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(54) **Window frame with one or more upright-sliding shutters.**

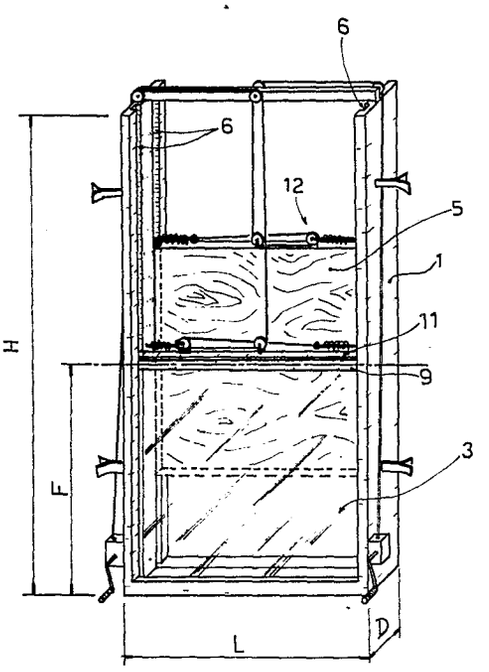
(57) This window frame allows the complete closing or opening of the window-space by means of a single upright-sliding shutter disappearing entirely into the wall, when it is completely lifted.

If it contains more shutters, each of them carries on a specific function of its own and by itself, that is the function of a windowpane or a blind or a house-breaking proof closing device.

It allows an high degree of thermal insulation of the room both because it is lacking in all those slits through which air filters in common roller shutters, and because the shuter 5 can be high termal insulating.

The shutters can be supplied with a locking device which be inaccessible and off sight in order to prevent them from being lifted from the outside, even when they are partly lifted in an opening position.

For a better comprehension, see Fig. 1.



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Window frame with one or more upright-sliding shutters

The object of this invention is a special window-frame which can be made in wood, metal (steel or aluminium and its alloys), or in other suitable materials, and which is provided with one or more upright-sliding shutters, each of them having a different function.

As we know, window-frames are components in building constructions intended to complete the openings made in outer walls, with the aim of protecting the inner room from atmospheric agents, without being prejudicial to natural light coming from the outside, or intended to be supplied with darkening means or defending locks.

On the whole, they are composed of a wooden or metal big frame i. e. main frame, delimiting the opening of the window-space, usually anchored by means of staffs and laying on the reveal, on the which shutters or moving panels are mounted.

The connection between the case and each of the shutters can be obtained by hinges which let the shutters swing on a vertical or a horizontal axis, or by means of slide guides which are horizontal or vertical too.

In the case we have upright sliding shutters, the closing can be obtained by means of a fixed panel and of a moving

one (sash window) or, on the other hand, by two moving panels sliding along coplanar, or not in the same plane, grooves.
These last closing systems present several defects:
a) impossibility to open the window-space completely;
b) difficulty in obtaining an efficacious tightness along the contact lines between the shutters, especially when they are not in the same plane; c) impossibility to make use of darkening shutters or opaque shutters if we want to avoid the permanent darkening of an half window-space at least;
d) impossibility to apply authomatic locking devices or shutter-blocking-up ones, which can be inaccessible and off sight; e) difficulty in cleaning the outer surface of the panes of glass and in applying self-cleaning devices;
f) impossibility to close the rooms assuring an elevated thermoacoustic insulation, more than the one double window panes can grant.
Besides, all that prevents from producing polyvalent window frames which can be supplied at the same time with panes, shutters, blinds and, if necessary, with mosquitonets.

The window frame wich is the object of the named invention aims at eliminating the above-said disadvantages.
Fist of all, it solves the problem of producing a window frame with upright-sliding shutters of a polyvalent kind, that is, which can be used at the same time if necessary, to mount a pane, a blind, a protecting shutter, all of them sliding.
At the same time, this invention also solves the problem to produce a window frame with upright-sliding shutters which let the whole light of the window space pass through it, and the closing of which be complete and perfectly airtight, even if the shutters themselves are opaque to

light or they consist in thermal insulating blinds or panels.

