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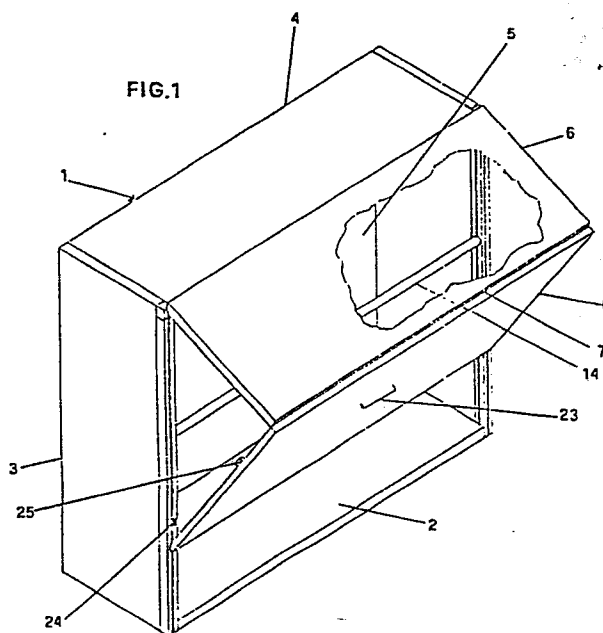
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(54) **Door-type closure device for wall-mounted furniture units.**

(57) The door-type closure device for wall-mounted furniture units in the form of a container (1) closable at its front by a pair of doors (6,6'), comprises a first door (6) hinged at its upper edge to the front edge of the roof (4) of the container (1), and a second door (6') of height substantially equal to the first and hinged at its upper edge to the lower edge of this latter and having the ends of its lower edge retained by and slidable along two guide rails (10) provided on the front vertical edge of the side walls (3) of the container (1). Such a device also comprises a balancing member comprising at least one cable (18) connected to said lower edge of said second door (6'), and at least one counterweight (14) which is operable from the outside and which when the two doors (6,6') are completely folded back to open the furniture unit is positioned in correspondence with the base (2) of said container (1), whereas when the two doors are coplanar to close the furniture unit it is positioned in correspondence with the roof (4) of said container (1).



This invention relates to a door-type closure device for wall-mounted furniture units.

Known wall-mounted furniture units, particularly kitchen units, generally consist of a parallelepiped container which is fitted to the room wall at a height generally less than 1.5 m and is closed by one or more doors hinged to the vertical edges of said container.

One drawback of these known wall-mounted furniture units is that when the doors are open they obstruct persons working in the kitchen. They also represent a danger as they are positioned at the height of a person's head.

A further drawback is that the space occupied by the open doors is considerable and if lateral light sources are used these open doors create shadow zones which prevent complete illumination of the furniture unit interior.

Wall-mounted furniture units are also known which are closed at their front by a single door hinged to the upper horizontal edge. One drawback of this closure system is that the single door can, as in the preceding case, hinder effective illumination of the furniture unit interior.

A further drawback is that the door can be kept in its raised (open) position only by the provision of

"compasses", springs or other retention members, which on the one hand represent bulky anti-aesthetic elements, and on the other hand do not enable the door to remain in intermediate positions.

5 A still further drawback is the practical impossibility of completely opening the door, because it would then lie at too high a level and could not be easily gripped by the user, especially if of short stature, in order to close the furniture unit.

10 All these drawbacks are obviated according to the invention by a door-type closure device for wall-mounted furniture units in the form of a container closable at its front by a pair of doors, characterised by comprising a first door hinged at its upper edge to the front edge of the
15 container roof, and a second door of height substantially equal to the first and hinged at its upper edge to the lower edge of this latter and having the ends of its lower edge retained by and slidable along two guide rails provided on the front vertical edge of the container side walls, and by
20 further comprising a balancing member comprising at least one cable connected to said lower edge of said second door, and at least one counterweight which is operable from the outside and which when the two doors are completely folded

back to open the furniture unit is positioned in correspondence with the base of said container, whereas when the two doors are coplanar to close the furniture unit it is positioned in correspondence with the roof of said 5 container.

Again according to the invention the two doors can be connected together by a continuous hinge joint.

