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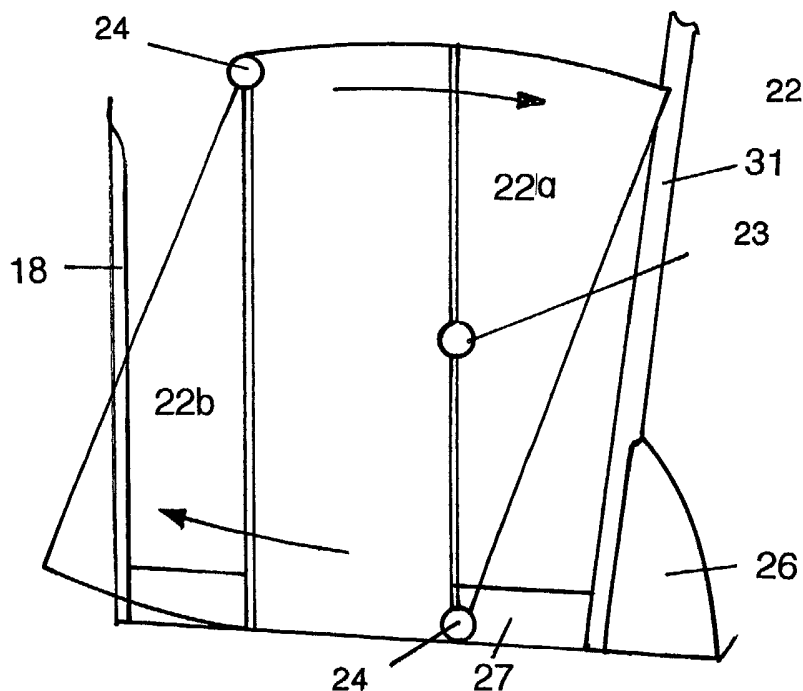
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(54) Title: BUILDINGS



(57) Abstract: There is provided a building such as a greenhouse having a roof (15), two end walls (11) and two side walls (12, 14). The roof (15) preferably has a convexly curved shape and one side wall (14) is higher than the other side wall (12) and is angled away therefrom. One of the ends (11) has a pivot door (22) comprising two door sections which are pivoted at opposite corners (24) and meet on a diagonal meeting line. The greenhouse has a gutter (17) which is a structural member and which acts as a rainwater reservoir.

BUILDINGS

This invention relates to buildings, particularly but not exclusively to greenhouses, sheds and other garden buildings.

Greenhouses and sheds are well known garden buildings and are available in many shapes and sizes. They have a door and sheds usually have one or more windows. They are usually rectangular in plan and comprise four perpendicular sides and a roof made of flat facets either apex or pitched, and an optional base.

According to a first aspect of the present invention there is provided a door structure comprising a supporting frame and two door sections, the first door section having a first meeting portion for co-operation with a second meeting portion provided by the second door section, each door being mounted for pivotal movement with respect to the frame between a first position in which said meeting portions cooperate to close the door and a second position in which said meeting portions are spaced from each other to open the door, each door section remaining substantially in the same plane during said pivotal movement.

Preferred features of the door structure are set out in the associated dependent claims attached hereto.

According to a second aspect of the present invention there is provided a gutter comprising an elongate member which defines in cross-section a partially enclosed shape having a lengthwise extending opening in an upper region thereof, the elongate member providing a lengthwise extending bearing surface at one side of the opening against which surface, in use, a marginal portion of a roof section engages to direct liquid into the gutter, the elongate section being closed at both ends to define a water reservoir.

Preferred features of the gutter are set out in the associated dependent claims attached hereto.

According to a third aspect of the present invention there is provided a panel building system comprising at least one elongate

structural member each of which defines in cross-section a track portion having a constant profile along its length, said track portion receiving and retaining a number of panel receiving strips interspersed with bar receiving connectors, the strips and the connectors each having a formation shaped for slidable insertion into said track portion.

Preferred features of the panel building system are set out in the associated dependent claims attached hereto.

The invention also provides a garden building such as a greenhouse or a shed incorporating the above described door structure and/or gutter and/or panel building system.

Embodiments of the present invention will now be described by way of example with reference to the accompanying drawing in which:-

Figure 1 shows in perspective a greenhouse incorporating a door structure according to the present invention in a closed condition,

Figure 2 illustrates the door structure in an open position,

Figure 3 is a perspective view of a structurally integral rainwater guttering tube according to the present invention,

Figure 4 is a perspective view of a structurally integral rainwater down pipe,

Figure 5 is a perspective view of a corner ballast pod,

Figure 6 is a perspective view illustrating ballast base sections,

Figure 7 illustrates a wheel attached for moving the greenhouse,

Figure 8 is a perspective view of a suspended rainwater reservoir,

Figure 9 is an exploded perspective view including details of a preferred door structure according to the present invention,

Figure 10 is a side view of a closed door structure according to the present invention,

Figure 11 shows the figure 10 door structure in an open condition,

Figure 12 is a side view of an alternative door structure in a closed condition,

Figure 13 shows the figure 12 door structure in an open condition,

Figure 14 is a perspective view of a panel building system according to the present invention in mid-assembly,

Figure 15 is a side view of a base structural member and bar-receiving connector of figure 14,

Figure 16 is a rear perspective view of the bar-receiving connector used in figure 14,

Figure 17 is a perspective view of a glazing bar used in figure 14,

Figure 18 is an end view of a glazing strip including a glazing panel,

Figure 19 is a vertical section through a gutter according to the present invention,

Figure 20 is another vertical section through the figure 19 gutter but with the roof section omitted, and

Figure 21 is another vertical section through the figure 19 gutter attached to structural members of a garden building.

Referring initially to figure 1 there is shown a building which in this embodiment is a greenhouse 10 comprising two ends 11, a vertical low side 12, a high side angled away from the low side 12 and a convex curved roof 15. Rainwater can run down the curved roof 15 and into an integral gutter tube 17 via holes 16 (figure 3). The gutter tube 17 can act as a water reservoir or can divert the water into integral structural down pipes 18 and into water butts (not shown) via outlets 19 (figure 4) or into an optional rainwater reservoir 20 (figure 8) which can feed an irrigation drip feed system 21. The gutter 17 and the down pipes are structural members of the greenhouse.

Figure 2 shows that in one end 11 of the greenhouse is a pivot door 22 having a first door section 22a and a second door section 22b. Further details of this will be described later. The first door section is pivoted at its bottom corner at 24 and the second door section 22b is

pivoted at its top corner 24. When handle 23 is pushed to the right as in figure 2 the two door sections pivot and open because they are preferably joined by a suitable linkage (see later). Movement of the handle 23 and first door section 22a back to the left closes the door 22.

Ventilation of the greenhouse 10 can be achieved in a number of ways. One possibility is by way of lateral twist louvre vents 25 indicated in figure 1.

In some circumstances, ballast may be required particularly if the greenhouse is not secured to the ground. Two corner ballast pods 26 are shown in figure 1 and these may be removable as indicated in figure 5. The pods can be filled with any suitable material such as sand, concrete or water. Also, base sections 27 of the greenhouse frame may be hollow for receiving ballast (figure 6). For example, bricks could be slid into the hollow base sections 27.

In some arrangements it is possible to add wheels 28 to some or all corners of the greenhouse to make it possible to move the greenhouse as desired. This is illustrated in figure 7.

In some arrangements, optional roof tensioning cables or rods 29 are connected to the base sections 27 at the low side 12 and to roof bar togs 30 as shown in figure 1. Also, the greenhouse frame comprises two angled corner masts 31 extending from the corner of the base 27 to provide a frame for the angled high side 14. The masts 31 can pass through the roof 15 to be topped with mast caps 32.

Both the low side 12 and the high side 14 are each held in 90 degree rectangular shape by side tension cables 33 with adjusters 34, which cables connect from the corners to a central tie ring 35.

The major surfaces of the sides, end and roof of the greenhouse are ideally formed from panels made of any suitable material such as glass, wood, plastic, metal and may be clear/semi-transparent/opaque either wholly or in various combinations depending on the end use of the

building. The use of the term greenhouse herein should not be considered limiting and can include sheds and other forms of garden building.

Figure 9 illustrates in more detail a suitable door structure 40. The door structure 40 comprises first and second door sections 22a and 22b. The first door section 22a has the shape of a segment of a circle and has inner and outer straight side edges 41, 42 and a part circular top edge 43. Corner reinforcements 44 are provided at the three corners. The second door section 22b has the shape of a right-angled triangle and has a short side 45, a long side 46 and a hypotenuse 47. Again, corner reinforcements 44 are provided. The hypotenuse 47 and the inner straight side 41 constitute meeting portions and, when the door is closed, abut one another.

