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(54) Window with a ventilation opening

(57) A window (1) comprises a sash/frame structure (2,5) supporting a pane (3), a separate ventilation opening being adapted in the sash/frame structure (2, 5) for flow communication between the exterior and interior sides of the window. A tubular valve housing (9) is inserted in the ventilation opening at the interior side of the window, the flow area of the valve housing being partially covered by a seat surface (12). A closing body (14) is journalled in the housing (9) so as to be pivotable between an open position in which the closing body (14) overlaps the seat surface (12), and a closed position.

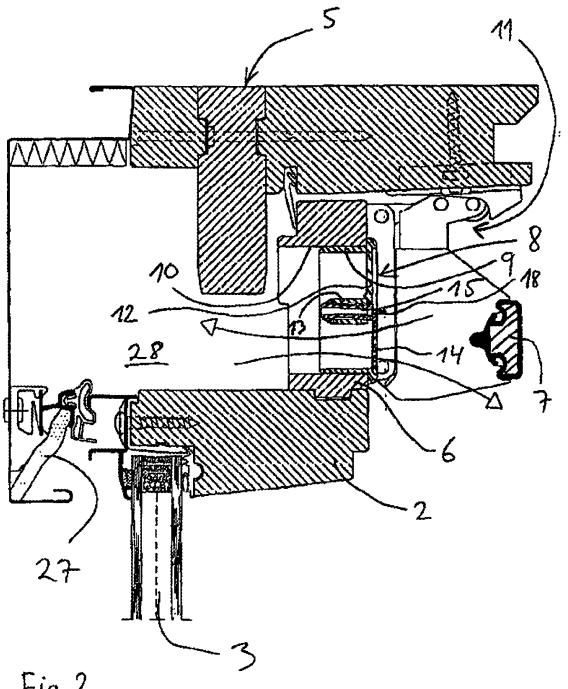

Fig. 2

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Description

[0001] The present invention relates to a window comprising a sash/frame structure supporting a pane, a separate ventilation opening being adapted in the sash/frame structure for flow communication between the exterior and interior sides of the window.

[0002] WO 99/51832 describes a roof window in which a pane-supporting sash is openably mounted in a frame. A longitudinal ventilation slot is formed in the top sash member and can be closed by means of a flap hinged to the interior side of the member. Ventilation of the room in which the window is mounted can be obtained in the closed position of the window by opening of the flap, whereby a flow passage is created between the interior and exterior sides of the pane through the ventilation slot in the member and in continuation thereof through a slot between the sash and the frame.

[0003] DE 36 22 652 describes a front window, the pane in a sash being openably mounted in a frame. In the top frame member, two through-going ventilation channels are formed, each with an integral ventilator which may be provided with a sensor-controlled switch and adjustment automatics for efficient ventilation of the room in which the window is mounted. Furthermore the ventilation channels are provided with a vertically displaceable adjustment damper allowing for manual adjustment of the force of ventilation.

[0004] However, in certain cases there is a need simply to ensure a pre-determined permanent minimal airflow passage between the interior and exterior sides of a closed window, as ventilation proper can be obtained by opening of the particular window or possibly other windows in the building. Modern buildings in particular may be so airtight that such forced minimal ventilation may be necessary for indoor climate reasons. The exact flow capacity required depends on local factors, but in all circumstances it should not be larger than necessary as this will result in unnecessary heat loss. However, prior-art solutions do not allow for a permanent and sufficiently exact setting of such suitably small flow passages as are required in such cases, as these solutions are adapted for opening and closing a ventilation passage proper according to current needs. Moreover, prior-art solutions are often unnecessarily complicated and therefore expensive to manufacture.

[0005] The object of the present invention is to provide a structurally simple window allowing for setting of a predetermined, minimal airflow passage between the interior and exterior sides of the window.

[0006] In view of this, the window according to the invention is characterized in that a circumferential valve housing is inserted in the ventilation opening, the flow area of the valve housing being partially covered by a seat surface, and that a closing body is journalled in the housing so as to be pivotable between an open position in which the closing body overlaps the seat surface, and a closed position in which the closing body and the seat surface together substantially cover the entire flow area of the valve housing.

