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(71) Applicant: **Centrometal S.r.l.**
Marene (IT)

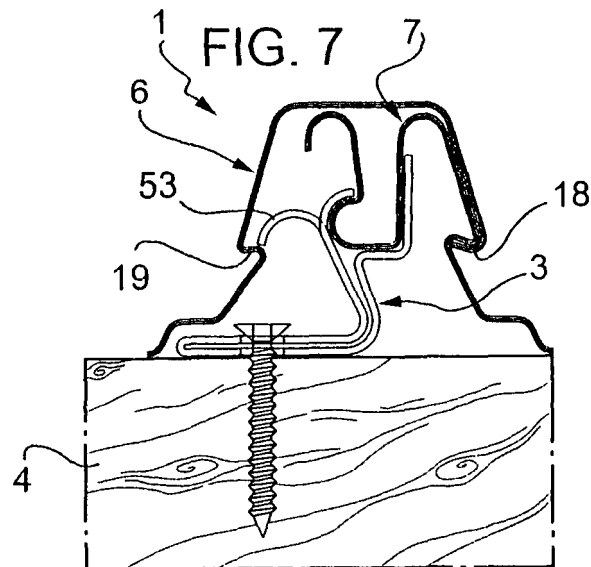
(72) Inventor: **Baudo, Pieter**
12030 Marene (IT)

(74) Representative: **Franzolin, Luigi et al**
STUDIO TORTA
Via Viotti 9
10121 Torino (IT)

(54) **Sheet modular roofing for the roofs of buildings and securing bracket for such a roofing**

(57) A sheet modular roofing (1) for a roof, including a plurality of sheets (2) adapted to be reciprocally constrained two by two by means of the overlapping and reciprocal engagement of respective edges (6, 7), and a plurality of anchoring brackets (3) including a stationary part (40) and a movable part (41) which are constrained to each other; the movable part (41) is movable between

a first position in which it allows the insertion of a hooking portion (27) of an edge (7) of a first sheet (2) into the bracket (3), and a second position in which such a hooking portion (27) is rigidly locked in the bracket (3); an edge (6) of a second sheet (2) adjacent to the first sheet (2) is engageable on the edge (7) of the first sheet (2) and on the brackets (3).



Description

[0001] The present invention relates to a sheet modular roofing for the roofs of residential or industrial buildings and to a securing bracket for such a roofing.

[0002] As it is known, modular roofings consisting of metal sheets reciprocally placed side by side and secured to an underlying bearing structure are increasingly used instead of traditional roofings, especially in the industrial field.

[0003] The longitudinal edges of the sheets are appropriately profiled so as to overlap the edges of the adjacent sheets thus forming an anchoring and water-sealing system. The securing to the underlying structure is generally obtained by means of brackets provided with a base adapted to be rigidly secured to the structure and an upper hooking portion adapted to snap-fittingly engage the profiled edges of the sheets.

[0004] Roofings of the above said type are shown, for instance, in EP-A-964014. A drawback connected to the known and briefly disclosed roofings consists in that, in order to obtain a mechanically reliable and water-sealing snap fit, elaborate-shaped (and therefore expensive) sheets and brackets need to be provided.

[0005] Specifically, the brackets must be made by injection moulding or casting and are therefore expensive.

[0006] It is the object of the present invention to provide a sheet modular roofing for roofs and an anchoring bracket for such a roofing, which do not display the drawbacks connected to the known and above specified brackets and roofings.

[0007] The above said object is achieved by a roofing according to claim 1 and by a bracket according to claim 8.

[0008] Two preferred embodiments are hereinafter disclosed for a better understanding of the present invention, by way of non-limitative example and with reference to the accompanying drawings, in which:

Figure 1 is a front elevational view of a sheet for a sheet roofing according to the present invention;

Figure 2 is a side elevational view of a roofing according to the present invention;

Figure 3 is a perspective view of an anchoring bracket for the roofing in Figure 1, in a resting undeformed position;

Figure 4 is a perspective view of the bracket in Figure 3, in an operating deformed position;

Figures 5, 6 and 7 show sequential steps of the assembly operations for the roofing in Figure 2;

Figures 8, 9 and 10 show sequential steps of the assembly operations for a roofing according to a variant of the embodiment of the present invention;

Figures 11 and 12 show two further variants of the roofing according to the invention.

[0009] With reference to Figures 1 and 2, numeral 1 shows as a whole a sheet roofing for the roofs of resi-

dential or industrial buildings.

