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(54) **Waste water handling apparatus**

(57) The invention relates to a gutter element 1 for use in a guttering system, comprising a plurality of means 2 adapted to restrict length variation of the element owing to thermal effects, the means 2 being spaced along at least a majority of the full length of the gutter element.

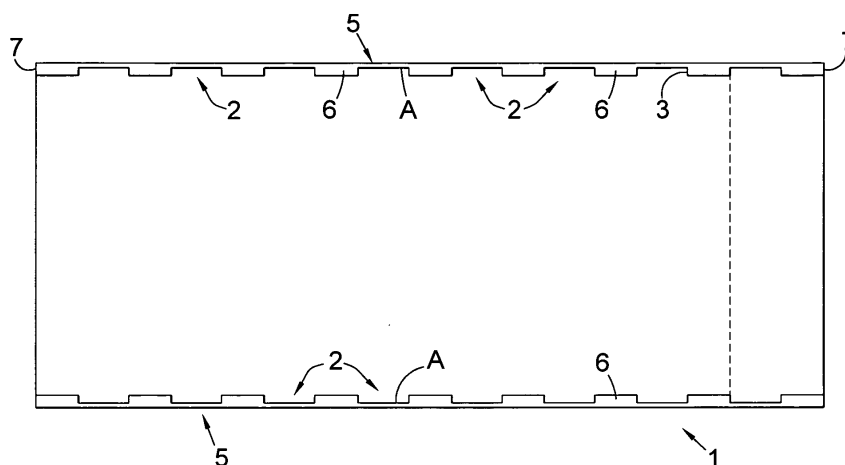
It will be understood that the means 2 may comprise a notch 3, suitably of open channel shape as shown, slot, slit or the equivalent opening in a gutter element 1 for receiving support element such as a bracket or gutter union.

The gutter element is of 'square' section in end elevation and has inwardly directed flanges 4 at facing upper

(in use) edges 5 which are each notched along their whole length by having notches 3 formed therein of channel shape, there being pairs of opposite notches on, in the embodiment, 29mm centres, each slot being 13 mm long, as is each land 6 between notches 3, and between an end notch 3 and an end 7 of the gutter element 1.

If the gutter element 1 is cut to length on site, e.g. along a line 'X', it is cut to leave a full land length. A gutter union with a retention web is inserted as by snap engagement at a desired position along the gutter element 1 in an appropriate pair of opposed notches 3, e.g. A-A.

There may be a single longitudinally axial central notch.



**Fig. 1**

## Description

**[0001]** The invention relates to a waste water handling apparatus, particularly a gutter or guttering system, and more particularly to a gutter element for use in such a system.

**[0002]** Gutter systems are well known and have proved to be an efficient way of dealing with run-off water from say a roof of a building such as a domestic dwelling or house. These systems usually comprise runs, sometimes extended runs, of gutter elements joined end to end and supported by brackets, there often being seals at abutting edges of adjacent elements to form a joint, where there is usually a union fitting or clip to ensure as watertight a joint as possible. The material of the gutter elements, usually metal or plastic, can however be effected by variations of ambient temperature, and the action of direct sunlight. Thus, the accommodation of thermal expansion and contraction is an issue which has to be addressed with the design of plastic gutter systems. For example, the thermal expansion of a PVCu gutter would result in movement of 0.5mm per 1m length of gutter for a 10°C temperature change. A 4m length of gutter would expand 6mm if the ambient temperature increased by 30°C or it would contract by 6mm if the temperature decreased by 30°C.

**[0003]** The expansion and contraction of the gutter is accommodated by building allowances in the union fittings which connect the lengths of gutter together. Rubber sealing strips are located in the sockets of the gutter union fittings (e.g. bends, running outlets, unions, stop ends etc.) to provide a hydraulic seal between the gutters and the fittings. The gutter is able to move axially across the rubber seals and a positive gutter stop is provided in the fitting which limits how far the gutter can move axially into the socket of the fitting. Typically the positive stop would be approximately 25mm from the inside edge of the rubber seal. To provide both a contraction and expansion allowance within each socket, and "insert to here" line is moulded on each fitting in-between the positive stop and the inner edge of the seal recess but not necessarily equi-distant, as it may be advantageous to have a greater contraction allowance than the expansion allowance to ensure that the gutter can never pull back over the seal.

**[0004]** Expansion and contraction will always be accommodated if gutters are correctly fitted to the "Insert to here" marks in the fittings and the fittings at each end of the gutter are screwed to the fascia on the house so that the positions of the fittings are fixed absolutely. If the union fittings are not fixed to the fascias as is increasingly common with the use of unskilled labour, then the repeated expansion/contraction cycles will cause the gutters to "shuffle-up" within the fittings so that, eventually, all the contraction will occur in one socket and the gutter will pull back over the seal and leakage will occur.

**[0005]** It is an object of the invention to seek to mitigate these disadvantages.

**[0006]** According to one aspect of the invention there is provided a gutter element for use in a guttering system, comprising means adapted to accommodate length variation of the element owing to thermal effects, the means being intermediate the length of the gutter element.

**[0007]** The means may be located at substantially the axial centre of the element.

**[0008]** This provides for an efficient and uniform construction for accommodating thermal effect length variations.

**[0009]** The means may comprise a notch formed in the gutter element. The notch may be of open channel section, or a slit, slot or equivalent opening in a gutter element, for receiving a support element such as a bracket or gutter union.

**[0010]** The notch may be formed at a top (in use) edge of the gutter. Suitably, the gutter element may include an axial flange at or adjacent the top (in use) edges of the gutter, in which the notch is formed. Either construction is a simple yet efficient one for accommodating thermal effect length variations in the element.

**[0011]** The top edge may be a rear edge in use. Alternatively, the top edge may be a front edge in use.

**[0012]** The gutter element is suitably formed by extrusion moulding.

**[0013]** The notice may be punched or routed from the gutter edge during extrusion moulding.

**[0014]** The support device may comprise a bracket or gutter union.

**[0015]** The bracket may be a bracket fixed adjacent an axial central position of the gutter element.

**[0016]** There may be a plurality of means adapted to accommodate length variation of the element owing to thermal effects, the means being intermediate the length of the element.

