(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 995 879 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
16.03.2016 Bulletin 2016/11

(21) Application number: **15184651.6**

(22) Date of filing: **10.09.2015**

(51) Int Cl.:
F24F 11/047 *(2006.01)* ***F24F 13/18*** *(2006.01)*
F24F 11/04 *(2006.01)* ***E06B 7/02*** *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA

(30) Priority: **11.09.2014 BE 201400683**

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(54) **VENTILATION GRILLE**

(57) This invention relates to a ventilation grille (1), comprising an air flow passage (2), a setting valve (5) which is at least adjustable to an open and a closed position, a self-adjusting valve (6) which is arranged at a distance from the setting valve (5) so as to be tiltable between an open and a closed position, and a bridging device (7, 10) which is arranged separate from the self-adjusting valve (6) between the valves (5, 6) in such a manner that it forces the self-adjusting valve (6) to its closed position when the setting valve (5) moves to its closed position and leaves the self-adjusting valve (6) unimpeded when the setting valve (5) is set to another position.

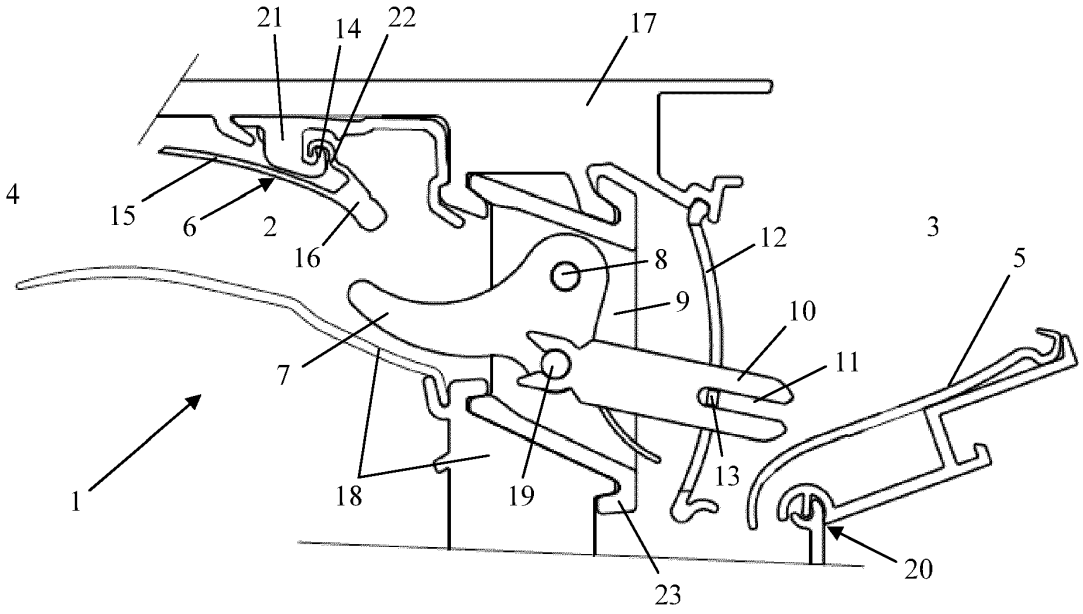

Fig. 1

EP 2 995 879 A1

Description

[0001] The present invention relates to a ventilation grille, comprising an air flow passage, a setting valve which is at least adjustable to an open position, in which the air flow passage is left substantially clear, and a closed position, in which the air flow passage is closed, and a self-adjusting valve, which is arranged at a distance from the setting valve so as to be tiltable in the air flow passage between an open position, in which it leaves the air flow passage substantially clear, and a closed position, in which it closes the air flow passage, and is arranged in such a manner that the air flow through the air flow passage is adjusted as a function of the pressure difference across said self-adjusting valve.

[0002] Such ventilation grilles are provided for the natural supply of air to a building. Normally, air from an external environment is passed into the internal environment of the building via such ventilation grilles by their air flow passage.

