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(54) A lifting device for a roof window

(57) A lifting device (1) for a top hung roof window, said device comprising a lifting arm (2) having a first end (3) connectable to a sash or frame element of said window, and a second end (4) pivotally connected to a slide block (5) adapted for slidable engagement with an opposite frame or sash element, the slide block (5) being in turn connected to a primary biasing means (6) arranged to urge the slide block (5) in a first direction. To provide a lifting device, which can provide a large opening to a roof window for rescue purposes, the lifting arm (2) is extendable and comprises a secondary biasing means (7) urging to extend the lifting arm (2).

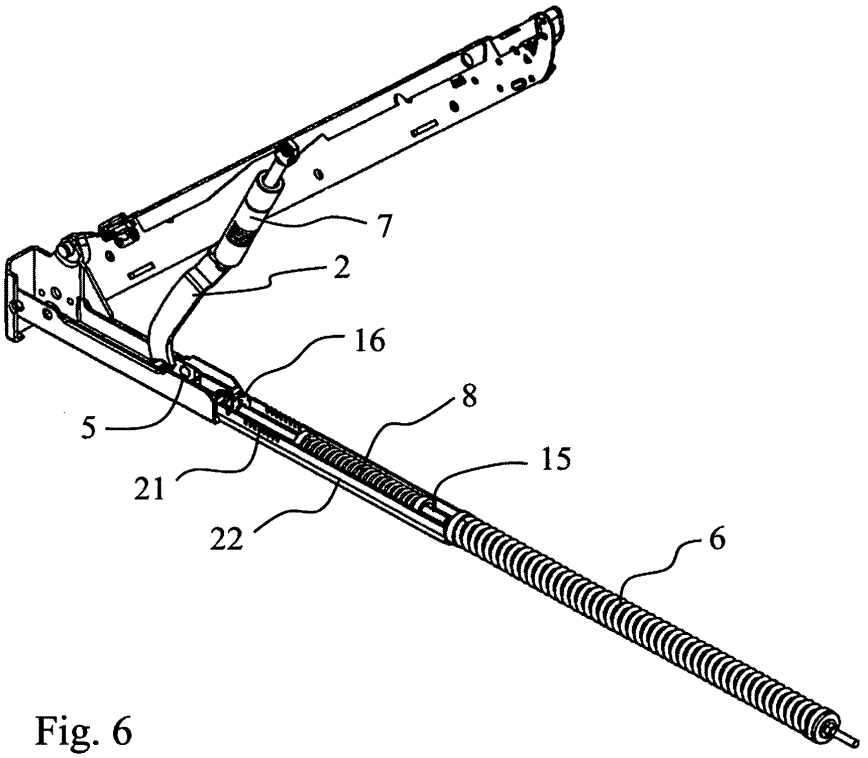

Fig. 6

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Description

[0001] The present invention relates to a lifting device for a top hung roof window, said device comprising a lifting arm having a first end connectable to a sash or frame element of said window, and a second end pivotally connected to a slide block adapted for slidable engagement with an opposite frame or sash element, the slide block being in turn connected to a primary biasing means arranged to urge the slide block in a first direction.

[0002] It is increasingly popular to include attics for living. Often it is possible to considerably increase living floor space at a reasonable price compared to building an extension to a house, which may be impossible anyway if it is in a densely built area. Further with the right windows, a former attic may be transformed into a comfortable and light dwelling, and often with a nice view to the landscape, the skyline and/or the sky, which will considerably raise the value of the house or flat.

[0003] A roof window construction is disclosed in EP 0 733 146 B1 (to the applicant). This construction is popular, as the sash of the roof window is balanced by a lifting device as outlined in the introduction, whereby the window is easy to operate and the sash may be parked in an arbitrary open position for ventilation.

[0004] In some countries, however, the regulations dictate an emergency exit or rescue opening to accept that a former attic is used for living. Although the roof window construction disclosed in EP 0 733 146 B1 can provide a large opening, which will allow most people to escape or be rescued there through in case of emergency, the construction does not comply with the most strict regulations regarding rescue openings. Hence a dedicated rescue opening may sometimes be required to meet the regulations, which will increase the cost of converting the former attic into a dwelling.

