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(54) Panel framing assembly

(57) A panel framing assembly (1) comprising a polygonal, substantially flat panel (3), a plurality of elongate peripheral frame members (5, 7, 9, 11) each having a cross-sectional shape defining a channel (27) in which a perimeter edge of the panel (3) is received, a plurality of corner connectors (19) each engaging a longitudinal end of two adjacent frame members (5, 7, 9, 11), the frame members and corner connectors forming a polygonal frame, the channel (27) defined by each of the frame members (5, 7, 9, 11) including a flexible wall (31) adapted to accommodate and engage the panel (3), whatever the thickness of the panel or its coverings and/or backings.

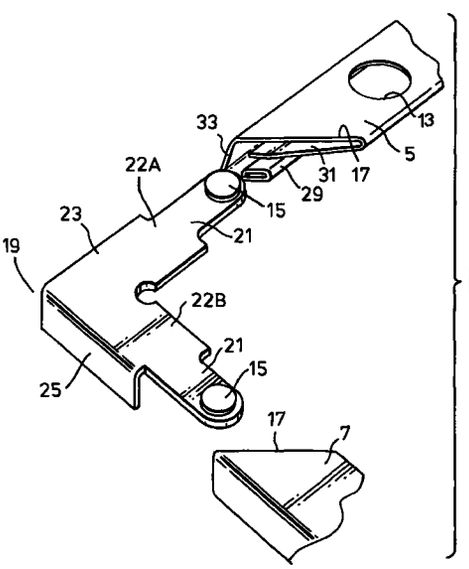

Fig.4.

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Description

This invention relates to an assembly for framing a panel, such as picture frame, mirror frame and like devices for displaying panels.

Frames and other panel displaying devices are often made so that they can be taken apart to enable an item, accommodated and displayed therein, to be exchanged for another item. Although several assemblies for framing panels have been proposed which would allow such exchanges, such assemblies have not always been easy and cost-effective to produce.

According to this invention, a framing assembly for a polygonal, substantially flat panel is provided comprising: a plurality of elongate peripheral frame members, each having a cross-sectional shape defining a channel in which a perimeter edge of the panel can be received; and a plurality of corner connectors, each engaging a longitudinal end of two adjacent frame members; the frame members and the corner connectors forming a polygonal frame; characterized by the channel of each frame member including a flexible wall adapted to accommodate and engage one or a plurality of thicknesses of the panel. Thereby, the same framing assembly can be used to display different thicknesses of one or more panels of the same or different thicknesses.

Further aspects of the invention will be apparent from the detailed description below of particular embodiments and the drawings thereof, in which:

Figure 1 shows a front view of a panel framing assembly of this invention;
Figure 2 shows a rear view of the assembly of Figure1;
Figure 3 shows a front perspective view of a corner connector for use with the assembly of Figures 1 and 2;
Figure 4 shows an exploded, rear perspective view of the corner connector of Figure 3, with the ends of the two adjacent frame members of the assembly of Figures 1 and 2, connected to the corner connector;
Figure 5 shows an enlarged partial cross-sectional view, taken along line V-V in Figure 2;
Figure 6 shows an elongate profile of constant cross-section, suitable for cutting into individual frame members of the assembly of Figures 1 and 2;
Figure 7 shows a front view of another embodiment of a panel framing assembly of this invention;
Figure 8 shows a rear view of the assembly of Figure 7;
Figure 9 shows a front view of another embodiment of a corner connector for use with the assembly of Figures 7 and 8;
Figure 10 shows a side view of the corner connector of Figure 9;
Figure 11 shows a rear view of the corner connector of Figure 9;
Figure 12 shows another side view of the corner connector of Figure 9;
Figure 13 shows a side view of an individual framing member of the assembly of Figures 7 and 8;
Figure 14 shows an enlarged cross-sectional view, taken along line XIV-XIV in Figure 8; and
Figure 15 shows an exploded rear view of the assembly of Figures 7 and 8.

In the Figures and the following description, corresponding parts of the alternative embodiment of the invention shown in Figures 7-15 are referred to by reference numerals which differ by "100" from those of the panel framing assembly shown in Figures 1-6.

Figure 1 shows the front of a rectangular panel framing assembly 1 of this invention. The assembly 1 includes a rectangular sheet or panel 3 facing its front and four peripheral frame members 5, 7, 9 and 11. The panel 3 can be, for example, a picture with or without a conventional superimposed glass panel and/or a conventional stiff backing panel. The panel 3 thus can be single panel or a plurality of superimposed panels.

At least the outer panels, i.e., front and back panels, of a plurality of superimposed panels 3 in the assembly 1 should have substantially the same shape and dimensions. Intermediate panels need not be of the same dimensions. This is often the case if the assembly 1 is used as a picture frame.

The panel 3 in the assembly 1 can also be a single panel 3, such as a mirror, black board or the like.