Further according to the invention a section bar allowing sliding and guiding of the lower edge of the lower 10 door can be applied to the front vertical edge of each side wall.

Advantageously each section bar can comprise a front slide and guide channel for a trolley hinged to the lower door.

15 Again according to the invention, each trolley can be housed in the corresponding front channel and connected to the counterweight by the cable, which passes about a pulley applied to the upper end of said section bar.

Advantageously, the counterweight can consist of a 20 horizontal cylindrical bar connected to the cables at its ends.

A preferred embodiment of the present invention is described in detail hereinafter by way of non-limiting

example with reference to the accompanying drawings, in which:

- Figure 1 is a perspective view of a wall-mounted furniture unit provided with the closure device according to the invention;
- Figure 2 is a reduced side view thereof in the closed state;
- Figure 3 shows it in the same view as Figure 2 but in the semi-open state;
- Figure 4 shows it in the same view as Figure 2 but in the open state;
- Figure 5 is an enlarged partial front view thereof on the line V-V of Figure 4;
- Figure 6 is a vertical section therethrough on the line VI-VI of Figure 5;
- Figure 7 shows it in the same view as Figure 6 but in the fixed open state;
- Figure 8 is an enlarged horizontal section therethrough on the line VIII-VIII of Figure 2; and
- Figure 9 is a vertical section therethrough on the line IX-IX of Figure 8.

As can be seen from the figures the closure device according to the invention is fitted to a wall-mounted

furniture unit in the form of a container, indicated overall by 1, and comprising a base 2, two side walls 3, a roof 4 and a rear wall 5.

The container is closed by a pair of doors 6,6', of which the upper door 6 is hinged to the container 1 at the front edge of the roof 4, whereas the lower door 6' is hinged to the upper door 6 along their contacting edges, at which a hinge section element 7 is provided allowing mutual 180° rotation to pass from the coplanar configuration in which the furniture unit is closed (Figure 2) to the superposed configuration in which the furniture unit is open (Figure 4).

A section bar 8 preferably of plastics or metal construction is applied to the front vertical edge of each side wall 3 and comprises a rear rib 9 for fixing to the side wall 3, a front channel 10 in which a trolley 11 slides and is guided, and a side channel 12 in which the pivot 13 of a counterweight 14 extending horizontally from one side wall 3 to the other sides and is guided.

In the case in which the section bar 8 is of plastics construction, the channels 10 and 12 are provided with longitudinal deformable approached lips (not shown in the drawings) ensuring the closure of the same channels when

they are not engaged by the trolley 11 and the pivot 13 respectively.

As stated, inside each channel 10 there slides a trolley 11 provided with an appendix 15 to which the lower door 6 is hinged in proximity to the corresponding lateral edge. To the upper end of each section bar 8 there is fitted a block 16 in which there is rigidly mounted a deviation pulley 17 for a cable 18 connected at one end to the corresponding trolley 11 and at its other end to the pivot 13 of the counterweight 14.

An element 19 rigid with the upper door 6 is hinged to each block 16.

The counterweight 14 consists of a horizontal cylindrical bar provided at its ends with the pivots 13 15 which slide in the lateral channel 12 of the section bars 8. In its central region the counterweight 14 is provided with a gripping lever 20 retained by a diametrical screw 21 of ferromagnetic material.

The angular position of the screw 21 relative to the lever 20 is such that when the lever is in its most downwardly inclined position, ie resting against the front edge of the base 2 of the container 1, the screw 21 is perfectly vertical with its head facing downwards towards a

magnet 22 fitted to the base 2 (Figure 7).

The operation of the closure device according to the invention is as follows:

when in the closed state (Figures 2, 8, 9) the two doors 5 6,6' are coplanar, the trolleys 11 are in their lower end-of-travel position and the counterweight 14 is in its upper end-of-travel position.

In order to open the furniture unit, a handgrip 23 fitted to the door 6' is pulled slightly forwards 10 sufficiently to displace the two doors 6,6' from their coplanar state. It is then possible to raise the lower door 6' so that it folds on to the door 6 because of their mutual connection and the connection between said door 6 and the container 1.

