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(71) Applicant: **NORDAG, besloten vennootschap met beperkte aansprakelijkheid**
3482 Beringen (BE)

(72) Inventor: **Lynen, Gaston**
3582 Koersel (DE)

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(74) Representative: **Donné, Eddy**
Bureau M.F.J. Bockstael nv
Arenbergstraat 13
2000 Antwerpen (BE)

(54) **Skylight**

(57) Skylight (1) for a sloping roof (2) that essentially consists of a window frame (4) on which a screen panel (3) is mounted in the plane of the sloping roof (2), whereby the window frame (4) is composed of a fixed part in the form of a fixed frame (5) and an inward-turnable part (6) in which a window leaf (12) is held and which is fastened

to the fixed frame (5) in a hinged way, whereby the turnable part (6), when opening up to 18°, can never protrude through the plane of the roof, and the turnable part can be locked in every desired position by means of a locking knob (16)

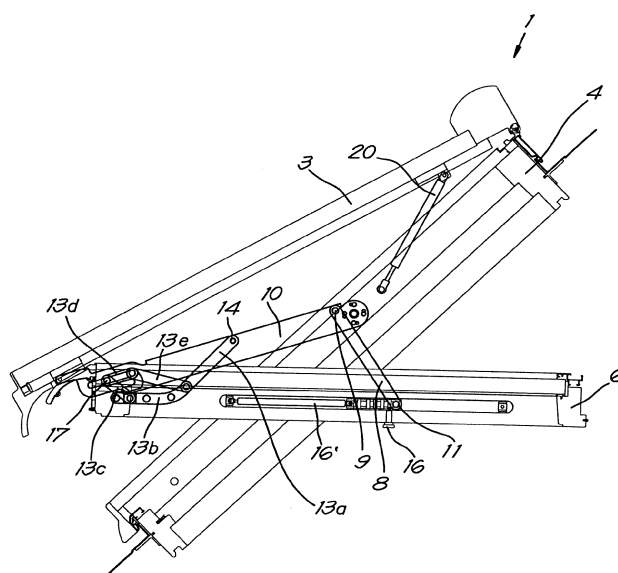


Fig. 7

Description

[0001] The present invention relates to a skylight.

[0002] More specifically, the invention relates to a skylight of the type that can be built into a roof opening of a sloping roof.

[0003] The function of an attic under a sloping roof is increasingly developing into a living space, arranged as a bedroom or hobby room for example. This means that it must be possible to let in sufficient daylight and ventilation, and also that the visual contact with the outside world through the skylight becomes more important.

[0004] Skylights for sloping roofs are already known that consist of a fixed window frame and a tiltable window leaf that is affixed in a hinged way in this window frame on a central horizontal shaft.

[0005] When opening such a skylight the top part of the aforementioned window leaf tilts inwards, while the bottom part tilts outwards.

[0006] The window leaf can be locked in an open position, whereby the window is left ajar for ventilation or the window can also be opened further so that the outside of the leaf is turned towards the inside, for example to be able to clean the outside of the window from the inside.

[0007] This type of skylight is widespread today but presents the following shortcomings:

- its thermal comfort is inadequate because these existing and known skylights turn outwards at the bottom and inwards at the top, which makes a closed outside sunblind in the plane of the roof impossible during ventilation, and the heat is consequently not blocked before it reaches the glass surface and heats up the attic room;
- its sleeping comfort is inadequate because an insect screen cannot be fitted on the outside of the skylight in the plane of the roof, due to the inward and outward turning of parts of the skylight;
- the visual comfort is inadequate because with these known skylights good visual contact with the outside world is not possible on account of the blind spot along the underside when looking outside;
- the intruder protection is inadequate because with the slightest opening of the window leaf, the window leaf can be turned fully open from the outside.

[0008] The purpose of the present invention is to provide a solution to the aforementioned and other disadvantages, by providing a skylight for a sloping roof that essentially consists of a window frame on which a screen panel is mounted in the plane of the sloping roof, whereby the window frame is composed of a fixed part in the form of a fixed frame and an inward-turnable part in which a window leaf is held and which is fastened to the fixed frame in a hinged way by means of

- (i) two movable arms (10,10') that are affixed in a hinged way at the same height at a distance from the underside of the fixed frame (5) to the upright side beams (5a,5b) of the fixed frame (5),
- (ii) two hinge mechanisms (13), that each consist of hinge arms (13a, 13b, 13c, 13d, 13e) that are connected together in different hinge shafts, whereby each hinge mechanism (13) is connected to one of the movable arms (10,10') on the one hand and to one of the side beams (6a, 6b) of the turnable part (6) on the other hand, and
- (iii) two connecting pieces (8,8') that are each connected in a hinged way by means of a hinge shaft (9,9') to one of the two movable arms (10, 10') on the one hand and by means of a hinge shaft (11,11') to the adjacent upright side beams (6a, 6b) of the turnable part (6) of the window frame (4) on the other hand, which together with the top (6c) and bottom (6d) crossbeams of the turnable part (6) comprise the window leaf (12) and whereby the turnable part (6), when opening up to 18°, never protrudes outside through the plane of the roof.

[0009] An advantage of the group of hinges that are movable around a hinge shaft on the bottom crossbeam of the turnable part is that, due to the path that these hinges take, for every opening angle up to 18° for ventilation the window frame never protrudes through the plane of the roof, so that a screen panel with a screen against insects on the outside or a sunblind on the outside or a burglar-proof grid on the outside does not have to be removed or opened in order to open the window frame to a ventilating open angle up to 18° towards the inside. In other words, the plane of the window leaf remains entirely inside the attic space in this ventilation position.

[0010] Preferably the connecting pieces, that connect the two hinges on the upright side beams of the fixed frame, connected to the adjacent upright side beams of the turnable part, consist of a connecting piece that connects a hinge on an upright side beam of the fixed frame to a hinge on an adjacent upright side beam of the movable part.

[0011] An advantage of this construction is that the movable part of the frame can be placed in a number of positions without losing the support from the fixed frame. The movable part can hereby be secured in every position by means of a locking knob that prevents the movable part from continuing to turn further than desired or turning back.

[0012] Preferably the locking knob (15) is a rotary knob, which when turned makes a pin move into one of a series of notches, by which the movement of a gas spring built into an upright beam (6b) of the turnable part (6) of the window frame (4) can be restricted, such that the turnable part (6) is locked in its current position.

[0013] Preferably the movable part of the window

frame can be turned through an angle greater than 18°, whereby the movable part of the window frame first comes to a horizontal position, whereby the screen panel is no longer in the plane of the sloping roof, but is lifted up by a small angle so that ventilation is possible, but the shelter of the outside sunblind largely remains preserved.

