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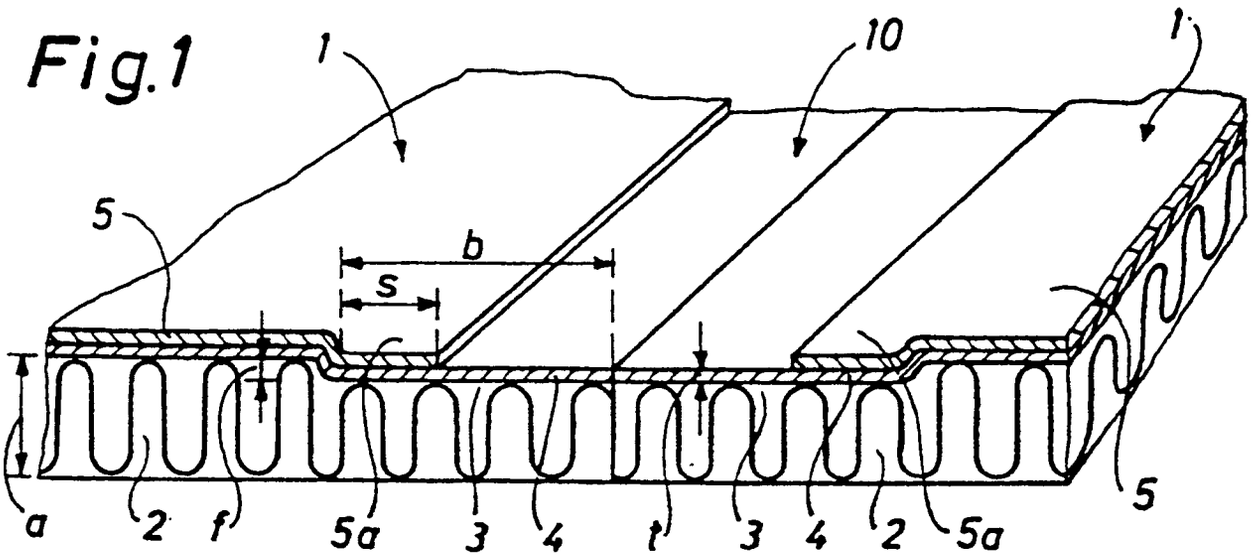
(54) Roofing and roofing units for use therein.

(57) Roofing of the type comprising a number of adjoining roofing units (1) and joining means (7) for joining the roofing units. Each roofing unit (1) comprises a layer of insulating material (2) the upper edge zone (3) of which has a depression on at least a portion of its length and/or width. At least one roofing material has been applied, optionally glued, on top of the layer of insulating material (2), said roofing material preferably being formed of at least one layer, such as roofing felt. The depth f of the depression of each edge zone (3) is in the range $t \leqq f \leqq 4\ t$, t being the thickness of the layer of roofing material. As a result, the joints between the roofing units are very tight and almost invisible and improved drainage makes the roofing less susceptible to the effects of the weather.

Fig.1



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The invention relates to roofing of the type comprising a number of adjoining roofing units and joining means to join the roofing units.

German Patent No. 28 42 347 discloses a roofing unit having a depression at a first edge zone and a projection at a second edge zone. The depression of one roofing unit thus cooperates with the projection of the corresponding adjoining roofing unit. The roofing units are, however, not joined by means of a felt-like material and the joints do not provide adequate drainage in case of a slightly pitched roof.

It is the object of the invention to provide a roofing of the above type where the joints between the individual roofing units are flush with the surface of the roofing units, thereby providing improved drainage, and where the joints are less exposed to the effects of the weather and which have a more pleasant appearance.

The roofing according to the invention is characterised in that each roofing unit comprises a layer of insulating material, the upper edge zone of which has a depression on at least a portion of its lenght and/or width and that at least one roofing material preferably in the form of at least one layer, such as roofing felt, has been applied, possibly glued, on top of the insulating material, and that the depth f of the depression of each edge zone is in the range $\leqq < f \leqq 4$ t, t being the thickness of the roofing material. As a result, the roofing units and the upper strip and the lower strip of the joining means may substantially flush with the under felt portions and top felt portions in the middle of the roofing units, whereby no recesses are formed in the finished roof surface. Also, no projections are formed which might prevent complete drainage.

An embodiment of the roofing according to the invention is characterised in that the layer of roofing material comprises at least one layer of under felt and at least one layer of top felt, placed on top of the under felt. It is thereby possible to exploit the special properties of the individual layers of felt, for instance their weatherproofness, waterproofness and low temperature fitness.