The invention is described as follows according to a favourite execution and referring to the pictures in the plates of drawings enclosed herewith, which explain respectively:

Fig. 1, an axomometric view of the window frame;

Fig. 2, one of its vertical sections;

Fig. 3, The transversal section of a structural steel composing the frame;

Fig. 4, the schematic representation of the elements of the frame which distinguish the invention;

Fig. 5, system regulating the vertical movement of the shutters.

The window frame is composed of a big case 1 which is different from the ones manufactured up to now, for its total height (H), if we consider the due tolerances, is twice the height (F) of the window-spece 2, so the shutters 3 (window-pane), 4 (blind), 5 (protection panel), each of them being as much high as the window-space itself and sliding along vertical grooves 6, can occlude the window-space completely or disappear completely into the wall when they are entirely lifted.

To this end, the big case 1 is mounted, as Fig. 2 and 4b show, in such a way that its top part may be included in that part of the outer wall thickness (S) which is not occupied by the thickness (D) of a reinforced-concrete panel 7or by one in another suitable material, the haight (L) of which is like the one of the window-space: this latter also acts as lintel delimiting it on the upper part.

As we can see in Fig. 2 and 4b, each of the shutters sliding in the thickness (D) of the case occludes the window-space

completely.

In order to prevent any air infiltration from the outside, along the dashed line 8 in Fig. 4c, the horizontal crosspieces 9 applied on the case are supplied with a suitable longitudinal weather strip 10 which holds on the surface of the opposed shutter, for instance 3 or 5, securing the complete thermal insulation between the outside and the inner room.

Besides, in order to improve the tightness of closing, the upper horizontal crosspieces of the sash constituting the pane 3 and of the shutter frame 5 are supplied with a rabbet tooth 11 which is intended to lean on the opposed crosspiece 9.

The Fig. 5 shows some latch-devices for shutter-lifting, which can stop each shutter in its closing position or can avoid the sash-falling of it.

In the device of Fig. 5a the locking of each shutter is obtained by pins 12a mounted on the upper crosspiece of the frame of each shutter: they penetrate into the holes 13 of the vertical grooves 6 when the shutter is lifted from the bottom, or in the case the little cable 14 breaks, under the pressure caused by a spring 12b.

In the device shown in Fig. 5b, the lifting of each shutter is executed through a threaded rod 15 which, by means of some driving gears 16, is caused to rotate in a lead nut 17 which is integral with the upper crosspiece of each shutter.

In Fig. 2, we may also see a horizontal-axed device 18 for the self-cleaning of the outer surface of the pane of glass, acting through a slipping movement and both ends of which are inserted in suitable spots on the vertical inner surface of the case.

The vertical grooves 6 are also supplied with weather strips

6a to improve the tightness of the shutters.

The Fig. 3 shows the section of a metal profile in order to realize a three-shutter-window frame.

The characteristics of the invention, which are schematically represented in Fig. 4, are respectively:

a) height (H) of the case, which is twice the height of the window-space;

b) way of inserting the window frame into the wall;

c) seals on the top part of the shutters in their closing position;

d) a set of panels inserted in the window frame.

Claims:

1. Window frame with one or more upright-sliding shutters, characterized by the fact that, all tolerances considered, its height (H) is twice the height (F) of the window-space, or twice the height of each one of the shutters themselves functioning, for instance, as windowpane, blind, protection shutter respectively.

2. Window frame as per claim 1, characterized by the fact that each one of the shutters has got a complete and specific function of its own, only by itself and independently from the other ones: for instance, that one of a windowpane or a blind or a protection shutter, each shutter disappears completely into the wall when it opens the window-space entirely.

