March 25, 1947. H. W. ASHMAN 2,417,899

ROOF AND ROOFING SHEETS FOR USE THEREIN

Filed Oct. 11, 1944 2 Sheets-Sheet 1

FIG. 2

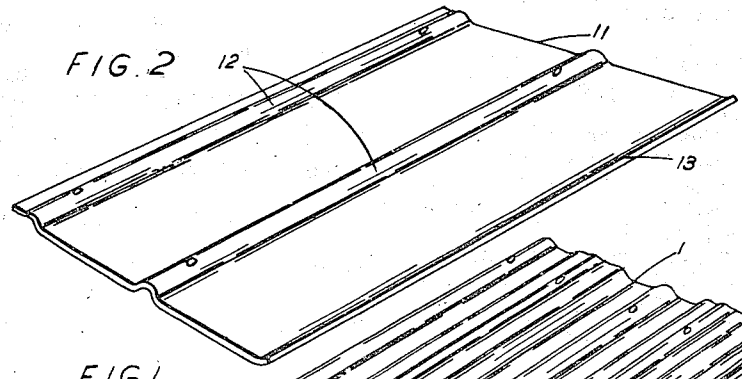


FIG. 1.

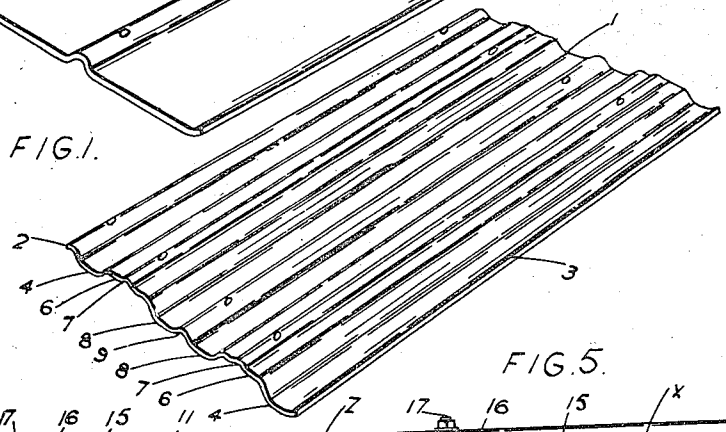


FIG. 5.

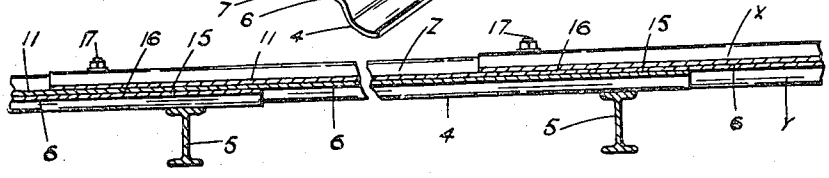


FIG. 6.

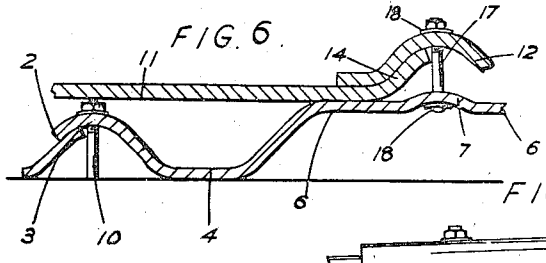


FIG. 7.

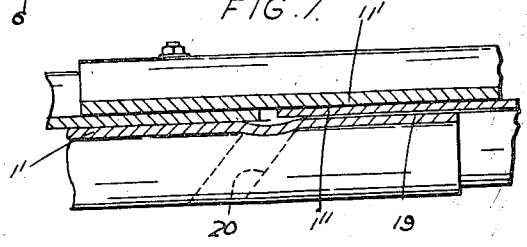
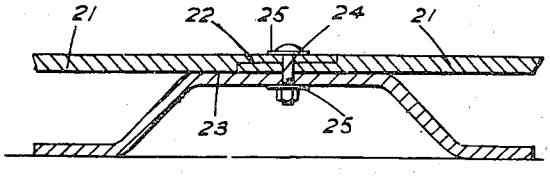


FIG. 8.