The door sections 22a, 22b are mounted in a door frame comprising first and second uprights 48, 49 and a base track 50 secured at each end to the uprights 48, 49. The first door section 22a is pivotally secured in the region of its apex 51 to the first upright 48 by means of a bolt 52. If the first door section 22a is pivoted clockwise about the bolt 52 then it moves from its closed position to an open position. In the finished greenhouse the top edge 43 of the first door section will be received in an arcuate guide channel 53 which is shown in figures 10 and 11.

The second door section 22b is pivotally secured in the region of its apex 54 between the long side 46 and the hypotenuse 47 with respect to the second upright 49 by means of another bolt 55 which extends through an elongate guide slot 56 in a bracket member 57 which is secured to the second upright 49. This enables the second door section 22b to pivot and translate relative to the second upright 49. At the bottom apex 58 between the short side 45 and the hypotenuse 47, a roller 59 is pivotally mounted. The roller 59 has a circumferential groove which

receives a raised bead 60 provided by the base track 50. If the second door section 22b pivots clockwise about the bolts 55, the roller 59 rolls along the bead 60 and the bolt rises in the guide slot 56. This allows the second door section to move from its closed position to an open position.

The two extreme positions of the door are illustrated more clearly in figures 10 and 11 except in this illustrated embodiment the guide slot 56 is provided on the second door section 22b and the bolt 55 remains fixed relative to the second upright 49.

A simpler version is illustrated in figures 12 and 13 where the guide slot 56 has been omitted. Both door sections 22a, 22b simply pivot about the bolts 52, 55. The vertical travel of the bottom apex 58 of the second door section 22b however means that a raised base section 27 must be provided across the doorway in order to close the bottom gap when the door is closed. This means that the user has to step over the base section 27 in order to access the greenhouse.

Returning to figure 9 there is also illustrated a linkage connecting the two door sections 22a, 22b such that opening and closing of the first door section 22a automatically opens the second door section 22b. This is achieved by a cable 61 which is attached to the top corner of the inner straight side edge 41 of the first door section 22a. The cable 61 passes around an upper pulley wheel 62 rotatably secured at the top of the second upright 49 and a lower pulley wheel 63 rotatably secured at the bottom of the second upright 49. Suitable notches 64 are made in the second upright 49 to enable passage of the cable 61. The other end of the cable 61 is secured to the second door section in the region of its bottom apex 58.

The door sections 22a, 22b preferably have handle means attached in the region of the middle of the meeting edges. The handle means may have one portion on one door section and another portion on the other door section. The handle portions could be lockable together either with

an integral lock or by using an external locking device such as a padlock passing through adjacent openings in the two handle portions.

Releasable catch means (not shown) are also provided to keep the door sections 22a, 22b either fully open or in one of a number of partially open positions.

The closing of the door sections can be by means of a damped, self-closing mechanism (not shown). This mechanism may involve the gravity closing of the doors having to work against a spring or a weight or friction or a combination of any of these.

Returning to the general form of the building, figures 14 to 18 shows the construction of a base frame member 70 and an associated glazing bar 71 and glazing strip 72. In cross-section, the base member 70 has a base 73, an upright section 74 and a top portion 75 and is ideally formed as an extrusion. The top portion 75 provides a lengthwise track portion 76 for slidably receiving a number of alternate glazing strips 72 and glazing bar connectors 77 to which the glazing bars 71 are connected.

The track portion 76 comprises an upward facing restricted opening 78 which opens into an enlarged internal space having lateral channels 79. The top portion 75 also has a lengthwise, upward facing recess 80 and an outwardly facing lateral recess 81 on its inner side.

Each glazing strip 72 and connector 77 has a formation 82 shaped to be slidably received within the track portion 76. Each formation essentially has a short leg section 83 (either a single broad leg or two spaced legs) which is received in the opening 78 of the track portion and a pair of laterally extending feet 84 which are received in the respective channels 79 behind the opening 78. The connector also has a laterally extending inward extension 85 terminating in a hook 86 which engages in the lateral recess 81 of the base member 70, and an outward extension 87 terminating in a upright trim strip 88 which engages around

the outer corner at the junction of the upright section 74 and the top portion 75 of the base member 70.

The glazing strip 72 has a similar outward extension 87 terminating in a glazing panel abutment surface/trim strip 88. The glazing strip has an angled resilient arm 89 with a curved lead-in 90 which holds a glazing panel 91 against the abutment surface 88.

Upstanding from the main surface of the connector 77 is a clip projection 92 over which the glazing bar 71 fits by way of correspondingly shaped recess 93. The glazing bar 71 also has a planar front face 94 with lengthwise seals inserted in grooves 95 on the rear surface thereof. The projection 92 also has a through hole 96 for receiving a peg (not shown) which also passes through holes (not shown) formed in the walls of the glazing bar. Alternative securing means are of course possible.

During assembly, glazing strips 72 of appropriate length with connectors 77 at appropriate intervals are inserted into the track portion 76. Each connector 77 can be fixed to the base member 70 by means of screws engaged in side slots 98 in the connector and securing in the upward facing recess 80 of the base member 70. The glazing bars 71 can then be pressed over the projections 92 of the connectors 77. The other ends of the glazing bars 71 can be attached to further connectors 77 engaged in a similar track portion 76 on another structural member of the building. The glazing panels 91 can then be inserted into the glazing strips 72 and into abutment with the seals on the glazing bars 71.

It will be appreciated that other panels could be used instead of the glazing panels 91. The other panels could therefore be opaque or a mixture of opaque/transparent sections depending on the end use of the building.

Figures 19 to 21 show preferred forms of gutter tube 17 for the low side 12 of the building. The gutter tube 17 is formed with a part-

circular section having a G-shape. The cross part of the G is in the form of a lengthwise extending, outwardly projecting bearing surface 100 against which the roof glazing bars 101 and glazing panels 102 sit. In the embodiment shown the roof glazing bars 101 are of inverted T shape in cross section with the glazing panels engaging the lateral flanges 103 of the T.

The glazing panels 102 and bars 101 project into the gutter tube. The ends of the gutter tube 17 are fitted with sealing caps (not shown) so that the gutter tube 17 essentially forms a reservoir for rainwater flowing down the roof.

At about the level of the bearing surface 100 an overflow pipe 104 is provided. This can direct water into drains or preferably water butts either directly via a hose attached to adaptor 105 or even via the structural down pipes 18 shown in figure 1. Also, a connection (not shown) could be made to the gutter at a location inside the greenhouse to connect to the further reservoir 20 and/or to an irrigation drip feed system 21.

At the underside of the gutter tube 17 there is an integral track portion 76 similar to that on the base members 70. This enables the gutter member to be structural such that it supports and retains the upper glazing strips 72 and the upper ends of the glazing bars 71 by means of further connectors 77. The gutter tube 17 also has a pair of spaced downwardly extending lips 106 on either side of the track portion 76. These lips 106 engage therebetween the down pipes 18 at each end of the gutter.

It will be appreciated that numerous variations of the above described arrangement will be possible whilst remaining within the scope of the attached claims.

Claims

1. A door structure comprising a supporting frame and two door sections, the first door section having a first meeting portion for cooperation with a second meeting portion provided by the second door section, each door being mounted for pivotal movement with respect to the frame between a first position in which said meeting portions cooperate to close the door and a second position in which said meeting portions are spaced from each other to open the door, each door section remaining substantially in the same plane during said pivotal movement.
2. A door structure as claimed in claim 1 wherein the first door section is in the shape of a segment of a circle having two angled straight sides meeting at an apex and a part circular edge opposite said apex, the pivotal connection to the frame being in the vicinity of said apex and the first meeting portion being constituted by one of said straight sides.
3. A door structure as claimed in claim 2 wherein the part circular edge of the first door section is received in a part circular track part of the supporting frame.
4. A door structure as claimed in any one of claims 1 to 3 wherein the second door section is in the shape of a right angled triangle having a short side, a long side and a hypotenuse, the pivotal connection with the frame being at the top corner at the apex of the long side and the hypotenuse, the hypotenuse constituting the second meeting portion.

5. A door structure as claimed in claim 4 wherein the second door section has a roller at the apex between the hypotenuse and the short side.
6. A door structure as claimed in claim 5 wherein the supporting frame provides a surface along which the roller rolls.
7. A door structure as claimed in claim 6 wherein said surface comprises an upwardly projecting bead which is received in a continuous circumferentially extending groove in the roller.
8. A door structure as claimed in any one of claims 1 to 8 wherein the pivotal mounting of the second door section with respect to the frame comprises a pin and slot combination such that the second door section can translate relative to the frame in addition to pivoting, the second door section remaining substantially in the same plane during said pivotal/translational movement.
9. A door structure as claimed in claim 8 wherein the slot is provided in a bracket secured to the supporting frame.
10. A door structure as claimed in any one of claims 1 to 9 wherein the two meeting portions abut in the first positions of the two door sections
11. A door structure as claimed in any one of claims 1 to 10 wherein the movement of the two door sections is linked such that pivotal movement of the first door section automatically moves the second door section.

