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(54) Shower tray and doors

(57) The present invention relates to a shower tray and doors or screens for use with a shower tray, in particular a shower tray having application for people of reduced mobility. There is described shower system comprising a shower tray (10) and at least one retractable shower door assembly (71), wherein the shower tray (10) comprises a generally rectilinear shower area (11) having drainage channels (12,13) along the, in use, front edge thereof and at least one other edge adjacent there-

to, the showering area (11) having a floor (14,15) sloping towards the drainage channels (12,13); wherein the drainage channels (12,13) are provided with means to support a cover grille (30) thereover, the grille (30) being positioned, shaped and dimensioned to provide an elongate drainage aperture between the grille and the edges of the showering area and wherein the grille includes elongate, channels (70) adapted to receive and support a lower edge of the retractable shower door (71).

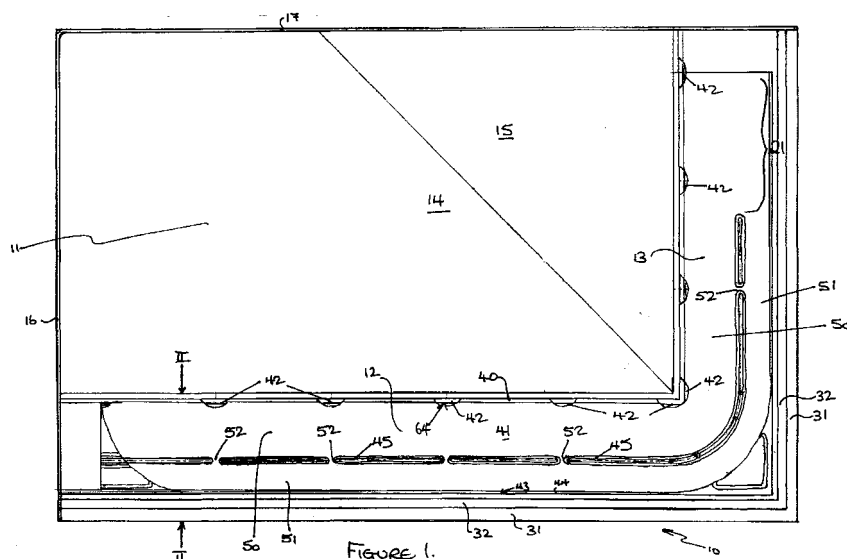


FIGURE 1.

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Description

[0001] The present invention relates to a shower tray and doors or screens for use with a shower tray, in particular a shower tray having application for people of reduced mobility.

[0002] Conventional square shower trays are unacceptably small for people of reduced mobility such as the elderly or disabled. For the disabled and others of reduced mobility, easy access into a shower area is essential. In the design of purpose-built accommodation, level access shower areas can be easily incorporated. However, the mobility of most people deteriorates over the course of a number of years and they will wish to delay leaving their own homes for as long as possible. It is known to remove existing baths and replace them by low-level access shower trays. However, conventionally, such trays sit on the floor of the bathroom in one corner and also include a drain in the corner. To enable the water to drain to the corner, the floor of the shower tray must be inclined towards the drain. This results in the front edge of the tray being raised above floor level, presenting the user with a step to overcome in order to enter the shower area. An example of such a tray is shown in GB 2 270 836A. Even a small step can present a significant obstacle to one whose mobility is impaired, particularly, of course, if that person is wheelchair bound.

[0003] There is a need therefore for a shower tray for which access thereto is at the same level as the surrounding floor. One solution is to excavate the floor covering in order to let the shower tray described above into the floor, but this is not entirely satisfactory particularly if the floor is of concrete construction. An alternative and more satisfactory solution is described in US Patent No 5,243,716. This describes a shower tray draining towards an integral trough positioned adjacent the front (in use) edge of the tray. Only the trough need be let into the floor and provides genuinely level access to the shower tray. The tray is installed between two fixed walls, allowing access from the front only. Nevertheless, there are a number of perceived disadvantages of this tray including the rate of drainage and thus limits on the water flow or power of the shower taken. There are also questions about access, it being the case that users will often have assistance showering from others who also need to be able to gain easy access to the shower tray. It is with these problems in mind that the present invention has been devised.

[0004] In its broadest sense, in one aspect the present invention provides a rectilinear shower tray comprising a showering area and drainage channels along the front, in use, edge thereof and at least one other adjacent edge, the showering area having a floor sloping towards the drainage channels. The drainage channels are provided with means to support a cover grille thereover, the grille being positioned, shaped and dimensioned to provide an elongate drainage aperture between the grille

and the edges of the showering area.

[0005] In a preferred embodiment, the grille includes elongate channels adapted to receive and support the lower edge of a sliding shower door assembly.

[0006] In a further aspect the present invention also provides a shower door set for positioning around a shower or shower area, the set comprising two retractable shower doors each being mountable upon respective walls and being adapted to pivot outwardly from or inwardly over a shower area pivoting at a point substantially adjacent the respective wall. The door set comprises channel means for providing channels in the floor of the shower or adjacent the shower. Each door comprises a plurality of door panels which are adapted to run in said channels.

[0007] Preferably, the door panels are adapted to run in the channels by means of runners or wheels being provided in a lower surface of each door panel.

[0008] Preferably, each door is adapted to pivot outwardly by being provided with a mechanism which includes a lifting mechanism to raise the runners or wheels of each panel out of engagement with the channels. Preferably the lifting mechanism includes a cap or pillar secured to the edge of the door panel adjacent the pivot point, which cap is pivotally mounted upon an intermediate element slidably mounted within a wall-mountable retaining channel. A hook or cam element is mounted on the intermediate element for pivotal movement about a horizontal axis such that a rotational movement of the hook or cam element imparts a linear motion to the intermediate element. In the case of a hook element, the pivotal movement is preferably actuated by means of a hook arm in the hook element engaging a rod or pin mounted eccentrically upon a rotatable pivot disc.

[0009] Preferably, pivot disc is caused to rotate by means of a handle connected thereto. Alternatively, the pivot disc may be caused to rotate by electromechanical means such as an electric or hydraulic motor.

[0010] In an alternative embodiment, a linear motion to the intermediate element is caused by means of a control cable preferably a Bowden cable, being coupled at one end thereof to the intermediate element, and at the other end thereof to actuating means, typically a handle or electromechanical means.

[0011] The above and other aspects of the present invention will now be described in further detail, by way of example only, with reference to the accompanying figures, in which:

Figure 1 is a plan view of a first embodiment of a shower tray in accordance with the present invention, with grille panels omitted;

Figure 2 is a cross-section along the line II-II of Figure 1;

Figure 3 is an exploded perspective view illustrating

a typical installation of a modification of the tray of Figure 1;

Figure 4 is a part perspective sectional view of a further embodiment of a shower tray in accordance with the present invention, together with shower doors;

Figure 5 is a plan view illustrating the principal features of an embodiment of a grille of a shower tray in accordance with the present invention;

Figure 6 is a cross section along the line VI-VI of Figure 5;

Figure 7 is an exploded view of a first embodiment of a shower door assembly in accordance with the second aspect of the present invention;

Figure 8 is a sequence of views illustrating the operation of the shower door assembly of Figure 7;

Figure 9 is a perspective view to one side of a second embodiment of a shower door assembly in accordance with the present invention;

Figure 10 is a front perspective view of the shower door assembly of Figure 9;

Figure 11 is an exploded view of the components of the door lifting mechanism of the assembly of Figures 9 and 10;

Figure 12 shows in a plan, two side and a perspective view the principle assembled components of the door lifting mechanism of Figure 11;

Figure 13 is a perspective view of the underside of an alternative embodiment of a grille in the form of a tile;

Figure 14 is a side view of an alternative door lifting mechanism; and

Figure 15 is an exploded view of the components of the door lifting mechanism of Figure 14.

[0012] Figures 1 to 3 illustrates the principle elements of a shower tray 10 in accordance with the present invention. The tray 10 includes a rectangular shower area 11 and front 12 and side 13 drainage channels along two adjacent edges thereof. The shower area 11 is raised at its rearward edge in order to produce an incline towards the drainage channels. The shower area 11 is divided into two drainage areas 14,15, each directing the flow of water predominantly into one of the channels 12,13. The tray is provided with upstanding splash-backs 16,17 around the sides not provided with drain-

age channels and a grille 30 over substantially the entire length of the drainage channels 12,13.