[0010] The roofing 1 includes a plurality of modular laminated sheets and a plurality of brackets 3 for anchoring the sheets 2 to an underlying bearing structure 4, for instance to roof purlins.

[0011] Hereinafter the shape of a single sheet 2 ("sheet 2") will be described, it being understood that all of the sheets 2 are identical to one another.

[0012] The sheet 2 (Figure 2) displays a substantially flat main intermediate portion 5 and first and second edges 6 and 7, which are longitudinal and parallel to each other. The edges 6 and 7 are profiled so as to allow the reciprocal coupling of the sheets 2, two by two, along the edges themselves, by means of their overlapping.

[0013] More specifically, the first edge 6 of the sheet 2 integrally includes from the intermediate portion 5 an upwardly angled junction area 9 and a receptacle portion 14 integrally connected to the junction area 9.

[0014] The junction area 9 includes, in this order from the intermediate portion 5 of the sheet, a first upwardly angled ramp 8, a horizontal wall 10 and a second ramp 11, which is substantially parallel to the first ramp 8.

[0015] The receptacle portion 14 features an upper wall 15 and two downwardly divergent oblique sides 16, 17, having respective lower edges folded inwards with respect to the receptacle portion 14 itself to form respective hook portions 18, 19.

[0016] The hook portion 18 forms a free end of the sheet 2. The hook portion 19 is connected to the second ramp 10 of the junction area 9.

[0017] The second edge 7 of the sheet 2 integrally includes from the intermediate portion 5 an upwardly angled junction area 21 and a hooking portion 25 adapted to cooperate with the receptacle portion 14 of an adjacent sheet 2.

[0018] The junction area 21 is formed by a first ramp 20 which is angled upwardly and outwardly with respect to the sheet 2, a horizontal wall 22 extending outwardly and a second ramp 23 which is substantially parallel to the first ramp 20. The hooking portion 25 includes a first hook portion 26 having a substantially inverted U shape, extending upwardly from the junction area 21 and forming a side tooth 30 displaying a triangular section and facing the intermediate portion.

[0019] More precisely (Figure 1), the first hook portion 26 displays an angled wall 29 facing the intermediate portion 5 of the sheet 2 and a vertical wall 31, which reciprocally form an acute angle and are connected to each other by an upper junction 32. The wall 29, which forms a first side of the tooth 30, is connected to the second ramp 23 of the junction area 21 by a second undercut-angled side 24.

[0020] The first side 29 is angled so as to form an obtuse dihedral angle with the plane of the intermediate portion 5.

[0021] The hooking portion 25 finally includes a second hook portion 27 extending from a lower end of the vertical wall 31 and including a side 33 facing the wall 31 and

slightly angled downwardly thereto, and a lower ribbing 34 defining the bottom of a recess 35 formed between the side 33 and the wall 31, and forming a flat bottom wall 36 and a rounded side ridge 37 extending laterally and outwardly with respect to the sheet 2 below the side 33. The latter ends on top with a free edge 38 which is folded downwards.

[0022] Each anchoring bracket 3 ("bracket 3" hereinafter - Figures 3 and 4) is made as a single piece by means of moulding from a metal strip and essentially includes a stationary part 40 and a movable part 41 integrally joined to one another along a fold 42 which defines a substantially hinged constraint.

[0023] The stationary part 40 includes a rectangular base plate 43 and a support portion 44 extending upwardly on one side of the base plate 43 opposite to the fold 42. The support portion 44 includes in turn a wall 45 which is integrally joined to the base plate 43 by means of a junction 46 and forming an acute angle therewith, an intermediate horizontal wall 47 extending from the wall 45 on the opposite side of the base plate 43 and an upper end wall 48 extending upwardly from the intermediate wall 47.

[0024] The movable part 41 includes in turn a plate 49 which is integrally constrained by the fold 42 to the base plate 43 of the stationary part 40 and may be overlapped thereto, and a hooking portion 50 extending on one side of the plate 49 opposite to the fold 42 and placed near the support portion 44. The hooking portion 50 is formed by a wall 51 forming an acute angle with the base portion 49 and by a plurality of bended hooks 52, 53 extending from an upper free edge of the wall 51; the hooks 52 face the support portion 44, the hooks 53 face the side of the fold 42. By way of example, two hooks 52 and three hooks 53 may be provided reciprocally intercalated along the width of the wall 51.