[0007] Such valve housing can be manufactured in suitably small dimensions so as to allow for setting of a minimal flow capacity within a suitable interval. Pivotable journalling of the closing body furthermore provides for suitably long travel between the open and closed positions of the valve to allow exact setting of the flow capacity. Moreover, the pivotable journalling of the closing body ensures minimal friction at the opening and closing movements. The valve housing with associated closing body is very simple to manufacture, as the two parts may, for example, be injection moulded from plastics. Moreover, it is easy to mount the valve housing in the window sash or frame as a hole is simply drilled therethrough, whereupon the valve housing is, for example, pressed in or glued on at the hole. Another advantage is that the valve housing may have a very limited extent, thus causing minimal effect on the window appearance. This moreover causes the valve to be hardly noticed by the user, who will therefore not try to alter the permanent pre-setting of the airflow capacity.

[0008] In a preferred embodiment, the valve housing is in the shape of a preferably circularly cylindrical tube, and the closing body is pivotable about an axis coaxial with the tube. The tubular valve housing combined with the coaxial journalling of the closing body allows for maximum utilization of the flow area of the valve housing and long travel of the closing body, that is, a rotation of 180°, which makes exact setting possible. Furthermore the tube is easy to mount so as to fit tightly in a bore in the sash/frame structure.

[0009] In an embodiment, which is advantageous in terms of manufacturing, the seat surface supports a pivot bearing for the closing body.

[0010] In an advantageous embodiment the seat surface and the closing body are shaped as semi-circular plates. This allows for the largest possible flow capacity in relation to the size of the valve housing; in other words the size of the housing can be minimized, and moreover the largest possible travel of the closing body is obtained between the open and the closed positions consequently allowing for more exact setting.

[0011] The valve housing may be provided with an end stop for the closing body so that further pivoting thereof is prevented when it reaches its fully open or fully closed position. A specific pivoting direction is thus defined for opening and closing of the valve as well as a clear indication of the fully open and fully closed positions. This facilitates operation of the valve.

[0012] In an advantageous embodiment the closing body and the valve housing have respective locking members for mutual engagement in a number of different fixed positions of the closing body in relation to the valve housing. This facilitates pre-setting of a particular flow capacity as different step settings for the closing body are thus defined. These settings may possibly be numbered, and it will then be sufficient to provide the window

fitter with the correct number of the setting to ensure suitable pre-setting. Furthermore, the locking members may be formed with strong engagement so as to prevent unintended subsequent setting of the closing body in the fully mounted window.

[0013] In an advantageous embodiment in terms of manufacturing, the respective locking members are formed as a projection on the closing member and a number of corresponding depressions in the seat surface.

[0014] It may be an advantage that the closing body can be sealed in a setting in relation to the valve housing, for example, by means of an adhesive placed between the closing body and the seat surface of the valve housing. This ensures in a more efficient manner that a presetting of the closing body cannot subsequently be altered.

[0015] In an advantageous embodiment, the sash/frame structure is composed of a sash and a frame, the sash supporting the pane and being openably journalled in the frame, the sash has a top member whereby, parallel therewith, a handle extends for operation of a locking mechanism for the window, and the valve housing is arranged at the top member behind the handle so that in the closed position of the window the handle covers the valve housing at least partially towards the interior side of the window. The valve housing is thus partially hidden, which is advantageous for aesthetical reasons, and moreover the risk of unintended post-setting of the closing body is minimized.

[0016] In a further advantageous embodiment, an elongated ventilation slot is formed in the top member of the sash for flow communication between the exterior and interior sides of the window, the slot being closable by operation of the handle by means of a ventilation flap hinged to the top member, and the valve housing being inserted in the ventilation flap. This allows for manual setting of ventilation proper in the situation of use, while it is possible to pre-set a specific minimal air passage, which should always exist in the building structure in question.

[0017] The invention will now be described in more detail below by means of examples of embodiments and with reference to the schematic drawing, in which

Fig. 1 shows an inside view of a roof window,
Fig. 2 is a section along the line II - II through the window of Fig. 1,
Figs. 3 and 4 are perspective, oblique front and back views, respectively, of the valve in a closed position, and
Figs. 5 and 6 are perspective oblique front views of the valve in a semi-open and a fully open position, respectively.