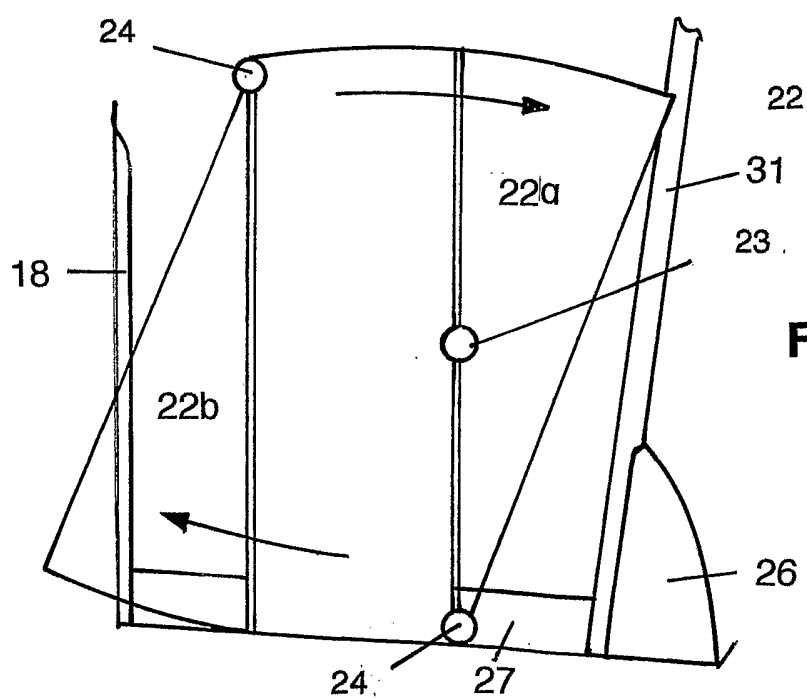
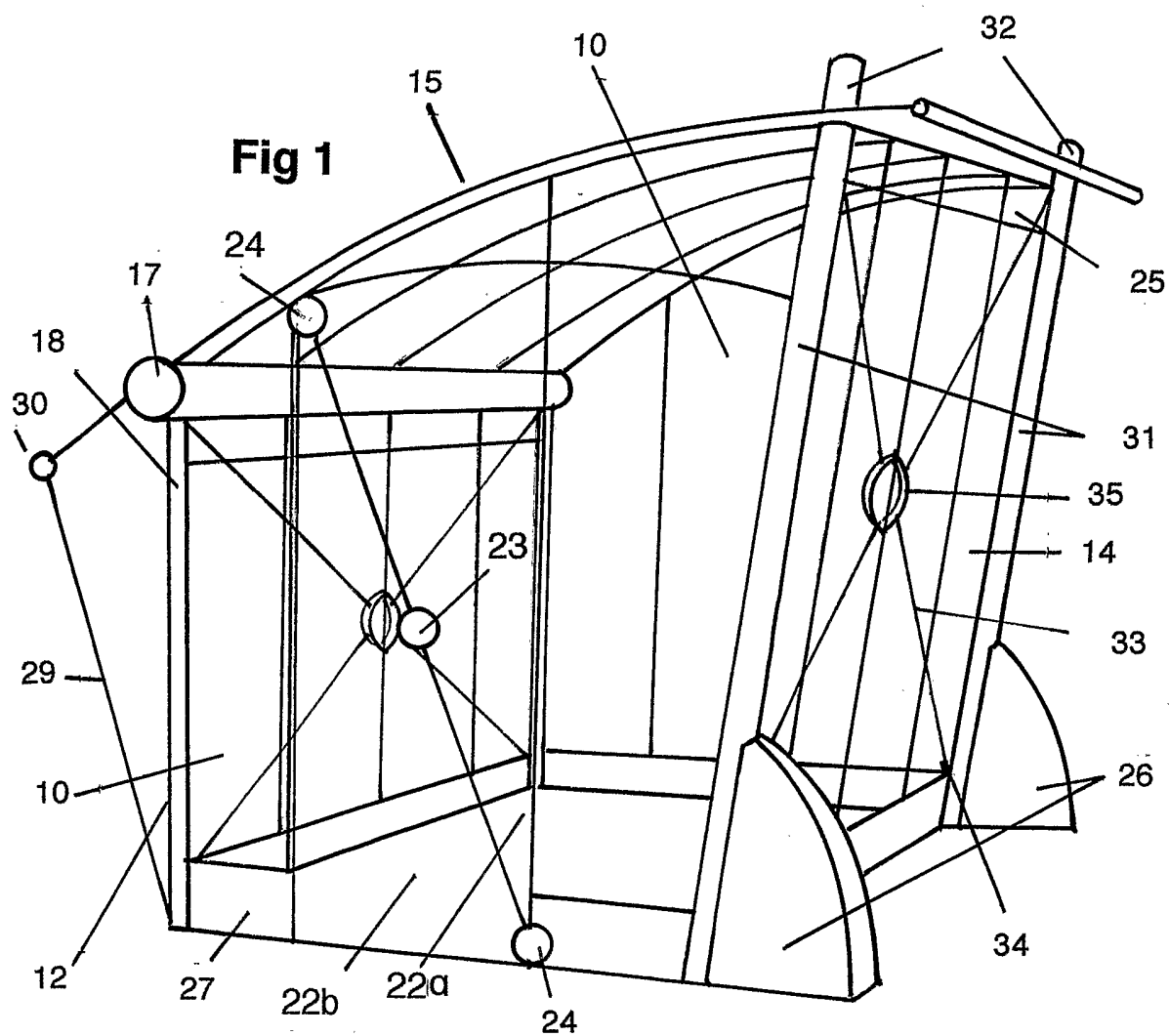
12. A door structure as claimed in claim 11 in combination with claims 2 and 4 wherein a connecting cable is attached at one end to an upper corner of the first door section and extends around pulleys to be attached at its lower end to the lower corner of the second door section adjacent the first door section.
13. A door structure as claimed in any one of claims 1 to 12 wherein the first door section is retainable in its fully open position by a releasable catch mechanism.
14. A door structure as claimed in claim 13 wherein the first door section is releasably retainable in intermediate open positions.
15. A door structure as claimed in any one of claims 1 to 14 wherein the closing of the doors is by way of a damped, self-closing mechanism.
16. A door structure as claimed in claim 15 wherein the self-closing mechanism works against a weight or a spring or friction or a combination thereof.
17. A door structure as claimed in any one of claims 1 to 16 wherein a handle mechanism is provided to facilitate manual pivoting of the door sections and to lock the door sections together in the closed condition.
18. A door structure as claimed in any one of claims 1 to 17 wherein a pull handle mechanism is attached to one or both door sections to enable a linear action to open the door sections.

19. A garden building incorporating a door structure as claimed in any of claims 1 to 18.
20. A gutter comprising an elongate member which defines in cross-section a partially enclosed shape having a lengthwise extending opening in an upper region thereof, the elongate member providing a lengthwise extending bearing surface at one side of the opening against which surface, in use, a marginal portion of a roof section engages to direct liquid into the gutter, the elongate section being closed at both ends to define a water reservoir.
21. A gutter as claimed in claim 20 wherein the bearing surface is substantially planar and projects outwardly from the elongate section.
22. A gutter as claimed in claim 20 or claim 21 wherein the partially enclosed shape is part-circular.
23. A gutter as claimed in any one of claims 20 to 22 wherein there is provided a lengthwise extending formation on the external side of the elongate member for receiving and retaining coupling members to which, in use, can be attached structural elements of a building.
24. A gutter as claimed in claim 23 wherein the gutter is, in use, a structural component of said building.

25. A gutter as claimed in claim 23 or claim 24 wherein said formation has a lengthwise extending, outwardly facing slot behind which is an enlarged space, said coupling members being slidable along the formation into position.
26. A gutter as claimed in any one of claims 20 to 25 wherein an overflow opening is provided at about the level of the bearing surface.
27. A gutter as claimed in any one of claims 20 to 26 wherein an openable tap is provided in the elongate member to enable selective use of liquid in the water reservoir or to connect to a drip feed system.
28. A gutter as claimed in any one of claims 20 to 27 wherein the elongate member is an extrusion and sealing end caps are provided to close both ends of the gutter.
29. A garden building incorporating a gutter as claimed in any one of claims 20 to 28 and comprising a roof section engaging the bearing surface of the gutter.
30. A garden building as claimed in claim 29 in conjunction with claim 25 and further comprising a number of coupling members engaged in the external formation of the elongate member and a corresponding number of structural elements of the garden building.

