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(54) Insect screen for a tilt and turn window

(57) A protective screen device for a pivotally opening window assembly (1), which device includes a first, substantially rectangular perimeter frame (15) that extends through at least three adjoining sides of a rectangle. The screen device also includes a second, substantially rectangular perimeter frame (17) that extends through at least three adjoining sides of a rectangle and a collapsible protective screen (11) connected for expansion between the first and second perimeter frames (15, 17). The first and second perimeter frames (15, 17) are movable with respect to one another between a first position in which a plane through the second perimeter frame is substantially coextensive with a plane through the first perimeter frame and a second position in which the planes of the first and second perimeter frames are substantially spaced. Means (27) are provided for resiliently urging the first and second perimeter frames (15, 17) away from one another.

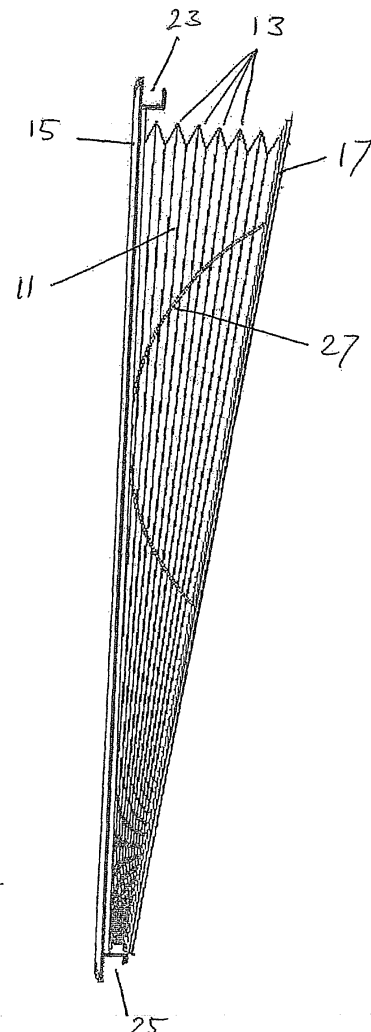


FIG. 3

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Description

[0001] The invention relates to a protective screen device for a turn and tilt window. The invention particularly relates to a screen, preferably a pleated screen, for preventing the ingress of foreign matter such as insects, when such a window is used for ventilation.

[0002] Turn and tilt windows (TAT windows) are windows of which the wing can selectively open about a vertical or horizontal axis, thus it can swing or tilt open with respect to the window frame. One example of such a window is described in GB 1,164,185. Protective screens for shielding against insects and/or pollen for use with such turn and tilt windows are also known in the art. Such insect screens are described in for example in EP 0 942 141 and EP 1 873 346, but these types of screens obstruct the view through the window when in use. Other proposals which do not obstruct the view and which may be left in place when not in use are described in DE 202004002240 and DE 44 33 841.

[0003] German patent publication DE 44 33 841 proposes a pleated insect screen for a turn and tilt window. The screen is connected between a pair of rectangular screen frame-members, the inner frame member is connected to the window frame and the outer frame member is connected to the wing. The connection of the outer frame member to the wing is by magnetic force in that the outer frame is magnetic. This protective screen has to follow the movement of the wing, which often differs from the ideal path of movement of the collapsible screen. This holds the risk of the screening device becoming damaged upon repeated opening and closing of the window wing. German utility model DE 202004002240 proposes a screen between a pair of frame members that are hingeably connected to hinge about a horizontal axis. This screen is to be mounted to a tiltable window by means of double sided adhesive tape. Apart from holding the same drawback of possible damage, this screen can moreover not be taken out of the window and put back for cleaning, or adjusting.

[0004] Ideally the insect screen can be removably mounted to the turn and tilt window and easily taken down, at the same time the frame members of the screen must remain in close contact with the window frame and wing and not disconnect while the window is tilted open. A removable framed insect screen is the magnetic frame of DE 44 33 841, but this insect screen can only be used in steel windows and not for wooden and other non-magnetic windows. Also the magnetic connection is too sticky to allow adaptation of the screen movement to the movement of the wing. The screen of DE 202004002240 is fixed on the window by an adhesive connection and thus it cannot be removed without becoming dysfunctional.

[0005] Accordingly it is an object of the present invention to propose an improved protective screen device. In a more general sense it is thus an object of the invention to overcome or ameliorate at least one of the disadvantages of the prior art. It is also an object of the present

invention to provide alternative structures which are less cumbersome in assembly and operation and which moreover can be made relatively inexpensively. Alternatively it is an object of the invention to at least provide the public with a useful choice.

[0006] To this end the invention provides a protective screen device for a pivotally opening window assembly, the device including: a first, substantially rectangular perimeter frame that extends through at least three adjoining sides of a rectangle; a second, substantially rectangular perimeter frame that extends through at least three adjoining sides of a rectangle; and a collapsible protective screen connected for expansion between the first and second perimeter frames; wherein the first and second perimeter frames being movable with respect to one another between a first position in which a plane through the second perimeter frame is substantially coextensive with a plane through the first perimeter frame and a second position in which the planes of the first and second perimeter frames are substantially spaced, and wherein means are provided for resiliently urging the first and second perimeter frames away from one another. By having a first frame quasi hingedly confined in respect of a second frame and a screen connected between the first and second frames the screen deploys when one of the frames move away from the other frame and a resilient member is connected between the two frames biasing the one frame away from the other. In retracted position the screen is held between the frames when they lie against each other when the window is closed. The insect screen can be removably mounted to window that has a tilting ventilation position and can easily be taken down. At the same time the frame members of the screen must remain in close contact with the window frame and wing and not disconnect while the window is tilted open. Thus an insect screen that can be easily installed to, and be removed from, a tiltable window and which when installed will ensure a closed connection between the window frame and wing has been provided by the invention. Advantageously the first perimeter frame has an upper and lower retaining structures for attachment of the first perimeter frame to a window surround. Since the spring bias will spread the first and second perimeter frames apart it is basically only necessary to retain the first perimeter frame in position with respect to a window opening of a window surround, such that it cannot escape there from when the wing is tilted open. More preferably the upper retaining structure includes upper spring clips, while the lower retaining structure includes lower spring clips. By such an arrangement the first perimeter frame may be positioned on a side of the window surround that is opposite of the tiltable wing. This allows additional room to be created, outside of the path of movement of the wing, to accommodate the screen when retracted. In such an arrangement it can be further advantageous when the lower spring clips differ from the upper spring clips.