[0018] Fig. 1 shows an inside view of a roof window 1 comprising a window sash 2 supporting a pane 3 and suspended pivotably about an axis 4 in a window frame 5. At the interior side of the window, at a distance from and along a top member 6 of the sash 2, an operating handle 7 is arranged for opening and closing of the window 1, that is, of the sash 2 in relation to the frame 5. At the right side of the top sash member 6 a circular valve 8 is provided, half covered by the operating handle 7, which is shown in the drawing in a sectional view. The structure of the window sash 2 and the window frame 5 may also be formed so as to be mutually fixed or integrally formed so that the window cannot be opened. Moreover, the valve 8 in the embodiment shown in Fig. 1 may also be provided in the window frame 5 instead of the window sash 2, as shown.

[0019] Fig. 2 shows a section along the line II-II through the valve 8 mounted in the sash 2 in the window frame 5 of Fig. 1. The valve 8 is shown in detail in Figs. 3 to 6 and has a tubular housing 9 inserted in a corresponding circular hole 10 in the top member 6 of the sash 2. Tilting of the operating handle 7 releases a locking mechanism 11 between the window sash 2 and the window frame 5, whereupon the window 1 can be opened by a further pull in the operating handle 7, the sash 2 tilting about the axis 4 in relation to the frame 5. The locking mechanism 11 may be of an ordinary, known type.

[0020] The circular flow area of the valve housing is partially covered at the interior side of the window sash 2 by a semi-circular seat surface 12 supporting a bearing bushing 13, which is arranged coaxially in the valve housing 9 and in which an also semi-circular closing body 14 is pivotably journalled coaxially in the housing 9 by means of a pivot pin 15, see Figs. 3 and 4. The pivot pin 15 is slit along its axis of rotation, and at its free end it has a wedge-shaped barb 16 on either side of the slit so that, when the valve housing 9 and the closing member 14 are assembled, the pivot pin 15 can be squeezed about the slit at insertion into the bearing bushing 13 and then by expansion lock itself in the bushing by means of the barbs 16, which abut on an end surface 17 of the bearing bushing 13. Along its straight edge surfaces the closing body 14 is provided with projections 18 serving as gripping surfaces at operation of the valve; a grip may, for example, be obtained at the diametrically opposed areas of the projections 18 in the valve along their lower and upper edges, respectively, by means of thumb and index finger.

[0021] In the closed position of the valve 8 shown in Fig. 3, at its lower surface directed into the valve housing 9, the circular edge of the closing body 14 abuts a projection 19 extending along the curved edge of a semi-circular hole 20 in the valve housing 9, this hole 20 lying below the closing member 14 in the closed position of the valve, and forming a through opening for the valve in the open position of the valve, see Figs. 5 and 6. Along its external periphery the valve housing 9 has a circumferential projection 21 abutting the interior side of the top sash member 6 in the mounted position of the valve in the window sash 2. Furthermore, on its exterior side the valve housing 9 has a number of ribs 22 extending in the

axial direction and spaced in the circumferential direction of the valve housing. When the valve housing 9 is being mounted in the hole 10, these ribs 22 fix the valve 8 in relation to the top member 6 so that the valve cannot rotate in the hole 10 when operated.

[0022] For locking the closing member 14 in different positions in relation to the valve housing 9, the back of the closing body 14, that is, the side facing towards the valve housing 9, has a projection 23 which can engage with one of a number of depressions 24 formed on the exterior side of the seat surface 12, that is, the side facing away from the valve housing 9, the depressions 24 being spaced in the circumferential direction of the valve housing. As it appears from Fig. 3, the valve 8 shown has three depressions 24 in the seat surface 12 so that the closing body 14 can be locked in three different partially open positions, the middle position being illustrated in Fig. 5. Furthermore, the closing body 14 can be locked in the fully closed position of the valve shown in Fig. 4, the projection 23 on the closing body 14 latching on to a straight edge surface 25 of the seat surface 12. Similarly, the projection 23 may latch on to the edge surface 25 in the fully open position of the valve 8 shown in Fig. 6. Thus, four different fixed flow areas for the valve 8 have been defined, but the valve may also be formed with more or fewer depressions 24 than the three ones shown, whereby more different flow areas can be defined. It is also possible to form the valve 8 without the projection 23 and the depressions 24, as the closing body 14 may be mounted in the valve housing 8 in a manner so that it pivots so tightly that it can thus be retained in a particular position. The closing body 14 may also be retained in a particular pre-set position by placing a little bit of liquid adhesive between the seat surface 12 and the closing body 14 when the pre-setting is made. The closing body 14 can also be sealed in relation to the valve housing 9 in other ways, for example, by means of a thread passed through a hole in both the closing body 14 and in the valve housing 9.