Figure 2 shows the reverse or back side of the panel framing assembly 1 of Figure 1. The panel 3 can be provided on its reverse side with means (not shown) to support the assembly 1 from a vertical surface or on a horizontal surface. Alternatively such support means can be provided on one or more of the frame members 5, 7, 9 and 11. Such support means in the form of loops, eyelets or legs are well known and their selection and placement are not critical to the panel framing assembly of this invention.

Also shown in Figure 2 are a plurality of openings 13, preferably circular openings, in the horizontal and vertical frame members 5, 7, 9 and 11, and located in each opening 13 is a protrusion 15, preferably a cylindrical protrusion, of a corner connector, engaging the opening 13. The corner connector, which will be described below, connects and holds the mitred ends 17 of the frame members together in the assembly 1.

Figure 3 shows the front of one of the corner connectors 19 connecting the frame members 5, 7, 9 and 11. The corner connector 19 is generally L-shaped with extensions 21 projecting perpendicularly to one another from the ends of the legs 22A and 22B of an L-shaped central body 23. The front of each leg 22A and 22B of the central body 23 is provided with a pair of upstanding, frontally-extending flanges 25 that are also perpendicular to one another and are adapted to engage the interior of the frame members as shown in Figure 4.

Figure 4 is an exploded view of the rear of the left hand corner of the panel framing assembly 1 as shown in Figure 2. The corner connector 19 connects and holds together the mitred ends 17 of frame members 5 and 7. In this regard, the rear of each leg 22A and 22B of the central body 23 is provided with a pair of the upstanding, rearwardly-extending protrusions 15 which engage the openings 13 in the frame members 5 and 7. The extensions 21 of the legs 22A and 22B of the central body 23 of the corner connector 19 preferably can be flexed relative to the central body 23 to allows the assembly 1 to be easily disassembled, for example for shipping the assembly and for changing the panel 3. Preferably, each protrusion 15 is cylindrical and fits closely within a circular opening 13, but other forms of matching detents and apertures can used instead, such as a kinematic inversion with a detent element on each frame member and an engaging opening in the corner connector.

The cross-sectional shape of the bottom frame member 9 (which is identical to the cross-sectional shape of the other frame member 5, 7 and 11) is shown in Figure 5. The frame member 9 has a generally U-shaped form, defining a channel 27 opening inwardly towards the centre of the assembly 1. The channel 27 is defined by: a rim 29 at the front of the channel 27 and at the front of the assembly 1; a flexible wall 31 at the rear of the channel 27; and a web 33 at the bottom of the channel 27 and at the periphery of the assembly 1. The flexible wall 31 is formed on the free end of an inclined leg portion 35 cantilevered from an inward edge 37 of a rear wall 39 of the frame member 9. The rear wall 39 is provided, adjacent each end, with one of the openings 13 as shown in Figure 2.

Preferably, the flexible wall 31 of each frame member 5, 7, 9 and 11 is resiliently urged by the inclined leg portion 35 towards the rim 29. Suitable resilient properties can be obtained by making the frame members 5, 7, 9 and 11 from a suitable sheet metal alloy. Suitable alloys for this purpose include the aluminium alloy classified by the American Aluminium Association as AA-5050 having a H46 or H48 hardness index. Other alloys may also be used, provided that they can be shaped to form resilient frame member 5, 7, 9 and 11. Using an AA-5050 alloy of 0.5 mm thickness, frame members 5, 7, 9 and 11 with suitably resilient flexible walls 31 can be made, for example, extending frontally of their respective rear walls 39 by about 25 mm and with the inward edges 37 of their respective rear wall 39 having a radius of about 2 mm.

As also shown in Figure 5, the flexible wall 31 of the frame member 9 engages the panel 3 at a location on the rear of the panel opposite to the location where the rim 29 engages the front of the panel. The flexible wall 31 allows the channel 27 to expand rearwardly and contract frontally to accommodate and hold a single panel 3 of different thicknesses T1 and T2 or superimposed panels of different thicknesses T1 and T2. For photographs and other paper panels 3, the range of thicknesses T1 to T2 of the channel 27 preferably includes the range 4 mm to 5.3 mm.

As seen from Figure 5, the frame member 9 has a hollow interior 41 that is large enough to receive therein one of the legs 22A and 22B and its extension 21 and one of the frontally-extending flanges 25 of the central body 23 of a corner connector 19 as shown in Figures 3 and 4. In this regard, the flange 25 on the central body 23, when inserted in the interior 41 of the frame member 9, will be guided by, and abut against, the inside surface of the web 33 and the remainder of the central body 23 will lie flat against the inside of the rear wall 39 of the frame member. The protrusion 15, when inserted in the interior 41 of the frame member 9, will exit the through an opening 13 where it will hold the corner connector and the frame member together. The corner connector 19, when inserted in the frame member 9, will not interfere with the rearward movement (shown by dotted lines in Figure 5) of the flexible wall 31 when placing a panel 3 in the channel 27 of the frame member.

