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(72) Inventors:
• **Wellman, David Anthony**
Aldridge, West Midlands WS9 0JW (GB)
• **Harrison, Peter James**
Darlaston, West Midlands WS10 7QT (GB)

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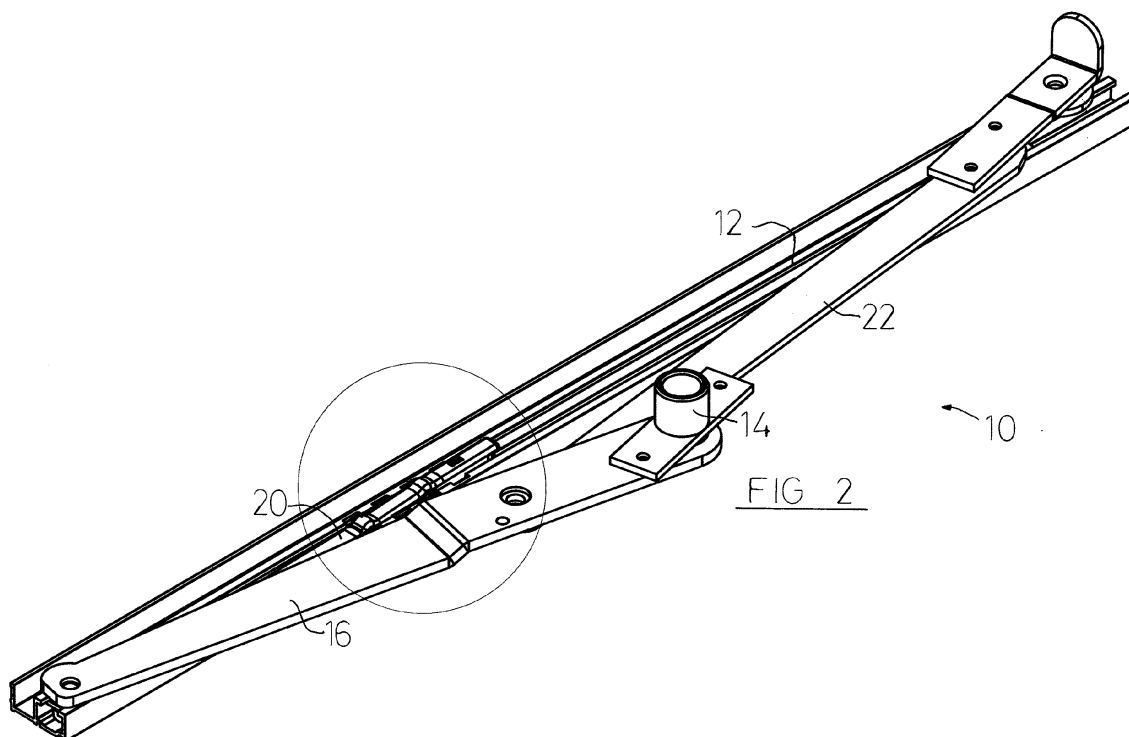
(74) Representative: **Gee, Steven William**
D.W. & S.W. Gee
1 South Lynn Gardens
London Road
Shipston on Stour, Warwickshire CV36 4ER (GB)

(71) Applicant: **J. Banks & Co. Ltd.**
Tipton
West Midlands DY4 9LE (GB)

(54) **Three-bar hinge incorporating a window estrictor**

(57) This invention relates to a three-bar hinge incorporating a window restrictor, and in particular to a three-bar hinge for a top swing fully reversible window. The three-bar hinge (10) comprises a mounting such as a pivot peg (14) for a window panel (1), a first bar or stay (16) carrying the mounting (14), a slider (20) to which the first bar is connected and guide means such as a channel

(12) for the slider. Opening movement of the window panel causes movement of the slider (20) along the guide means (12) in use. The guide means (12) and slider (20) have cooperating parts (40, 42) which define a restricted position for the slider, and the hinge has a key-operated locking means (56, 66) adapted to prevent movement of the slider beyond its restricted position.



Description

FIELD OF THE INVENTION

[0001] This invention relates to a three-bar hinge incorporating a window restrictor, and in particular to a three-bar hinge for a top swing fully reversible window.

[0002] In this description, directional and orientational terms such as "top", "bottom", "vertical" etc., usually refer to a top swing fully reversible window in its normal orientation of use, and with three-bar hinge fitted in its expected position of use as shown in Fig.1, unless stated otherwise in relation to particular drawings.

BACKGROUND OF THE INVENTION

[0003] There are many different types of opening window available on the market. The type of window to which this invention is directed is most often referred to as a "top swing fully reversible" window. Such a window is designed to pivot about a substantially horizontal axis, and is able to pivot through around 90 degrees (or perhaps more). Such a window is not mounted upon fixed (butt) hinges, but instead is mounted upon two sets of pivoting stays, each set of pivoting stays being most often referred to as a "three-bar hinge". The action of the three-bar hinge is such that the pivot axis moves as the window is opened.

[0004] A top swing fully reversible window is shown schematically in Fig.1. In this window a single pivotable window panel 1 is provided, but it will be understood that top swing fully reversible windows may be used in conjunction with other (fixed or movable) window panels in a common window frame.

[0005] The window panel 1 is mounted within a fixed window frame 2, and has a handle 3 connected to locking means (not seen) by which the window panel 1 may be secured in its closed position relative to the frame 2, in known fashion. The window panel 1 is supported by a pair of three-bar hinges 4, which are located in the gap between the window frame 1 and window panel 2 along the vertical edges of the window, and are therefore shown in dotted outline as they are not visible when the window panel is closed.

[0006] When the handle 3 is turned to open the window panel 1, the bottom edge 5 of the window panel may be pushed outwardly, the window panel being caused to pivot about a substantially horizontal axis upon the aligned pivot pegs (not shown in Fig.1 but see the pivot peg 14 in Fig.2) of the respective three-bar hinges 4. During this pivoting movement, the top edge 6 of the window panel 1 also moves away from its corresponding frame part.

[0007] The pivot pegs of the three-bar hinges upon which the window panel 1 is mounted move out of alignment with the window frame 2 during the opening movement. The effect of this is that the window panel 1 undergoes a somewhat complex movement, with the top edge 6 moving downwardly relative to the window frame 2.

The three-bar hinges 4 define a fully open position for the window panel 1, which in most designs is close to horizontal, the window panel 1 projecting outwardly from the window frame 2. This fully open position permits the outside of the window panel 1 to be cleaned from inside the room or building, and also permits persons to exit the room or building in case of an emergency.

[0008] In order to prevent a person such as a child from falling out of an opened window, the handle 3 is usually key-lockable. However, the user must unlock the handle when the window is to be opened for cleaning or ventilation and if the user fails to re-lock the handle after the window has been closed there is then no barrier to a child for example (deliberately or inadvertently) opening the window panel 1 sufficiently to fall through the window opening.

[0009] This is a disadvantage with all opening windows, and has been addressed in relation to top swing fully reversible windows by the use of a safety catch or window restrictor which permits only partial opening of the window, in particular to a position in which the window opening provides ventilation but is too small for a person to pass therethrough. British Standard BS 6375 in particular requires a window opening of no more than 100 mm in the restricted position.