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ROOF AND ROOFING SHEETS FOR USE THEREIN

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FIG. 3.

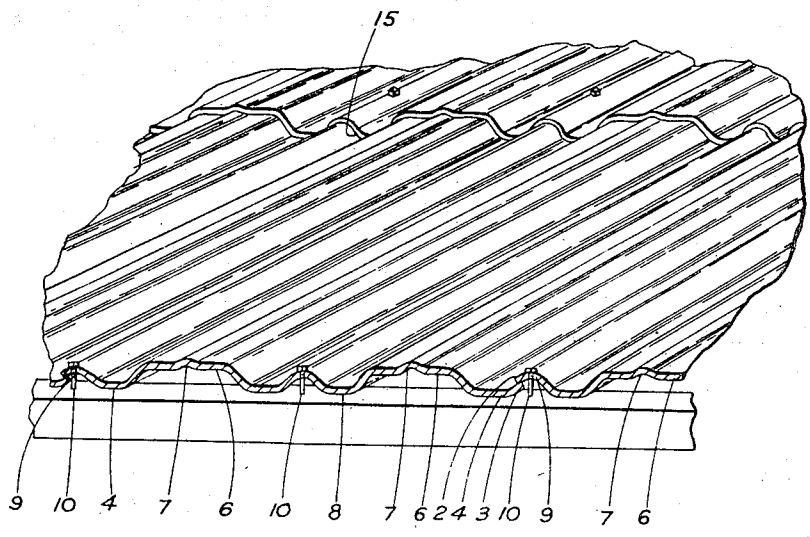
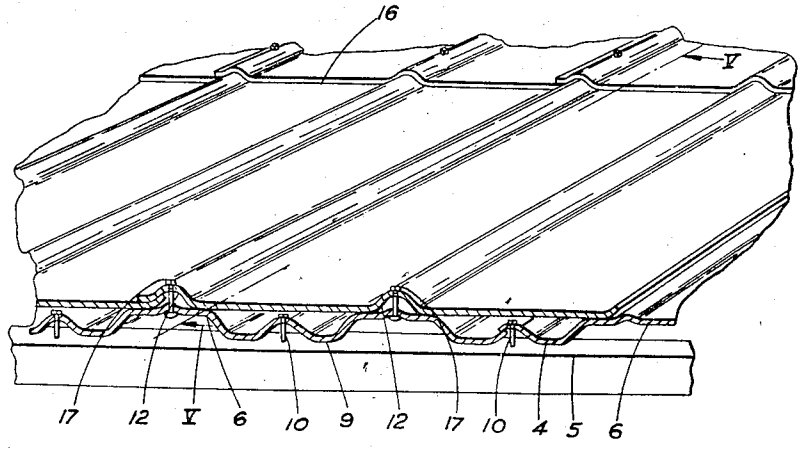


FIG. 4.



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ROOF AND ROOFING SHEETS FOR USE THEREIN

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3 Claims. (Cl. 108—13)

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Flat roofs are usually provided with a continuous covering of asphalt or some bituminous material with or without layers of felt to render them water-tight. This covering is wholly relied on to exclude rainwater, and if it has any cracks or weakness the roof may not be water-tight. Such coverings are usually black or dark in colour, are thus non-reflective to solar heat and accordingly provide poor insulation, and may be liable to soften or deteriorate under solar heat. In order to protect them from the direct rays of the sun a top layer of light-coloured material is often applied to them, this layer also serving to provide a harder and more serviceable walking surface.

It is to be understood that flat roofs are rarely completely flat, but usually have a slight fall, say in the order of 3 or 4 inches in 10 feet. The invention relates to any roofs that are technically called flat.