[0007] In a further advantageous embodiment of the

protective screen device the means for resiliently urging the first and second perimeter frames away from one another include a spring element. Preferably the spring element is in the form of an arc shaped wire spring. Such a wire spring can be easily accommodated to a side of the collapsible screen. To reduce friction and wear of the areas where the wire spring contacts the opposite perimeter frames a low friction coating, or low friction sliding elements may be optionally employed.

[0008] In yet a further advantageous embodiment movement of the first and second perimeter frames between the first and second position is guided by a link structure. While a quasi fan-like opening will be induced by the pivoting window structure when the protective screen device is installed, the integrity of the screen device when not installed may benefit from a link structure. Such a link structure can effectively limit the freedom of movement by the resilient biasing means. Optionally the first perimeter frame can include an upper first frame member and parallel left and right first frame members extending from relevant opposite ends of the upper first frame member. Similarly also the second perimeter frame can include an upper second frame member and parallel left and right second frame members extending from relevant opposite ends of the upper second frame member. Such separate members can be easily made to correspond to various sizes of tiltable windows and be readily assembled by appropriate corner connectors. In such an arrangement it is also advantageous when the link structure is arranged in the vicinity of opposing free ends of the parallel left and right first frame members and the parallel left and right second frame members. Additionally, but also alternatively, the first perimeter frame can have a lower first frame member connected between the free ends of the parallel left and right first frame members. Similarly the second perimeter frame can also have a lower second frame member connected between the free ends of the parallel left and right second frame members. This will provide for first and/or second perimeter frames that are circumferentially closed and thereby offer not only added integrity, but also additional opportunities in the mounting of the protective device to a tiltable window, and for its constituting components. In this regard it is advantageous when the link structure is operatively arranged between the lower first and second frame members.

[0009] When a link structure is provided, it is further preferred that the link structure includes a pair of pivotally connected first and second links.

[0010] Irrespective of whether a link structure is provided the protective screen device according to the invention may also benefit when an extension limiter is operatively arranged between the first and second perimeter frames to limit movement of the upper first and second frame members to the second position. This not only helps to control the integrity of the screen device when not in use, but the extension limiter may also be arranged in such a manner that it supports the collapsible

screen in use.

[0011] It is further in particular preferred that the protective screen is a pleated screen. Such a collapsible screen can be accommodated in a very confined space, which is an advantage when allowing the protective screen to also remain in place when the tiltable window is closed. Rather than a pleated screen it is also conceivable that honeycomb material is used as proposed in GB 2233895.

[0012] Further advantageous aspects of the invention will become clear from the appended description and in reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a tiltable window fitted with a protective screen device according to the invention;

Figure 2 is a perspective view, partially cross-sectioned of the window of Figure 1, but viewed from the opposite direction;

Figure 3 is a side view of a protective screen device according to the invention, shown in an expanded condition;

Figure 4 is an outside elevation of the window of Figure 1;

Figure 5 is a cross-section according to the line V-V in Figure 4, when the window is opened by tilting its pane carrying wing;

Figure 6 is an enlarged partial view according to the detail VI indicated in Figure 5;

Figure 7 is an inside elevation of the window of Figure 1;

Figure 8 is a cross-section according to the line VIII-VIII in Figures 7, when the window is opened by tilting of its pane carrying wing;

Figure 9 is an enlarged partial view according to the detail IX indicated in Figure 8;

Figure 10 is an enlarged partial view according to the detail X indicated in Figure 9;

Figure 11 is an exploded view of the protective screen device of Figure 3, and

Figure 12 is a partial perspective view showing the bottom corners of the protective screen device according to the invention.

[0013] Figure 1 shows a window assembly 1 that comprises a surround 3 for attachment to a building wall (not shown, but conventional) and a tiltable wing 5. The tiltable wing 5, which is shown in its tilted position, carries a glass pane 7. The window assembly 1 is conveniently, but not necessarily, of the so-called swing-and-tilt, or turn-and-tilt, type. Such well known window assemblies allow opening about two different axes. For full opening the wing 5 is allowed to swing about a vertical axis and for ventilation the wing 5 is allowed to tilt about a horizontal axis at the bottom. In the ventilation position the allowed angle of opening of the wing is limited not to exceed 25 or 30 degrees, but more commonly between 5 and 15 degrees. The selection of movement between swinging

and pivoting is controlled by a handle 9. For the example described here, it is irrelevant whether the handle 9 serves only for pivoting about a horizontal axis, or whether additionally it may also control opening about a vertical axis.

[0014] Also shown in Figure 1 is that a protective screen 11 is interpose between in the opening gap between the surround 3 and wing 5. The protective screen 11 can be an insect screen, but also a pollen filter or like, which enables ventilation but forms a barrier to unwanted elements entering through the ventilation opening.

[0015] Figure 2 is a partially cross-sectioned view of the window assembly 1 viewed from its opposite side. The glass pane has been deleted from Figure 2 for clarity. It is seen that the protective screen 11 has a plurality of pleated folds 13, to allow it to collapse when the wing 5 is closed against the surround 3. The protective screen 11 has a first perimeter frame 15 that is partly co-extensive with the surround 3 and a second perimeter from 17 that is partly co-extensive with the wing 5. The surround 3 has a lower jamb 19 and the wing 5 has a lower member 21 pivotally connected to the lower jamb 19 to allow pivoting of the wing 5.

[0016] In Figure 3 a side elevation of the protective screen 11 is shown and without yet being mounted between the surround and wing of a window assembly, as in Figures 1 and 2. The first perimeter frame 15 has a hook shaped upper retaining structure 23 and a lower hook shaped retaining structure 25.

[0017] While a preferred form of hook shaped retaining structure will be described herein below, the skilled person may also wish to revert to solutions as described in EP 0 942 142 and EP 1 873 346. Further shown in Figure 3 is a spring element 27 that urges the first and second perimeter frames 15, 17 away from one another, while expanding the pleated protective screen 11. The spring element 27 can in principle be positioned anywhere between the top and bottom retaining structures 23, 25, but the appropriate position is preferably selected by taking into account the type of spring, the range of expansion and contraction, and the amount of spring bias that is desired. The arc shaped wire spring element 27 as shown in the described example is both simple in construction and allows sufficient expansion. Not visible in Figure 3, but subject to further explanation below, the first and second perimeter frames 15, 17 are preferably movably linked to one another adjacent to the lower retaining structure 25.

[0018] Figure 4 shows an elevation from outside of the window assembly 1. The first perimeter frame 15 of the protective screen partially overlaps the window surround. 3.