Preferably, the cross-section of each frame member 5, 7, 9 and 11 is continuous. Frame members of continuous cross-section can be made by conventional extrusion or roll-forming methods. Preferably, the frame members are made by roll-forming prepainted or prelaminated sheet metal coil stock to form continuous profiles 43 of predetermined lengths as shown in Figure 6. In this regard, the sheet metal coil stock can be a layered material which includes a non-metallic layer, such as a conventional lacquer, or a metallic layer, such as a foil covering. From such continuous profiles 43, individual frame members 5, 7, 9 and 11 can be cut to order to the required lengths for a panel framing assembly 1 of this invention. At the same time, the mitred ends 17 and the openings 13 are preferably cut in such frame members.

The shape of the profile 43 illustrated in Figure 6 is characterised by an elongate body of constant cross-section which includes three elongate surfaces 45, 47 and 49 that will be visible from the front of a panel framing assembly 1 made from frame members cut from the profile 43. The three faces are generally flat, two of them 45 and 47 are opposed, spaced apart and generally parallel, and the third 49 is perpendicular to the other two. One of the two opposed parallel faces 45 is relatively narrow and has a smoothly rounded longitudinal free edge or rim 29.

Figures 7-15 show another embodiment 101 of a rectangular panel framing assembly of this invention. The assembly 101 includes a rectangular panel 103 facing its front (as shown in Figure 7) and four peripheral frame members 105, 107, 109 and 111.

As shown in Figures 13 and 15, a plurality of notches 113 are provided in the rear walls 139 of the horizontal and vertical frame members 105, 107, 109 and 111 (as shown in Figure 8), and located in each notch 113 is a protrusion 115 of a corner connector 119,

engaging the notch 113. Thereby, the corner connectors 119, which will be further described below, connect and hold together the mitred ends 117 of the frame members in the assembly 101.

As shown in Figures 9-12, each corner connector 119 is generally L-shaped with extensions 121 projecting perpendicularly to one another from the ends of the legs 122A and 122B of a rectangular central body 123. The facing sides of the legs 122A and 122B are each provided with one of the protrusions 115 which extend perpendicularly to one another and which can engage the notches 113 in the frame members. The rear of the central body 123 is provided with a pair of upstanding, rearwardly-extending flanges 125 that are remote from the legs 122A and 122B, are perpendicular to one another and are adapted to engage the interior of the frame members when the corner connector 19 connects and holds together the mitred ends 17 of two adjacent frame members 105, 107, 109 and 111.

The cross-sectional shape of the bottom frame member 109 (which is identical to the cross-sectional shape of the other frame member 105, 107 and 111) is shown in Figure 14. The frame member 109 has a generally U-shaped form defining channel 127 opening inwardly towards the centre of the assembly 101 and is defined by: a rim 129 at the front of the channel 127 and at the front of the assembly 101; a flexible wall 131 at the rear of the channel 127; and a web 133 at the bottom of the channel 127 and at the periphery of the assembly 101. The flexible wall 131 is formed on the free end of an inclined leg portion 135 cantilevered from an inward edge 137 of a rear wall 139 of the frame member 109. The inward edge 137 is provided, adjacent each end, with one of the notches 113 as shown in Figure 15.

As seen from Figure 14, the frame member 109 has a hollow interior 141 that is large enough to receive therein one of the legs 122A and 122B with its protrusion 115 and one of the rearwardly-extending flanges 125 of the central body 123 of a corner connector 119. In this regard, the flange 125 on the central body 123, when inserted in the interior 141 of the frame member109, will be guided by, and abut against, the inside surface of the web 133 and the remainder of the central body 123 will lie between the cantilevered leg portion 135 and the rear wall 139. The protrusion 115, when inserted in the interior 141 of the frame member109, will exit the interior 141 through a notch 113 where it will hold the corner connector and the frame member together. The corner connector 119, when inserted in the frame member 109, will not interfere with the rearward movement of the flexible wall 131 when subsequently placing a panel 103 in the channel 127 of the frame member.

The invention is, of course, not limited to the above-described embodiments which may be modified without departing from the scope of the invention or sacrificing all of its advantages. In this regard, the terms in the foregoing description, such as "rectangular", "perpendicular", "upper", "lower", "front" and "rear", have been used only as relative terms to describe the relationships of the various elements of the panel frame assemblies of the invention. For example, the panel framing assemblies 1 and 101 need not be rectangular or have four frame members, and therefore, the pairs of legs 22A and B and 122 A and B of the corner connectors 19 and 119 need not be perpendicular to one another but instead would be at an angle equal to 360 degrees/number of frame members.

Claims

1. A framing assembly for a polygonal, substantially flat panel comprising: a plurality of elongate peripheral frame members, each having a cross-sectional shape defining a channel in which a perimeter edge of the panel can be received; and a plurality of corner connectors, each engaging a longitudinal end of two adjacent frame members; the frame members and the corner connectors forming a polygonal frame; characterized by the channel of each frame member including a flexible wall adapted to accommodate and engage one or a plurality of thicknesses of the panel.

2. The assembly of claim 1 wherein the flexible wall is cantilevered from a location on each frame member remote from where the panel is held.