[0025] The base plates 43, 49 are provided with respective reciprocally overlapped pairs of holes 54, 55 adapted to receive respective fastening screws 56 (Figures 5-7).

[0026] The coupling of the sheets 2 in order to form the roofing 1 is disclosed hereinafter with reference to Figures 5 to 7.

[0027] A plurality of brackets 3 (only one of which is shown in Figure 5), which are appropriately spaced one from the other along the width of the sheets, is previously assembled on the second edge 7 of a sheet 2 so that the flat wall 36 of the second hook portion 27 of the second edge 7 rests on the intermediate horizontal wall 47 of the support portion 44 of the brackets 3. It may be noted that in the undeformed position of the brackets 3 shown in Figures 3 and 5 there is enough space between the hook portions 52 and the upper end wall 48 to allow the passage of the second hook portion 27.

[0028] The brackets 3 rest on the support structure 4 with their base plates 43.

[0029] Subsequently, as shown in Figure 6, the fastening screws 56 are screwed in the support structure 4

through the holes 54, 55, so as to shift the movable part 41 towards the stationary part 40 elastically deforming the fold 42, which substantially acts as a hinge.

[0030] When fastening has occurred (Figure 6), the plate 49 of the movable part 41 is substantially parallel to the base plate 43, and the hook portions 52 envelop the ribbing 34 of the second hook 27 of the edge 7 of the sheet 2, thus retaining the sheet itself.

[0031] The mounting of the following sheet 2 occurs as shown in Figure 7.

[0032] The first edge 6 of the second sheet is snap fitted on the second edge 7 of the first sheet 2, so that the hook portion 18 snap-fittingly engages the tooth 30 underside and the hook portion 19 snaps beyond the hooks 53 in order to be better secured.

[0033] The assembly of the following sheets 2 occurs by cyclically repeating the steps which are disclosed above and shown in Figures 5 to 7.

[0034] Figures 8 to 10 show the assembly of a roofing 100 according to a variant of the embodiment of the present invention.

[0035] The roofing 100 is disclosed hereinafter only in as much as it differs from the roofing 1, by using the same reference numerals to indicate the same parts or parts corresponding to already disclosed parts.

[0036] The roofing 100 differs from the roofing 1 in that the brackets 3, otherwise identical to those previously described, include an additional hook portion 101 folded downwardly from an upper end of the vertical wall 48. The hook portion 101 ends with an edge 102 which is angled downwardly and outwardly.

[0037] During the assembly step of the bracket 3 on the second edge 7 of the sheet 2, the hook portion 101 engages the first hook portion 26 of the edge 7 itself, and the edge 102 snaps beyond the second side 24 of the tooth 30 thus determining a preliminary constraint of the bracket on the sheet.

[0038] In use, the engagement between the hook portions 102 and 26 is a further constraint adapted to increase the securing upon extraction loads exerted by wind.

[0039] Figures 11 and 12 show two further variants, respectively indicated by numerals 110 and 120.

[0040] The solution in Figure 11 is similar to that in Figures 5 to 7; the only difference consists in that the ribbing 34 of the hooking portion 27 of the second edge 7 is symmetrical with respect to a vertical plane and substantially has an inverted mushroom shape, with two opposite side convex ridges 111, 112. Accordingly, the bracket 3 features, instead of the upper flat wall 48, a hook portion 113 facing the hooks 52 and configured so as to embrace the ridge 112.

[0041] The roofing 120 in Figure 12 is identical to that in Figure 11, except for the bracket 3 having no teeth 53 in the case in which the coupling of the hooks 52 and of the hook portion 113 with the projections 111 and 112 of the ribbing 34 is sufficient to secure the retaining.

[0042] From an analysis of the features of the roofing

1 made according to the present invention, the advantages it allows to obtain are apparent.

[0043] Firstly, the sheets 2 and the brackets 3 may be made in a cost-effective manner although ensuring optimum properties as far as mechanical resistance and water-sealing are concerned. Furthermore, the assembly is especially simple and fast and does not require the use of special tools.

[0044] It is finally apparent that the disclosed roofings 1, 100, 110, 120 may be modified or varied without departing from the protective scope defined in the claims.

[0045] Specifically, the brackets 3 may be made of plastic material.