My principal object is to provide such a roof with an entirely different kind of covering which will be waterproof, will provide a light-coloured surface that will reflect the sun's rays and will be hard enough to carry the normal traffic on a flat roof.

Another object is to provide an improved roof covering composed of rigid sheets.

A further object is to provide novel corrugated sheets suitable for use in technically flat roofs.

Yet another object is to provide a double covering for a roof in which any water which may pass through the upper part will be led away to the edge of the roof by the lower part.

In my invention, I make the covering from two decks, each composed of sheets of asbestos-cement or equivalent rigid material, e. g. metal, the lower deck supporting the upper deck. The sheets that compose the lower deck overlap one another at the sides and ends in the way usual in corrugated sheeting and if they were of normal plane or corrugated construction they would not alone afford adequate resistance to the passage of water between them or through the holes made in them for fixing purposes. They are not, however, of normal construction but instead are corrugated to provide valleys or troughs which rest on the supporting framework or on a flat surface covering the framework, inverted troughs which provide bearing surfaces for the upper deck, and flutes or rolls intermediate in height between the valleys or troughs and the inverted troughs. The fixing bolts or other devices for attaching the covering to the supports below pass

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through these flutes or rolls. The holes for these fixing bolts or the like are thus spaced above the valleys or troughs, which form the lowermost part of the lower deck and in which any water that may pass through the upper deck collects. These valleys or troughs lead the water to the eaves or gutter. No reliance is placed on the upper deck for providing completely watertight joints, but naturally these are made as sound as possible so that the upper deck as a whole provides umbrella-like protection over the laps and fixing holes in the lower deck, so that the risk of any water passing through the laps and fixing holes is reduced to a minimum.

The invention includes the sheets from which the lower deck is composed. In any such sheet there must be at least two valleys or troughs, at least one inverted trough and at least one flute or roll intermediate in height between the valleys or troughs and the inverted trough.

The sheets composing the upper deck may be flat or of any convenient shape, and they may be internally reinforced if desired. They may abut or overlap or be joggled or rebated at the side joints, and particularly in the case of butt joints cover strips may be provided over the joints. The end joints preferably overlap, and it is best to arrange the joint in the upper deck slightly below the corresponding lap in the lower deck.

In order that the invention may be clearly understood and readily carried into effect, some examples will now be described with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a lower deck sheet;

Figure 2 is a perspective view of an upper deck sheet;

Figure 3 shows part of a lower deck composed of sheets as shown in Figure 1;

Figure 4 shows part of a roof covering formed by the lower deck shown in Figure 3 and an upper deck composed of sheets as shown in Figure 2;

Figure 5 is a section on the line V—V in Figure 4;

Figure 6 is an enlarged cross-section through part of the covering;

Figure 7 is an enlarged longitudinal section showing a modification; and

Figure 8 is an enlarged cross-section showing another modification.

One of the sheets of the lower deck is shown in Figure 1 and is designated 1. As an example of typical dimensions it may be 7 feet long and 3 feet 9 inches wide and it is corrugated length-

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wise. At one side it has a small roll 2 and at the other side a small roll 3, the roll 2 of one sheet fitting over the adjacent roll 3 of the next sheet. Next to each side roll there is a flat valley or trough 4, and when the roof is assembled the undersides of these troughs 4 rest on transverse purlins 5 or other members of the supporting framework as shown in Figures 3 to 5. Next to each valley or trough 4 is an inverted trough 6 and in the middle of each trough 6 is an upwardly projecting flute 7. The flat upper surfaces of each trough 6 on the two sides of the flute 7 form bearing surfaces for the sheets of the upper deck, and they may, for example, lie about 2½ inches above the valleys 4. Between the two inverted troughs 6 are two more valleys or troughs 8 separated from one another by a flute 9 of approximately the same height above the valleys 4 and 8 as the side rolls 2, say about 1½ inches. The central flute 9 and both the side rolls 2 and 3 are formed with holes for fixing bolts or the like. These may be knuckle bolts 10 by which the sheets of the lower deck are secured to the purlins 5.