Such ventilation grilles are typically intended to be built into a door or window opening in order to make ventilation possible through an upright wall, in which this door or window opening is incorporated. They typically comprise an elongate housing. In this case, the profiles of this housing are typically adapted to the profiles of the door or window frame so that they adjoin them, making it possible to incorporate the ventilation grille as well as possible in the door or window opening.

[0003] By means of the self-adjusting valve, the air flow opening in the air flow passage is automatically adjusted, since the valve body of the self-adjusting valve moves automatically as a function of the pressure difference across the air flow passage, without the use of an actuator or motor. Due to the presence of such a self-adjusting valve, such a ventilation grille is also referred to as a self-adjusting ventilation grille.

[0004] Users can typically set the setting valve manually in different positions in order to open the air flow opening to a greater or lesser extent, as desired, or even to close it completely. In this way, it is possible to adjust the air flow at a given pressure difference across the air flow passage.

In practice, users generally open this setting valve completely when it is warm outside, while they close it completely when it is cold outside.

[0005] In particular with buildings in regions where outside temperatures are low to very low during the winter months, it is desirable for such ventilation grilles to have a high thermal resistance, a high temperature factor and a high air density. In such cases, ventilation grilles are desirable which can temporarily be closed and minimize the loss of energy while at the same time preventing condensation or the formation of ice in or on the ventilation grille.

Also with buildings having a mechanical ventilation system with both mechanical air supply and mechanical air discharge, such ventilation grilles with a high thermal resistance, a high temperature factor and a high air density can provide a significant amount of added value. Due to the high degree of insulation and the high air density of the building skin of such buildings, the heat gains via solar radiation, internal heat loads, et al. are usually greater than the heat losses via transmission and ventilation. There is therefore a great need to increase the ventilation losses by opening additional ventilation devices at the point in time when the outside temperature is lower than the inside temperature. When using ventilation grilles having a high thermal resistance, a high temperature factor and a high air density, 1 or 2 ventilators of the existing mechanical ventilation system can be switched off as soon as the ventilation grilles are in use. This provides an additional energy gain for such houses with a mechanical ventilation system which is not insignificant.

[0006] BE 1 018 607 A5 already discloses such a ventilation grille which offers, in the closed position, a sufficiently high thermal resistance, a sufficiently high temperature factor and a sufficiently high air density to meet said requirements. However, in addition to the self-adjusting valve this ventilation grille still requires three mutually coupled adjusting valves.

[0007] It is an object of this invention to improve the thermal resistance, temperature factor and air density of a self-adjusting ventilation grille in closed position in a simple manner.

[0008] This object of the invention is achieved by providing a ventilation grille, comprising an air flow passage, a setting valve which is at least adjustable to an open position, in which the air flow passage is left substantially clear, and a closed position, in which the air flow passage is closed, and a self-adjusting valve, which is arranged at a distance from the setting valve so as to be tiltable in the air flow passage between an open position, in which it leaves the air flow passage substantially clear, and a closed position, in which it closes the air flow passage, and is arranged in such a manner that the air flow through the air flow passage is adjusted as a function of the pressure difference across said self-adjusting valve, in which the ventilation grille comprises a bridging device which is arranged separate from the self-adjusting valve, between the setting valve and the self-adjusting valve, movable in such a manner that this bridging device, when moving the setting valve to its closed position, is moved by the setting valve in such a manner that it forces the self-adjusting valve to its closed position and leaves the self-adjusting valve unimpeded when the setting valve is set to the open position.

[0009] According to the invention, a bridging device is now provided by means of which the self-adjusting valve is automatically closed (forced to its closed position) when the setting valve is being closed (moved to its closed position). Air is trapped between both valves in order to thus form an insulating buffer.

The bridging device is arranged separate from the self-adjusting valve, so that it leaves the self-adjusting action

of the self-adjusting valve unimpeded when the setting valve is set to its open position.

