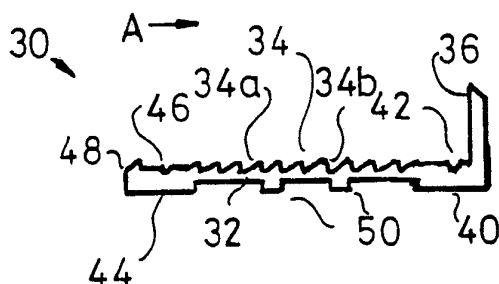




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(54) Title: RETENTION COMPONENT AND ARRANGEMENT



## (57) Abstract

A retention component (30) and arrangement, particularly for use in securing a building panel such as a pre-assembled window in a wall opening, comprising a base (32) which carries on one face one or more teeth (34) and an abutment (36) for the panel, each tooth having a retention flank (34b).

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## RETENTION COMPONENT AND ARRANGEMENT

This invention relates to a retention component and arrangement, and in particular to a retention component and arrangement for use in securing a building panel in a wall opening.

5 A typical panel for which the retention component of this invention is suitable is a window frame, specifically a factory pre-assembled double or triple glazed window unit. Such units are popular with users, but the fitting staff often find them difficult to manipulate into position in a prepared wall  
10 opening, especially in a multi-storey building in adverse weather.

Currently-used fitting methods require a pre-built wall opening, and this opening has to be accurately sized and shaped both to receive the respective unit and to permit the fitting  
15 staff to hold the unit in position until secured. Several fitting staff are usually involved.

A simple but reliable retention component, and a retention arrangement using such retention component, is widely demanded.

20 In one prior proposal, a rectangular retaining member having

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an outwardly directed flange is fed into a prepared (rectangular) wall opening from one side of the wall until the flange engages the internal wall surface around the opening, and a window frame also having an outwardly directed flange is  
5 fed into the opening from the other side of the wall so as to telescope within the retaining member and until its flange engages the external wall surface around the opening; the frame is held in the retaining member by resilient tabs carried either by the retaining member or the frame and which  
10 inter-engage with respective facing grooves on the frame or retaining member. It is suggested that by providing a plurality of grooves this proposed arrangement can be used for various wall thicknesses, with the respective flanges sandwiching the brickwork around the wall opening, but to help  
15 ensure that the desired tight retention is obtained a resilient sealing strip positioned between the frame flange and the outer wall surface around the opening can be compressed a distance substantially in excess of the spacing between successive grooves.

20 The above proposed arrangement has however a number of disadvantages in that (a) there needs to be simultaneous access available from both sides of the wall opening, which may not always be possible whilst building is continuing; (b) the prefabricated window frame needs to be manipulated into the  
25 frame opening at the same time as the retaining member, requiring extra fitting staff; (c) the telescopic arrangement

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assumes a uniform wall depth all around the opening, typically requiring the bricklayer accurately to lay the surround brickwork.

We now propose a retention component and a retention arrangement which avoids or reduces some of the above disadvantages.

We therefore propose a retention component for securing a window panel or the like in a wall opening comprising a base, a tooth projecting from one side of the base, and an abutment projecting from said one side of the base, said abutment projecting at least as far from said base as the tooth, said tooth having a retention flank. Preferably there are a plurality of teeth, and said abutment projects further from said one side of the base than said teeth. The teeth will usefully be angled towards the abutment; so that if saw-teeth, then the one flank (the retention flank) will be substantially parallel to the plane of the abutment whilst the other flank (the over-ride flank) will be in a plane intersecting the abutment plane. Usefully all of the teeth are of uniform height i.e. a common projected distance from said one side of the base; but some or all of the teeth may be of different heights to suit the intended cooperating retaining fingers, or the retention member itself may include or comprise retaining fingers. It will be understood that for ease of production the teeth will preferably extend the length of the component

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(laterally of the panel insertion direction), and will usefully be in the form of angle blades.

Each upstanding (saw-tooth) retention flank is firmly engagable by a respective resilient retaining finger, typically one finger of a group of fingers integral with or secured to a pre-assembled glazed window unit, to provide an improved retention arrangement for the unit; during installation the retaining fingers can ride over the angled (over-ride) flank of a saw-tooth.

10 In one arrangement, means are provided to secure a respective retention component according to the invention to each opposed side face of the opening, preferably to each vertical side face, permitting simplified alignment of the window panel during installation. The window panel is inserted towards and  
15 usually up the abutment, but cannot be fed past the abutment, which is spaced inwardly of the building, and which can also provide a plaster edge, and a plaster "height level". Thus if the building is "new built" with the opening already present, our retention component can include nailing points or lines,  
20 whereby the component can be secured at selected positions therealong, typically aligned with (and to engage in) the mortar joints between the reveal bricks.

We also propose an alternative arrangement, suitable for use if the opening is to be formed in a cavity wall of a

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"new-build" structure, with the cavity wall formed for instance by "outer" brickwork and "inner" blockwork (considered relative to the enclosed building). The retention component can be connected to, preferably integral with, a radially outward  
5 (relative to the opening) extension piece which projects from one end thereof and away from the other side of the base (i.e. the other side from that side with the teeth) to be located between the outer brick wall and the inner block wall. Suitably, the retention component has mitred ends whereby it is  
10 joined to similarly shaped components to form a rectangular structure providing a former about which the bricks and blocks can be built; this design of retention component avoids the need for a temporary framework as conventionally used to define the opening, and which is removed when the brickwork is  
15 completed (perhaps leaving an opening of different dimensions to that of the panel, which may only be brought on site later).

Usefully, the abutment can locate a resilient sealing gasket, permitting easy finishing of a fitted window, with the gasket  
20 concealing the plaster edge. If the plaster shrinks after the window has been fitted, any gap between the plaster edge and the abutment is not visible. Draughts through the gap can be prevented. The gasket can flex to follow (fitted) window movement.

25 An advantage of our alternative arrangement when used as a

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former built into "new-build" structures to enclose the opening (i.e. with the opening being formed therearound) is that not only can the retention arrangement of the invention locate a panel such as a window unit reliably in the opening, but the extension piece itself provides damp proofing and draft sealing of the cavity between the outer brickwork and inner blockwork i.e. there can be cavity closing, cavity sealing, and damp proofing.