[0019] Figure 5 shows a cross-section of the window assembly 1 as viewed in the direction of arrows V-V, indicated in Figure 4. In Figure 5 one can generally recognise that the first perimeter frame 15 of the protective screen 11 is attached to the surround. 3, while the second perimeter frame 17 is urged by a spring element (not

visible in Figure 5) to lie against the wing 5 at a perimeter region thereof. Indicated by reference numeral 29 is a link structure that movably links a lower region of the first and second perimeter frames 15, 17 to one another. Detail VI in Figure 5 is shown on an enlarged scale in Figure 6. This helps to illustrate an extension limiter 31 that controls the maximum extension permitted for the protective screen 11 and which may also function in supporting the pleats 13 during expansion and collapsing. The extension limiter 31 may be a flexible element, as a cord or cable, but as preferred in this example, it is a rigid element that is pivotally linked to first and second anchorage sliders 33, 35. The first anchorage slider 33 thereby is slidably engaged in a longitudinal groove in the first perimeter frame 15 and the second anchorage slider 35 is slidably engaged in a groove in the second perimeter frame 17. The upper retaining structure 23, as shown in Figure 6 is in the form of an upper spring clip.

[0020] Now turning to Figure 7 there is shown an elevation of the window assembly 1 as viewed from the inside. Here the wing 5 is in a partially overlapping arrangement with the surround 3. The handle 9 can be used to open the wing 5 to the position shown in Figure 8, which is a cross section in the direction of arrows VIII-VIII in Figure 7. Similar to Figure 5, Figure 8 is used to indicate the details IX and X, which are illustrated at an enlarged scale in Figures 9 and 10 respectively. In Figure 9 it is visible that the protective screen 11 can remain in place when the window is closed. When closed the wing 5 closes against a first sealing element 37 on the surround 3. In the closed position of the wing 5 against the surround 3, the second perimeter frame 17 does not interfere with any structure of the window assembly 1 and the pleats 13 can be collapsed between the first and second perimeter frames 15, 17.

[0021] In Figure 10 it is seen how the link structure 29 movably interconnects the lower region of the first and second perimeter frames 15, 17. The link structure 29 in an advantageous execution includes, as shown in Figure 10, a pair of pivotally connected links. This provides for a certain amount of freedom of the lower region of the second perimeter frame 17 when it moves in respect of the first perimeter frame 15. The first perimeter frame 15 at its bottom is fixed to the surround 3 by lower retaining structure 25 in the form of a lower spring clip.

[0022] One important aspect of the present invention already becomes clear from the above description. As obviously the protective screen device according to the invention should advantageously be suitable for use in different types of windows, there is a need to accommodate differences in the position of hinges between surround 3 and wing 5. In the prior art as exemplified by DE 4433841 1 and DE 20 2004 002 240 the perimeter frames of the screening device are each attached to the respective surround and wing. When the wing moves about a pivot center that is not shared by a plane through one of the faces of the wing to which one of the perimeter frames is attached, this will lead to an ungainly deformation of

the pleated structure. Not only is this objectionable from an esthetical point of view, but it will also lead to an untimely failure of the screening device by damage. In the structure according to the present invention, only the first perimeter frame 15 is firmly attached to the surround 3, while the second perimeter frame 17 can freely slide over the face of the wing 5 against which it is merely urged by spring force. The freedom of movement allowed by the link structure 29 ensures that the particular position of a hinge between the surround 3 and the wing 5 has no influence on the functioning of the protective screen device. Thereby the pleated screen 11 becomes more durable.

[0023] Reverting now to Figure 11, the protective screening device is shown in an exploded arrangement. The first perimeter frame is an assembly of an upper first frame member 15A and two upright left and right first frame members 15B, 15C. The left hand first frame member 15B and the upper first frame member 15A are connected in a mitre connection by a connector 15D. A similar connection 15D is used between the upper first frame member 15A and the right hand first frame member 15C. Optionally a lower first frame member 15E may be provided and connected by additional connectors 15D. The second perimeter frame may be assembled in an analogous manner. An upper second frame member 17A is connected to upright left and right second frame members 17B, 17C by corner connectors 17D. Again a lower second frame member 17E is optional and can be connected to the left and right second frame members 17B, 17C by further corner connectors 17D. Whatever the chosen arrangement, it is important that the link structures 29 are operatively engaged between the respective upright first and second frame members 15B, 17B and 15C, 17C respectively. Conveniently the link members 29 are adapted to engage the first and second perimeter frames on facing sides at lower corners thereof. When fitted with the optional lower first frame member 15E, the lower spring clips 25 are conveniently positioned, as shown in Figure 11, to connect the first perimeter frame to the bottom jamb of the surround. Clearly when the optional lower frame member 15E would not be fitted the lower spring clips 25 could be positioned to attach lower ends of the left and right first frame members 15B, 15C to the respective upright surround members. The upper spring clips 23 always connect the upper first frame member 15A to the upper jamb of the surround 3.

[0024] In Figure 12 the bottom corners of the assembled screen device are shown. This is the variation shown in Figure 11 that has both the optional lower first and second frame members 15E, 17E. The entire second perimeter frame is however deleted in Figure 12 for the necessary clarity in showing the link structures 29. Each link structure 29 has a first mounting base 29A that is formed to engage a mating structure on the lower first frame member 15E and a second mounting base 29B for mounting to the lower second frame member (not shown, but explained in reference to Figure 11). Extend-

ing between the first and second mounting bases 29A, 29B is a pair of pivotally connected first and second links 29C, 29D. The first link 29C is pivotally connected by a first pivot pin 29E to the first mounting base 29A, by a second pivot pin 29F to the second link 29D, and the second link 29D by a third pivot pin 29G to the second mounting base 29B. Further Figure 12 shows the possible position of the lower spring clips 25 and the lower ends of the pleated protective screen 11.

[0025] Accordingly a protective screen device is disclosed for a pivotally opening window assembly 1, which device includes a first, substantially rectangular perimeter frame 15 that extends through at least three adjoining sides of a rectangle. The screen device also includes a second, substantially rectangular perimeter frame 17 that extends through at least three adjoining sides of a rectangle and a collapsible protective screen 11 connected for expansion between the first and second perimeter frames 15, 17. The first and second perimeter frames 15, 17 are movable with respect to one another between a first position in which a plane through the second perimeter frame is substantially coextensive with a plane through the first perimeter frame and a second position in which the planes of the first and second perimeter frames are substantially spaced. Means 27 are provided for resiliently urging the first and second perimeter frames 15, 17 away from one another. Further means are also provided for guiding movement of the first and second perimeter frames 15, 17 between the first and second position by a link structure 29 and for limiting movement of the upper first and second frame members 15A, 17A not to extend beyond the second position by an extension limiter 31.

