Aug. 4, 1964 E. ESS 3,142,937

COVERING FOR ROOFS AND WALLS

Filed July 18, 1961 2 Sheets-Sheet 1

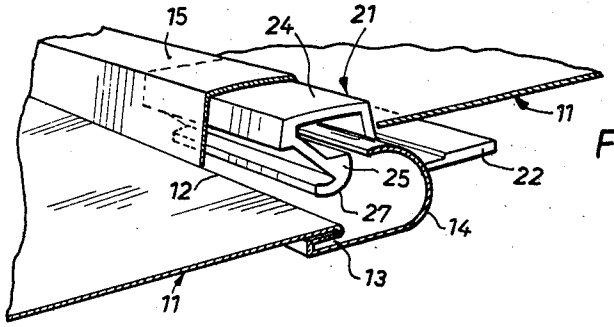


Fig. 1

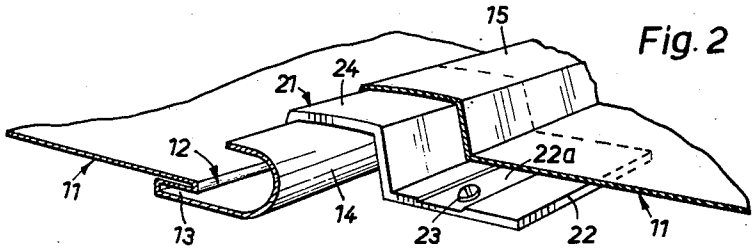


Fig. 2

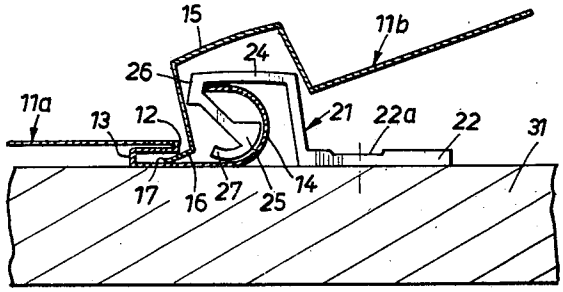


Fig. 3

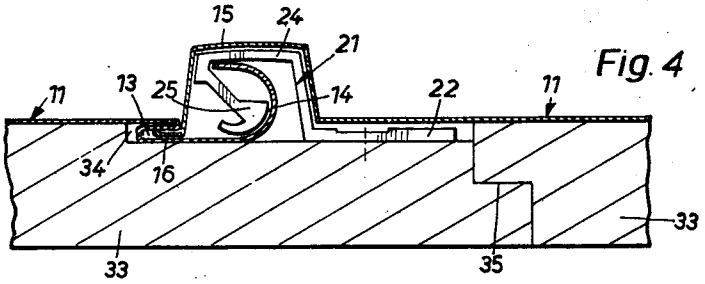


Fig. 4

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COVERING FOR ROOFS AND WALLS