[0005] It is hence an object of the present invention to provide a lifting device, which can provide a large opening to a roof window for rescue opening.

[0006] To achieve this object, the lifting device as outlined in the introduction is characterized in that the lifting arm is extendable and comprises a secondary biasing means urging to extend the lifting arm. Hereby the lifting arm may extend to push the sash to a larger angular position in regard to the frame, and thereby provide a considerably larger escape opening to allow exit through the window.

[0007] The primary biasing means may be a gas spring, but according to an embodiment the primary biasing means is a helical spring. Helical springs are low tech, robust and do not change characteristics over time, so the basic functionality of the window will not be deteriorated over time. Further helical springs are relatively cheap.

[0008] It is conceivable to use a helical spring as the secondary biasing means, but it is preferred that the secondary biasing means is a gas spring. Such gas springs are standard, mass-produced components, which can be purchased at reasonable price, and hence will not add significantly to the total cost of the lifting device.

[0009] To increase the versatility of the lifting device, the device may further comprise an auxiliary biasing means arranged in conjunction with the primary biasing means to provide enhanced lifting force.

[0010] To further increase the versatility of the lifting device, the auxiliary biasing means may be provided with adjustment means to allow the lifting force to be adjusted. Hereby it is rendered possible to adjust the lifting force of the lifting device to the specific needs dependent on inclination of the roof, weight of the sash, any accessories mounted on the sash etc.

[0011] In an alternative or supplementary embodiment, the auxiliary biasing means is provided with adjustment means adapted to influence an active angular interval of the auxiliary biasing means. Hereby the auxiliary biasing means may be rendered operative or non-operative in a given angular interval of opening of the window, which functionality may further increase the versatility of the lifting device.

[0012] According to an embodiment, the secondary biasing means is adapted for releasable locking in an unextended position. Hereby it is possible to operate the window as an ordinary roof window under normal conditions, and release the secondary biasing means only in exceptional occasions for exit through the window. This may be advantageous as operation of the window under normal conditions is facilitated, especially for relatively short people, as the opening range of the window is restricted, and hence the handle of the sash is easier to reach.

[0013] An embodiment of the invention relates to a roof window comprising a frame and a movable, top hung sash and a lifting device as described above being arranged at an upper corner of the window.

[0014] Providing only a single lifting device may be sufficient for relatively small windows having a relatively light sash construction, or when the window is mounted in a roof having a steep inclination. However according to an embodiment the roof window may comprise a lifting device at both upper corners of the window, which will provide increased lifting capability and decrease the load on the sash due to the symmetric application of the lifting force of the lifting device on the sash.

[0015] In the following the invention will be described in more detail by way of example and with reference to the accompanying drawings, in which

Fig. 1 is a photograph of a roof window fitted with a lifting device according to the invention,

Fig. 2 is a photograph of a detail of the roof window of Fig. 1,

Fig. 3 is a perspective view of the lifting device according to the invention,

Fig. 4 is a side view of the lifting device in an open position,

Fig. 5 is a side view of the lifting device in a position

of extended opening, and

Fig. 6 is a perspective view of the lifting device mounted with springs.

[0016] The roof window 10 partially shown in the photo of Fig. 1 is adapted for mounting in an inclined roof. The window 10 comprises a frame 11 and an openable, top hung sash 12 supporting a glass pane 13. The window 10 incorporates a lifting device 1 to more or less counterbalance the weight of the sash 12, whereby the window can be operated easily, and even be parked in an arbitrary position. In Fig. 1 the sash 12 is in a fully open position, in which the window can be used as an exit. The lifting device 1 comprises a lifting arm 2 arranged to lift the sash 12 in respect to the frame 11. At a first end 3 the lifting arm 2 is connected to a sash element of the sash 12, and at a second end 4 to a slide block (not shown) sliding in a guideway 14 on the front side of a frame element of the frame 11, said frame element being opposite to the sash element. The slide block is in turn connected to a tie rod (not shown) connected to a primary biasing means 6, in this case a helical spring, which will urge the slide block downwards in the guideway 14, and thereby lift the sash 12 as illustrated. The lifting device 1 further comprises secondary biasing means 7, which becomes effective at an opening of 40-45° and continues to a max opening of approximately 67° corresponding to an opening height of about 120 cm by extension thereof. The embodiment shown further comprises auxiliary biasing means 8, which may be adjusted to provide initial lifting depending on inclination of the roof and the weight of any accessories on the sash.

