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(71) Applicant: **VKR Holding A/S**
2970 Hørsholm (DK)

(72) Inventor: **Karstensen, Karl**
6950 Ringkøbing (DK)

(74) Representative: **Münzer, Marc Eric**
Zacco Denmark A/S
Hans Bekkevolds Allé 7
2900 Hellerup (DK)

(54) Locking device for double doors or windows

(57) The present invention relates to a locking device suitable for double doors and/or windows, said locking device comprising:

• a base element comprising a sliding rail and a guiding track;

• a sliding bolt adapted to move along said sliding rail between a locked position and an unlocked position, where at least a part of said sliding bolt protrudes more from said base element in said locked position than in said unlocked position;

• an activating member which is arranged to rotate about an axis of rotation, said axis of rotation being arranged to slide along said guiding track; and

where said activating member is pivotally attached to the sliding bolt such that rotation of said activating member about said axis of rotation causes the sliding bolt to move along said sliding rail.

The invention further relates to a window or door structure comprising a fixed frame adapted to be mounted in an opening in a building structure, a first and second leaf hinged to said fixed frame and the above described locking device attached to the first leaf.

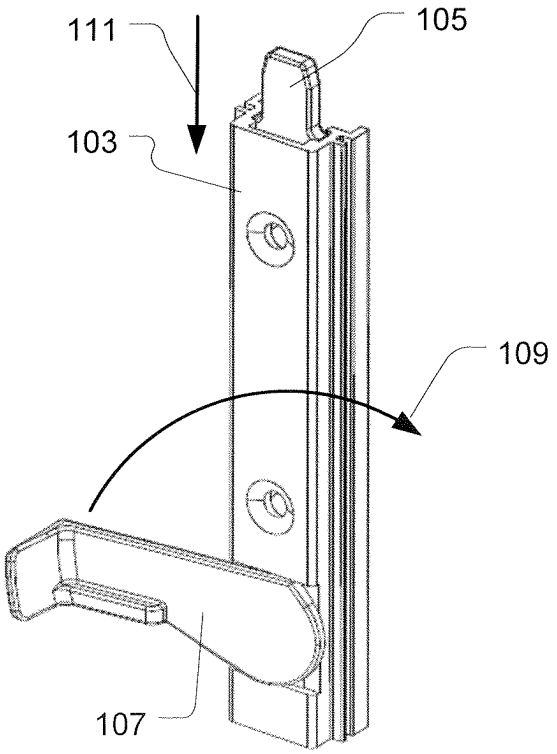

Fig. 3

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Description

Field of the invention

[0001] The present invention relates to locking devices which are suitable for double doors and double windows comprising two door or window leaves each pivotably hinged to opposite sides of a fixed frame and where the leaves each swing to their own side.

Background of the Invention

[0002] Double windows or doors of the above mentioned kind need to be secured in their closed position to the fixed frame in order to prevent opening of the leaves. This is typically achieved by using a first locking mechanism that is secured to one of the leaves. The locking mechanism comprises a sliding bolt that is slid into a recess in the fixed frame when the leaf is closed. The other leaf is hereafter secured to the first leaf by a second locking mechanism. The sliding bolt typically needs to be slid into the recess in the fixed frame manually in order to secure the leaf properly. However people can forget to slide the sliding blot into the recess of the fixed frame and then the leaves are only secured together by the second locking mechanism and not to the fixed frame. The double window or door is as a consequence not secured properly. In the case of an outwardly opening window/door assembly, the two leaves can be opened by pushing from the inside or by pulling from the outside. In the case of an inwardly opening window/door assembly, the opposite is true.

[0003] It should be obvious to the person skilled in the art, that the locking device of the current invention is also suitable for use with window and door assemblies which are different from the one described above. One example is door and window assemblies which have more than two leaves. For example, window assemblies with three leaves are quite common. In addition, in certain types of window or door assemblies, a removable mullion is arranged in the fixed frame. The mullion is attached to the fixed frame via a locking mechanism and then the two leaves on each side of the mullion are locked to the mullion with each their own locking mechanism. The locking mechanism according to the current invention can also be used in such an assembly in order to secure the removable mullion to the fixed frame.