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Fig. 5

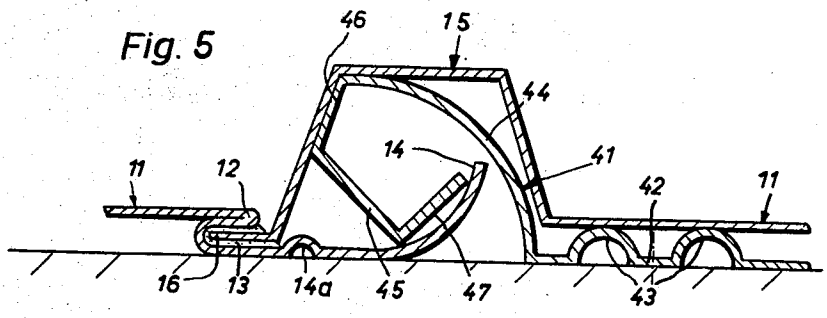
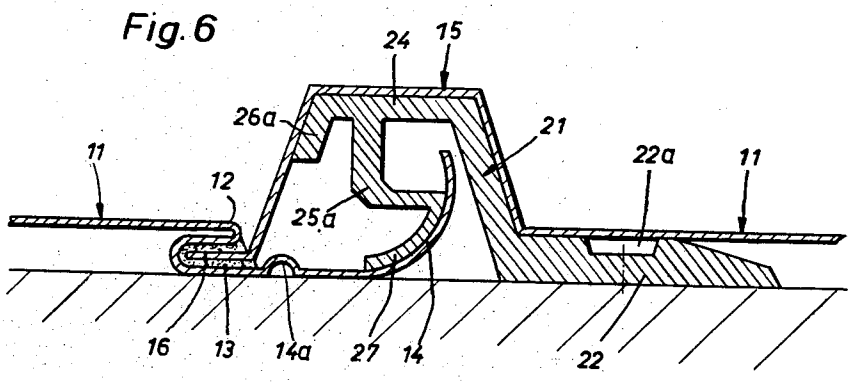


Fig. 6



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COVERING FOR ROOFS AND WALLS

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10 Claims. (Cl. 50—220)

The present invention relates to a covering for roofs and walls comprising a skin composed of a plurality of courses and corresponding fastening means. The courses, which in particular may consist of light metal sheets, have the edges bent into cross sectional shapes which are interengaging, and the fastening means are brackets formed as profiled pieces and adapted for fastening to a supporting member.

Various types of coverings of the kind considered are known but they have certain drawbacks, among which the comparatively high manufacturing costs of their several components and the cost of their assembling are the most important.

One of the objects of the present invention is to provide a covering which will avoid this drawback though presenting the most desirable features of the constructions known hitherto.

Other objects and advantages of my invention will become apparent from the description, now to follow, of a preferred embodiment of the invention and of some modifications thereof, which are shown by way of example only in the accompanying drawings.

In these drawings:

FIGS. 1 and 2 are partly sectional perspective views from different sides, of portions of two adjoining courses of the covering and of one fastening bracket, the sheets forming the said courses being sectioned transversely;

FIG. 3 is a cross-section through the same parts of the covering, showing how the sheets forming the said courses can be brought into engagement with each other and with the bracket fastened to its support;

FIG. 4 also is a cross-section through the covering in which, however, the support differs from that shown in FIG. 3;

FIGS. 5 and 6 show two further embodiments of the invention, each in cross-section.

The courses from which the skin of the covering is composed in each of the embodiments shown, are formed by metal sheets **11** which are similar to each other. One longitudinal marginal portion of each sheet **11** has a first part folded back through 180° towards the inside surface of the two parallel sides of the sheet **11** forming the covering along a fold line **12**, and adjacent thereto a second part is folded once more through 180° towards the inside of the covering so as to form a groove **13** from which it extends in its initial direction again. The same longitudinal marginal portion further comprises a terminal third part **14** bent up towards and past a projection of the outside surface of the covering and having an approximately semi-circular cross-section.

The opposite longitudinal marginal portion of each sheet **11** is folded up first transversely away from the outside surface then substantially parallel to said outside surface, and then towards the inside surface of the covering to form a hollow rib **15** of substantially trapezoidal cross-section and in front of that rib comprises a terminal flange **16** (see FIGS. 3 and 4) which extends approximately in the same direction as the sheet portion rearwardly adjacent to the hollow rib **15**. The extreme edge part **17** of the flange **16** is bent up through an angle surface of some few degrees, at the most through 30 deg., to the outside of the covering.