3. Window frame as per claim 2, characterized by the fact that each one of the shutters is inserted in the case thickness (D) parallel with the other ones, into a couple of parallel and opposed vertical grooves 6, for the height of each shutter is such as to occlude the window-space completely height way, and because in this way each of them can carry on its own specific function, independently from the other ones and only by itself.

4. Window frame as per previous claims, characterized by the fact that the vertical seals of the panels constituting each shutter are supplied with suitable weather strips 6a which lay within the same vertical grooves of the case they slide along, while the horizontal seals, which are intended to prevent the breaths of air from passing through the dashed

line 8, or through the slits between the horizontal upper edge of the frame of each shutter and the horizontal opposed crosspiece 9 of the case, are supplied with suitable horizontal-axed weather strips 10 applied on the two horizontal crosspieces themselves in such a way as to slip on the adjacent surfaces of the windowpane or those of the closing panel or of the horizontal upper crosspiece of the blind frame.

5. Window frame as per claims above, characterized by the fact that it can be supplied with inaccessible or self-locking authomatic closing devices, for instance 12, which are placed in the top part of each shutter: this part is protected by the crosspiece 9 and covered by the reinforced-concrete panel 7 or by the outer wall in order to prevent any vertical shifting of each shutter from the outside even though partially lifted.

6. Window frame as per previos claims, characterized by the fact that the shutters themselves can be even more than three.

7. Window frame as per previous claims, characterized by the fact that half a height (H) of the frame itself is completely covered by the outer wall, all tolerances considered, in such a way as to be inaccessible, while the other half can be entirely occluded or left open by each of the panels constituting each shutter to close or to open the window-space.