According to the invention, the layer of roofing material may be formed of one layer of top felt. Only one layer of roofing material is thereby necessary, which probably makes the manufacturing less expensive than if two separate layers of roofing material were used.

Furthermore, according to the invention, the top felt may extend from the middle portion of the roofing unit and a distance s into the depressed edge zone, where s is in the range $0.2b \leqq s \leqq 0.8b$, b being the width of the edge zone, thereby allowing a large overlap between the parts of the roofing.

Moreover according to the invention, the top felt may extend from the middle portion of the roofing unit and a distance s into the depressed edge zone, where s is in the range $0.2b \leqq s \leqq b$, b being the width of the edge zone. This is necessary when only one layer of top felt is used.

Further according to the invention, each joining means may be made of a long lower strip to be applied in the broad depressed area formed by the edge zones of two adjoining roofing units as well as a long upper strip to be applied on top of the lower strip and on top of the portion of the top felt which is in the depressed edge zone in such a manner that the lower strip and the upper strip substantially fill out the broad depressed area entirely. A homogenous and waterproof surface is thereby obtained.

According to the invention, each joining means may comprise a long upper strip on top of the portion of the top felt which is in the depressed edge zone, said upper strip substantially filling out the broad depressed area entirely. Thereby a tight coherent surface is provided by means of one single strip.

The insulating layer of each roofing unit may advantageously be made of mineral wool, cellular plastics with open or closed cells or non-flammable materials with cellular structure.

It has also proved advantageous that the width b of the depressed edge zone of the roofing unit is in the range $5 \text{ cm} \leqq b \leqq 40 \text{ cm}$.

According to the invention, the upper strips and lower strips of the joining means may be joined, for instance by gluing, to form a unit before being applied in - and optionally glued to - the depressed area formed by the edge zones of two adjoining roofing units. As a result, the mounting of the joining means and consequently the entire roofing is thereby facilitated.

According to the invention, the upper strip and the lower strip of the joining means may advantageously have such thickness that they are substantaily flush with the top felt of the central portions of the roofing unit when the stips are mounted on the depressed edge zone.

The invention is described in greater detail below with reference to the drawing, in which

Figure 1 is a perspective view of portions of two adjoining roofing units according to the invention prior to the mounting of the joining means.

Figure 2 is a perspective view of a joining means according to the invention,

Figure 3 is a perspective view of a second embodiment of the roofing unit shown in Figure 1, a second embodiment of the joining means according to Figure 2 being mounted thereto.

The roofing according to the invention comprises many adjoining roofing units 1, joined mutually by means of joining means 7. Figure 1 shows two roofing units 1 closely abutting each other. Each roofing unit 1 comprises a layer of insulating material 2, the upper edge zone 3 of which is depressed on at least a portion of its length and/or width. At least one roofing material, such as roofing felt, has been applied, optionally glued, on top of the insulating material, said

roofing material comprising at least one layer. The depth f of the depression of each edge zone 3 is in the range $t \leqq f \leqq 4t$, where t is the thickness of the roofing material. In Figure 1 f equals about 2t.

The layer of roofing material is made of at least one layer of under felt 4 and at least one layer of top felt 5 applied on top of the under felt 4. The layer of roofing material may also be made of only one layer 5 of top felt, see Figure 3.

As to the edge zone 3 of the insulating material 2, the top felt 5 does not cover this entire zone but only extends a distance s into the zone. s fulfils the requirement $0.2\ b \leqq s \leqq 0.8\ b$, b being the width of the edge zone. Preferably s is in the range between 0.35 b and 0.5 b. Particularly advantageously, s is about 0.4 b. In the case where only one layer of top felt 5 is used, the top felt 5 extends from the middle portion of the roofing unit 1 and a distance s into the depressed edge zone 3, where s is in the range $0.2b \leqq s \leqq b$, b being the width of the edge zone. Preferably s equals b.

As shown in Figure 2, each joining means 7 comprises a long lower strip 8 as well as a long upper strip 9. The lower strip 8 is to be applied in the broad depressed area 10 formed by the depressed edge zones of the two neighbouring roofing units. The long upper strip 7, placed on top of the lower strip and fastened thereto, is to substantially fill up said broad depressed area entirely. The edge portions of the upper strip are fastened to top felt portions 5a by means of glueing, said top felt portions projecting into the depressed edge zones 3 and thereby into the depressed area 10 formed by said zones.

As appears from Figure 3, each joining means 7, only comprising one long upper strip 9, substantially fills up the entire broad depressed area 10.