[0017] In the embodiment shown, the window 10 is equipped with a set of lifting devices, one at each side of the sash 12. This is partly because of the restricted space available for the secondary biasing means 7. In the shown embodiment, the necessary lifting capacity is approximately 1000 N, whereas the largest possible gas spring mountable at the sash has a lifting capacity of 1100 N at the time of delivery. However gas springs tend to fade with time at a rate of approximately 2% per year, so it is advisable with a safety margin.

[0018] The primary biasing means 6 and the auxiliary biasing means 8 can be seen in the photograph of Fig. 2. The primary biasing means 6 is a helical tension spring, which is connected to the sliding block 5 via a tie rod 15. The auxiliary biasing means 8 is a helical compression spring, which becomes effective at abutment with the abutment 16, which is moveable for adjustment. The abutment 16 may be adjusted by positioning the abutment 16 in one of a series of notches 21, such as nine positions, in a secondary guideway 22. Hence the auxiliary biasing means 8 may be adjusted to the inclination of the roof and the weight of the sash etc. to cooperate with the primary biasing means 6 during initial opening of the window 10. The function is described in more detail in EP 0 733 146 B1.

[0019] The lifting device can be seen in isolation in Fig. 3. The position shown corresponds to a situation in which the sash is lifted to an open position, however prior to extension of the secondary biasing means 7. This corresponds to the maximum opening of the prior art window construction of EP 0 733 146 B1. In the embodiment shown in Fig. 3, the lifting arm 2 comprises a secondary biasing means 7 in the form of a gas spring. A first end 3 of the lifting arm 3 is connected to a fitting or intermediate sash 17. The intermediate sash 17 is connected to a frame fitting 19 by a hinge 18. A sash may be connected to the intermediate frame 17 at a pivot hinge 20, to thereby achieve a window, which is operable as either a centre-hung window or a top-hung window.

[0020] In the perspective view of Fig. 3, the slide block 5 is in an extreme position in the guideway 14, urged by the primary biasing means (not shown), whereby the lifting arm 2 is raised, whereby the intermediate sash 17 is raised to a maximum, normal opening. Fig. 4 is a corresponding side view illustrating the lifting device in the maximum, normal opening, in which the intermediate sash 17 is raised by the lifting arm 2, but the secondary biasing means 7 is not extended. In the embodiment shown, the maximum, normal opening is an opening of about 40-45°.

[0021] In a subsequent step, the secondary biasing means 7 is extended, raising the intermediate sash 17 further to an escape opening as illustrated in the side view of Fig. 5. In the embodiment shown, the escape opening is an opening of about 65-70°.

[0022] The lifting device is in Fig. 6 seen mounted with a primary biasing means 6 in the form of a helical spring which is connected to the slide shoe 5 of the lifting device via the tie rod 15. A secondary biasing means 8, namely a helical spring, is arranged around the tie rod 15. In the illustrated position, the secondary biasing means 8 is not active, as it is free floating between the end of the primary biasing means 6 and the abutment 16.

[0023] The term "lifting device" is intended to cover any counterbalancing, biasing or lifting device, as will be understood by the skilled person. In other words, the term "lifting device" is not restricted to a device urging the sash to an open position, but will also cover devices, which only partially carry the weight of the sash, i.e. a counterbalancing or lifting aid to facilitate opening of the window.

[0024] Other embodiments than the ones shown in the drawing and explained above are obviously feasible. Although the embodiment shown comprises a primary biasing means arranged in parallel to a frame side part, it will be evident to the skilled person that a kinematical reverse situation is also possible in which the primary biasing means is arranged in parallel with a sash side part. It is also possible to completely substitute the lifting arm with the secondary biasing means.

