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(54) Window.

(57) A turn-tilt window 1 has a glazed sash 3 mounted on a fixed frame 2 for opening movement about either a horizontal axis (tilt) through pivots 7,8 or about a vertical axis (turn) through pivots 7,9 and a drive mechanism 10 operable by a control handle 5 to select the combination of pivots 7,8 and 9 for operation in the tilt or turn modes.

The drive mechanism 10 is mounted for sliding movement around the peripheral edge of the sash 3 on rotation of the control handle 5 and a safety device 6 mounted on the sash 3 permits sliding movement of the drive mechanism 10 on rotation of the control handle 5 to a first operative position in which pivots 7,8 are selected for operation in the tilt mode but prevents sliding movement of the drive mechanism 10 and rotation of the control handle 5 to a second operative position in which the pivots 7,9 are selected for operation in the turn mode until the safety device 6 has been manually released.

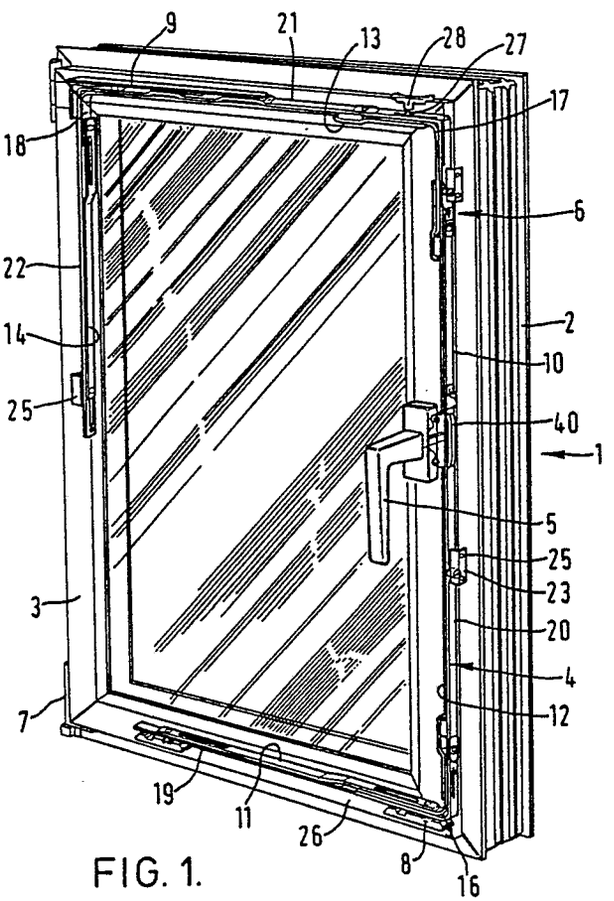

FIG. 1.

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WINDOW

This invention relates to windows and in particular to windows of the type herein referred to as turn-tilt windows comprising a fixed frame and a sash mounted thereon by a turn and tilt mechanism for pivotal movement about a vertical axis for operation in the turn mode and about a horizontal axis for operation in the tilt mode with the axis of pivotal movement being selected by a control handle operably connected to the turn and tilt mechanism.

In such windows the sash is fitted to tilt from the bottom of the frame and to turn from the side of the frame. Operation in the tilt mode provides limited opening movement at the top of the window sufficient for normal ventilation purposes but insufficient to allow a person, in particular a child to fall outwards through the opening. Operation in the turn mode provides unrestricted opening movement and allows access to both sides of the window from the inside for cleaning purposes. The windows are therefore particularly suited for use above ground level and in particular in high rise buildings by allowing safe ventilation with the facility for cleaning the window from the inside.

Generally, the control handle is operable to fasten the sash in the closed position and is rotatable from the fastened position to a first operative position for operation of the sash in the turn mode and a second operative position for operation in the tilt mode. The first and second operative positions are usually obtained by rotation of the control handle through 90° and 180° respectively from the fastened position. In addition the control handle may optionally have a third operative position which also permits operation in the tilt mode to provide a small degree of opening movement at the top of the window for permanent or night ventilation purposes. Where provided, the third operative position is intermediate the first and second operative positions and is obtained by rotation of the control handle through 135° from the fastened position.

A disadvantage of such handle operation is that the turn mode is obtained first on rotation of the control handle and the tilt mode is only obtained after rotation of the control handle beyond the operative position for the turn mode. Accordingly, there is a risk, in service, of the turn mode being inadvertently selected. This presents a serious safety hazard particularly in the case of operation of the control handle by a child.

It is an object of the present invention to provide a turn-tilt window which overcomes the aforementioned disadvantage of the known turn-tilt windows thereby providing for safe operation by all users including children.

According to the present invention, there is provided a turn-tilt window of the kind herein referred to wherein the control handle is operable to fasten the sash in a closed position and is rotatable from the fastened position to a first operative position for operation of the sash in the tilt mode and a second operative position for operation of the sash in the turn mode, the second operative position being selected by rotation of the control handle beyond the first operative position and, a safety device to permit rotation of the control handle to the first operative position but restrict rotation of the control handle to the second operative position, the safety device being manually releasable to allow rotation of the handle to the second operative position.

By the present invention, the normal operation of the control handle to select the turn and tilt modes is reversed so that the tilt mode is obtained first on rotation of the handle and a safety device is provided which prevents rotation of the handle to obtain the turn mode until the safety device has been released. In this way the tilt mode may be selected at all times but the turn mode may only be selected after the safety device has been released. As a result, the window may be operated in the tilt mode providing limited opening for normal ventilation purposes by all users but inadvertent operation in the turn mode providing unrestricted opening with access to both sides of the window for cleaning purposes is precluded. Consequently, the afore-mentioned safety hazard, to children especially, resulting from unrestricted opening of the window in the turn mode is considerably reduced.

