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(54) **Folded sheet metal roofing structure**

(57) A folded metal sheet roofing structure, which comprises: a plurality of metal sheets (33) with two non-adjacent edges (36, 37) complementarily folded or otherwise shaped so as to allow mating of two contiguous metal sheets (33) by partial overlapping and snap engagement; a plurality of supporting and holding blocks (1), which can be anchored to a roofing purlin and have a base portion with two protruding raised portions (3, 4), each raised portion being externally flanked by a respective recess. One raised portion of each supporting block (1) has a diverging inclination with respect to the other and each one of the recesses is externally adjacent to an inclined-plane cradle which is inclined toward a corresponding raised portion with its access delimited by a shoulder or abutment tooth (11) on one side, and by inclined-plane surfaces at the other side, thereby allowing the anchoring and quick overlapping coupling of one metal sheet (33) with a contiguous one simply by applying pressure from above to cause the metal sheet to slide on the inclined-plane surfaces.

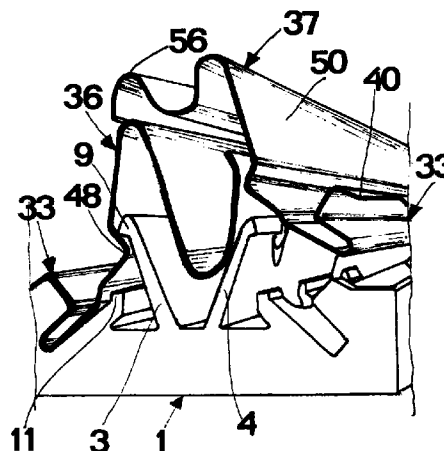


Fig. 7

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Description

[0001] The present invention relates to a sheet metal roofing.

[0002] The present invention is a well-known type of roofing system which comprises a plurality of metal sheet panels which have two folded ends and arranged to be coupled side by side by snap overlapping and to be anchored to supporting blocks which are spaced from one another and fixed to an underlying load-bearing purlin. Although such a system has proved to be highly satisfactory from a number of technical and economic viewpoints, it has still some drawbacks due to difficulties in installation, especially when dealing with panels of large dimensions, often exceeding 20-30 meters in length.

[0003] The main object of the present invention is to provide a roofing structure of the type described above in which installation difficulties are eliminated and installation can be performed without resorting to troublesome operations or using special equipment.

[0004] Another object of the present invention is to provide a walkable roofing structure which is weather-proof for long time without requiring maintenance.

[0005] Another object of the present invention is to provide a roofing structure easy to be produced and thus having a low production cost, whereby being also advantageous from an economic point of view with respect to other commercially available roofing structures.

[0006] These and other objects which will become better apparent hereinafter are achieved by a folded metal sheet roofing structure, which comprises: a plurality of metal sheets having two non-adjacent edges complementarily folded or otherwise shaped so as to allow mating of two contiguous metal sheets by partly overlapping snap engagement; a multiplicity of supporting and holding blocks to be anchored to a load-bearing purlin for the roofing and having a base portion with two raised portions arranged side by side of a respective recess; and characterized in that one raised portion of each supporting block has a diverging inclination with respect to the other and in that each one of said recesses is externally adjacent to an inclined-plane cradle which is inclined towards its respective raised portion, and has its access delimited by a shoulder or abutment tooth on one side and by inclined-plane surfaces at its other side, thereby allowing anchoring and quick overlapping coupling of one metal sheet with a contiguous one simply by applying pressure from above to cause said metal sheet to slide on said inclined-plane surfaces.