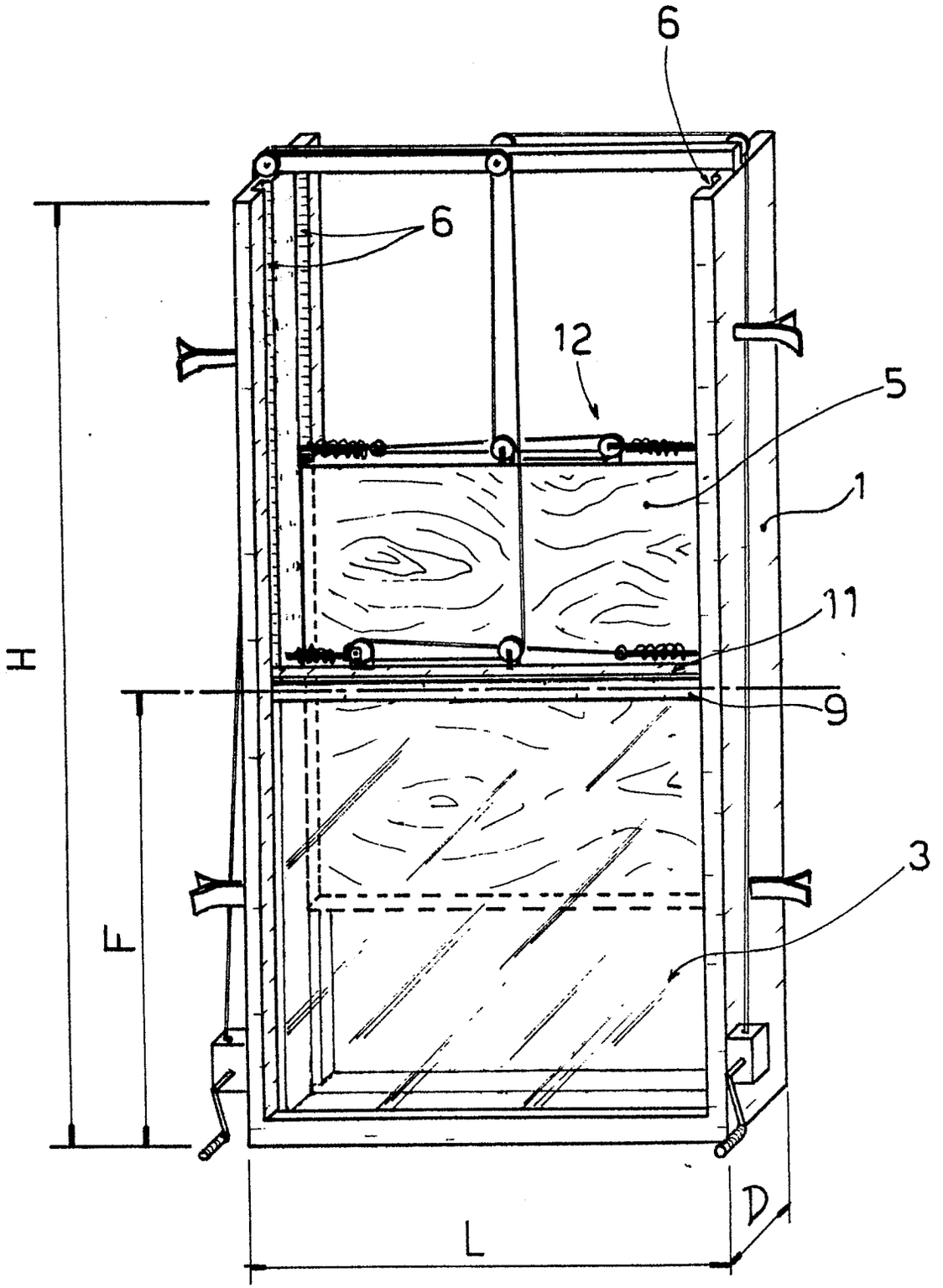


FIG.1