Due to the bridging device, it is therefore also possible to close the self-adjusting valve closed when closing the setting valve, without these valves having to be permanently mechanically coupled to each other. The reason for this is that such a mutual mechanical coupling would impede the self-adjusting action of the self-adjusting valve.

By means of two valves, which are desirable for regulating the air flow in a ventilation grille anyway, it is now possible to achieve a similar effect to that of the additional valves coupled in series, without impeding the self-adjusting action of the self-adjusting valve during the passage of air.

In this way, it is possible to achieve a high thermal resistance, a high temperature factor and a high air density using a relatively small number of valves and a bridging device. This solution is therefore simpler and less expensive than the solution proposed in BE 1 018 607 A5.

If the setting valve is adjustable to several positions other than the closed position, then the bridging device also preferably leaves the self-adjusting valve unimpeded in several positions other than the closed position of the setting valve. Still more preferably, this then leaves the self-adjusting valve unimpeded in all positions of the setting valve other than the closed position.

[0010] In this case, the bridging device may at least partly form part of the setting valve or be fixedly coupled to the setting valve. Preferably, however, the bridging device will be arranged separate from the setting valve, so that the air circulation through the air flow passage is affected as little as possible in the positions of the setting valve other than the closed position.

[0011] In a preferred embodiment, the bridging device of a ventilation grille according to this invention comprises a tilting element which is arranged so as to be tiltable about a tilting point in the air flow passage. By means of such a tilting element, the movement of the setting valve during closing can simply be transformed into a movement for closing the self-adjusting valve, without said tilting element impeding the self-adjusting action of the self-adjusting valve during air circulation.

[0012] In order to fit such a tilting element in the air flow passage, the ventilation grille preferably comprises a partition which is arranged in the air flow passage between the setting valve and the self-adjusting valve and from which the tilting element is suspended so as to be tiltable. More specifically, it is also possible to provide a partition on both sides of the tilting element and to arrange a shaft in between, from which the tilting element is suspended so as to be pivotable. Still more specifically, these partitions may, for example, form part of the same insert element which may be inserted, for example, in a housing of such a ventilation grille.

[0013] In a particular embodiment of a ventilation grille according to this invention, the bridging device comprises a driving handle which engages with said tilting element at a distance from the tilting point, around which the tilting element is arranged so as to be tiltable in the air flow passage.

Preferably, the driving handle and the tilting element are then arranged in such a manner that, when moving the setting valve to its closed position, the setting valve drives the driving handle, so that the driving handle causes the tilting element to tilt and so that the tilting element engages with the self-adjusting valve and forces it to its closed position.

Such a driving handle furthermore preferably comprises a guide slot, in which a guide element engages which is arranged in a fixed position in the air flow passage. Still more preferably, the driving handle is in this case suspended in the air flow passage only by means of the guide element and the tilting element.

Such an embodiment is useful in particular in cases where a grille is arranged in the air flow passage downstream of the setting valve to prevent insects and/or dirt from entering the ventilation grille. A part of this grille may serve as a guide element for guiding the movement of the driving handle. In this way, it is possible to transfer the movement of the setting valve in a simple manner through such a grille to the tilting element by means of such a driving handle.

[0014] The setting valve and the self-adjusting valve of a ventilation grille according to this invention are preferably arranged in the air flow passage in such a manner that the setting valve, when moving to its closed position, moves towards the self-adjusting valve. With such an arrangement, the bridging device can be of a relatively simple design.

[0015] Still more preferably, the self-adjusting valve in such an embodiment is arranged so as to be tiltable with respect to a tilting point and comprises a valve body which extends substantially on one side with respect to said tilting point and which is provided to substantially close the air flow passage in the closed position of the self-adjusting valve and an engagement body which extends on the other side with respect to said tilting point, in which the valve body moves towards the setting valve when the self-adjusting valve moves towards its closed position and in which the bridging device is provided to engage with the engagement body when the setting valve moves towards its closed position in order to force the self-adjusting valve towards its closed position.