[0026] It is thus believed that the operation and construction of the present invention will be apparent from the foregoing description. To the skilled person in this field of the art it will be clear that the invention is not limited to the embodiments represented and described here, but that within the framework of the appended claims a large number of variants are possible. Also kinematic inversions are considered inherently disclosed and to be within the scope of the present invention. The terms comprising and including when used in this description or the appended claims should not be construed in an exclusive or exhaustive sense but rather in an inclusive sense. Expressions such as: "means for ..." should be read as: "component configured for ..." or "member constructed to ..." and should be construed to include equivalents for the structures disclosed. The use of expressions like: "critical", "preferred", "especially preferred" etc. is not intended to limit the invention. In this regard, the terms in the foregoing description and the appended claims, such as "upper", "lower", "right", and "left", have been used only as relative terms to describe the relationships of the various elements. Features which are not specifically or explicitly described or claimed may be additionally included in the structure according to the present invention without deviating from its scope.

Claims

1. Protective screen device for a pivotally opening window assembly, the device including:

a first, substantially rectangular perimeter frame that extends through at least three adjoining sides of a rectangle;
 a second, substantially rectangular perimeter frame that extends through at least three adjoining sides of a rectangle; and
 a collapsible protective screen connected for expansion between the first and second perimeter frames; wherein
 the first and second perimeter frames being movable with respect to one another between a first position in which a plane through the second perimeter frame is substantially coextensive with a plane through the first perimeter frame and a second position in which the planes of the first and second perimeter frames are substantially spaced, and wherein
 means are provided for resiliently urging the first and second perimeter frames away from one another.

2. Protective screen device according to claim 1, wherein the first perimeter frame has an upper and lower retaining structures for attachment of the first perimeter frame to a window surround.

3. Protective screen device according to claim 2, wherein the upper retaining structure includes upper spring clips.

4. Protective screen device according to claim 2 or 3, wherein the lower retaining structure includes lower spring clips.

5. Protective screen device according to claim 4, wherein the lower spring clips differ from the upper spring clips.

6. Protective screen device according to one of the preceding claims 1-5, wherein the means for resiliently urging the first and second perimeter frames away from one another include a spring element.

7. Protective screen device according to claim 6, wherein the spring element is an arc shaped wire spring.

8. Protective screen device according to one of the preceding claims 1-7, wherein movement of the first and second perimeter frames between the first and second position is guided by a link structure.

9. Protective screen device according to claim 8,

wherein the first perimeter frame includes an upper first frame member and parallel left and right first frame members extending from relevant opposite ends of the upper first frame member.

10. Protective screen device according to claim 8 or 9, wherein the second perimeter frame includes an upper second frame member and parallel left and right second frame members extending from relevant opposite ends of the upper second frame member.

11. Protective screen device according to claim 10, wherein the link structure is arranged in the vicinity of opposing free ends of the parallel left and right first frame members and the parallel left and right second frame members.

12. Protective screen device according to claim 9, wherein the first perimeter frame has a lower first frame member connected between the free ends of the parallel left and right first frame members.

13. Protective screen device according to claim 10, wherein the second perimeter frame has a lower second frame member connected between the free ends of the parallel left and right second frame members.

14. Protective screen device according to both claim 12 and 13, wherein the link structure is operatively arranged between the lower first and second frame members.

15. Protective screen device according to one of claims 8-14, wherein the link structure includes a pair of pivotally connected first and second links.

16. Protective screen device according to one of claims 1-15, wherein an extension limiter is operatively arranged between the first and second perimeter frames to limit movement of the upper first and second frame members to the second position.