[0014] Preferably the movable part of the window frame can be further turned to an upward sloping intermediate position, whereby the outside sunblind is now kept horizontal by the supporting movable part of the window frame, whereby more ventilation is possible and the shelter of the outside sunblind covers a greater footprint on the sloping roof.

[0015] Preferably the movable part of the window frame can be further turned to the vertical position, whereby the screen panel is now held sloping upwards by the vertical supporting movable part of the window frame and whereby the bottom crossbeam of the movable part is turned upwards, and whereby the side of the window that is turned towards the outside in the closed position of the skylight is now turned towards the inside and can be easily reached from the attic room.

[0016] An advantage of this possibility to turn the window leaf to the vertical position, with the outside of the window now turned towards the inside of the attic, is that this position enables the outside of the window to be cleaned from the inside in an easily accessible vertical position.

[0017] Another advantage of this possibility to turn the window leaf to the vertical position is that a larger ventilation opening is hereby obtained in the previous positions of the window leaf.

[0018] Another advantage of this possibility to turn the window leaf to the vertical position is that it provides a better view of the outside world and the roof surface compared to the view from a dormer window.

[0019] Preferably the screen panel, which is in the plane of the roof in the closed position of the skylight, is in an upward sloping position when the window leaf is turned to a vertical position.

[0020] An advantage of this possibility is that the screen panel does not need to be removed in order to be able to bring the window leaf to a vertical position.

[0021] Another advantage is that the screen panel with the outside protection of the skylight will automatically be in a good closed position again when the window leaf is turned back again.

[0022] With the intention of better showing the characteristics of the invention, a preferred embodiment of a skylight according to the invention is described hereinafter by way of an example, without any limiting nature, with reference to the accompanying drawings, wherein:

Figure 1 schematically shows a perspective view of a skylight according to the invention in a closed position;

figure 2 shows the skylight of figure 1 but opened in a ventilation position of 18°;

figure 3 shows the skylight of figure 1 but in an open and vertically turned position;

figure 4 schematically shows a side view of the window frame of the skylight according to the invention in a closed position;

figure 5 shows figure 4 but now opened 18° in a ventilation position;

figure 6 shows figure 5 but now locked against further turning;

figure 7 shows figure 4 but now turned to a horizontal position;

figure 8 shows figure 7 but now turned further to an upward sloping position;

figure 9 shows figure 8 but now turned further to a vertical position.

[0023] Figure 1 shows a perspective view of a skylight 1 according to the invention, built into a sloping roof 2 and consisting of a screen panel 3 mounted on a window frame 4, consisting of a fixed frame 5 and a turnable part 6, whereby the skylight 1 is shown in a closed position and whereby the screen panel 3 is in the plane of the sloping roof 2 and is provided with an insect screen and/or a light-blocking roller blind and/or a burglar-proof screen with an optional roll-up mechanism 7.

[0024] Figure 2 shows the skylight 1 of figure 1, but now the turnable part 6 of the window frame 4 is turned open towards the inside at an angle of 18° in a ventilation position, whereby parts of the mechanism that enables this movement can be seen. The turnable part 6 is connected to the fixed frame 5 by means of connecting pieces 8 and 8' that connect the two hinge shafts 9, 9' on the upright movable arms 10, 10' on the side beams 5a, 5b of the fixed frame to the hinge shafts 11, 11' on the upright side beams 5a, 5b of the turnable part 6. The turnable part 6 of the window frame 4 with the window leaf 12 no longer closes the attic room off from the outside air in this position, as shown in more detail in figure 5.

[0025] Figure 3 shows the skylight 1 of figure 1, but now the turnable part 6 of the window frame 4 is turned further completely towards the inside to a vertical position, whereby the bottom crossbeam 6a of the turnable part 6 is turned upwards, and the top crossbeam 6b is now at the bottom and the window leaf 12 is brought to a vertical position so that the side of the window that is turned towards the outside in the closed position of the skylight 1 is now turned towards the inside and can be easily reached from the attic room.

[0026] Figure 4 shows a side view of the window frame 4 of the skylight 1 in the closed position again, with its fixed frame 5 and turnable part 6 and with the connecting piece 8, that connects a hinge shaft 9 on an upright moving arm 10 on the fixed frame 5 to a hinge shaft 11 on an upright side beam 5b of the turnable part 6. The mechanism 13, which enables the turnable part 6 to turn around its bottom axis when opening to 18°, without the turnable part 6 of the window frame 4 going outside the plane of the roof, consists of the components 13a, 13b,

13c, 13d and 13e, whereby different hinge shafts are connected together in order to perform the movement that is shown in figure 5.

[0027] Figure 5 again shows a side view of the skylight 1 of figure 4, but now opened by 18° in a ventilation position, whereby the upright arm 10 remains in the same position, but the connecting pieces 8 and 13a and 13e turn around the hinge shafts 9, 14 and 15 on the upright arm 10 such that the turnable part 6 of the window frame 4 turns inwards, without going out of the plane of the roof towards the outside. The skylight 1 can be locked in this position by means of a locking knob 16, that restricts the movement of a gas spring 16' that is built into each upright beam of the turning part 6 of the window frame 4.

[0028] Figure 6 shows a side view of the skylight 1 of figure 5, but opened somewhat further and locked again, such that the turnable part 6 cannot continue turning by itself to another position. The locking knob 16, now inserts a pin in a different groove provided for this purpose, such that further movement of the gas spring 16' is prevented.

[0029] Figure 7 shows a side view of the skylight 1 of figure 6, but now turned further to a position whereby the turnable part 6 of the window frame 4 is in a horizontal position. The upright arm 10 is now no longer in the same position but is turned around the hinge shaft 17 by which the upright arm 10 is fastened to the turnable part 6 of the window frame 4, while the other end of the upright arm 10 is fastened to the fixed frame 5 of the window frame 4. In this position too, the skylight 1 can be locked by means of the locking knob 16. The screen panel 3 is hereby brought to a downward position and hereby largely screens the skylight, but nonetheless allows space for direct ventilation.

[0030] Figure 8 shows a side view of the skylight 1 of figure 7, but now turned further, so that the turnable part 6 of the window frame 4 is now in an upward sloping position and hereby supports the screen panel 3 and brings it to a horizontal position. To this end only the position of a slide 18 is changed that is fastened to the underside of the turnable part 6 of the window frame by moving on a guide rail 19 that is on the underside of the screen panel 3. In this position, the screen panel 3 can function as a sunblind.

[0031] Figure 9 shows a side view of the skylight 1 of figure 8, but now turned as far as possible, so that the turnable part 6 of the window frame 4 is now in a vertical position and the screen panel 3 is supported in an upward sloping position, whereby the window leaf 12 is now upside down and the outside the window is now turned towards the interior. To this end the slide 18 is moved further over the guide rail 19 on the screen panel 3 and the screen panel 3 is also supported by two gas springs 20 that connect the screen panel 3 to the fixed frame 5 of the window frame 4.

