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(54) Building cladding system.

(57) A building cladding system comprising a plurality of cladding panels, each comprising an outer skin and an inner skin with a filling of thermally insulating material therebetween, one edge of each sheet having a tongue part and the opposite edge of each sheet having a groove part, the tongue part of one sheet being receivable in the groove part of an adjacent sheet so as to be juxtaposed and clip means for attaching adjacent parts to a support member of the building comprising a clip having an attachment part, for attachment to the support member, and a panel engagable part, for reception between a juxtaposed tongue and groove.

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Building Cladding System.

This inventon relates to a building cladding system.

According to one aspect of the invention we provide a building cladding system comprising a plurality of cladding panels, each comprising an outer skin and an inner skin with a filling of thermally insulating material therebetween, one edge of each sheet having a tongue part and the opposite edge of each sheet having a groove part, the tongue part of one sheet being receivable in the groove part of an adjacent sheet so as to be juxtaposed and clip means for attaching adjacent panels to a support member of the building comprising a clip having an attachment part, for attachment to the support member and a panel engagable part, for reception between a juxtaposed tongue and groove.

The tongue and groove parts may be provided by parts of the outer skin.

The tongue parts may be provided by a "U" shape in cross section part of the outer skin and the base of the "U" providing the outer most portion of the tongue.

The groove part may be provided by a "U" shape in cross section part of the outer skin and the base of the "U" providing the inner most part of the groove.

The panel engagable part of the clip may be generally "U" shape in cross section and be adapted to be sandwiched between a juxtaposed "U" shaped tongue and groove.

One limb of the "U", at the end of the limb distant from the base, may be connected to the attachment part of the clip by a connecting part.

The connecting part may extend generally transverse to the "U" shaped part and hence to the panels, and one end of the connecting part may be connected to the "U" shaped panel engagable part and the other end thereof is connected to the attachment part.

The connections are preferably by virtue of being formed integrally with the attachment and panel engagable parts.

The panel engagable part may have means to accommodate variation in the clearance between the juxtaposed tongue and groove parts between which it is sandwiched.

The means may vary the effective thickness of the panel engagable part.

The means may comprise displacable portions of the panel engagable part which may be displaced so as to cause said variation in effective thickness.

The displaceable portions may comprise elastically and/or plastically deformable portions.

The displaceable portions may comprise at least one lug means projecting from the clip towards the associated panel tongue part and/or groove part.

Preferably at least two lug means are provided, one lug means projecting from the clip towards the associated tongue part and the other lug means projecting from the clip towards the associated groove part.

The one lug means may extend from the inside surface of the "U" shaped panel engagable part for engagement with the tongue part and the other lug means may extend from the outer surface of the "U" shaped panel engagable part for engagement with the groove part.

The other lug means may extend from the outer surface of said one limb and the one lug means may extend from the inner surface of the other limb.

The one lug means may extend inwardly and towards the base of the "U" shaped panel engagable part and the other lug means may extend outwardly and away from the base of the "U" shaped of the panel engagable part.

The attachment part may be provided with at least one opening to receive screw fastener means and may be adapted to engage a bracket provided on the sheeting rail or other member of the building.

Alternatively the attachment means may be provided with a socket means to receive, and attach the clip to, a part of the support member.

The juxtaposed edges of the panel may extend vertically or horizontally and the attachment parts being connected to sheeting rails or other members of the building which correspondingly extend vertically or horizontally.

The panel engagable part may be of greater longitudinal extent from the attachment part.

From another aspect the panel engagable part may be of greater longitudinal extent than the width of the part of the support member to which the attached part is to be attached. This ensures that the panels, particularly during wind uplift conditions, where a panel is being pulled away from the support member, are securely attached to the building since the attachment load is spread more evenly throughout the length of the panel by providing a relatively longer panel engagable clip part than would be achieved with a panel engagable part of the same longitudinal extent as the support member. At the same time the amount of material needed for such a clip is minimised by maintaining the attachment part of a length appropriate for engagement with the support member. For exam-

ple, not longer than the width of the part of the support member to which the attachment part is to be attached.

The panel engagable part may be between 150 and 200mm long or 150 and 300mm long and the attachment part may be between about 50 and 70mm long.

The ratio of the length of the panel engagable part to the attachment part may lie in the range 2:1 to 6:1, but may lie in the range 2:1 to 4:1.

According to another aspect of the invention we provide a building when clad with a building cladding system according to the first aspect of the invention.

Examples of the invention will now be described by way of example with reference to the accompanying drawings wherein

FIGURE 1 is a fragmentary perspective view showing part of a building embodying the invention,

FIGURE 2 is a cross-section, to an enlarged scale, on the line 2-2 of Figure 1,

FIGURE 3 is a side elevation of the clip shown in Figure 2 looking in the direction of the arrow A,

FIGURE 4 is a underneath plan view of the clip shown in Figure 2 looking in the direction of the arrow B,

FIGURE 5 is a view similar to that of Figure 3 but showing an alternative form of clip,

FIGURE 6 is a view similar to that of Figure 4 but showing another alternative form of clip.