Preferably the safety device is manually movable from a limit position in which rotation of the control handle in a first sense to select the turn mode is precluded to a release position in which rotation of the control handle in the first sense to select the turn mode is permitted.

Advantageously the safety device is resiliently biassed to the limit position, for example by a spring. In this way, the safety device is automatically re-set in the limit position on rotation of the control handle in the opposite sense from the second operative position.

Preferably the turn and tilt mechanism includes pivot connections between the sash and frame for controlling opening movement in the tilt and turn modes and a drive mechanism extending around the peripheral edge of the sash for controlling the combination of the pivot connections for operation in the turn and tilt modes. The control handle is coupled to the drive mechanism and, on rotation of the control handle, is operable to displace the drive mechanism around the sash to select the required combination of the pivot connections for operation in the turn and tilt modes.

Advantageously, the drive mechanism preferably includes means operable to prevent rotation of the control handle when the sash is in an open position. As a result, the user is prevented from selecting a different mode of operation when the sash is open and the sash must first be moved to the closed position before the control handle can be rotated. In this way, operation of the drive mechanism to obtain the required combination of the pivot connections is ensured.

Preferably the safety device is mounted behind a face flange of the sash and is accessible only when the sash is in an open position. In this way the safety device cannot be released when the sash is in the closed position and the control handle must be rotated to the first operative position to enable the sash to be opened in the tilt mode for the safety device to be released.

Conveniently the safety device comprises a slider mounted on the sash for limited sliding movement thereon and a fixed stud mounted on the drive mechanism for movement therewith relative to the slider. Preferably the fixed stud is engageable with the slider in the limit position to prevent displacement of the drive mechanism to select the turn mode and the slider is movable to the release position to free the stud and permit displacement of the drive mechanism to select the turn mode.

Advantageously, the engagement of the fixed stud and slider in the limit position of the safety device corresponds to a third operative position of the control handle intermediate the first and second operative positions in which opening movement in the tilt mode is permitted. Preferably opening movement in the third operative position is restricted by engagement of a lug mounted on the drive mechanism with a retainer mounted on the frame to provide a small degree of opening movement for permanent or night ventilation.

Preferably the slider has a bifurcated portion having a lead-in part and a narrower tail part and the fixed stud has a shank slidable in both parts and a stud collar slidable in the lead-in part only. The resilient biassing acts between the slider and the sash to bias the slider to the limit position in which the stud collar is received in the lead-in part and permits rotation of the control handle until the stud collar abuts the slider at the end of the lead-in part. The slider is moved to the release position by depressing against the resilient biassing and sliding lengthwise relative to the fixed stud to locate the stud shank in the tail part whereupon further rotation of the control handle is permitted.

An exemplary embodiment of the invention will now be described in more detail with reference to the accompanying drawings wherein:

FIGURE 1 is a perspective view of a window according to the present invention with the turn and tilt mechanism superimposed;

FIGURE 2 is a perspective view of the window shown in Figure I showing operation in the tilt mode;

FIGURE 3 is a perspective view of the window shown in Figure I showing operation in the turn mode;

FIGURE 4 is a front view of one half of the window shown in Figure 1 showing the position of the control handle for permanent or night ventilation;

FIGURE 5 is a side view of the window in the permanent or night ventilation position shown in Figure 4;

FIGURE 6 is a side view, partly in section, showing the safety device in the limit position for restricting rotation of the control handle;

FIGURE 7 is a side view similar to Figure 6 showing the safety device in the release position for permitting rotation of the control handle;

FIGURE 8 is a view showing the relative position of the safety device in the first operative position of the control handle;

FIGURE 9 is a view similar to Fgure 8 showing the relative position of the safety device in the third operative position of the control handle; and

FIGURE 10 is a view similar to Figures 8 and 9 showing the relative position of the safety device in the second operative position of the control handle.

Referring first to Figures 1 to 5 of the accompanying drawings, there is shown a window I comprising a fixed frame 2 and a glazed sash 3 mounted thereon by a turn and tilt mechanism 4 operable by a control handle 5 mounted on the sash 3 to select operation of the window I in a turn mode or a tilt mode and, a releasable safety device 6 mounted on the sash 3 to prevent selection of the turn mode until the safety device 6 has been manually released.

The turn and tilt mechanism 4 includes a fixed pivot 7 and a releasable pivot 8 connecting the bottom of the sash 3 to opposed lower corners of the frame 2 and, a scissors stay 9 connecting the top of the sash 3 to an upper corner of the frame 2 vertically above the fixed pivot 7. The scissors stay 9 is pivotally connected to the frame 2 and may be locked in the folded position to provide a fixed pivot.

For operation of the window 1 in the tilt mode, the releasable pivot 8 is engaged to permit pivotal movement of the sash 3 from the bottom of the frame 2 about a horizontal axis and, for operation of the window 1 in the turn mode, the releasable pivot 8 is disengaged and the scissors stay 9 is locked in the folded position to provide a fixed pivot to permit pivotal movement of the sash 3 from the side of the frame 2 about a vertical axis.

The turn and tilt mechanism 4 further includes a drive mechanism 10 comprising respective elongate bars 11,12,13,14 slidably mounted on each side of the sash 3 in a groove 15 extending around the peripheral edge of the sash 3 with the adjacent ends of the bars on adjoining sides of the sash 3 being connected at three corners of the sash 3 by flexible strips 16,17,18 for transmitting the drive to successive bars around the sash 3.

The bars 11,12,13,14 are retained in the groove 15 by a cover plate designated 19,20,21,22 and are provided with one or more locking members 23, for example bolts, rollers or the like, which project outwardly through slots 24 in the overlying cover plate for releasable engagement with fixed keepers 25 on the frame 2 to fasten the sash 3 in a closed position. The drive mechanism 10 is concealed behind a face flange 26 of the sash 3 and is not visible when the sash 3 is closed thereby providing a neat finish and preventing tampering with the drive mechanism 10.