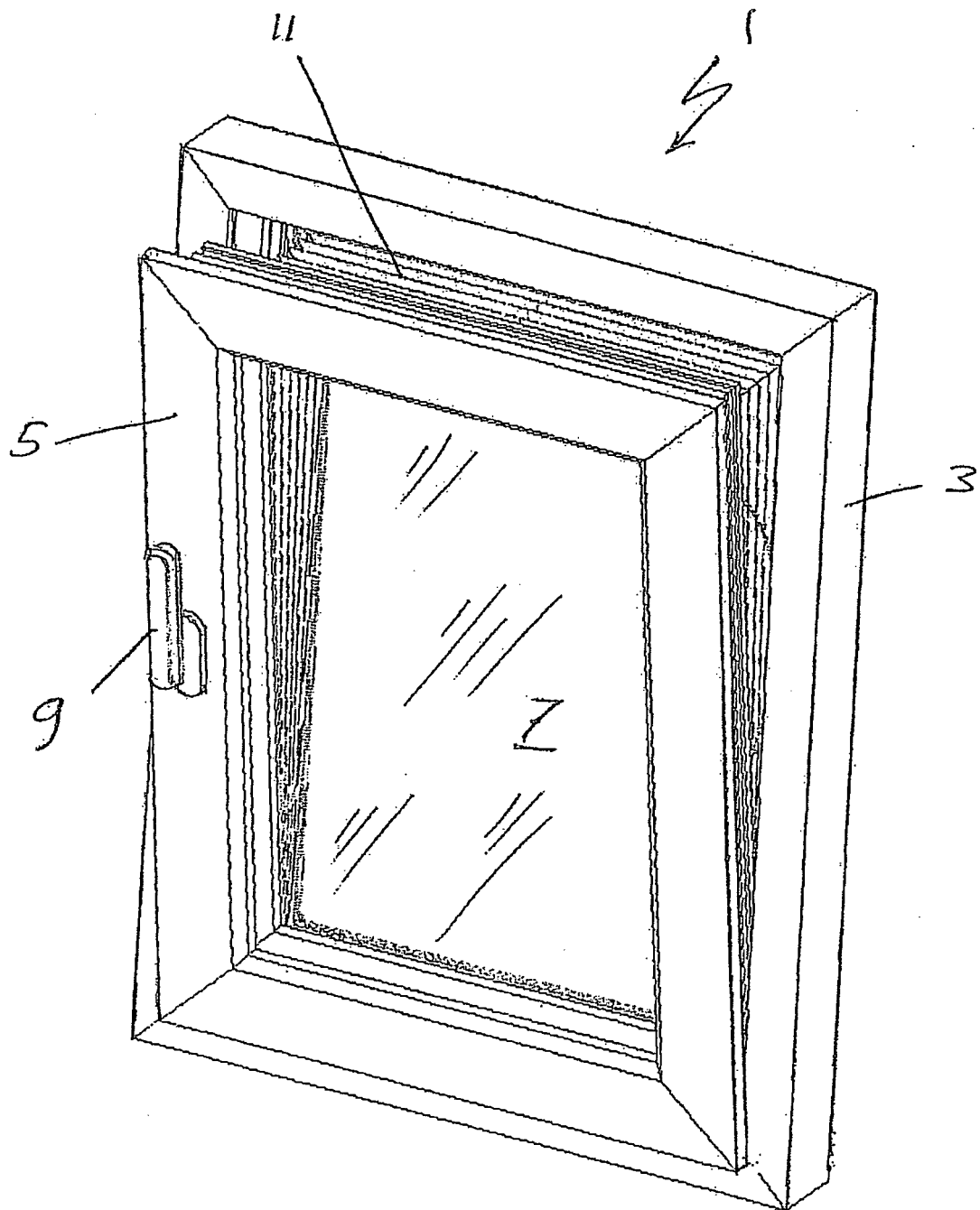


FIG. 1

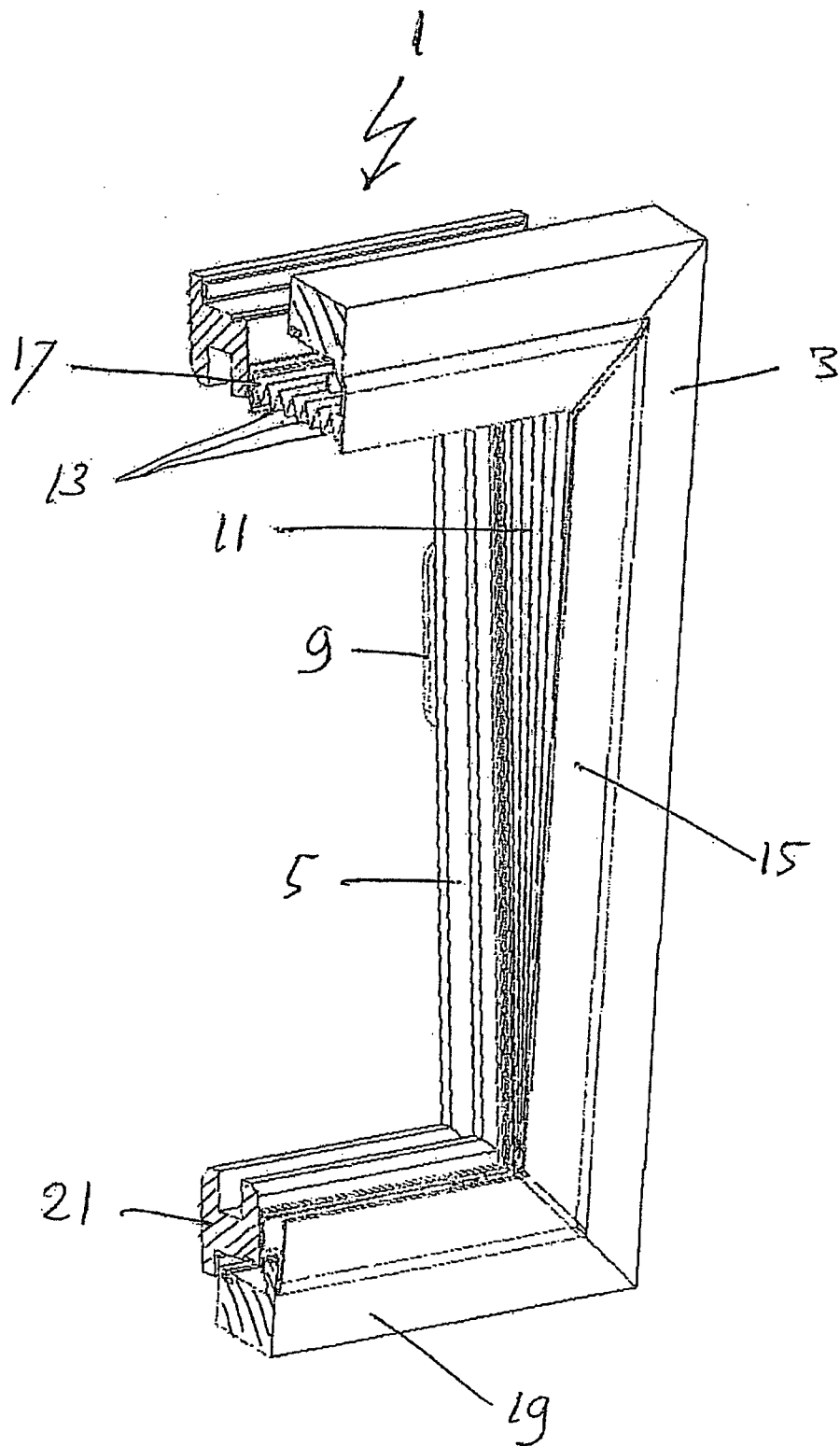


FIG. 2

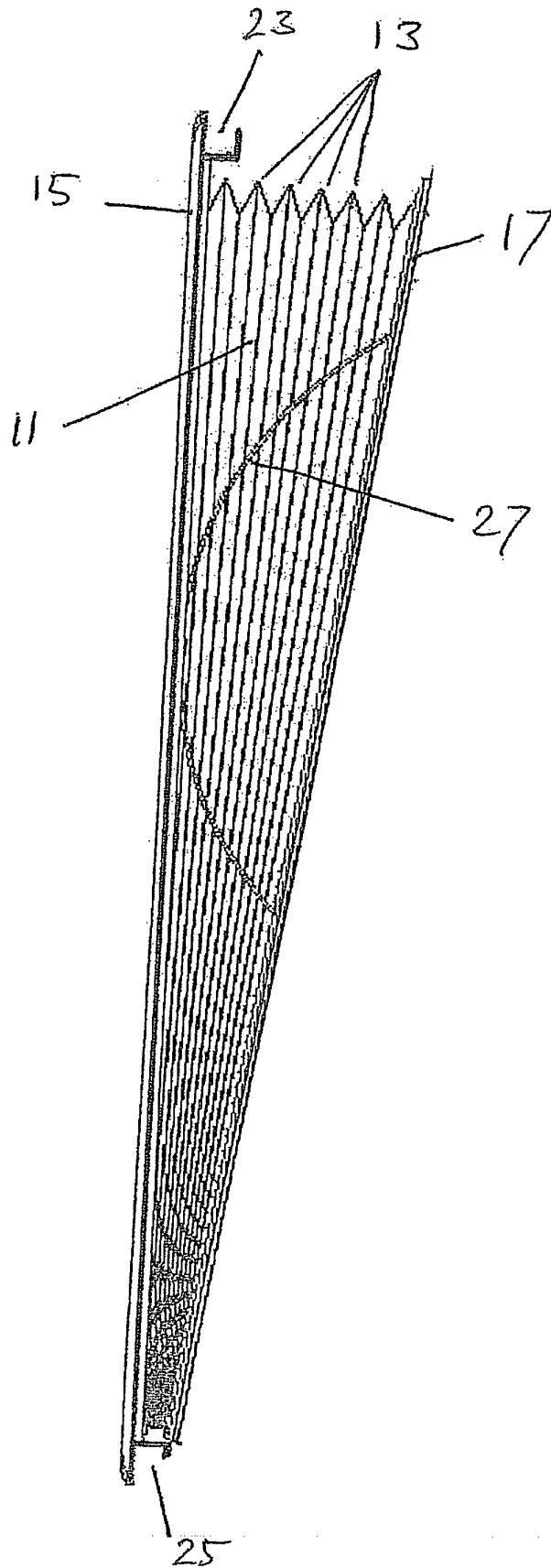


FIG. 3