[0010] Manufacturers of three-bar hinges for top swing fully reversible windows take advantage of the relative movement between a slider and a channel of the three-bar hinge during window opening, and by restricting the movement of the slider relative to the channel it is possible to restrict the opening movement of the window panel. The channel within which the slider moves has a set of recesses providing a detent position for the slider. As the window panel 1 is opened to its restricted position lugs of the slider locate within the recesses and prevent further movement of the slider and therefore further opening movement of the window panel. In order to disable the restrictor and open the window further the lugs of the slider must be moved out of the recesses by pressure upon the slider.

[0011] Spring biasing of the slider towards its detent position ensures that the window restrictor is activated each time the window panel is closed, which is a major advantage of this type of window restrictor. However, this known window restrictor suffers the major disadvantage that it requires only manual pressure upon the slider in order to disable the restrictor, and it is possible for a child to exert the necessary pressure. This disadvantage is exacerbated by the practice of fitting a three-bar hinge with a restrictor to one side only of the window panel, so that very little dexterity is required to disable the restrictor.

SUMMARY OF THE INVENTION

[0012] It is an object of this invention to increase the security of a window restrictor for the three-bar hinge of a top swing fully reversible window, and in particular to make the restrictor harder to disable.

[0013] It is another object of this invention to provide a window restrictor for a three-bar hinge which can only be disabled with a key.

[0014] According to the invention therefore there is provided a three-bar hinge incorporating a window restrictor, the three-bar hinge having:

a pivot peg for a window panel;
a first stay upon which the pivot peg is mounted;
a slider to which the first stay is connected;
a channel within which the slider is located;
whereby opening movement of a window panel causes movement of the slider along the channel in use;
the channel having at least one recess in which a part of the slider can be located in a restricted position for the three-bar hinge, the part of the slider being biased to enter the recess;

characterised in that the three-bar hinge has a keyhole into which the correct key must be inserted so as to permit the slider to move beyond its restricted position.

[0015] Accordingly, the present invention shares many of the features of the prior art three-bar hinges incorporating window restrictors, but instead of the window restrictor being disabled solely by pressure upon the slider, in the present invention a key is required to disable the window restrictor.

[0016] Preferably, the keyhole is located in the slider, and ideally is located close to said part of the slider which can be located in the recess. This part of the slider is necessarily accessible when the window panel is opened to its restricted position, facilitating insertion of the key into the keyhole.

[0017] Desirably, the channel carries a locking peg which can locate in a locking recess of the slider. Desirably also the locking peg is movable, and is preferably resiliently biased to an active position in which it can project into the locking recess.

[0018] Preferably, the keyhole is open to the locking recess. The correct key can therefore be inserted into the keyhole until its leading end enters the locking recess and engages the peg. The key can therefore be used to move the peg out of the locking recess. It is arranged that when the peg has been moved out of the locking recess the window restrictor can be disabled and the window panel opened beyond its restricted position.

[0019] Desirably, the keyhole is substantially parallel with the axis of the pivot peg. In such an orientation the key will project towards the centre of the window panel, and in particular will foul the window panel as the window panel is closed. It is therefore necessary to remove the key before the window panel is closed. Because the peg is resiliently biased to its active position the window restrictor will automatically become enabled when the key is removed and the window panel is closed.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] The invention will now be described in more detail, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a schematic view of a top swing fully reversible window;

Fig. 2 is a perspective view of a three-bar hinge incorporating a window restrictor according to the present invention;

Fig. 3 is an enlarged view of the circled part of Fig. 2;

Fig. 4 is an exploded view of the components of the slider of the three-bar hinge;

Fig. 5 is a view of the assembled slider;

Fig. 6 is an exploded view of the locking peg of the three-bar hinge;

Fig. 7 is a view of the assembled locking peg;

Fig. 8 is a plan view of the three-bar hinge in its restricted position, with the restrictor enabled;

Fig. 9 is an enlarged view of the circled part of Fig. 8;

Fig. 10 is a sectional view along the lines X-X of Fig. 8;

Fig. 11 is an enlarged view of the circled part of Fig. 10;

Fig. 12 is a view similar to that of Fig. 11, but with the restrictor disabled;

Fig. 13 is a view similar to that of Fig. 2, but with the restrictor disabled;

Fig. 14 is an enlarged view of the circled part of Fig. 13;

Fig. 15 is a view similar to that of Fig. 13, but corresponding to a position of further window opening;

Fig. 16 is an enlarged view of the circled part of Fig. 15;

Fig. 17 is a view similar to that of Figs. 11 and 12, but corresponding to a position of further window opening; and

Fig. 18 is a view similar to that of Fig. 8, but corresponding to a position of further window opening.

DETAILED DESCRIPTION

[0021] A general description of a top swing fully reversible window as shown in the schematic representation of Fig.1 is provided above and will not be repeated here.

[0022] A three-bar hinge incorporating a window restrictor according to the present invention is shown in Fig.2. The three-bar hinge 10 has a channel 12 which is mounted (suitably by screws or other fixings in known fashion) upon the window frame 2, in the gap between the vertical side part of a window frame 2 and the corresponding vertical side edge of a window panel 1.

[0023] The three-bar hinge 10 has a pivot peg 14 upon which the window panel 1 is pivotably mounted, again in known fashion. The pivot peg 14 is mounted to one end of a first bar or stay 16, the other end of which stay is pivotably mounted upon a slider 20, the slider 20 being mounted for sliding movement along the channel 12. Between its ends the first stay 16 is pivotably connected to one end of a second bar or stay 22, the other end of which stay is pivotably connected to a member 24 (Fig.10) which is fixed relative to the channel 12.

[0024] When the window panel 1 is in its closed position relative to the window frame 2 the first stay 16 and the second stay 22 are substantially parallel with each other, and the stays 16, 22 overlie and are substantially parallel with the channel 12. As the window panel 1 is opened, engagement of a sealing lip (not shown) at the top edge 6 of the window panel 1 with the surface of the window frame 2 causes the pivot peg 14 to move out of alignment with the channel 12 (as seen in Fig.2). During this movement, the slider 20 is caused to slide along the channel 12, towards the member 24.

[0025] The components of the slider 20 are more clearly shown in Figs. 4 and 5. The slider 20 comprises a bar 26, typically of metal, to which is affixed a slider element 30. The slider element 30 is suitably a plastics moulding, and has moulded projections 32 (see Figs. 11 and 12) which can fit into the holes 34 of the bar 26, whereby the slider element can be substantially permanently fixed to the bar 26.

[0026] The slider element has a rail 36 to either side (only one of which can be seen in Figs 4 and 5), and which serves to locate the slider element in the channel 12, in known fashion. The slider element 36 is designed to be a relatively tight sliding fit in the channel 12 so as to provide a degree of frictional resistance so as to hold the window panel 1 in a chosen opened position.

[0027] The slider element 30 also has a number of (in this embodiment six) projecting lugs 40, the lugs 40 being the parts of the slider 20 which can fit into the recesses 42 (Fig.3) of the channel 12.

[0028] Within the slider element 30 is a keyhole 44 which can accommodate the shaft of an appropriately configured key 46. The keyhole and correspondingly the shaft of the key 46 are of a particular form so that a screwdriver or the like cannot be inserted. It will be understood from the following description that the key 46 does not

require to be rotated in this embodiment.

[0029] The end of the bar 26 opposite to the slider element 30 has a pivot hole 38, which receives the pivot peg of the first stay 16.

[0030] Finally, the slider 20 has a slider plug 50 which has a hole 52 into which projects a pin 54 of the slider element 30. The slider plug 50 slides within the channel 12 and serves to prevent unauthorised access to the locking peg, as described in more detail below.