FIGURE 7 is a perspective view similar to in that of Figure 1 but of another embodiment of the invention,

FIGURE 8 is an fragmentary perspective view of part of Figure 7 to an enlarged scale,

FIGURE 9 is a front elevation of an alternative form of clip, and

FIGURE 10 is a front elevation of a yet further alternative form of clip.

Referring to Figure 1, part of a building 10 is shown which has a frame which comprises vertical stanchions 11 carrying upper and lower structural channel section members 12, 13 respectively. The structural members 12, 13 have connected thereto by conventional rail cleats, not shown, a plurality of vertical sheeting rails 14 at spaced intervals along the length of the wall. A bottom sheeting rail 15 is provided at the foot of the stanchions 11 and vertical sheeting rails 14. The sheeting rails 14, 15 may be of any suitable configuration that are preferably of a "sigma" configuration as shown in the drawings.

The sheeting rails 14 and 15 carry a plurality of wall panels portions of three of which are illustrated in Figure 1 at 16a, 16b and 16c. In this example each panel 16a -16c extends for the full width of the wall but, if desired, may extend for only part of the length of the wall adjacent side edge faces being abutted and provided with suitable sealing and trim means.

Each panel 16a-16c comprises an outer skin 17 and an inner skin 18 with a filling 19 of thermally insulating material therebetween. One edge 20 of each sheet has a tongue part 21 projecting therefrom whilst the opposite edge 22 of each sheet has a groove part 23 provided therein. As best shown in Figure 2 the outer skin 17 is formed to provide the tongue part 21 and groove part 23. The tongue and groove parts are generally "U" shaped in cross-section and the base 24 provides the outer most part of the tongue part 21 whilst the base 25 provides the inner most part of the groove part 23. One limb 26 of the "U" of the tongue 21 is formed integrally with the remainder of the outer skin 17 whilst one limb 27 of the "U" of the groove is likewise formed integrally with the remainder of the outer skin 17.

The inner skin 18 is formed with a rebate portion 28 adjacent the edges 20, 22 provided with tongue and groove parts to accommodate fastening means as hereinafter to be described.

The tongue part 21 of one panel, for example, panel 16a is received within the groove part 23 of the adjacent panel, for example, 16b so that the tongue and groove parts are inter-engaged in the sense of being juxtaposed with the tongue part within the groove part.

In order to attach the panels to the vertical sheeting rails 14 a plurality of clip means 30 are provided which hold the panels to the sheeting rails by virtue of engagement with the outer sheet 17.

Each clip means 30 comprises an attachment part 31 for attachment to a sheeting rail 14 and a panel engaging part 32 for reception between the inter-engaged tongue part 21 and groove part 23. The panel engaging part 32 is generally "U" shaped in cross-section and is thus sandwiched between the "U" shaped tongue part 21 and "U" shaped groove part 23. One limb 33 of the panel engaging part 32 at the end thereof distant from the base 34 of the "U" is connected to the attachment part 31 of the clip by connecting part 35 which extends transversely to the "U" shaped panel engaging part 32 and hence transversely to the general plane of the panels 16a-16b. One end of the connecting part 35 is, therefore, connected to the limb 33 and the other to the attachment part 31 and is so connected by virtue of being formed integrally therewith.

The panel engaging part 32 is provided with means to accommodate variation in the clearance between the tongue part 21 and groove part 23 arising, for example, as a result of tolerances in manufacture of the panels. This means comprises

one lug means comprising three lugs 40 pressed out of the other limb 36 to the limb 33 and extending inwardly towards the tongue part 21 and the base 34 of the "U". The lug means also comprise another lug means comprising three lugs 41 pressed out of the one limb 33 and extending outwardly away from the base 34 and towards the groove part 23. The lugs 40, 41 are elastically deformable and thus can accommodate any variation in tolerance between the tongue part 21 and groove part 23. For instance, if the tolerance is less than the extent to which the lugs project the lugs as appropriate, may be elastically deformed towards their associated limb.

If desired the lugs 40, 41 (or other means to accomodate variation in the clearance between the tongue part 21 and groove part 23,) may be plastically deformable as well as, or possibly instead of, being elastically deformable.

It will be appreciated that their angle of inclination is such that relative movement between the lugs 41 and the groove part 23 in the direction to disengage the connection tend to cause the free edge of the lugs 41 to dig into the wall of the groove part 23 whilst similarly relative movement between the lugs 40 and the tongue part 21 likewise tends to cause the edge of the lugs 40 to dig into the wall 21.

The attachment part 31 is connected to its associated sheeting rail 14 by virtue of being received between the sheeting rail 14 and a bracket 50. The bracket 50 comprises a channel shaped part 51 and out turned lugs 52 each of which is provided with an aperture 53 through which a screw fastener 54 passes to fasten the bracket to the sheeting rail 14.