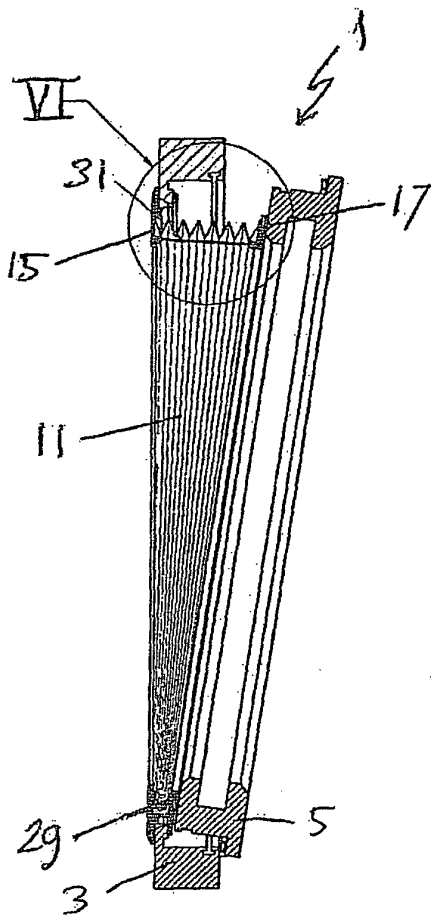


FIG. 5

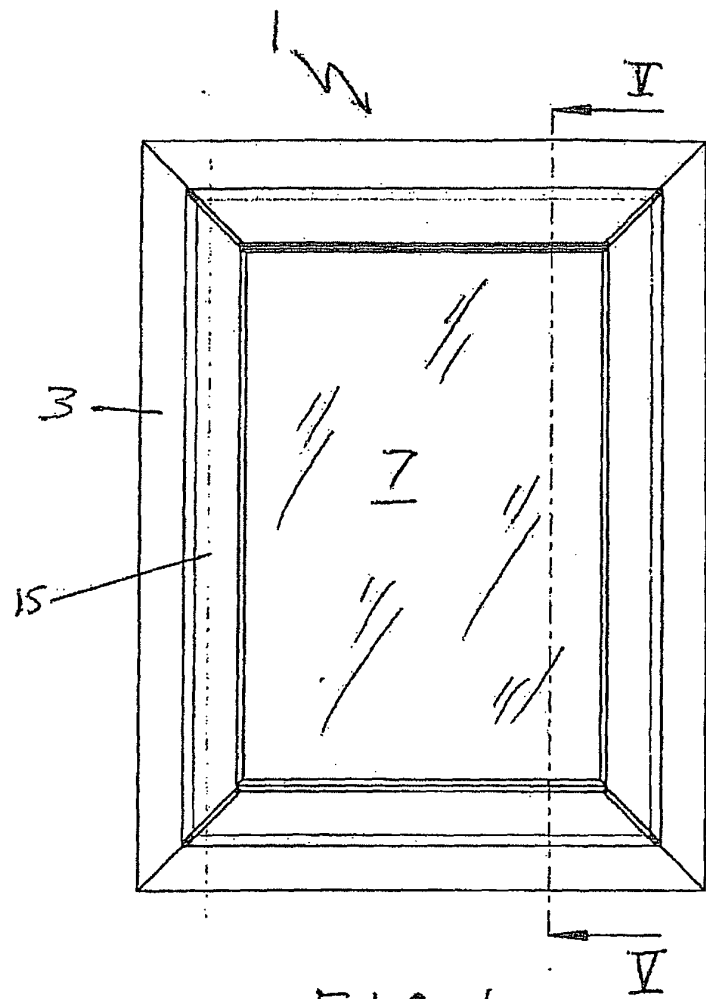


FIG. 4

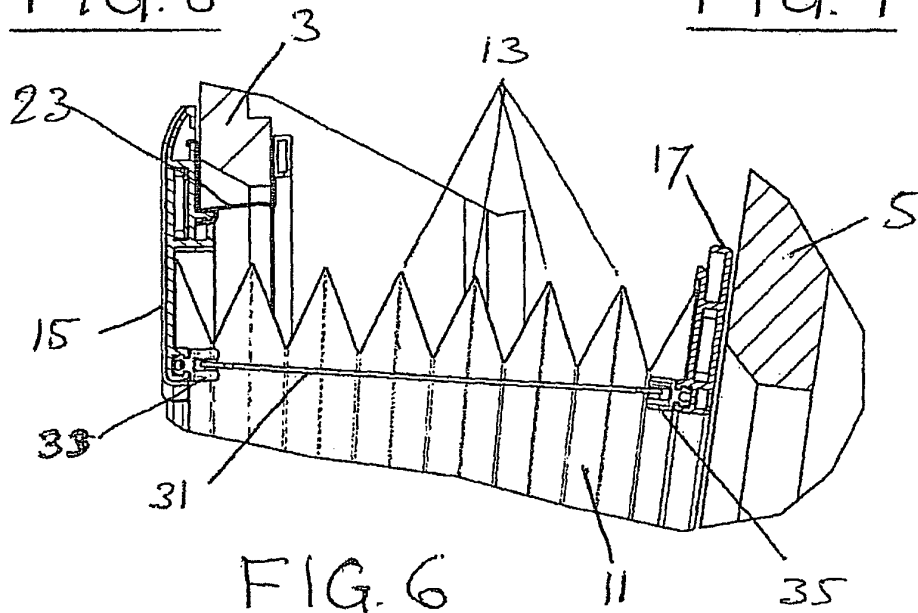


FIG. 6