[0023] Moreover, the closing body 14 has an end stop in the form of a pin 26 placed at the straight edge surface of the closing body projecting into the valve housing 9 so that it can abut the edge surface 25 of the seat surface 12 in the fully closed position of the valve shown in Figs. 3 and 4 and the fully open position shown in Fig. 6 and thus prevent further rotation of the closing body 14 when these respective positions have been reached. The valve housing 9 and the closing body 14 may advantageously be injection moulded from plastics.

[0024] It appears from Fig. 2 that airflow can be created via the valve 8 to the interior of the window from the exterior of the window through a channel 28 between the sash 2 and the frame 5 and through a dust filter 27. Presetting of the valve 8 in one of its open positions thus ensures a permanent, minimal supply of fresh air to the room in which the window 1 is mounted. It is obvious that more valves 8 may be mounted in a window 1, and that the valves can be arranged as desired in the sash/frame structure of the window, both in the top and bottom as well as the side members. Instead of mounting the valve 8 direct in a member of the window sash 2, the valve 8 may also be mounted in an openable ventilation flap, which can open and close a ventilation slot in the top member 6 of the sash 2. This allows ventilation proper of the room by opening of the ventilation flap, and when the ventilation flap is in its closed position, a minimal supply of fresh air into the room will be guaranteed nevertheless.

[0025] It should also be noted that instead of being mounted in the position shown in Fig. 2 where the closing body 14 of the valve and its finger grip 18 face the room in which the window 1 is mounted, the valve 8 may also be mounted in the opposite way so that the finger grip 18 and possibly also the closing body 14 face outwards from the exterior side of the member 6 of the sash 2, as the closing body is thus made difficult to access and unintended operation thereof after mounting of the window is thus prevented. It will also be possible to replace the finger grips 18 on the closing body 14 with one or more small depressions in the surface of the closing body 14 so that a special tool can engage with these depressions for operation of the closing body 14. This will also prevent unintended operation of the closing body. Furthermore, it should be noted that in view of the operation by means of the finger grips 18 it is an advantage that the closing body 14 pivots on the external surface of the seat surface 12 as, in all positions of the closing body 14 in relation to the valve housing 9, the finger grips 18 are accessible along the entire diameter of the valve housing.

[0026] A first embodiment of a window according to the invention is characterized in that the seat surface (12) and the closing body (14) are shaped as semi-circular plates.

[0027] A second embodiment of a window according to the invention is characterized in that the valve housing (9) is provided with an end stop (26) for the closing body (14) so that further pivoting thereof is prevented when it reaches its fully open or fully closed position.

[0028] A third embodiment of a window according to the invention is characterized in that the closing body (14) and the valve housing (9) have respective locking members (23, 24) for mutual engagement in a number of different fixed positions of the closing body (14) in relation to the valve housing (9).

[0029] A fourth embodiment of a window according to the invention is characterized in that the respective locking members are formed as a projection (23) on the closing member (14) and a number of corresponding depressions (24) in the seat surface (12).

[0030] A fifth embodiment of a window according to the invention is characterized in that the closing body (14) can be retained in a position in relation to the valve housing (9).

[0031] A sixth embodiment of a window according to the invention is characterized in that the sash/frame structure (2, 5) is composed of a sash (2) and a frame

(5), the sash (2) supporting the pane (3) and being openably journalled in the frame (5), that the sash (2) has a top member (6) whereby, parallel therewith, a handle (7) extends for operation of a locking mechanism (11) for the window (1), and that the valve housing (9) is arranged at the top member (6) behind the handle (7) so that in the closed position of the window (1) the handle (7) covers the valve housing (9) at least partially towards the interior side of the window (1).

[0032] A seventh embodiment of a window according to the invention corresponds to the sixth embodiment and is further characterized in that an elongated ventilation slot is formed in the top member (6) of the sash (2) for flow communication between the exterior and interior sides of the window (1), the slot being closable by operation of the handle (7) by means of a ventilation flap hinged to the top member (6), and that the valve housing (9) is arranged at the ventilation flap.

