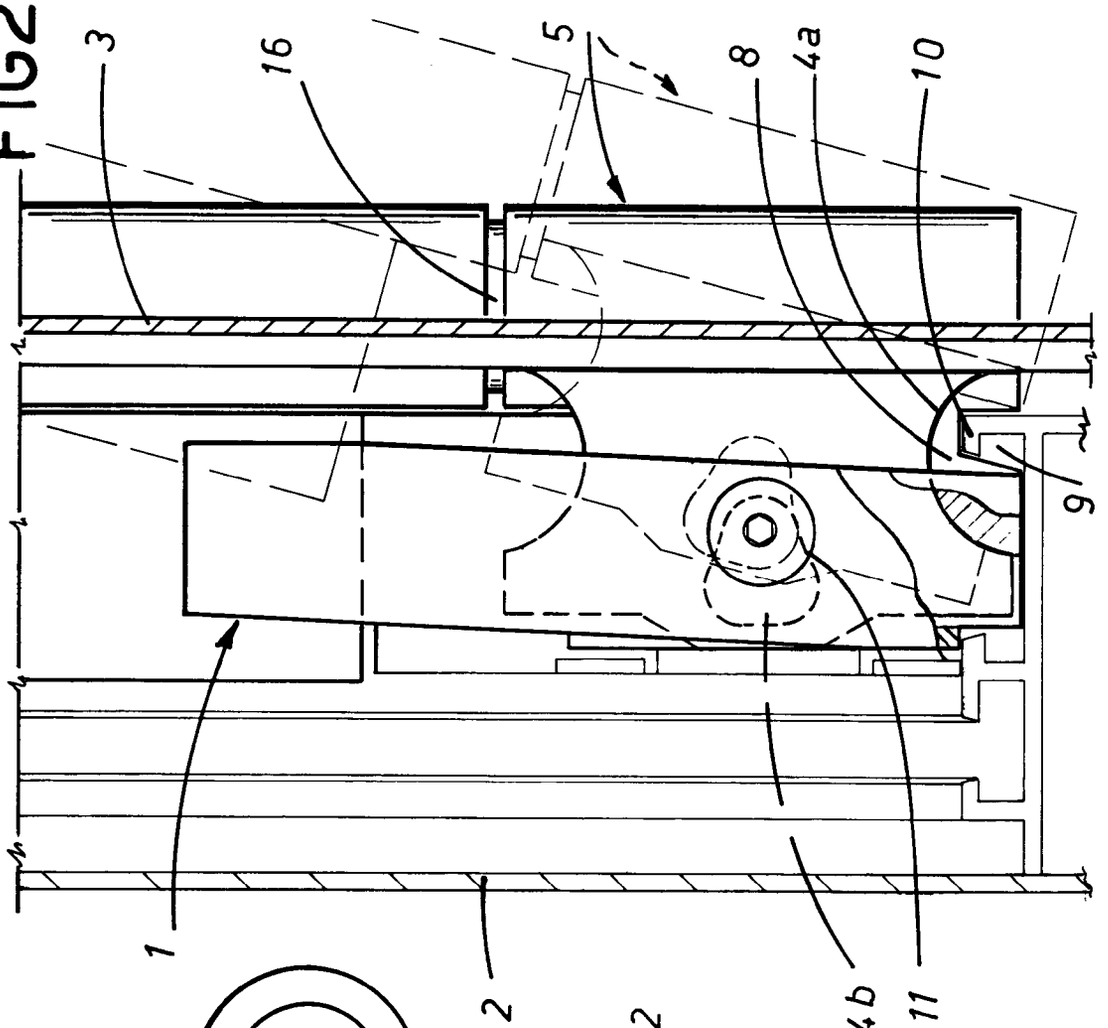
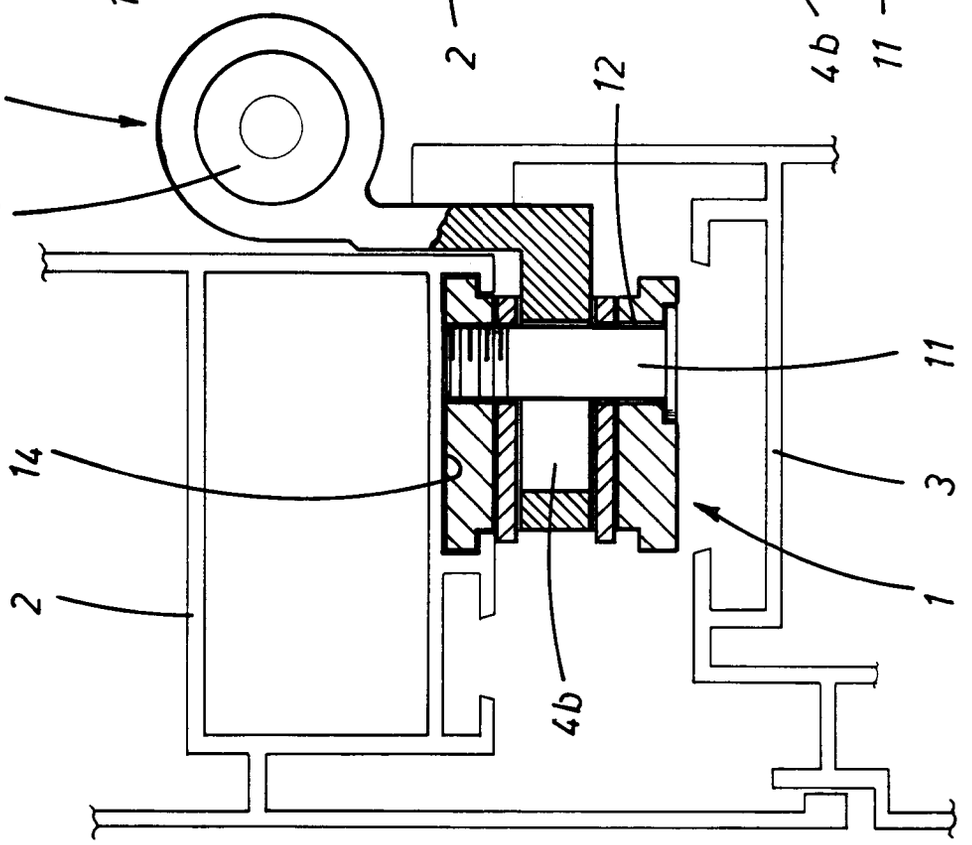


FIG3



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EUROPEAN SEARCH REPORT

Application Number

EP 91 83 0391

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	CH-A-563 516 (A. GRÜNERT) * column 2, line 33 - line 46; figures 5,6,7 * ---	1,3,5	E05D15/52
A	GB-A-143 662 (A. S. CHESTON) * page 2, line 44 - line 46 * * page 3, line 3 - line 9; figures 1-4 * ---	1,5	
A	FR-A-1 129 206 (ART ET TECHNIQUE) * page 1, column 2, line 4 - line 27; figures 1,2 * -----	1,5	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5) E05D E05C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	06 JANUARY 1992	GUILLAUME G.E.P.

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