[0016] This tilting point of the self-adjusting valve may advantageously be arranged virtually at the top of the air flow passage, in which the self-adjusting valve is placed loosely on the tilting point, in such a manner that said self-adjusting valve hangs on this tilting point.

[0017] In an advantageous embodiment, the ventilation grille is of elongate design, the setting valve extends virtually over the entire length of the ventilation grille, the self-adjusting valve extends virtually over the entire length of the ventilation grille and several similar bridging devices are distributed over the length of the ventilation grille between the setting valve and the self-adjusting

valve.

[0018] The present invention will now be explained in more detail by means of the following detailed description of a preferred ventilation grille according to this invention. The aim of this description is solely to give illustrative examples and to indicate further advantages and particulars of this invention, and can therefore not be interpreted as a limitation of the area of application of the invention or of the patent rights defined in the claims.

[0019] In this detailed description, reference numerals are used to refer to the attached drawings, in which:

- Fig. 1 shows a part of an embodiment of a ventilation grille according to this invention in cross section, with the setting valve and the self-adjusting valve in their open position;
- Fig. 2 shows the ventilation grille from Fig. 1 in cross section, with the setting valve and the self-adjusting valve in their closed position.

[0020] The illustrated ventilation grille (1) is intended to be built into or surface-mounted on a window in order to enable air circulation through the wall in which this window is fitted. In this way, outside air can be supplied from an external space (4) to an internal space (3) by means of this ventilation grille (1). To this end, the ventilation grille (1) comprises a housing with profiles (17) which form a top wall (17) and profiles (18) which form a bottom wall (18). At the ends, the ventilation grille (1) is typically covered with head plates. The top wall (17), bottom wall (18) and head plates together form an elongate housing for the ventilation grille (1). Between the top wall (17) and the bottom wall (18), an air flow passage (2) extends which connects the external space (4) to the internal space (3).

[0021] Towards the internal space (3), the ventilation grille (1) is provided with a setting valve (5) which is movable between an open position, as illustrated in Fig. 1, and a closed position, as illustrated in Fig. 2. In its open position, the setting valve (5) leaves the air flow passage (2) substantially clear. In its closed position, the setting valve (5) closes the air flow passage completely. In this case, the setting valve (5) extends substantially along the length of the ventilation grille (1). There are several known ways of arranging such a setting valve (5) in a ventilation grille (1) so as to be movable. In the illustrated embodiment, the setting valve (5) is attached by means of a pivot coupling (20).

[0022] At a distance from the setting valve (5), a self-adjusting valve (6) is suspended in the air flow passage (2). There are also several known ways of arranging such a self-adjusting valve (6) in an air flow passage (2). In the illustrated embodiment, a hook-shaped profile part (21) is provided at the top of the air flow passage (2), in which the hook thereof serves as a mounting body. The self-adjusting valve (6) is loosely placed on top of this mounting body. To this end, the self-adjusting valve (6) comprises a hook-shaped element (22), by means of which it is hooked on the hook of the hook-shaped profile part (21). In this way, a substantial line contact is formed between the self-adjusting valve (6) and the hook-shaped profile part (21). This forms the tilting point (14) around which the self-adjusting valve (6) is suspended so as to be tiltable between an open position, as illustrated in Fig. 1, and a closed position, as illustrated in Fig. 2. In its open position, the self-adjusting valve (6) leaves the air flow passage (2) substantially clear. In its closed position, the self-adjusting valve closes this air flow passage (2). To this end, the self-adjusting valve (6) extends substantially over the length of the ventilation grille (1). The self-adjusting valve (6) automatically moves on account of the changing pressure difference across this valve (6).