[0031] Located within the channel 12 of the three-bar hinge 10 is a locking peg 56, which is shown in detail in Figs. 6 and 7. The locking peg 56 is mounted within a housing 60, the housing 60 having a tubular boss which contains a compression spring 62 and the body 64 of the locking peg 56. The compression spring 62 acts to bias the locking peg 56 out of the housing 60, into its active position as shown in Fig.7. However, when sufficient pressure is applied to the peg to overcome the spring 62, the locking peg may be pressed substantially completely into the housing 60.

[0032] The position of the locking peg 56 relative to the slider 20 is shown most clearly in Figs. 10 and 11. The housing 60 is mounted into the base wall of the channel 12, with the tubular boss projecting through a hole in the base wall. The locking peg 56 projects upwardly as drawn in Figs. 10 and 11, and it is arranged that when the three-bar hinge is in the restricted opening position as shown the locking peg projects into a locking recess 66 within the slider element 30.

[0033] It will be seen in particular from Figs. 8 and 9 that the channel 12 has a number of recesses 42, each recess being sized and positioned to receive a respective lug 40 of the slider 20. In the restricted position shown in Figs. 8 and 9 the six lugs 40 are located in six of the eight recesses 42 (with the two recesses at the right-hand end of the set of recesses being empty). When the lugs 40 are located in the recesses 42 further movement of the slider 20 relative to the channel 12 is prevented, so that this position corresponds to the restricted opening position of the window panel 1.

[0034] It will be seen from Fig. 4 and 5 that the bar 26 of the slider 20 has a step 70, and this step, ideally in combination with the natural resilience of the material of the bar 26, causes the part of the bar 26 carrying the slider element 30 to be biased upwardly in the orientation as shown in Figs. 10 and 11 (and out of the paper in the orientation of Figs. 8 and 9). Accordingly, once the slider 20 is moved along the channel to a position in which the lugs 40 are aligned with the first six recesses 42 they will be caused to enter the recesses by the bias of the slider bar 26. This corresponds to the restricted window opening position, and the three-bar hinge 10 is therefore automatically enabled (in common with the prior art three-bar hinges).

[0035] It will be understood that it is possible to depress the slider element 30 further into the channel 12, and thereby to release the lugs 40 from the recesses 42. Whilst in the prior art three-bar hinge that would be suf-

ficient to disable the window restrictor, in the present invention that does not disable the restrictor because the locking peg 56 is located within the locking recess 66, so that further movement of the slider relative to the channel (towards the right as drawn in Fig.11) is prevented, and further opening movement of the window panel is prevented.

[0036] In order to disable the window restrictor of the present invention it is necessary to insert the key 46 into the keyhole 44. It will be seen from Figs.11 and 12 in particular that in the restricted position the keyhole 44 is aligned with the locking peg, and the shaft of the key 46 can therefore be brought into engagement with the locking peg. Pressure upon the key 46 can drive the locking peg 56 out of the locking recess as shown in Fig.12, and if the lugs 40 are released from the recesses 42 (as by pressure upon the top of the slider element 30, further opening movement of the window panel 1 is permitted. As above indicated therefore, it is not necessary to rotate the key 46 to disable the restrictor, but in alternative embodiments a more complicated lock can be provided if desired. In addition, it is arranged that the compression spring 62 is strong enough to resist the pressure which might be exerted by way of a paper clip forced through the keyhole 44 for example.

[0037] It will be observed from Fig.11 that the locking peg 56 only projects slightly into the locking recess when the lugs 40 are located in their respective recesses 42. This is because it is desired that when the window is restricted any further window opening movement be resisted by the lugs 40 and recesses 42 rather than by the locking peg 56. In common with prior art three-bar hinge of this type there are six lugs located in six recesses in the restricted condition, and the six lugs therefore share the applied load. It is therefore not necessary (or desirable) for the locking peg also to share the applied load, but in an alternative embodiment the locking peg could project further into the locking recess.

[0038] In the embodiment shown the channel 12 has eight recesses 42, i.e. four pairs of recesses, to accommodate three pairs of lugs 40. The additional pair of recesses 42 provides a secondary restricted position, i.e. a restricted position in which the two free recesses are the left-hand pair of recesses in the orientation of Fig.8. In this embodiment the window restrictor does not require a key to release it from the second restricted position, and instead requires only pressure upon the slider element 30.

[0039] Notwithstanding that there are eight recesses and six lugs, the embodiment described provides only two restricted positions, i.e. it is necessary that all six of the lugs 40 be aligned with six of the eight recesses 42 in order for the lugs to enter the recesses. This is in common with prior art three-bar hinges of this type.

[0040] It will be understood that the number of recesses, and the number of lugs, is immaterial to the present invention, and the three-bar hinge manufacturer can incorporate the present invention in a three-bar hinge hav-

ing any number of lugs and recesses, and one or more restricted positions, as desired.

[0041] As is shown in Figs. 12, 13 and 14, when the key 46 has been inserted and the slider element 30 pressed further into the channel 12 so as to release the lugs 40 from the recesses 42, the slider 20 may be moved along the channel 12 beyond its restricted position. Usefully, this movement is caused by further opening movement of the window panel 1 to which the pivot peg 14 is connected. Once the lugs 40 have been moved out of alignment with the recesses 42 pressure upon the slider element 30 need not be maintained, and once the locking peg 56 has been moved out of the locking recess 66 pressure upon the key 46 need not be maintained. The window panel 1 may be opened to its required angle, with the slider 20 moving along the channel 12 to the appropriate position, as shown in Figs. 15-18.

[0042] Figs. 15-18 show the key 46 remaining in the keyhole 44, but it is of course possible to remove the key 46 once the locking peg 56 has been released from the locking recess 66. However, it will be understood that the window panel 1 cannot be fully closed without removal of the key. Thus, when the window panel 1 is subsequently closed, the first stay 16 will foul the key 46 before the window is closed. It is therefore necessary to remove the key 46 in order to fully close the window panel 1.

[0043] As the window panel 1 is closed from the position shown in Figs. 15-18, the slider 20 moves (to the left as drawn in Figs 17 and 18) along the channel 12. During this movement, the locking peg 56 remains pressed into the housing 60 by engagement with the underside of the slider bar 26 and slider element 30. However, when the slider 20 reaches the position of Figs. 11 and 12 in which the locking recess 66 overlies the locking peg 56 the locking peg 56 is automatically driven into the locking recess 66 by its spring 62. Further closing movement of the window panel 1 is accompanied by further leftwards movement of the slider 20 (in the orientation of Fig.11) beyond the position of Fig.11, with the locking peg 56 engaging the slope 70 of the locking recess 66.

[0044] It will be understood that the movement of the slider 20 relative to the channel 12 between the restricted position of Fig.11 and the fully closed position of the window is small, and in particular is small enough so that the locking peg 56 does not engage the slider plug 50.

[0045] It will be understood from Fig.11 in particular that the slider plug 50 prevents access to the locking peg 56 from the end of the slider 20. Thus, it might otherwise be possible to insert a tool such as a screwdriver or the like along the channel in order to force the locking peg 56 into its housing 60 and thereby disable the window restrictor. The slider plug 50 effectively fills the channel 12 and therefore prevents such unauthorised access.

[0046] It can be arranged that the lugs 40, and/or the recesses 42, have a lead-in from one end, so that whilst they automatically enter the recesses 42 upon closing movement of the window panel 1, they automatically leave the recesses upon continued closing movement,

so that it is not necessary to depress the slider element 30 in order to close the window panel 1.