**[0017]** The means may be spaced along at least a majority of the full length of the gutter element. This provides for a multi-point mounting of the gutter element, particularly when the means may be spaced apart over the full length of the gutter element.

**[0018]** The means may be suitably spaced notches (as herein defined) formed in the gutter element. This provides a relatively simple construction.

**[0019]** There may be an inwardly directed axially extending flange, the notches being formed in the flange. This provides for relative ease of construction, and use.

**[0020]** The flange may be located at or adjacent a top (in use) edge of the gutter element.

**[0021]** In an alternative construction, the notches may be formed, in at or adjacent a top (in use) edge of the gutter element.

**[0022]** There may be notches formed at or adjacent opposed top edges of the gutter element.

**[0023]** The gutter element may have a support device for the gutter element adapted to be secured in a notch or notches positioned intermediate the length of the gutter element.

**[0024]** There may be a pair of opposed notches, one

on each side of the gutter element, formed at substantially the axial centre of the gutter element. This provides for secure fixing so that only part of the element distal of the centre notches move to accommodate expansion and/or contraction.

**[0025]** A support device for the gutter element may be adapted to be secured in the notches.

**[0026]** The support device may comprise a bracket applied to the gutter element to provide a top fixing thereof in use.

**[0027]** Such a bracket may comprise plastic or metal such as plastic-coated or galvanized steel.

**[0028]** The notches may be slots at, in or adjacent each longitudinal edge of the gutter element, and there may be a separate retention device adapted to be snap-engaged to the slots.

**[0029]** The slots may be formed in a longitudinally extending edge at the front (in use) of the gutter element. Alternatively, the notches (as hereinbefore defined) may be formed in opposed sides of the gutter element.

**[0030]** There may be a device to conceal the notches, particularly a U-shaped element adapted to receive an edge of the gutter element and which may have legs of sufficient length to conceal the notches.

**[0031]** There may be integral retention clips on the support device.

**[0032]** A rear (in use) edge of the gutter may comprise notches and the front (in use) edge of the gutter may comprise notches and the front (in use) notches may be through an additional overhang to obviate the notches being seen from below.

**[0033]** The notches may be in, at, on or adjacent a single longitudinal edge of the gutter.

**[0034]** The edge may be the rear edge or the front edge (in use). The element may be formed by extrusion of plastic.

**[0035]** The notches may be punched or routed from the or each gutter edge continuously during an extrusion moulding process.

**[0036]** The gutter element may be supportable at only a longitudinal centre thereof.

**[0037]** According to a second aspect of the invention there is provided a gutter system comprising a plurality of gutter elements as hereinbefore described, joined end to end to provide a run of guttering of a desired length.

**[0038]** A guttering element may be supported only at substantially the longitudinal or axial centre thereof in the guttering system.

**[0039]** Gutter elements and a system embodying same according to the invention are hereinafter described, by way of example, in the accompanying drawings, all of which are schematic.

Fig. 1 and Fig. 1A show a plan and end elevational view of a gutter element according to the invention;

Fig. 2 shows a plan view of use of a gutter element like that of Fig. 1, with a support device such as a

gutter support bracket at a centre point;

Fig. 3 shows a plan view of a further gutter element according to the invention, and Fig. 3A shows a use of that gutter element;

Figs. 4A - 4D show a yet further embodiment of gutter element, with notches in the sides thereof, Fig. 4A being a longitudinal sectional view, Figs. 4B and 4C respectively being a plan view and a longitudinal sectional view of the gutter element with a shield device, and Fig. 4D is an end elevational view of Fig. 4B;

Fig. 5 shows a plan view of an embodiment used with union fittings having integral gutter retention clips;

Fig. 6A to 6D showing details of another embodiment for mounting a gutter element;

Fig. 7 is a perspective view of part of a length of gutter element according to the invention;

Fig. 8 is a plan view of the element of Fig. 1;

Fig. 9 is a plan view of a second embodiment of gutter element according to the invention;

Fig. 10 is a plan view of part of a guttering system according to the invention; and

Figs. 11A-11E show respectively side, top, bottom and end elevations of a fascia bracket.

**[0040]** Referring to Figs. 1 to 6D of the drawings, in which like parts are indicated by like reference numerals there is shown in Fig. 1 and 1A a gutter element 1 for use in a guttering system, comprising a plurality of means 2 adapted to restrict length variation of the element owing to thermal effects, the means 2 being spaced along at least a majority of the full length of the gutter element.

**[0041]** It will be understood that the means 2 may comprise a notch 3, suitably of open channel shape as shown in Fig. 1, slot, slit or the equivalent opening in a gutter element 1 for receiving support element such as a bracket or gutter union.

**[0042]** In Fig. 1 the gutter element is of 'square' section in end elevation and has inwardly directed flanges 4 at facing upper (in use) edges 5 which are each notched along their whole length by having notches 3 formed therein of channel shape, there being pairs of opposite notches on, in the embodiment, 29mm centres, each slot being 13 mm long, as is each land 6 between notches 3, and between an end notch 3 and an end 7 of the gutter element 1.

**[0043]** If the gutter element 1 is cut to length on site, e.g. along a line 'X', it is cut to leave a full land length. A gutter union with a retention web is inserted as by snap

engagement at a desired position along the gutter element 1 in an appropriate pair of opposed notches 3, e.g. A-A in Fig. 1.

**[0044]** The engagement of the gutter union webs in the notches 3 restricts movement into and out of each socket of the union whilst still accommodating length variations owing to thermal effects such as expansion or contraction.

**[0045]** Fig. 2 shows a gutter element 20 similar to Fig. 1 in that it has a continuous array of notches 3 along its length, the notches being defined by lands 6. A gutter support element or bracket 21 has parts which fit more or less exactly into notches on each side of the gutter at the centre thereof thereby providing a fixed point so that all expansion and contraction is concentrated on the support element 21 at each end of the gutter element 20. This construction and arrangement is operative to concentrate expansion and/or contraction into support elements such as unions (not shown) at each end of the gutter element 20, even when retention webs of the unions are absent and thus do not latch into the notches 3 at the end of the gutter elements 20.