If desired, however, the attachment means 31 may be connected to the building frame by other means, for example, by being appropriately dimensioned and provided with apertures 55 through which screw threaded fasteners or other fastening means pass as shown in Figure 5 or by being provided with a hook portion 56 to hook onto a lip 57 of a frame member 14 as shown in Figure 6.

In a modification shown in Figure 9 the clips 230 are of the same general configuration as the clips 30 described hereinbefore but have a panel engagable part 232 of greater longitudinal extent that is the attachment part 231 whilst the connecting part 235 is of truncated triangular configuration so as to increase in longitudinal extent from the end thereof connected to the attachment part towards the end thereof connected to the panel engagable part. The relatively long extent of the panel engagable part 232 ensures that the restraining load is distributed over a relatively large area of the panel whilst the attachment part 231 is made of a length which is related to the width of the support member so as to minimise the amount of material in the attachment part. For example, the attachment part may be made such that it is not longer than the width of the part of the support member to which the attachment part is attached. Such clip configuration is particularly suitable when the panel is likely to be exposed to significant wind uplift conditions where a panel is pulled away from a support member. By providing clips of the configuration shown in Figure 9 the panels are securely attached to the support member since the attachment load is spread more evenly throughout the length of the panels by providing the relatively longer panel engagable parts than would be achieved with panel engagable parts of the same longitudinal extent as the associated part of the support member. In the example illustrated in Figure 9 the panel engagable part 232 is 300mm long whilst the attachment part is 70mm long.

If desired the panel engagable part 232 may be of a different longitudinal extent to that described above, for example, it may be shorter, for example, 150mm or 200mm long or may be longer is desired to spread the load over a still greater area of the panels. Similarly the attached part may be of different width for example, 50 to 70mm long.

The ratio of the length of the panel engagable part to the attachment part may lie in the range 2:1 to 6:1 but may lie in the range 2:1 to 4:1.

The bottom edge of the panel 16a is connected to the bottom sheeting rail 13 by means of a clip 60 which is similar to the clip 30 described hereinbefore except for the configuration of the attachment means which as best shown in Figure 1, extends from the connecting part 35 on the same side thereof as the panel engaging part 32 and is provided with openings through which screw threaded fasteners pass to attach the clip 60 to the bottom sheeting rail 13. The clip 60 is preferably unprovided with clearance variation accomodating lugs, or other means, for economy since there is no tongue part engaged with the groove part of the bottom edge of the panel 16a.

There is shown in Figure 10 an alternative form of clip 360 to the clip 60. The clip 360 has a panel engagable part 332 of the same size as that shown in Figure 10 but adapted for connection of the bottom edge of the panel 116a. It will be seen that in this example the attachment part 331 is of the same longitudinal extent as the panel engagable part 332 and connecting part 335. To permit of access to apertures 331a through which screw threaded fasteners pass to attach the clip to the bottom sheeting rail 113 slots 350 are provided in the panel engagable part 332.

Referring now to Figure 7 and 8 there is shown a modification of the invention in which the cladding panels indicated at 116a-116d extend with

their longest edges vertical. These edges are configured in exactly the same way as the longitudinal edges 20, 22 of the embodiment previously described and thus are formed with inter-engagable tongue part and groove part 21, 23. Clip means 130, similar to the clip means 30 described hereinbefore are sandwiched between the tongue and groove parts 121, 123 and are attached to sheeting rails 114 similar to the sheeting rails 14 shown in Figure 1 but extending horizontally. In Figure 7 the bottom sheeting rail is shown at 113 and is of generally channel section.

The clip means 130 are similar to the clip means 30 shown in Figure 1 except that the attachment means 31 extends for the full width of the panel engaging part 32 and is provided with a pair of openings through which screw threaded fasteners 170 pass to secure the clips 130 to the associated rails 114 or 113.

In all other respects the clip means inter-engagement with the panels is as in the previously described embodiment.

Both the "horizontal" cladding panels shown in Figure 1 to 6 and the "vertical" cladding panels shown in Figures 7 and 8 are secured to the upper channel section member, or eaves beam, 12 with conventional through - fixing self drilling and tapping screws which are subsequently hidden behind a gutter or a flashing. If desired other securing means may be provided. Where the panels are vertical panels clip means may be provided thereby avoiding the use of through-fixings altogether.

If desired the panels may be of other construction to that described hereinbefore and the tongue and groove parts may be provided in other ways than by the outer skin.

The features disclosed in the foregoing description, or the accompanying drawing, expressed in their specific forms or in terms of a means for performing the disclosed function, or a metal or process for attaining the disclosed result, or a class or group of substances or compositions, as appropriate, may, separately or any combination of such features, be utilised for realising the invention in diverse forms thereof.