[0007] The invention is described further hereinafter with reference to the accompanying drawings, wherein:

Figure 1 is a perspective view slightly from above of a supporting block;

Figure 2 is a reduced-scale bottom view of the sup-

porting block of Figure 1;

Figure 3 is an enlarged-scale cross-sectional view, taken along the line III-III of Figure 2;

Figure 4 is a partly cross-sectional perspective view slightly from above of a plan metal sheet;

Figure 5 is a cross-sectional view taken along the line V-V of Figure 4;

Figure 6 is a perspective view slightly from above of an edge of a metal sheet according to another embodiment;

Figure 7 is a perspective view of a supporting block with two adjacent metal sheets during assembly;

Figure 8 is a view similar to Figure 7, but with a metal sheet whose edges are folded according to a variation; and

Figure 9 is a perspective view slightly from above of the metal sheet of Figure 7, snap engaged with a supporting block.

[0008] In the accompanying drawings, identical or similar parts or components have been designated by the same reference numerals.

[0009] With reference first to Figure 1, it will be noted that a supporting and retaining block 1 provided with a base 2 which is designed to rest on a purlin (not shown) and has two raised portions 3 and 4. Each raised portion partly delimits a respective external recess 5 and 6, which in turn is adjacent to a respective seat or cradle 7 and 8. The raised portions 3 and 4 mutually diverge in an upward direction and terminate with an expansion at the top thereof, thereby delimiting an external shoulder or tooth 9. The cradles 7 and 8 are instead inclined toward the adjacent raised portion 3 and 4 and their access inlet 10 is delimited, on one side, by an abutment tooth 11 which is proximal to the raised portion 3 and 4 and by a protruding step 12 on the other side.

[0010] The cradles 7 and 8 are preferably symmetrical with respect to a median vertical plane and extend at an angle of approximately 20° to 40° with respect to the base 2.

[0011] The step 12 is flanked by two lateral shoulders 13 and 14 which delimit two adjacent inclined plane surfaces 15 and 16. The surfaces 15 protrude with the same angle of orientation as the underlying cradle 7 or 8 and are fillet through a short horizontal portion 17 with a side wall 18 of the base 2.

[0012] At least at one abutment tooth 11 two slots 23 are formed, below which there is a respective counter-sink guiding portion 24 for a hole 25 passing through the base 2 to accommodate fixing screws for securing the block 1 to the purlin. Preferably, the end of the raised portion 4 is formed with two notches 26 which are coaxial with the slots 23 to allow free passage for a screw-driver for fixing the screws.

[0013] With reference to Figures 2 and 3, it will be noted that the base 2 of the block 1 has a plurality of longitudinal ribs 27 which are distributed inside a central lightening space 28 and in two lateral spaces 29 and 30

delimited by transverse partitions 31 protruding from said base surface 2 and co-planar with the peripheral rim of the base 2.

[0014] With reference to Figures 4 and 5, a metal sheet 33 is shown which comprises an intermediate flat portion or body 34 which is formed preferably with transverse stiffening corrugations 35 and has folded longitudinal edges 36 and 37. More particularly, at each folded edge 36 there is (in the direction from inside outward) a rising portion 38, followed by a flat strip 39 and a slightly rising portion 40. From the rising portion 40 an inclined portion 41 extends downwards approximately at 90° with respect to both its uphill portion 40 and its downhill portion 42 and delimits, together with a successive flat portion 43, a deep inwardly extending fold 44.

[0015] The flat portion 43 is connected in turn to a slightly arcuate portion 45 which ends at a groove 48, the other edge of which extends into a rising flat portion 50 which belongs to a sharp upward fold 51 which has, on the opposite side, a sloping portion 52. Said sloping portion is folded at 53 and terminates with an end portion 54, so as to delimit a channel for collecting and discharging any water that may have penetrated the joint into a gutter, as is known in the art.

[0016] At the edge 37, that is designed to constitute the overlapping part of a joint, the folded top 51 of the flat portion 50 is instead folded and extends cantileverwise outwards to a corrugated end portion 55 which is further folded in relief at 56.

[0017] According to a modification shown in Figure 6, the upper folded end 51 of the flat portion 50 at the edge 37 is lacking the raised portion 56.