31. A panel building system comprising at least one elongate structural member each of which defines in cross-section a track portion having a constant profile along its length, said track portion receiving and retaining a number of panel receiving strips interspersed with bar receiving connectors, the strips and the connectors each having a formation shaped for slidable insertion into said track portion.
32. A panel building system as claimed in claim 31 wherein the track portion is constituted by an outwardly facing opening in a main surface of the structural member and an enlarged internal space behind the opening.
33. A panel building system as claimed in claim 33 wherein the enlarged internal space of said track portion includes a lateral channel on each side of the opening.
34. A panel building system as claimed in claim 33 wherein the formation provided on each connector and strip incorporates a leg portion terminating in a pair of laterally extending feet for receipt in the respective lateral channels with the leg portion being disposed in the opening of the track portion.
35. A panel building system as claimed in claim 34 wherein the or each connector has a projection extending oppositely away from the formation for receiving a bar.
36. A panel building system as claimed in claim 35 wherein the or each projection has connection means for retaining the bar thereon.

37. A panel building system as claimed in claim 35 or claim 36 wherein the bar is a glazing bar, the panels are glass or other transparent/semi-transparent material and the panel receiving strips are glazing strips.
38. A panel building system as claimed in any one of claims 32 to 37 wherein the main surface has a lateral extension terminating in a lengthwise extending trim strip which engages over an adjacent corner of the structural member.
39. A panel building system as claimed in any one of claims 31 to 38 wherein the structural member includes a lengthwise extending recess for receiving one or more retaining screws associated with the or each of the connectors.
40. A panel building system as claimed in any one of claims 31 to 39 wherein one of the elongate structural members is a gutter as claimed in any one of claims 20 to 28 in conjunction with claim 23.
41. A garden building having one substantially vertical side wall, one higher side wall spaced from and angled away from the vertical side wall, a first end wall and a second end wall and a convexly arcuate roof.
42. A garden building as claimed in claim 41 incorporating a door structure as claimed in any of claims 1 to 18 and/or a gutter as claimed in any of claims 20 to 28 and/or a panel building system as claimed in any of claims 31 to 39.