[0033] An eighth embodiment of a window according to the invention corresponds to the seventh embodiment and is further characterized in that the valve housing (9) is inserted (fig. 2) in the ventilation flap.

[0034] A ninth embodiment of a window according to the invention is characterized in that the valve housing and/or the closing body is made by injection moulding.

[0035] A tenth embodiment of a window according to the invention is characterized in that the valve housing and/or the closing body is made from plastic.

Claims

1. A method of providing ventilation at a window (1) comprising a sash/frame structure (2, 5) supporting a pane (3), where a separate ventilation opening is made in the sash/frame structure (2, 5) so that flow communication is established between the exterior and interior sides of the window, **characterized in that** a valve housing (9) is arranged at the ventilation opening, that the flow area of the valve housing is partially covered by a seat surface (12), and that a closing body (14) is arranged in the housing (9), so that it is pivotable between an open position in which the closing body (14) overlaps the seat surface (12), and a closed position.

2. A method according to claim 2, **characterized in that** a hole is drilled through the window sash or frame and that the valve housing is pressed into the hole.

3. A method according to claim 1 or 2, **characterized in that** a hole is drilled through the window sash or frame and that the valve housing is glued on at the hole.

4. A method according to any of the preceding claims, **characterized in** the seat surface (12) supports a bearing bushing (13) arranged coaxially in the valve housing (9) and a pivot pin (15) inserted into the bearing bushing (13).

5. A window (1) comprising a sash/frame structure (2, 5) supporting a pane (3), a separate ventilation opening being adapted in the sash/frame structure (2, 5) for flow communication between the exterior and interior sides of the window, **characterized in that** a valve housing (9) is arranged at the ventilation opening, the flow area of the valve housing being partially covered by a seat surface (12), and that a closing body (14) in the housing (9) is pivotable between an open position in which the closing body (14) overlaps the seat surface (12), and a closed position.

6. A window according to claim 5, **characterized in that** the valve housing is in the shape of a preferably circularly cylindrical tube (9).

7. A window according to claim 5 or 6, **characterized in that** along its external periphery the valve housing (9) has a circumferential projection (21) abutting the sash/frame member (6).

8. A window according to any of claims 5-7, **characterized in that** on its exterior side the valve housing (9) has a number of ribs (22) extending in the axial direction and spaced in the circumferential direction of the valve housing.

9. A window according to any of claims 5-8, **characterized in**, and that the closing body (14) is pivotable about an axis coaxial with the ventilation housing (9).

10. A window according to claim 9, **characterized in that** the seat surface (12) supports a pivot bearing (13) for the closing body (14).

11. A window according to any of claims 5-10, **characterized in that** the seat surface (12) supports a bearing bushing (13), which is arranged coaxially in the valve housing (9), and that a closing body 14 is pivotably journalled coaxially in the housing (9) by means of a pivot pin (15).

12. A window according to claim 11, **characterized in that** the pivot pin (15) is slit along its axis of rotation allowing it to be squeezed about the slit at insertion into the bearing bushing (13), and at its free end it has a wedge-shaped barb (16) on either side of the slit, which abut on an end surface (17) of the bearing bushing (13) in the mounted state.