When the joining means have been mounted as shown in Figure 3, the depressed area 10 is filled out, thereby providing a strong and tight joint between the two roofing units 2, said joint having a pleasant appearance in that it is hardly visible and being less exposed to the effects of the weather.

The roofing may be carried out on concrete or steel plates (corrugated), plywood or other self-supporting bases in new buildings or when renovating an existing roof. The insulating layer 2 of the roofing unit 1 comprises mineral wool or cellular plastics.

The roofing may be divided longitudinally/transversely, optionally diagonally. Each roofing unit 1 may be bevelled so as to be used on round or lopsided roofs.

It has proved practical for the width b of the depressed edge zone 3 of the roofing unit 1 to be in the range $5\ cm \leqq b \leqq 40\ cm$.

The edge zones may have depressions in more than the two levels shown.

The insulating layer 2 may be made of mineral wool, foamed plastics, cellular plastics, compressed glass particles (Foamglas™) or other heavily insulating material. The insulating material may have open or closed cells. The top felt is preferably a roofing felt or a roof membrane of conventional construction with for instance reinforcement material and bitumen with different additives, such as talc, polymerization agent or softener. The under felt is preferably of the same structure as the top felt.

The upper strip 9 and the lower strip 8 of each joining means 7 may be joined, for instance by gluing, to form a unit before being laid into the broad depressed area 10. This is, however, not an absolute necessity. The lower strip may be placed first, followed by the upper strip. The joining means 7 is preferably fastened by means of gluing to the broad depressed area 10. The fastening may also take place by melting which is the most common method.

The upper strip and the lower strip of the joining means 7 may not necessarily be of the same thickness. Possibly the thicknesses may be selected in such a manner that the surface of the upper strip 9 projects slightly above the top felt 5 of the central portions of the roofing units 1 when the strips have been mounted in the entire depressed area 10. However, in the embodiment shown, the upper strip 9 flushes with the top felt 5 on the central portion of the roofing unit 1. The conventional production margin are $\pm \frac{1}{2}$ t, corresponding to 4 mm.

The protection is not only directed towards the roofing as such but also towards each roofing unit, which will typically have the dimensions 120 x 240 cm.

The joining means, which are in the form of strips, extend along the roofing units, for instance along their long side as appears from the drawing. A depressed edge zone with projecting top felt and under felt may also be provided on the short sides of the roofing units, in the samme manner as shown in Figure 1.

The invention may be varied in many ways without thereby deviating from the scope thereof.

Claims

1. Roofing of the type which comprises a number of adjoining roofing units (1) and joining means (7) for joining the roofing units (1), characterised in that each roofing unit (1) comprises a layer of insulating material (2) the upper edge zone (3) of which has a depression on at least a portion of its lenght and/or width and that at least one roofing material preferably in the form of at least one layer, such as roofing felt, has been applied, possibly glued, on top of the insulating material, and that the depth f of the depression of each edge zone (3) is in the range $t \leqq f \leqq 4\ t$, t being the thickness of the roofing material.

2. Roofing as claimed in claim 1, characterised in that the layer of roofing material comprises at

least one layer of under felt (4), and at least one layer of top felt (5) placed on top of the under felt (4).

3. Roofing as claimed in claim 1, characterised in that the layer of roofing material is made of a layer of top felt (5).

4. Roofing as claimed in claim 2, characterised in that the top felt (5) extends from the middle portion of the roofing unit (1) and a distance s into the depressed edge zone (3) where s is in the range $0.2b \leqq s \leqq 0.8b$, b being the width of the edge zone (3).

5. Roofing as claimed in claim 3, characterised in that the top felt (5) extends from the middle portion of the roofing unit (1) and a distance s into the depressed edge zone (3), where s is in the range $0.2b \leqq s \leqq b$, b being the width of the edge zone (3).

6. Roofing as claimed in one or more of the claims 1-5, characterised in that each joining means (7) comprises a long lower strip (8) to be applied in the broad depressed area (10) formed by the edge zones (3) of two adjoining roofing units as well as a long upper strip (9) to be placed on top of the lower strip (8) and on top of the portion (5a) of the top felt (5) which is in the depressed edge zone (3), in such a manner that the lower strip (8) together with the upper strip (9) substantially entirely fill up the broad depressed area (10).

7. Roofing as claimed in claim 3 or 5, characterised in that each joining means (7) comprises a long upper strip (9) on top of the portion (5a) of the top felt (5) which is in the depressed edge zone (3) and that the upper strip (9) substantially entirely fills up the broad depressed area (10).