2/9

Fig 3

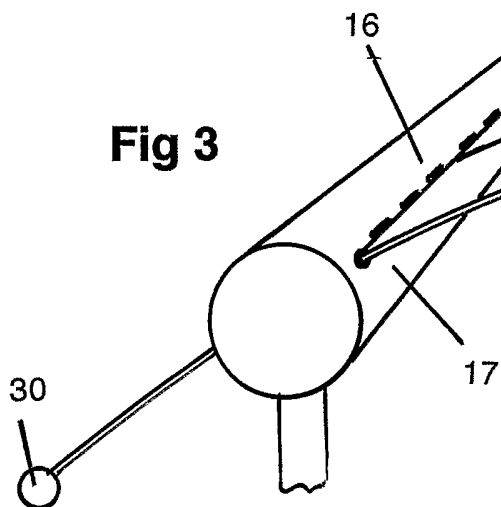


Fig 4

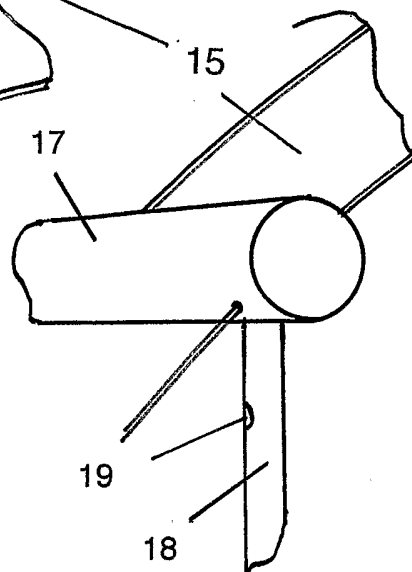


Fig 6

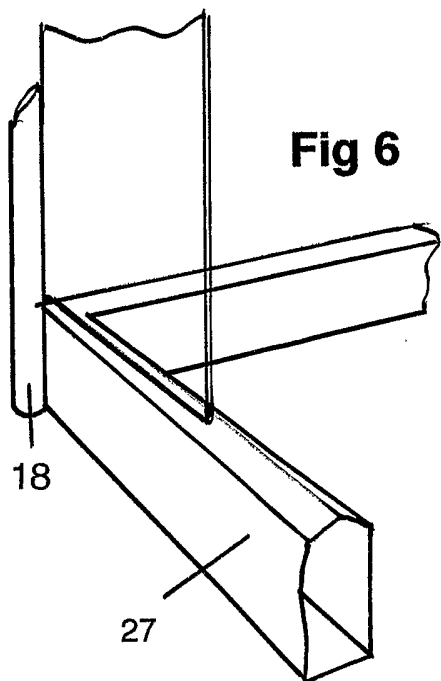


Fig 5

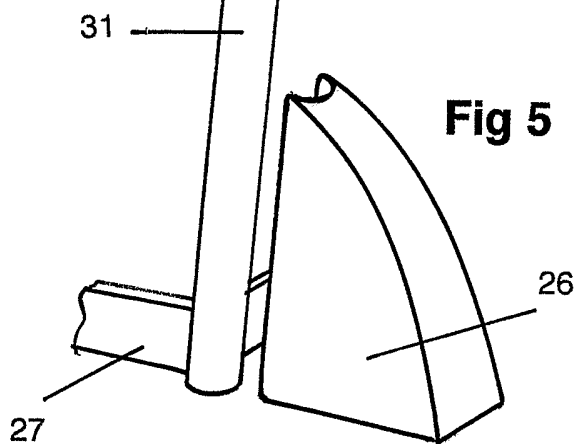


Fig 7

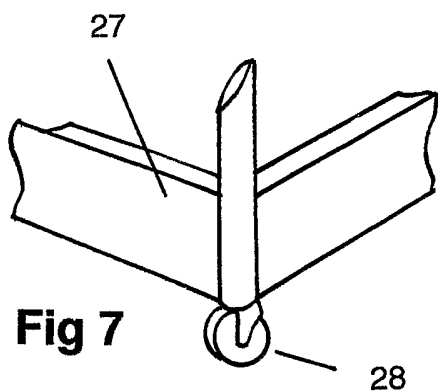
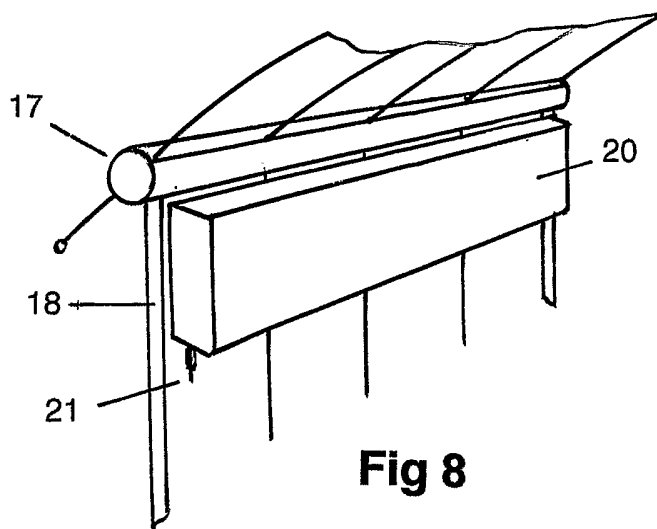
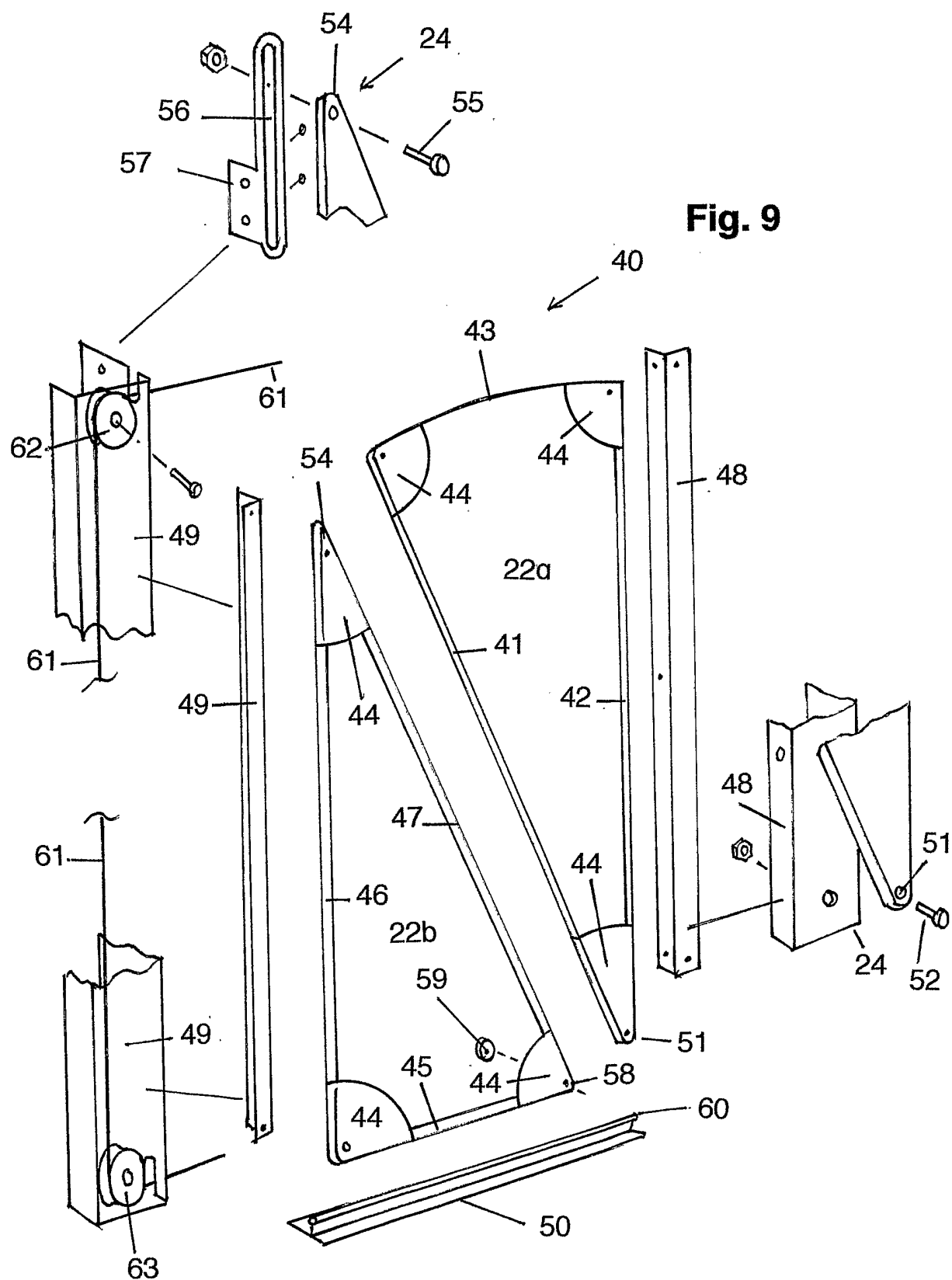


Fig 8



3/9



4/ 9

Fig. 10

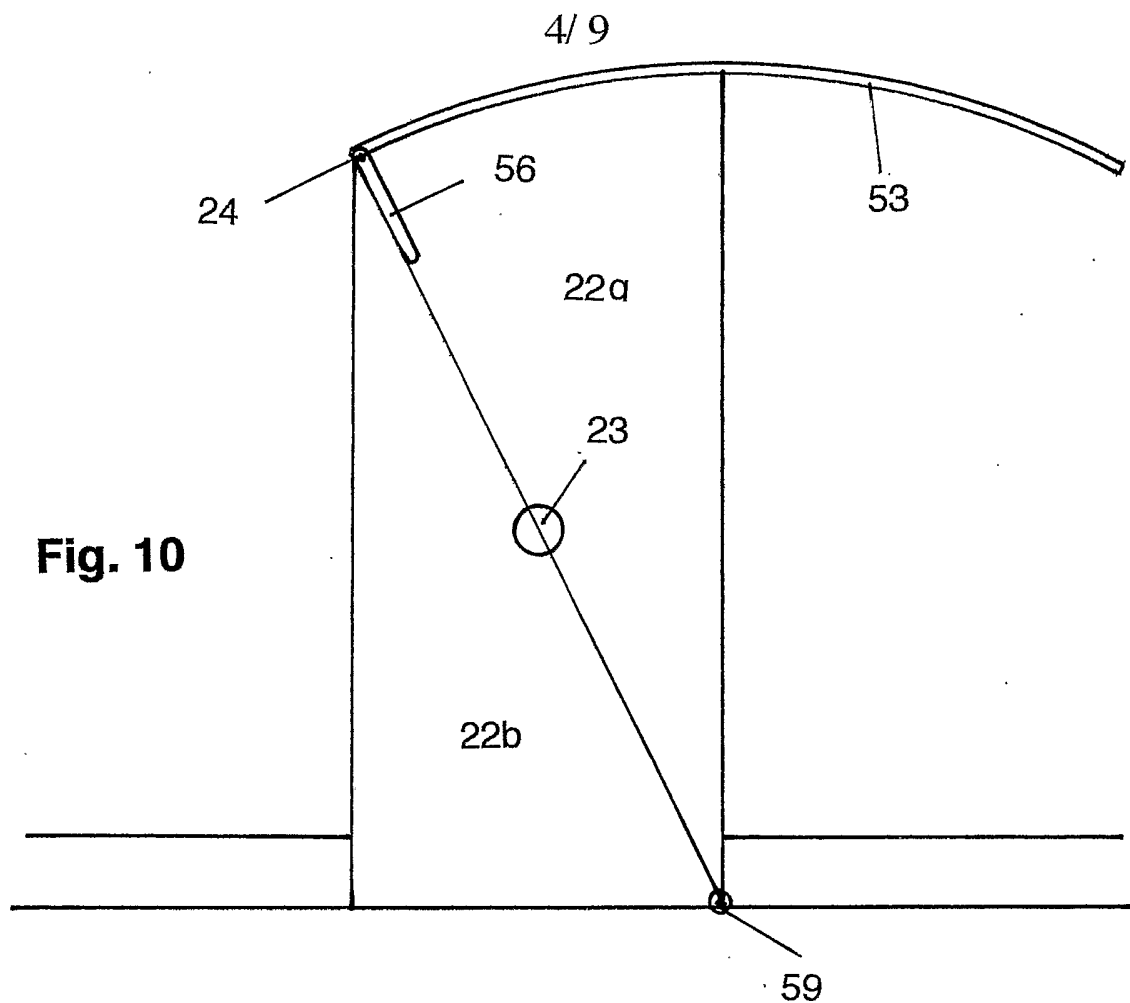
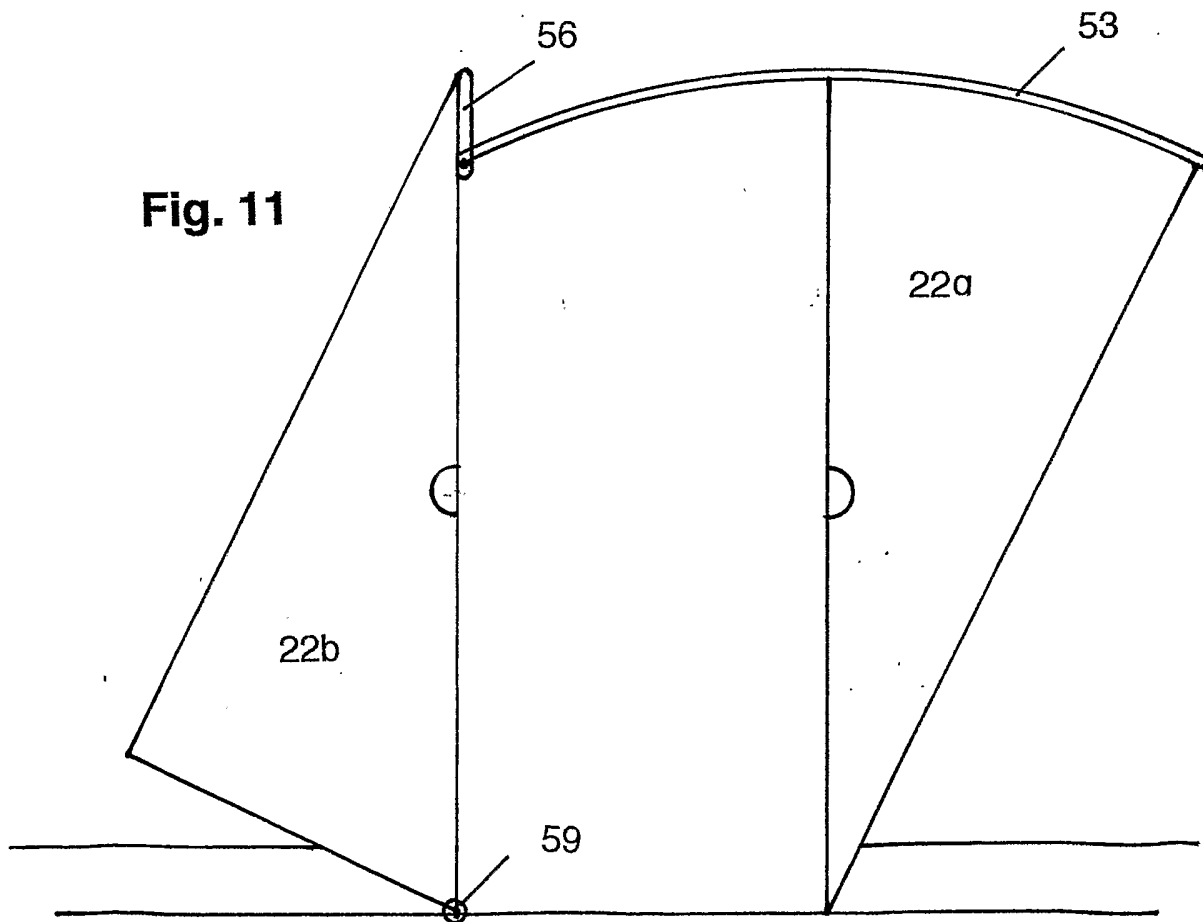