[0004] Locking mechanisms of this kind are known in the prior art. For example DE 29814404 describes a locking mechanism for a double window which is embodied as a hasp that is hinged to the bottom of a first window leaf and can pivot from a first position to a second position. The hasp comprises a free end that in the first position engages with a pin positioned inside the window at the bottom or top of the fixed window frame. The first window leaf can thus be secured to the fixed window frame in its closed position by positioning the hasp in the first position. In order to open the window leaf, the hasp needs to be positioned in the second position. The hasp further comprises a second free end that is positioned opposite the first free end, and that in the second position would extend outside the frame of the first window leaf. The second window leaf would push to the second free end when this window leaf is closed and the hasp would as a consequence be rotated into the first position. The second window leaf would thereafter be secured to the first window by another locking mechanism. The result is that the double window is secured to the fixed window frame and can thus not be opened by pushing from the inside or by pulling from the outside. This locking mechanism is however not sufficient as the pin and hasp that secures the first window leaf to the fixed window frame are not very strong and can be ruined by relatively small push/pull forces, such as when a burglar tries to open the window by using a crowbar. Further many people finds that such locking mechanism ruins the aesthetic impression of the door/window assembly and therefore often prefer manual sliding bolts that are positioned between the two windows leaves and are thus not visible.

[0005] EP1420136, EP1231344 and FR2854919 disclose locking devices for double door or window assemblies. The locking devices are of the type which are mounted to a first one of the door/window leaves and positioned between the two door/window leaves when they are closed. The locking device comprises a faceplate with a slideable bolt which can be slid into a locking position where the bolt engages with a recess at the top or bottom of the fixed door/window frame. The locking device further comprises a control lever mounted to rotate about an axis perpendicular to the plane of the door/window leaves on the front plate. One end of a connecting rod is articulated to the control lever and the other end to the sliding rod. The connecting rod would upon rotation of the control lever slide the sliding bolt along the faceplate. The sliding bolt can thus be slid from the open position to the locked position by rotating the control lever and reverse. The locking device can be mounted at (on) one door or window leaf such that the control lever in the open position would extend outside the door/window leaf. The other door/window would therefore push the control lever when this door/window leaf is being closed and the control lever would thus rotate and bring the sliding bolt into the locking position whereby the windows/doors are secured to the fixed door/window frame. This type of locking device does not secure the door/window leaves sufficiently as it is possible to insert a sharp object such as a screw driver between the two door/window leaves and in this way force the double doors/windows to open and at the same time bring the sliding blot into the open position. Locking devices of this kind are further rather complicated to manufacture as three movable parts (the control lever, the connecting rod and the sliding blot) need to be connected and aligned properly in order for the locking device to work properly. The control lever and connection rod are further embodied as thin metal profiles which can bend whereafter it becomes impossible

to close the door/window leaves because the control lever and connecting rod then would not be able to rotate into the locking position between the two windows/doors.

[0006] JP3581129 B2 discloses another type of locking apparatus for double doors. The locking apparatus is attached to one of the door leaves and comprise a bolt which is slid into a recess in the fixed frame when the other door is closed. The bolt is activated by an activating member which is mounted on the first door leaf in a manner in which it can pivot about a fixed pivot point and pushes the bolt into its locked position when the second door comes into contact with the activating member.

Object and Summary of the Invention

[0007] It is an object of the invention to provide a locking device as mentioned in the introductory paragraph which is better or different to the locking devices known from the prior art.

[0008] This is achieved by the invention as defined by the independent claims, and other advantageous embodiments of the invention are defined by the dependent claims. The benefits and advantages of the present invention are explained and discussed in the detailed description.

[0009] It should be emphasized that the term "comprises/comprising/comprised of" when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

Brief Description of the Drawings

[0010] In the following, the invention will be described in greater detail with reference to the one embodiment shown by the enclosed figures. It should be emphasized that the embodiments shown are used for example purposes only and should not be used to limit the scope of the invention.

Figure 1 illustrates a first embodiment of a locking device according to the present invention seen from behind and in a locked position;

figure 2 illustrates an exploded view of the locking device of figure 1;

figure 3 illustrates the locking device of figure 1 seen from the front and in a locked position;

figure 4 illustrates an exploded view of the locking device of figure 3;

figure 5a illustrates a front view of the locking device of figure 1 in a locked position and where the base element has been removed for clarity purposes;

figure 5b illustrates a front view of the locking device of figure 1 in an intermediate position and where the base element has been removed for clarity purposes;

figure 5c illustrates a front view of the locking device of figure 1 in a unlocked position and where the base element has been removed for clarity purposes.