[0018] To install a roofing according to the present invention, first of all multiple blocks 1 are fixed to the purlins, preferably at modular distances, by means of screws or the like which can be inserted in the holes 25. A folded portion 44 of an edge 36 (Figures 7 to 9) of a metal sheet 33 is then moved closer and positioned in front of its respective cradle 7 of the various underlying blocks 1. At this point the operator inserts the folded portion 44 of the edge 36 into the cradle 7 of each blocks, e.g. by pressing with his feet, so that the inclined portion 45 (Figure 9) abuts by snap action against its respective abutment tooth 11 and simultaneously the inner part of the groove 48 abuts by snap action against the toothed end 9 of the raised portion 3, whilst the channel 53 is received and rests between the two spaced raised portions 3 and 4 or, according to the modification shown in Figure 8, the wing 55 extends cantileverwise above the raised portion 3.

[0019] Whilst the folded portion 44 enters the respective cradle 7 with a snap action (after sliding on the inclined-plane sides 1b), the concave part of the step 41 of the metal sheet 1 mates with the step 12 of the block 1, so that the flat strip 39 rests in the end on the corresponding horizontal portion 17 of the block 1.

[0020] The edge 37 of the subsequent adjacent metal sheet is then placed on the edge 36 of the metal sheet

already installed, by repeating the same operations described above so that the edge 37 mates with the end corrugated portion 51 and the block 1, while sliding along the inclined-plane sides 1b. These operations, too, can be performed in a simple manner by taking advantage only of pressure that the operator can apply with his feet.

[0021] A hermetic overlap joint is thus obtained which can withstand even extremely large lifting forces, e.g. due to the wind. In particular, it is practically impossible for the wind to extract the folded portions 44 of the metal sheets 1 from their respective cradles 7 or 8, since the snap interlock will withstand also at the toothed ends 9 of its respective raised portions 3 or 4 in each block 1.

[0022] The blocks 1 are preferably made of antifriction material, which assists in preventing sliding movements of the metal sheets once installed. The antifriction material can be of reinforced polyamide type, which is also a good insulator capable of ensuring good protection against stray electric currents, thereby also hindering electrolytic corrosion processes.

[0023] The metal sheets 1 can be made of copper, aluminum or stainless steel according to requirements.

[0024] Their configuration, rich in folds, while ensuring good elasticity, allows to satisfactorily absorb possible thermal expansions-contractions, which prevent dangerous stresses, which would otherwise occur due to excessive rigidity of the jointed structure, from being generate.

[0025] A roofing obtained as described above ensures positive waterproofing and excellent drainage to the gutter owing to the presence of the channel 53, if provided.

[0026] The invention is susceptible of numerous modifications and variations within the protection scope defined by the tenor of the appended claims.

[0027] The disclosures in Italian Utility Model Application No. VR98U000036 from which this application claims priority are incorporated herein by reference.