The control handle 5 is coupled to the drive mechanism 10 by a rack and pinion device 40 for converting rotary movement of the control handle 5 into linear displacement of the bars 11,12,13,14 around the sash 3 to disengage the locking members 23 from the keepers 25 and select the required combination of the pivots 7,8 and scissors stay 9 for operation of the window I in the turn and tilt modes.

The control handle 5 is rotatable from the fastened position shown in Figure 1 in which the sash 3 is closed to first and second operative positions in which the sash 3 may be opened in the tilt mode and the turn mode respectively. The first and second operative positions correspond to rotation of the control handle 5 through 90° and 180° respectively from the fastened position.

In the first operative position of the control handle 5 shown in Figure 2, opening movement of the sash 3 in the tilt mode is controlled by the scissors stay 9 and the full extension of the stay 9 is such as to provide an opening at the top of the window sufficient for normal ventilation purposes but insufficient for a person, especially a child, to pass through the opening.

In the second operative position of the control handle 5 shown in Figure 3, the sash 3 is free to open inwards in the turn mode providing access to both sides of the sash 3 to facilitate cleaning and a wide opening through which a person may pass to facilitate escape in an emergency, e.g. in a fire.

In addition to rotation to the first and second operative positions, the control handle 5 is rotatable to a third operative position, intermediate the first and second operative positions in which the sash 3 may also be opened in the tilt mode. The third operative position corresponds to rotation of the control handle 5 through 135° from the fastened position.

In the third operative position of the control handle 5 shown in Figures 4 and 5, opening movement of the sash 3 in the tilt mode is limited by the engagement of a lug 27 mounted on the drive mechanism 10 in a retainer 28 mounted on an upper corner of the frame 2 vertically above the releasable pivot 8. The retention of the lug 27 in the retainer 28 enables the sash 3 to be opened a safe small amount for permanent or night ventilation purposes.

The drive mechanism 10 also includes means (not shown) to prevent rotation of the control handle 5 when the sash 3 is in an open position and thereby prevent the user selecting a different mode of operation when the window I is open. Such means may be of any known type and ensures that the required combination of the pivots 7,8 and

scissors stay 9 for the turn and tilt modes is always obtained. Thus, it will be understood that, if the window I is open in the turn mode shown in Figure 3 and the control handle 5 is rotated to the first operative position shown in Figure 2 for operation in the tilt mode, the scissors stay 9 would be released but the releasable pivot 8 would not be engaged on the frame 2 and consequently the window 1 would fall inwards placing a high strain on the scissors stay 9. A similar result would also be obtained if the control handle 5 was rotated to select the turn mode while the sash 3 is open in the tilt mode.

Referring now to Figures 6 and 7, the safety device 6 for preventing selection of the turn mode until the safety device 6 has been released is shown and comprises a slider 29 and a fixed stud 30 mounted on the side of the sash 3 adjacent to the upper corner of the frame 2 above the releasable pivot 8. The safety device 6 is concealed behind the face flange 26 of the sash 3 and is not visible or accessible when the sash 3 is closed thereby preventing tampering with the safety device 6.

The slider 29 is mounted on the cover plate 20 for limited sliding movement lengthwise of the cover plate 20 by means of a headed rivet 31 fixed to the cover plate 20 and extending through a slot 32 in the slider 29. The fixed stud 30 is mounted on the underlying bar 12 of the drive mechanism 10 and projects outwards through an elongate opening 33 in the cover plate 20 for reception in a bifurcated portion 34 of the slider 29. The bifurcated portion 34 is in two parts having a wide lead-in part 35 and a narrow tail part 36. The stud 30 has a shank 37 slidable in both the lead-in and tail parts 35 and 36 respectively of the bifurcated portion 34 of the slider 29 and, a collar 38 is provided on the shank 37 which is slidable in the lead-in part 35 only.

A spring 39 mounted on the rivet 31 acts between the cover plate 20 and the underside of the slider 29 to bias the slider 29 to a limit-position shown in Figure 6 in which the stud collar 38 is received in the lead-in part 35. The slider 29 is manually movable to a release position shown in Figure 7 in which the stud shank 37 is received in the narrow tail part 36 of the bifurcated portion 34 by depressing the slider 29 against the bias of spring 39 to raise the bifurcated portion 34 above the stud collar 38 and sliding the slider 29 towards the stud 30.

Referring now to Figures 8,9 and 10, operation of the safety device 6 will now be described in conjunction with the operation of the control handle 5 to select the operation of the window 1 in the tilt and turn modes as previously described. In Figures 8,9 and 10 the fastened position of the control handle 5 is shown in dotted lines and the operative positions of the control handle 5 are shown in full lines.

In the fastened position of the control handle 5, the safety device 6 is in the limit position with the stud collar 38 received in the lead-in part 35 of the bifurcated portion 34 of the slider 29. On clockwise rotation of the control handle 5 from the fastened position, the drive mechanism 10 is actuated and the bar 12 of the drive mechanism and the stud 30 mounted thereon are displaced relative to the slider 29 causing the stud collar 38 to move along the lead-in part 35 towards the tail part 36 of the bifurcated portion 34. As shown in Figures 8 and 9 such rotation is permitted up to 135° so that both the first and third operative positions of the control handle 5 for operation of the window I in the tilt mode for normal and permanent or night ventilation may be freely selected without hindrance from the safety device 6. However, as shown in Figure 9, when the control handle 5 reaches the third operative position, the stud collar 38 is at the end of the lead-in part 35 and further displacement of the stud 30 relative to the slider 29 is prevented. As a result, further displacement of the bar 12 of the drive mechanism 10 is prevented and rotation of the control handle 5 to the second operative position to select operation in the turn mode is prevented until the safety device 6 has been manually released.