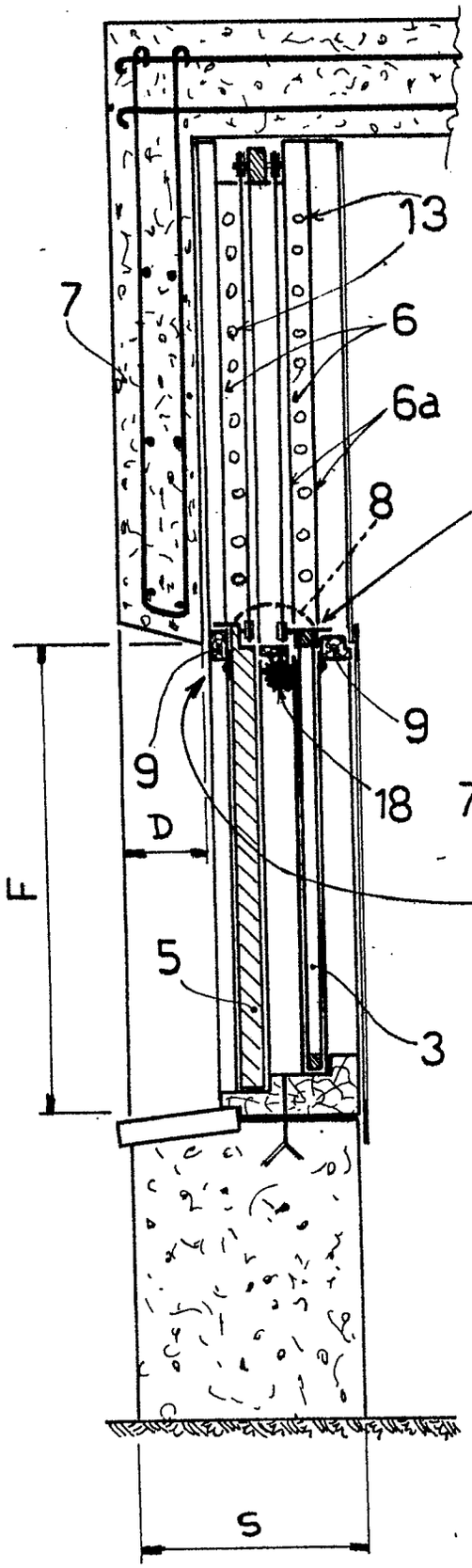
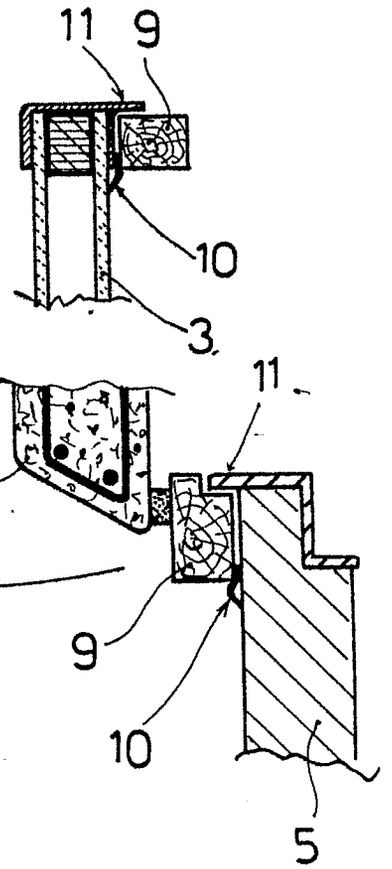