**[0046]** There could be support elements such as brackets between the central locked bracket 21 and the ends 22, 23 of the gutter element 20, but these brackets would not be locked into any notches 3 so providing for free movement on expansion and/or contraction, which movement would therefore not be impeded. In a modification, not shown, only a single pair of notches 3, one on each side of the gutter element 20 and axially centrally thereof, would be provided. These notches 3 would be concealed by the brackets, so that they could be in the side of the gutter element 20 and not along a top edge or top intumed flange. The gutter element with such notches could also be supported by a top fixing bracket system. The bracket can be made of any suitable material, for example plastic or metal such as pre-coated galvanized steel.

**[0047]** Referring now to Figs. 3 and 3A, the gutter element 30 shown has a profile in which axially (longitudinally) extending flanges 31 are provided, spaced downwardly from the top edge of the gutter element 30 to permit use of top fixing brackets, i.e. brackets which support the gutter element from the top, as considered in use.

**[0048]** Slots 32 are formed in the flange although notches like that of the first embodiment could also be utilised. In the embodiment, the flanges are shown on the rear axially extending flange and a band clip 33 or bracket is formed with a retention nib, web or detent 34 which is engageable as by being snap-engageable, in a respective slot 33.

**[0049]** It will be understood that although not shown in Figs. 3 and 3A, notches *per se*, or slots could be incorporated in a front (in use) axially extending flange of the gutter element 30. In this case the retention nib, or web or detent 34 comprises a separate member adapted to be snap-fitted through an orifice moulded on the top (as viewed) of the overhang on the band clip to engage the

slot/notch in the axial gutter flange. This is the case as otherwise it would not be possible to mount the gutter element under the overhang because of the greater length of the retention nib, web or detent necessary to engage in the axial flange which is displaced below the top ledge of the gutter.

**[0050]** Referring now to Figs. 4A-4D, an embodiment 40 of gutter element is shown having notches 3 or slots (not shown) and lands 6 formed in the sides of the gutter element, that is, without there needing to be an axial flange or flanges. This provides for a relatively simple production process, such as by extrusion. In order to hide the notches or slots, if necessary a U-shaped elongate element 41 such as a cover could be pushed onto a front, in use, edge of the gutter element 40, the legs or limbs 42 of the U-shaped element 41 being sufficiently long to conceal the notches or slots 3, so improving the aesthetics of the gutter element 40 in use.

**[0051]** Referring now to Fig. 5, there are shown a gutter element 50 including union brackets 51 with integral gutter element retention clips 52, rather than separate band-clips.

**[0052]** With reference to Figs. 6A-6D, there is shown an embodiment 60 of gutter element in which the rear 62, in use, edge of the element 60 has slots 61 and the front edge 63 notches 3 and lands 6 in an additional flange or overhang 64 so that the notches 3 cannot be seen from below when the gutter element is installed. This configuration has the benefit of simpler, and thus less costly, production. The webs 65 shown (Fig. 6D) can be omitted. Adjacent gutter elements 60 are connected by a gutter union 65.

**[0053]** Referring now to Figs. 7 and 8 there is shown a further gutter element 100, extruded from plastic material and for use with a guttering system 110 (Fig. 10) comprising means 102 adapted to accommodate length variations of the element 100 owing to thermal effects, the means 102 being intermediate the length of the gutter element 100.

**[0054]** In Figs. 7 and 8, the means 102 comprises a notch formed in an upper in use edge 103 of the element 100 at one side or edge thereof at substantially the longitudinal axial centre of the gutter element 100.

**[0055]** In Fig. 9, the notch 102 is formed in a longitudinally extending internal flange 14 at one side or edge thereof at the upper in use edge 105 of the gutter element 106.

**[0056]** In both cases, the gutter element 100, 106, is supported by a fixed support member such as a bracket 107 or gutter union to form part of the system 110, as shown in Fig. 10. In that Figure, there is a bracket with a body of internal profile complementary in shape to that of the external surface of the gutter element 100, 106 to provide a cradle therefor. The inboard side 108 of the bracket is fixed to say a fascia (not shown) of a building, and has a spigot, detent or projection 109 received in the notch 102, suitably with a push or snap fit, to secure the gutter element axially centrally so that the element can

expand equally on either side thereof owing to thermal effects.

**[0057]** In Fig. 9 the edge with the notch 102 is a rear in use edge of the element 100, 106. The notch could equally be in the front, in use, edge of the gutter element 100, 106, in which case the outboard part of the bracket or gutter union would have appropriate spigot, detent or projections for locating in the notch.

**[0058]** It will be understood that the notch 102 may not be located in the actual top edge 103 of the gutter element. It could be spaced towards the base of the gutter, providing it is above the level of normal water flow in the gutter element.

**[0059]** It will also be understood that the notch as hereinbefore defined can be formed during manufacture of a gutter element as by being punched or routed from a gutter or gutter edge during a forming process, e.g. extrusion.

**[0060]** Referring to Figs. 11A-11E there is shown a fascia bracket 200 which is adapted for fixing to a fascia (not shown) and for receiving a gutter element X. The bracket 200 has a width W sufficient to cover at least two upstands on a gutter element. This provides that the edge of the bracket does not snag the notch or notches when the gutter moves through the bracket as it expands and contracts. There is also a relatively large radius 201 or angled ramp which avoids snagging on upstands 202 on the top edge of the gutter element, and which provides a lead-in for mounting the gutter element X in the bracket 200, again so that there is no snagging when the gutter expands and contracts. There is an angled front edge 203 which provides an access to a fixing hole 204 for receiving a securing means such as a screw to secure the bracket 200 to a fascia.

**[0061]** It will be understood that the notch or notches as hereinbefore defined can be formed during manufacture of a gutter element as by being punched or routed from a gutter edge or edges during a forming process, e.g. extrusion. It will also be further understood that the notch(es) (as herein defined) can be formed along only one upper (in use) edge of a gutter element, rather than along two as shown in the drawings. Suitably, the edge in this case could be the in use rear edge as this would not be visible from the ground when the gutter element is installed. However, the edge could be the front edge only, as in use this edge is exposed more to sunlight and so in use would become hotter than the rear edge.