[0013] The channels 12,13 need to be let into the surface of the floor by removal, as shown, of sections 20 of floorboards 25. The depth of the shower tray in the area of the channels is, accordingly, chosen to correspond to the thickness of a standard floorboard such that the bottom surface 22 (in Figure 2) of the tray is supported upon one or more floor joists 26. Additional support may also be provided to give support to the tray between the joists. For example, the whole area below the shower tray may be excavated and a board put in place to create a continuous and flat surface upon which the tray can sit.

[0014] The shower tray has a drainage hole 23 at one end of a channel, the particular position being chosen such that the associated drain gully 24 occupies a position between adjacent floor joists. In the embodiment shown in Figure 1, no drainage hole is provided but an enlarged flat area 21 is provided at the end of side drainage channel 13 for on-site cutting of a drainage hole in an appropriate position to avoid underlying floor joists. Similarly with floors of solid construction such as concrete, a corresponding channel 20 is chased out of the floor, together with the necessary space for the drainage components 24.

[0015] Rather than provide shower trays with two enlarged flat areas 21, it will be appreciated that shower trays in accordance with the present invention will be provided in a range of configurations. For example, when viewed from the front, the side channel 13 may be on the left or the right hand side and for each of these configurations, the drain may be provided at the end of the side channel 13 or at the end of the front channel 12. Alternative embodiments can be envisaged such as one in which the drainage hole is provided at the junction of the two channels 12,13.

[0016] Typically, drainage of water from the tray will be by conventional gravity means. Alternatively, pump-assisted drainage may be provided.

[0017] As is most clearly illustrated in Figure 2, the outer edge of the tray 10 is stepped to provide regions for overlapping floor coverings. Firstly, the tray abuts the adjacent floor board 25. The tray has a recessed or stepped portion 31 to receive a sheet of waterproofed board 27 such that the waterproofed board overlaps both the floorboard 25 and the tray 10. Finally, there is a further stepped portion 32 to receive the final floor covering 28, typically a slip resistant linoleum-type material, such as that sold under the trade mark 'Altro', such that final floor covering 28 overlaps the waterproofed board 27 and the tray 10. As shown, the shower area 11 of the tray may also be recessed to receive a sheet of matching floor covering 33 although this is not an essential feature.

[0018] The features of the drainage channel itself are most clearly illustrated in Figures 1 and 2. As illustrated, the channel has a first sidewall 40 adjoining the edge of the shower area 11, curving downwardly towards the

base 41 of the channel 12 and a second sidewall 43 which may also be curved. First sidewall 40 includes a plurality of arcuate grille-support members 42 projecting outwardly therefrom. Second side wall 43 includes a ledge 44 also acting as a grille support. In an alternative embodiment (not shown), arcuate grille-support members 42 are replaced by a continuous support ledge. A raised longitudinal ridge 45 is provided within the channel intermediate the sidewalls to provide additional grille support, thereby dividing the drainage channel into two flow channels, a primary flow channel 50 adjacent the showering area 14 and a secondary flow channel 51 adjacent the outer edge of the shower tray. As shown, preferably the raised ridge 45 is positioned closer to the outer edge of the shower tray than it is to the showering area, providing a primary flow channel 50 of greater width than the secondary flow channel.

[0019] In the preferred embodiment, as is illustrated in Figures 1 and 2, preferably all surfaces over or around which water will flow are arcuate or rounded to encourage a smooth or laminar flow.

[0020] The grille itself will now be described in further detail with particular reference to Figures 5 and 6 which show a section of grille to be positioned at the junction between the two channels 12,13. The grille 60 includes a plurality of longitudinal drainage apertures 61 formed in channels 62 which encourage drainage therethrough. Alternatively, the apertures could be axial or diagonally orientated. As is most clearly seen in Figure 6, the grille is provided with a slight camber to encourage drainage. The grille 60 includes downwardly depending inner leg components or ledge 63 which engage corresponding ledges 64 formed in the arcuate grille support members 42. The grille and arcuate grille support members are dimensioned so as to provide a spacing for drainage between the inner edge 64 of the grille and the first sidewall of the channel. The inner edge 64 of the grille is also provided with an angled profile to provide a clear drainage pathway from the shower area to the drainage flow channel 50. The underside of the grille 60 includes an elongate track 65 depending therefrom and being profiled to rest, for support, on ridge 45 of the drainage channel.

[0021] In the embodiment shown, raised ridge 45 is discontinuous and includes a number of overflow channels 52 to allow fluid communication between the two flow channels 50,51. In an alternative embodiment, not shown, raised ridge 45 is continuous and elongate track 65 includes discontinuities to provide the desired fluid communication. To ensure adequate flow in this arrangement, typically ridge 45 will be lower in height than in the embodiment illustrated and elongate track 65 is extended downwardly to contact the ridge 45.

[0022] As shown in Figure 3, the grille 30 may be a unitary element. However, preferably, the grille is formed by a number of discrete grille elements.

[0023] The upper surface of the grille includes a plurality of further channels 70, preferably perforated for

drainage, which act as running tracks for a sliding door assembly 71 (Figure 4). By ensuring that the door assembly runs in tracks in the grille, the present invention ensures that there is little or no flooding of water outside the shower doors. Any water that may, for example, splash over the top of any shower doors will fall onto that part of the grille outside the doors, draining through the grille and into the distal flow channel. This is a significant advantage of the present invention.

[0024] The shower door assembly 71 includes a long door 80 and a short door 81 and, by way of example, the operation of the long door will now be described in a more detail. Long door 80 comprises three panels, a hinge panel 82, a central panel 83 and an end panel 84. Each panel, which may be made of toughened or safety glass or of a polymeric material such as acrylic or polycarbonate, is mounted for slidable movement with respect to each adjacent panel. End panel 84 is held between a top rail 90 and bottom rail 91 both of extruded aluminium and including left end caps 92 and right end caps 94. Mounted in the lower edge of bottom rail 91 are two wheels 93 which engage the innermost channel 70 of the grille. Central panel 83 is similarly mounted between top and bottom rails 90,91, the latter of which includes wheels 93 to run in central channel 70 of the grille. Top and bottom rails 90 and 91 of the central panel each include a respective channel 95,96 on the rear face thereof which each receive a respective slider element 100,101 secured to the front face of the end panel. Each slider element 100,101 is restrained to slide within its respective channel by top and bottom end caps 98. End caps 98 include a removable insert 99 having extended legs 99a. In use in position in the end cap, the legs 99a of each insert 99 bear against the respective slider element arresting the sliding movement of the end panel 84 over the central panel 83 typically resulting in an overlap between the two panels of several inches, providing a resilient door. However, if the insert is removed, the slider elements are free to move to the end of the channels 95,96, being restrained only by the end caps themselves. This reduces the overlap between the panels to a minimal amount, useful for cleaning. The sliding action of the central panel 83 over the hinge panel 82 is exactly the same. The end panels of the long and short doors are provided with locking means to hold them together in a closed configuration. In this embodiment, tubular elements 105,106 are mounted upon the external vertical edges of the respective end panels. Tubular elements 105,106 include opposing magnetic strip elements which serve to retain the doors when closed and provide a degree of waterproofing.

[0025] Once the doors are retracted, in order to allow fully open access to the shower area, the shower doors of the present invention are provided with a hinge mechanism to allow the doors to swing outwardly. However, the doors must also be raised in order to disengage the wheels 93 from the channels 70 of the grille. In the embodiment shown in Figure 7, this is achieved as follows.

Hinge panel 82 is provided with a pillar 119 along its vertical end edge which is adapted to pivot within an intermediate element 120 coupled to a wall adjustment element 121 itself slidably mountable within a wall-mounted retaining channel 122. Intermediate element 120 includes means, as shown, in the form of an additional stub component 123, including means for resiliently receiving a distal end of a Bowden cable 124. Bowden cable 124 passes over a bar 125 and engages, at its other, proximal end, actuating handle 130 which is located for rotational movement within the wall-mounted retaining channel 122. As actuating handle 130 is rotated, the proximal end of Bowden cable 124 is pulled downwardly, thus raising the distal end of Bowden cable 124 and with it the stub component 123 and thereby the whole door. With the wheels raised from engagement with the channels of the grille, the door can be swung outwardly.