Our invention will be further described by way of example by reference to the accompanying schematic drawings in which:-

- Fig.1 is a plan view of a fastening device suitable for use with the retention component of the present invention;
- Fig.2 is a view (not to scale) on the line II-II of Fig.1;
- Fig.3 is a view (not to scale) on the line III-III of Fig.1;
- 15 Fig.4 is a sectional view of one embodiment of retention component suitable for a "new-built" structure;
- Fig.5 is a part-perspective view of an alternative retention component, also suitable for a "new-built" structure;
- Fig.6 is a part-perspective view of a wall opening with a fitted retention component according to Fig.4 or Fig.5;
- 20 Fig.7 is of an alternative design of retention component suitable for use in a "new-build" structure;

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- Fig.8 is of an alternative embodiment of retention component fitted in a "new-build" structure;
- Fig.9 is a schematic front elevation of a fitted retention component formed from an extruded plastics strip  
5 shaped according to Fig.7 or Fig.8.
- Fig.10 is a side elevation of another alternative embodiment to that of Fig.7;
- Fig.11 is a plan view of the embodiment of Fig.7;
- Fig.12 is a side elevation of yet another alternative  
10 embodiment to that of Fig.7;
- Fig.13 is a side elevation of the embodiment of Fig.12 with a window fitted;
- Fig.14 is a side elevation of a further alternative  
15 embodiment to that of Fig.7 in which three teeth formed as resilient fingers or tabs are used;
- Fig.15 is a side elevation of an alternative embodiment to that of Fig.4, in which the teeth forming a plurality of adjacent grooves are between two teeth forming angled tabs; and
- 20 Fig.16 is a side elevation of an alternative embodiment to that of Fig.5.

The fastening device 10 shown in Figs. 1,2,and 3 is the subject

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of my co-pending European Patent Application 88902516.9. It is formed from 0.4mm thick hard rolled stainless steel, in this embodiment from a rectangular blank of 80mm X 35mm; it comprises a flat plate section 12 and two gripping members 14 and 16 which extend generally upwardly (as seen in Fig.2) from the plate section 12, and to the same side thereof. Between the gripping members there is retained an intermediate portion 19, in the same plane as the flat plate section 12, and which in an alternative embodiment has a nailing hole i.e. of smaller diameter than screw holes 18. The gripping members 14, 16 have their engagement tips 15,17 axially (i.e. upwardly as seen in Fig.1) and laterally offset.

The gripping member 14 is in the form of a tongue, provided by a substantially planar strip punched from flat plate section 12 and which is angled at 60 degrees to the plane of plate section 12, and in this embodiment reaches at its tip 15 a height of 10mm above the plane of plate section 12.

The second gripping member 16 is also in the form of a tongue, provided by a strip angled from plate section 12, to a height at its tip 17 of 9mm above the plane of plate section 12. The gripping member 16 comprises two sections 16a and 16b. The first section 16a is at 45 degrees to the plane of plate section 12, and the second section 16b, which is integral with the first section 16a, is at 85 degrees to the plate section 12.

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Two holes 18, aligned with gripping members 14 and 16, are formed through the plate 12; in use, fastening means such as a countersunk screw or (less preferably) a nail can be passed through each hole 18 to fix fastening device 10 to a surface, 5 such as to the surface of a window reveal.

The retention component 30 of Fig. 4 has a base 32, a plurality of saw-teeth 34 projecting from one side of the base (i.e. as seen in the view of Fig.4 generally upwardly, but inwardly of the opening in use) and providing closely-spaced 10 adjacent grooves each shaped lockingly to receive a tab from a window or equivalent frame (e.g. tab 209 of Fig.13), and an abutment 36 extending from one longitudinal edge 38 of the base and projecting further from said one side of the base than the saw-teeth 34. The teeth 34 are all to one side of the abutment 15 36 i.e. that side first met when a panel is inserted in direction "A". The grooves are defined by an over-ride flank 34a angled to intersect the plane of the abutment and a retention flank 34b parallel to the plane of the abutment.

In an alternative embodiment, abutment 36 extends from the 20 base a similar distance as the saw-teeth 34, whose tips are therefore resilient or deformable to allow the tab (e.g. the aforesaid tab 209 of Fig.13) to ride thereover and lockingly engage with the rear surface of a tooth whilst the frame is prevented from further inward movement (in direction "A") by

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engagement with the abutment.

Abutment 36 is spaced from saw teeth 34 by a foot portion 40 which includes a nailing recessed groove 42. Retention component 30 has a second foot portion 44 connecting a  
5 longitudinally extending toothed member 48 (i.e. into the paper as viewed in Fig.4), toothed member 48 being of the same height as saw-teeth 34; the second foot portion 44 has a nailing recessed groove 46. In this embodiment toothed member 48 comprises a single tooth with a rearwardly-angled taper,  
10 corresponding to the taper angle of saw teeth 34, to permit a tab finger 14,16 peripherally mounted on or integral with a frame to slide thereover with slight flexure until springing behind an upstanding locking flank.

Toothed member 48 can thus if required provide an interim  
15 fitting stage, wherein the frame is temporarily held whilst being checked for alignment, before being (squarely) pressed rearwardly towards abutment 36 for respective tab engagement with the upstanding (rear) flank of a tooth 34. For lighter windows, use of toothed member 48 can permit installation by a  
20 fitter acting alone.

Columns 50 extend from the other side of the base 32 (which is the outer side in use, relative to the panel or window opening), and terminate in a plane substantially in line with the terminal plane of feet 40,44. In the alternative embodiment

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of retention component 130 shown in Fig.5, the columns 150 are made of greater height.

In use, and as schematically shown in Fig.6, the retention component 30, 130 is extruded from plastics material and cut to 5 length. A suitable length is secured to each of the upright, opposed facing walls 66 of a "new-built" i.e. existing, opening and secured into selected mortar joints 62 by nails 64 hammered through the grooves 42,46. Abutment 36 is positioned adjacent the internal building wall, and can subsequently 10 provide a plaster face.

A window frame (not shown) but suitably pre-formed as shown in Fig.13 and possibly double-glazed, and fitted with resilient fastening members, suitably of metal and shaped as shown in Figs.1-3, is now fed from outside the building in direction "A" 15 inwardly towards abutment 36 (or 136 if the embodiment of Fig.5 is fitted), and is permanently retained by engagement of one or both of finger tips 15,17 with one or more respective retention flanks of saw teeth 34,134, to effect a retention arrangement.