Detailed Description of Embodiments

[0011] The locking device according to present invention is in the following described as a locking device for a double window comprising two window leaves each hinged to a fixed window frame on opposite sides of said window frame. The locking device is arranged in the sash frame of one of the window leaves such that it is positioned between the two window sashes when the windows are closed. A person skilled in the art would however realize that the locking mechanism could easily also be used in connection with double doors or with window/door assemblies comprising any number of leaves or with window assemblies comprising a removable mullion.

[0012] Figures 1 and 3 illustrate a locking device (101) according to the present invention in the locked position. The locking device (101) comprises a base element (103), a sliding bolt (105) and an activating member (107). The activating member can be rotated as illustrated by the arrow (109) from a first position (illustrated in fig. 1-4, 5a) which corresponds to a locked position of the locking device and into a second position which corresponds to an unlocked position of the locking device (illustrated in fig. 5c). The activating member is pivotally connected to the sliding bolt (105), which protrudes more from the base element in the locked position than in the unlocked position. The sliding bolt is upon rotation of the activating member from the first position to the second position slid downwards inside the base element as illustrated by arrow (111).

[0013] Figures 2 and 4 illustrate exploded views of the locking device of figure 1 and 3. The base element (103) comprises a sliding rail (201) and a guiding track which is made up of two support surfaces (401 a, 401 b). The sliding track runs along the base element and comprises a number of parallel flanges wherein the sliding blot (105) can be inserted. The sliding bolt can thus be displaced along the sliding track from the locked position where a part of the sliding blot protrudes from the base element to the unlocked position where the sliding bolt is arranged inside the base element. The base element can be secured to the sash frame of a window leaf by a number of screws or nails inserted through a number of securing holes (204) in the base element and the sliding bolt comprises oblong openings (206) which allow the sliding bolt to be displaced around the screws or nails. The activating member (107) comprises an activating lever (205) with a securing flange (208) and a cam (207) having a cam surface (216) arranged between and supported by the

two support surfaces (401a, 401b) of the guiding track, and a pivot (210) pivotably connected to the sliding blot through a hole (209) in the sliding bolt and a nut (211). The cam surface is arranged to rotate on the support surfaces and thus the centre of rotation of the cam is displaced along the guiding track and the pivot is arranged offset to the center of the cam and would therefore be displaced, as illustrated in figure 5a, 5b and 5c, as the sliding bolt can only move along the sliding rail. The sliding bolt is therefore forced to move along the sliding rail upon rotation of the activating member.

[0014] The locking device further comprises a resilient friction spring (213) arranged between the sliding bolt and the sliding rail in a recess (215) in the sliding bolt. The friction spring would align the sliding bolt in the sliding rail and thereby reduce play and increase the friction between the sliding blot and the sliding rail whereby the sliding bolt would move more smoothly in the sliding rail. The resilient friction spring could be embodied as a curved piece of metal or plastic or as an elastic material.

[0015] Figure 5 illustrates how the sliding bolt would be displaced upon rotation of the activating member; where figure 5a illustrates the locking device in the locked position, figure 5b an intermediate position and figure 3c the unlocked position. The locking device is arranged at the top (illustrated as to dotted line 501) of a sash frame of a first window leaf which is closed and the activating lever (205) protrudes outwards of the sash frame in the locked position in fig 5a. The sash frame of the other window leaf is in figure 5c open, and its front edge (503) would as illustrated in figure 5b push to the securing flange (208) of the activating lever (205) when it is being closed. The activating member is hereby forced to rotate around an axis of rotation (505,) which in the illustrated embodiment runs through the center of the cam (207), and since the cam is arranged between the two support surfaces (401 a, 401 b) of guiding track illustrated as dotted lines (507a) and (507b), the axis of rotation (505) would be displaced along the horizontal line (509) in between the support surfaces as illustrated by arrow (511a). The pivot (210) would at the same time be forced to move along a vertical axis as illustrated by arrow (513) because the sliding bolt can only move alone the sliding rail, and the sliding bolt is therefore forced to protrude from the base element and sash frame. The horizontal displacement of the axis of rotation (505) would be reversed (511 b) as illustrated in figure 5b once the activating lever has passed its vertical position illustrated in figure 5b as the pivots only can be displaced along a vertical axis. The rotation of the activating member is hereby converted into a linear displacement of the sliding bolt.