[0028] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

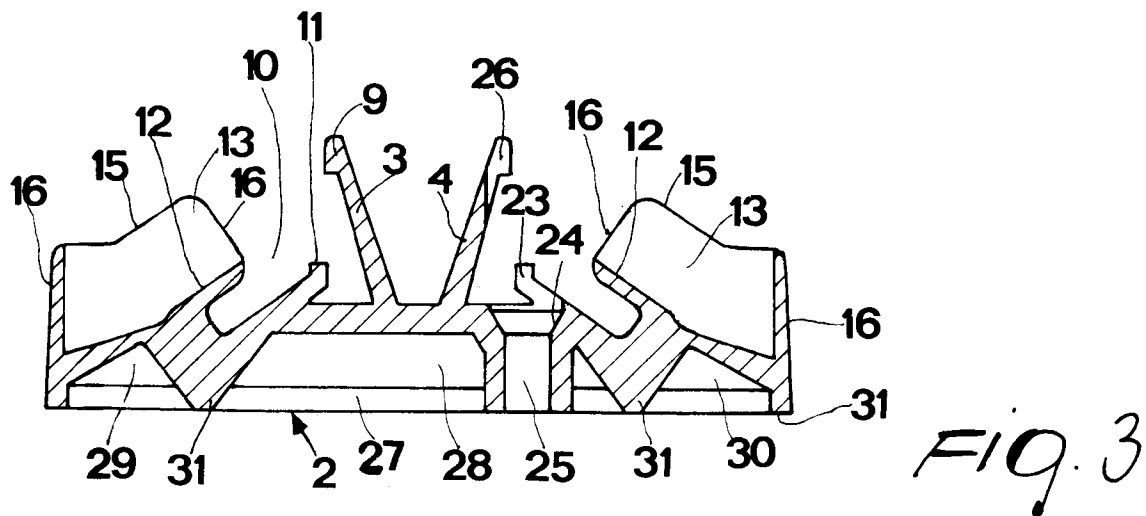
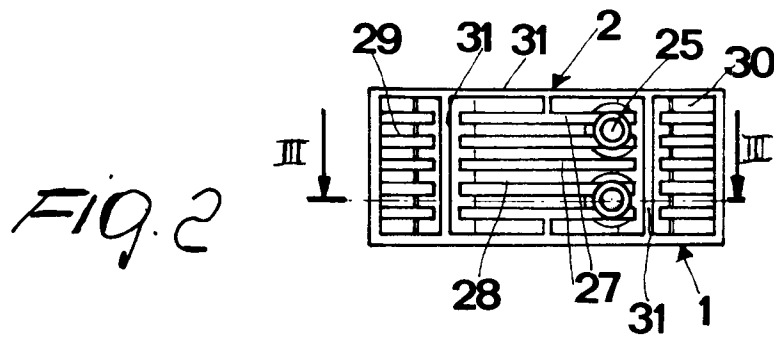
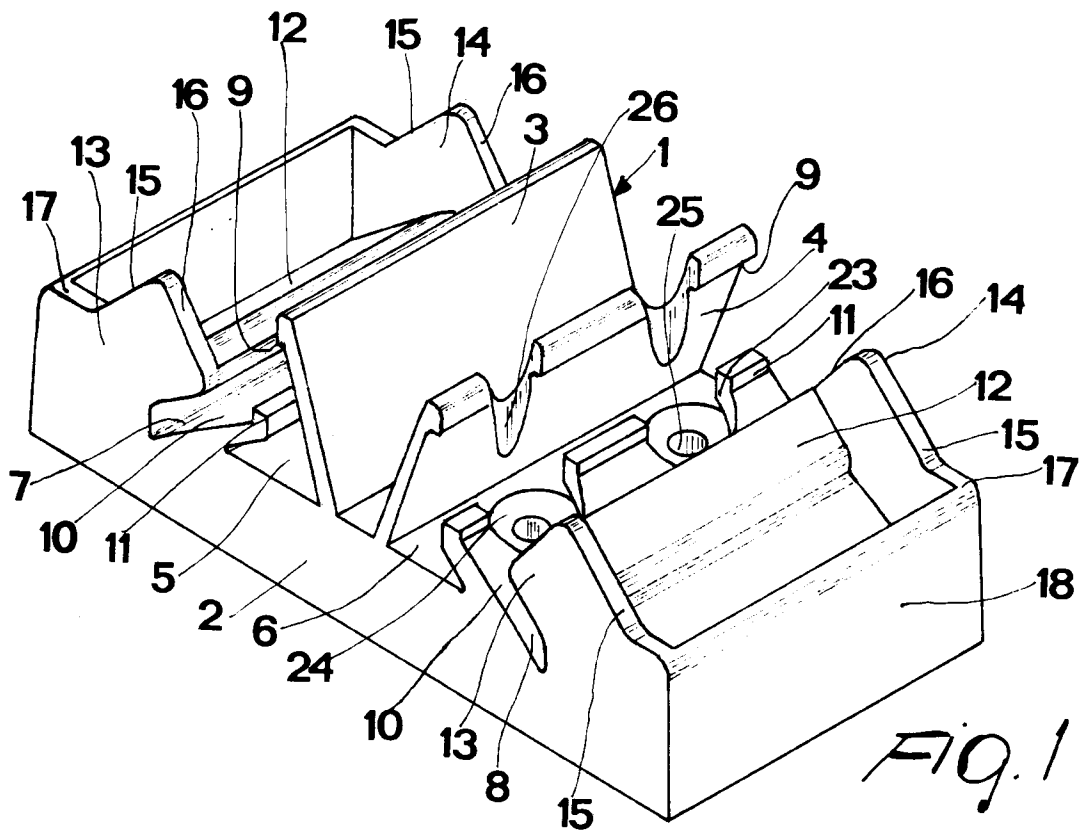
1. A folded metal sheet roofing structure, which comprises: a plurality of metal sheets (33) having two non-adjacent edges (36,37) complementarily folded or otherwise shaped so as to allow mating of two contiguous metal sheets (33) by partly overlapping snap engagement; a multiplicity of supporting and holding blocks (1) to be anchored to a roofing purlin, said blocks (1) having a base portion (2) with two raised portions (3,4) arranged side by side a respective recess (5,6); and characterized in that