[0032] The operation of the skylight 1 according to the invention is very simple and as follows.

[0033] In the event of cold or wet weather the skylight 1 is kept closed and the desired screening is rolled down

in the screen panel 3. The skylight now provides thermal insulation, acoustic insulation, darkening and intruder protection, which is certainly conducive to sleeping comfort.

[0034] In the event of hot and dry weather the skylight 1 can be opened to a ventilation position, whereby a number of opening angles up to 18° are possible, without the screen panel 3 having to be opened, and whereby the outside air can flow into the attic room, without hampering sleeping comfort (insect screen remains active) or reducing the intruder protection. The turnable part 6 of the window frame 4 can be locked in the desired position by means of the locking knob 16.

[0035] For the maintenance of the skylight, the movable part 6 can be opened further until the window leaf 12 is upside down and stands vertically in the roof opening, whereby the glass surface that was turned towards the outside is now turned towards the inside and is readily accessible for cleaning, for example. All this can be done without having to take off the screen panel 3, because this panel remains supported in a folded out position. After cleaning, the movable part 6 can be turned back again, whereby the screen panel 3 turns back to its original and screening position.

[0036] This facility increases the maintenance convenience of this skylight 1 and also increases the visibility of the outside surroundings through the skylight, just as is also possible in a dormer window.

[0037] It goes without saying that the skylight 1 can be equipped with automation means, such as the remote control of the screen panel 3 and the roller blind(s) therein. The opening to the desired position can also be controlled remotely by home automation means.

[0038] The present invention is by no means limited to the embodiment described as an example and shown in the drawings, but a skylight according to the invention as specified in the claims can be realised in all kinds of forms and dimensions, without departing from the scope of the invention.

Claims

1. Skylight (1) for a sloping roof (2) that essentially consists of a window frame (4) on which a screen panel (3) is mounted in the plane of the sloping roof (2), **characterised in that** the window frame (4) is composed of a fixed part in the form of a fixed frame (5) and an inward-turnable part (6) in which a window leaf (12) is held and which is fastened to the fixed frame (5) in a hinged way by means of:

- (i) two movable arms (10,10') that are affixed in a hinged way at the same height at a distance from the underside of the fixed frame (5) to the upright side beams (5a,5b) of the fixed frame (5),
- (ii) two hinge mechanisms (13), that each consist of hinge arms (13a, 13b, 13c, 13d, 13e) that

are connected together in different hinge shafts, whereby each hinge mechanism (13) is connected to one of the movable arms (10,10') on the one hand and to one of the side beams (6a, 6b) of the turnable part (6) on the other hand, and - (iii) two connecting pieces (8,8') that are each connected in a hinged way by means of a hinge shaft (9,9') to one of the two movable arms (10, 10') on the one hand and by means of a hinge shaft (11,11') to the adjacent upright side beams (6a, 6b) of the turnable part (6) of the window frame (4) on the other hand, which together with the top (6c) and bottom (6d) crossbeams of the turnable part (6) comprise the window leaf (12) and whereby the turnable part (6), when opening up to 18°, never protrudes outside through the plane of the roof.

2. Skylight according to claim 1, **characterised in that** the turnable part (6) of the window frame (4) can be turned continuously by an opening angle greater than 18°, whereby a number of positions of the turnable part (6) are possible, from sloping inwards, horizontal, sloping outwards to vertical, whereby the turnable part can be locked in every desired position by means of a locking knob (16).
3. Skylight according to claim 2, **characterised in that** the locking knob (16) is a rotary knob, which when turned makes a pin slide into one of a series of notches, such that the movement of a gas spring 16' built into an upright beam (6b) of the turnable part (6) of the window frame (4) is restricted, such that the turnable part (6) is locked in its current position.
4. Skylight according to claim 2, **characterised in that** the turnable part (6) of the window frame (4) is turned to the vertical position, whereby the bottom cross-beam (6d) of the turnable part (6) is turned upwards, and the window leaf (12) is brought to an upside down position, and whereby the side of the window that is turned towards the outside in the closed position of the skylight (1) is now turned towards the inside and can be easily reached from the attic room.
5. Skylight according to claim 5, **characterised in that** the screen panel (3), which is in the plane of the roof (2) in the closed position of the skylight, is now in a supported folded open position, such that this screen panel (3) does not need to be removed to be able to bring the window leaf (12) to a vertical position.
6. Skylight according to claim 5, **characterised in that** in the turned position of the opened skylight, the screen panel (3) folded towards the outside is supported by the lower edge (6d) of the movable part (6) that is connected to the folded open screen panel (3) via a slide (18) that can slide in a hinged way over

a guide rail (19) provided on the inside of the screen panel (3).

7. Skylight according to claim 1, **characterised in that** the screen panel (3) is supported by two gas springs (20) that connect the screen panel (3) to the fixed frame (5) of the window frame (4).