15 As the trolleys 11 rise, the counterweight descends. However when the door 6' is about to attain a height out of reach of the user, the counterweight 14 will have descended below this height and the user will be able to continue the opening operation by pulling the 20 counterweight 14 downwards. When opening is complete (Figure 4) the counterweight 14 will have reached its lower end-of-travel position, and in this position because of the fact that opening has been effected by pulling the lever 20

downwards the screw 21 will have its head also facing downwards and be retained by attraction by the magnet 22. The open configuration is thus stabilised.

To close the furniture unit, the user grips the 5 lever 20 and lift it. This initially rotates the counterweight 14 with consequent disengagement of the screw 21 from the magnet 22, followed by raising of the counterweight itself. As the counterweight rises, the two rolleys 11 connected thereto by the cables 18 descend and 10 drag the lower door 6' which, being connected to the upper door 6, thus closes the furniture unit. When the counterweight has risen to a height beyond the maximum reach of the user, the user continues the closure action by directly pulling the lower edge of the lower door 6' or 15 handgrip 23.

The completely closed configuration is stabilised by the actual weight of the two doors 6,6' and preferably by magnets 24 fitted to the section bars 8 and corresponding metal plates 25 fitted to the lower door 6'.

20 From the foregoing description it is apparent that the closure device according to the invention is much more advantageous than conventional devices, in that:

- when in the open state there is no obstruction to the

user as the doors are positioned above his head,

- when in the open state it is of small overall size and does not obstruct illumination of the furniture unit interior,
- 5 - no compasses or other members for stabilising the open configuration are present,
 - by suitable sizing of the counterweight, substantial balancing of the doors is obtained in any of their configurations,
- 10 - the furniture unit can be totally opened in that the subsequent reclosure does not require direct gripping of the doors, which can therefore lie at a greater height than the maximum which can be directly reached by the user,
- 15 - stability of the furniture unit opening and closure states is ensured by the attraction between the screw 21 of the counterweight 14 and the magnet 22, and by the attraction between the magnets 24 and the corresponding plates 25 respectively.

20 In a different embodiment, but still based on the same inventive concept, instead of a single counterweight 14 provided for the double purpose of balancing the weight of the doors and acting as an operating member when these

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latter have attained too great a height to be directly reached by the user, a pair of counterweights (of half weight) are provided, each applied to the cable of the corresponding section bar 8 and also operable from the 5 outside.

C L A I M S

1. A door-type closure device for wall-mounted furniture units in the form of a container (1) closable at its front by a pair of doors (6,6'), characterised by comprising a first door (6) hinged at its upper edge to the front edge of the roof (4) of the container (1), and a second door (6') of height substantially equal to the first and hinged at its upper edge to the lower edge of this latter and having the ends of its lower edge retained by and slidable along two guide rails (10) provided on the front vertical edge of the side walls (3) of the container (1), and by further comprising a balancing member comprising at least one cable (18) connected to said lower edge of said second door (6'), and at least one counterweight (14) which is operable from the outside and which when the two doors (6,6') are completely folded back to open the furniture unit is positioned in correspondence with the base (2) of said container (1), whereas when the two doors are coplanar to close the furniture unit it is positioned in correspondence with the roof (4) of said container (1).

2. A device as claimed in claim 1, characterised in that the two doors (6,6') are connected together by a continuous hinge joint (7).

3. A device as claimed in claim 1, characterised in that a section bar (8) allowing sliding and guiding of the lower edge of the lower door (6') is applied to the front vertical edge of each side wall (3).
- 5 4. A device as claimed in claim 3, characterised in that each section bar (8) comprises a front slide and guide channel (10) for a trolley (11) hinged to the lower door (6') and a side and guided channel (12) for the pivot (13) of the counterweight (14).
- 10 5. A device according to claim 4 characterised in that the channels (10,12) are provided with longitudinal deformable approached lips .
6. A device as claimed in claim 4, characterised in that each trolley (11) is housed in the corresponding front
15 channel (10) and is connected to the counterweight (14) by the cable (18), which passes about a pulley (17) applied to the upper end of said section bar (8).
7. A device as claimed in claim 6, characterised in that the counterweight consists of a horizontal cylindrical
20 bar (14) connected to the cables (18) at its ends.
8. A device as claimed in claims 6 and 7, characterised in that the counterweight bar (14) is provided at its ends with two pivots (13) which are each guided in a

lateral channel provided in the inner side of the guide section bar (8) and are connected to the corresponding cable (18).