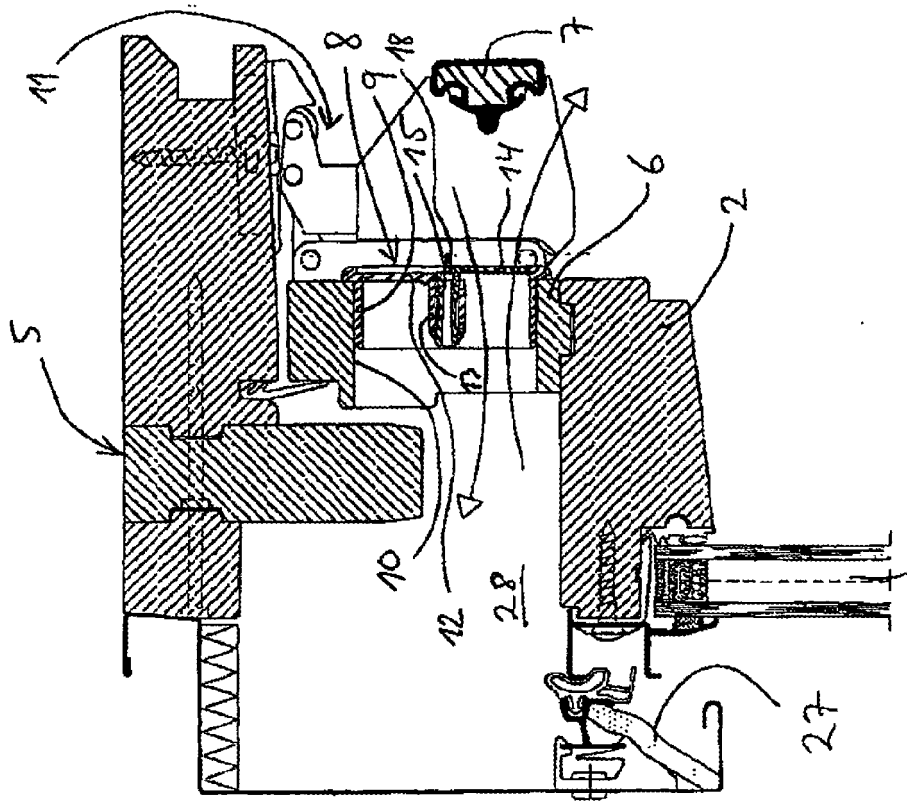

Fig. 2

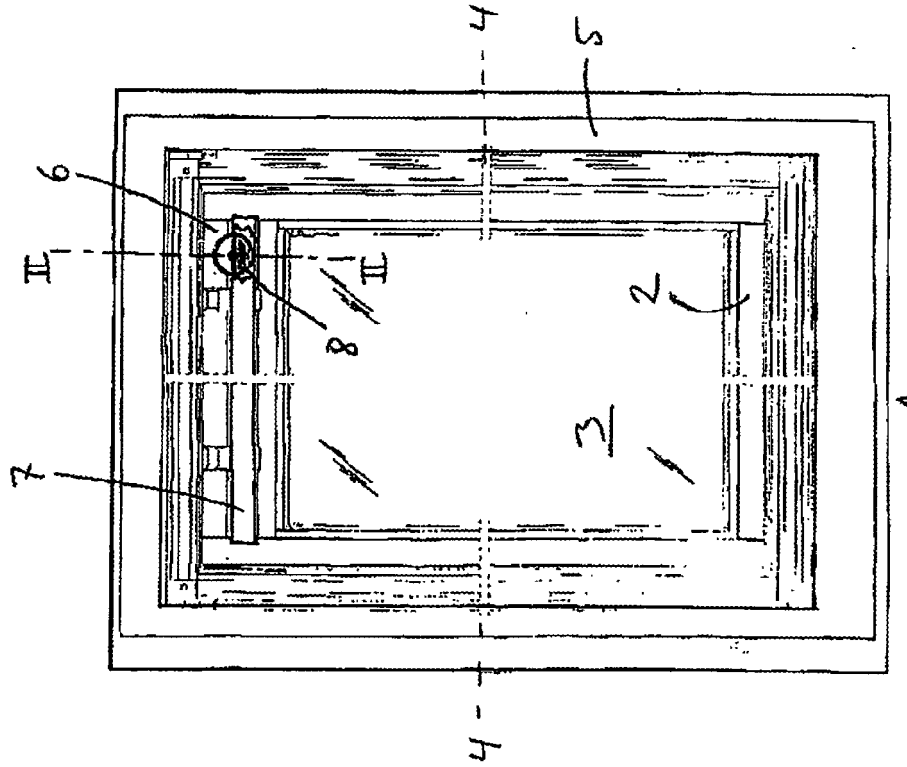

Fig. 1

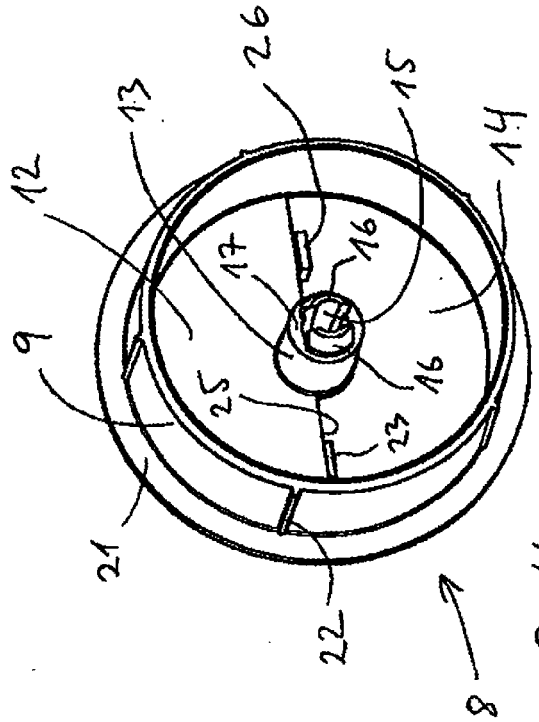

Fig. 4

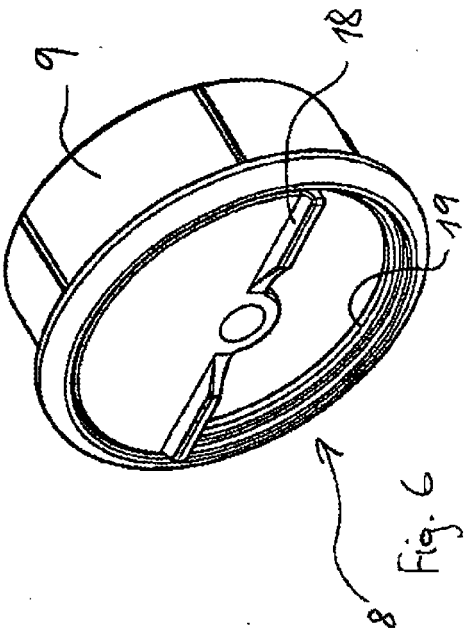

Fig. 6