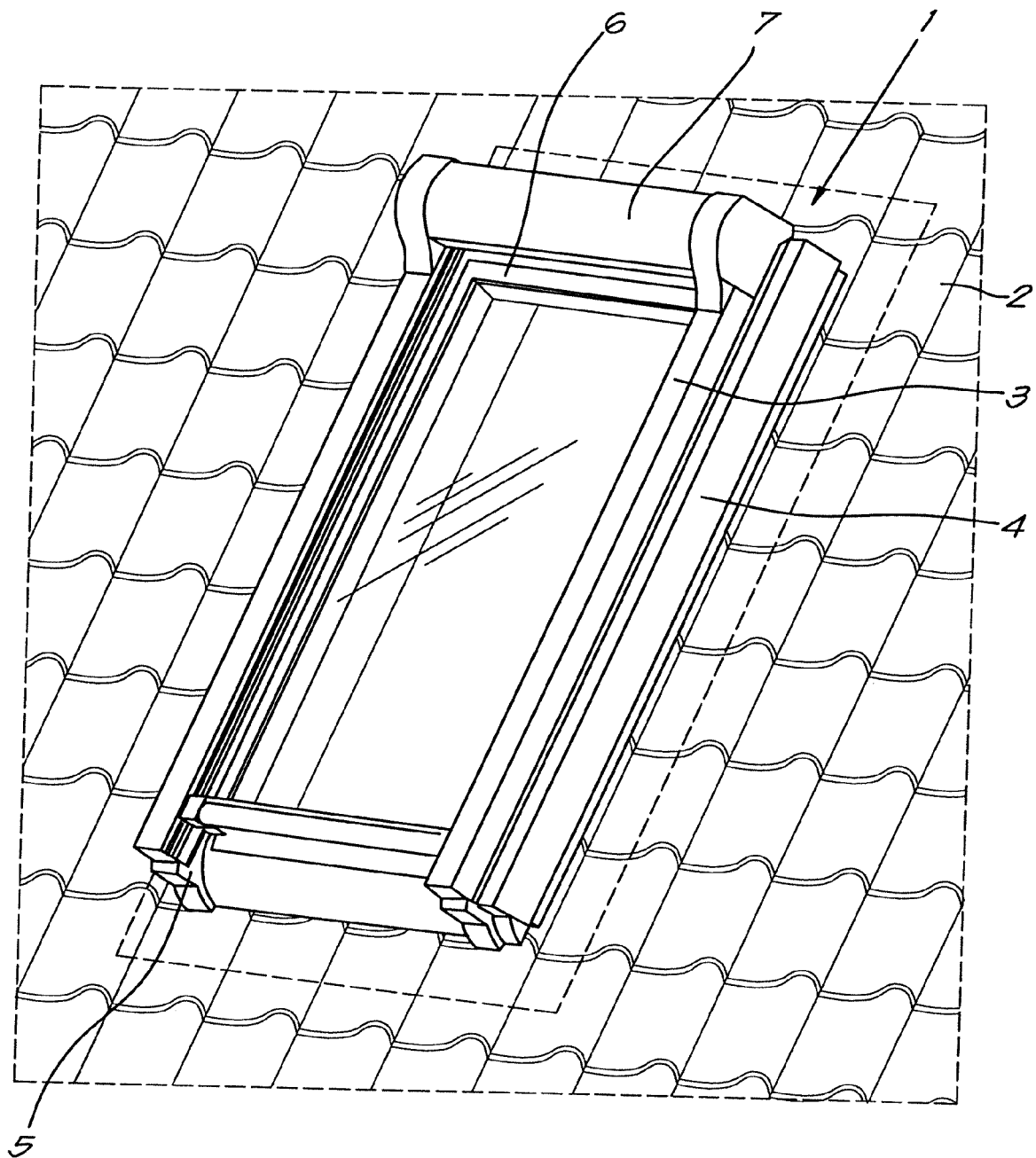


Fig. 1

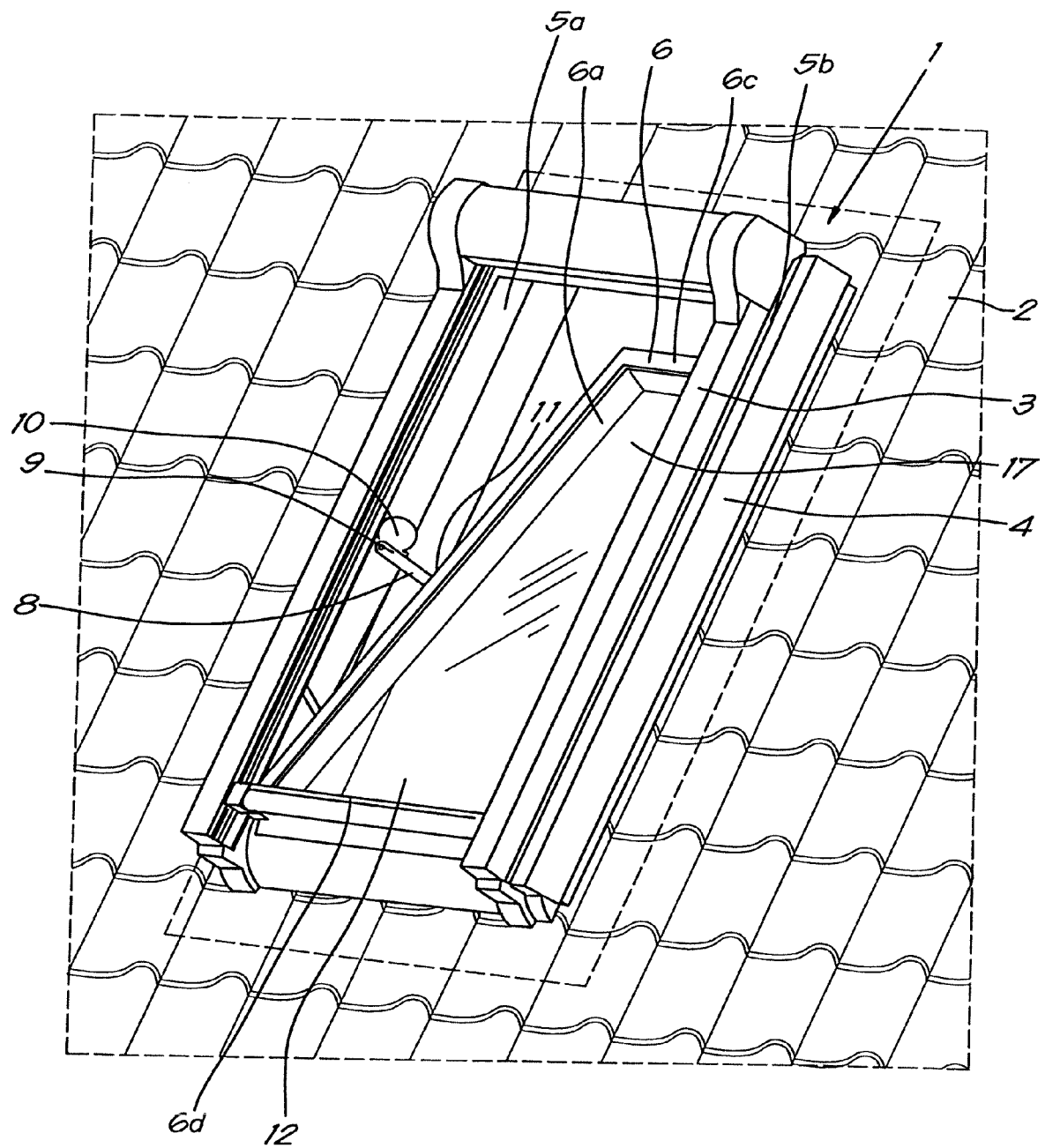


Fig. 2

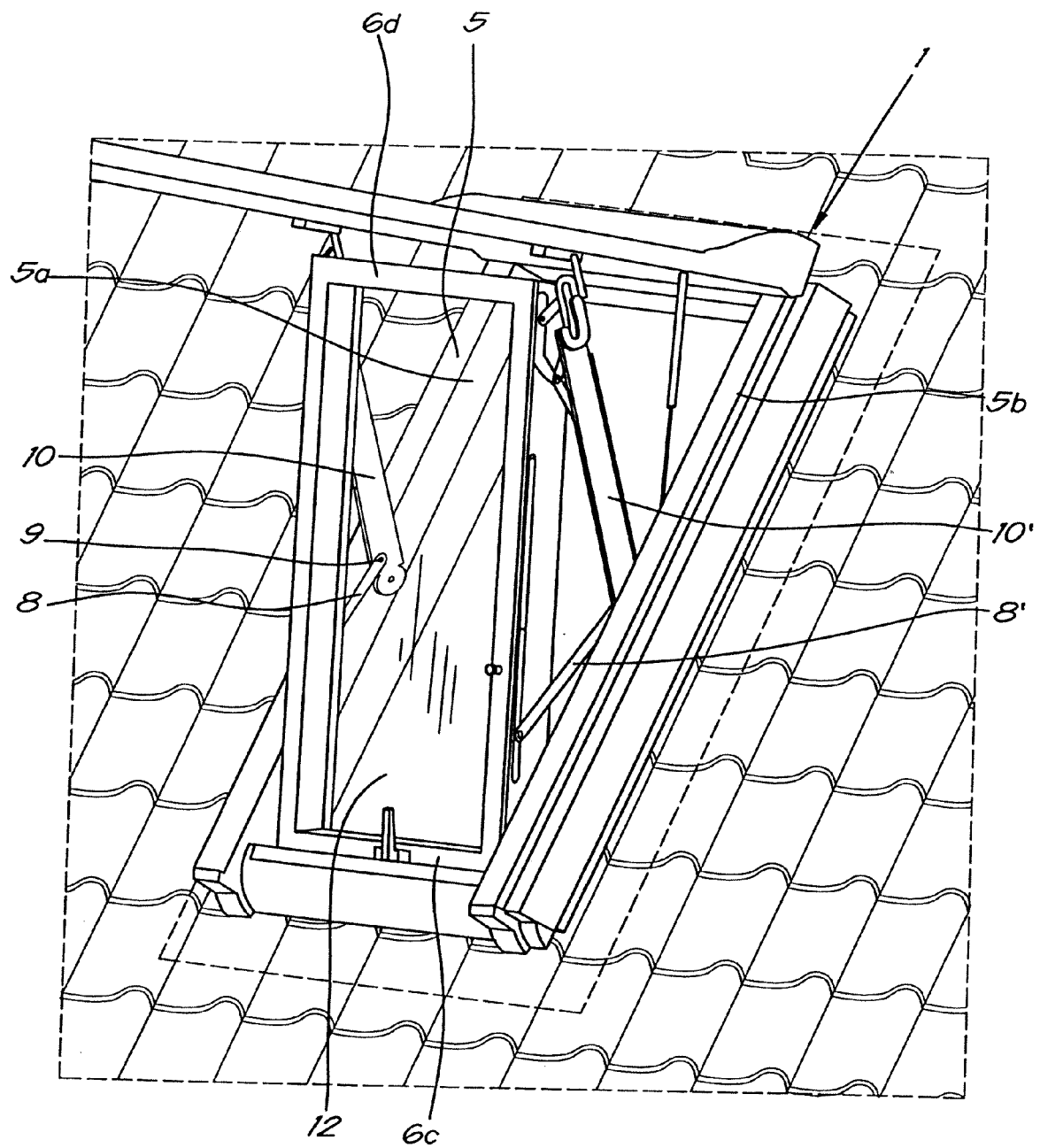


Fig.3

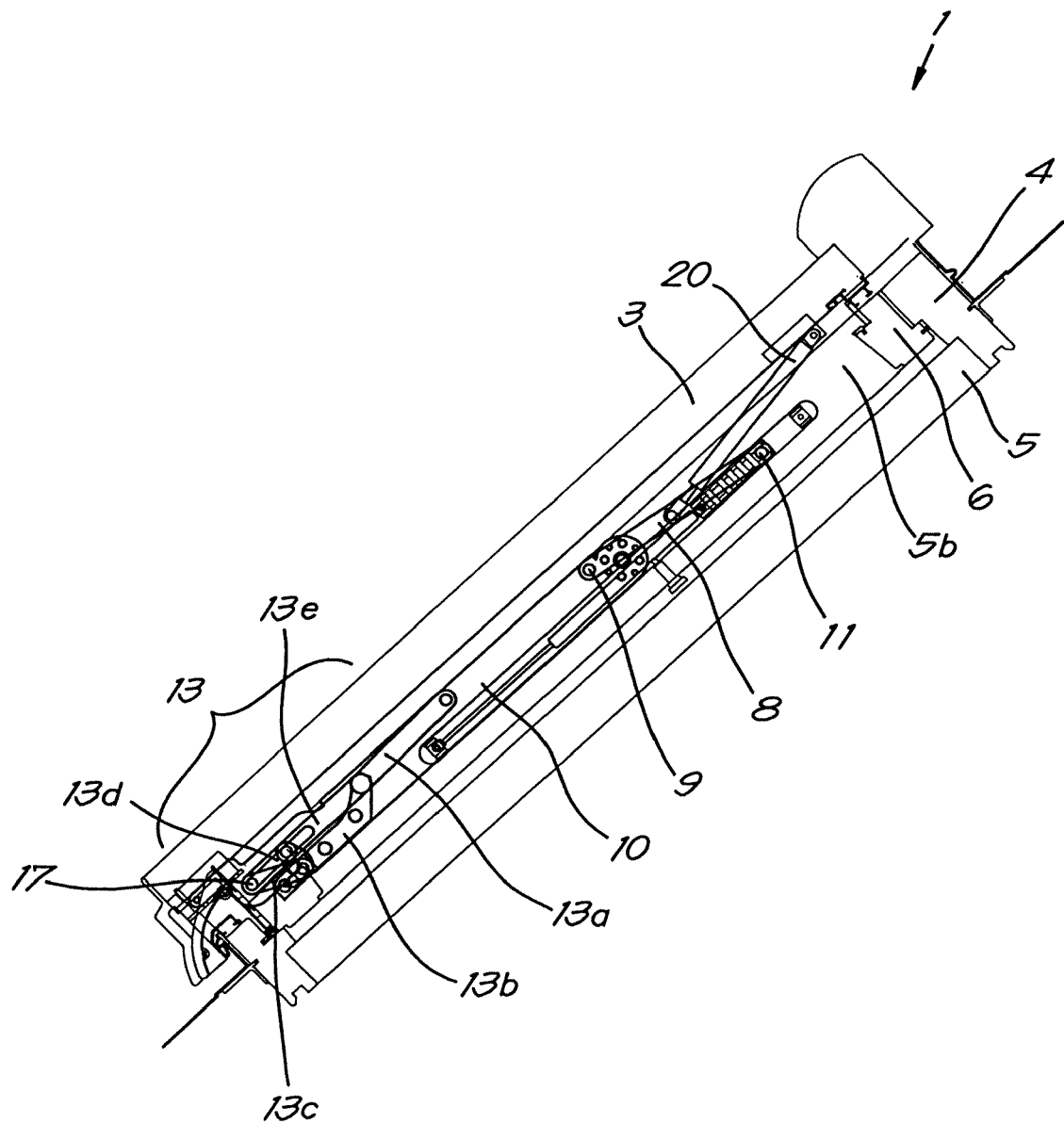