In order to select operation in the turn mode, it is necessary to rotate the control handle 5 to the first operative position, open the sash 3 in the tilt mode to gain access to the safety device 6, release the safety device 6 as described so that the stud shank 37 is located in the tail part 36 of the bifurcated portion 34 of the slider 29 and close the sash 3 whereupon the control handle 5 may be rotated to the second operative position as shown in Figure 10.

If the control handle 5 is subsequently rotated counter-clockwise from the second operative position, the stud 30 will again be displaced relative to the slider 29 causing the stud shank 37 to move along the tail part 36 towards the lead-in part 35 of the bifurcated portion 34 of the slider 29. When the control handle 5 reaches the third operative position, the stud 30 is again located in the lead-in part 35 and the slider 29, under the bias of spring 39, positions the stud collar 38 in the lead-in part 35 thereby automatically re-setting the safety device 6 in the limit position and preventing re-selection of the turn mode until the safety device 6 has again been released.

It will be apparent from the foregoing description that by reversing the operative positions of the control handle 5 for selecting operation in the turn and tilt modes and providing a manually releasable safety device 6 which prevents selection of the turn mode until the safety device 6 has been released, inadvertent selection of the turn mode, especially by a child, is precluded. In particular, it is extremely unlikely that the sequence of operations required to select the turn mode including first selecting the tilt mode would be achieved by a child.

The invention is not limited to the embodiment above described, for example while a drive mechanism consisting of elongate bars positioned along the sides of the sash and connected by flexible corner strips has been described, other known constructions of drive mechanisms including a length of wire extending around the sash to which the associated elements are secured may be used.

Also the provision of a third operative position of the control handle intermediate the first and second operative positions for a permanent or night ventilation facility as above-described is optional and may be omitted. If the third operative position is omitted, the engagement of the stud and slider to prevent rotation of the control handle to select the turn mode may be arranged to correspond to the first operative position of the control handle.

The angular separation of the various operative positions of the control handle above-described is exemplary and may readily be altered as required to suit any given application.

The control handle may be rotatable in the counterclockwise direction from the fastened position to select the operation in the tilt and turn modes.

The safety device may be mounted on the sash at different positions, for example on the top of the sash.

Claims

1. A turn-tilt window (1) comprising a sash (3) mounted on a fixed frame (2) by a turn and tilt mechanism (4) including pivot means (7,8,9) and a drive mechanism (10) operable by a control handle (5) to select combinations of the pivot means - (7,8,9) for pivotal movement of the sash (3) about a vertical axis in the turn mode and about a horizontal axis in the tilt mode characterised in that the control handle (5) is rotatable from a fastened position for securing the sash (3) closed to a first operative position for operation of the sash (3) in the tilt mode and a second operative position for operation of the sash (3) in the turn mode, the second operative position being selected by rotation of the control handle (5) beyond the first operative position and, a safety device (6) to permit rotation of the control handle (5) to the first operative position but restrict rotation of the control handle (5) to the second operative position, the safety device (6) being manually releasable to allow rotation of the control handle (5) to the second operative position.

2. A window according to claim I characterised in that the drive mechanism (10) is mounted for limited sliding movement around the peripheral edge of the sash (3) and the safety device (6) comprises a first part (29) on the sash (3) for engagement with and disengagement from a second part (30) on the drive mechanism (10) to prevent and permit respectively sliding movement of the drive mechanism (10) to select the turn mode.

3. A window according to claim 2 characterised in that the first part (29) is resiliently biassed to a limit position for engagement with the second part (30) and is manually movable against the resilient biassing to a release position for disengagement from the second part (30).

4. A window according to claim 3 characterised in that the first part (29) comprises a slider (29) having a bifurcated portion (34) and the second part - (30) comprises a stud (30) received in the bifurcated portion (34).

5. A window according to claim 4 characterised in that the bifurcated portion (34) has a lead-in part (35) and a narrower tail part (36) and the stud (30) has a collar (38) slidable in the lead-in part (35) in the limit position of the slider (29) and a shank (37) slidable in the tail part (36) in the release position of the slider (29).

6. A window according to claim 5 characterised in that the slider (29) is mounted for limited sliding movement on the sash (3) for positioning the shank (37) in the tail part (36) in the release position of the slider (29).

7. A window according to any one of claims 2 to 6 characterised in that the engagement of the first and second parts (29,30) of the safety device (6) 25 corresponds to the first operative position of the control handle (5).

8. A window according to any one of claims 2 to 6 characterised in that the engagement of the first

and second parts (29,30) of the safety device (6) corresponds to a third operative position of the control handle (5) intermediate the first and second operative positions in which operation of the sash (3) in the tilt mode is permitted and opening movement of the sash (3) is limited by the engagement of respective formations (27,28) on the drive mechanism (10) and fixed frame (2).

9. A window according to any one of the preceding claims characterised in that the safety device (6) is accessible only when the sash (3) is open.

10. A window according to any one of the preceding claims characterised in that the control handle (5) is rotatable only when the sash (3) is closed.