one raised portion (3,4) of each supporting block (1) has a diverging inclination with respect to the other and in that each of said recesses (5,6) is externally adjacent to an inclined-plane cradle (7,8) which is inclined toward its respective raised portion (3,4) and has its access delimited by a shoulder or abutment tooth (11) on one side, and by an inclined-plane surface or step (12), at its other side, thereby allowing the anchoring and quick overlapping coupling of one metal sheet (33) with a contiguous one simply by applying pressure from above, to cause said metal sheet (33) to slide on said inclined-plane surfaces (16).

2. A roofing structure according to claim 1, characterized in that each of said raised portions (3,4) has an end with a shoulder or tooth (9) which extends outwardly. 15
3. A roofing structure according to claim 1 or 2, characterized in that said step (12) is flanked by shoulders (13,14) delimiting an inclined plane (15,16). 20
4. A roofing structure according to any one of the preceding claims, characterized in that each metal sheet (33) has two non-adjacent edges (36,37) which are complementarily folded, so as to allow mating of two contiguous metal sheets (33) by partial overlapping of one edge (37) of one metal sheet (33) on one edge (36) of the contiguous metal sheet (33) at said raised portions (3,4) of one or more blocks (1) and snap engagement with the cradles (7,8) of said blocks (1). 25 30
5. A roofing structure according to claim 4, characterized in that each metal sheet (33) has, at each folded edge (36,37) thereof, in sequence, at least one slightly rising portion (40), an inclined portion (41) sloping at approximately 90° with respect to said rising portion (40), a deep inward fold (44) which is directed substantially at right angles with respect to said sloping portion (41) and is arranged to fit into a respective cradle (7,8) of said block or blocks (1), and a rising portion (50) which is folded at the top thereof and is formed with an intermediate abutment groove (48). 35 40 45
6. A roofing structure according to claim 5, characterized in that said rising portion (50) folded at the top thereof extends with a portion shaped like a gutter drainage channel (53) at one edge (36) of each metal sheet (33). 50
7. A roofing structure according to claim 5 or 6, characterized in that each metal sheet (33) has an end portion with two folds (51,56) at the other edge (37) thereof, whereby covering hermetically the drainage channel-like portion (53) of an adjacent metal 55

sheet (33).

8. A roofing structure according to any one of the preceding claims, characterized in that the base (2) of said block (1) has a plurality of longitudinal ribs (27) and at least one transverse partition (31) for delimiting multiple compartments or spaces.
9. A roofing structure according to any one of the preceding claims, characterized in that each block (1) has at least one hole (25) with a respective counter-sink guiding portion (24) for the insertion therein of a screw or anchor for fixing the block (1) to a supporting structure.