[0023] An insert (23) is fitted between the setting valve (5) and the self-adjusting valve (6) in the air flow passage (2). This insert (23) is of tubular design and forms two partitions (9) between the top wall (17) and the bottom wall (18). A tilting element (7) is suspended from a shaft (8) between these partitions (9) so as to be pivotable. The tilting element (7) extends from the shaft (8) substantially in the direction of the self-adjusting valve (6). At a distance from the shaft (8), a pin (19) is attached to the surface of the tilting element (7), from which a driving handle (10) is suspended from a first end so as to be pivotable. At its other end, this driving handle (10) is provided with a guide slot (11). The driving handle (10) extends from the tilting element (7) substantially in the direction of the setting valve (5). Between the insert (23) and the setting valve (5) in the air flow passage (2), a grille (12) is suspended in order to prevent insects and/or dirt from entering the ventilation grille (1). A transverse piece (13) of this grille (12) engages in the guide slot (11), so that the driving handle (10) is suspended from the pin (9) of the tilting element (7), on one side, and from this transverse piece (13) of the grille (12), on the other side.

[0024] In the open position of the valves (5, 6), as illustrated in Fig. 1, the tilting element (7) hangs downwards on account of the force of gravity, at a distance from the self-adjusting valve (6). This leaves the self-adjusting action of the self-adjusting valve (6) unimpeded in this case. Here, the driving handle (10) extends partly through the grille (12). When the setting valve (5) is being closed, the setting valve (5) strikes the driving handle (10) and forces it further through the grille (12) towards the self-adjusting valve (6). The tilting element (7) tilts and in this case strikes an engagement part (16) of the self-adjusting valve (6). In this case, the self-adjusting valve (6) tilts towards its closed position, in which the valve body (15) substantially closes the air flow passage (2). The largest part of this valve body (15) extends on another side of the tilting point (14) than the engagement part (16) with which the tilting element (7) engages.

[0025] The insert (23), the tilting element (7) and the driving handle (10) are significantly shorter than the length of the ventilation grille (1) in order to impede the air circulation through the air flow passage (2) as little as possible. Depending on the length of the valves (5, 6), it

may be desirable to incorporate several such inserts (23) comprising tilting elements (7) suspended therein and driving handles (10) attached thereto distributed over the length of the valves (5, 6) in the air flow passage (2).

Claims

1. Ventilation grille (1), comprising an air flow passage (2), a setting valve (5) which is at least adjustable to an open position, in which the air flow passage (2) is left substantially clear, and a closed position, in which the air flow passage (2) is closed, and a self-adjusting valve (6), which is arranged at a distance from the setting valve (5) so as to be tiltable in the air flow passage (2) between an open position, in which the air flow passage (2) is left substantially clear, and a closed position, in which the air flow passage (2) is closed, and is arranged in such a manner that the air flow through the air flow passage (2) is adjusted as a function of the pressure difference across said self-adjusting valve (6), **characterized in that** the ventilation grille (1) comprises a bridging device (7, 10) which is arranged separate from the self-adjusting valve (6), between the setting valve (5) and the self-adjusting valve (6), movable in such a manner that this bridging device (7, 10), when moving the setting valve (5) to its closed position, is moved by the setting valve (5) in such a manner that said bridging device (7, 10) forces the self-adjusting valve (6) to its closed position and leaves the self-adjusting valve (6) unimpeded when the setting valve (5) is set to its open position.

2. Ventilation grille (1) according to Claim 1, **characterized in that** the bridging device (7, 10) is arranged separate from the setting valve (5).

3. Ventilation grille (1) according to one of the preceding claims, **characterized in that** the bridging device (7, 10) comprises a tilting element (7) which is arranged so as to be tiltable about a tilting point (8) in the air flow passage (2).

4. Ventilation grille (1) according to Claim 3, **characterized in that** the ventilation grille (1) comprises a partition (9) which is arranged in the air flow passage (2) between the setting valve (5) and the self-adjusting valve (6) and from which the tilting element (7) is suspended as to be tiltable.