FIG. 2



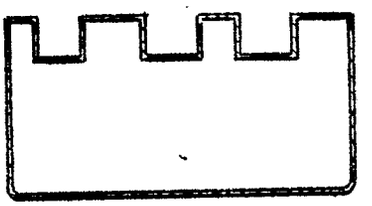


FIG. 3

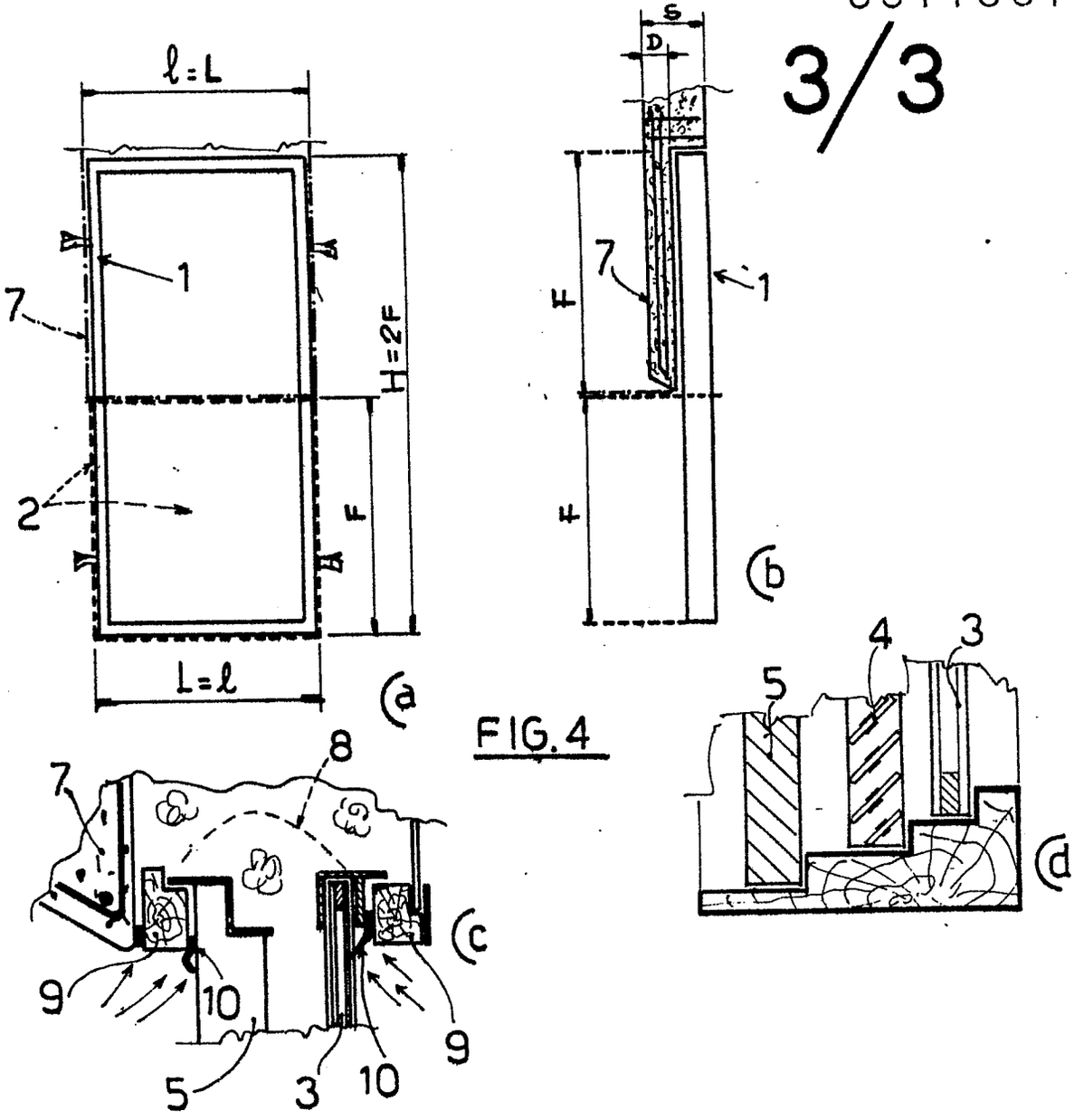

l=L
1
7
H=2F
2
F
L=l
(a
s
D
7
F
1
F
(b
4
3
5
(d
8
7
(c
9
10
5
3
10
9

FIG.4

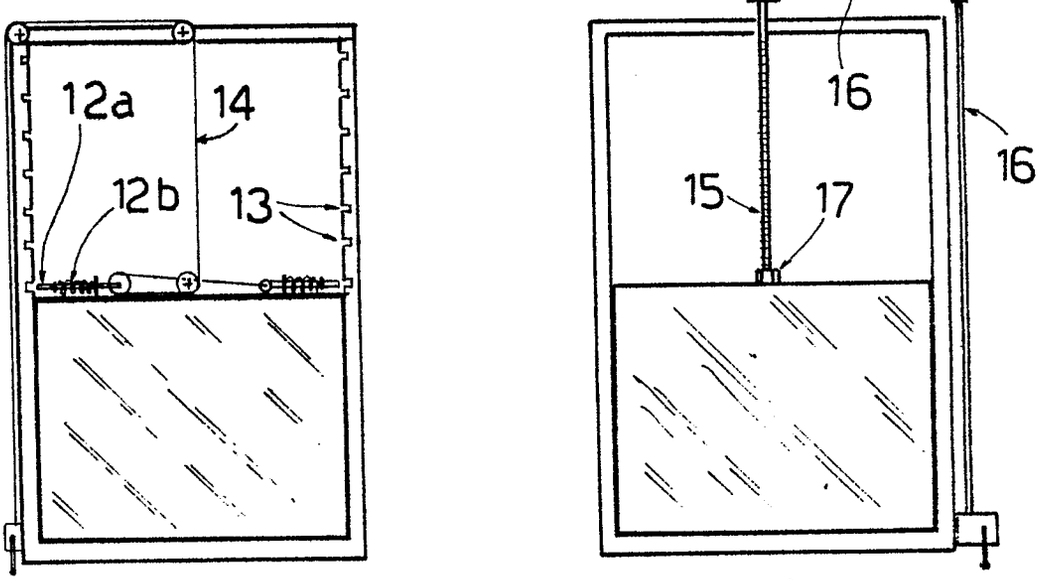

12a
14
12b
13
16
16
15
17
a)
b)

FIG.5