Claims

1. A sheet modular roofing (1) for a roof, including a plurality of sheets (2) having a substantially flat intermediate portion (5) and first and second profiled and longitudinal edges (6, 7), said sheets (2) being adapted to be reciprocally constrained two by two by means of the overlapping and the reciprocal engagement of said respective edges (6, 7), said roofing (1) further including a plurality of anchoring brackets (3) adapted to be secured to a bearing structure (4), said sheets (2) being constrained to said brackets (3) at said overlapped edges (6, 7), **characterised in that** each of said brackets (3) includes a stationary part (40) and a movable part (41) which are constrained to each other, said movable part (41) being movable between a first position in which it allows the insertion of a hooking portion (27) of the second edge (7) of a first sheet (2) into the bracket (3), and a second position in which said hooking portion (27) of said second edge (7) of said first sheet (2) is rigidly locked in said bracket (3), said first edge (6) of a second sheet (2) adjacent to said first sheet (2) being engageable on said second edge (7) of said first sheet (2) secured to said bearing structure (4) by means of a plurality of said brackets (3) and on said plurality of brackets (3).
2. A roofing according to claim 1, **characterised in that** said stationary part (40) and said movable part (41) are integrally connected to one another by means of a substantially hinged constraint (42).
3. A roofing according to claim 1 or 2, **characterised in that** said bracket (3) is secured to said bearing structure (4) by means of fastening means (56), said fastening means (56) maintaining in use said movable part (41) in said second position.
4. A roofing according to any one of the preceding claims, **characterised in that** said stationary part (40) of said bracket (3) includes a base plate (43) which may be anchored to said bearing structure (4)

and a support portion (44) for said second edge (7) of said first sheet (2) extending upwardly from the base plate (43), and that said movable part (41) includes a plate (49) which is hingedly constrained to said base plate (43) of said stationary part (40) and a hooking portion (50) forming at least one first hook (52) to lock said hooking portion (27) of said second edge (7) of said first sheet (2) on said support portion (44) of said stationary part (40).

5. A roofing according to claim 4, **characterised in that** said hooking portion (50) of said movable part (41) forms at least one second hook (53) to constrain a hook portion (19) of said first edge (6) of said second sheet (2).
6. A roofing according to claim 5, **characterised in that** said base plate (43) of said stationary portion (40) and said plate (49) of said movable portion (41) are integrally connected to one another by a fold (42) defining said substantially hinged constraint.
7. A roofing according to any one of the preceding claims, **characterised in that** the first edge (6) and the second edge (7) of said sheets (2) are provided with first snap-fit hooking means (18) and second snap-fit hooking means (30), respectively, the first snap-fit hooking means (18) of a sheet (2) snap-fittingly cooperating with the second snap-fit hooking means (30) of an adjacent sheet (2).
8. A roofing according to claim 7, **characterised in that** said first edge of said sheets (2) includes a receptacle portion (14) displaying a substantially trapezoidal downwardly open section, said receptacle portion (14) being adapted to house said hooking portion (25) of said second edge (7) and defining said second snap-fit hooking means (18) and said hook portion (19) of said first edge (6).
9. A roofing according to any one of the preceding claims, **characterised in that** said hooking portion (27) of said second edge (7) includes at least one first side ridge (37, 111) which engages said first hook (52) of said movable part (41) of said bracket (3).
10. A roofing according to claim 9, **characterised in that** said hooking portion (27) of said second edge (7) displays a substantially inverted mushroom shape, and includes a second side ridge (112) which is symmetrical with respect to said first ridge (111), said stationary portion (40) of said bracket (3) including a hook portion (113) facing said first hook (52) and configured so as to embrace said second ridge (112).
11. An anchoring bracket for a sheet modular roofing (2) for a roof including a plurality of sheets (2) having a