Fig. 4

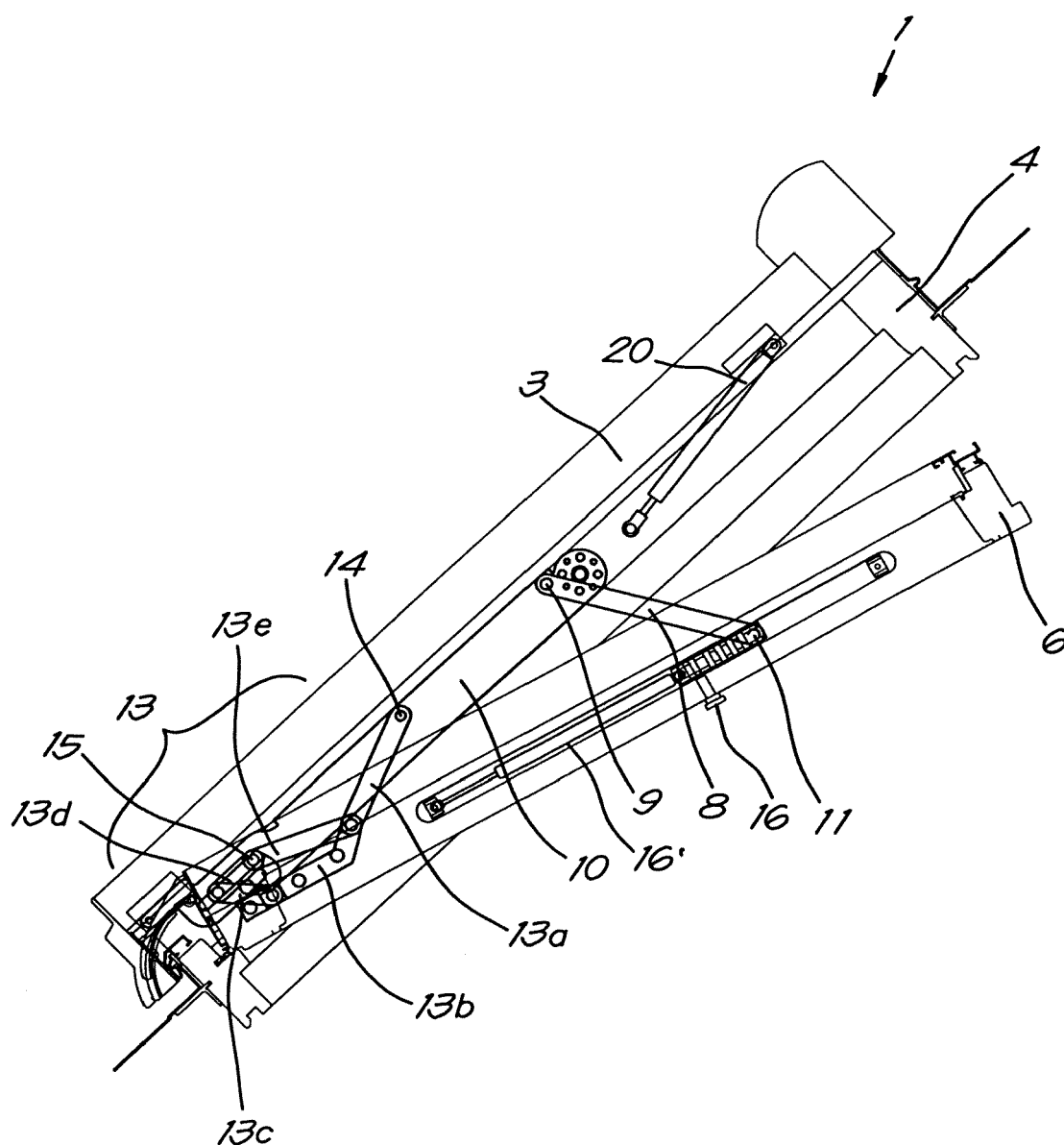


Fig.5

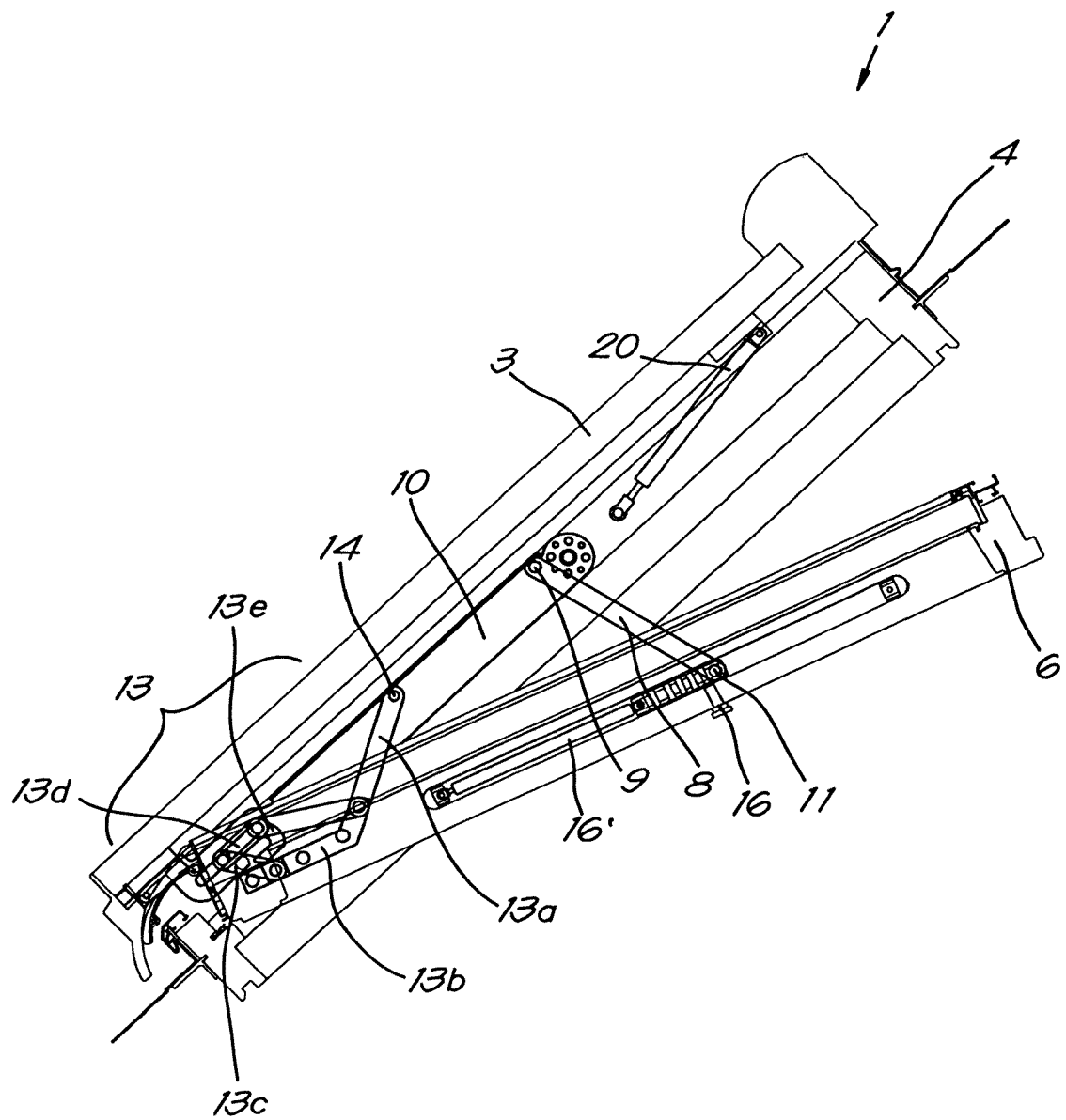


Fig. 6

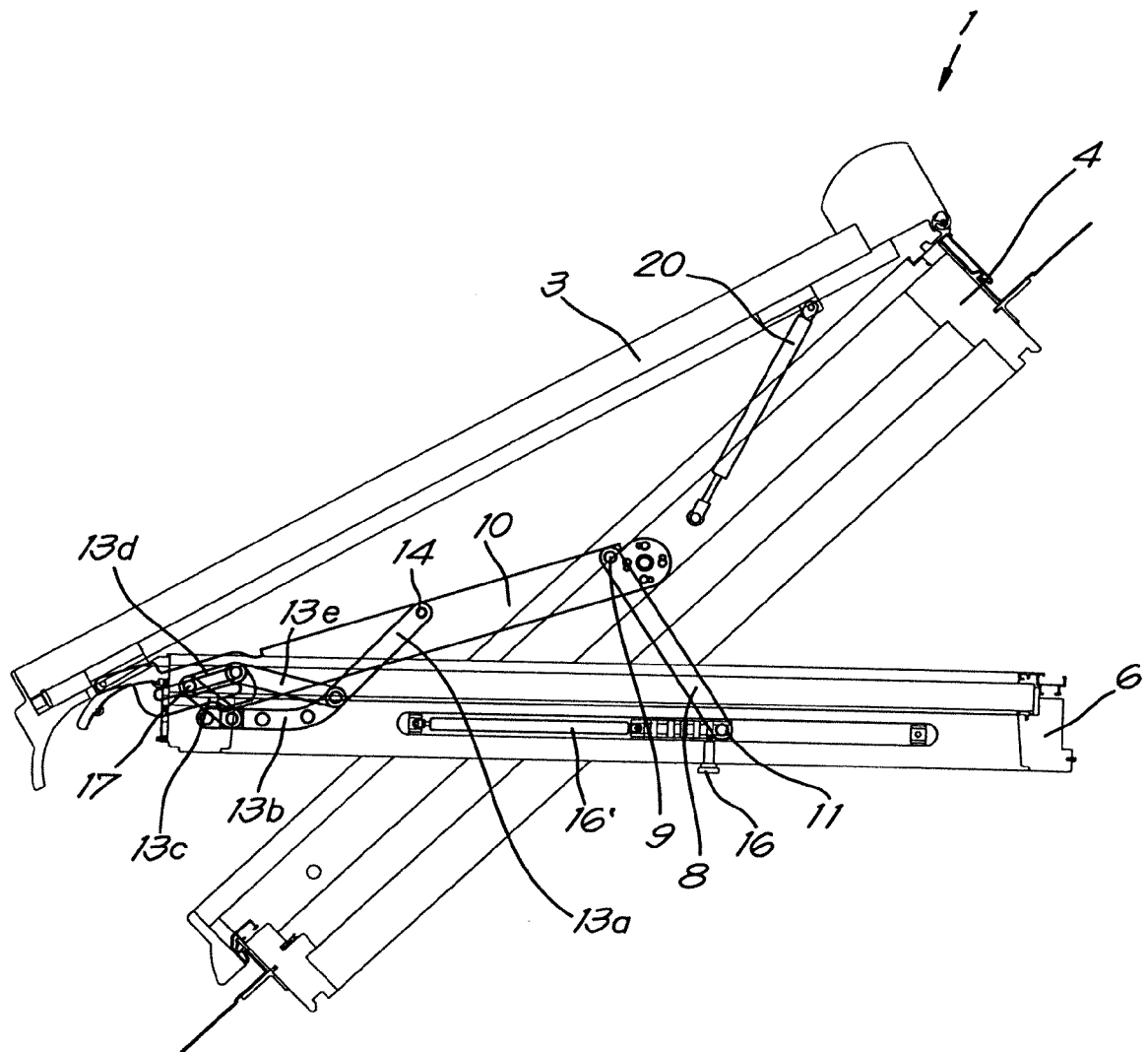