Fig. 11



5/9

Fig. 13

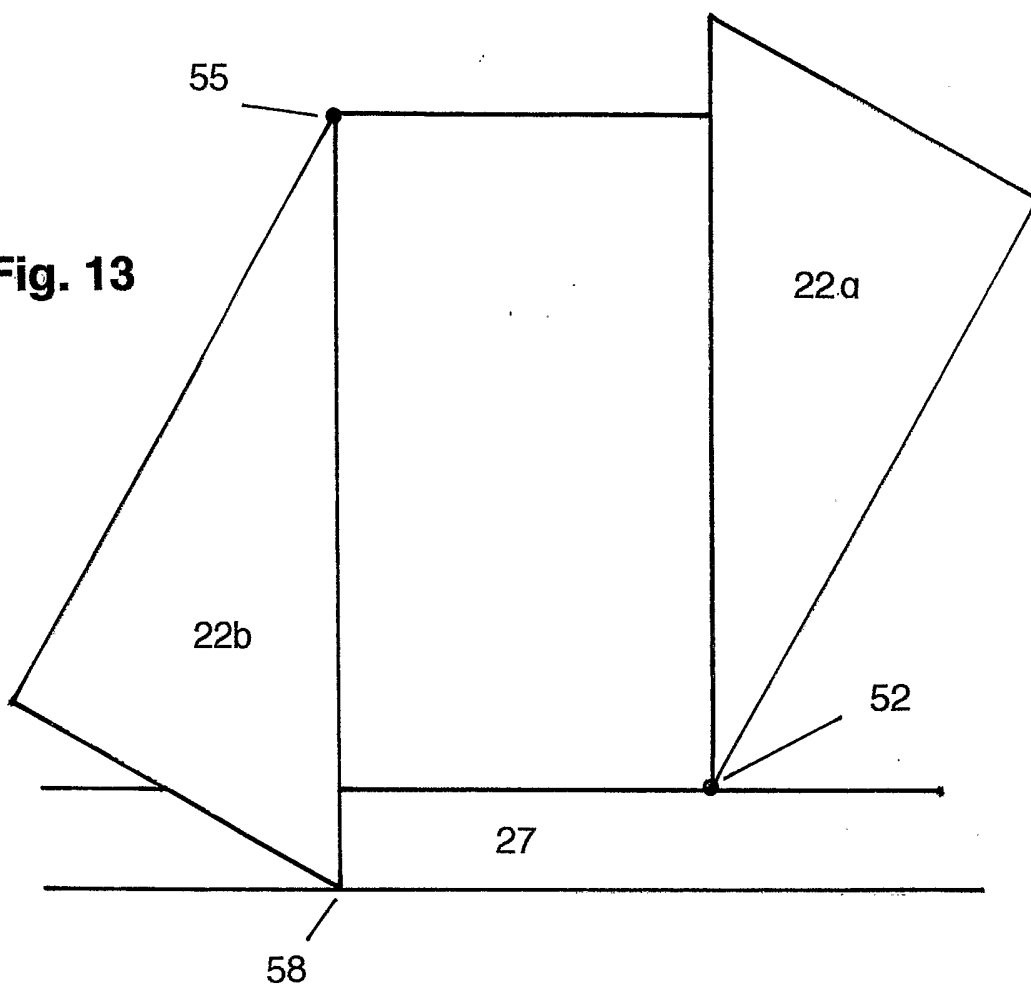
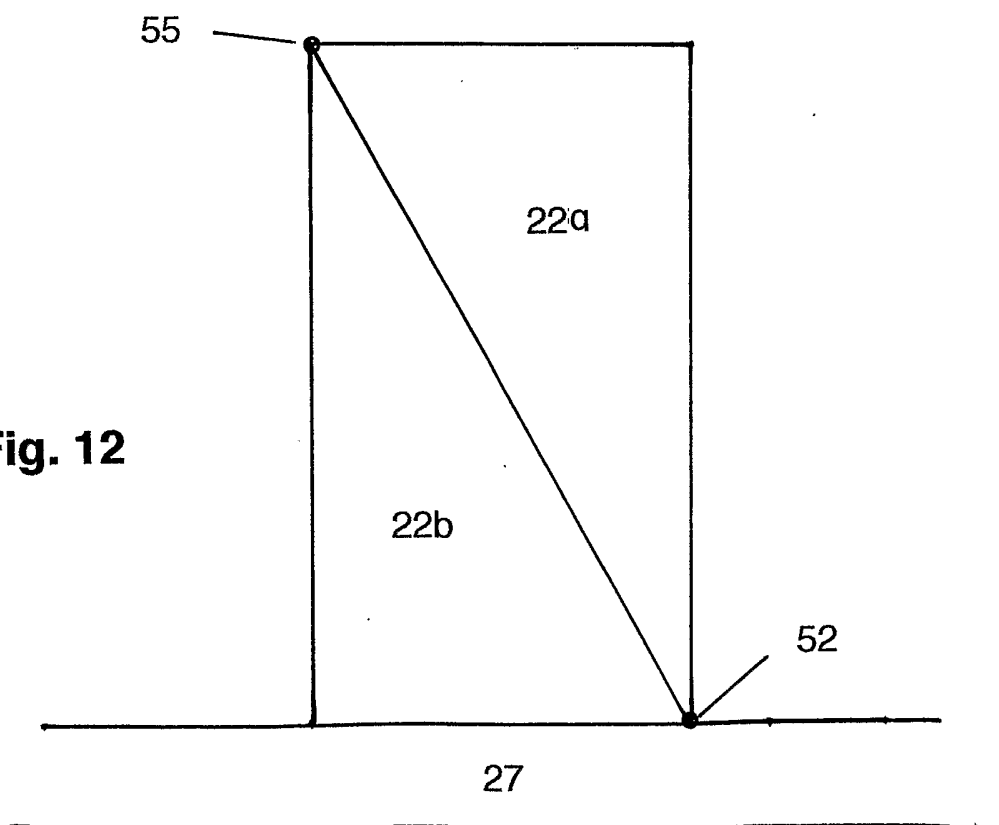