8. Roofing as claimed in one or more of the claims 1-7, characterised in that the insulating layer (2) of each roofing unit (1) is of mineral wool, cellular plastics with open or closed cells or non-flammable materials with cellular structure.

9. Roofing as claimed in one or more of the claims 1-8, characterised in that the width b of the depressed edge zone (3) of the roofing unit (1) is in the range $5\ cm \leqq b \leqq 40\ cm$.

10. Roofing as claimed in one or more of the claims 1-9, characterised in that the lower strip (9) of the joining means (7) is firstly applied to - and optionally glued to - the depressed area (10) formed by the edge zones (3) of two adjoining roofing units (1), and that the upper strip (9) of the joining means (7) is subsequently applied to - and optionally glued to - the lower strip (8) laid in the depressed area (10).

11. Roofing as claimed in one or more of the claims 1-10, characterised by the upper strip (9) and lower strip (8) of the joining means (7) having such a thickness that the surface of the upper strip (9) substantially flushes with the top felt (5) of the central portion of the roofing unit (1) when the strip has been mounted in the depressed edge zone (3).

Fig.1

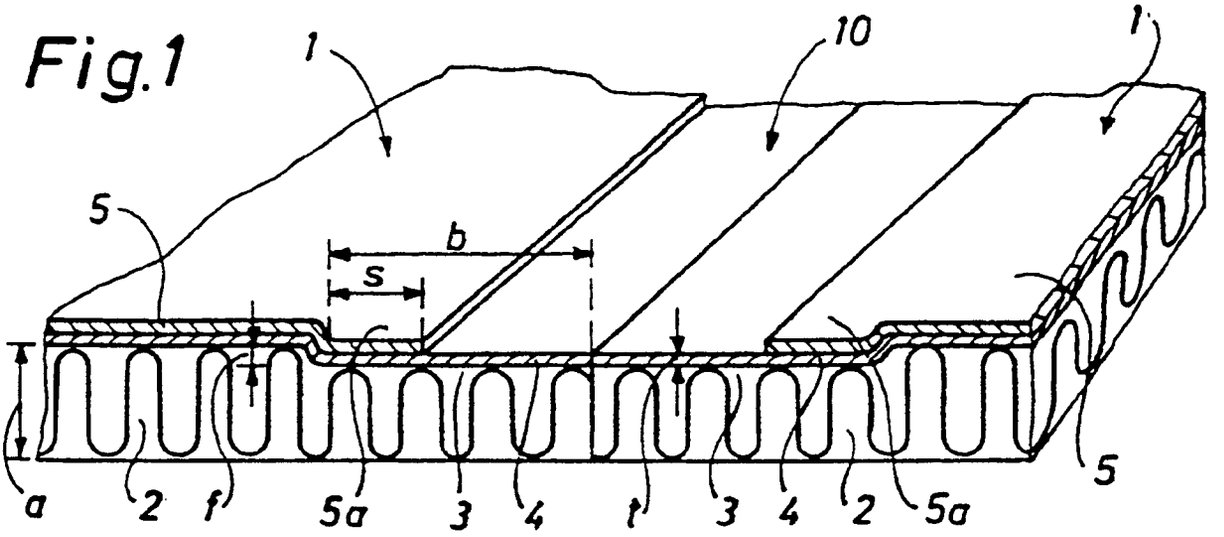

Fig.2

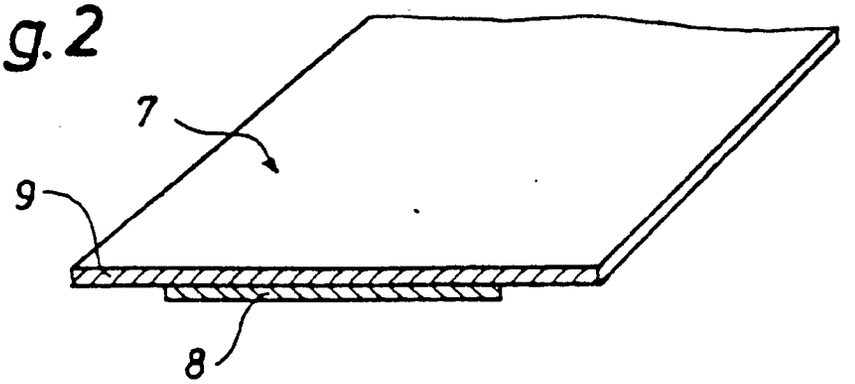

Fig.3