The sheets composing the upper deck may be flat, but it is preferred to corrugate them lengthwise. A typical sheet is shown at 11 in Figure 2 and it is essentially flat but has corrugations 12 spaced so that when the whole roof is assembled they lie over the flutes 7 of the lower deck. The sheet 11 also has side rolls 13.

In assembling a complete roof the sheets 1 of the lower deck may first be laid and bolted to the purlins, the sheets overlapping at the end joints as shown at 15. The sheets 11 of the upper deck are then laid with overlapping joints as shown at 16. As shown in Figure 5, it is best to arrange the joint 16 in the upper deck slightly below or down roof of the corresponding joint 15 in the lower deck. Thus at its end the right-hand upper deck sheet shown in Figure 5 at X rests on a lower deck sheet Y, but for some part of its bottom end it overlaps and rests on the top end of an upper deck sheet Z.

The upper deck is secured to the lower deck by bolts 17 which pass through the corrugations 12 and the flutes 7 and are fitted with washers 18 above and below. These bolts 17 are not subjected to any pivoting action, so there is very little risk of leakage past them.

The bolts 10 by which the lower deck is secured to the purlins are, it will be seen, covered by the upper deck. Such water as passes through the upper deck runs into the valleys which lead it to the eaves or gutter and does not tend to pass through the holes for the bolts 10.

It will be understood that the number of troughs, inverted troughs and flutes and also their relative positions may be varied. For instance between any two inverted troughs there may be no flute or more than one flute, and again there may be a trough or valley at one side of each sheet and an inverted trough at the other.

It is sometimes desirable to make the sheets in the upper deck thicker than those in the lower deck. Such an arrangement is shown in Figure 7, and it will be seen that the end 19 of an underlapping sheet 1' in the lower deck is slightly stepped up so as to lift the overlapping sheet 1'' of the same joint and thus make the surfaces

on which the overlapping sheet 11' of the upper deck rests lie in a single plane.

It may also be desirable to provide small transverse sinking or water grooves on the tops and sides of the inverted troughs just beyond the end joints to trap any moisture that may penetrate through the joints and to lead it to the valleys or troughs. Such a groove is also illustrated in Figure 7, where it is shown at 20. In this particular arrangement the groove 20 is coincident with the part of the sheet 1' at which the end 19 is stepped up, but it will be understood that such a groove may be provided in a sheet devoid of any step at its end.

Figure 8 illustrates a covering in which the upper deck sheets are flat. Two such sheets 21 are shown, the joint between them being rebated, as shown at 22. In the lower deck the flutes 7 are omitted so that the inverted troughs, one of which is shown at 23, present wholly flat bearing surfaces for the upper deck. In this type of covering it is convenient to use bolts of the kind known as gutter bolts, seam bolts or stitching bolts for securing the upper deck to the lower deck through the inverted troughs, and one such bolt is shown at 24. In addition to washers 25, felt strips may also be interposed in the joints through which these bolts pass.

I claim:

1. A roofing structure of superposed rigid sheets carried by supports comprising a lower deck made up of a plurality of sheets overlapped at their sides and ends and longitudinally corrugated to form inverted troughs of lesser and greater heights with valleys therebetween, the valleys of said sheets resting upon the roof supports and fastening means passing through the crests of the inverted troughs of lesser height for affixing the lower deck sheets to said supports, an upper deck of overlapping sheets resting upon the crests of the inverted troughs of greater height of the lower deck sheets, and fastening means for attaching the upper to the lower deck at the crests of said inverted troughs of greater height.

2. A roof as defined in claim 1 wherein in each deck the sheets overlap at the end joints and the end joints in the upper deck lie slightly down roof of the corresponding joints in the lower deck.

3. A roof as defined in claim 1 wherein transverse grooves are formed on the tops and sides of the inverted troughs of greater height below the end joints between the lower deck sheets.

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