Claims

1. A three-bar hinge incorporating a window restrictor (10) comprising:

a mounting (14) for a window panel (1);
a first bar (16) carrying the mounting (14);
a slider (20) to which the first bar is connected;
guide means (12) for the slider, opening movement of the window panel causing movement of the slider (20) along the guide means (12) in use;
the guide means (12) and slider (20) having co-operating parts (40, 42) which define a restricted position for the slider,

characterised by

key-operated locking means (56, 66) adapted to prevent movement of the slider beyond its restricted position.

2. A three-bar hinge incorporating a window restrictor (10) according to Claim 1 in which the cooperating parts comprise at least one recess (42) and at least one projection (40) which can locate in the recess. 25
3. A three-bar hinge incorporating a window restrictor (10) according to Claim 2 in which said at least one recess (42) is located on the guide means (12) and said at least one projection (40) is located on the slider (20). 30
4. A three-bar hinge incorporating a window restrictor (10) according to Claim 2 or Claim 3 in which said at least one projection (40) is biased to enter said at least one recess (42). 35
5. A three-bar hinge incorporating a window restrictor (10) according to any one of Claims 1-4 in which the guide means is a channel (12) within which a part of the slider (12) is located. 40
6. A three-bar hinge incorporating a window restrictor (10) according to any one of Claims 1-5 in which the locking means (56) is resiliently biased towards an active position. 45
7. A three-bar hinge incorporating a window restrictor (10) according to any one of Claims 1-6 in which the locking means comprise a locking peg (56) and a locking recess (66) into which the locking peg can locate. 50
8. A three-bar hinge incorporating a window restrictor according to Claim 7 in which the locking peg (56)

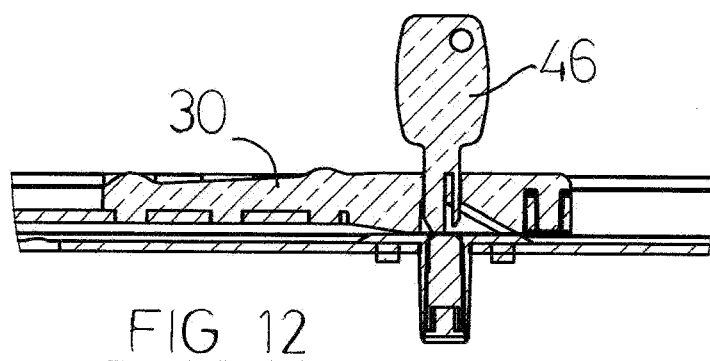
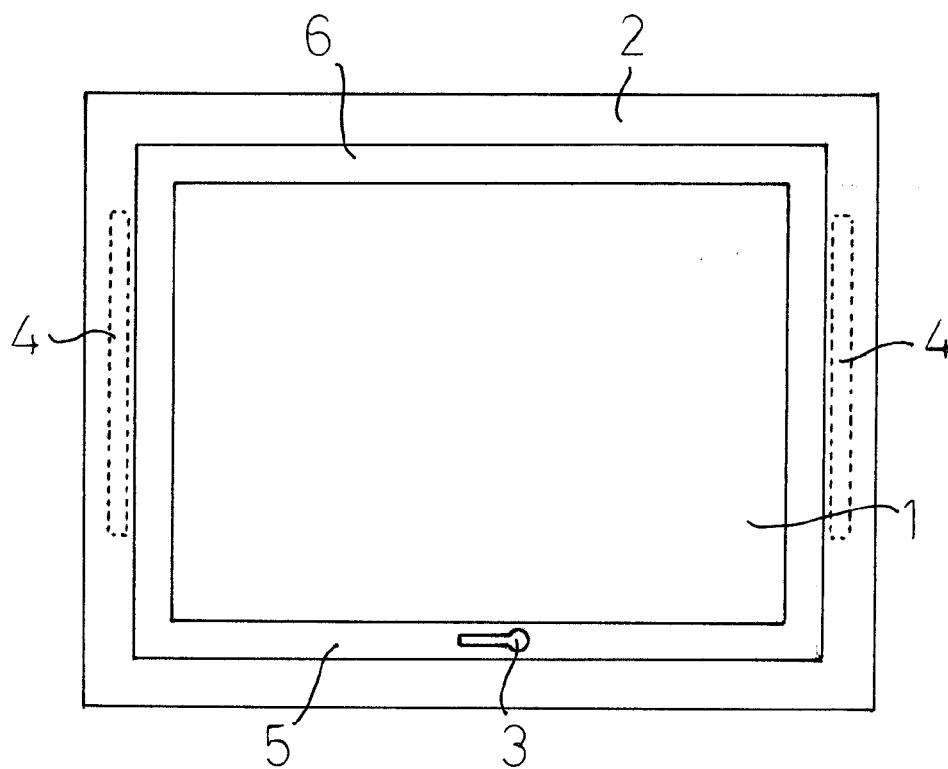
is mounted upon the guide means (12) and the locking recess (66) is a part of the slider (20).

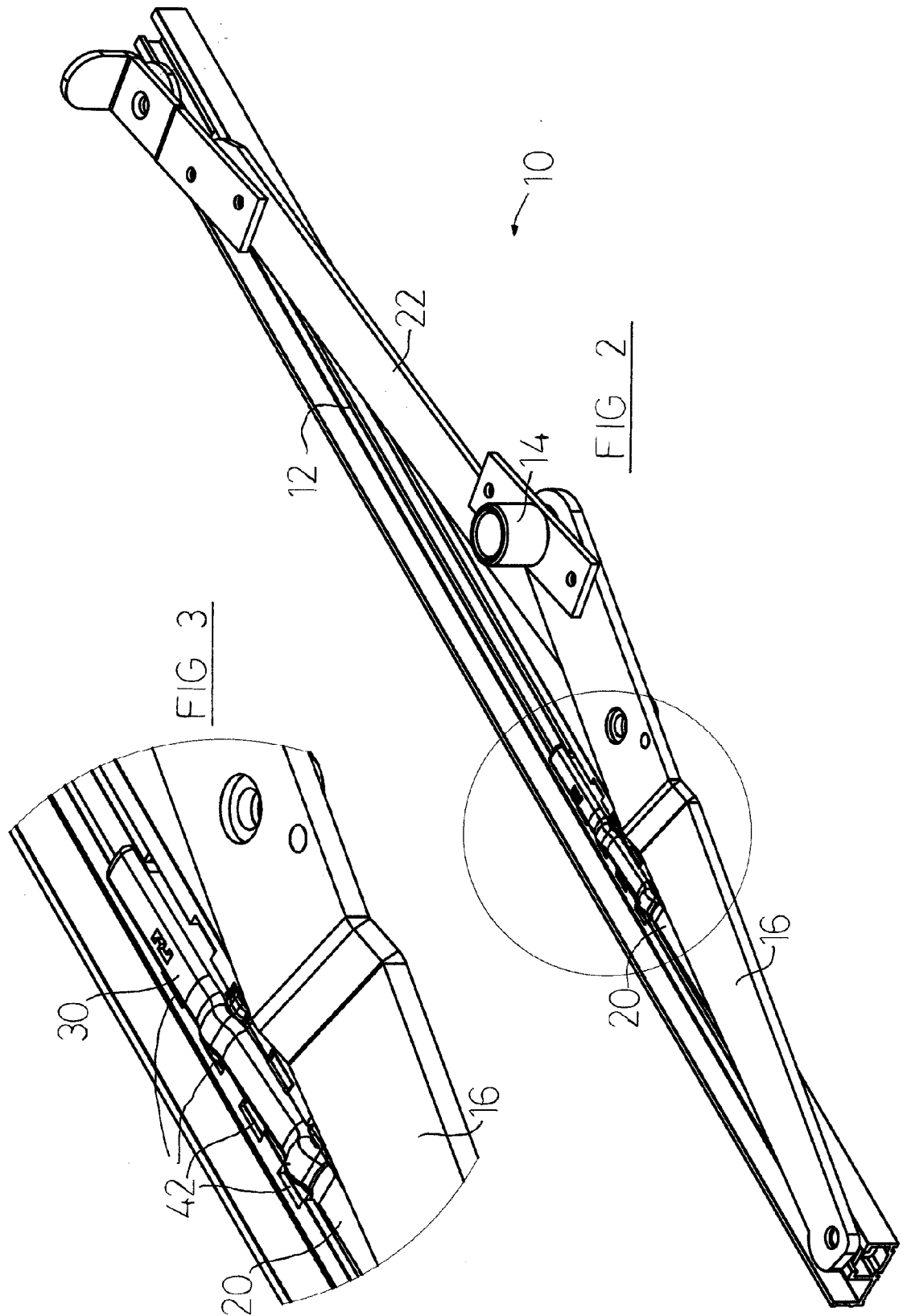
9. A three-bar hinge incorporating a window restrictor (10) according to Claim 7 or Claim 8 in which the locking peg (56) is movable. 5