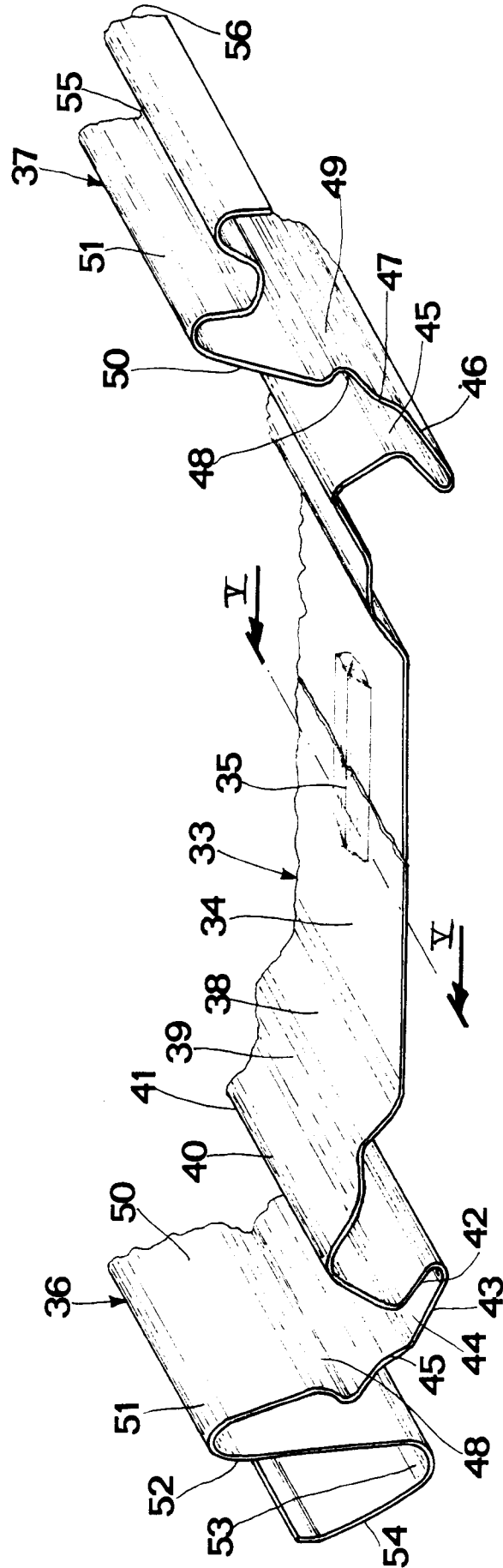


Fig. 4

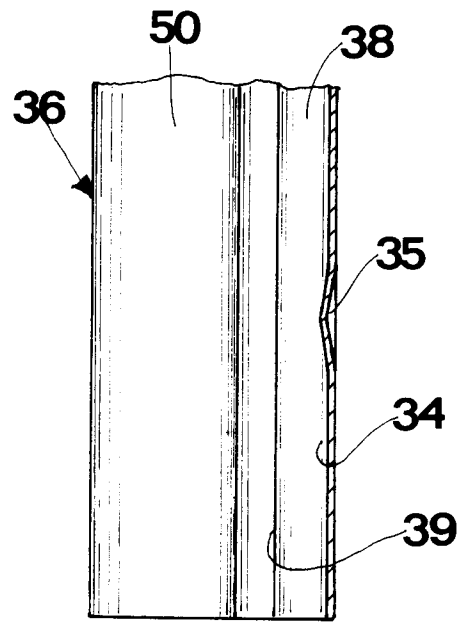


Fig. 5