[0016] The securing flange (208) is in the locked position illustrated in figure 5a aligned with the front edge (503) of the other window sash and would thus lock the activating member in the locked position because the activating member cannot be rotated as long as the window leaves are closed. The axis of rotation (505) has furthermore passed the vertical axis along which the pivot can be displaced and the sliding bolt is hereby arranged in a self locking position. The securing flange and the self locking position automatically secure the double window when the window leaves are closed and the locking device hereby e.g. prevents a burglar from using a sharp object to open the window. The locking device is further positioned between the two window leaves and is therefore very discreet and does not ruin the aesthetic impression of the double window assembly.

[0017] The cam surface further comprises two stop surfaces (515a and 515b) formed as linear portions of the cam surface. The stop surfaces would prevent the activating member from rotating 360 degrees. The stop surface (515a) would thus prevent the activating member from rotating clock wise when positioned in the unlocked position in figure 5c and the stop surface (515b) would prevent the activating member form rotating counter clockwise when positioned in the locked position in figure 5a.

[0018] It is to be understood that the illustrated embodiments only serve as illustrating examples rather than limiting the scope of the claims. A person skilled in the art may therefore be able to construct alternative embodiments within the scope of the claims.

[0019] One example could be that the guiding track was arranged as a slot in the base element and the activating member comprised a tap which was displaceably and rotatably arranged in said slot. Another example could be that a sliding element was displaceably arranged in a groove in the base element and the sliding element had a pivot to which the activating member was pivotably attached. Many other examples are also possible.

Claims

1. A locking device (101) suitable for double doors and/or windows, said locking device comprising:

   - a base element (103) comprising a sliding rail (201) and a guiding track (401, 509);
   - a sliding bolt (105) adapted to move along said sliding rail between a locked position and an unlocked position, where at least a part of said sliding bolt protrudes more from said base element in said locked position than in said unlocked position;
   - an activating member (107) which is arranged to rotate about an axis of rotation (505), said axis of rotation being arranged to move along said guiding track (509); and

   where said activating member is pivotally attached to the sliding bolt such that rotation of said activating member about the axis of rotation of the activating member causes the sliding bolt to move along said sliding rail.

2. A locking device (101) according to claim 1, **characterized in that** the guiding track (401) of said base element is arranged as at least one support surface (401 a, 401 b) and that said activating member (107) comprises a cam having a cam surface (216) supported on said at least one support surface, and where said cam surface moves on said support surface upon rotation of said activating member whereby said activating member pivots relative to said sliding bolt (105) and moves said sliding blot at least partly between said locked position and said unlocked position.

3. A locking device (101) according to claim 2 **characterized in that** said cam surface (216) comprises at least one stop surface (515a, 515b) at least partly restricting said rotation of activating member (107).

4. A locking device (101) according to any one of claims 1-3 **characterized in that** said axis of rotation (505) of said activating member (107) passes the axis along which said pivot point (210) between the sliding bolt (105) and the activating member is moved, whereby said activating member and said sliding bolt is arranged in a self locking position.

5. A locking device (101) according to claim 4 **characterized in that** said activating member (107) and said sliding bolt (105) are arranged in said self locking position in said locked position.

6. A locking device (101) according to claims 1-5 **characterized in that** said activating member (107) further comprises a pivot (210) positioned offset from the center of said cam (505) and pivotally attaching said activating member to said sliding bolt (105).

7. A locking device (101) according to any one of claims 1-6, **characterized in that** said locking device is arranged such that when said locking device is mounted on a door or window, the sliding rail (201) is arranged essentially parallel to the plane of the window or door, the guiding track (401) is arranged essentially perpendicular to the plane of the door or window and the axis of rotation (505) of the activating member (107) is arranged essentially perpendicular to the sliding rail and essentially parallel to the plane of the door or window.