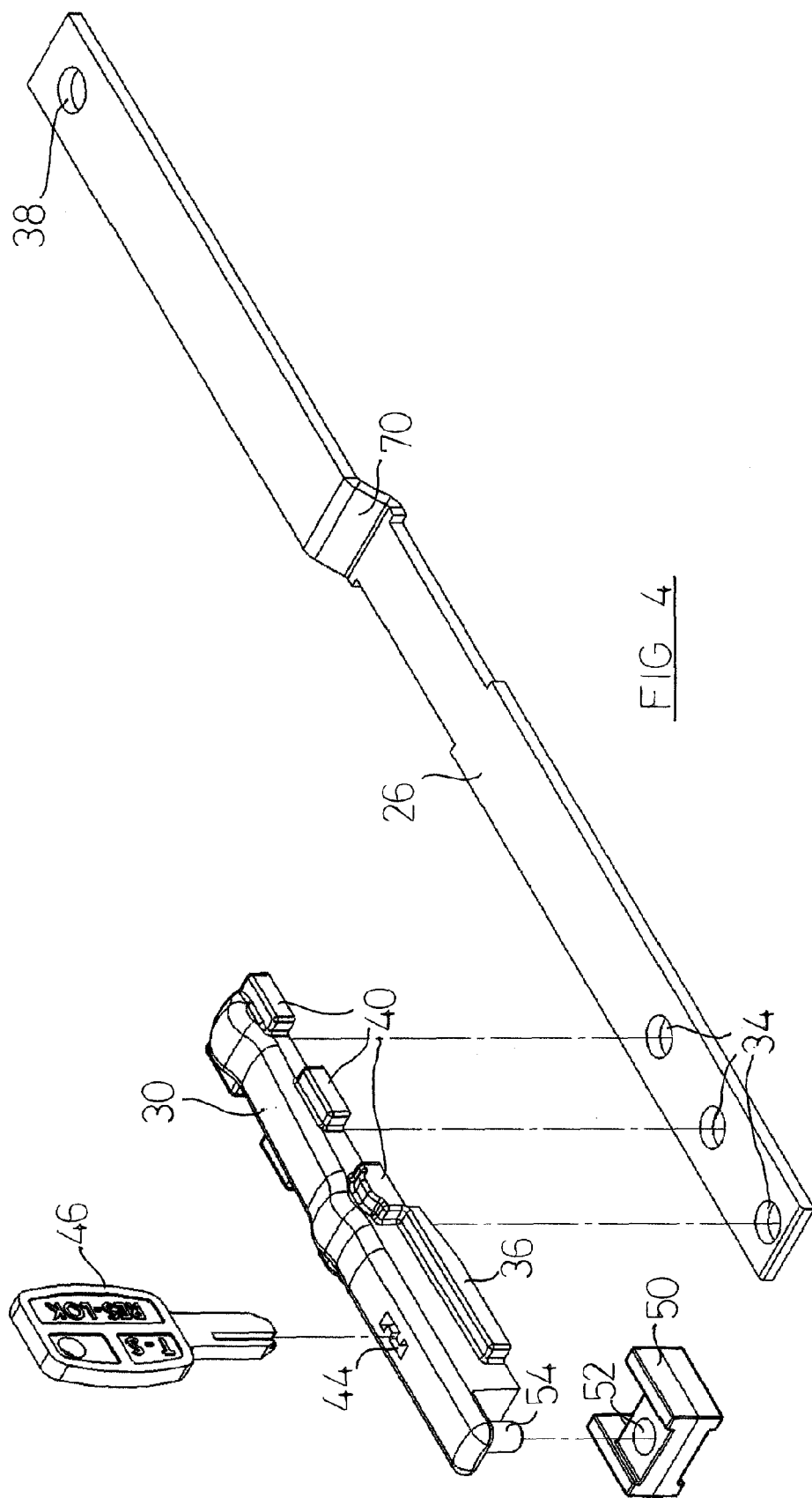
10. A three-bar hinge incorporating a window restrictor (10) according to any one of Claims 7-9 in which the locking peg (56) is engageable by a key (46) inserted into a keyhole (44) 10