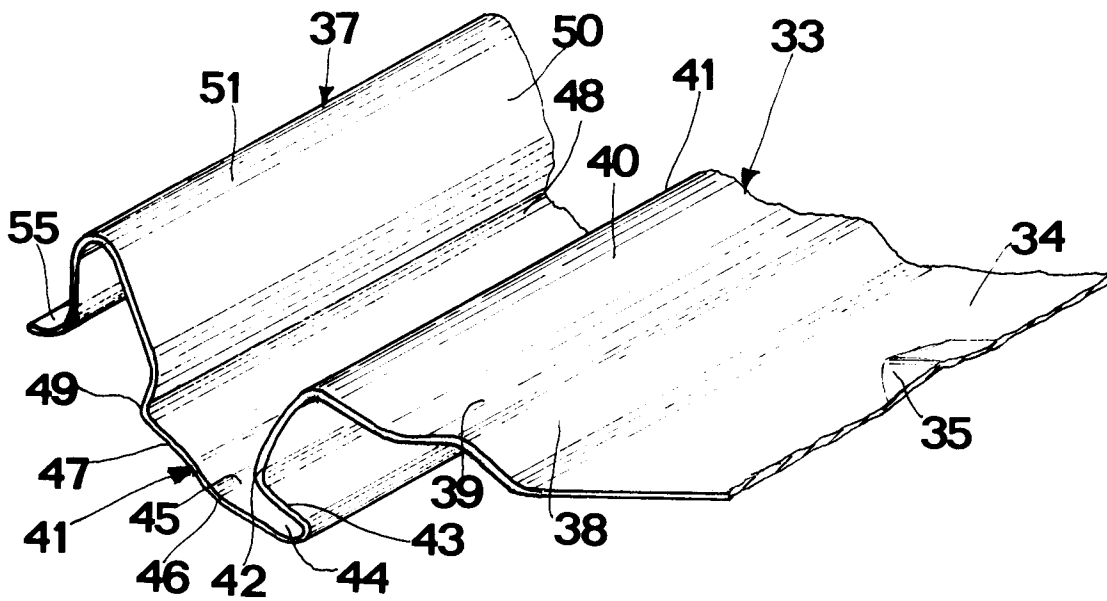


Fig. 6

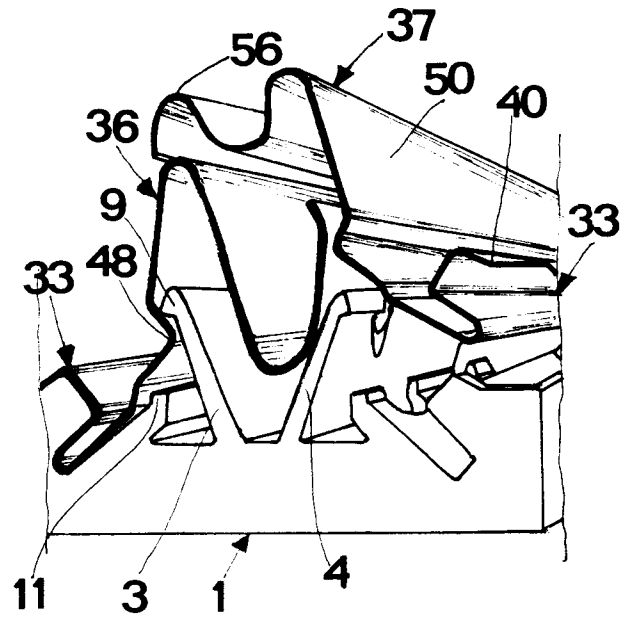


Fig. 7