Claims

1. A lifting device (1) for a top hung roof window, said

device comprising a lifting arm (2) having a first end (3) connectable to a sash or frame element of said window, and a second end (4) pivotally connected to a slide block (5) adapted for slidable engagement with an opposite frame or sash element, the slide block (5) being in turn connected to a primary biasing means (6) arranged to urge the slide block (5) in a first direction, **characterized in that** the lifting arm (2) is extendable and comprises a secondary biasing means (7) urging to extend the lifting arm (2).

2. A device (1) according to claim 1, wherein the primary biasing means (6) is a helical spring.

3. A device (1) according to claim 1 or 2, wherein the secondary biasing means (7) is a gas spring.

4. A device according to any of the claims above, further comprising an auxiliary biasing means (8) arranged in conjunction with the primary biasing means (6) to provide enhanced lifting force.

5. A device (1) according to claim 4, wherein the auxiliary biasing means (8) is provided with adjustment means (16) to allow the lifting force to be adjusted.

6. A device (1) according to claim 4, wherein the auxiliary biasing means (8) is provided with adjustment means (16) adapted to influence an active angular interval of the auxiliary biasing means (8).

7. A device (1) according to any of the claims above, wherein the secondary biasing means (7) is adapted for releasable locking in an unextended position.

8. A roof window (10) comprising a frame (11) and a movable, top hung sash (12) and a lifting device (1) according to any of the claims above being arranged at an upper corner of the window (10).

9. A roof window (10) according to claim 8, said roof window (10) comprising a lifting device (1) at both upper corners of the window (10).