[0026] An alternative lifting mechanism is illustrated in Figures 9 to 12. As before a tubular pillar 127 is provided on the vertical edge of the hinge panel 82. This cap engages lower and upper hinge plates 125, 126 mounted at respective ends of a channel 131 fixedly mounted upon a box-section intermediate element 132 which is adapted to slide in a channel 133 of wall-mounted retaining channel 122. Hinge caps 125, 126 allow a full pivoting movement of pillar 120 and thus the doors. Lifting of the doors is achieved as follows. Secured to intermediate element 132 are two plates 134 and 135. Plates 134 and 135 are shaped as to combine to form a hook plate 140 (Figure 12) open around three sides. Sandwiched between plates 134, 135 of hook plate 140 for pivotal movement is a hook arm 141 having a hook at its uppermost (as shown) end. The hook of hook arm 141 engages a pivot rod 142 mounted between two pivot discs 143, 144 at a position adjacent the periphery thereof. Pivot discs 143, 144 are mounted upon a spindle 145 which engages actuating handle 130. Rotation of handle 130 causes hook arm 141 and thus hook plate 140 to lift via a cam action thereby also raising the doors which are then free to pivot open. Alternative cam action mechanisms will be readily apparent to those skilled in the art.

[0027] Such an alternative is illustrated in side view in Figure 14 and in an exploded view in Figure 15. As will be apparent from Figure 15, the construction of this embodiment is broadly similar to that of Figures 11 and 12. However, the hook assembly 140, 141, 142, 144 is replaced by a cam element 150 operatively mounted upon spindle 145 which engages actuating handle 130. Cam element 150 is generally trapezoidal in plan view. Plates 134, 135 secured to intermediate element 132 are modified from the embodiment described above by provision of a cut-out portion 151 adapted to engage cam element 150. Plates 134, 135 may, of course, be formed from a single component.

[0028] As is illustrated in Figure 14, although the feature is equally applicable to any embodiment, preferably a gas strut or piston 152 is included below plates 134,

135 to act as a damper to slow the descent of the doors
[0029] In both cases described above, the doors can also pivot over the shower tray for the purposes of drainage.

5 **[0030]** In the embodiment described above, the doors are held in the closed position by means of magnetic strips. In the embodiment shown in Figures 9 and 10, a simple male cap 150 having a pin depending therefrom mounted on the end cap of one end panel engages a
10 corresponding aperture in a corresponding female cap 151 mounted on the end cap of the other end panel. The male and female components can, of course, be reversed with advantageous results in avoiding pooling of water within the cavity of the male cap.

15 **[0031]** The shower tray of the present invention provides a number of significant advantages over the prior art, in particular the tray of US 5,243,716. For example, the use of a drainage channel around more than one edge of the tray allows the use of lower flow rates, which
20 in turn allows the use of shallower gradients and thus tray depths. Alternatively, it allows the use of increased water flows for the same gradients and depths. As the doors overlap the grille generally centrally, water hitting the door from the shower can drain freely into the channel. There is no pooling or flooding as occurs with exist-
25 ing shower door designs. It also provides a shower tray with true level access on two sides, that is to say, it provides enhanced, open, access, a significant advantage for wheelchair bound users and their carers.

30 **[0032]** The shower doors of the present invention provide additional significant advantages to those with disabilities. Users with restricted mobility will tend to lean upon any available surfaces for support. All surfaces in showers designed for the disabled should therefore to
35 be able to bear a significant force, although often such showers are not so designed. The present invention satisfies this requirement in a number of aspects. In particular, in use, lateral movement of the shower doors is resisted to a slight degree by wheels 93 running in the channels 70 of the grille. The running of the doors in the channels also allows vertical forces exerted on the top of the doors to be transmitted vertically down to the grille and thus to the shower tray.

[0033] The tray and grille may be made out of many materials as will be apparent to one skilled in the art.
45 For example, the tray may be made by vacuum forming, preferably from glass reinforced plastics materials or by infusion or resin transfer moulding. The grille may be extruded or moulded, from aluminium, a plastics or resinous materials, optionally reinforced, such as a carbon fibre resin material.

50 **[0034]** For certain embodiments, moulding is a preferred method for the production of the grille as it allows the addition of arcuate vanes or flow directors 110 to the underside surface of the grille (as shown in Figure 13). Such vanes act to direct the flow of water specifically towards the drainage area 21 reducing turbulence and
55 aiding water flow velocity. It will be appreciated that the

vanes will be left-handed or right-handed to correspond to the required direction of flow. Typically, the vanes 110 project approximately 5mm below the level of the inner ledge 63. As the channel 13 slopes downwardly towards the gully 23, the gap between the bottom of the vanes increases from approximately 5mm to around 16-18mm.

Claims

1. A shower system comprising a shower tray (10) and at least one retractable shower door assembly (71), wherein the shower tray (10) comprises a generally rectilinear shower area (11) having drainage channels (12,13) along the, in use, front edge thereof and at least one other edge adjacent thereto, the showering area (11) having a floor (14,15) sloping towards the drainage channels(12,13); wherein the drainage channels (12,13) are provided with means to support a cover grille (30) thereover, the grille (30) being positioned, shaped and dimensioned to provide an elongate drainage aperture between the grille and the edges of the showering area and wherein the grille includes elongate channels (70) adapted to receive and support a lower edge of the retractable shower door (71).
2. A shower system as claimed in Claim 1 wherein each drainage channel (12,13) has a first sidewall (40) adjoining the edge of the shower area (11) and a second sidewall (43) adjoining the edge of the shower tray (10); wherein the first and second sidewalls (40,43) are formed with respective grille-support members (42,44) and wherein a raised longitudinal ridge (45) is provided within the drainage channel (12,13) intermediate the first and second sidewalls, thereby defining a primary flow channel (50) adjacent the shower area (11) and a secondary flow channel (51) adjacent the edge of the shower tray.
3. A shower system as claimed in Claim 2 wherein ridge (45) is formed closer to the second sidewall (43) than to the first sidewall (40).
4. A shower system as claimed in Claim 2 or Claim 3 wherein the ridge (45) is discontinuous to allow fluid communication between the primary and secondary flow channels (50,51).
5. A shower system as claimed in any one of Claims 2 to 4 wherein at least one of the grille-support members (42,44) associated with the first and second sidewalls (40,43) comprises a plurality of generally arcuate members (42) projecting outwardly from the respective sidewall.
6. A shower system as claimed in any preceding claim wherein the shower door assembly (71) comprises two retractable shower doors (80,81) each being mountable upon respective walls adjacent the shower area (11) and being adapted to pivot outwardly from or inwardly over the shower area (11) pivoting at a point substantially adjacent the respective wall, wherein each door comprises a plurality of door panels (82,83,84) which are adapted to run in said elongate channels (70) of said grille (30).
7. A shower system as claimed in Claim 6 wherein the door panels (82,83,84) are adapted to run in the elongate grille channels (70) by means of runners or wheels (93) being provided in a lower surface (91) of each door panel (82,83,84).
8. A shower system as claimed in Claim 6 or Claim 7 wherein each door (80,81) is adapted to pivot outwardly by being provided with a mechanism which includes a lifting mechanism to raise the runners or wheels (93) of each panel (82,83,84) out of engagement with the channels (70) of the grille (30).
9. A shower system as claimed in Claim 8 wherein the lifting mechanism includes a cap or pillar (119,127) secured to the edge of that door panel (82) adjacent the pivot point, which cap (119,127) is pivotally mounted upon an intermediate element (120,132) slidably mounted (121,133) within a wall-mountable retaining channel (122); and wherein a hook element (140,141) is mounted on the intermediate element (132) for pivotal movement about a horizontal axis such that a rotational movement of the hook element (140,141) imparts a linear motion to the intermediate element (132) and wherein such pivotal movement is preferably actuated by means of a hook arm (141) in the hook element engaging a rod or pin (142) mounted eccentrically upon a rotatable pivot disc (143,144).
10. A shower system as claimed in any one of Claims 6 to 9 wherein each door comprises at least a first and a second door panel, wherein each panel is mounted between respective top (90) and bottom (91) rails and the first panel includes a respective channel (95,96) on a first face thereof each of which channels (95,96) receives a respective slider element (100,101) secured to the second face of the second panel; wherein each slider element (100,101) is constrained to slide within its respective channel by top and bottom end caps (98) including a retractable insert (99) having extended legs (99a) adapted to bear against a respective slider element (100,101).