Claims

1. A building cladding system comprising a plurality of cladding panels, each comprising an outer skin and an inner skin with a filling of thermally insulating material therebetween, one edge of each sheet having a tongue part and the opposite edge of each sheet having a groove part, the tongue part of one sheet being receivable in the groove part of an adjacent sheet so as to be juxtaposed and clip means for attaching adjacent parts to a support member of the building comprising a clip having an attachment part, for attachment to the support member, and a panel engagable part, for reception between a juxtaposed tongue and groove.

2. A system according to claim 1 wherein the panel engagable part of the clip is generally "U" shape in cross section and is adapted to be sandwiched between a juxtaposed "U" shaped tongue and groove.

3. A system according to any one of the preceding claims wherein the panel engagable parts have means to accommodate variation in the clearance between the juxtaposed tongue and groove parts between which it is sandwiched.

4. A system according to claim 3 wherein the means comprises displacable portions of the panel engagable part which are displaceable so as to cause said variation in effective thickness.

5. A system according to claim 4 wherein the displaceable portions comprise at least one lug means projecting from the clip towards the associated panel tongue part and/or groove part.

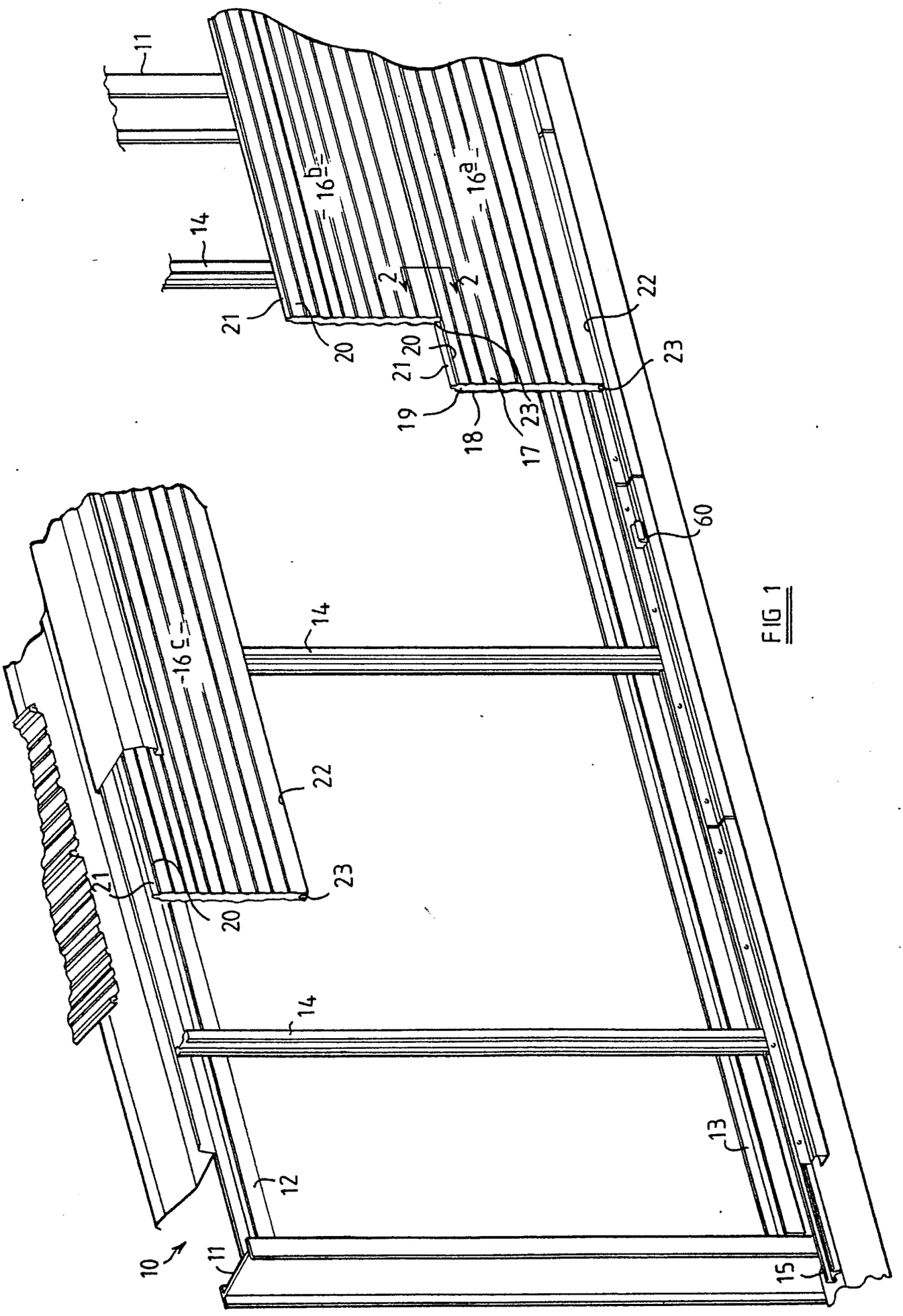
6. A system according to claim 5 wherein one lug means extends from the inside surface of the "U" shaped panel engagable part for engagement with the tongue part and another lug means extends from the outer surface of the "U" shaped panel engagable part for engagement with the groove part.