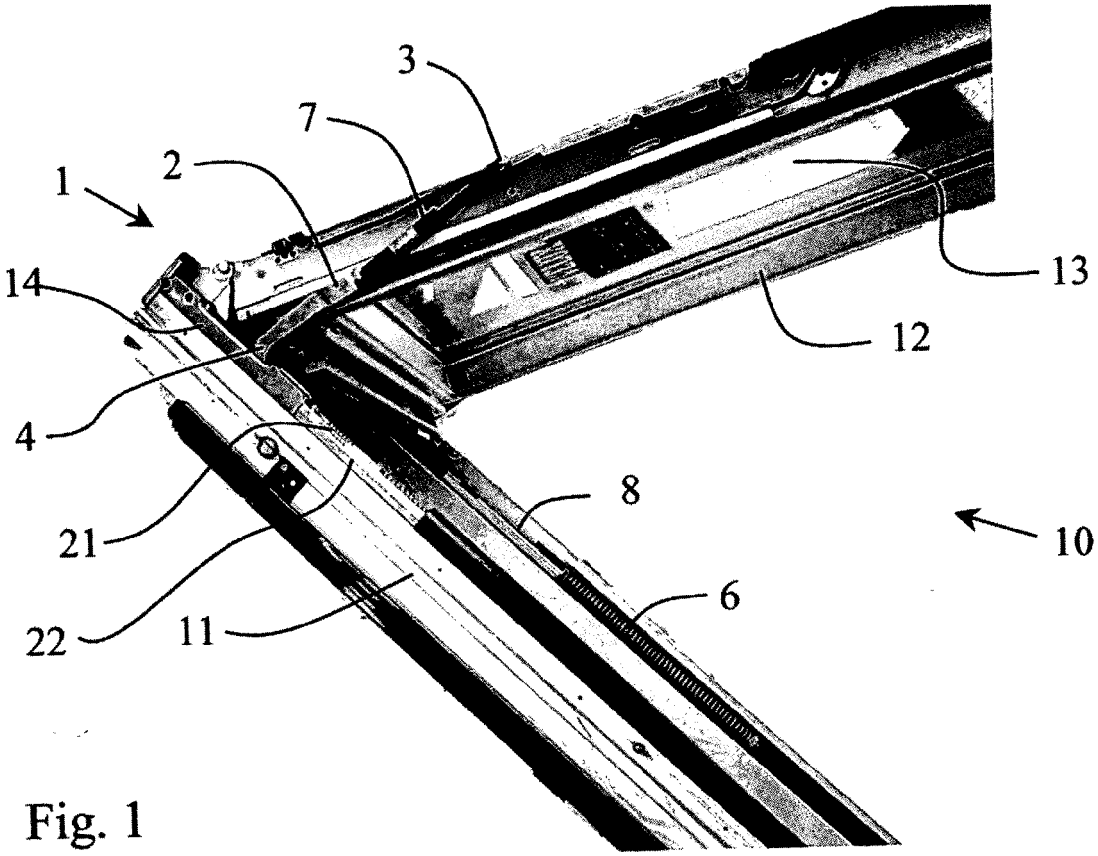

Fig. 1

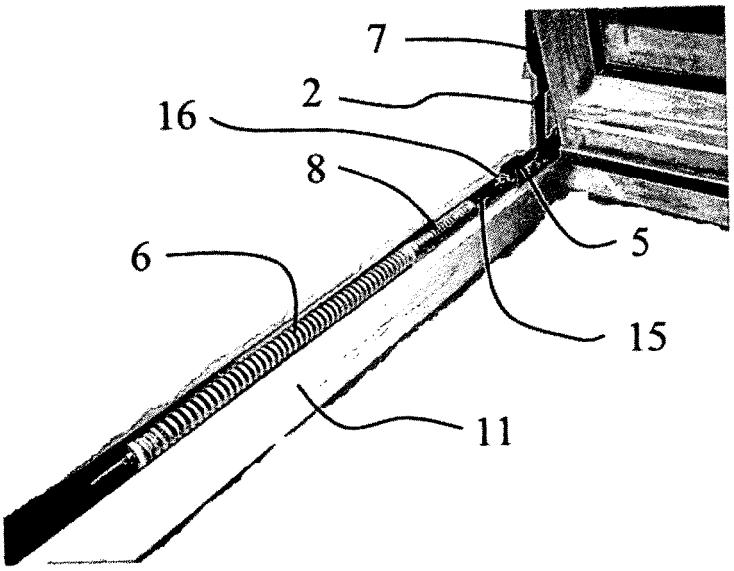

Fig. 2

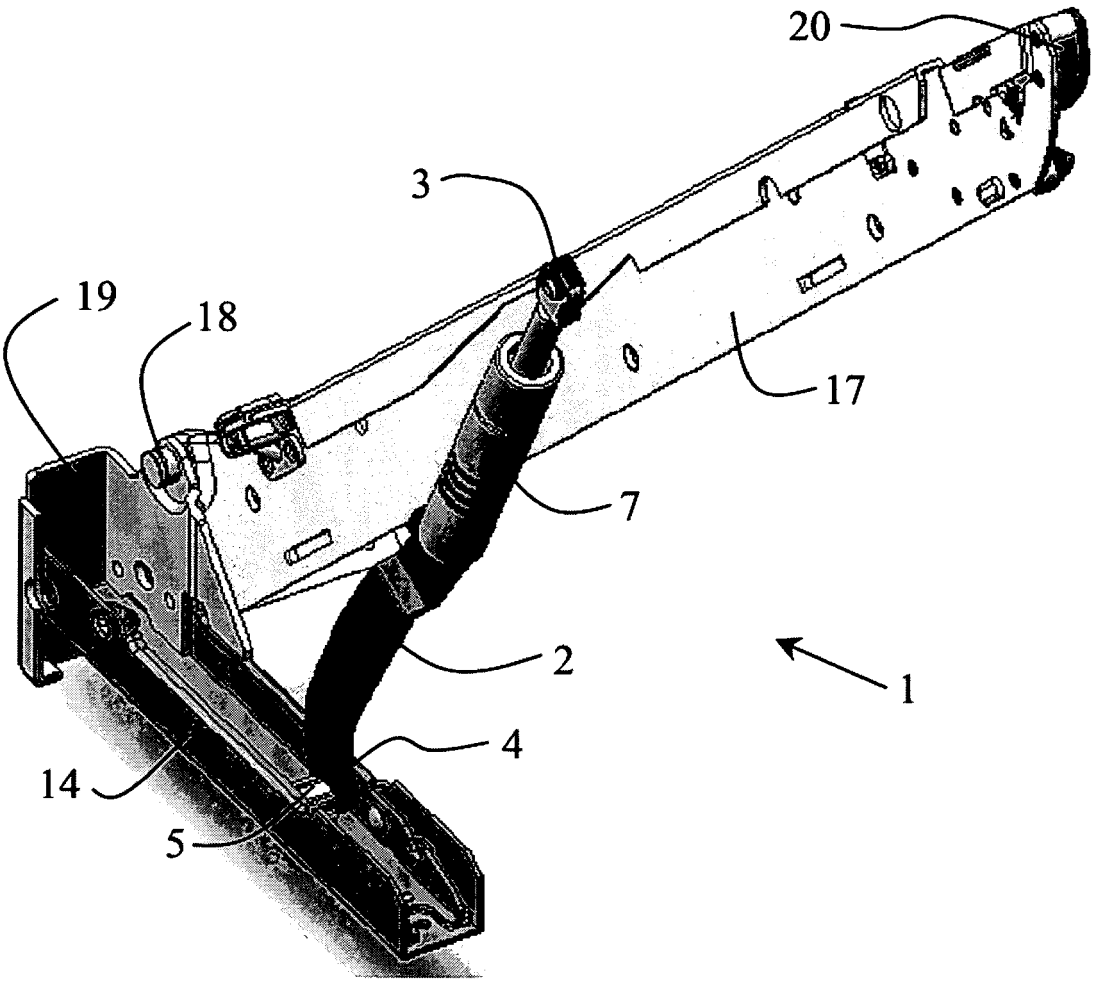

Fig. 3

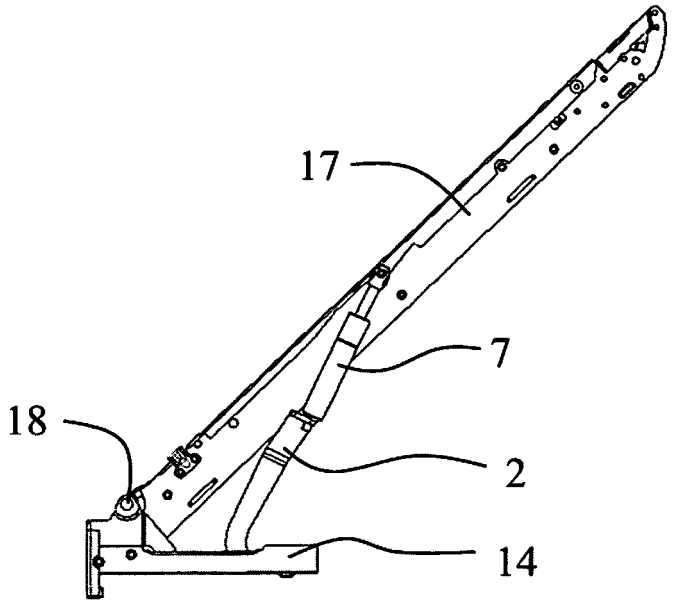