**[0062]** All of the gutter elements described may be installed in a gutter system, in which facing ends of adjacent gutter elements embodying the invention are received in respective sockets on seatings of a gutter union or bracket as described which includes seals to provide for sealing against hydraulic leakage. Also, the gutter elements may be of other axial shapes than straight, e.g. curved, right-angled or Z-shaped, and may be of any desired profile in cross-section, such as ogee.

**[0063]** A guttering system including gutter elements as described herein will include downpipes, spouts etc. as

necessary, but these form no part of the invention and are not therefore described further.

## 5 Claims

1. A gutter element for use in a guttering system, comprising means adapted to accommodate length variation of the element owing to thermal effects, the means being intermediate the length of the gutter element.
2. A gutter element according to Claim 1, the means being located at substantially the axial centre of the element.
3. A gutter element according to Claim 2, the means comprising a notch formed in the gutter element.
4. A gutter element according to Claim 3, the notch being formed at a top (in use) edge of the gutter.
5. A gutter element according to Claim 3 or Claim 4, including an axial flange at or adjacent the top (in use) edge of the gutter, in which the notch is formed.
6. A gutter element according to any of Claims 3 to 5, the top edge being a rear edge in use.
7. A gutter element according to any of Claims 3 to 5, the top edge being a front edge in use.
8. A gutter element according to Claim 7, the notch being punched or routed from the gutter edge during extrusion moulding.
9. A gutter element according to Claim 1, comprising a plurality of means adapted to accommodate length variation of the element owing to thermal effects, the means being intermediate the length of the element.
10. A gutter element according to Claim 9, the means being spaced along at least a majority of the full length of the gutter element.
11. A gutter element according to Claim 10, the means being spaced apart over the full length of the gutter element.
12. A gutter element according to any of Claims 9-11, the means being spaced notches (as herein defined) formed in the gutter element.
13. A gutter element according to Claim 12, comprising an inwardly directed axially extending flange, the notches being formed in the flange.
14. A gutter element according to Claim 13, the flange

- being located at or adjacent a top (in use) edge of the gutter element.
15. A gutter element according to Claim 14, the notches being formed in, at or adjacent a top (in use) edge of the gutter element. 5
16. A gutter element according to Claim 15, there being notches formed at or adjacent opposed top edges of the gutter element. 10
17. A gutter element according to Claim 16, and a support device for the gutter element adapted to be secured in a notch or notches positioned intermediate the length of the gutter element. 15
18. A gutter element according to Claim 9, there being a pair of opposed notches, one on each side of the gutter element, formed at substantially the axial centre of the gutter element. 20
19. A gutter element according to Claim 18, a support device for the gutter element being adapted to be secured in the notches. 25
20. A gutter element according to Claim 19, the support device comprising a bracket applied to the gutter element to provide a top fixing thereof in use.
21. A gutter element according to Claim 20, the bracket comprising plastic or metal such as plastic-coated or galvanized steel. 30
22. A gutter element according to Claim 21, comprising notches being slots at, in or adjacent each longitudinal edge of the gutter element, and a separate retention device adapted to be snap-engaged to the slots. 35
23. A gutter element according to Claim 22, the slots being formed in a longitudinally extending edge at the front (in use) of the gutter element. 40
24. A gutter element according to any of Claims 9 to 12, the notches (as herein defined) being formed in opposed sides of the gutter element. 45
25. A gutter element according to Claim 24, including a device to conceal the notches. 50
26. A gutter element according to Claim 27, the device comprising a U-shaped element adapted to receive an edge of the gutter element and having legs of sufficient length to conceal the notches. 55
27. A gutter element according to any of Claims 15 to 26, including integral retention clips on the support device.
28. A gutter element according to any preceding claim, a rear (in use) edge of the gutter comprising a notch or notches and the front (in use) notch(es) being through an additional overhang to obviate the notches being seen from below.
29. A gutter element according to any preceding claim, there being notch(es) in, at, on or adjacent a single longitudinal edge of the gutter.
30. A gutter element according to Claim 29, the edge being the rear edge (in use).
31. A gutter element according to Claim 29, the edge being the front edge (in use).
32. A gutter element according to any preceding claim, formed by extrusion.
33. A gutter element according to Claim 32, formed of plastic.
34. A gutter element according to Claim 32 or Claim 33, the notch or notches being punched or routed from the or each gutter edge continuously during an extrusion moulding process.
35. A gutter according to any preceding claim, supportable at only a longitudinal centre thereof.
36. A gutter system comprising a plurality of gutter elements according to any preceding claim, joined end to end to provide a run of guttering of a desired length.
37. A guttering system including a gutter element according to any preceding claim, and a support device thereof.
38. A guttering system according to Claim 37, the support device comprising a bracket or gutter union.
39. A guttering system according to Claim 38, the bracket being a bracket fixed adjacent an axial central position of the gutter element.
40. A guttering system according to any of Claim 37 to 39, including a fascia bracket.