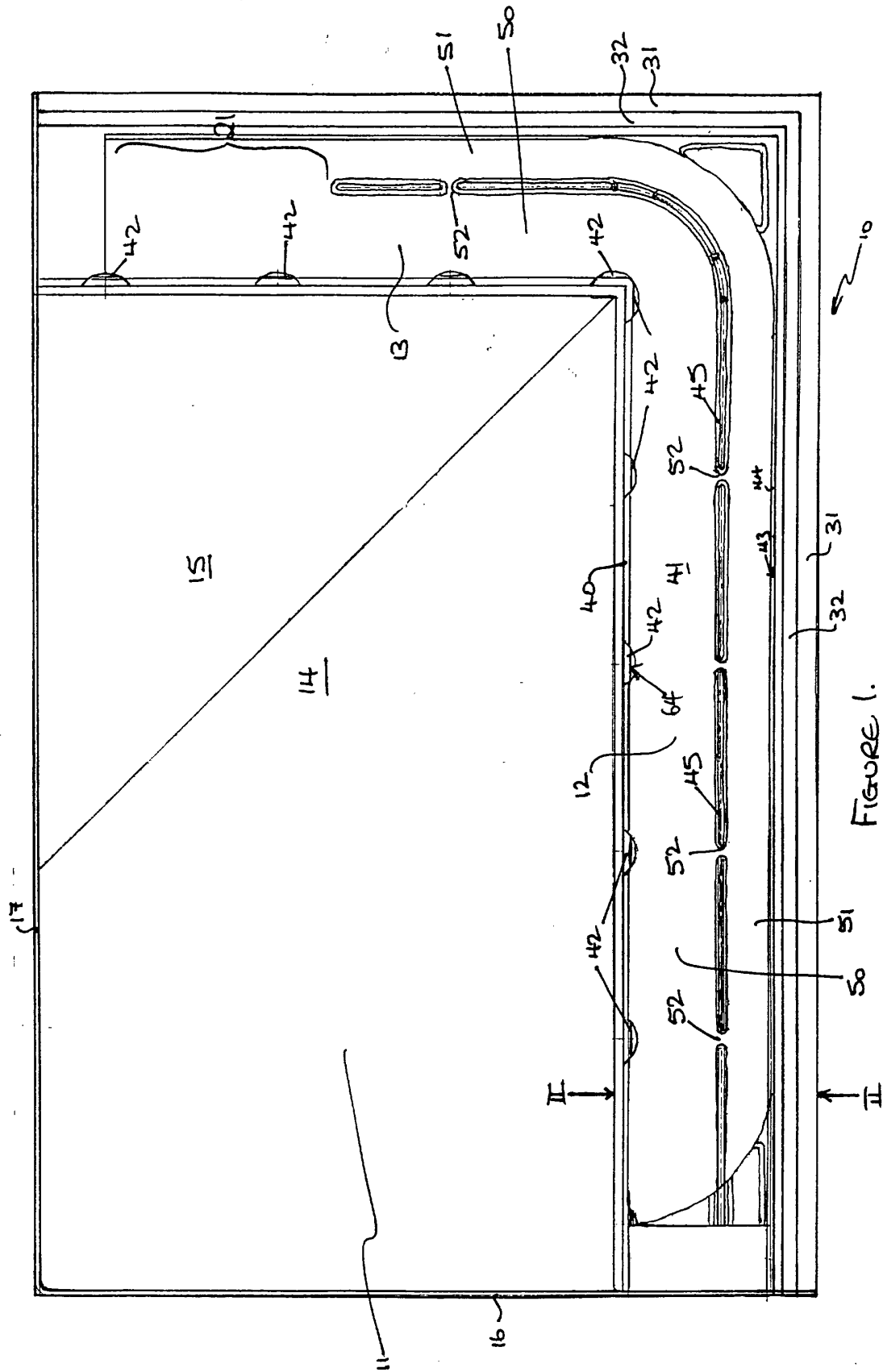
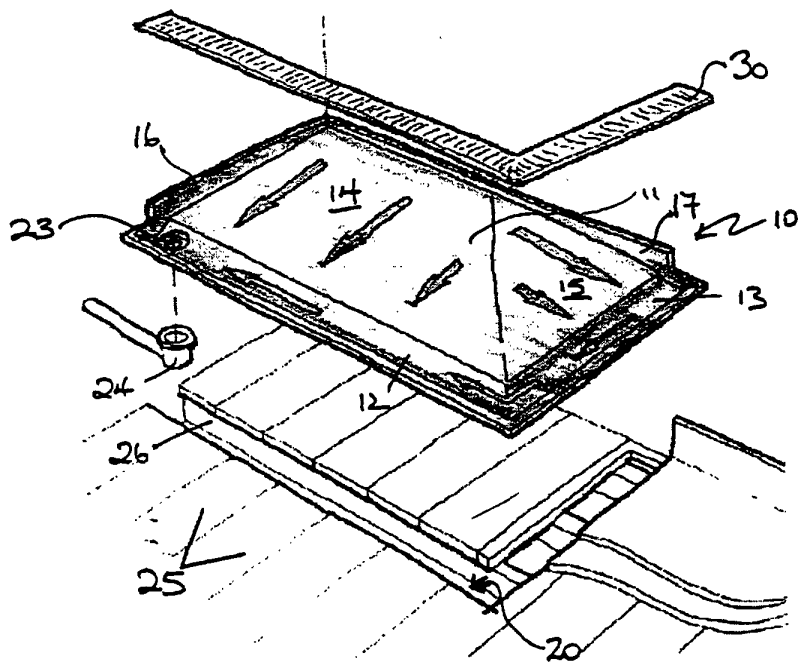
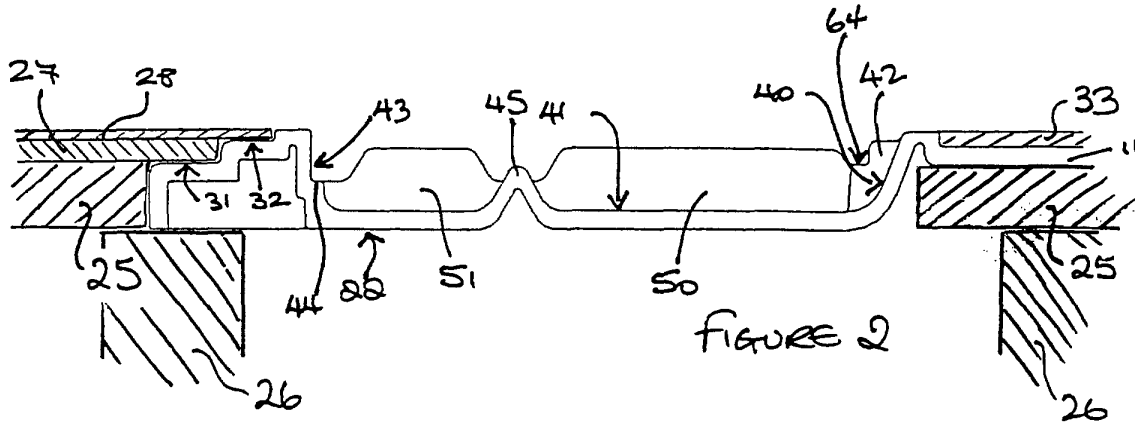


FIGURE 1.