- substantially flat intermediate portion (5) and first and second profiled and longitudinal edges (6, 7), said sheets (2) being adapted to be reciprocally constrained two by two by means of the overlapping and the reciprocal engagement of said edges (6, 7), said bracket (3) being adapted to be secured to a bearing structure (4) and constrain said sheets (2) at said overlapped edges (6, 7), **characterised in that** it includes a stationary part (40) and a movable part (41) which are constrained to each other, said movable part (41) being movable between a first position in which it allows the insertion of a hooking portion (27) of the second edge (7) of a first sheet (2) into the bracket (3), and a second position in which said hooking portion (27) of said second edge (7) of said first sheet (2) is rigidly locked in said bracket (3).
12. A bracket according to claim 11, **characterised in that** said stationary part (40) and said movable part (41) are integrally connected to one another by means of a substantially hinged constraint (42).
13. A bracket according to claim 11 or 12, **characterised in that** it is securable to said bearing structure (4) by means of fastening means (56) which maintain in use said movable part (41) in said second position.
14. A bracket according to claim 12 or 13, **characterised in that** said stationary part (40) of said bracket (3) includes a base plate (43) which may be anchored to said bearing structure (4) and a support portion (44) for said second edge (7) of said first sheet (2) extending upwardly from the base plate (43), and that said movable part (41) includes a plate (49) which is hingedly constrained to said base plate (43) of said stationary part (40) and a hooking portion (50) forming at least one first hook (52) to lock said hooking portion (27) of said second edge (7) of said first sheet (2) on said support portion (44) of said stationary part (40).
15. A bracket according to claim 14, **characterised in that** said hooking portion (50) includes at least one second hook (53) to constrain a hook portion (19) of said first edge (6) of said second sheet (2).
16. A bracket according to claim 14 or 15, **characterised in that** said stationary portion (40) of said bracket (3) includes a hook portion (113) facing said first hook (52) and configured so as to cooperate therewith to embrace said hooking portion (27).
17. A bracket according to any one of the claims 12 to 16, **characterised in that** said base plate (43) of said stationary portion (40) and said plate (49) of said movable portion (41) are integrally connected to one another by a fold (42) defining said substantially hinged constraint.
18. A bracket according to any one of the claims 11 to 17, **characterised in that** it is made as a single piece by moulding from a metal strip.