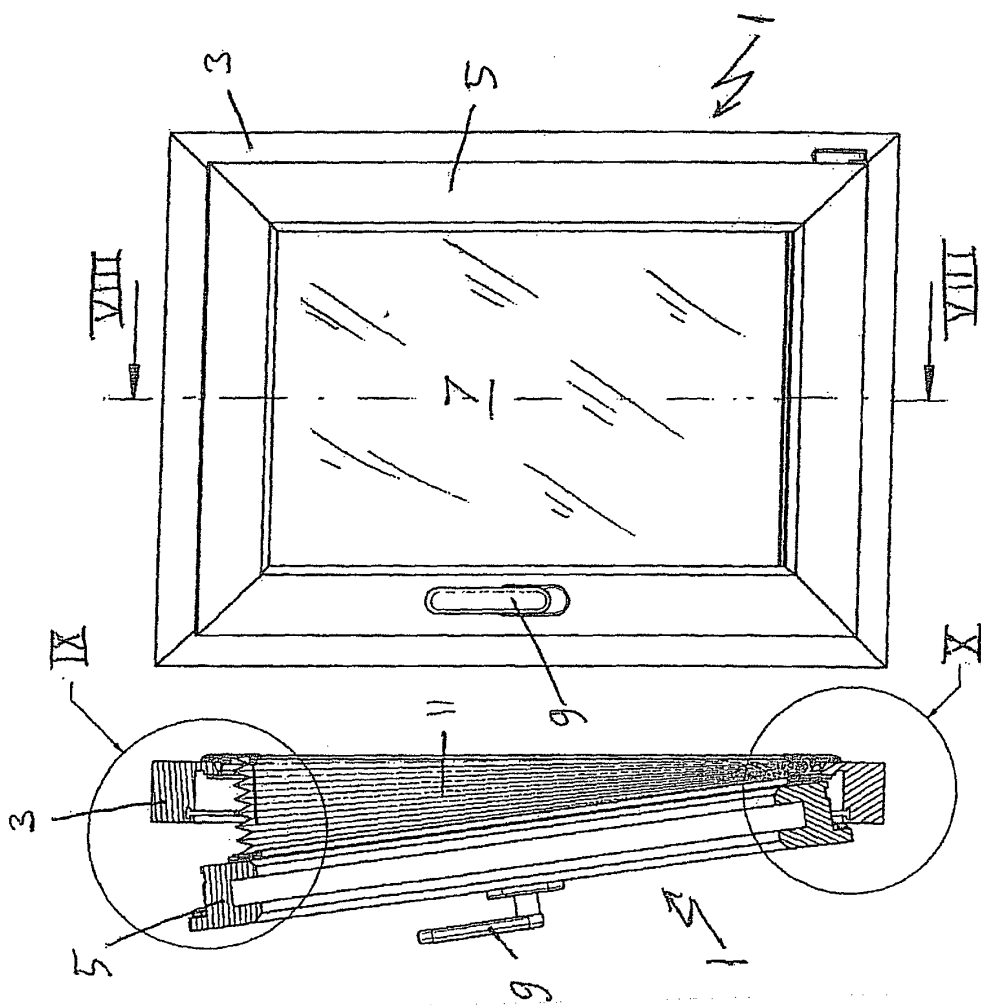


FIG. 7

FIG. 8

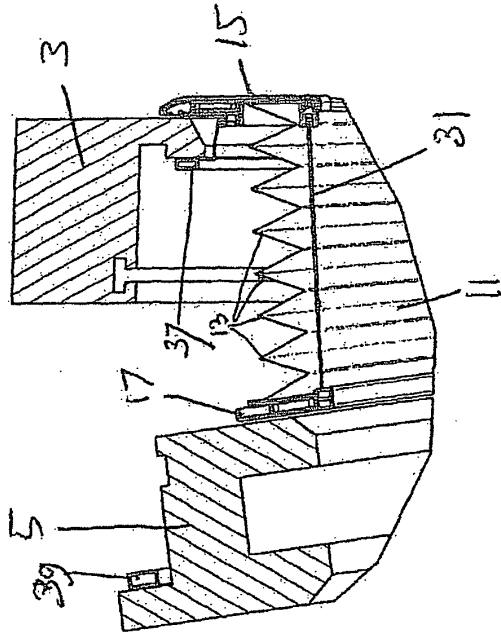


FIG. 9

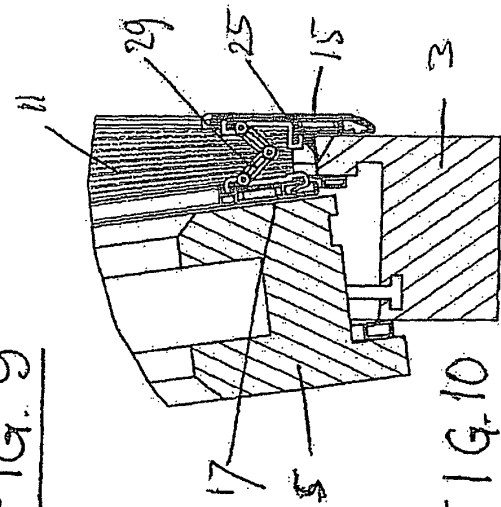
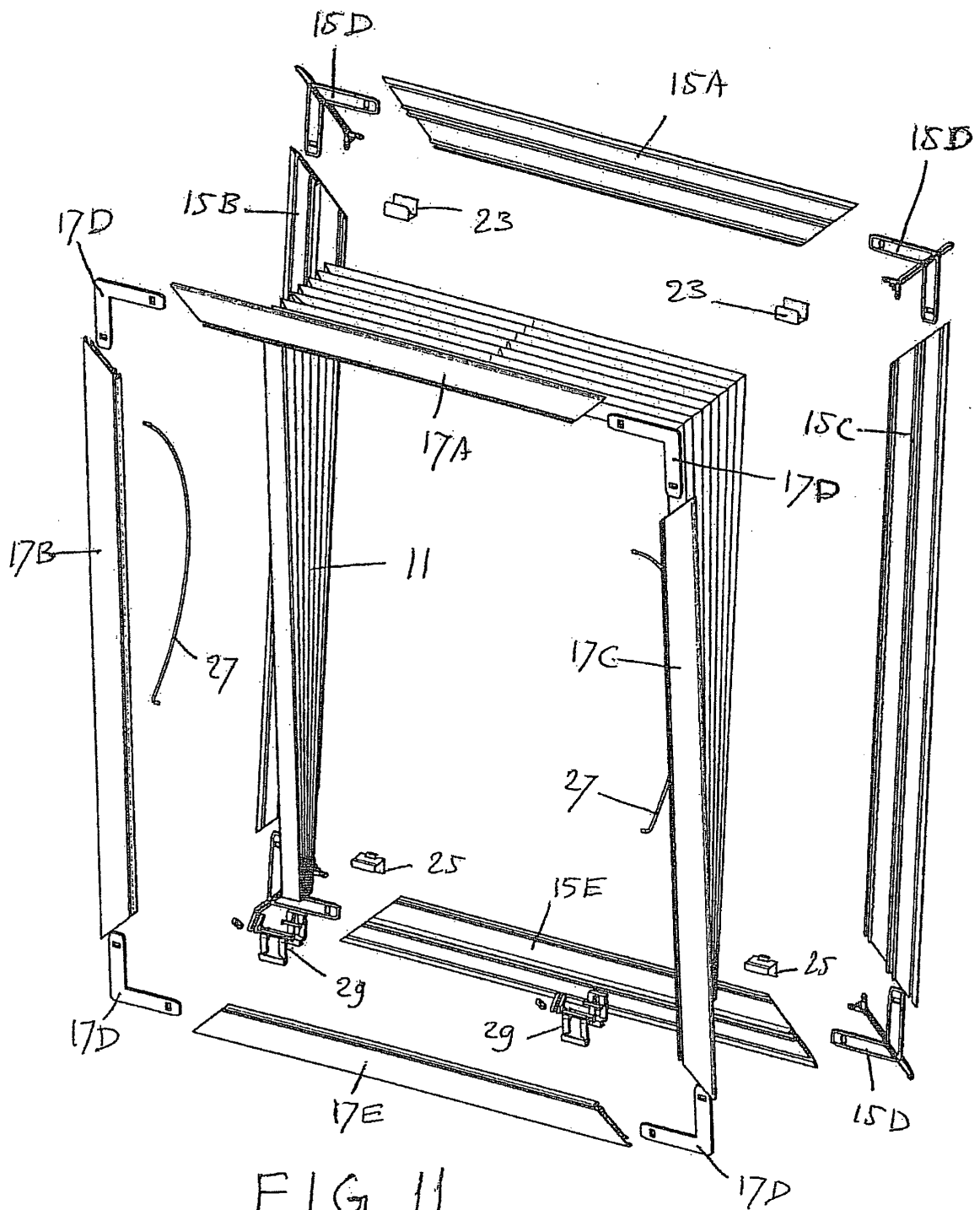