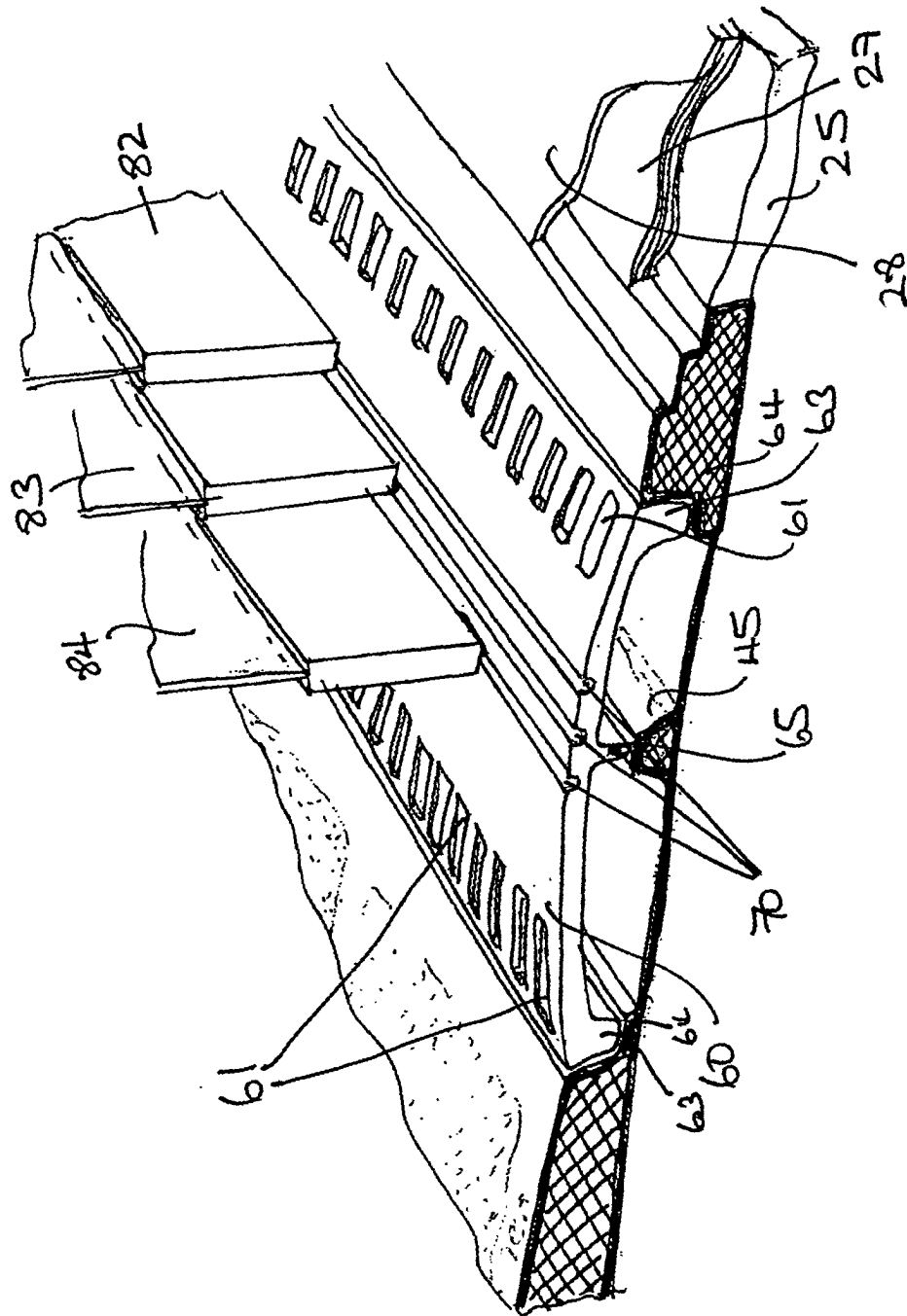


Figure 4.

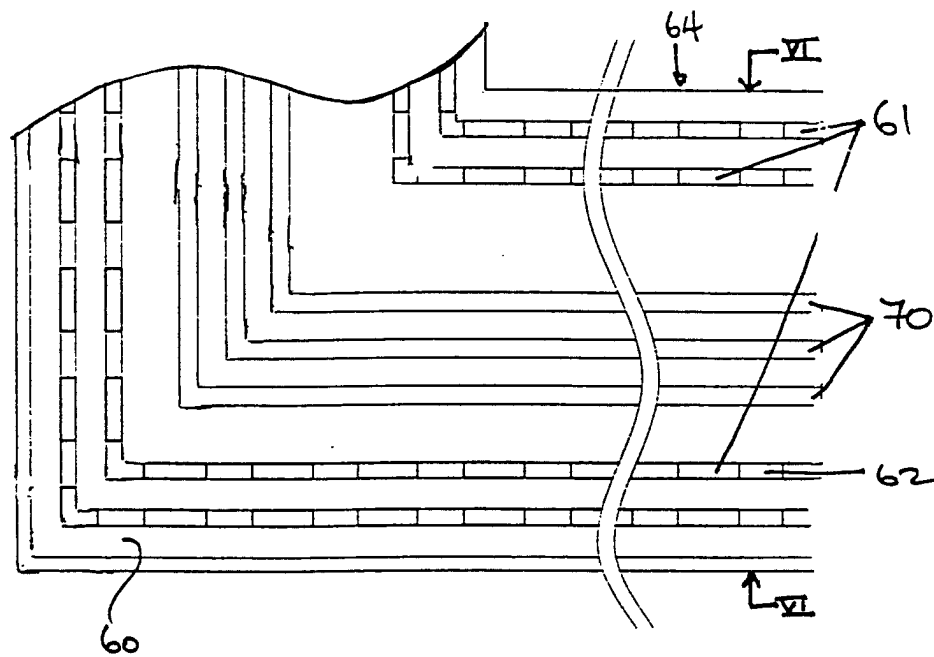


FIGURE 5

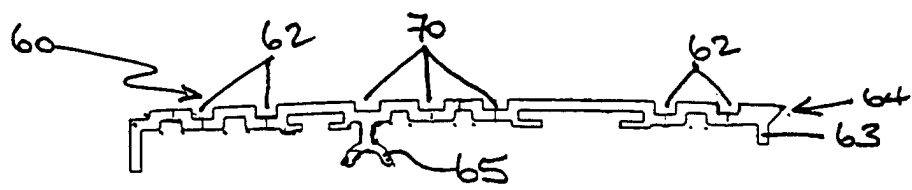


FIGURE 6.