3. The assembly of claim 2 wherein the flexible wall is cantilevered from an inward edge of a rear wall of each frame member.

4. The assembly of any one of claims 1-3 wherein each frame member is formed from a resilient sheet metal.

5. The assembly of claim 4 wherein the metal is aluminium.

6. The assembly of claim 5 wherein the aluminium is an alloy classified by the American Aluminium Association as AA-5050.

7. The assembly of any one of claims 4-6 wherein the frame members are made by roll-forming the sheet metal.

8. The assembly of any one of claims 1-7 wherein the frame members each have both ends mitred.

9. The assembly of any one of claims 1-8 wherein the panel is rectangular and the assembly is rectangular.

10. The assembly of any one of claims 1-9 wherein

each frame member is provided, adjacent each mitred end, with an opening, preferably a circular opening, and each corner connector is provided with a pair of protrusions, preferably cylindrical protrusions, one of which fits within and engages the opening.

11. The assembly of any one of claims 1-9 wherein each frame member is provided, adjacent each mitred end, with a notch and each corner connector is provided with a pair of protrusions, one of which fits within and engages the opening.

12. The assembly of claim 10 or 11 wherein each corner connector also includes a pair of upstanding, rearwardly extending flanges which are perpendicular to one another and one of which fits within and abuts an interior surface of the frame member when the one protrusion is fit within the frame member.

13. The assembly of any one of claims 1-12 which further comprises the polygonal, substantially flat panel.

Fig.1.

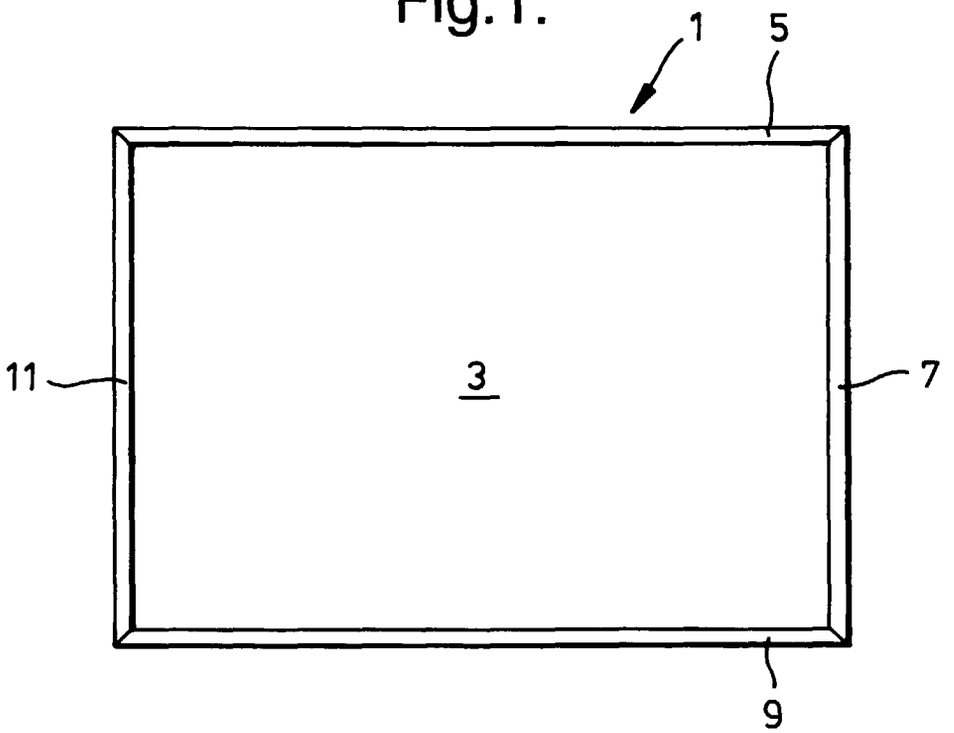


Fig.2.