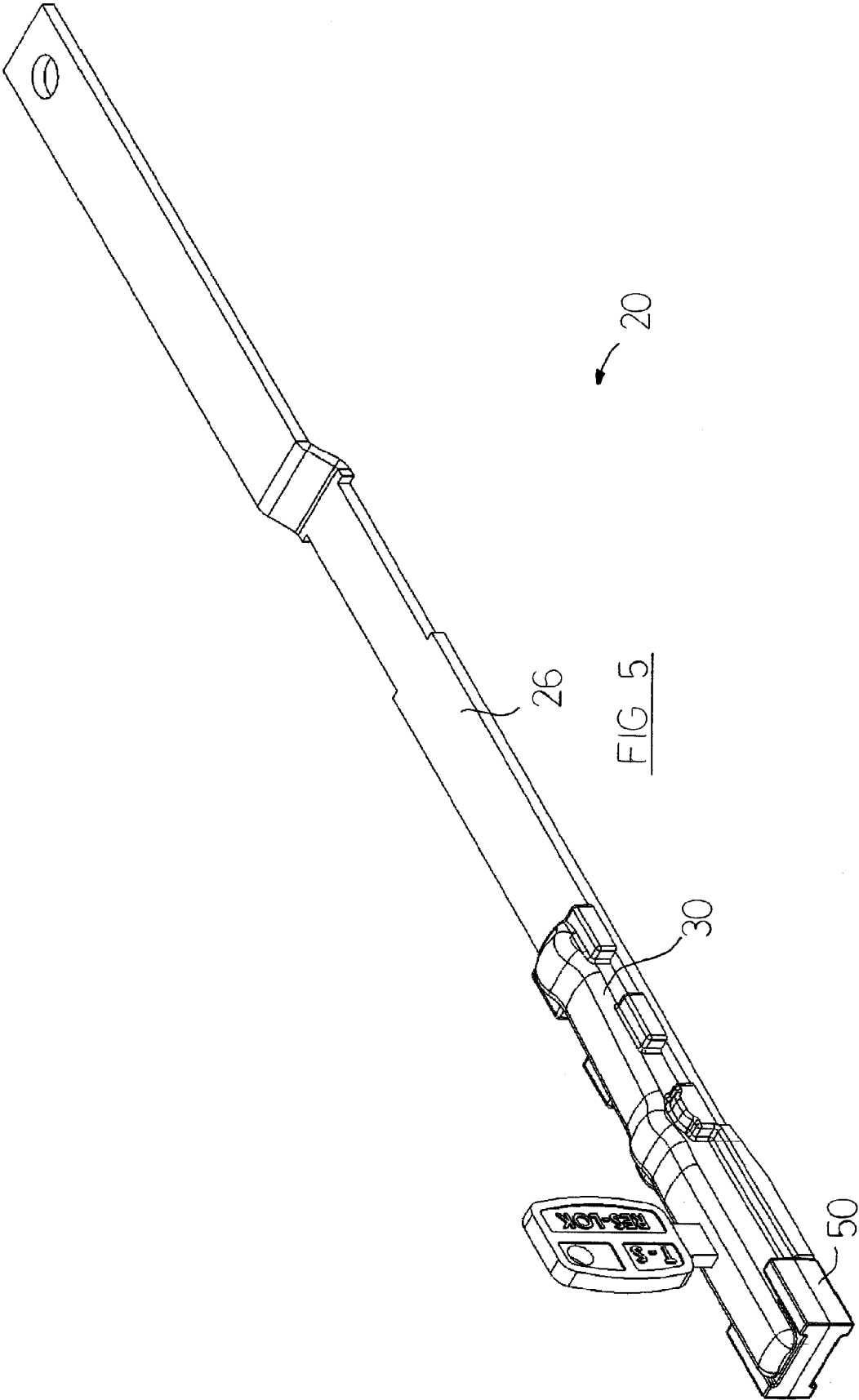
11. A three-bar hinge incorporating a window restrictor according to Claim 10 in which the keyhole (44) is open to the locking recess. 15

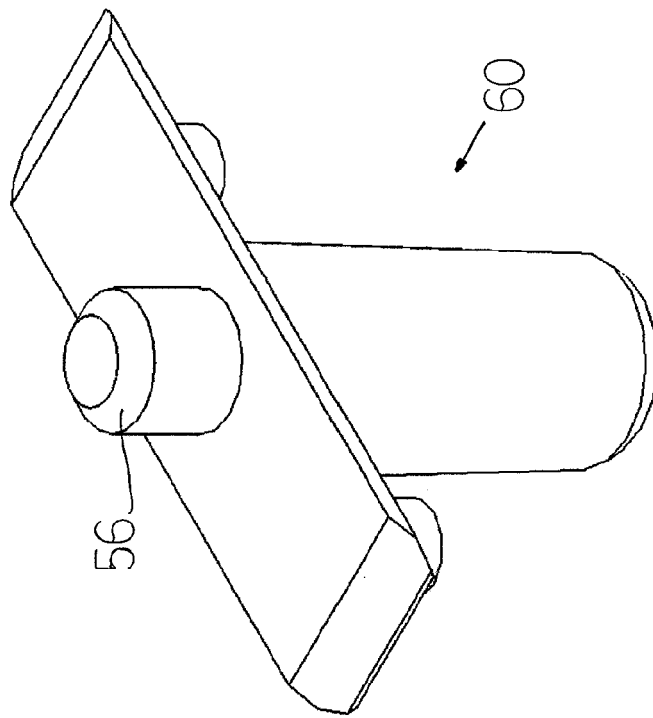
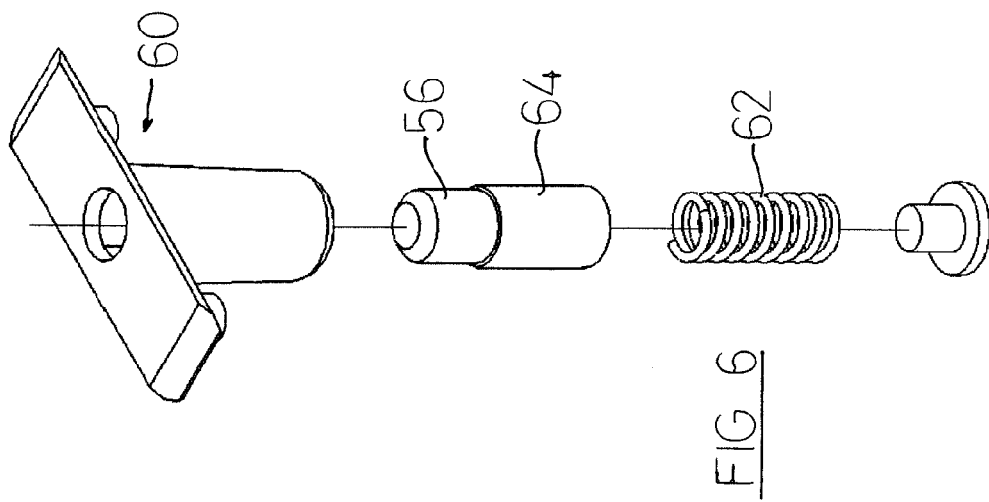
12. A three-bar hinge incorporating a window restrictor (10) according to Claim 10 or Claim 11 in which the keyhole (44) is substantially parallel with the axis of the mounting (14). 20