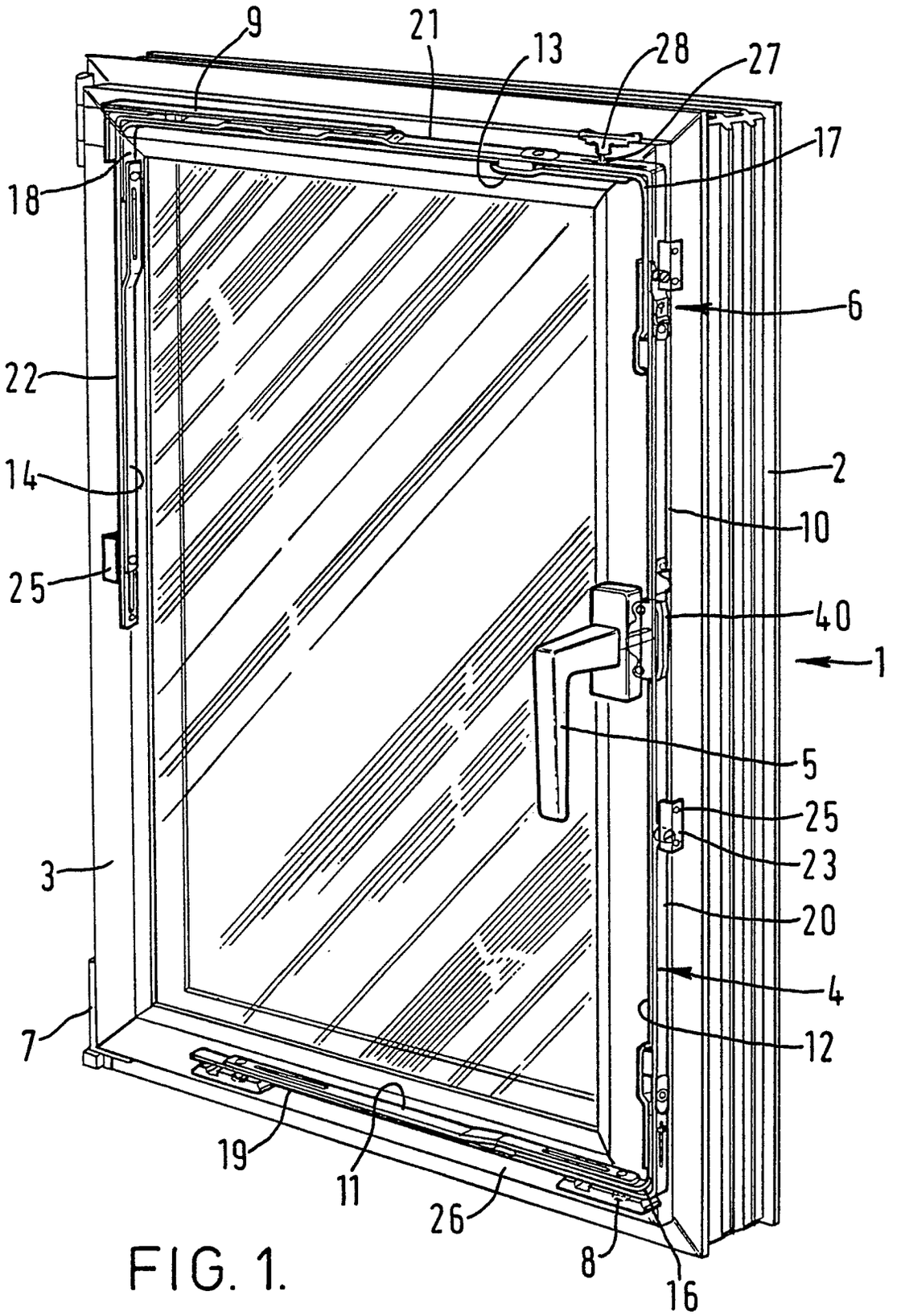

FIG. 1.