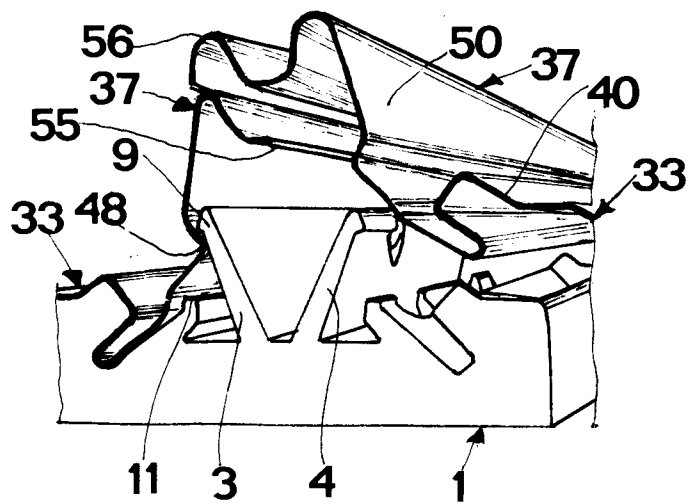


Fig. 8

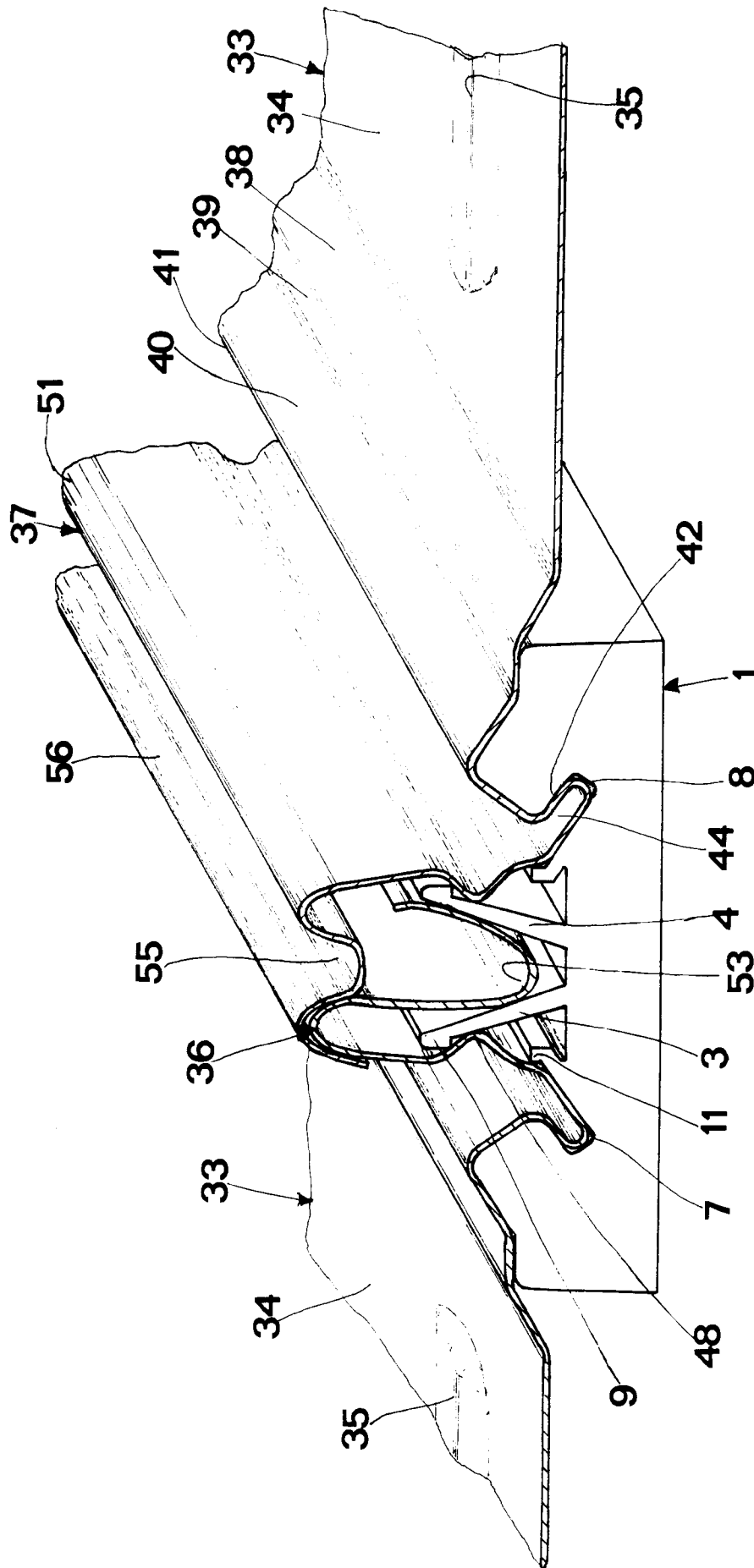


Fig. 9