One advantage of the described arrangement is that the 20 bricklayer can lay the bricks 60 for a cavity wall structure (or even for a single wall structure) without needing the glazier to be present; another is that the retention component 30,130 can be fixed to inwardly facing sections of the wall opening when built, without the builder or window fitter

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needing to consider whether the opening has a constant depth (from outside the building to inside) since the arrangement does not depend upon sandwiching the wall for effective securement; yet another advantage is that the window fitter 5 (and glazier if a non-glazed frame is fitted) can attend upon the opening merely from the outside of the building without requiring anyone inside to hold the retention component; and a yet further advantage is that once the window is fitted, the plasterer can continue to lay plaster internally of the 10 building, often using the abutment 36, 136 as a height guide and end stop.

The alternative arrangements of Figs.7-13 are suitable for a "new-build" opening. The bricklayer will typically lay a line of bricks 60 and blocks 70 to a selected height, and will then 15 lay a further layer of either the bricks or blocks, position the extension part 200 of a preformed rectangular retention member 201 against the extra layer, and then clamp the extension part 200 in position by laying further bricks or blocks so as to sandwich the extension part 200, as seen in 20 Fig.8.

Abutment 236 has a rearward angled surface 237, which provides a plastering level for plastering section 235. To help key the plaster, surface 237 is ridged. Extension part 200 is of hollow extruded construction, with strengthening ribs 205; 25 alternatively the parts can be separately extruded, and heat

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welded or otherwise secured together.

Although for clarity a gap is shown (Fig.8) between the extension part and the bricks and blocks, in practice the bricklayer will seek to avoid these gaps, using if necessary  
5 the, or another, extension part as a cavity spacer when building up the lower cavity wall, below the window opening. However the retention component can if required be laid on a bed of mortar or equivalent, or the gap can be sealed by a known resilient sealing compound.

10 Typical cavity widths are 38mm, 48mm, and 64mm. In the Fig.10-13 embodiments the extension piece 200 has a width of 38mm, and spacers 205 (Fig.12) can be fitted to one or both sides of the extension piece, by way of heads 207 received in recesses 211a, 211b on opposed sides of the extension piece  
15 200.

In this alternative embodiment, abutment 236a is differently shaped to abutment 236; and as seen in the plan view of Fig.11, plastering section 235 has aperture 236, whereby in use the plaster can key through the retention member directly onto the  
20 brickwork, e.g blocks 70. In alternative embodiments, teeth 204, 206 etc. are not continuous from one side edge 231a to the other side edge 231b; and a number of separate retention members 230, 230a may be fitted (as for Fig.6) around the aperture 203, touching or spaced apart, providing suitable

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weather sealing is used, at least for external (e.g. window panel) openings.

As the brick and blocks continue to be laid, the retention component 230, which in this embodiment is integral with extension part 200, is located in position in the cavity or gap between the outerwall bricks and innerwall blocks. Usefully, and as seen in Fig.9, the retention component will be cut to length, and will be connected (as by welding or adhesive or corner brackets) to similar cut lengths to form a rectangular frame, around which the bricks 60 and blocks 70 can be built to form a window opening 203 of pre-selected dimensions and size, with the rectangular frame (assembled from four retention components) locked permanently in position in the window opening, and itself defining the wall opening.

15 A window frame 205 (Fig.13) with glazing 207 can be securely positioned in the opening by being fed towards abutment 236 in direction "A". In one embodiment, a window frame carries spaced fastening devices 10 (Figs 1-3) having tips 15,17 one or both of which respectively ride over and then engage with one or 20 more respective angled saw-teeth 314. However, in the embodiment of Fig.13, window frame 205 has integral resilient finger 209 which engages behind the single angled tooth 334. Recess 211a locates brickwork tie 213.

Fig.12 uses a modified abutment 336 for retention unit 230b.

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Thus the forward or outer face 336f carries a nib 340, and has a shaped recess 342. As seen in Fig.13 when frame 205 has been fitted up against nib 340, resilient sealing gasket 341 can be located in the recess 342 with one sealing edge 344 against the rear wall 346 of the frame, whilst its other sealing edge 347 rests upon plaster 348 and conceals the plaster edge i.e. the join of the plaster and the abutment rear or inward (relative to the building) face 336r. In normal use, resilient plate or finger 209 biases the frame 205 against nib 304, thereby squeezing the necked part of the gasket 341.

In an alternative embodiment, a fastening device 10 is located by way of flat plate section 12 between a pair of surfaces 204, 206, or 208,210 or 212,214 with the upstanding tips 15,17 directed generally towards the interior of the building i.e. towards the abutment, to engage outwardly directed ribs in the frame and so retain the window frame, in this embodiment by their serrated tip(s) as disclosed in my co-pending European Patent Application 88902516.9; but alternatively with tips 15, 17 engaged in one or more spaced recesses in the cooperating frame edge. The surfaces 204,206 will have a height substantially equal to the thickness of flat plate section 12 i.e. 0.05mil. In this embodiment the pairs of surfaces 204,206 and 208,210 and 212,214 have facing projections 216 (Fig.7) at their upper (inward) ends, to retain the fastening device 10 until the window frame is inserted; fastening device 10 will be of a hard material e.g. metal,

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which can be pressed past the facing projections 216, usually of a plastics material, and which thereafter spring back towards their initial positions.

In yet other alternative embodiments the saw-teeth of the 5 retention component can terminate at differing heights from the base. Usefully the saw teeth will be formed by removal of material from a thick base member (for Fig. 4 of 3mil and for Fig.5 of 5mil) with the respective abutments 36 and 136 having heights from the feet of 10mil and 12mil; the retention 10 components 30,130 have a length in the outer to inner fixing direction of 63mil, with feet 40,44 of length 10mil.

In further alternative embodiments the retention components 30,130,230 can be formed with integral or built-in gripping members (corresponding to gripping members 14,16 of Figs 1-3) 15 engagable in spaced recesses in (or against raised lips extending outwardly of) a window frame edge.

In the embodiment of Fig.14, three upstanding teeth are shown, each with a differently profiled engagement tooth tip 414a, 414b,414c, the tips being below the height of abutment 20 436. This embodiment is suitable for nominated use in conjunction with a profile of one proprietary frame manufacturer, with recesses or raised lips at a known spacing. The teeth are spaced by base sections.

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The embodiment of Fig.15 is also primarily intended for use with one (proprietary) profile, but since it includes closely-spaced saw teeth 534 between the tabs or fingers 514a,514b, it can also be used with a window frame which itself has externally projecting tabs or fingers engageable with respective saw teeth.