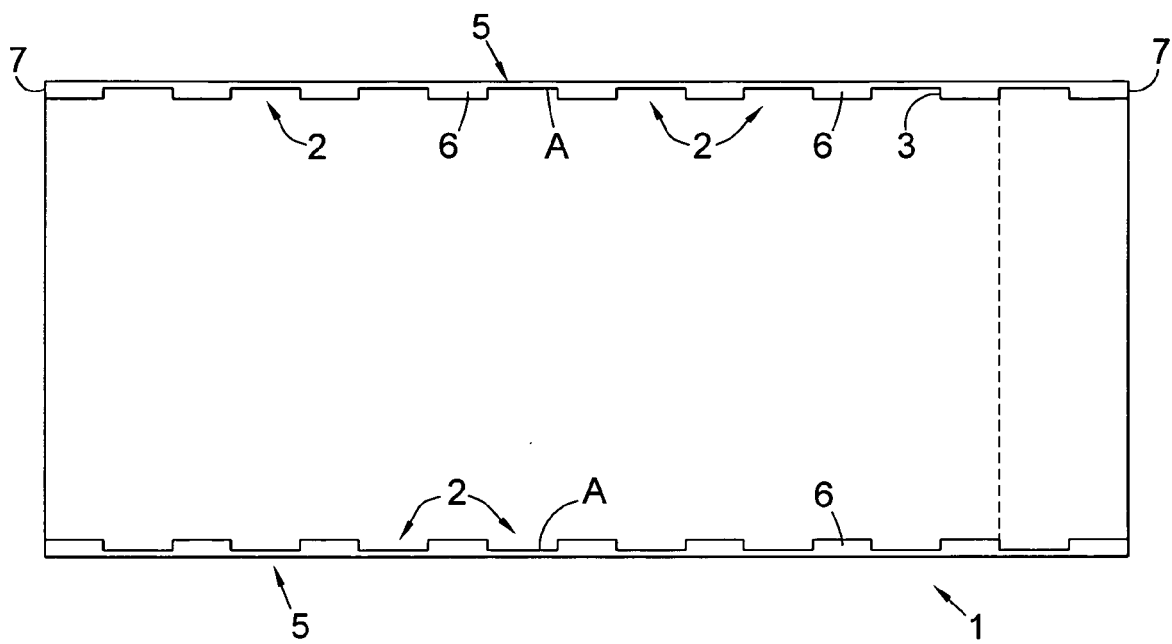


Fig. 1



Fig. 2

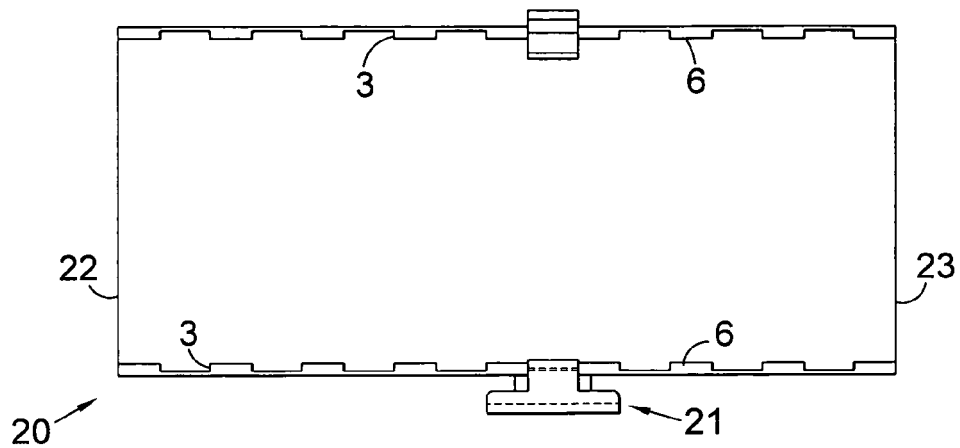


Fig. 2

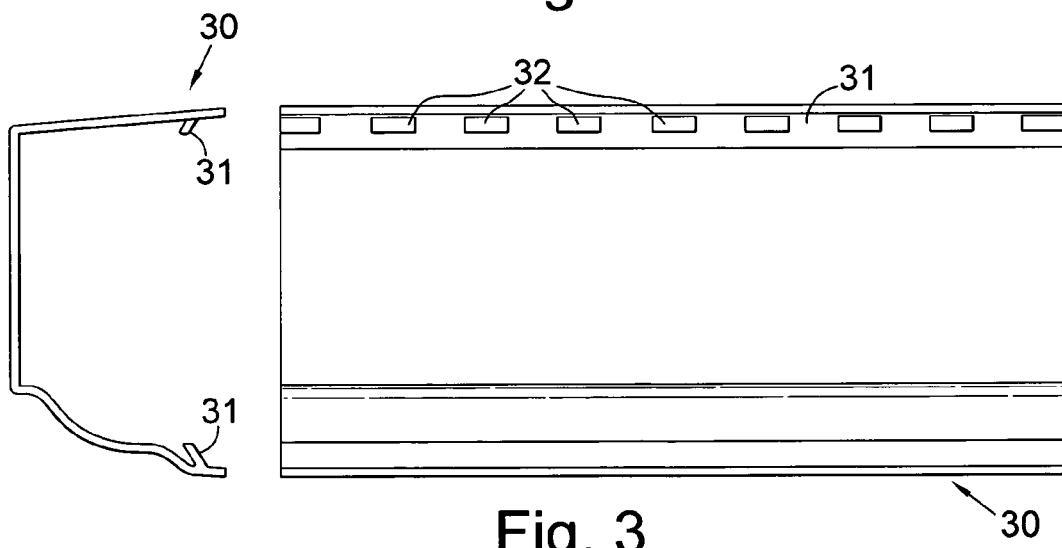


Fig. 3

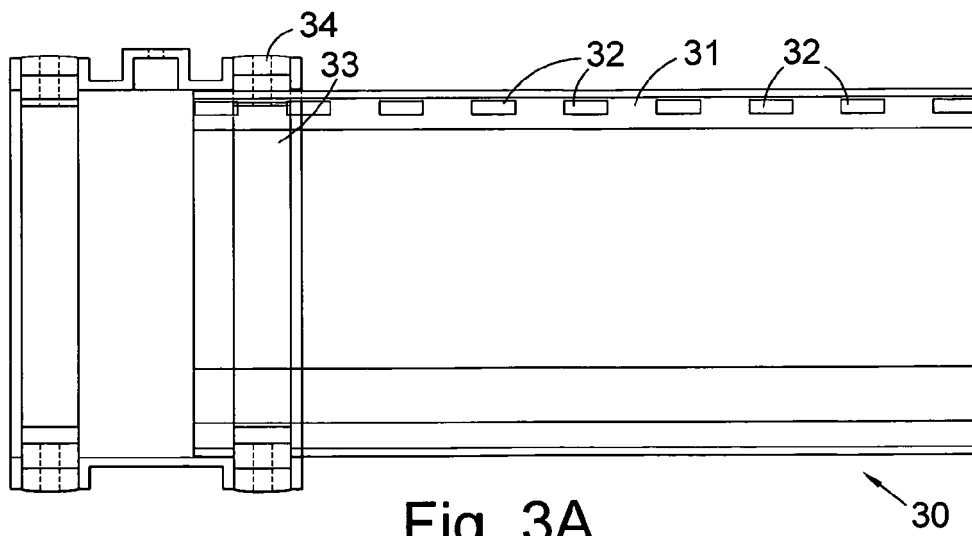


Fig. 3A

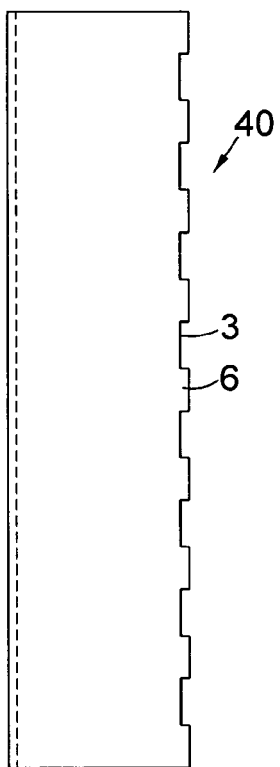


Fig. 4A

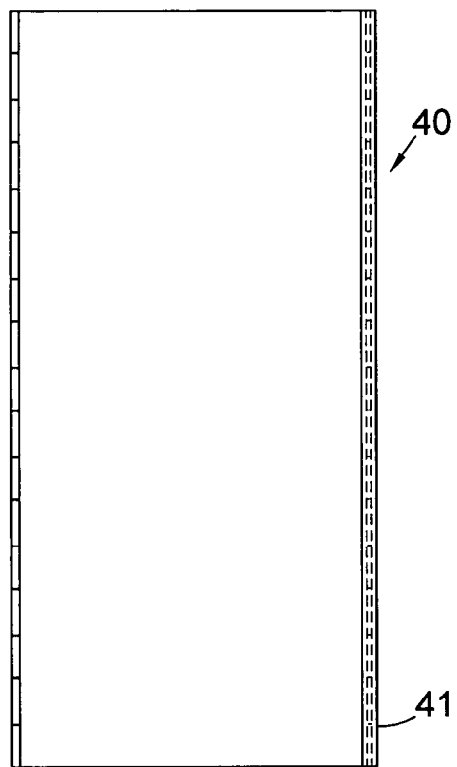