Fig. 7

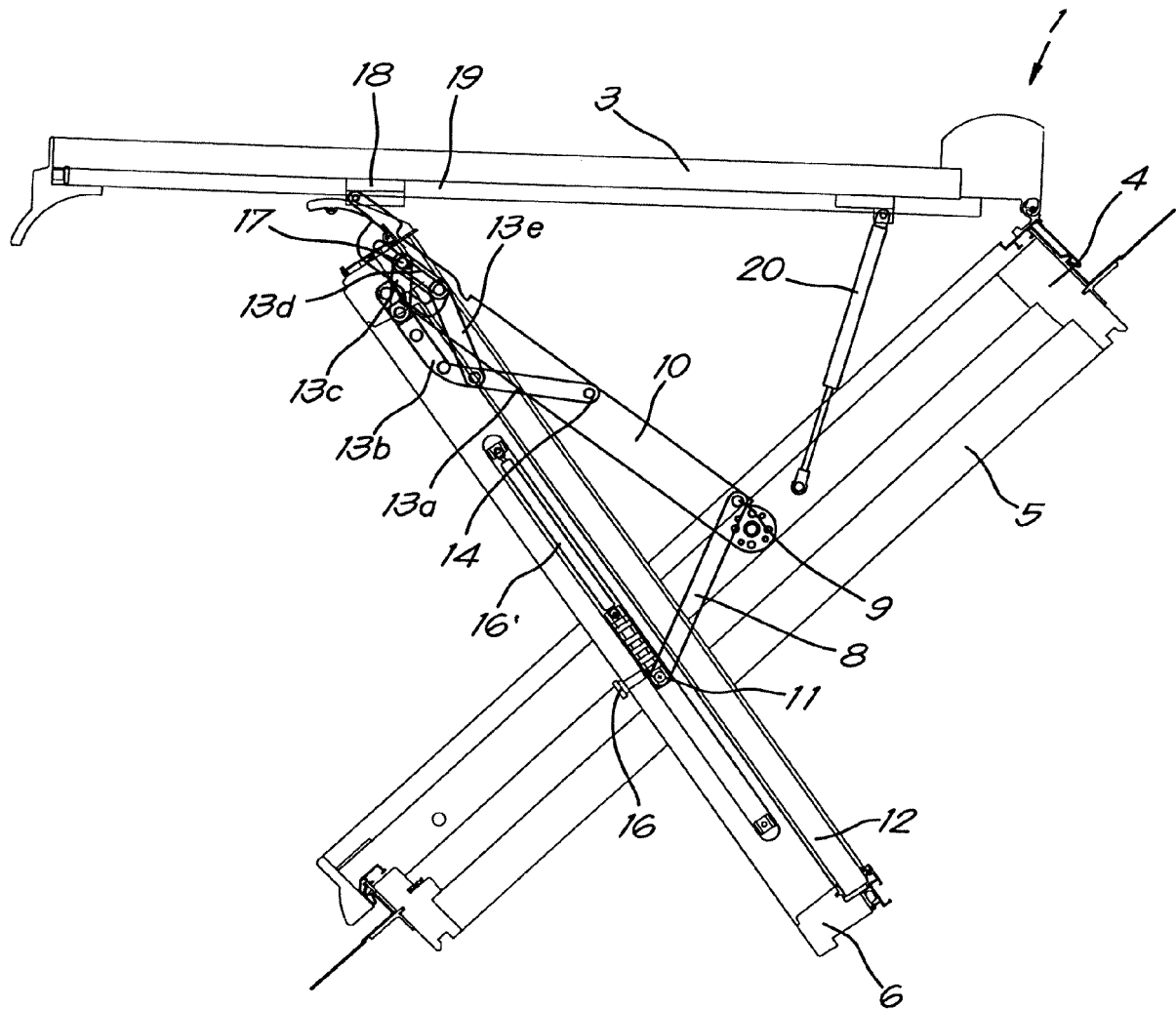


Fig. 8

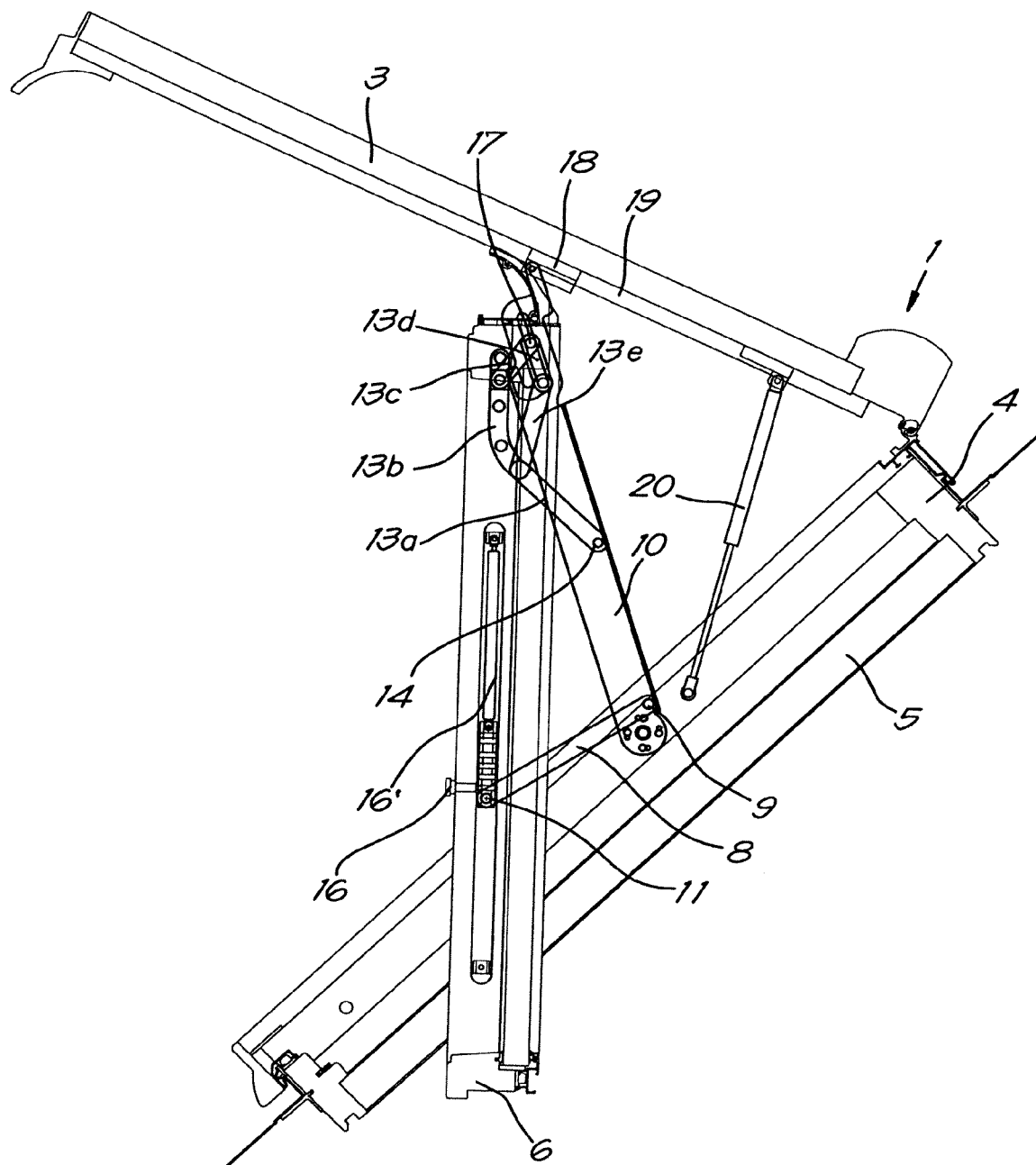


Fig. 9



EUROPEAN SEARCH REPORT

 Application Number
EP 14 00 1412

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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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 The Hague		Date of completion of the search 8 July 2014	Examiner Demeester, Jan
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 14 00 1412

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