8. A locking device according to claim 1, **characterized in that** said activating member comprises a tap which is arranged to slide along said guiding track and where said tap is pivotably arranged in said guiding track.

9. A window or door structure comprising a fixed frame adapted to be mounted in an opening in a building structure, a first and second leaf hinged to said fixed frame **characterized in that** said window or door structure comprises a locking device (101) according to any one of claims 1-8 secured to said first leaf.

10. A window or door structure according to claim 9 **characterized in that** said locking device (101) is arranged between said leaves and that said activating member of said locking device is arranged, such that when said second leaf closes, the second leaf will rotate said activating member (107), whereby said sliding bolt (105) is moved into said locked position, such that at least a part of said sliding bolt protrudes into a recess in said fixed frame and thereby securing said first leaf to said fixed frame.

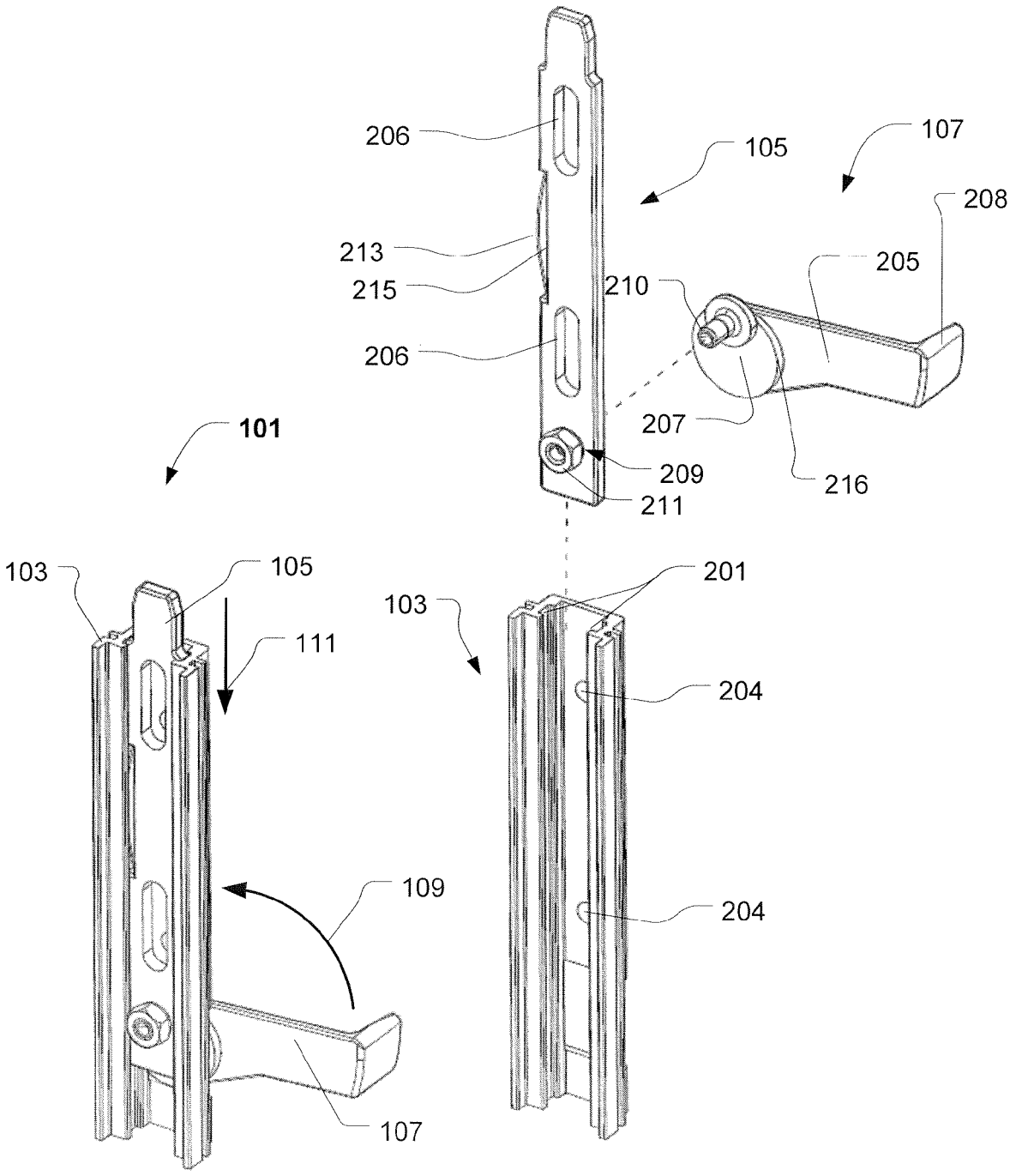
101
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Fig. 1