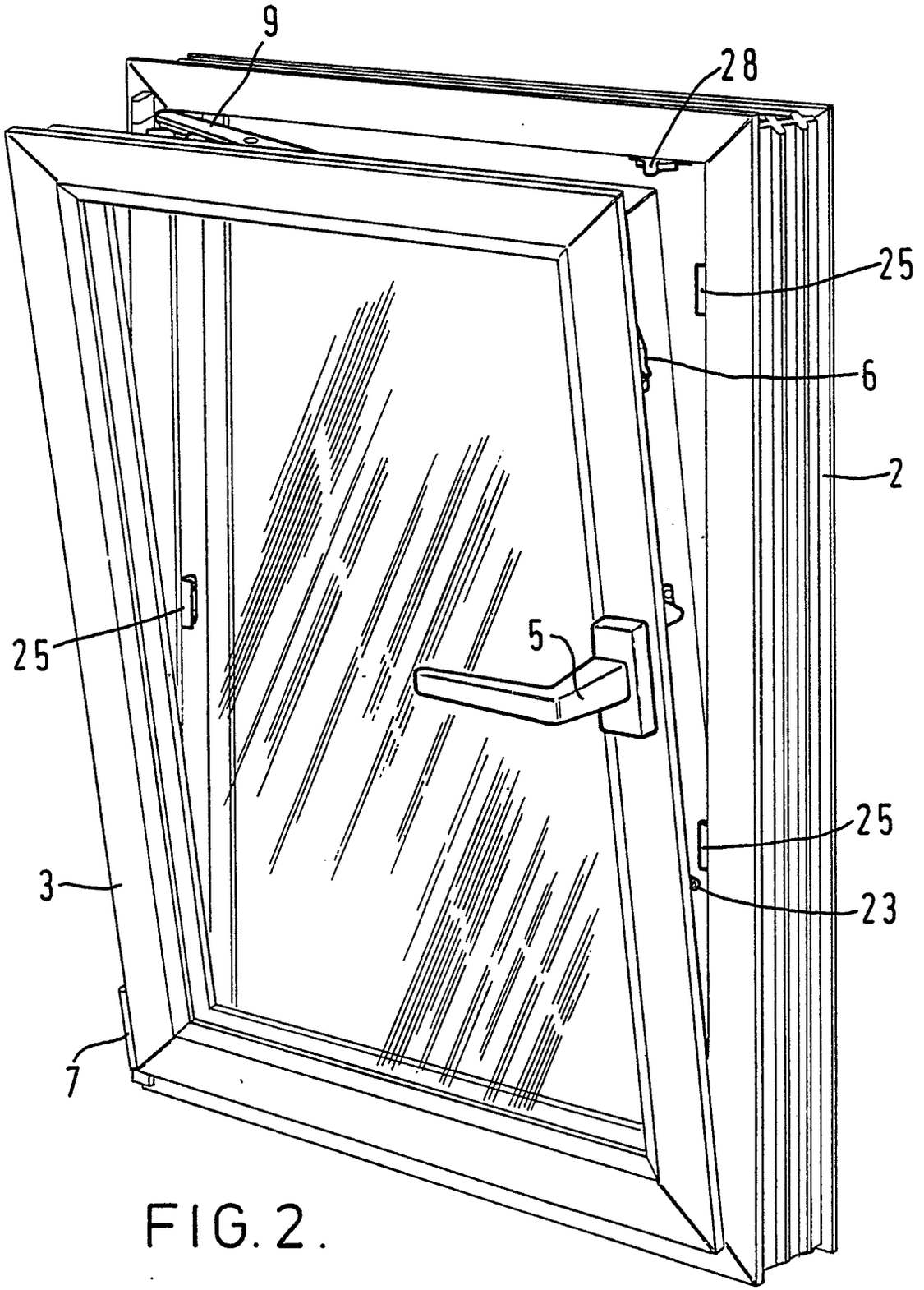

FIG. 2.

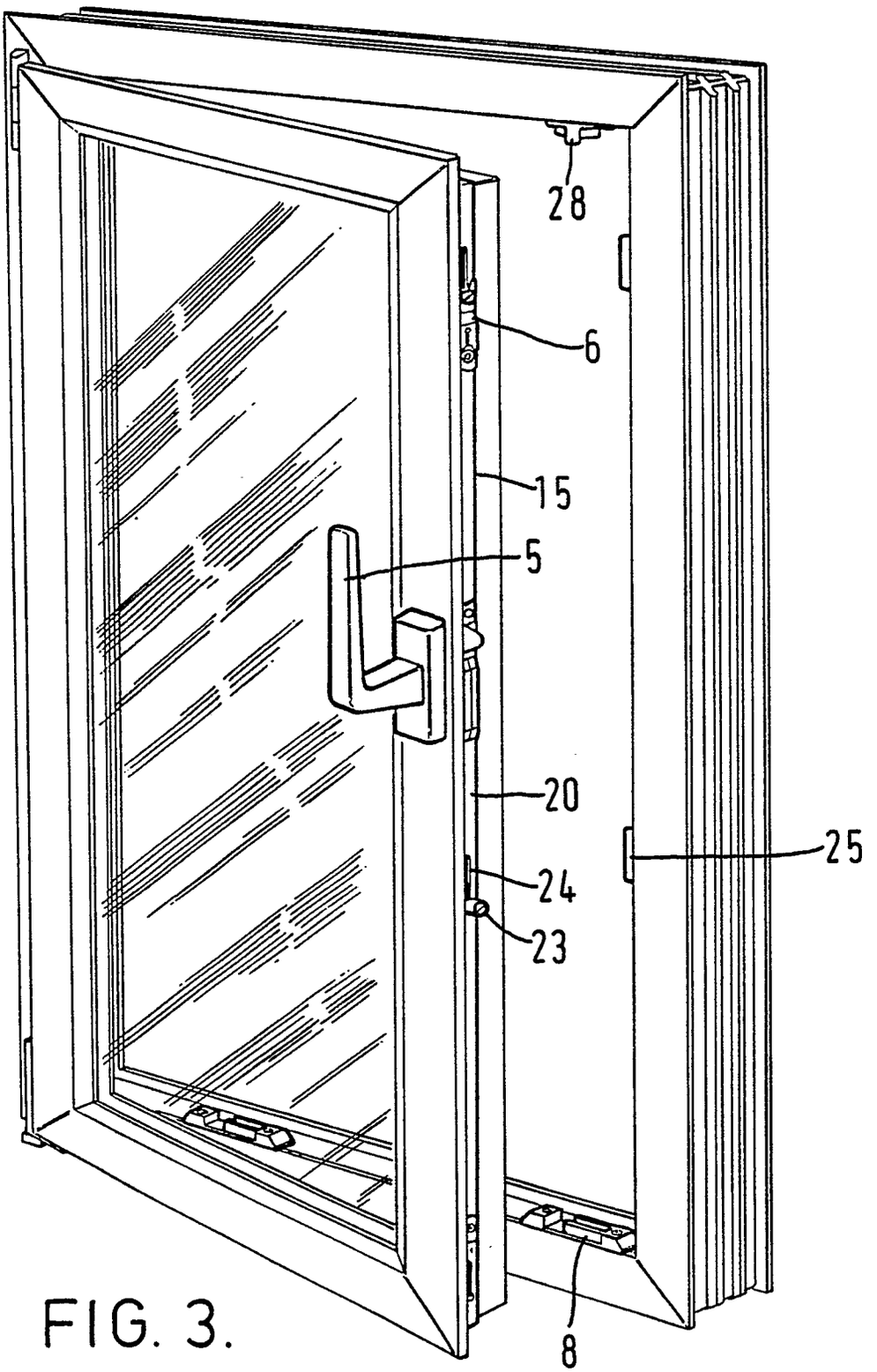

FIG. 3.