7. A system according to any one of the preceding claims wherein the panel engagable part is of greater longitudinal extent than the attachment part.

8. A system according to any one of the preceding claims wherein the panel engagable part is of greater longitudinal extent than the width of the part of the support member to which the attachment part is to be attached.

9. A system according to claim 7 or claim 8 wherein the panel engagable part is between 150 and 300mm long.

10. A system according to any one of claims 21 to 26 wherein the ratio of the length of the panel engagable part to the attachment part lies in the range 2:1 to 6:1.


11
14
16b
16a
2
2
21
20
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21
19
18
17
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60
14
16c
22
23
21
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12
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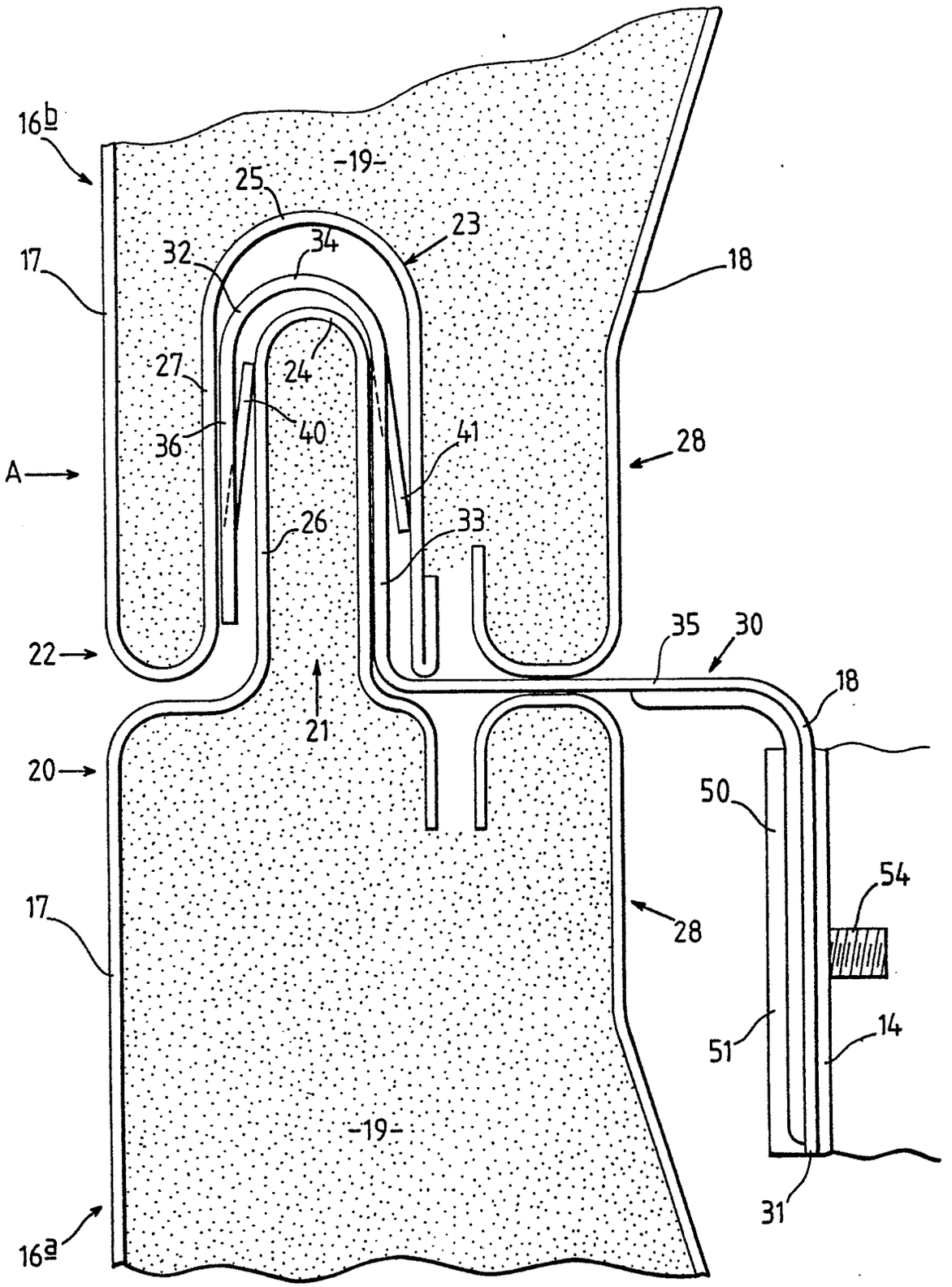
11
15