Fig. 12



6/9

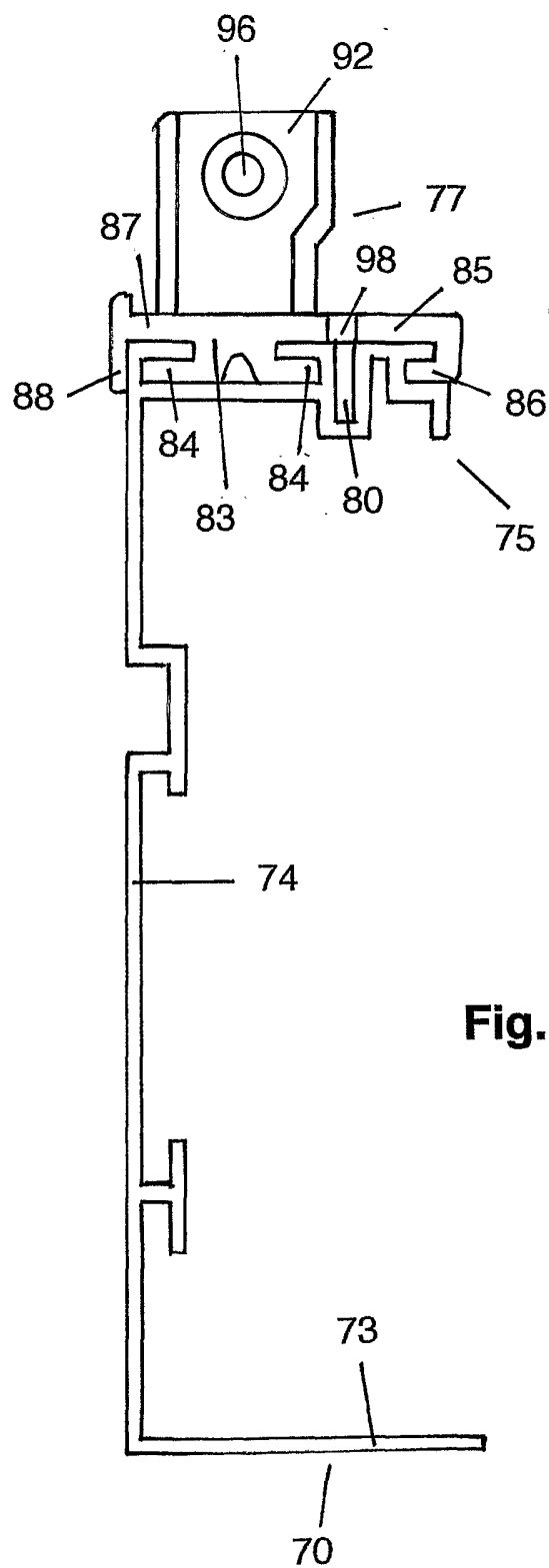


Fig. 15

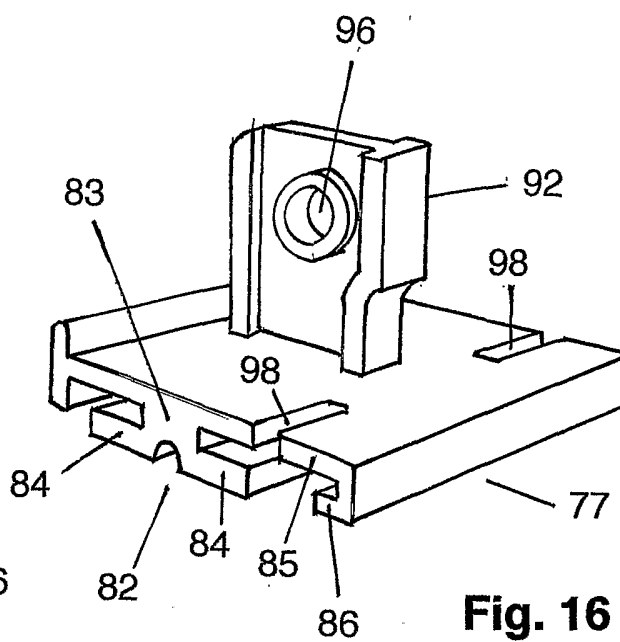
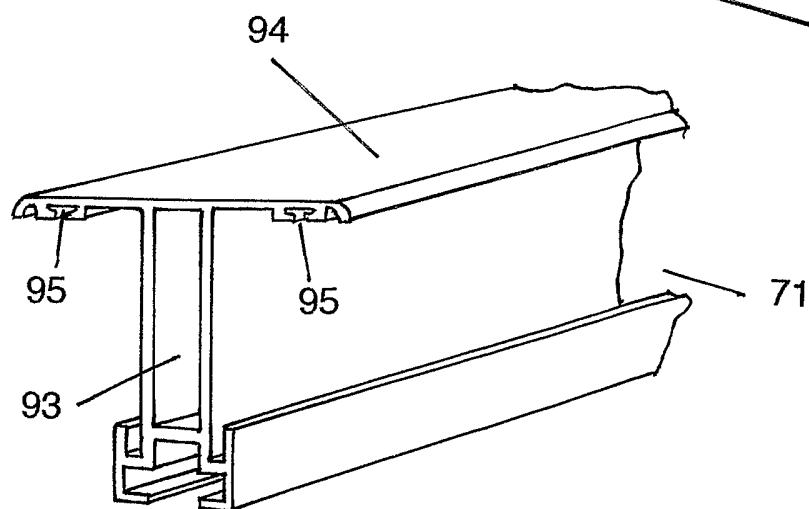
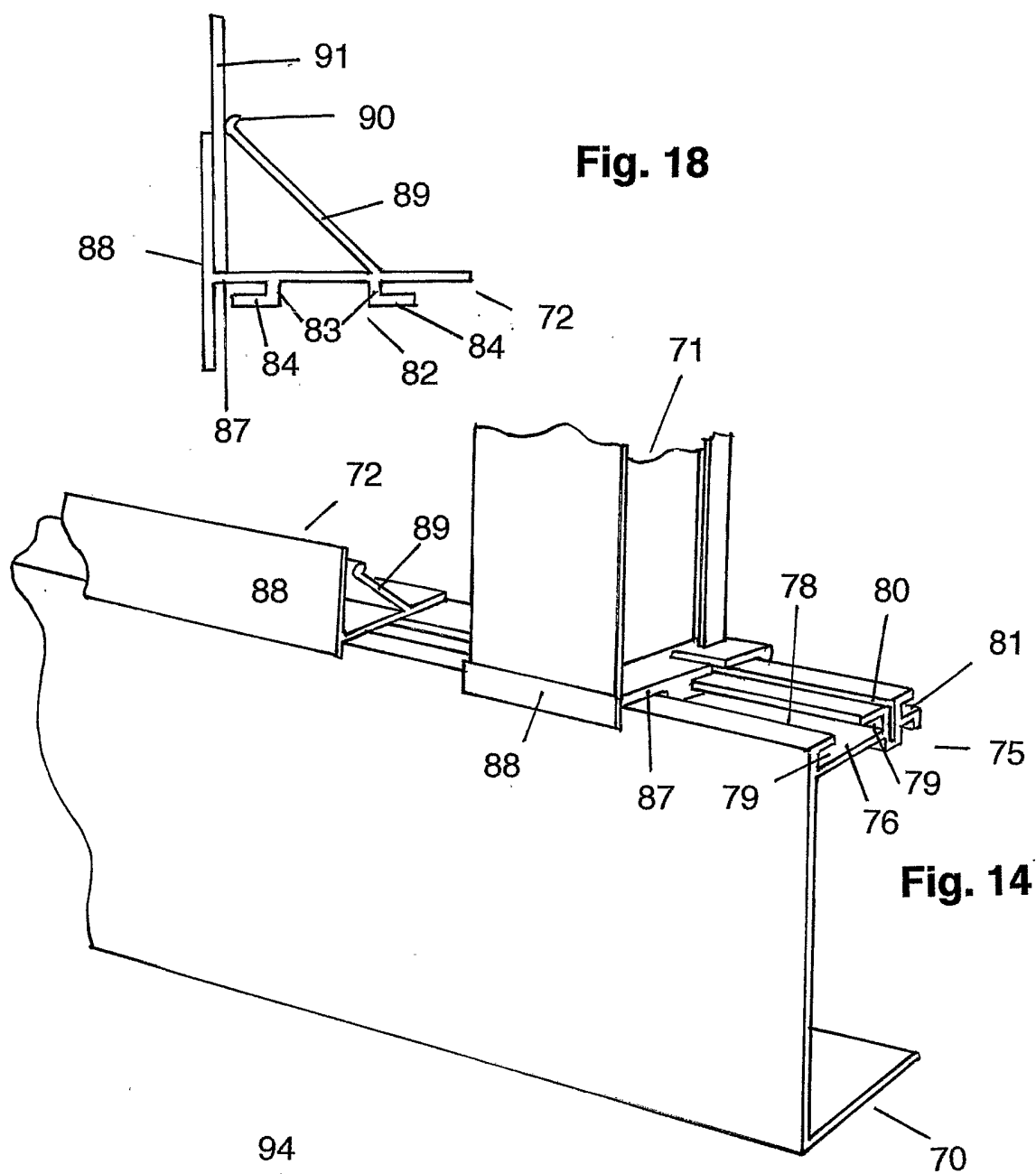