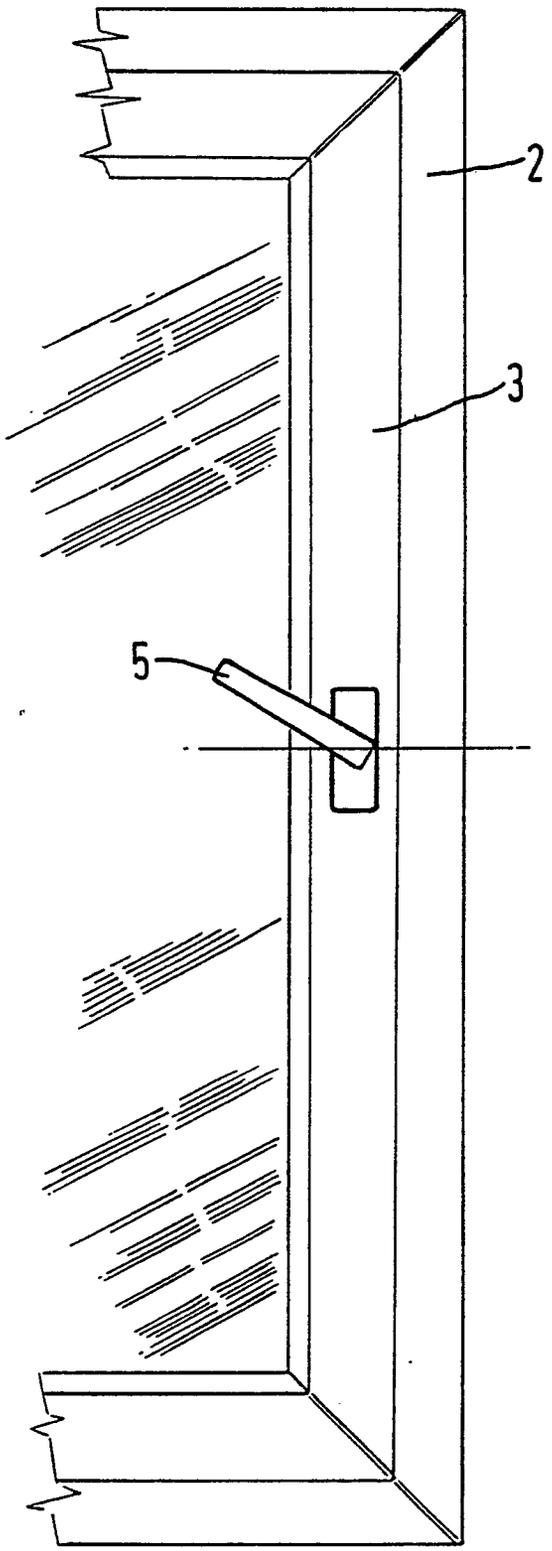

FIG. 4.

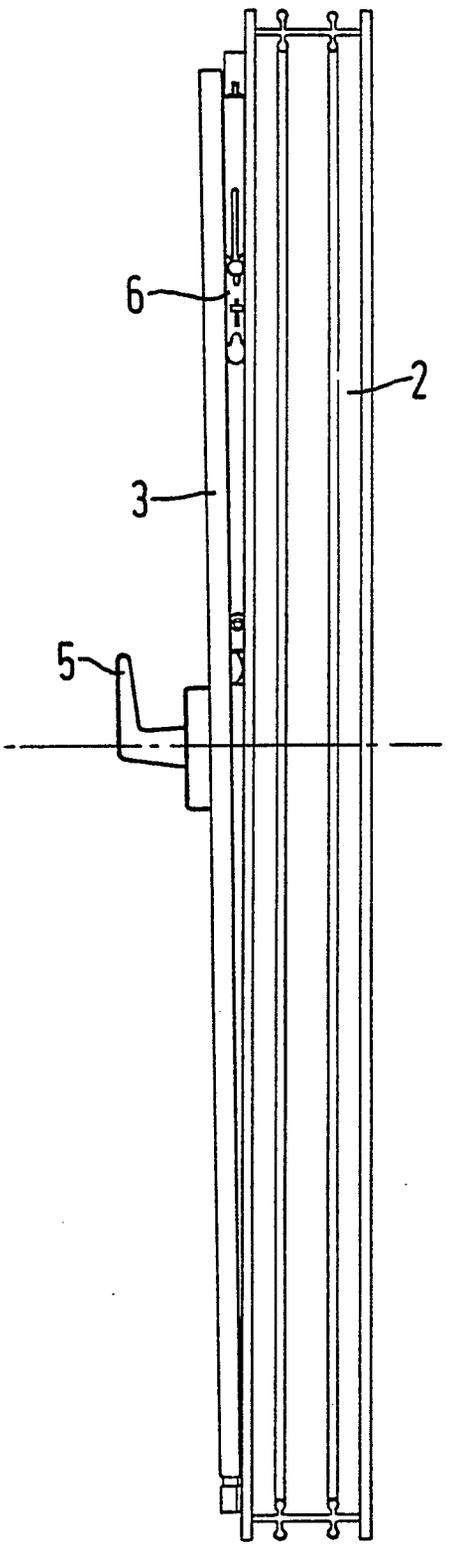

FIG. 5.

FIG. 6.