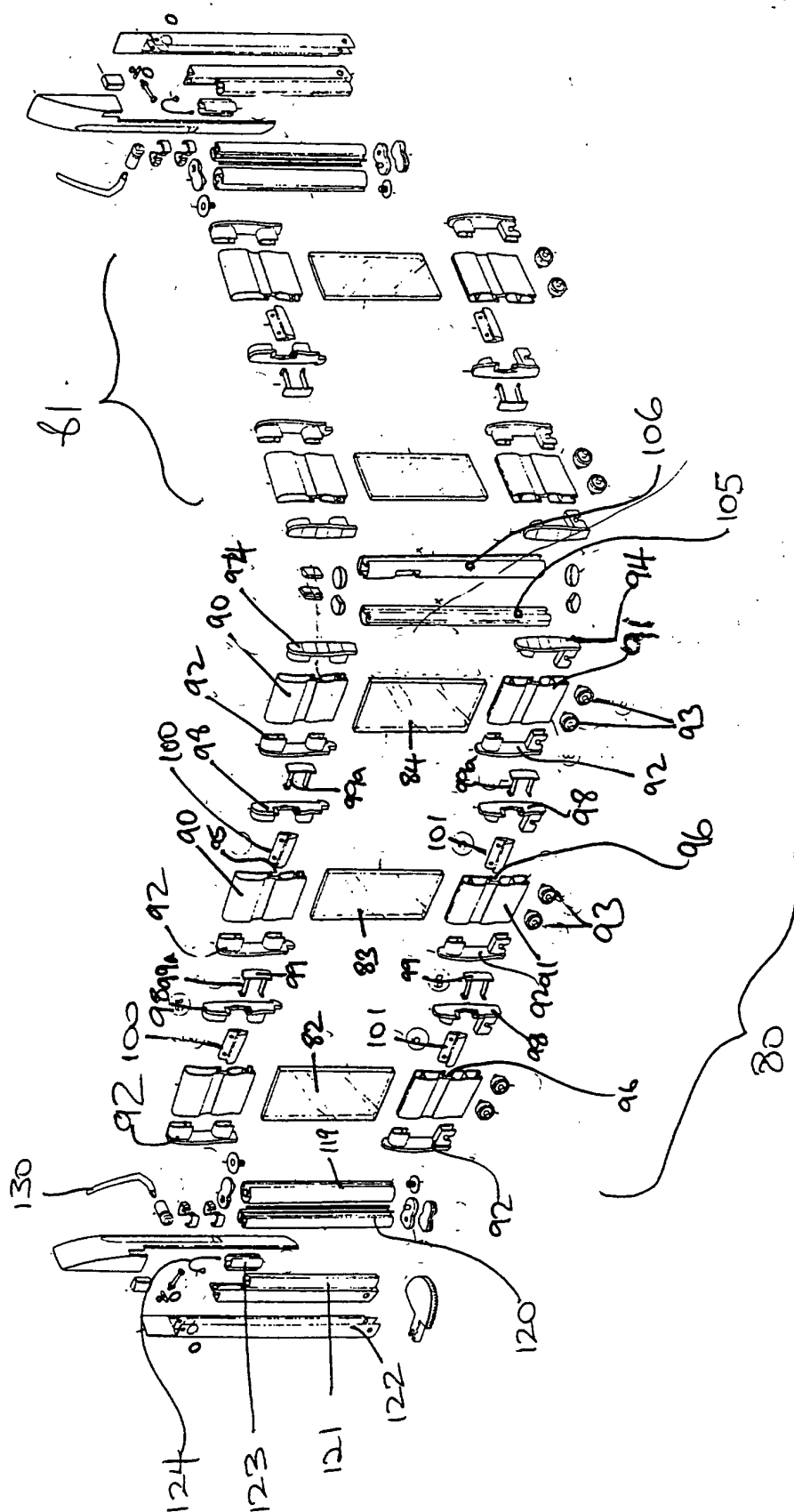


figure 7.

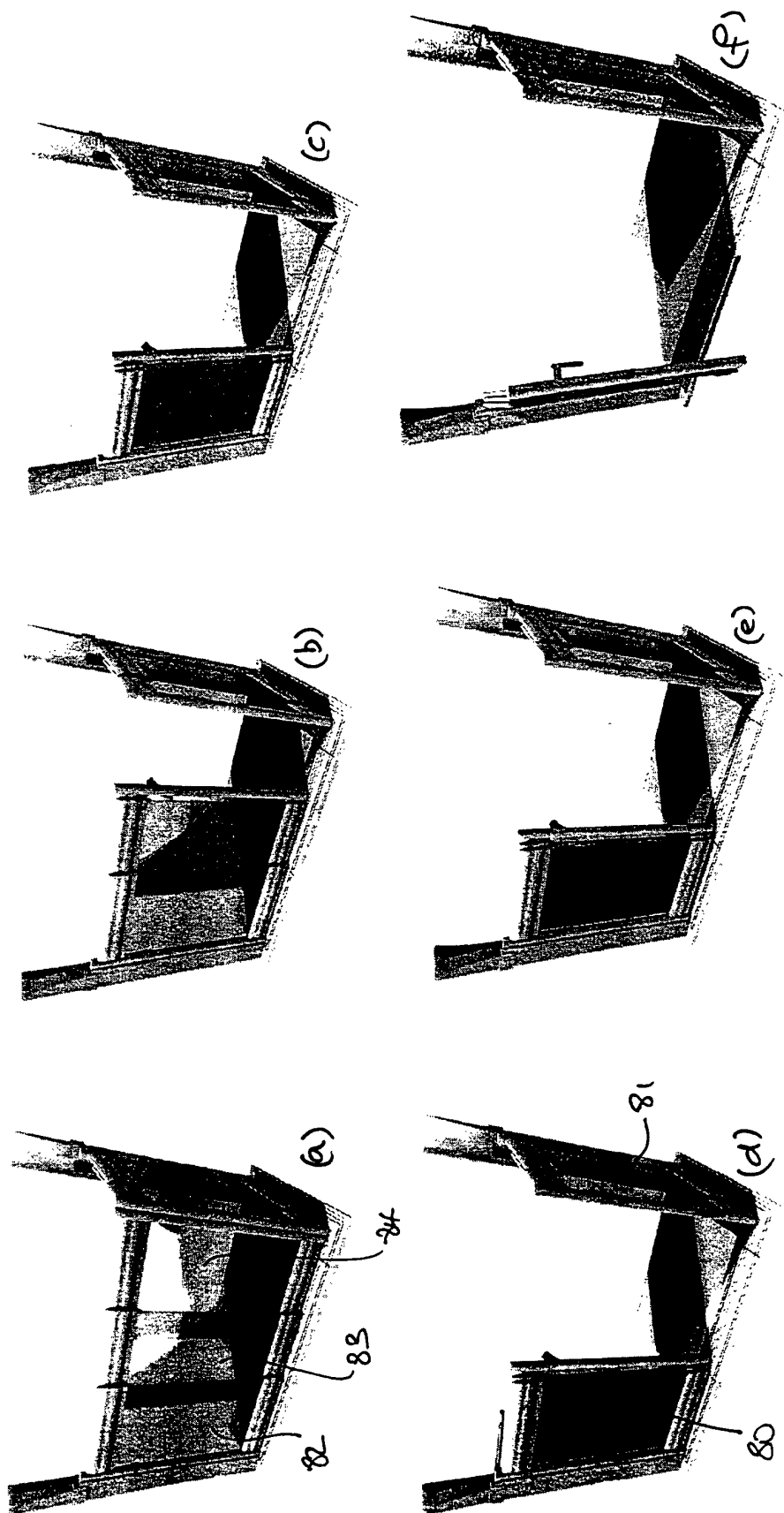