Fig. 4B

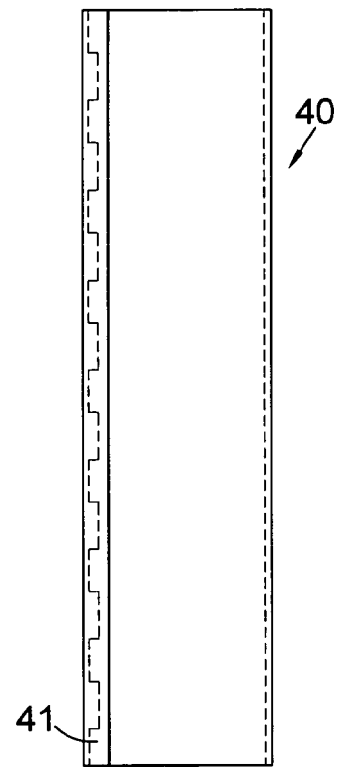


Fig. 4C

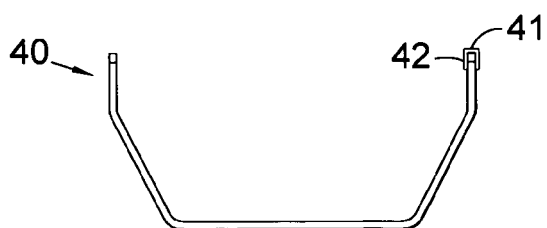


Fig. 4D

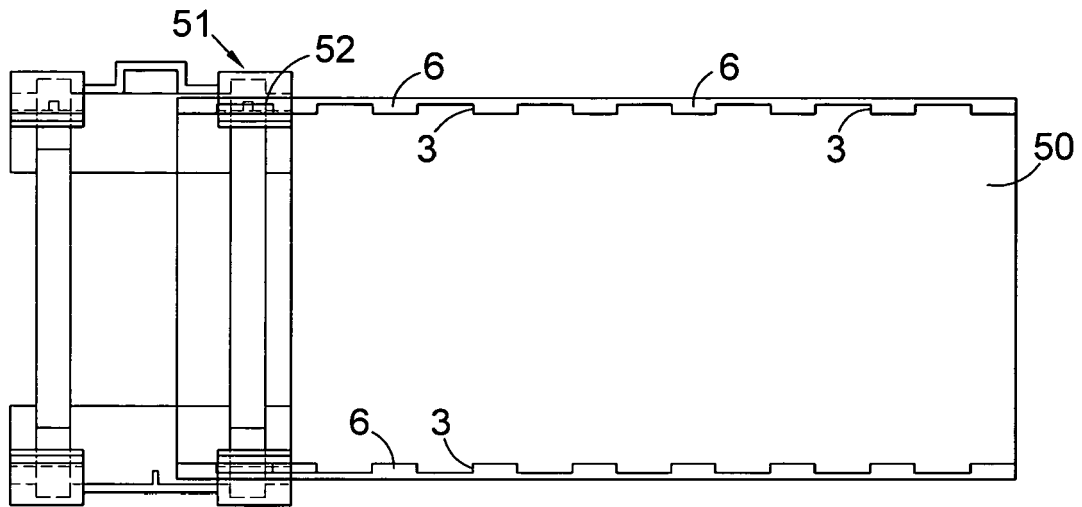


Fig. 5

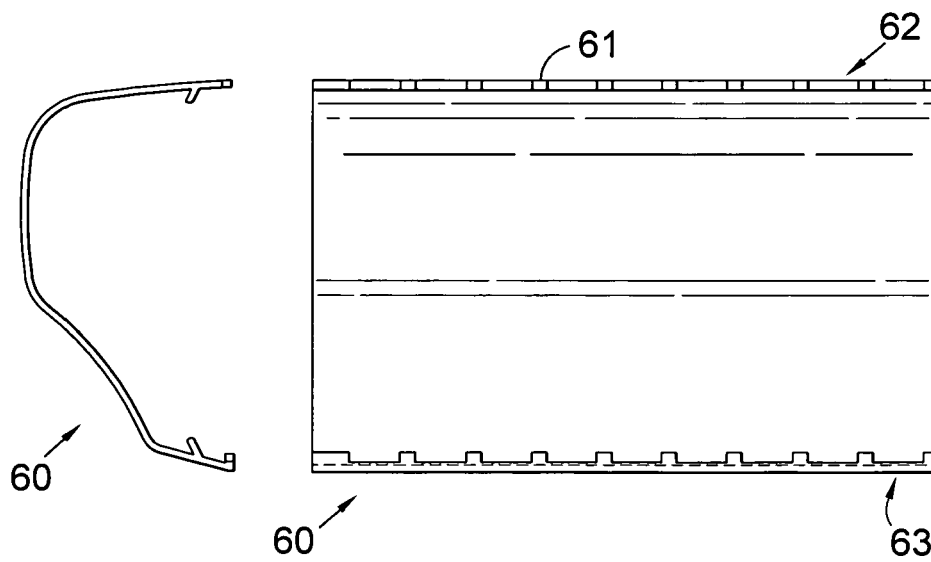


Fig. 6A

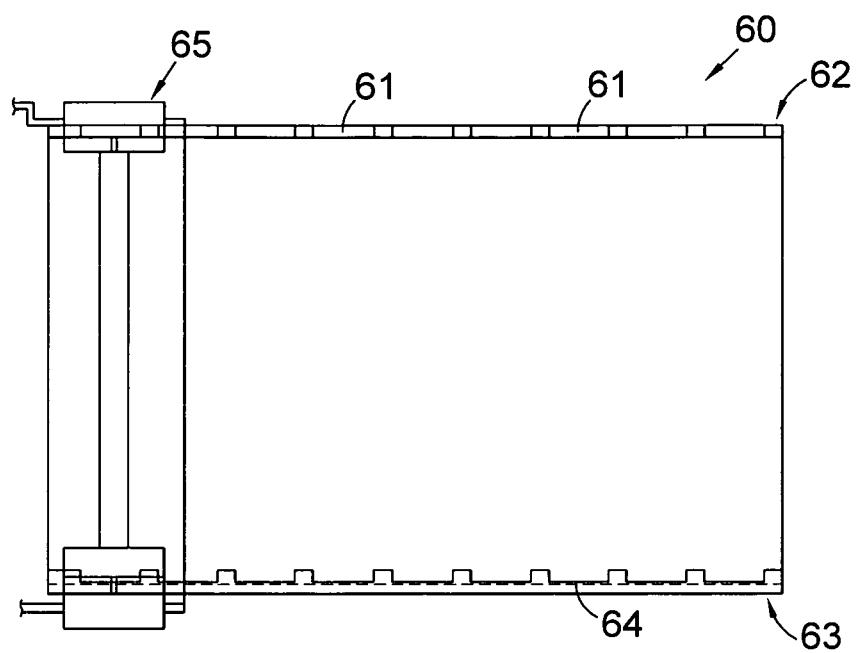


Fig. 6B