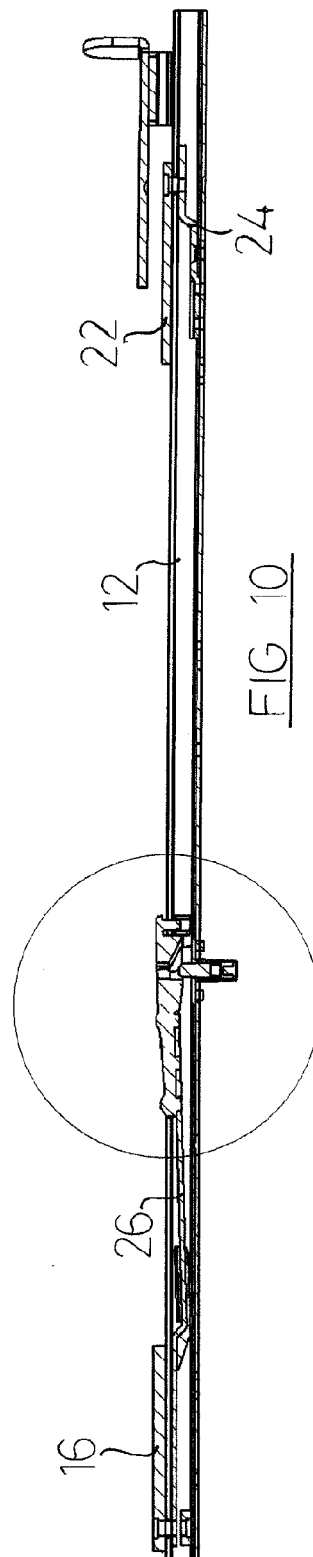
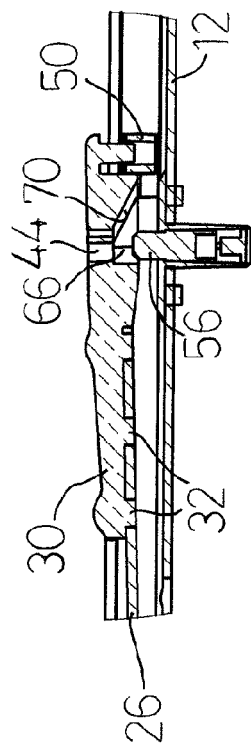
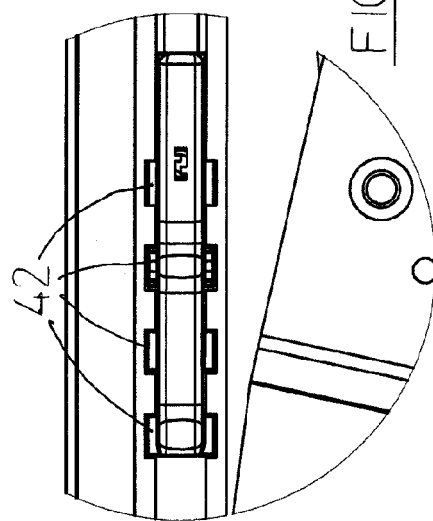
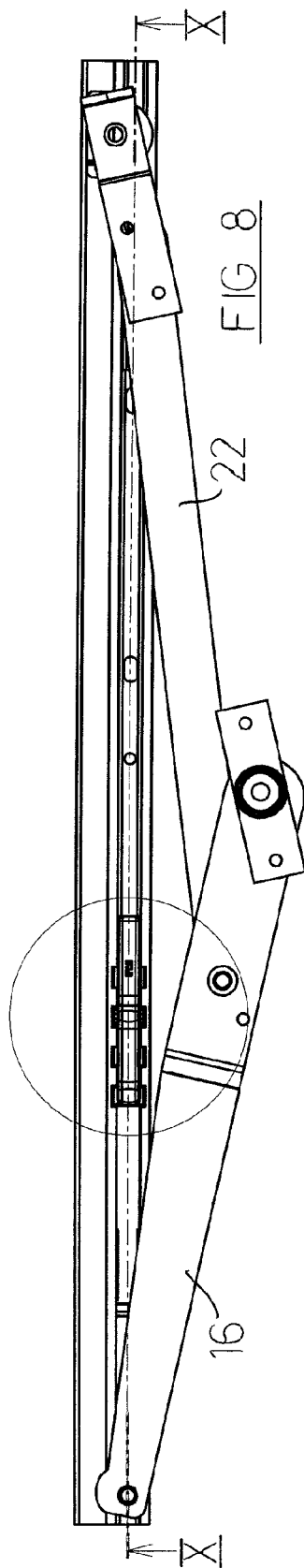