FIG 1


16b
-19-
25
23
32
34
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27
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36
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41
28
A
26
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28
51
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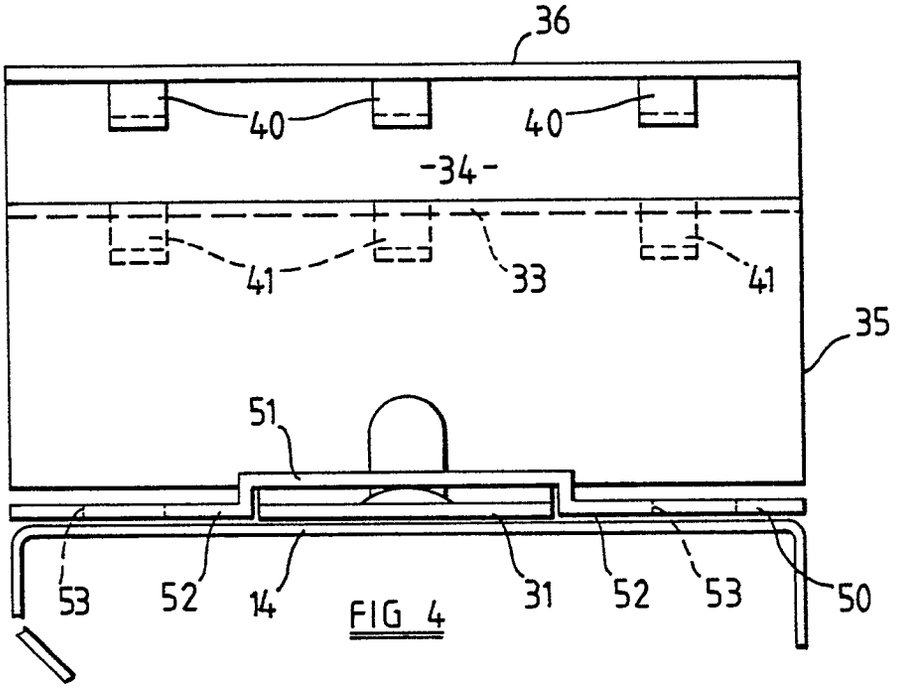
-19-
31
16a

FIG 2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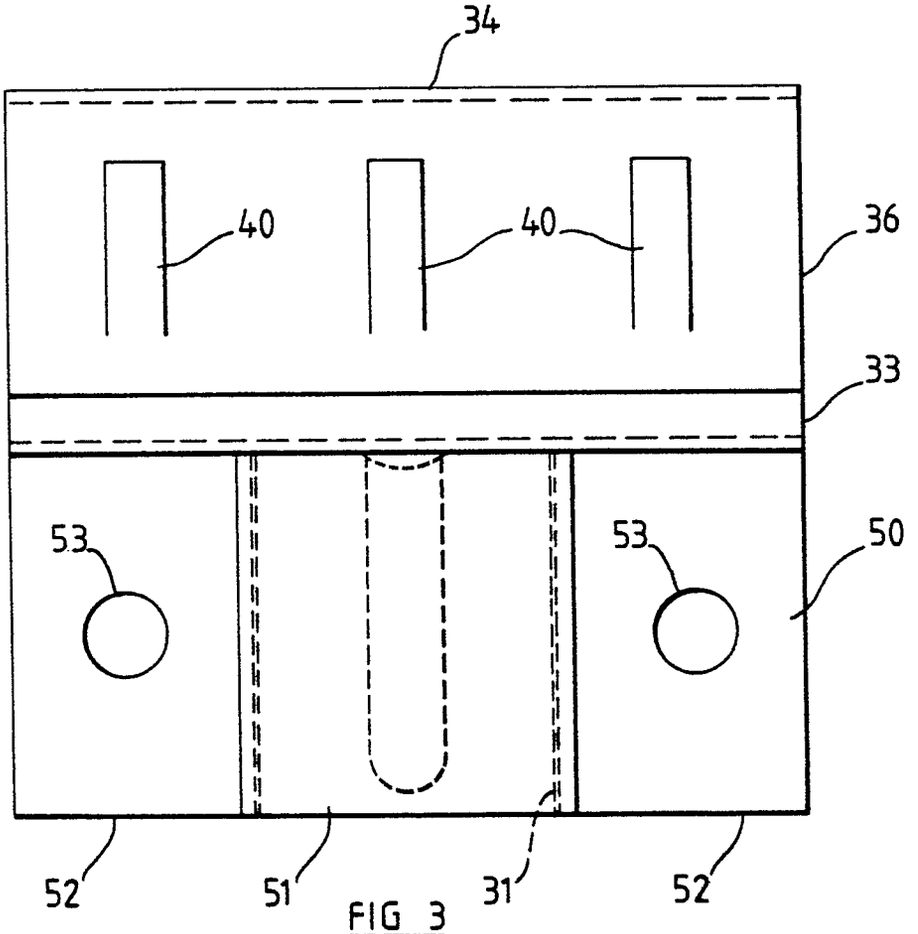
31
52
53
50