9. A device as claimed in claims 1 and 6, characterised in that a block (16) for supporting the pulley (17) and to which the upper door (6) is hinged is applied to the upper ends of each section bar (8).

10. A device as claimed in claim 1, characterised in that the counterweight (14) is provided with means for stabilising its positioning when in its lower end position.

11. A device as claimed in claims 7 and 10, characterised in that the counterweight bar (14) is provided with at least one ferromagnetic element (22) cooperating with a corresponding magnet (23) supported on the container base (2).

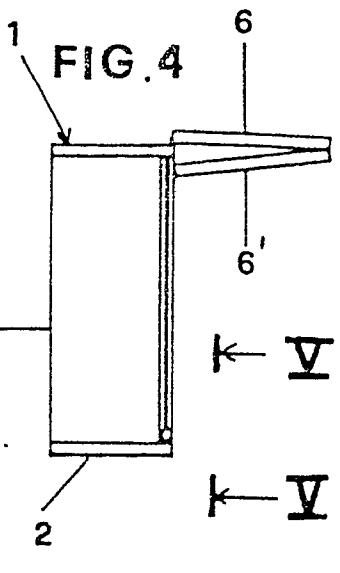
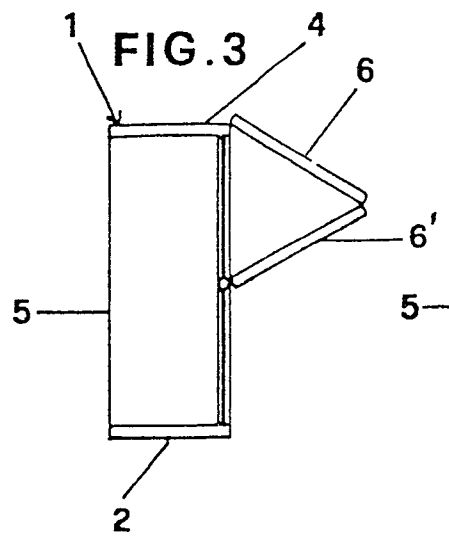
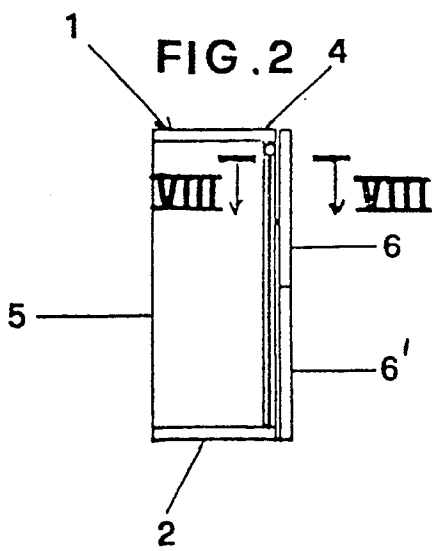
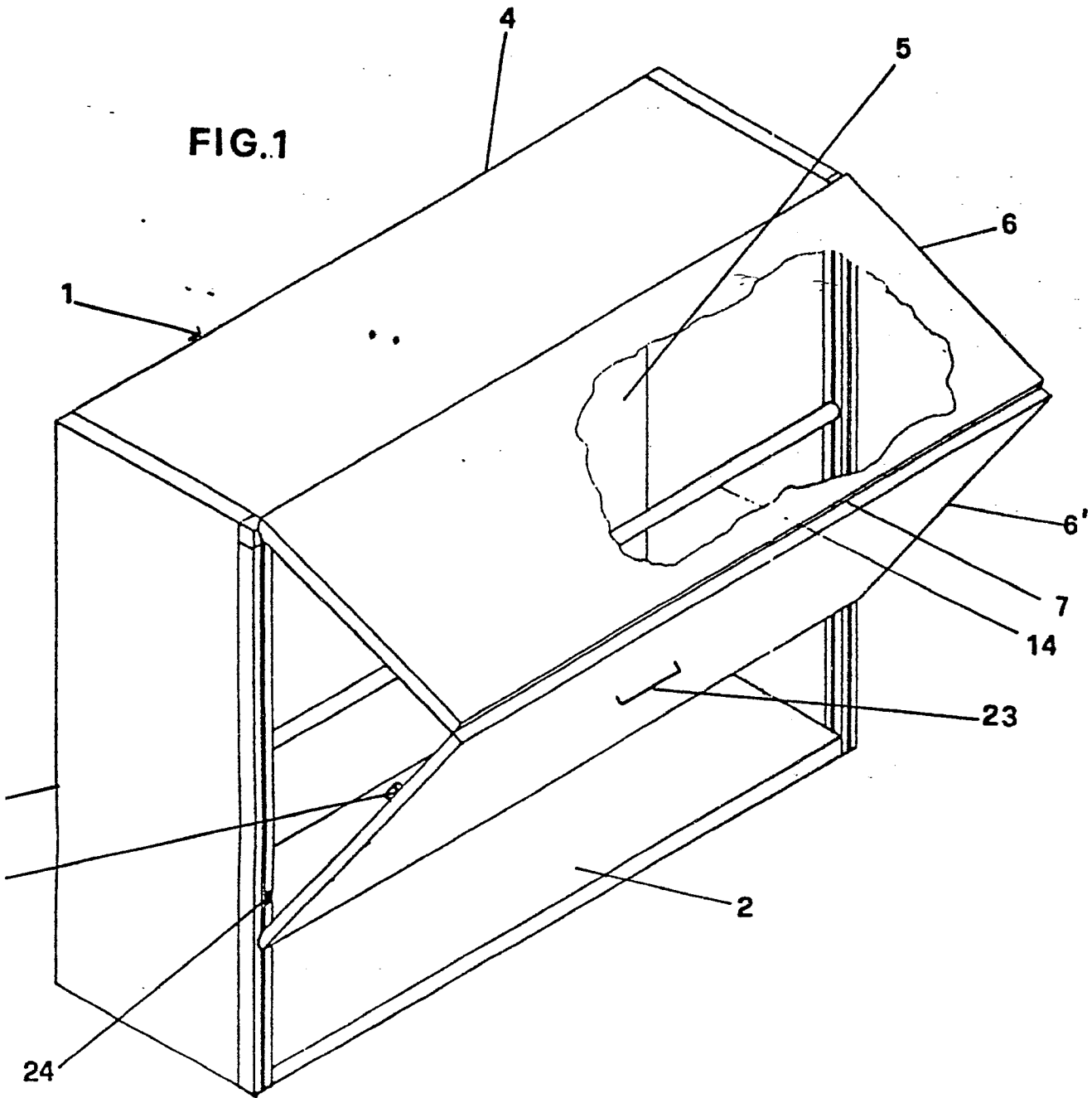
12. A device as claimed in claim 11, characterised in that the counterweight bar is provided with a handgrip (20) disposed in such a manner that when a downward traction force is applied to it it rotates said bar such that the ferromagnetic element (21) faces the magnet (22).