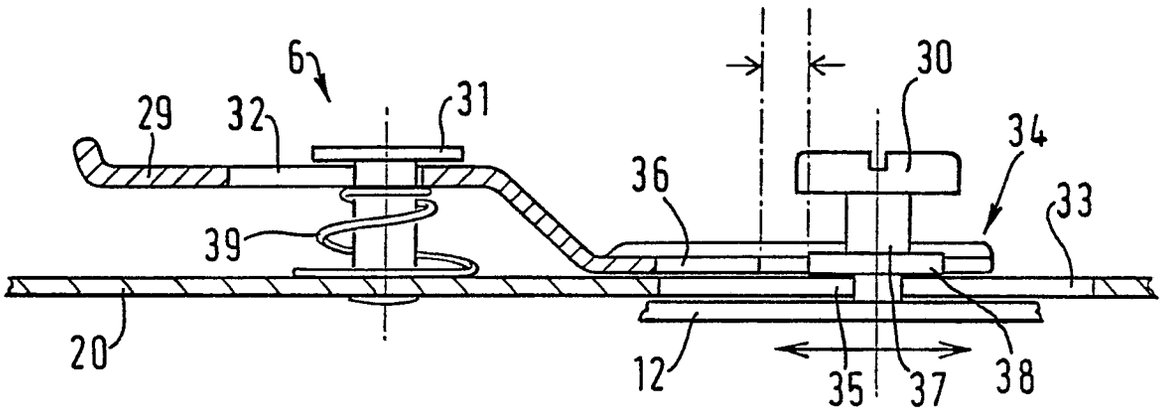
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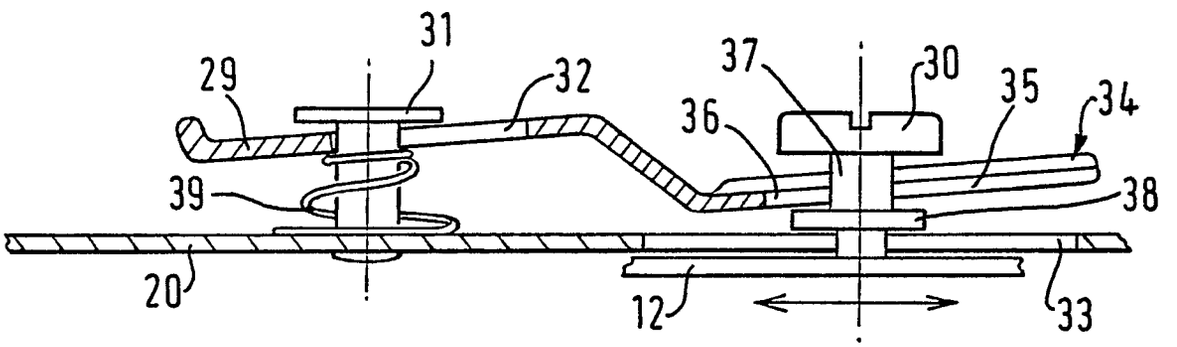
FIG. 7.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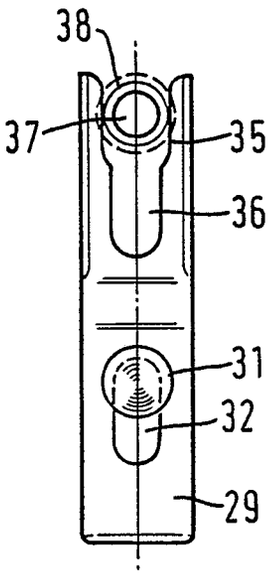

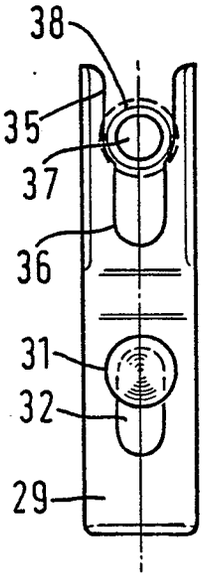

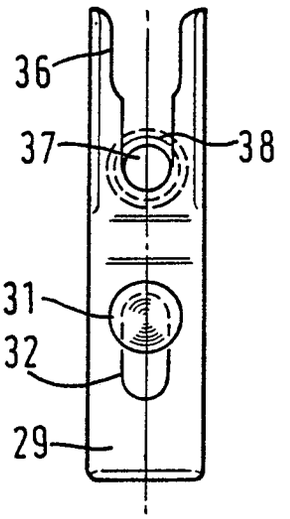

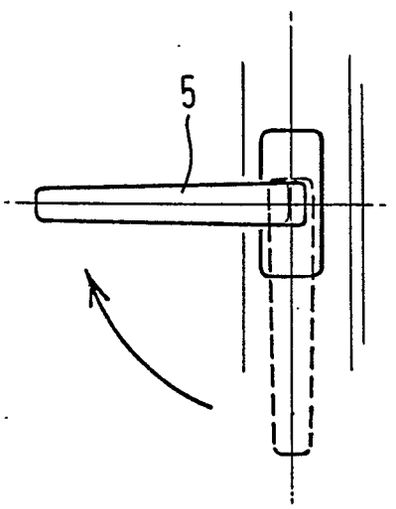

FIG. 8.

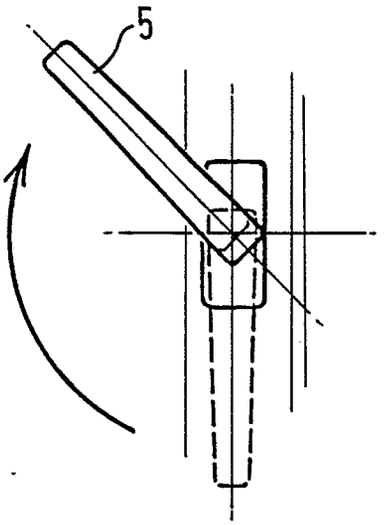

FIG. 9.

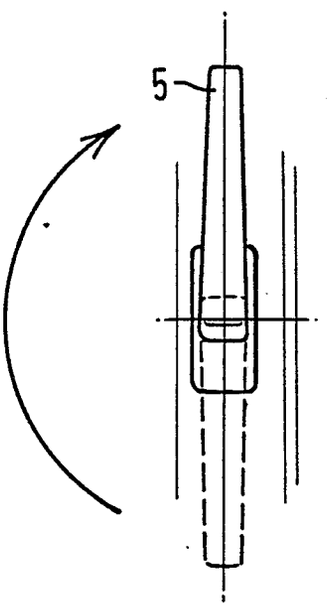

FIG.10.