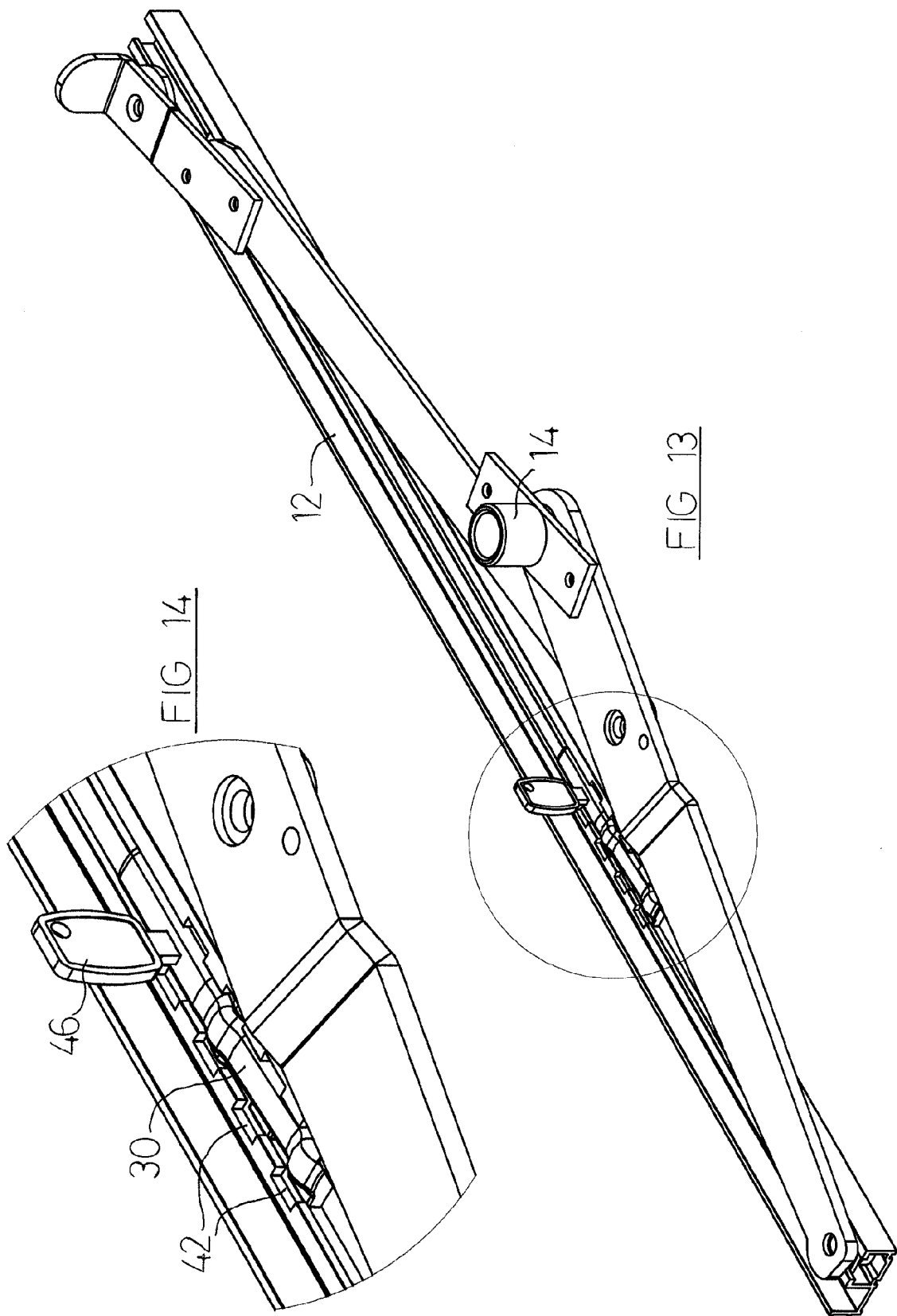


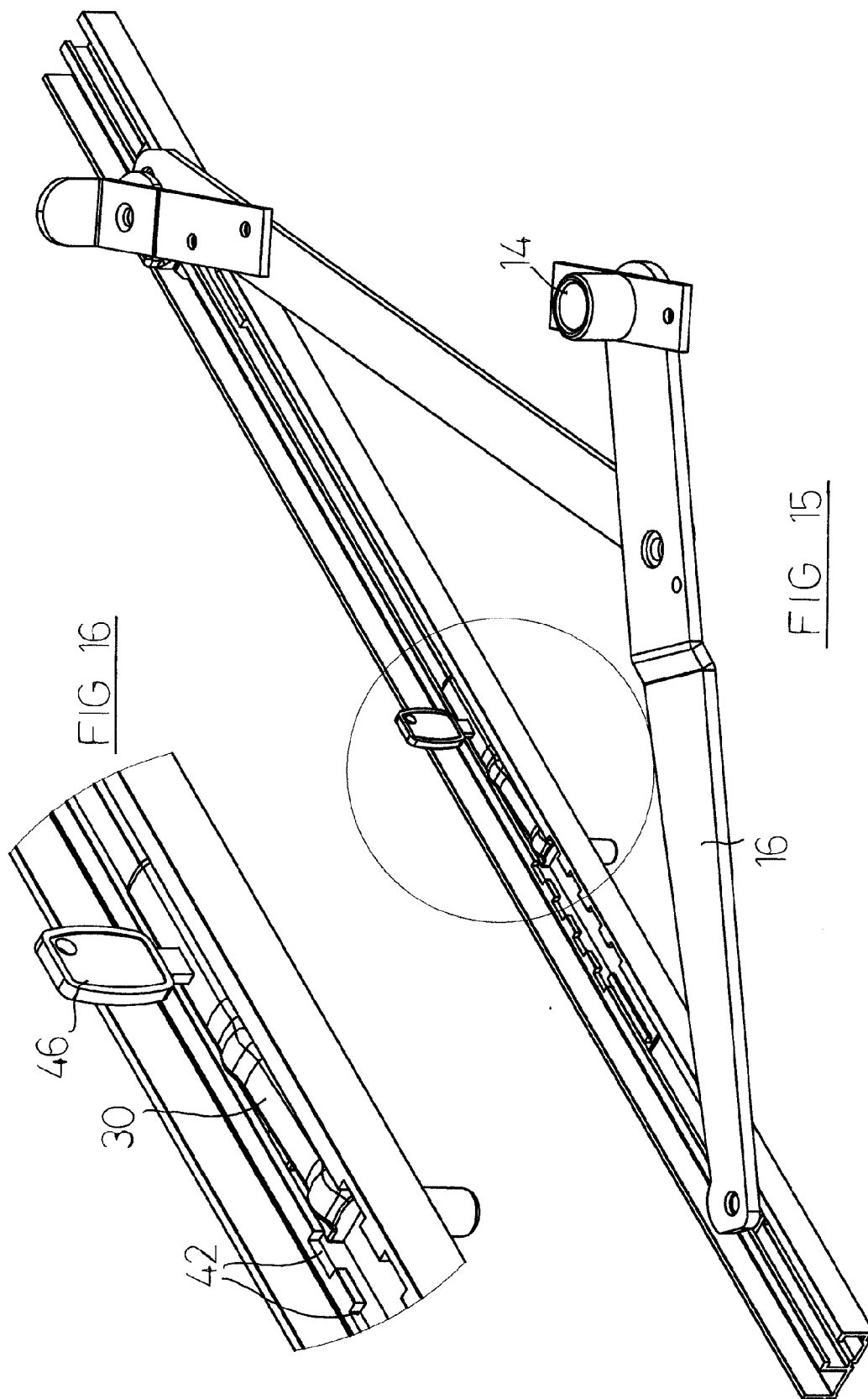


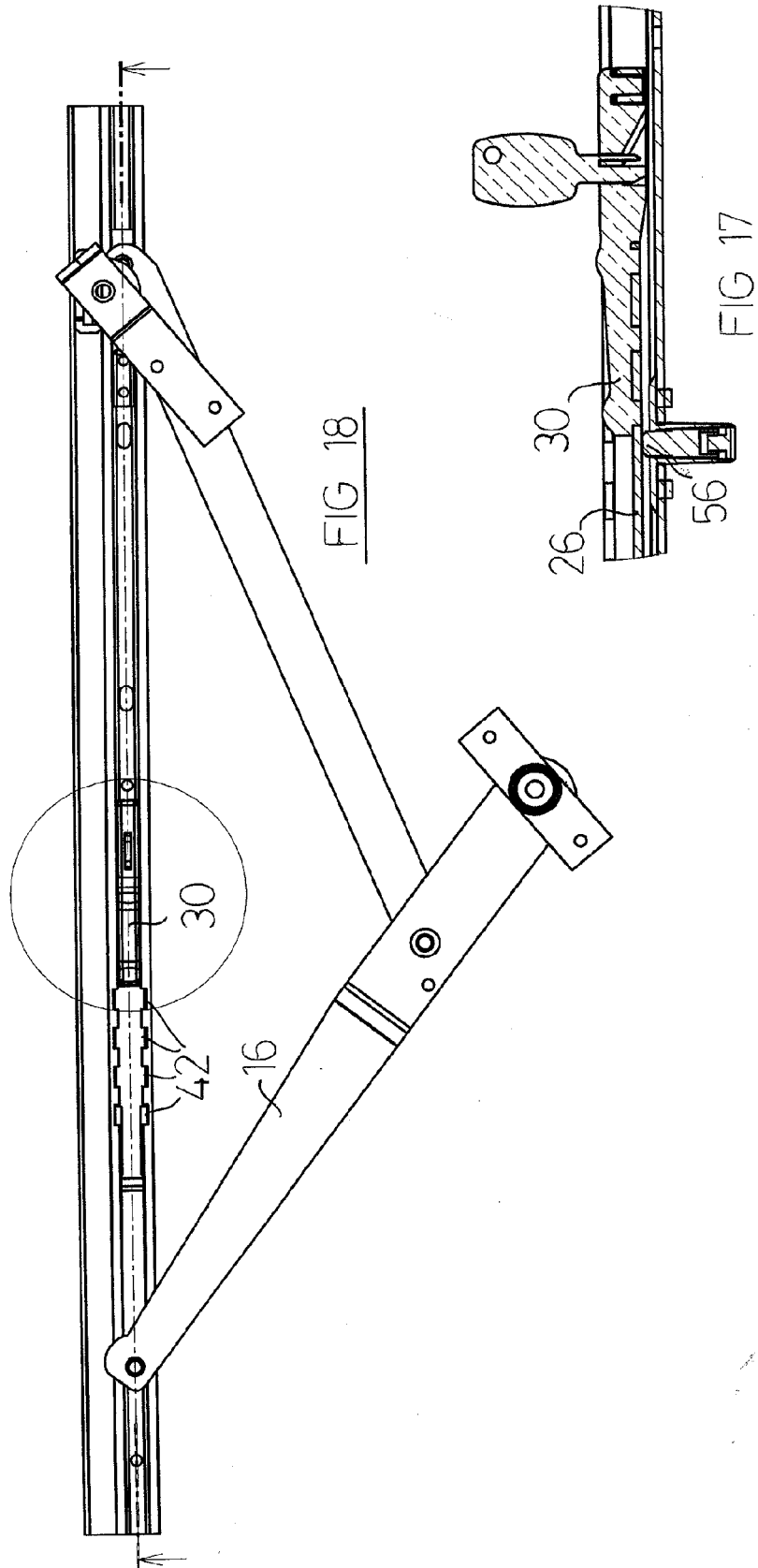














EUROPEAN SEARCH REPORT

Application Number
EP 09 10 0077

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 145 151 A (HARDWARE & SYSTEMS PATENTS LTD) 20 March 1985 (1985-03-20) * the whole document *	1-12	INV. E05D15/44
A	GB 2 246 393 A (SECURISTYLE LTD [GB]) 29 January 1992 (1992-01-29) * the whole document *	1	
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			TECHNICAL FIELDS SEARCHED (IPC)
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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 8 May 2009	Examiner Wagner, A
CATEGORY OF CITED DOCUMENTS 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 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 & : member of the same patent family, corresponding document			

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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 10 0077

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