Fig. 16



8/9

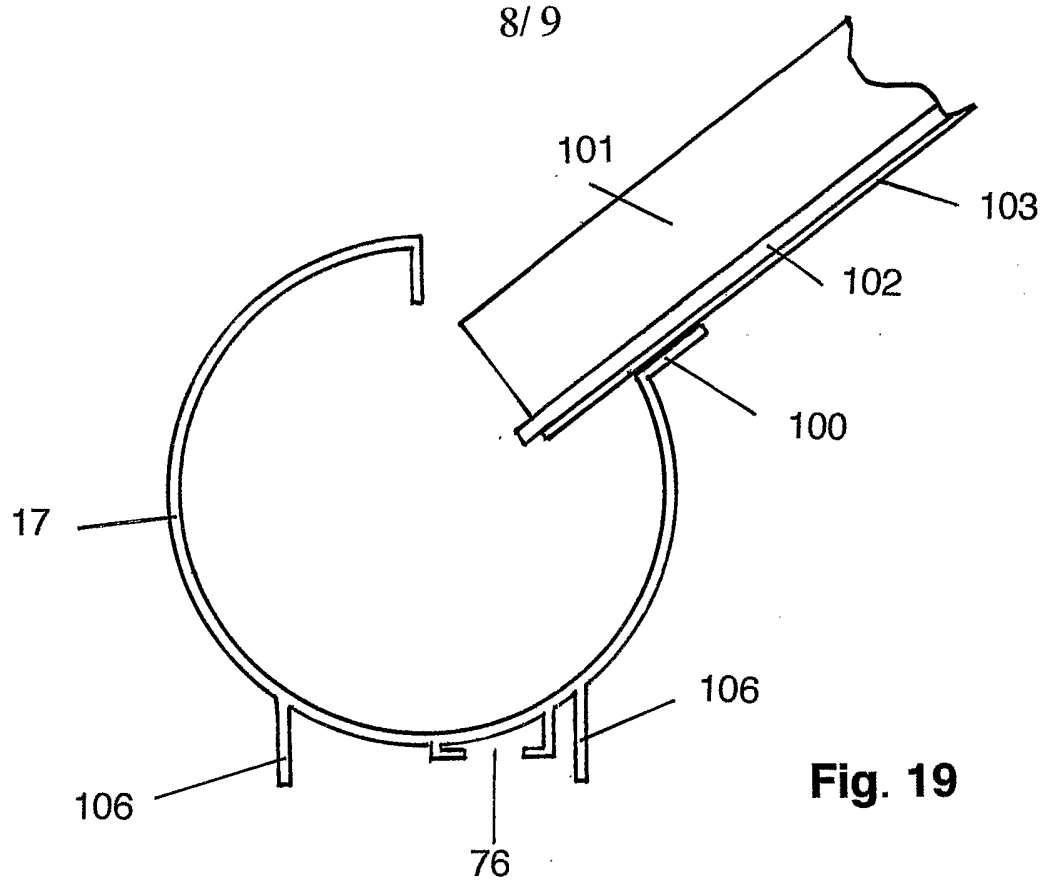


Fig. 19

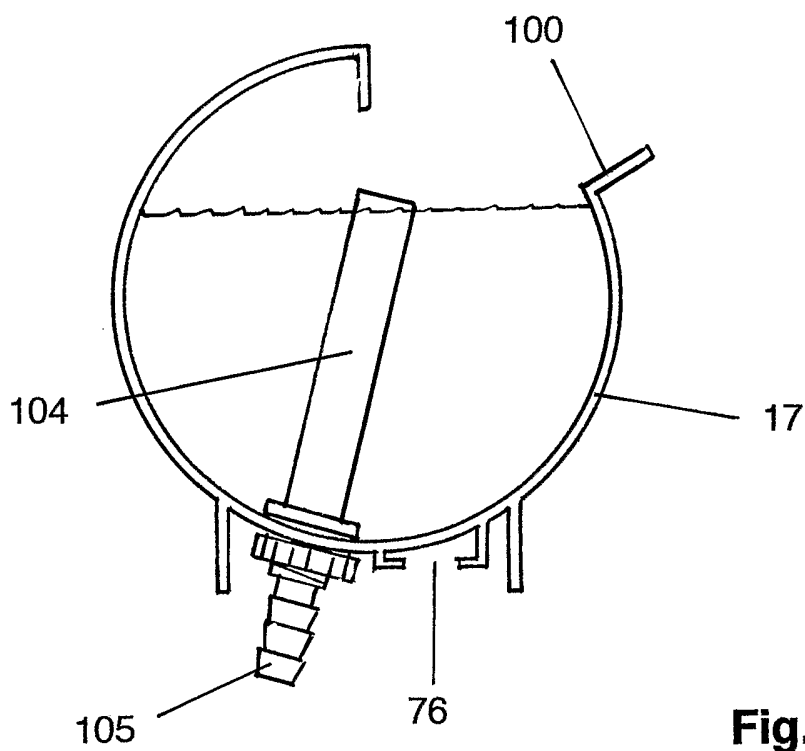


Fig. 20

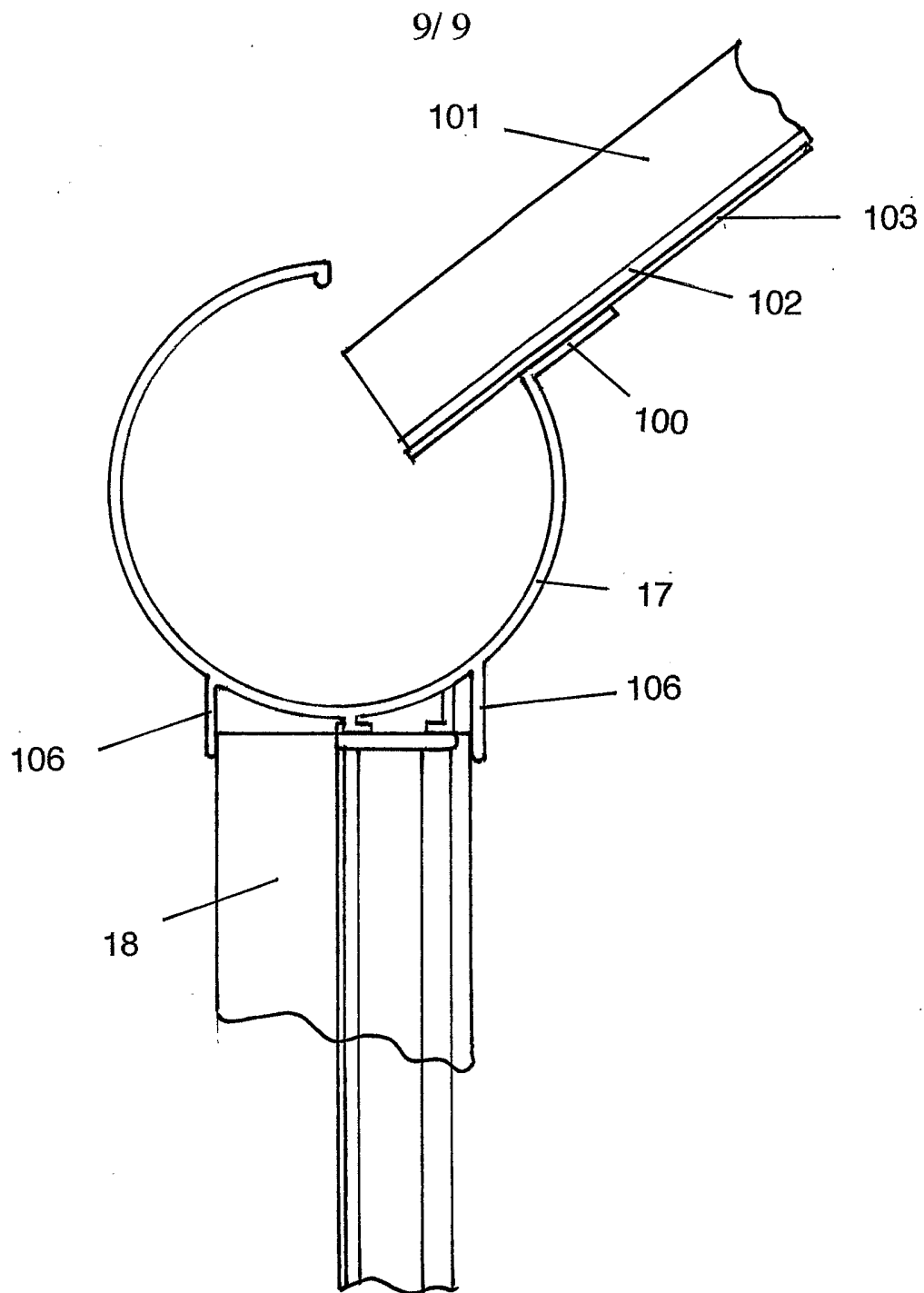


Fig. 21