FIG. 1

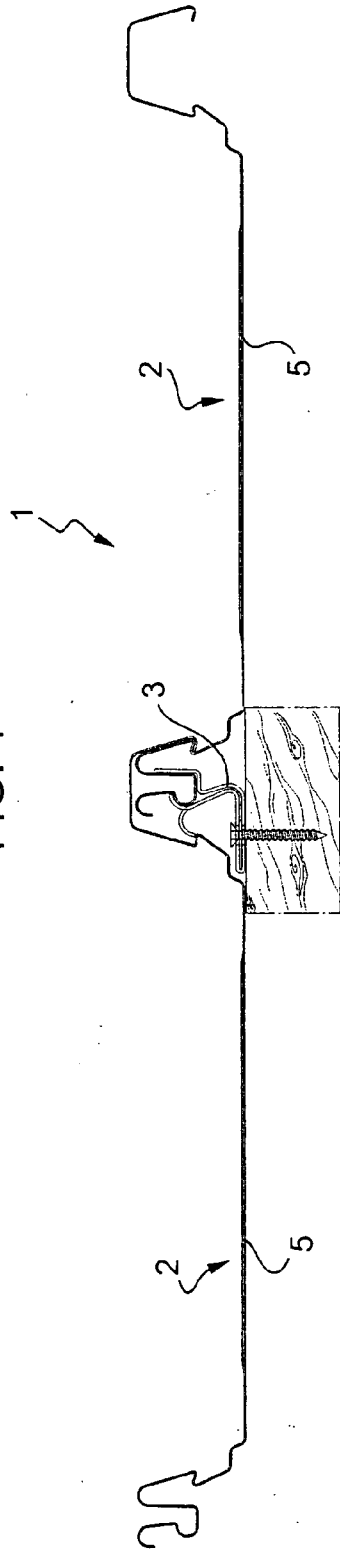


FIG. 2

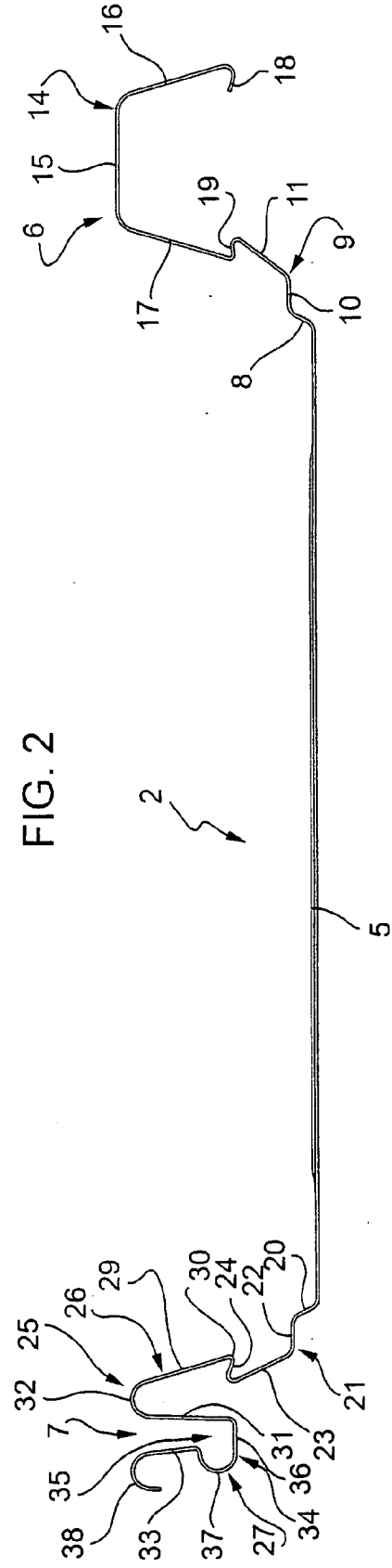


FIG. 3

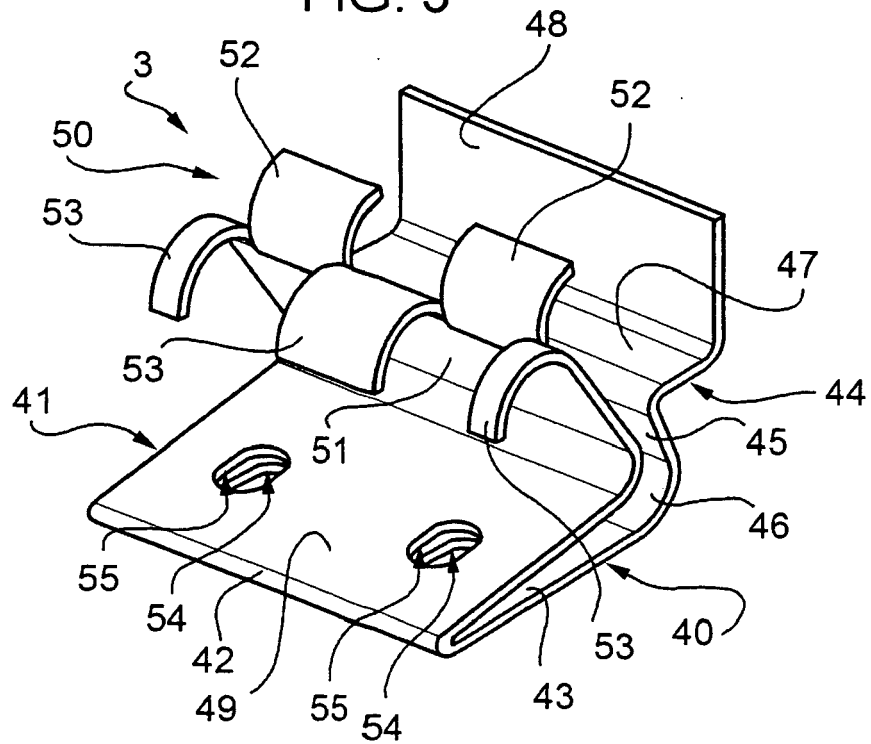
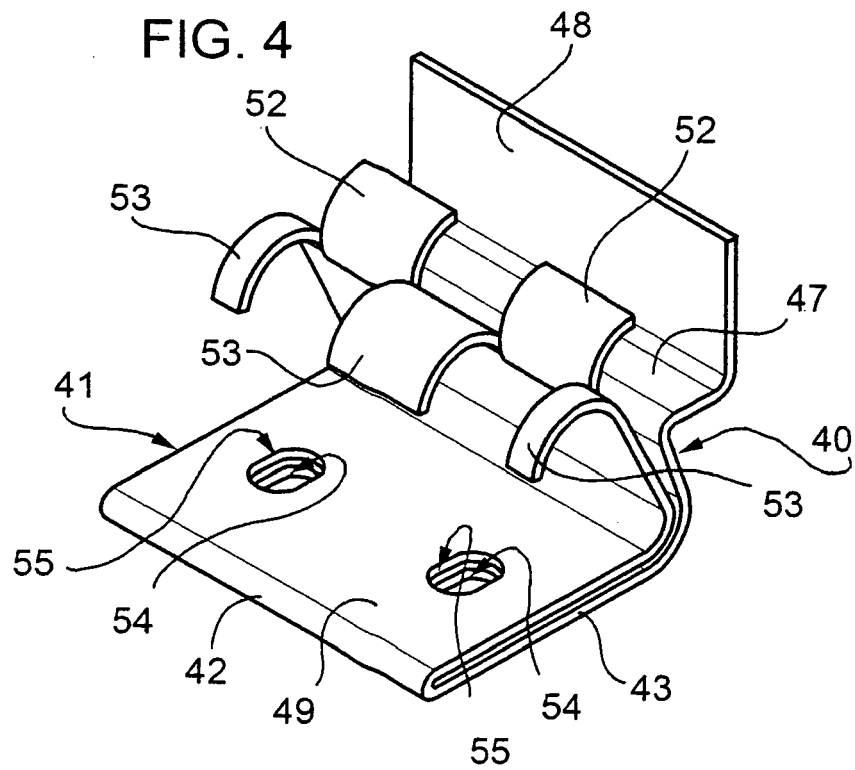