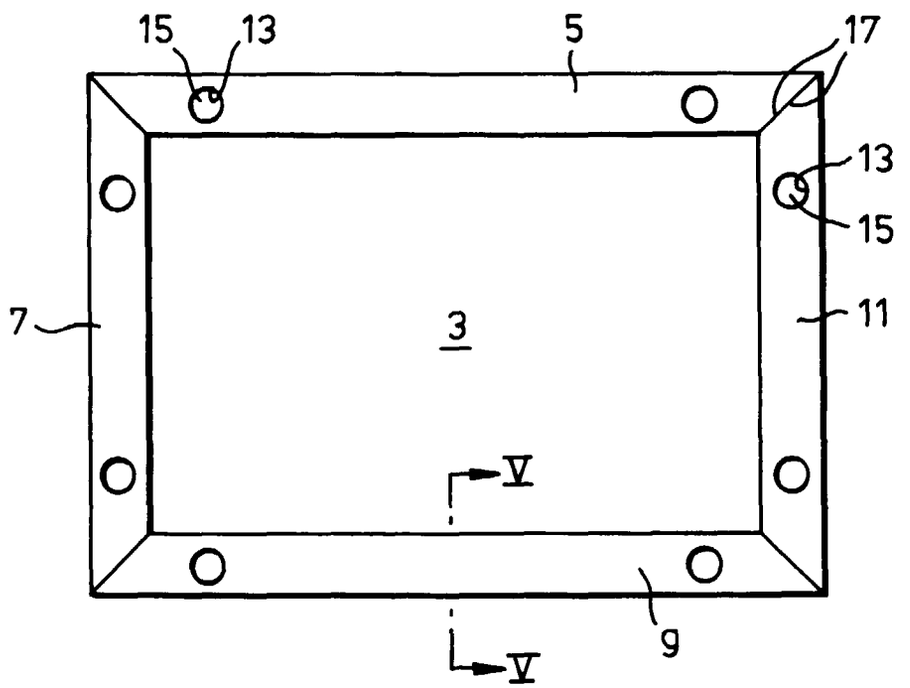
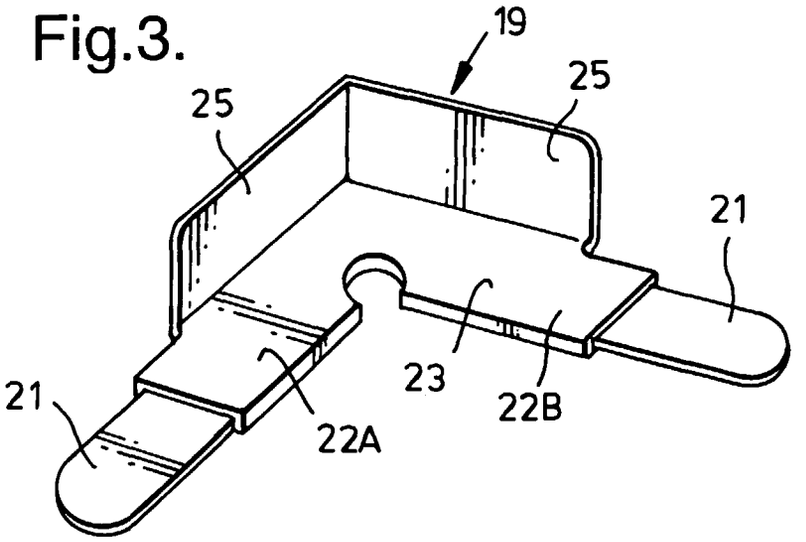


Fig.3.