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Fig. 2

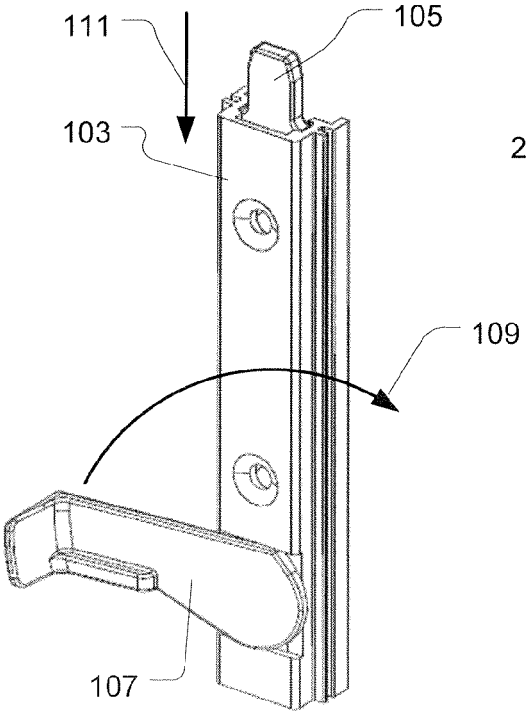
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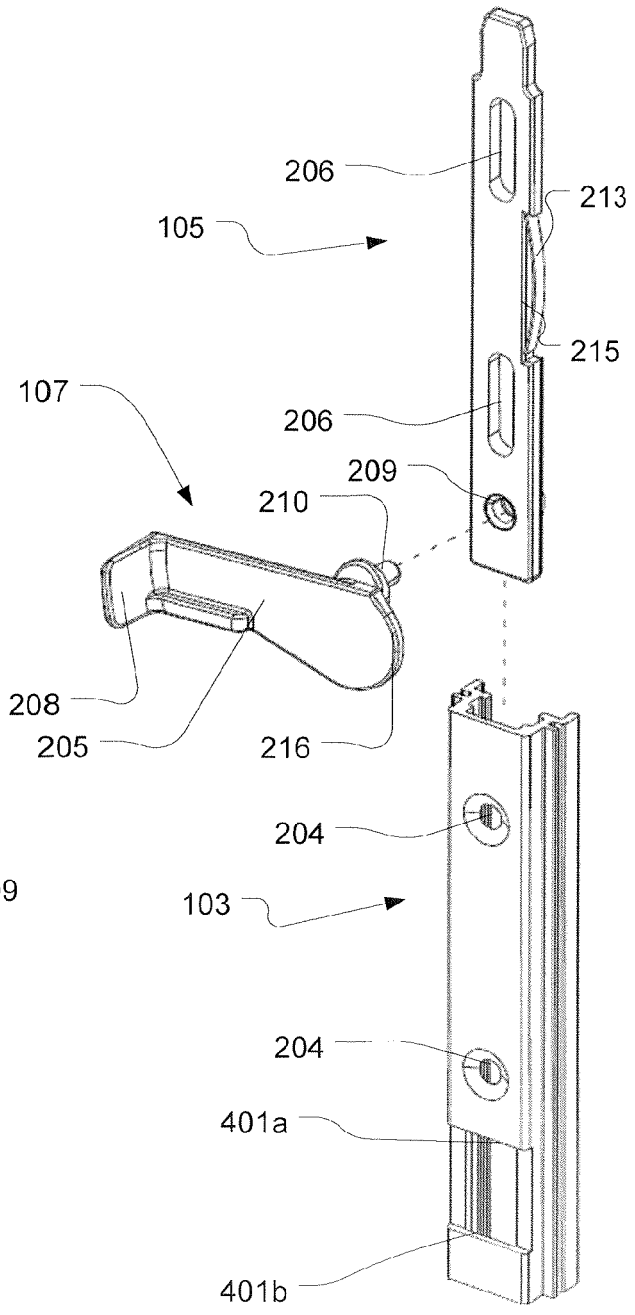
Fig. 3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401b