When the covering is assembled, the terminal flange **16** of each sheet **11**, including its bent-up part **17**, engages the groove **13** of the sheet **11** which forms the adjacent

course of the covering while the terminal third part **14** of the last-mentioned sheet extends from beneath into the hollow rib **15** of the first-mentioned sheet **11**. Thus a water-tight joint is formed between adjoining sheets **11**. It should be noted that in the case of a roof covering, the direction in which the courses formed by the sheets **11** and therefore the hollow rib **15** extend is in the line of fall of the roof; in the case of a wall covering, this direction preferably is vertical. Any water which may have penetrated between the flanks of the groove **13** and the terminal flange **16** is prevented by the terminal third part **14** from spreading on the inner side of the skin of the covering, and is drained off through the gutter formed by the part **14** and the groove **13** of the one sheet.

Fastening of the skin formed by the sheets **11** on a supporting structure is effected by means of brackets **21** obtained from profile stock. In the example shown, the brackets **21** have a securing flange **22** which is fastened on the supporting structure, for example by screws **22** or by resilient clamps (not shown), or the like. Each bracket farther comprises a back part **24** fitting into the cross-section of the hollow rib **15**, and a foot **25** which extends obliquely to the rear from the front edge **26** of the back **24** and which has a retaining surface **27** in the shape of a cylinder sector for engaging the terminal third part **14** of the respective sheet **11**.

As shown in FIG. 3, the supporting structure consists of horizontal beams **31** onto which the brackets **21** are screwed. After the sheet **11***a* shown at the left in FIG. 3 has been laid at the proper place, a few brackets **21** are brought into engagement with the terminal third part **14** of the said sheet **11***a* and are then screwed to the respective beams **31**. By means of the retaining surfaces **27** of the feet **25** of these brackets, the portion of the sheet **11***a* comprised between the groove **13** and the terminal part **14** is held down onto the beams **31**. Thereafter, the extreme edge part **17** of the terminal flange **16** of the adjacent sheet **11***b* is introduced into the groove **13** of the sheet **11***a* already fastened, the sheet **11***b* being first held in inclined position with respect to the beams **31**, as shown in FIG. 3. The sheet **11***b* is then swung down onto the beams **31** about the edge **12** of the sheet **11***a* acting as a hinge. Thereby, the hollow rib **15** of the sheet **11***b* is caused to engage the backs **24** of the brackets **21**, which now prevent lateral displacement of the sheet **11***b* The opposite marginal portion of the sheet **11***b* (not shown in FIG. 3) is now fastened in a similar manner to the beams **31** as previously described with reference ot the sheet **11***a*.

In FIG. 4, a structure consisting of boards **33** is provided in place of that formed by the beams **31**, and the sheets lie flat immediately on the one face of these boards. To render this possible, the boards **33** are provided with recesses **34** receiving portions of the brackets **21** and of the sheets **11**. While the structure shown in FIG. 3 has the advantage that the inner face of the skin of the covering is well exposed to air, the structure of FIG. 4 ensures better support of the skin, so that a roof covering according to this example can be walked on as is required in many cases.

The construction according to FIG. 4 also permits prefabrication of roofs and walls since it is possible to manufacture in a factory comparatively large panels built up from boards **33** and covering sheets **11** fastened thereto; each panel may comprise a plurality of courses formed by sheets **11** and mounted side by side. The sheets **11** are fastened to the boards **33** by means of the brackets **21** but they may moreover be cemented to the boards by means of an adhesive. The panels thus prefabricated can readily be assembled into a roof or a wall at the place of erection by engaging with each other the free marginal portions of the outermost sheets on each panel, exactly in the same manner as has been described with reference to FIG.

3. The outermost boards 33 of adjoining panels are preferably stepped at their mutually engaging edges, as shown at 35 in FIG. 4.

Instead of being made from wood, the supporting structure could also consist of metal beams, in which case the brackets would preferably be fastened to the beams by resilient metal clamps. However, the supporting structure could also be a mixed construction made from wood and metal, for instance from wooden rafters parallel to the hollow ribs 15 and to which the brackets 21 would be fastened and from metal wires or metal bands stretched across these rafters and supporting the sheets 11 between them. In that case, the flanges 22 of the brackets 21 could be at right angles to the inner surface of the covering instead of being parallel thereto.