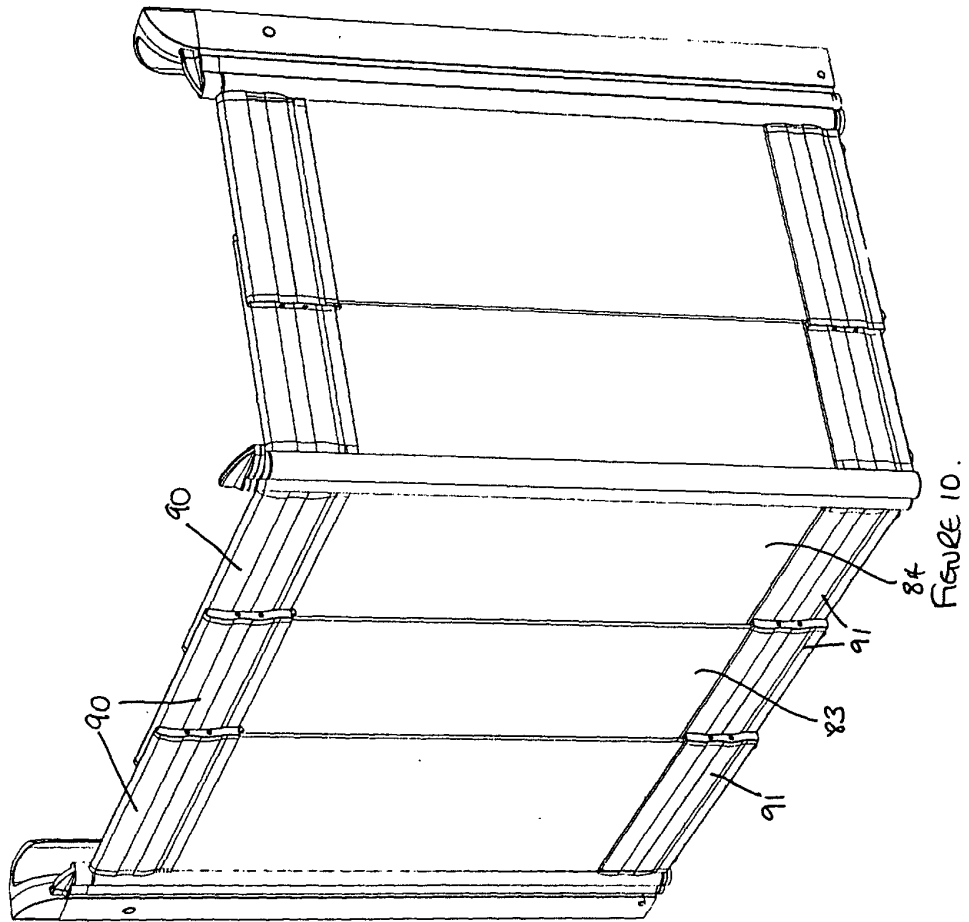
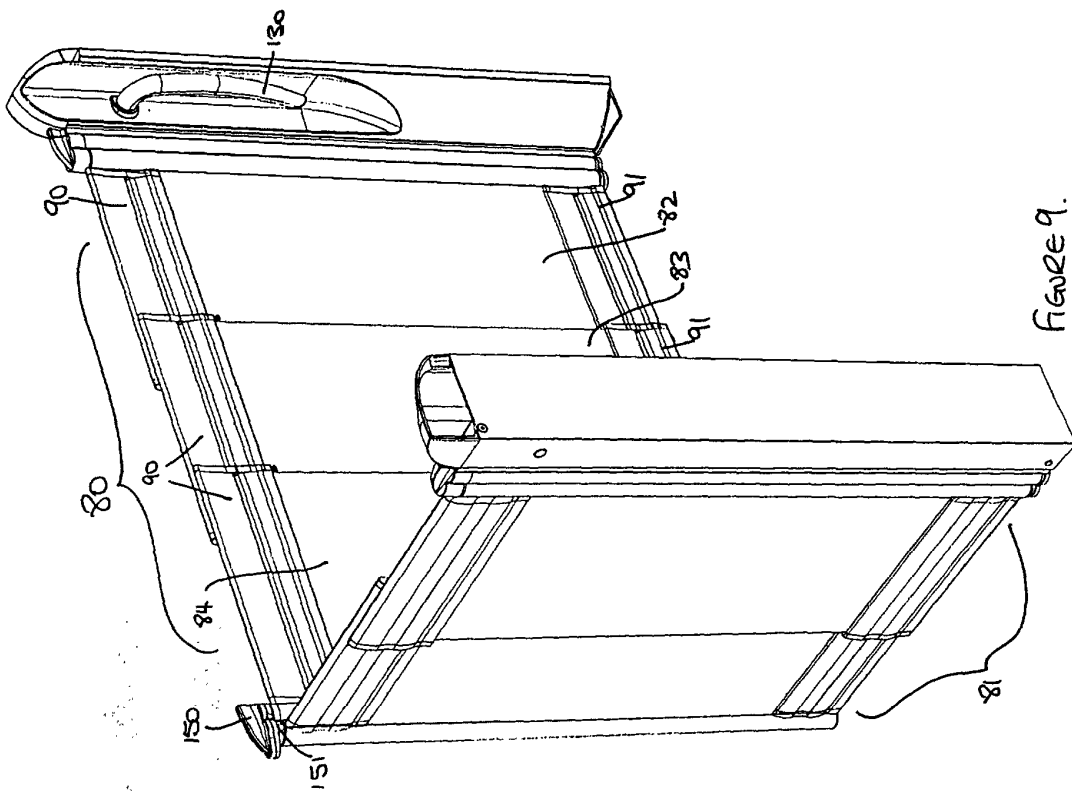