The further alternative embodiment of Fig.16 indicates that the fingers 614a,614b have their tips spaced by a distance "S" suited to another proprietary profile, and that the fingers are formed integrally with a base 632 of height "H" and with a platform of width "W". The height and/or spacing of tooth 648 can be altered if desired, to make subsequent affixing (nailing) easier.

Preferably the fingers in Figs. 14-16 will be in the form of longitudinally extending plates. In one embodiment these plates extend the full length of the retention member without interruption; but in alternative embodiments there can be spaced slits or recesses or apertures to assist finger flexure during frame insertion, or to avoid frame pieces, but selected to minimise any reduction of the frame retention facility.

The embodiments of Fig.14-16 will preferably be made of a plastics material, for used with frames of any material (aluminium, wood, plastics e.g. PVC) but are likely to be of particular value for use with metal (e.g. steel) frames for

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which the retention tips of the members according to Figs.1-3 may be less effective. If however without suitable recesses or projections with which the tabs e.g. 514a,514b can engage, the frame can have its own tabs to engage teeth 534 e.g. integral tabs if a plastics frame, or affixed retention components such as that of Fig.1-3 for a frame of metal, wood or plastics. Thus frames of all materials can be secured by a retention member according to this invention.

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## CLAIMS

1. A retention component (30,130,230,230a,330,430,530,630) for securing a window panel or the like in a wall opening characterised by a base (32,132,232,332,432,532,632), a tooth (34,134,234,334,434,534,634) projecting from one side of the base, and an abutment (36,136,236,336,436,536,636) projecting from said one side of the base, said abutment projecting at least as far from said base as the tooth, said tooth having a retention flank (34b).
2. A retention component according to Claim 1 characterised in that the abutment extends in a plane, in that there are a plurality of teeth projecting from said one side of the base, in that at least one of said teeth has a surface parallel to the plane of the abutment to provide a retention flank (34a), in that the tooth has a second surface in a plane intersecting the plane of the abutment to provide an over-ride flank (34a), in that at least one tooth has a different profile engagement tip to that of another tooth (514a, 514b), in that the abutment projects further from said base than any of the teeth, and in that the teeth are all to one side of the abutment.
3. A retention component according to Claim 2 characterised in that the teeth are spaced by base sections (432) each of which sections is planar, in that the sections lie in a

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common plane, in that the teeth are of uniform height and so have a common projected distance from said one side of the base, in that the teeth extend transversely along the component in the form of angle blades, and in that the component is a member linear in form with the teeth extending from one side edge (231a, 231b) of the member to the other side edge.

4. A retention component according to Claim 1 or Claim 2 characterised in that securement portions (40,44) are provided for use in securing the retention component to opposed side walls (66) of the window opening, in that said means comprising spaced nailing points, in that said nailing points are connected to form a nailing groove (42), in that a first foot portion (40) is provided which includes said first nailing recessed groove (42), and also includes a second foot portion (44) spaced therefrom with a second nailing recessed groove (46), the teeth being between said foot portions, in that the second foot portion (44) has a toothed member (48) of the same height as the teeth (34) and which extends in the same direction away from the base (32) as said teeth, and in that the retention member is extruded from a plastics material and cut to length.
5. A retention member according to Claim 4 characterised in that each said foot portion terminates in a supporting

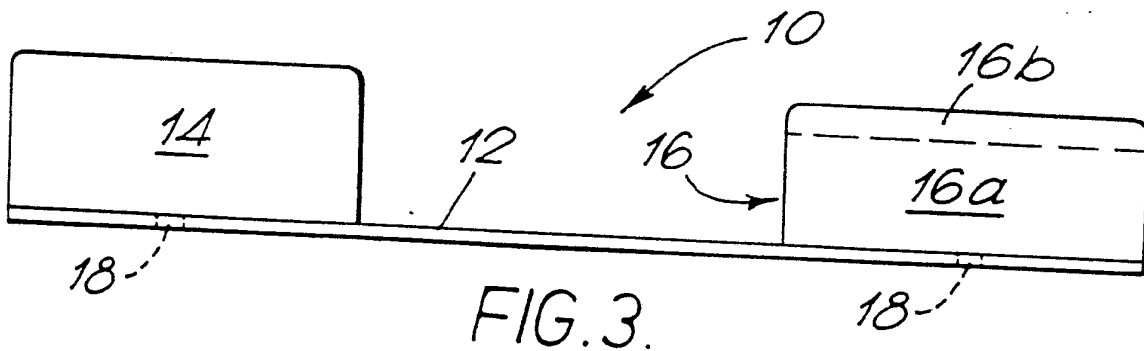
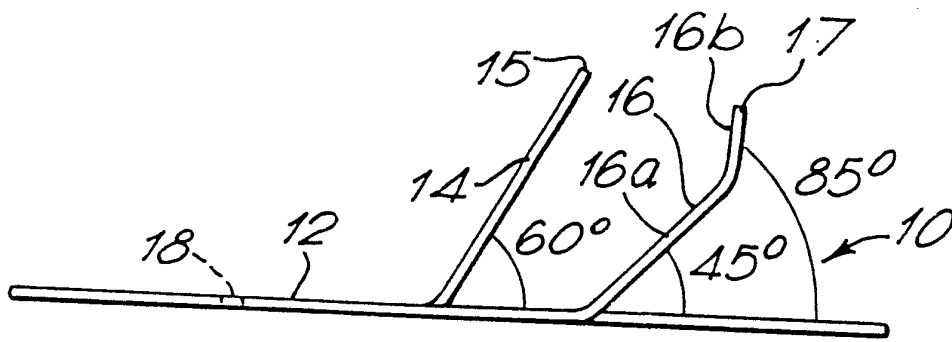
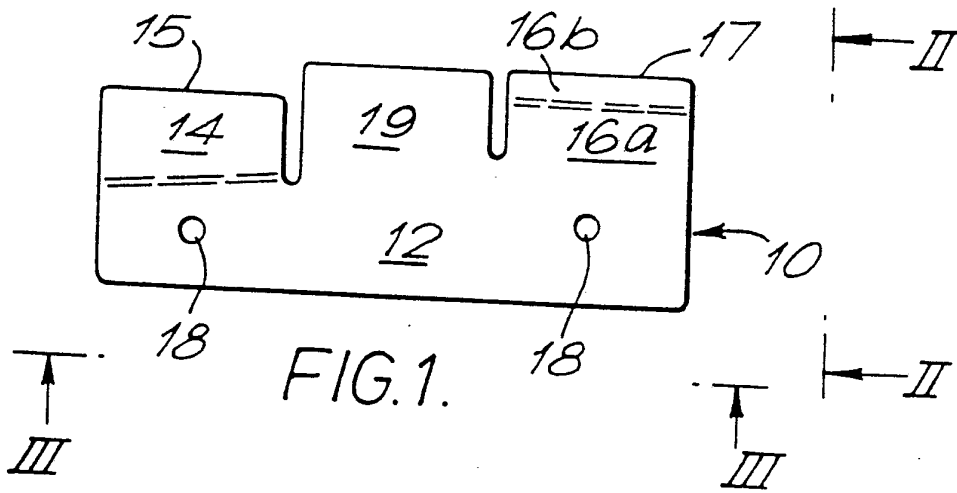
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plane, in that supporting columns (50) extend from the side of the base (32) opposed to that with the teeth, and in that said columns terminate in a plane substantially in line with the terminal plane of the feet (40,44).