FIG 4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53
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51
31
52

FIG 3

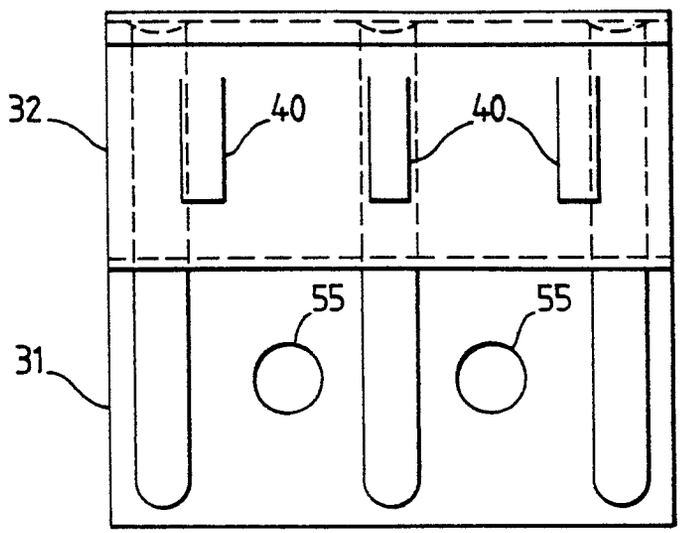

FIG 5

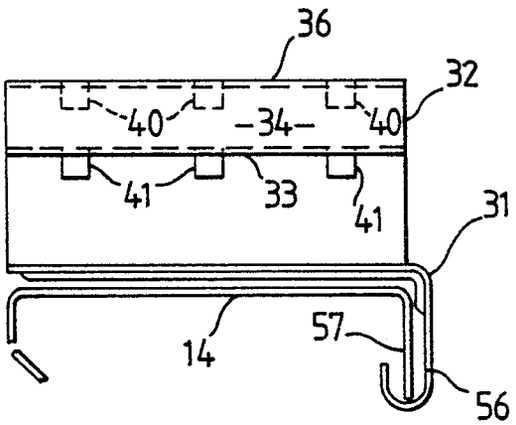