FIG. 10



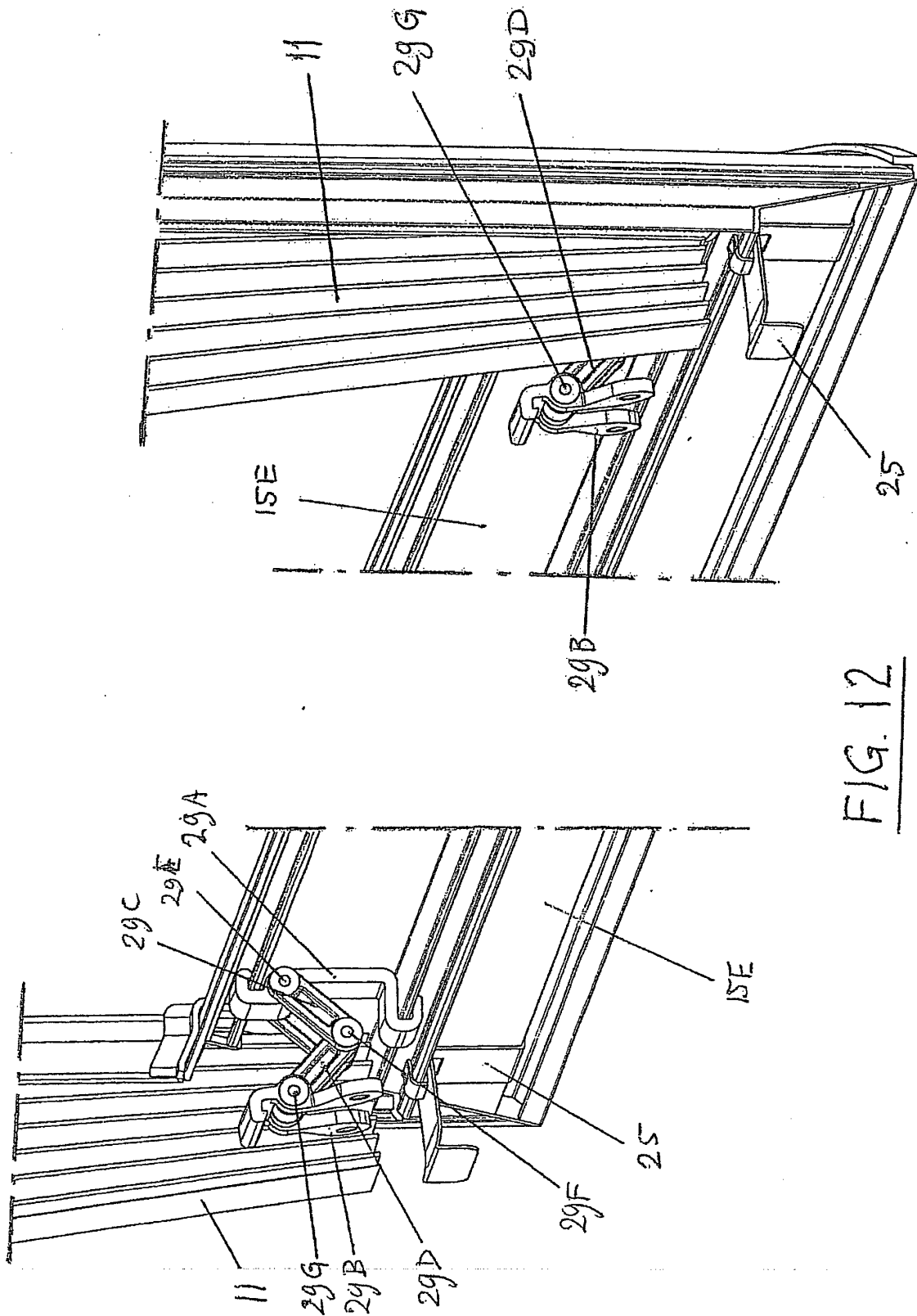


FIG. 12

REFERENCES CITED IN THE DESCRIPTION

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