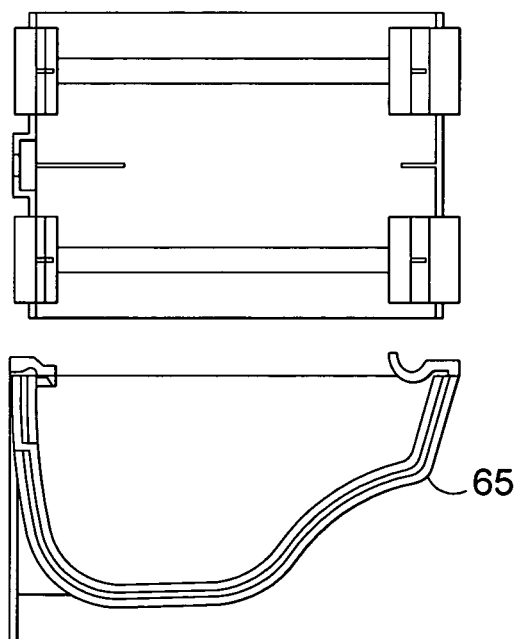


Fig. 6C

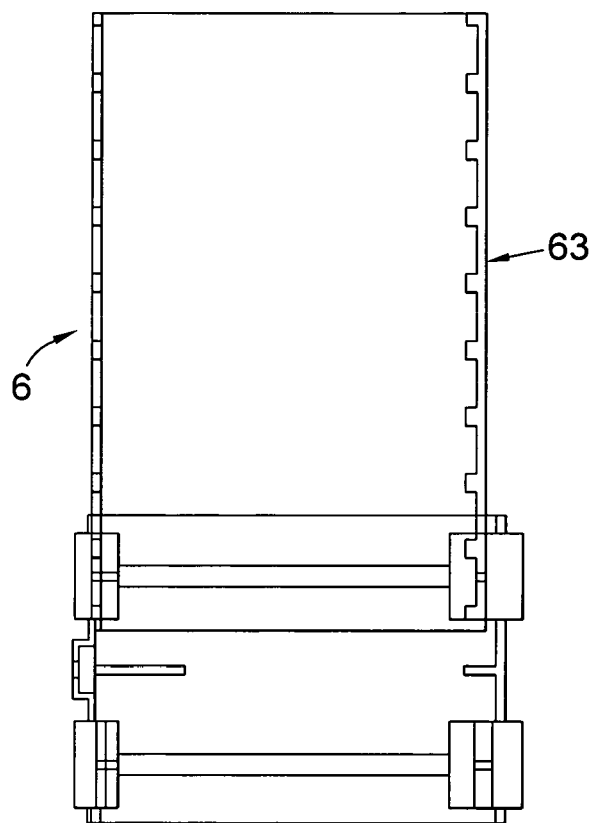
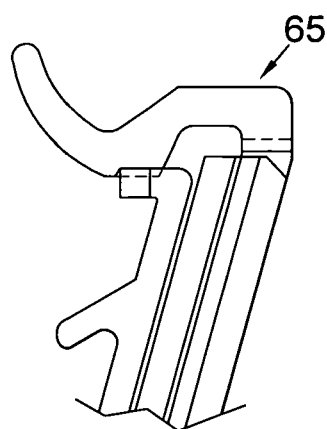
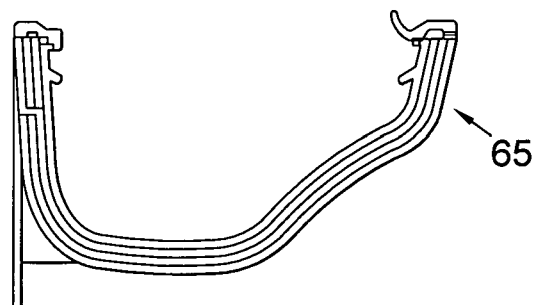
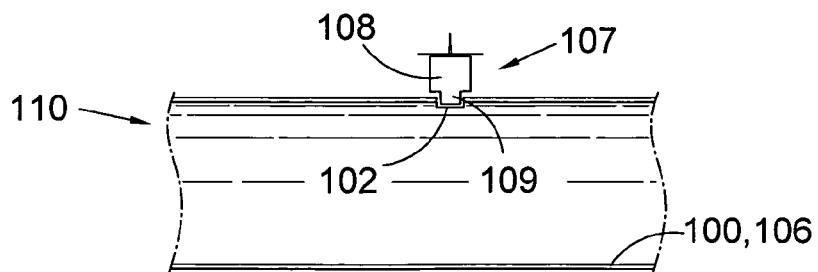
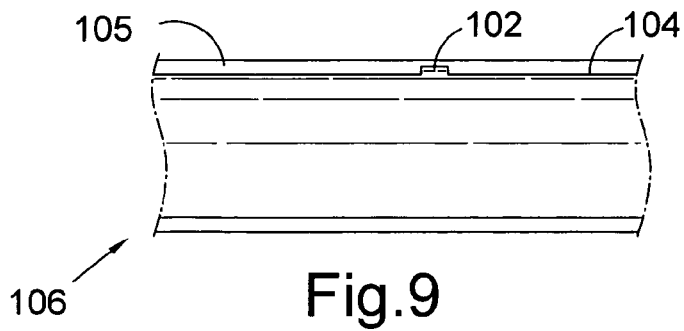
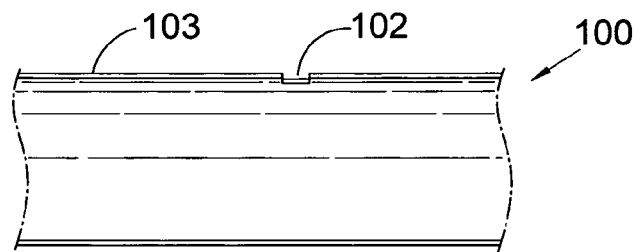