Figure 8.



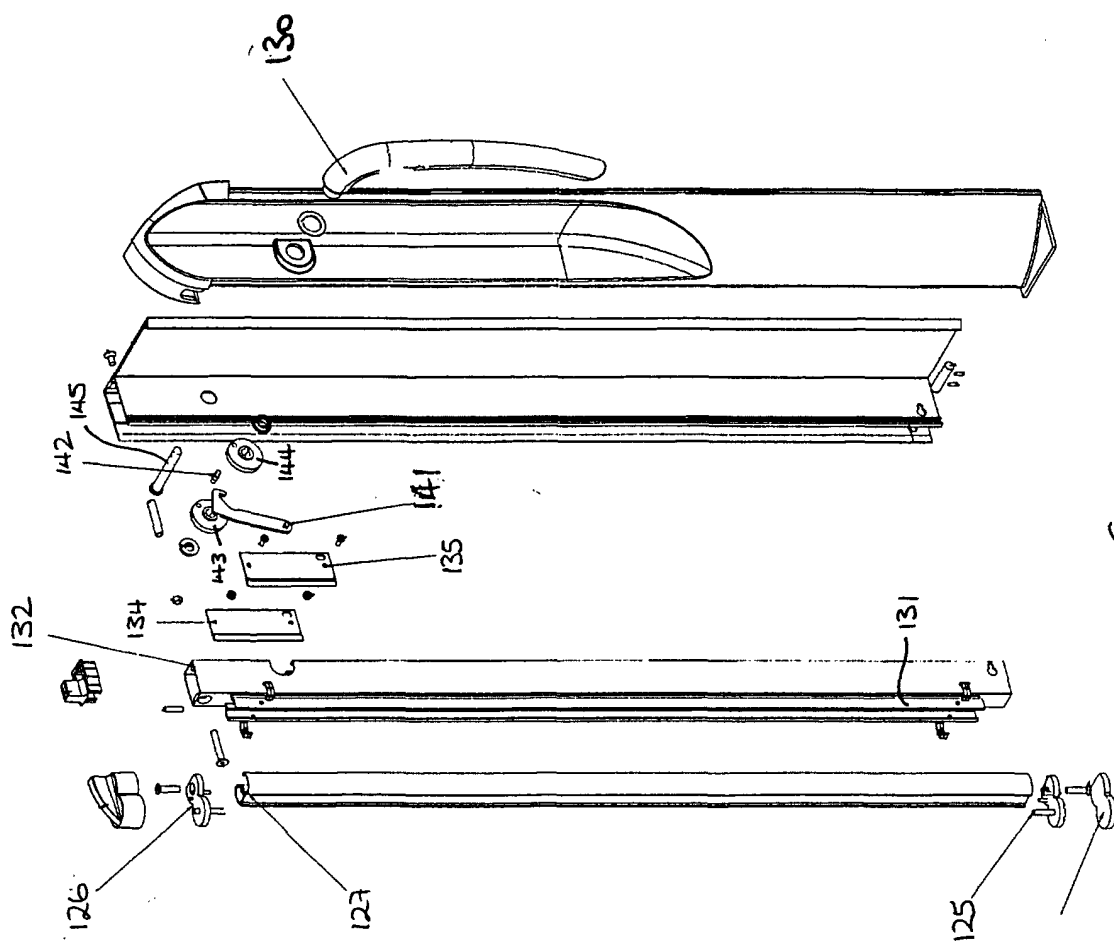


FIGURE 11

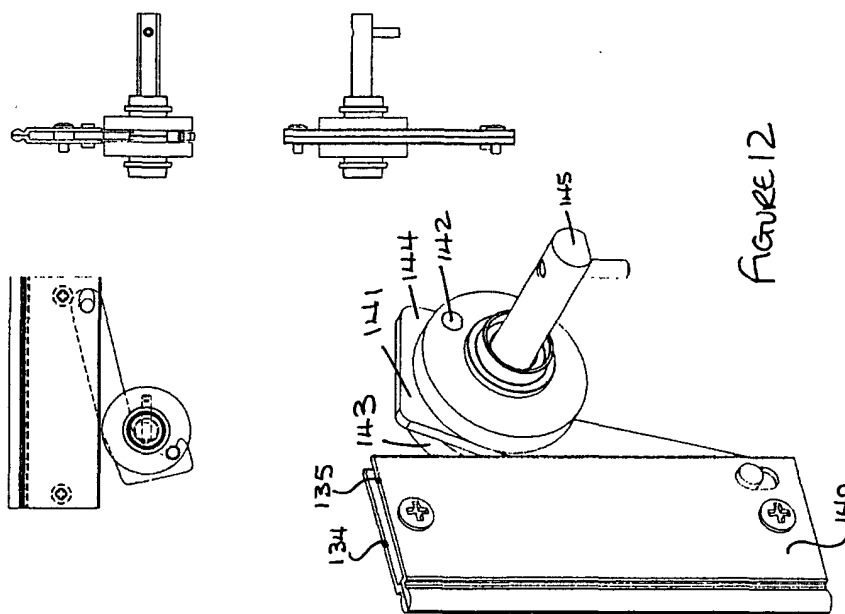


FIGURE 12

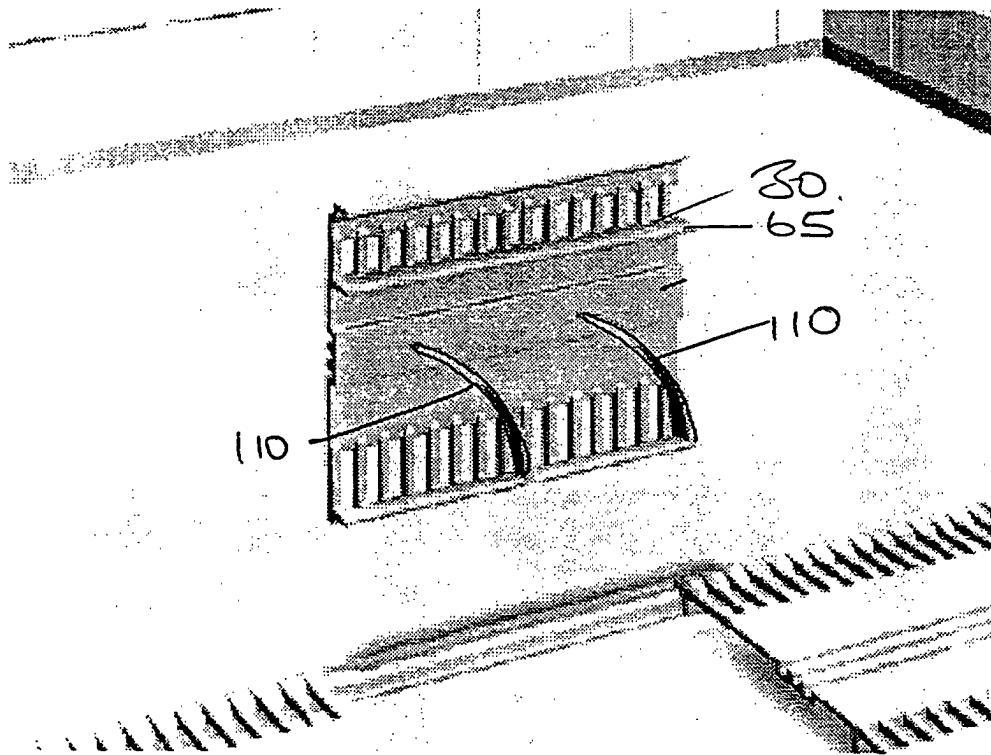


FIGURE 13

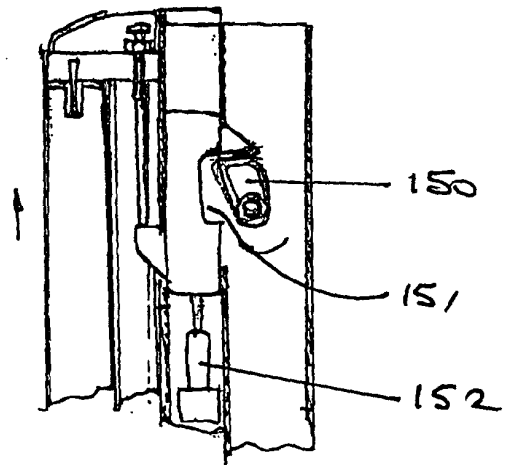


figure 14

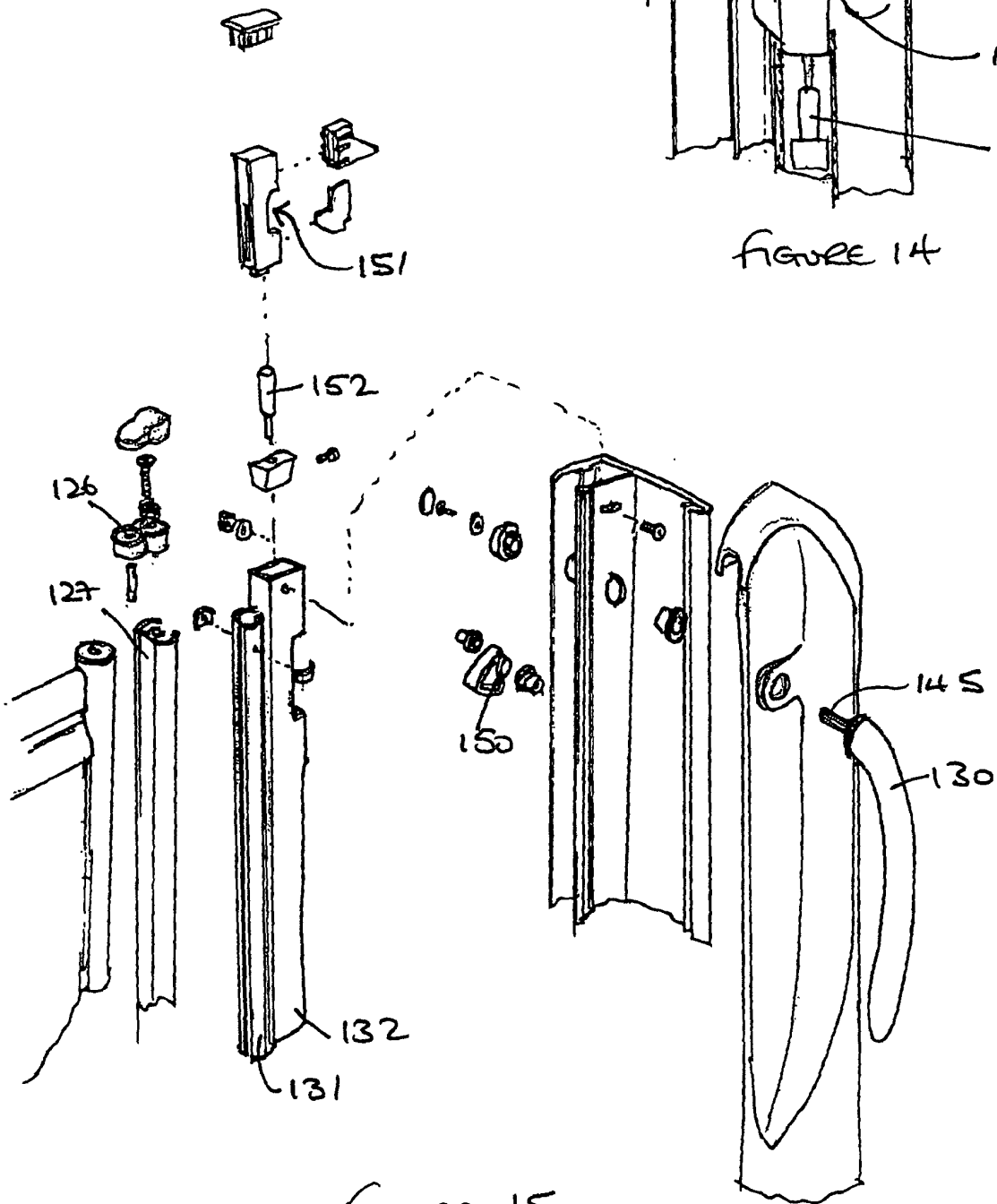


figure 15.



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 30 1135

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.7)
Y	DE 36 00 945 A (BEUTEL WALDEMAR) 23 October 1986 (1986-10-23) * page 7, line 16 - page 8, line 5 * * page 10, line 28 - page 11, line 25; figures 1,2 * -----	1	A47K3/40
Y	DE 91 01 583 U (H. SCHWITTERS) 4 June 1992 (1992-06-04) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			A47K
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 2 April 2001	Examiner Delzor, F
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82