As shown in the drawing, the fastening flange 22 of the brackets is provided with a groove or recess 22*a* in which the heads of the fastening screws 23 or of corresponding nails are lodged, so that these heads will not damage the sheet 11 overlying them, if that sheet moves somewhat due to its dilatation or contraction. Clamps or other fastening means if provided as mentioned for fastening the brackets 21 to the supporting structure could also be inserted into the groove 22*a*.

The sheets 11 of the described covering are enabled to dilate both in their longitudinal and in their transverse directions, which is a decisive advantage especially in tropical countries. The skin need not be perforated for its fastening. A rain-tight roofing can be obtained even if the inclination of the roof surface with respect to the horizontal is as small as about 2%. The gutter formed by the groove 13 and the terminal third part 14 prevents any water which may have penetrated into it from dripping onto the supporting structure. Mounting of the covering is simple and can be effected in comparatively little time.

The bending of the longitudinal marginal portions of the sheets 11 can be effected in relatively simple manner with appropriate equipment; if a large area is to be covered, the bending could even be done at the place of erection. As a rule, however, the sheets are brought to that place as prefabricated elements which must only be cut to the required length. The sheets may also be prefabricated altogether. The longitudinal edges of the sheet are not necessarily parallel in each case but they may be at an angle with each other, if they are to be used for the covering of tent-shaped or pointed roofs and the like.

Since the sheets can be produced from flat-rolled sheet stock by subsequent bending, the cost of their manufacture is comparatively small and at any rate is much lower than that of sheets rolled or extruded to a specific profile as now often used for roof and wall coverings.

For their good appearance and for further facilitating their transverse dilatation, the sheets 11 may have one or more further longitudinal ribs of the same cross-section as the hollow rib 15. Further, the hollow rib 15 need not always have the trapezoidal cross-section shown but could have a profile more approaching a semi-circle or a triangle or any other shape. However, the configuration of the back 24 of the brackets 21 should always be adapted to that of the hollow ribs 15 to give the respective marginal portion sufficient support against lateral displacement so that the terminal flange 16 is never drawn out of the groove 13 of the adjacent sheet. The configuration of the back 24 of the bracket 21 is sufficiently adapted to that of the hollow rib 15 if the back contacts the inside of the said rib at several points only, provided the position of the hollow rib 15 with reference to the brackets is positively determined by these contacts. For instance, the back 24 may have a few projecting humps which extend into contact with the inside of the hollow rib 15.

In the example of FIG. 5, the sheets 11 of which are otherwise shaped as described above, the groove 13 is filled with an appropriate cement or putty before assembly of the covering. Between the groove 13 and the terminal third part 14, there is a bead 14*a* extending toward the outside surface and which on one hand reinforces that part of the sheet and on the other hand prevents the cement or putty from coming out of the groove 13.

The skin assembled from the sheets 11 is fastened on its supporting structure by brackets 41 made from the same material as the sheets 11, e.g., aluminium sheet. The brackets comprise a securing flange 42 which is fastened on the supporting structure, e.g., by screws or by resilient clamps (not shown) or the like. The flange 42 has two spaced beads 43 projecting upwardly, between which the flange is engaged by these fastening means; thus, the overlying sheet is retained out of contact with these fastening means and moreover the beads 43 reinforce the flange 42. Each bracket 41 moreover has a back 44 which fits into the hollow rib 15, and a foot 45 below the back 44, which foot is bent inwardly and obliquely to the rear from a longitudinal portion 46 of the back 44 remote from the securing flange, and has an upwardly bent terminal flange 47 abutting the terminal part 14 of the sheet 11; instead of being plane as shown, this terminal flange 47 could be curved into the shape of a cylinder sector fitting the similarly curved terminal part 14. These brackets made from band material are easier and less expensive to manufacture than the brackets made from profile stock. The curved back of the brackets not only gives them increased strength but also leaves sufficient latitude for the choice of a proper shape of the hollow ribs on the sheets.