5. Ventilation grille (1) according to Claim 3 or 4, **characterized in that** the bridging device (7, 10) comprises a driving handle (10) which engages with said tilting element (7) at a distance from the tilting point (8), about which the tilting element (7) is arranged so as to be tiltable in the air flow passage (2),.

6. Ventilation grille (1) according to Claim 5, **characterized in that** the driving handle (10) and the tilting element (7) are arranged in such a manner that, when moving the setting valve (5) to its closed position, the setting valve (5) drives the driving handle (10), so that the driving handle (10) causes the tilting element (7) to tilt and so that the tilting element (7) engages with the self-adjusting valve (6) and forces the self-adjusting valve (6) to its closed position.

7. Ventilation grille (1) according to Claim 5 or 6, **characterized in that** the driving handle (10) comprises a guide slot (11), in which a guide element (13) engages which is arranged in a fixed position in the air flow passage (2).

8. Ventilation grille (1) according to Claim 7, **characterized in that** the driving handle (10) is suspended in the air flow passage (2) only by means of the guide element (13) and the tilting element (7).

9. Ventilation grille (1) according to one of the preceding claims, **characterized in that** the setting valve (5) and the self-adjusting valve (6) are arranged in the air flow passage (2) in such a manner that the setting valve (5), when moving to its closed position, moves towards the self-adjusting valve (6).

10. Ventilation grille (1) according to Claim 9, **characterized in that** the self-adjusting valve (6) is arranged to as to be tiltable with respect to a tilting point (14), comprises a valve body (15) which extends substantially on one side with respect to said tilting point (14) and which is provided to substantially close the air flow passage (2) in the closed position of the self-adjusting valve (6), and comprises an engagement body (16) which extends on the other side with respect to said tilting point (14), in which the valve body (15) moves towards the setting valve (5) when the self-adjusting valve (6) moves towards its closed position and in which the bridging device (7, 10) is provided to engage with the engagement body (16) when the setting valve (5) moves towards its closed position in order to force the self-adjusting valve (6) towards its closed position.

11. Ventilation grille (1) according to Claim 10, **characterized in that** the tilting point (14) of the self-adjusting valve (6) is arranged virtually at the top of the air flow passage (2) and **in that** the self-adjusting valve (6) is placed loosely on the tilting point (14), in such a manner that said self-adjusting valve (6) hangs from this tilting point (14).

12. Ventilation grille (1) according to one of the preceding claims, **characterized in that** the ventilation grille (1) is of elongate design, **in that** the setting valve (5) extends virtually over the entire length of

the ventilation grille (1), **in that** the self-adjusting valve (6) extends virtually over the entire length of the ventilation grille (1), and **in that** several similar bridging devices (7, 10) are distributed over the length of the ventilation grille (1) between the setting valve (5) and the self-adjusting valve (6).