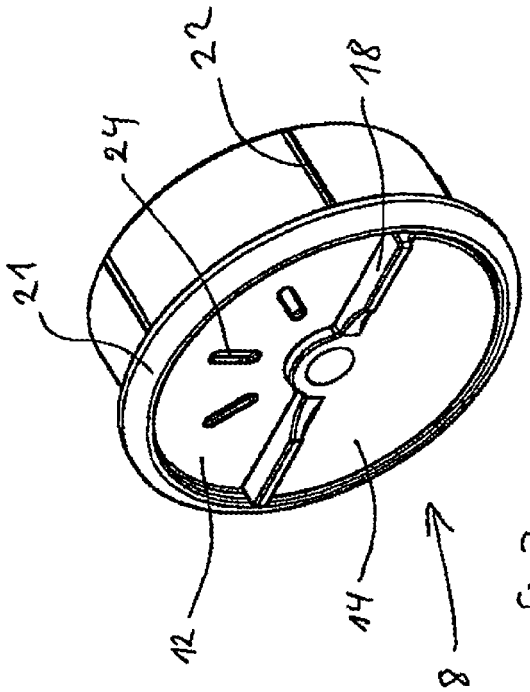

Fig. 3

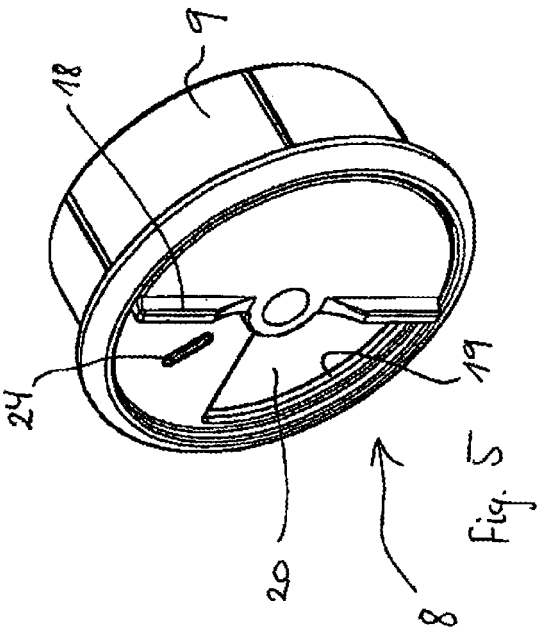

Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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