6. A retention component according to Claim 1 or Claim 2 characterised in that the component is a four-sided unit, rectangular in form and defining an opening or aperture, in that the component comprises four linear members connected at respective ends, in that each linear member has a securement portion (200) for use in securing the retention component in a wall opening defined by twin facing walls separated by a cavity gap, in that said securement portion is a spacer member (200) for determining the cavity gap between two facing walls of the wall opening, in that means for fitting one or more removeable spacers (205) are provided, in that said securement portion is an outward extension piece (200) projecting away from the side of the base opposed to the side of the base with the teeth, and in that each retention component has ends whereby it can be joined to two other retention components with mating ends whereby to form said rectangular structure.
  
7. A retention member according to Claim 1 or Claim 2 characterised in that integral gripping members (14,16) are provided, engageable in spaced recesses of a window frame edge.

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8. A retention arrangement for a wall having an opening closed by a panel, characterised in that the panel is retained by a retention member according to Claim 1 or Claim 2, and in that the opening is provided in a cavity wall with the retention member having an outward extension piece which extends into the cavity to form a damp-proofing member, a draught seal and cavity closure member.
9. A wall assembly wherein an opening defined by inner and outer building wall surfaces is to be closed by a panel characterised in that the panel is retained by a retention member according to Claim 1 or Claim 2, and in that the abutment is adjacent the inner wall and provides a plastering edge.
10. A method of retaining a panel in an opening characterised in that a retention member according to Claim 1 or Claim 2 is used, the retention member providing a former about which bricks and blocks can be assembled to form the opening, which includes the steps of feeding the panel towards the abutment, locating the panel by means of an upstanding tooth, and sealing the panel by a resilient gasket located in the retention member so that it engages the panel.