Fig. 4

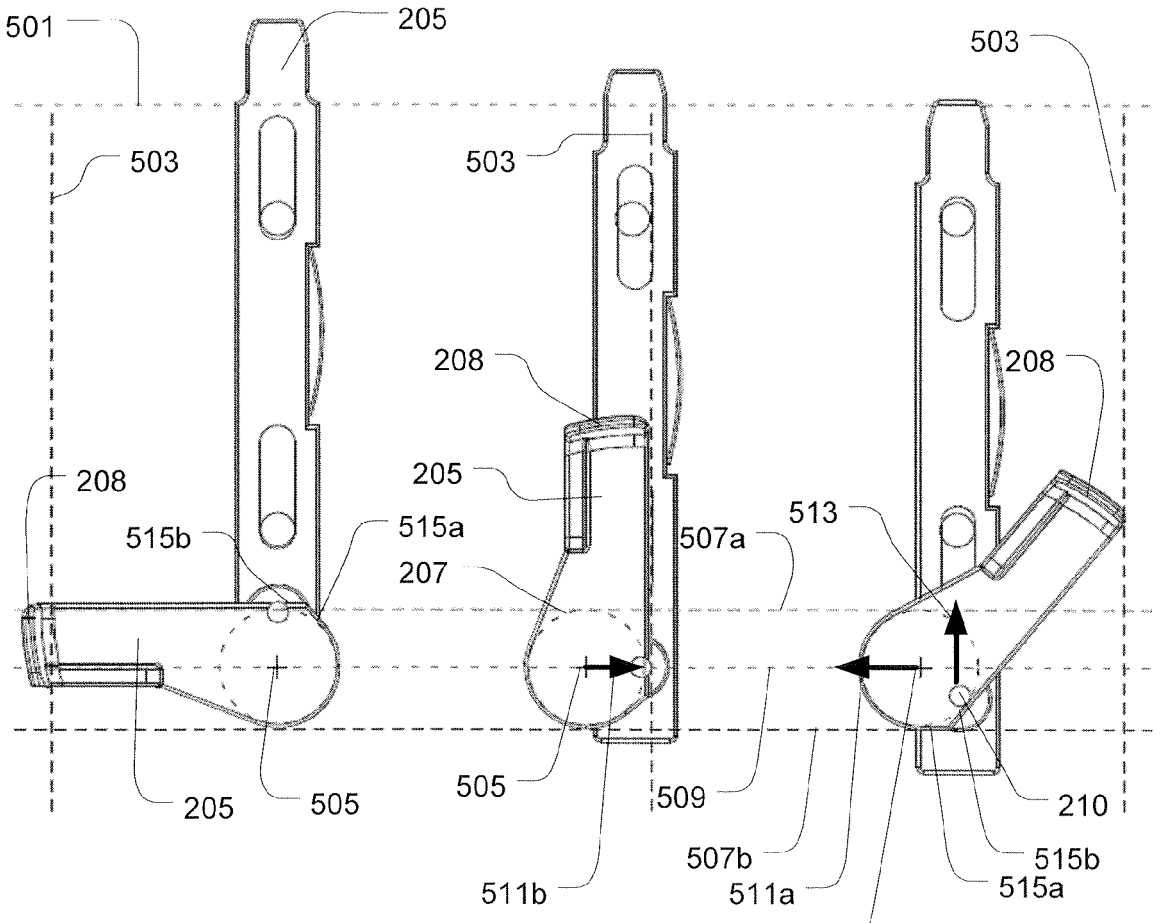

Fig. 5a Fig. 5b Fig. 5c

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EUROPEAN SEARCH REPORT

Application Number
EP 08 15 1951

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	US 5 715 631 A (KAILIAN NOURHAN [US] ET AL) 10 February 1998 (1998-02-10) * the whole document * * figure 2 * -----	1-10	
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			TECHNICAL FIELDS SEARCHED (IPC) E05C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 July 2008	Wagner, A

CATEGORY OF CITED DOCUMENTS

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29-07-2008

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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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