19
25
25
21
21
23
22B
22A

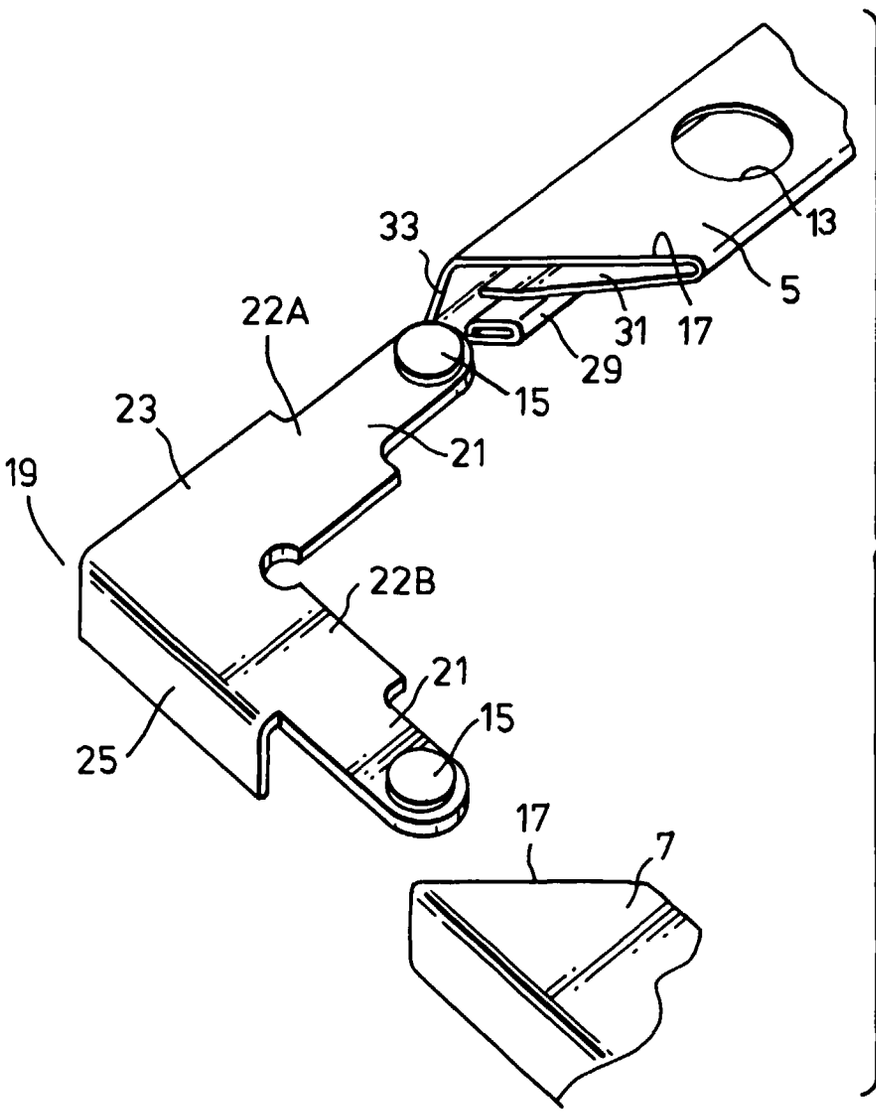

33
13
5
22A
31
17
29
15
23
21
19
22B
21
15
25
17
7

Fig.4.

Fig.5.

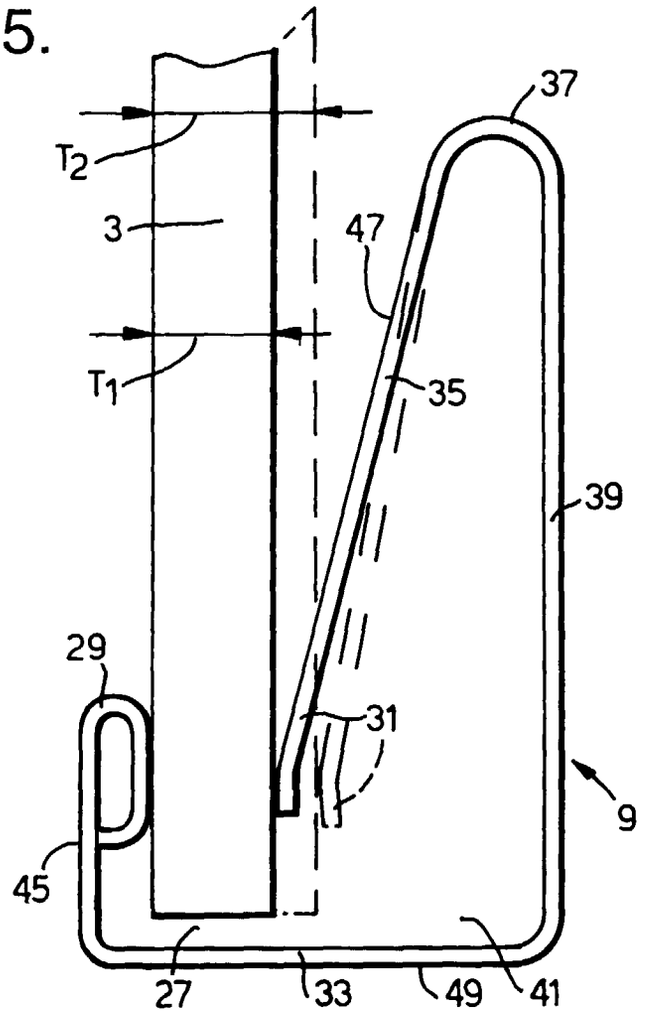


Fig.6.

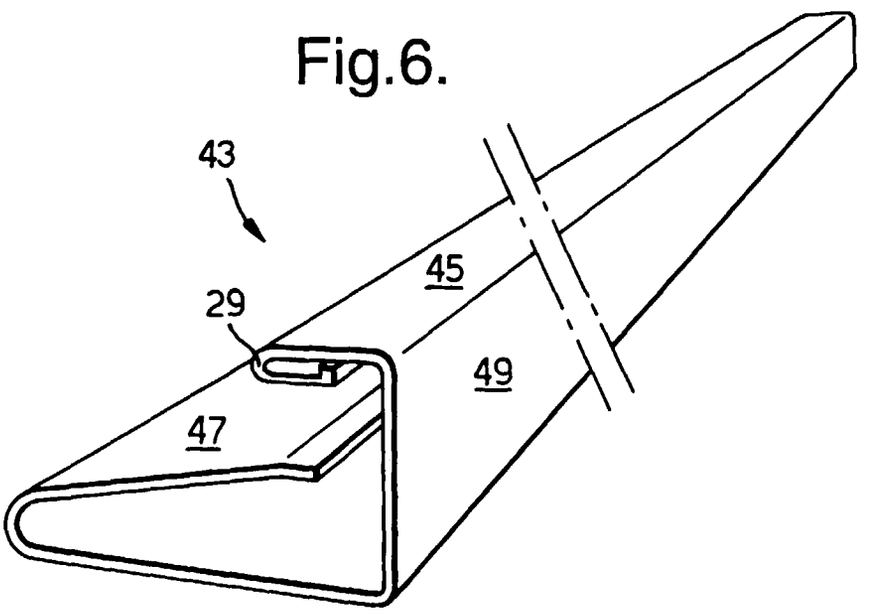


Fig.7.