13. A device as claimed in one or more of claims 1 to 6, characterised by comprising two separate balancing systems applied in correspondence with the two front

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vertical edges of the side walls (3).

FIG.1



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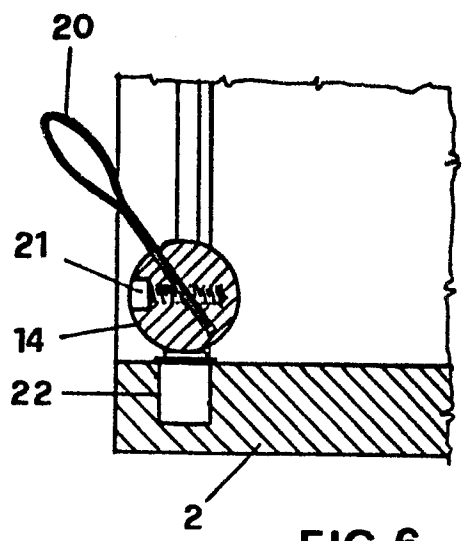


FIG. 6

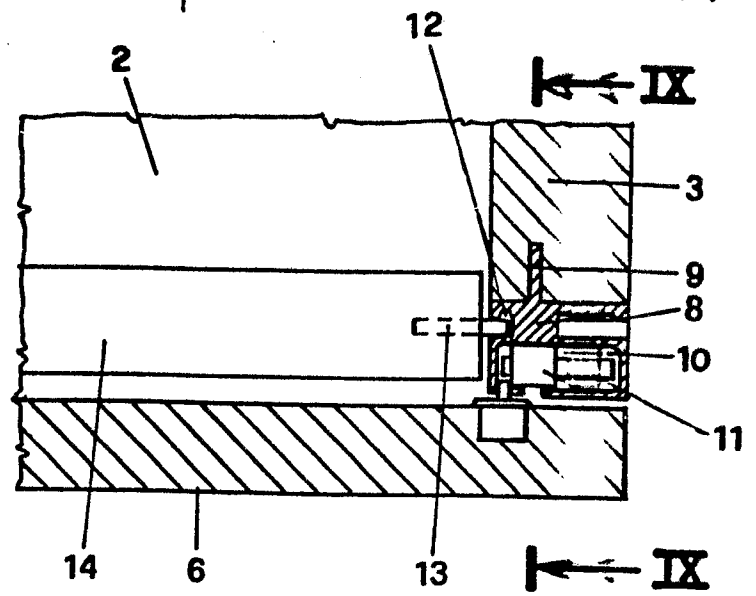


FIG. 8

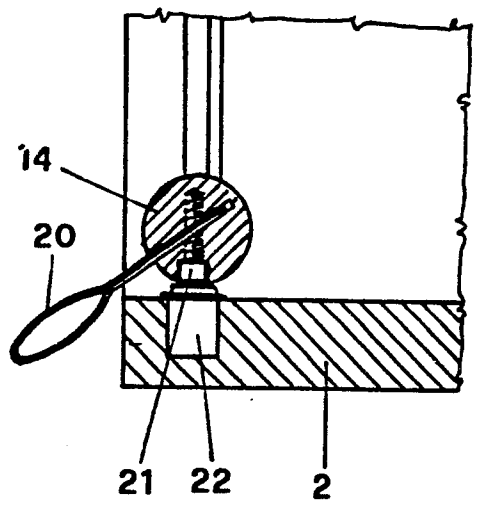


FIG. 7

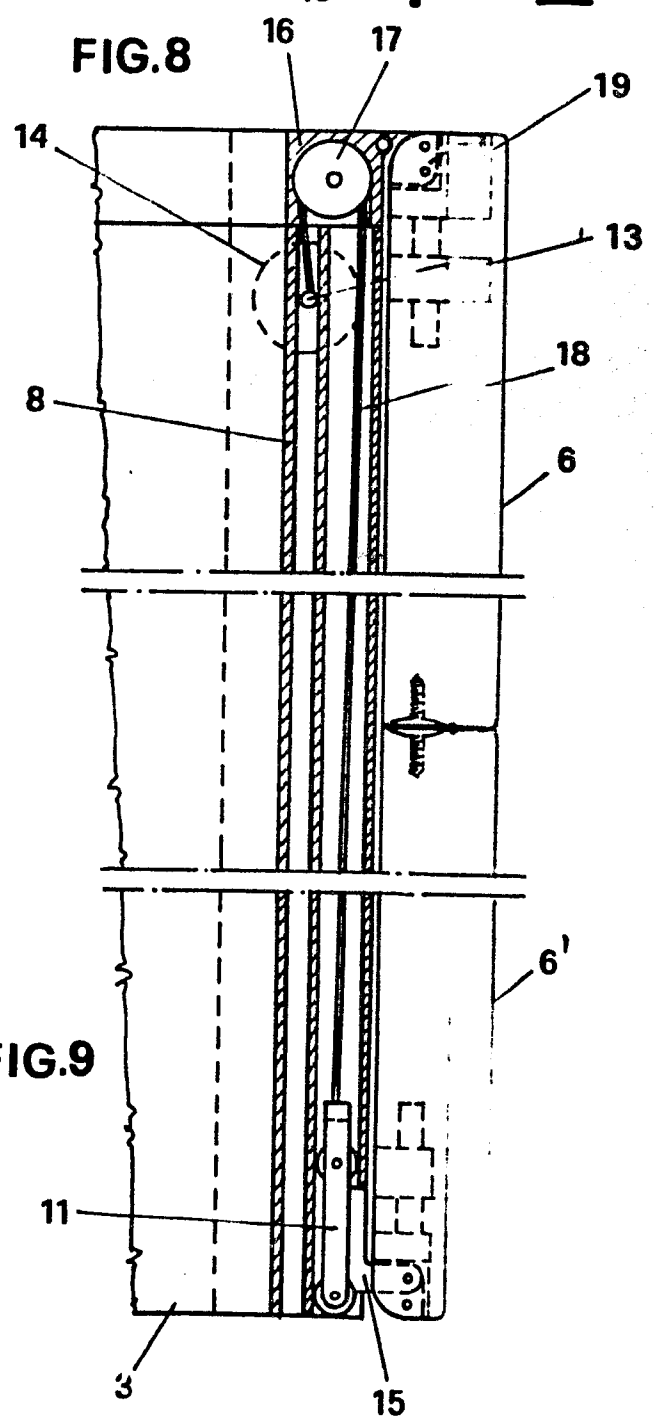


FIG. 9

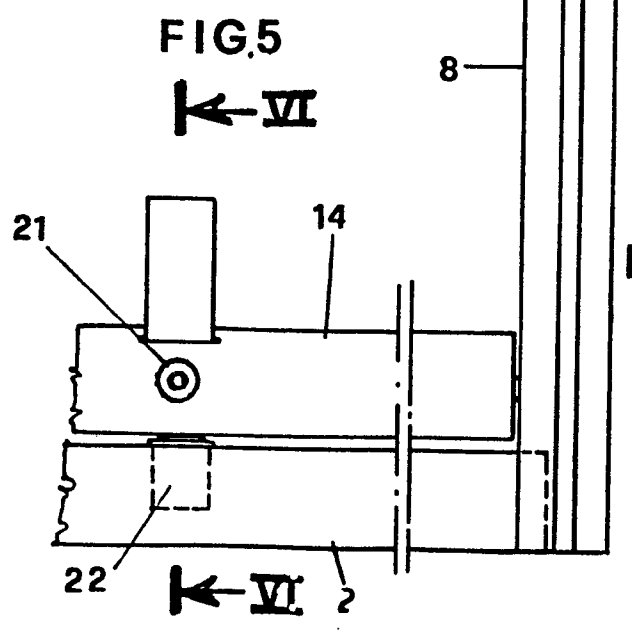


FIG. 5



DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int Cl 4)
Y	US-A-1 716 394 (TRAMMELL) * Page 1, line 57 - page 2, line 24; figures 1-8 *	1-3, 13	E 06 B 3/48 E 05 D 15/26
Y	FR-A-1 148 606 (DUBARRY) * Page 1, column 1, line 6 - page 2, column 1, line 38; figures 1,2 *	1-3	
A		4, 6-8	
Y	FR-A- 840 510 (LEGENDRE) * Page 1, line 37 - page 2, line 58; figures 1-10 *	1, 13	
A	US-A-2 523 929 (TAYLOR) * Column 2, line 4 - column 4, line 64; figures 1-5 *	1	
A	CH-A- 572 149 (FRIGERIO) * Column 1, line 40 - column 2, line 25; figures 1-4 *	1, 3, 6, 7, 9	TECHNICAL FIELDS SEARCHED (Int Cl 4) E 06 B E 05 D
A	US-A-3 317 259 (OTIS) * Column 2, line 63 - column 3, line 4; figures 1-4 *	3, 4	
--- -/-			
The present search report has been drawn up for all claims			

Place of search
THE HAGUE

Date of completion of the search
09-10-1986

Examiner
DEPOORTER F.

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int Cl 4)
A	US-A-3 349 829 (DIXON) * Column 2, line 70 - column 3, line 34; figures 1-4 *	5	
A	--- CH-A- 256 800 (BIESSER) * Page 1, lines 39-47; figures 1-3 *	12	
A	--- US-A-3 684 341 (BUCHTEL) -----		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int Cl 4)
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