Fig. 4

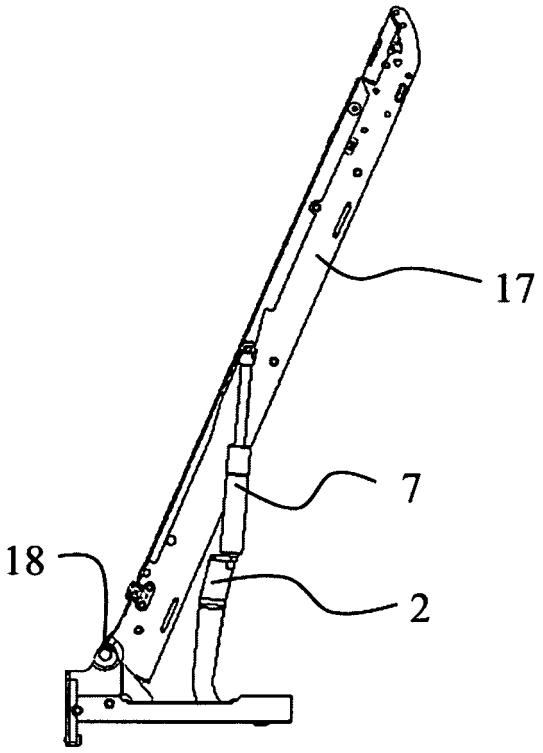

Fig. 5

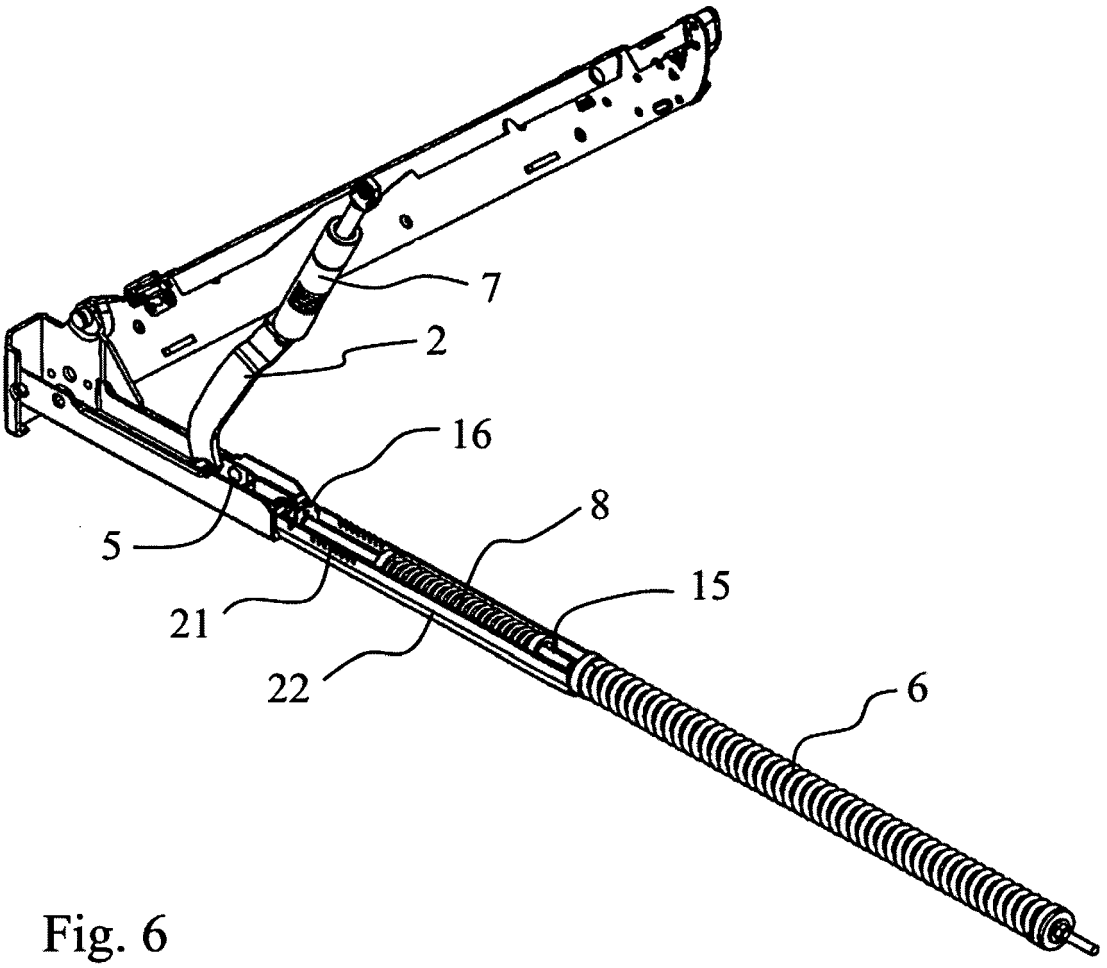

Fig. 6

European Patent Office

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Application Number
EP 05 38 8078

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	13 February 2006	Mund, A

CATEGORY OF CITED DOCUMENTS

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