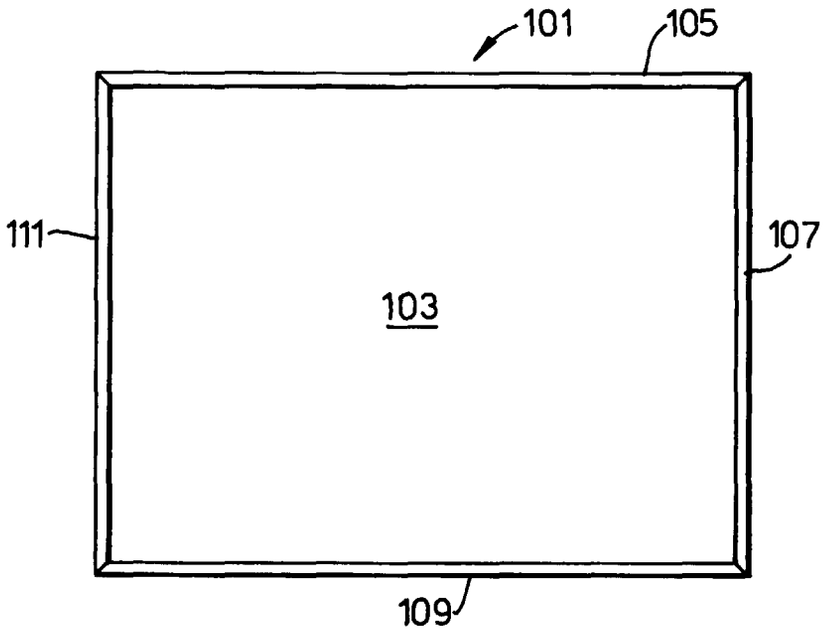


Fig.8.

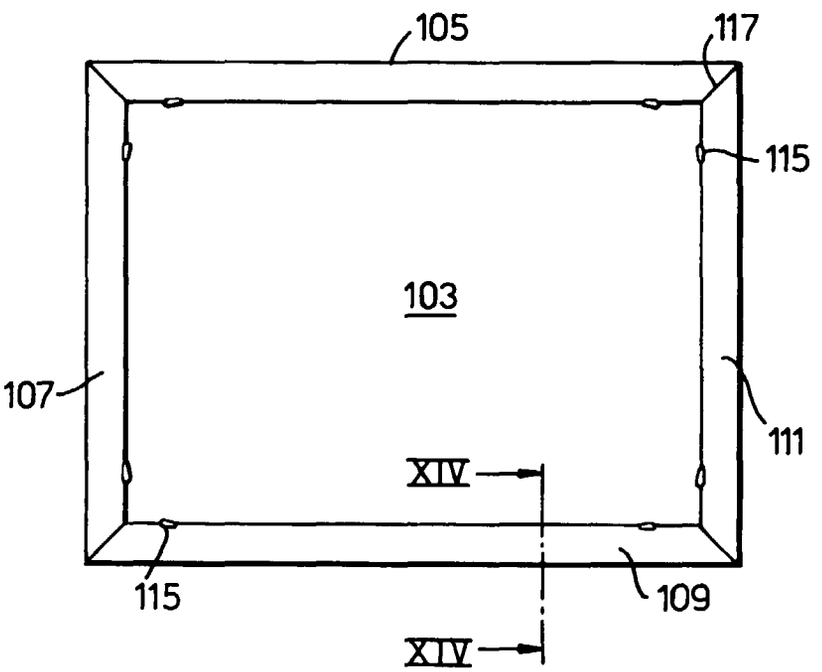


Fig.9.

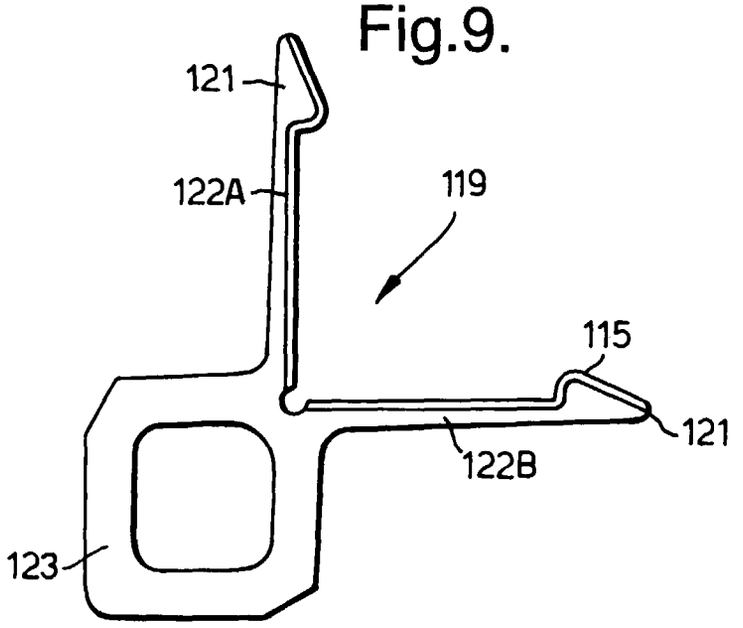


Fig.10.