FIG. 4



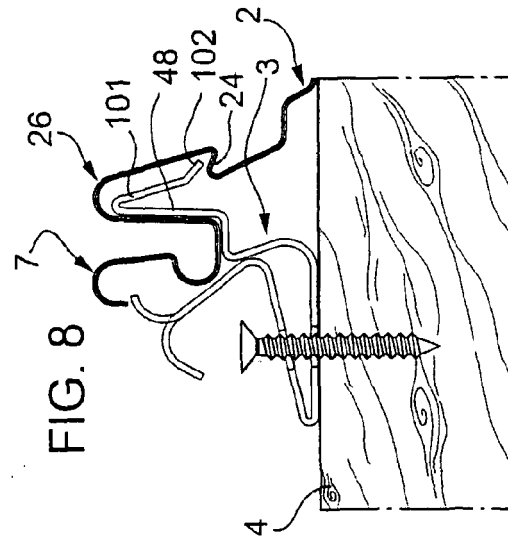
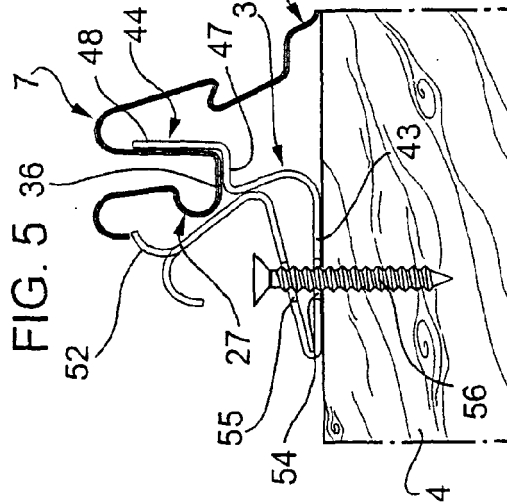
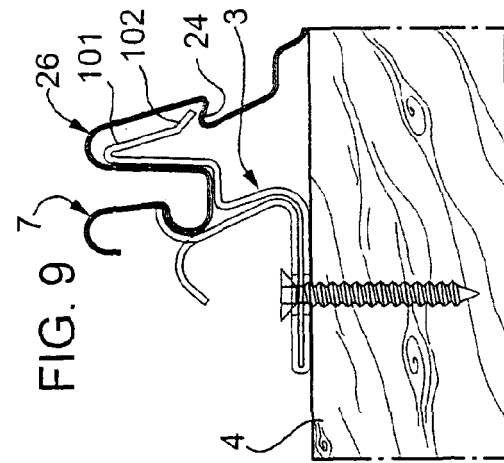
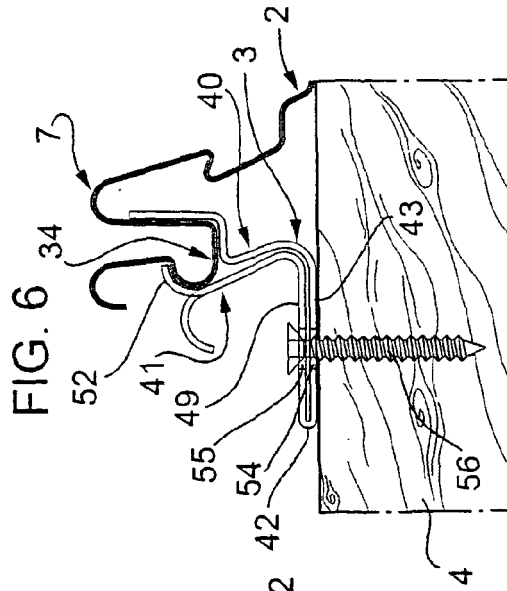
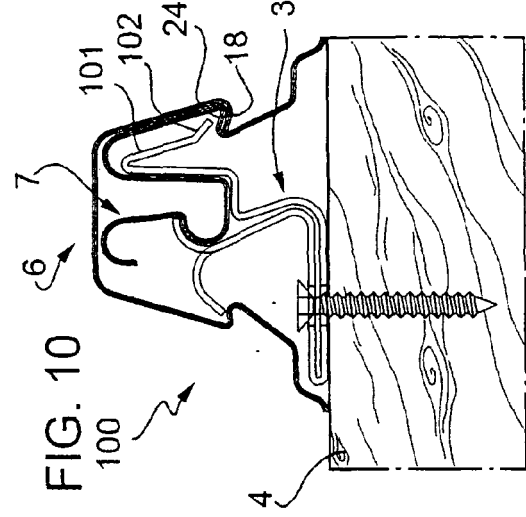
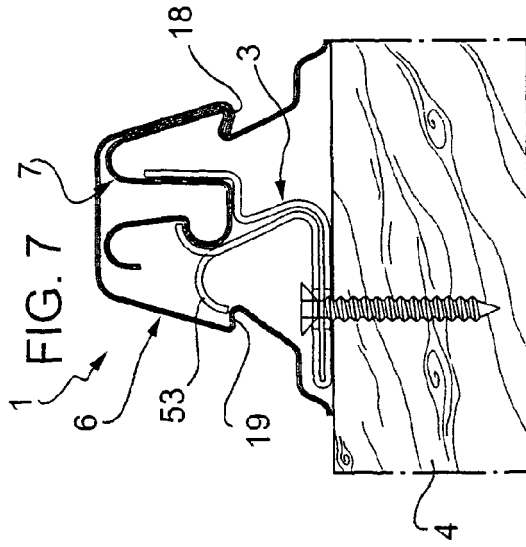