In the modification of FIG. 6 as well, the groove 13 is filled with cement or putty. Here again, an upwardly projecting bead 14*a* is provided between the groove 13 and the terminal part 14 for reinforcing that portion of the sheet and for preventing the cement or putty from being driven out of the groove 13. The cement or putty filling of the groove 13, into which the terminal flange 16 of the adjacent sheet extends when the covering is assembled, ensures a perfect sealing of the sheet joint.

I claim:

1. Covering for roofs and walls comprising a skin composed of a plurality of sheets each having a pair of substantially parallel sides, and fastening means, each sheet engaging an adjacent one along one of its longitudinal edges, and the fastening means comprising brackets adapted to be fastened on a supporting structure, wherein each of said sheets comprises a first marginal portion along a first one of its said longitudinal edges, said first marginal portion comprising a first part folded inwards 180° along one of said sides of the sheet, an adjacent second part folded outwards through 180° from said first part and there beyond and defining therebetween an outwardly open groove, and a terminal third part extending from the outer portion of said second part in a curved path transversely of the pair of sides and to a point past a projection of the other of said pair of sides and defining a concave side facing towards said groove and said other side said sheet further comprising a second marignal portion along another of its longitudinal edges substantially opposite to the said first longitudinal edge, said second marginal portion extending transversely away from said other side in a direction opposed to said folded first part, then outwardly substantially parallel to said other side and then returning transversely of and past a projection of said other side, thus forming a hollow rib on the said other side of the sheet, and thereafter substantially outwards thus forming a termianl flange, said terminal flange of the second marginal portion of one sheet engaging said groove of the first marginal portion of an adjacent sheet, and wherein the said brackets each comprise a convex back portion engaging the inside of said hollow rib of said one sheet at least on the parts thereof extending transversely of said sheet, and a foot portion extending from said back portion of the bracket into contact with the concave side of said terminal third

part of the first marginal portion of said adjacent sheet for applying the latter onto said supporting structure.

2. Covering as claimed in claim 1 wherein the extreme part of said terminal flange of the second marginal portion of each sheet is bent up from the plane of the terminal flange towards the first part defining said groove through 30 deg. at the most.

3. Covering as claimed in claim 1 wherein the said first marginal portion of each sheet has a longitudinal bead projecting toward the other of said pair of sides of the sheet intermediate the said second and third parts, and wherein the said groove is filled with sealing material.

4. Covering as claimed in claim 1 wherein the said terminal third part of the first marginal portion of each sheet is at least approximately semi-circular in cross-section, and wherein the said foot portion of each bracket has a surface in the shape of a cylinder sector in contact with said terminal part of the first marginal portion of the respective sheet.

5. Covering as claimed in claim 4 wherein the said foot portion of the bracket extends obliquely with respect to said sheets towards said terminal third part, said back portion of the bracket having a free edge toward the transversely returning part of said second marginal portion and from which said foot portion extends.

6. Covering as claimed in claim 4 wherein each bracket comprises a flange for securing it to said supporting structure, said flange having a recess for receiving fastening members.

7. Covering as claimed in claim 1 wherein each bracket

is formed from a strip of the same material as the said sheets, each bracket comprising a flange for securing it to said supporting structure, said last-named flange having at least two beads supporting the said one sheet and forming between them a recess for receiving fastening members, a back portion extending from said last-named flange along an arc the convex side of which faces the inside of said hollow rib of the said one sheet, and a foot portion extending obliquely with respect to said sheets from the opposite end of said back portion towards the concave side of said terminal third part of the said other sheet.

8. Covering as claimed in claim 7, wherein the said foot portion has on the free end thereof an extension extending along the concave surface of said terminal third part of said other sheet towards the concave side of the said back portion of the bracket.

9. Covering as claimed in claim 8 in which said extension is straight.

10. Covering as claimed in claim 8 in which said extension is arcuate.

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