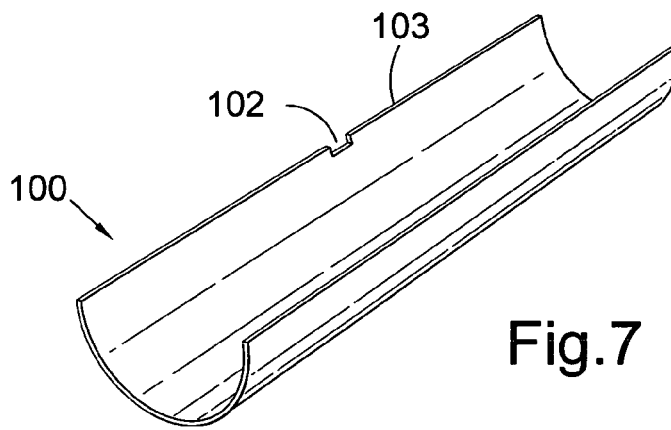


Fig. 6D





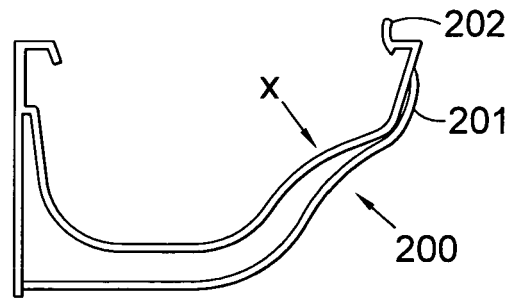


Fig.11A

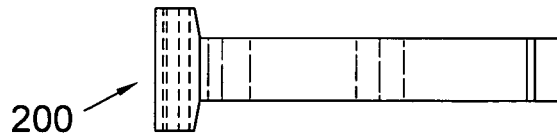


Fig.11B

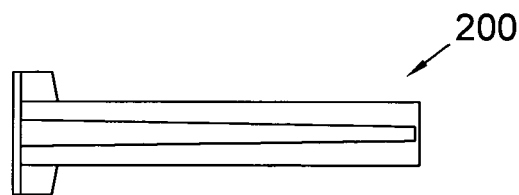


Fig.11C

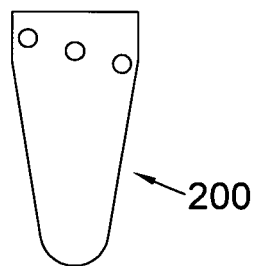


Fig.11D

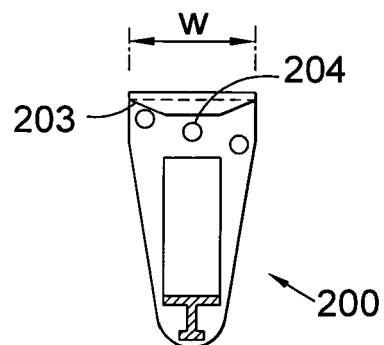


Fig.11E