FIG. 12

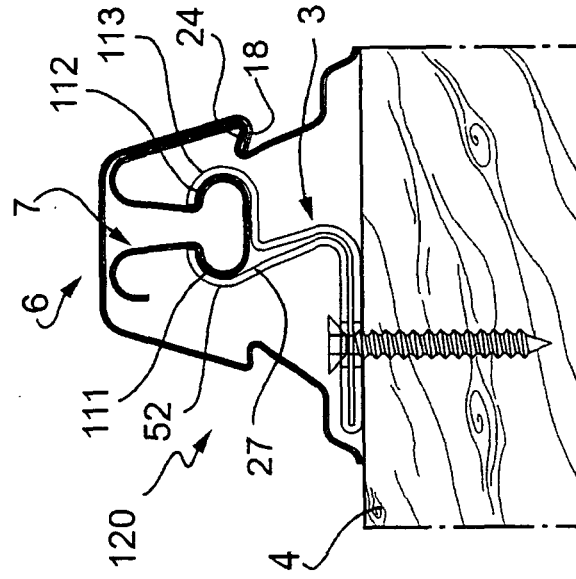
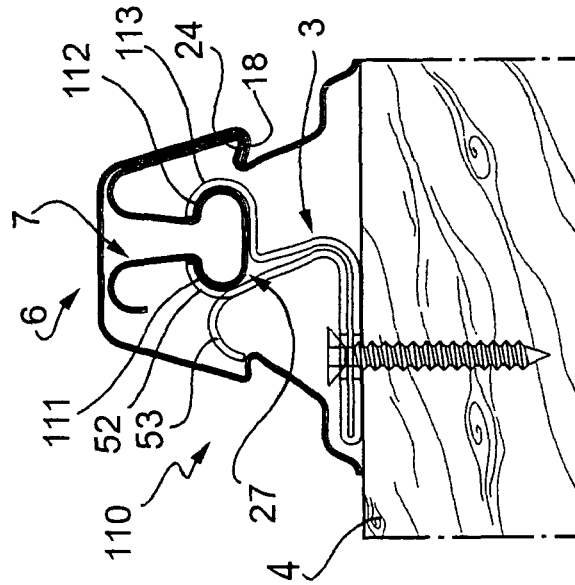


FIG. 11





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5198

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 August 2008	Examiner Demeester, Jan
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 08 42 5198

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18-08-2008

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