FIG 6

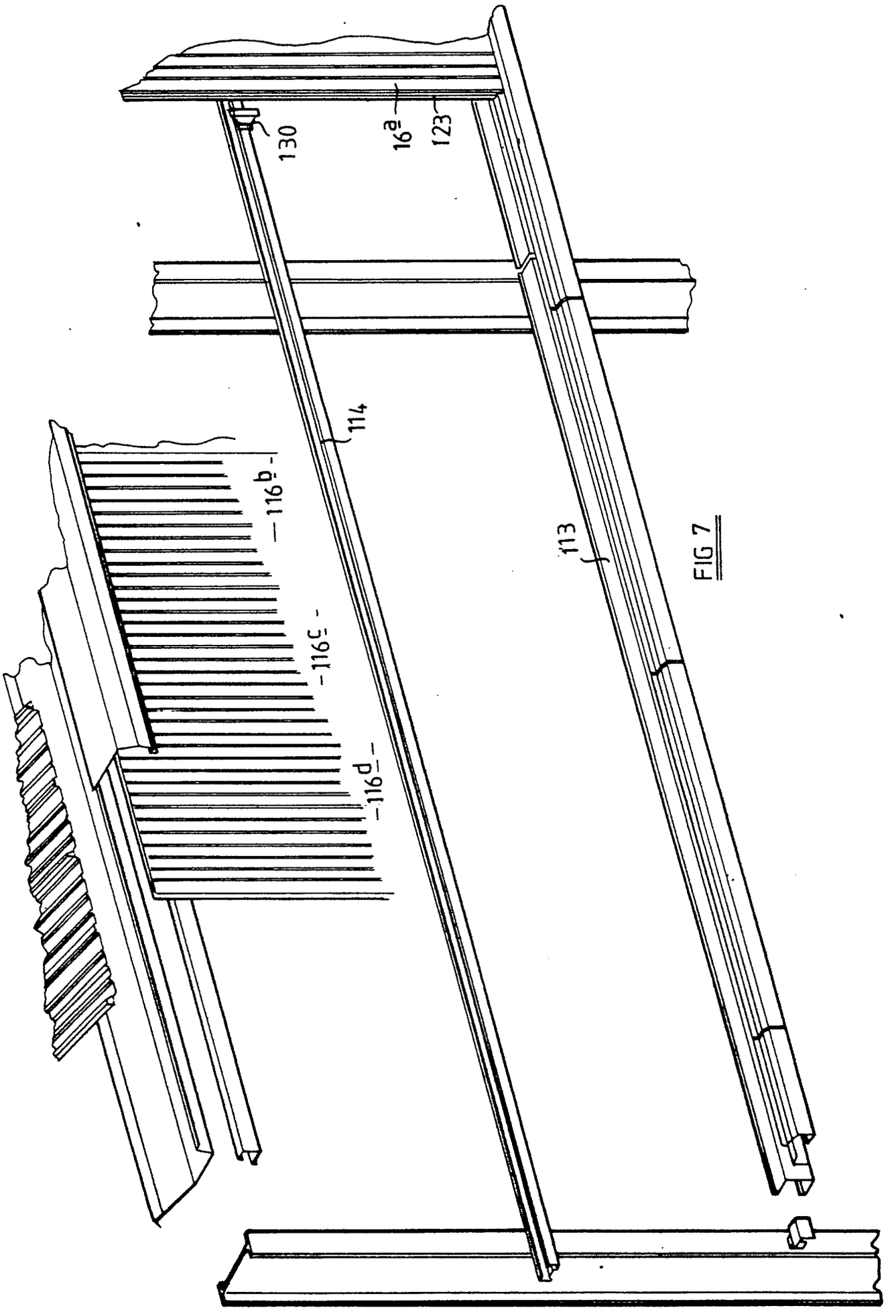

FIG 7

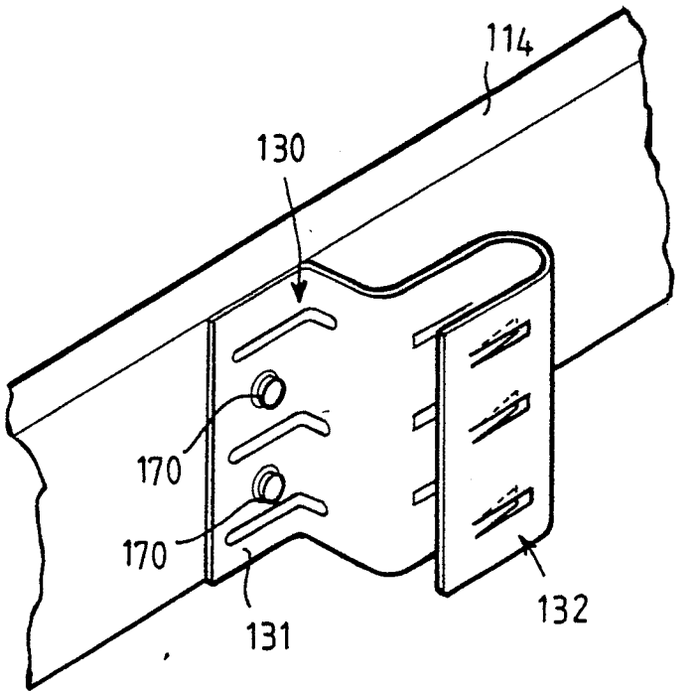

FIG 8

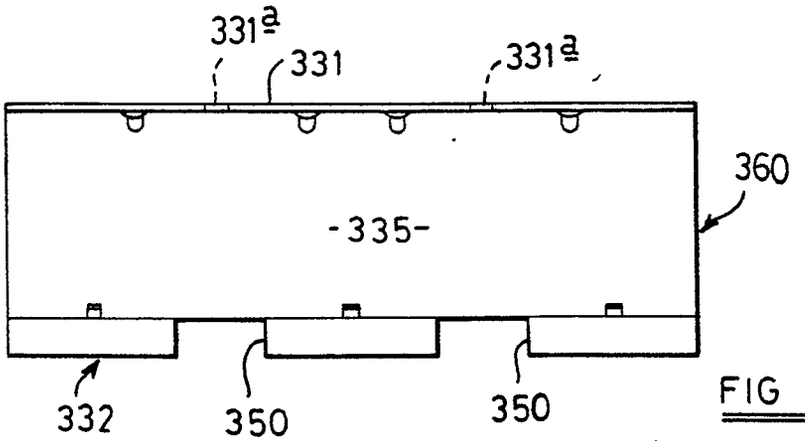

FIG 10

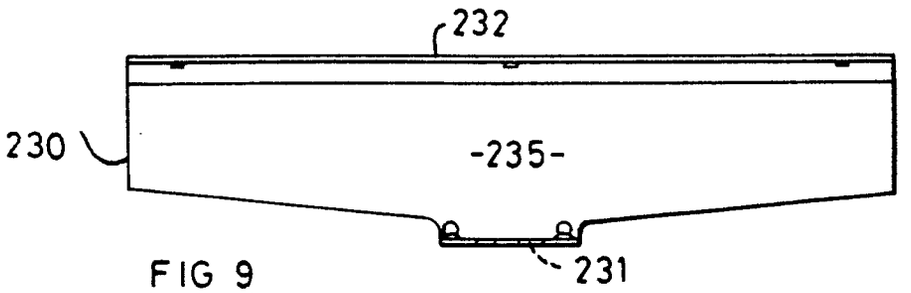

FIG 9