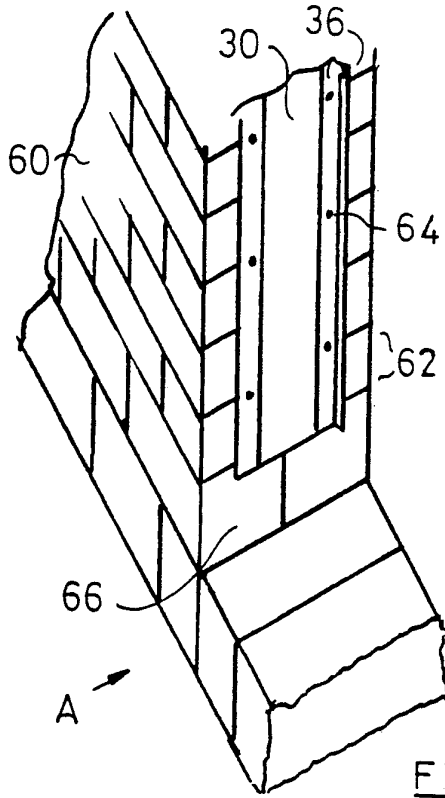


FIG 6

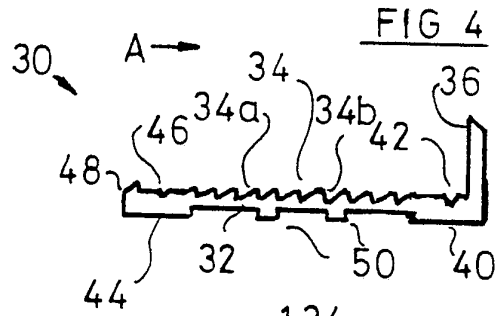


FIG 4

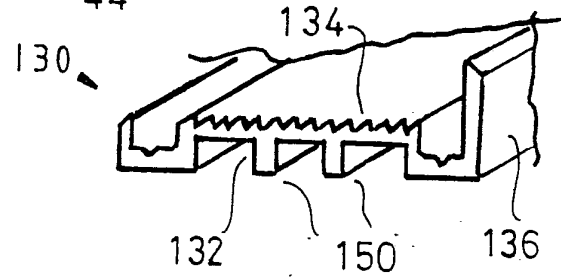


FIG 5

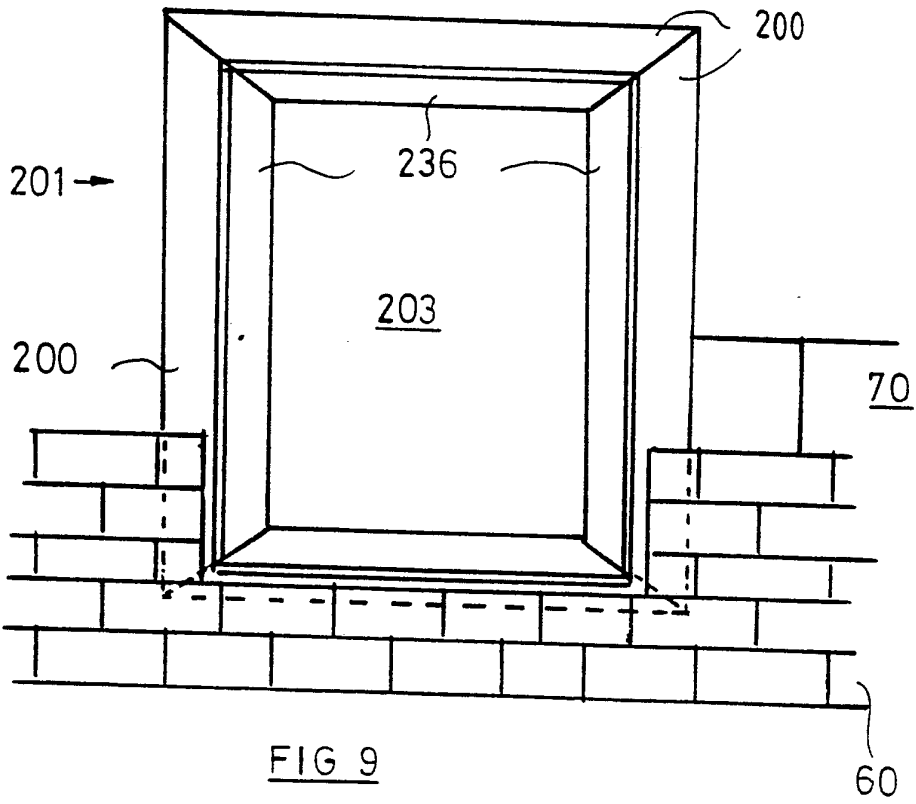


FIG 9

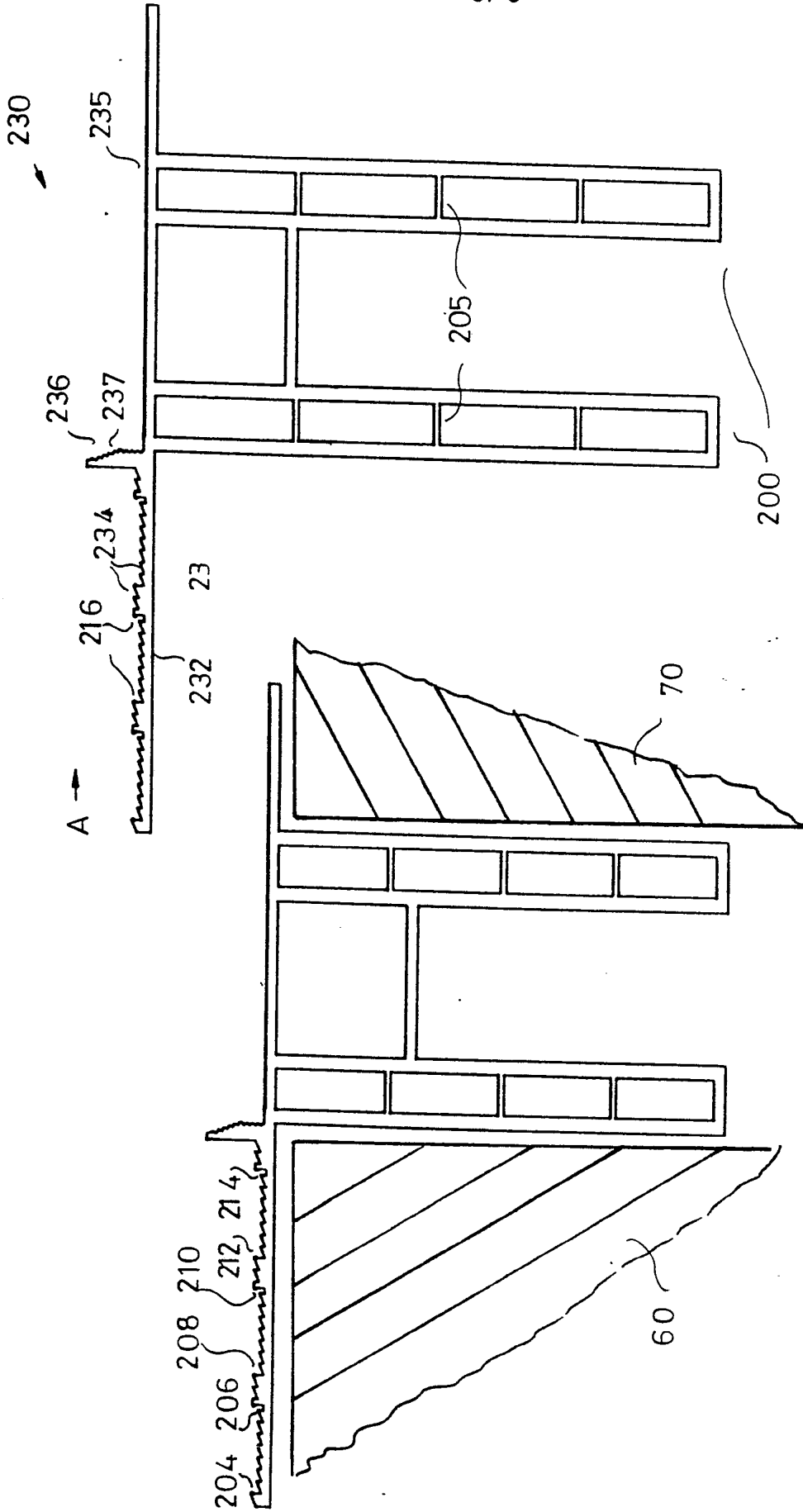


FIG 7

FIG 8

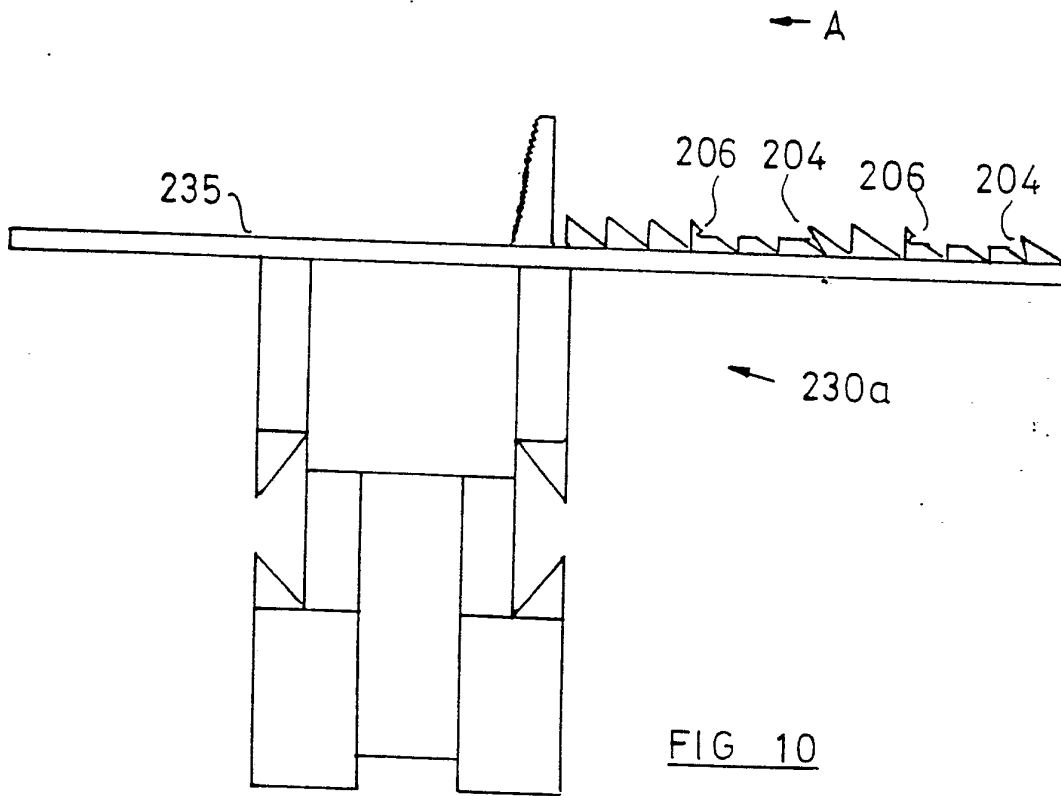


FIG 10

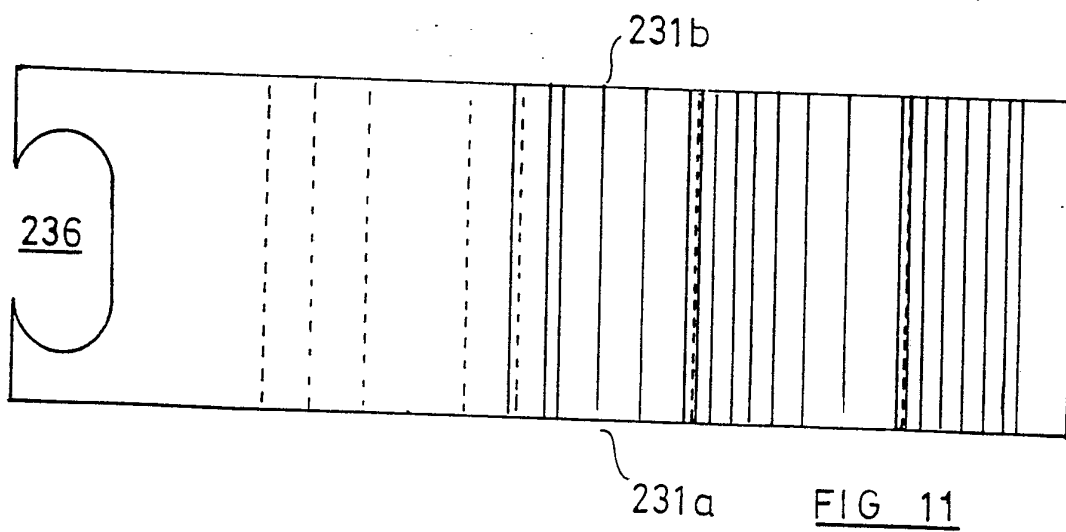
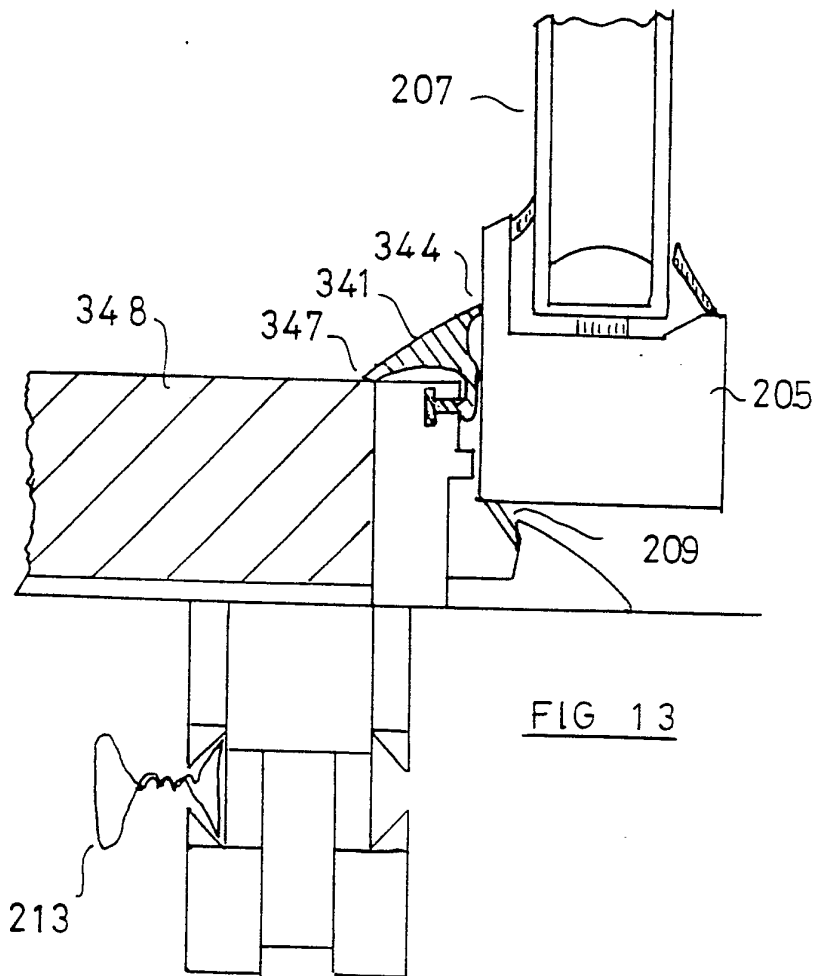
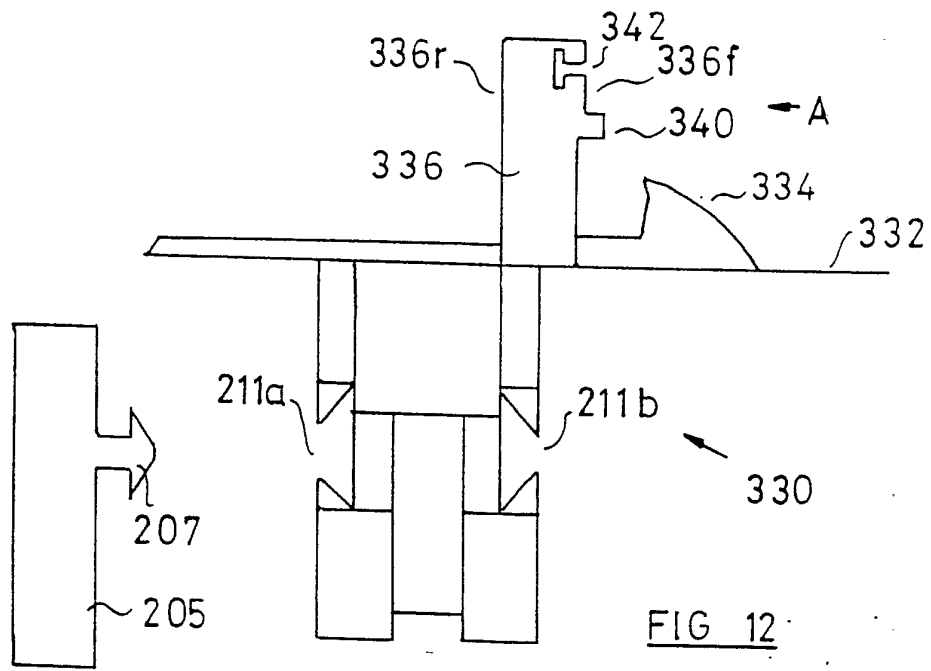
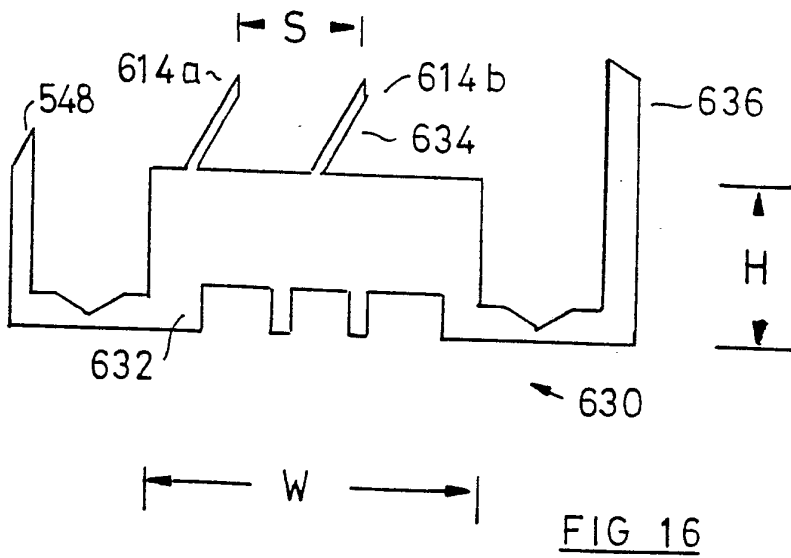
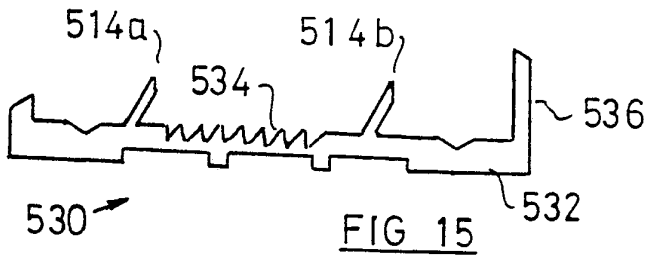
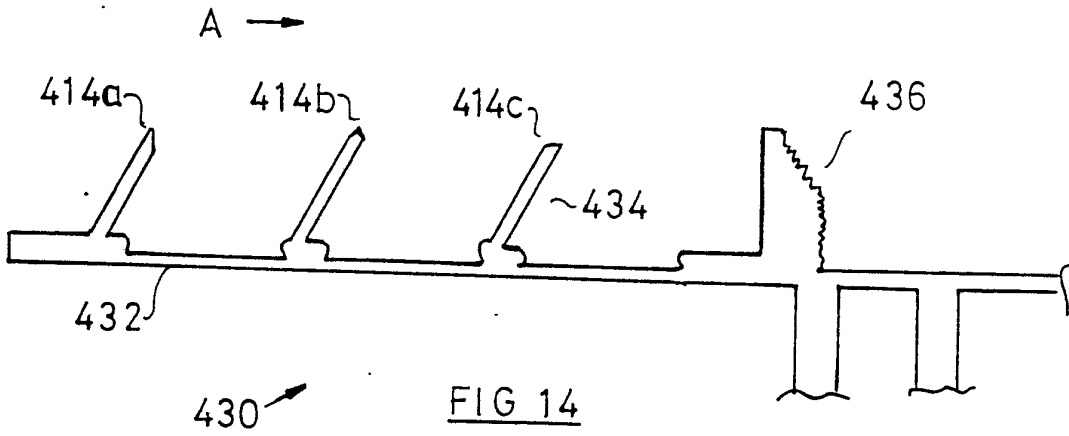


FIG 11

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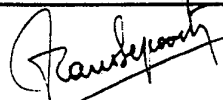




## INTERNATIONAL SEARCH REPORT

PCT/GB 91/00342

International Application No

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. 5                      E06B1/02		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
Int.Cl. 5	E06B	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>		
Category <sup>o</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	US,A,3 694 985 (SPAICHES) October 3, 1972 see column 1, line 48 - column 3, line 59; figures 1-6 ---	1,2,3,7
X	AT,B,349 718 (KRAUSHOFER) April 25, 1979 see page 2, line 40 - page 3, line 15; figures 1,2 ---	1,2,7
X Y	NL,A,8 301 027 (WAVIN) October 16, 1984 see page 1, line 19 - page 7, line 9; figures 1-5 ---	1,8,9,10 6
Y	FR,A,2 143 909 (GLOVER) February 9, 1973 see page 10, line 27 - page 11, line 5; figure 15 ---	6
A	DE,A,2 114 208 (MOLYNEUX) December 23, 1971 ---	
<p><sup>o</sup> Special categories of cited documents: <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
12 JUNE 1991	04.07.91	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	DEPOORTER F. 	

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 9100342

SA 45490

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The members are as contained in the European Patent Office EDP file on

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