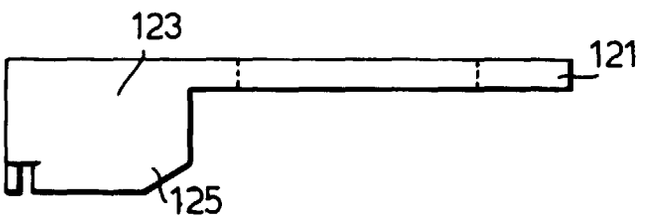


Fig.11.

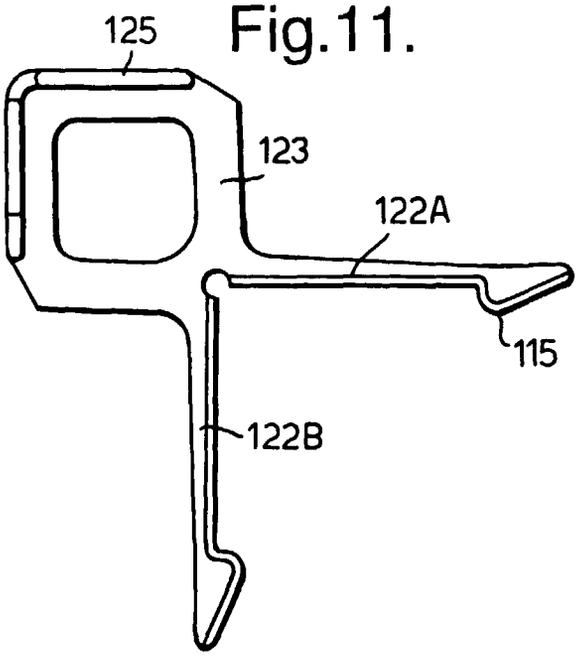


Fig.12.

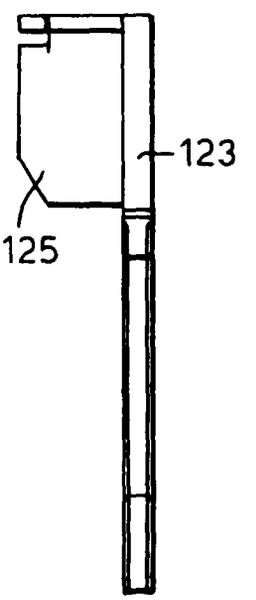


Fig.13.

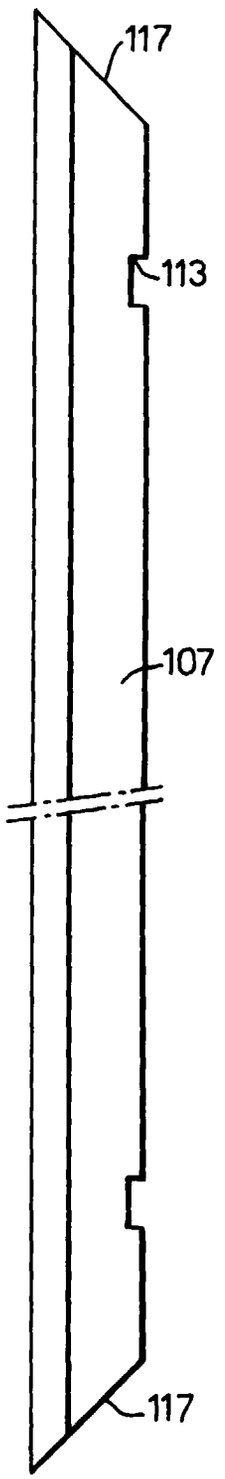


Fig.14.

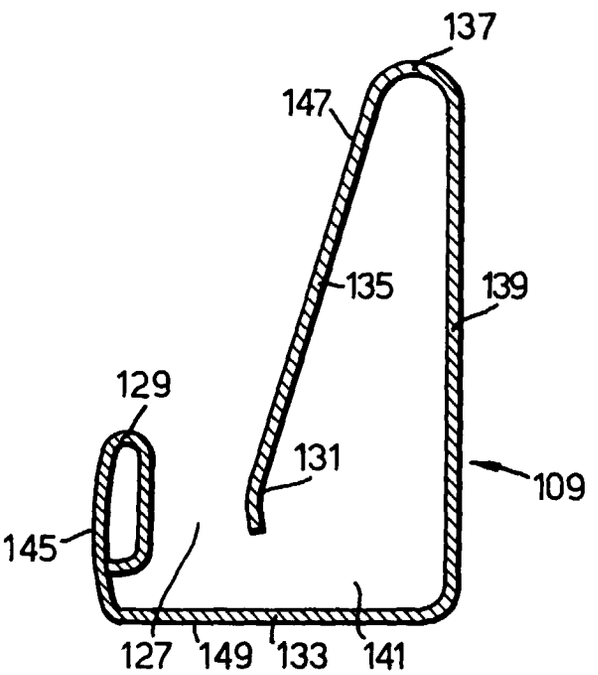


Fig.15.