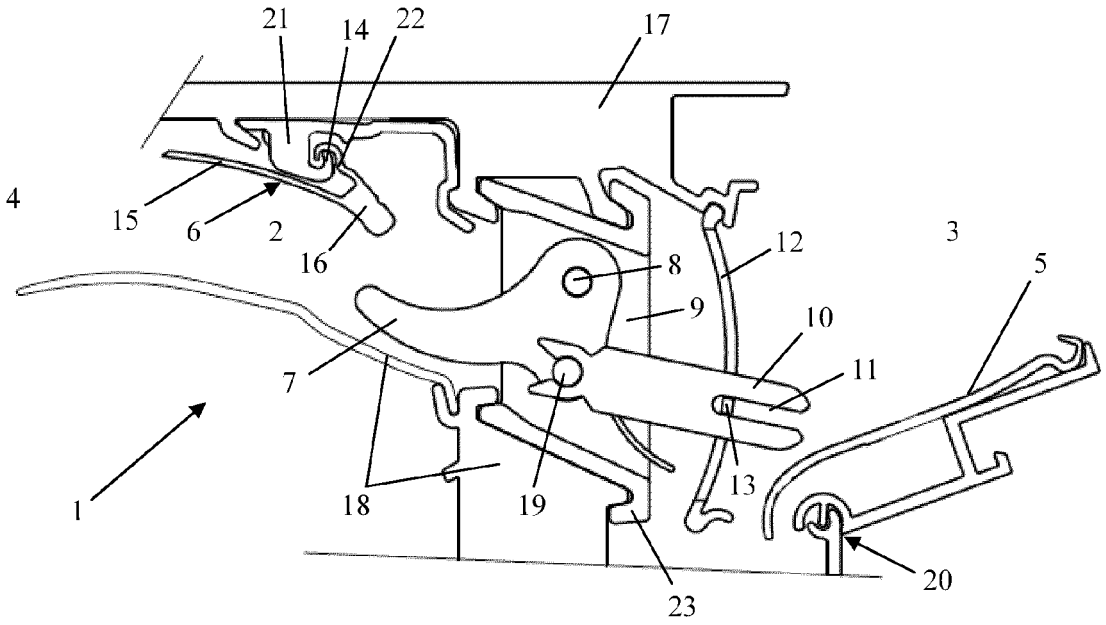
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Fig. 1

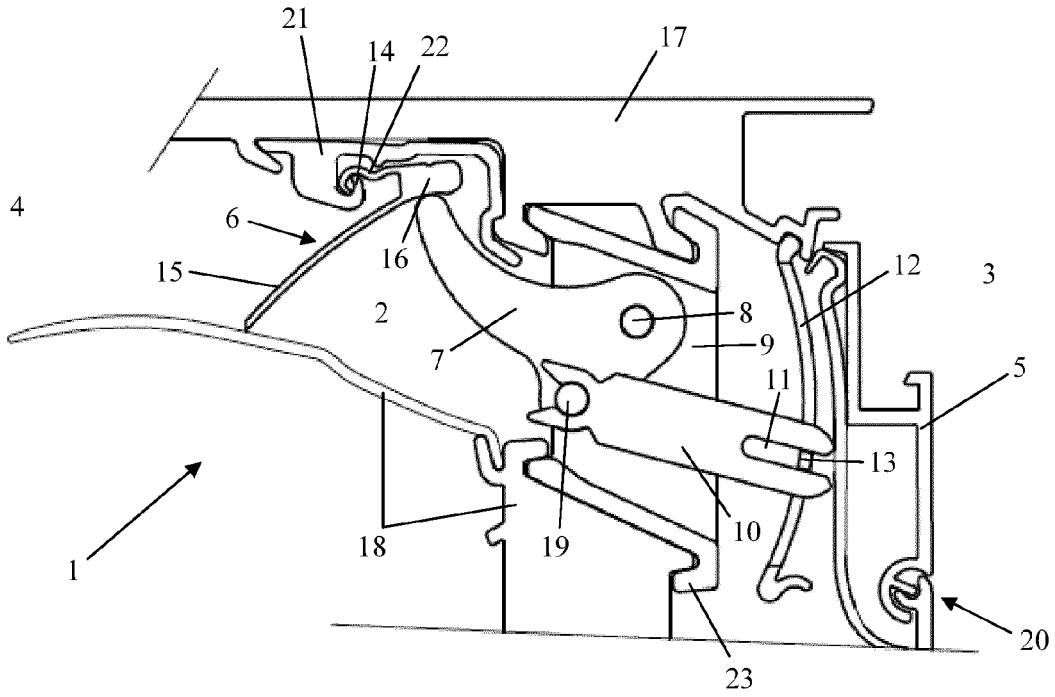
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Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 15 18 4651

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TECHNICAL FIELDS SEARCHED (IPC)

F24F
E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	14 December 2015	González-Granda, C

CATEGORY OF CITED DOCUMENTS

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