

Feb. 24, 1959

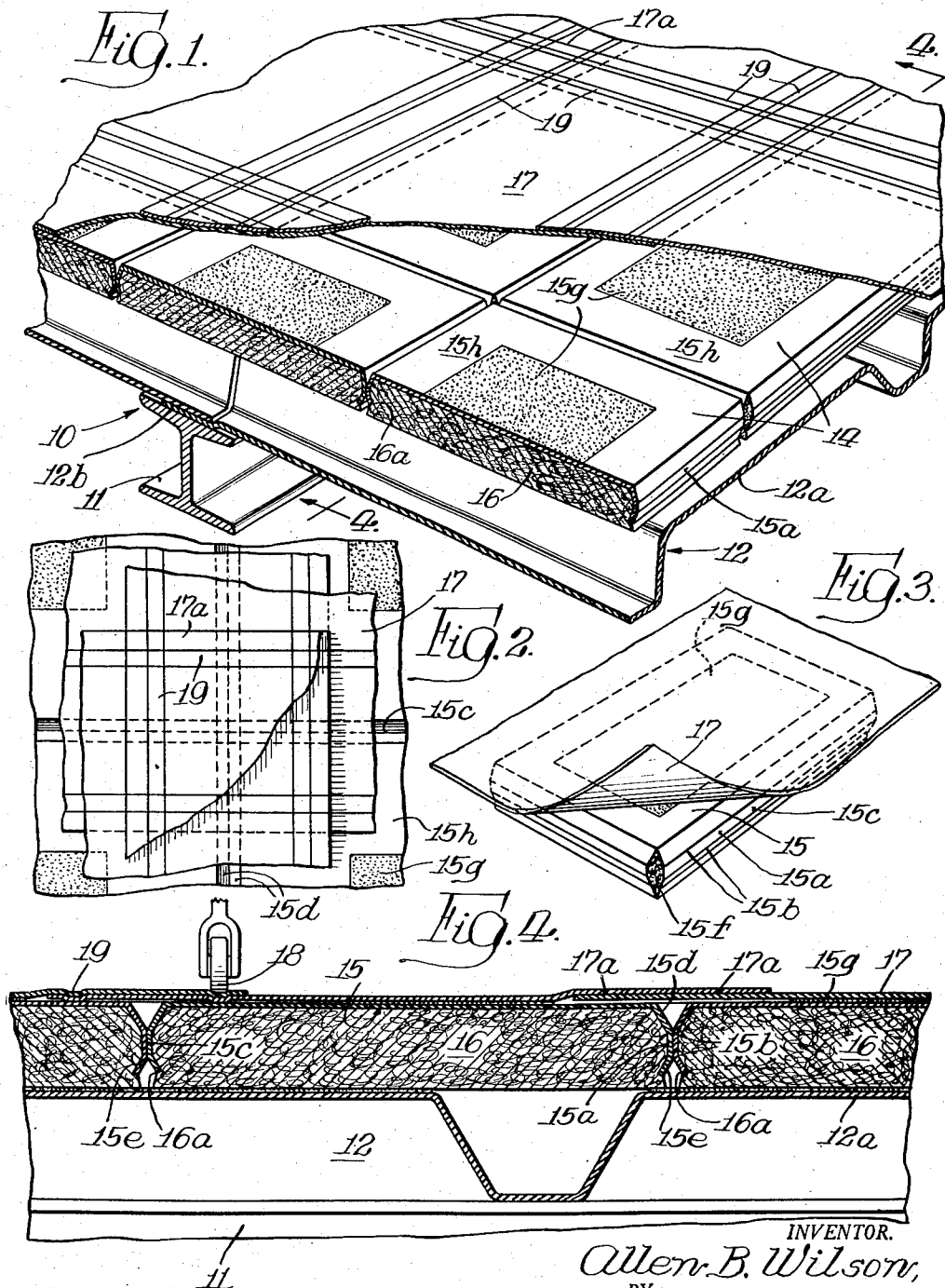
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2,874,652

ROOF CONSTRUCTION AND TILE THEREFOR

Filed Nov. 2, 1955

2 Sheets-Sheet 1



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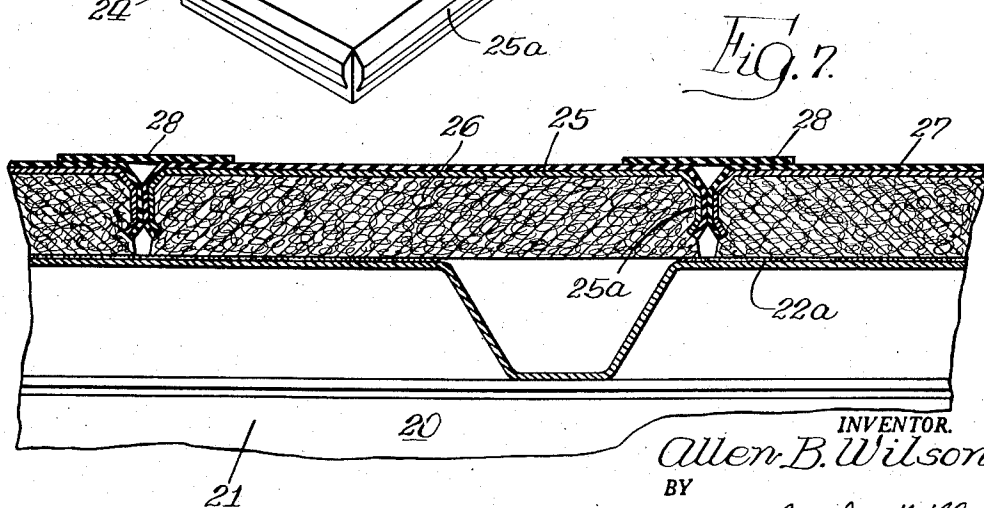
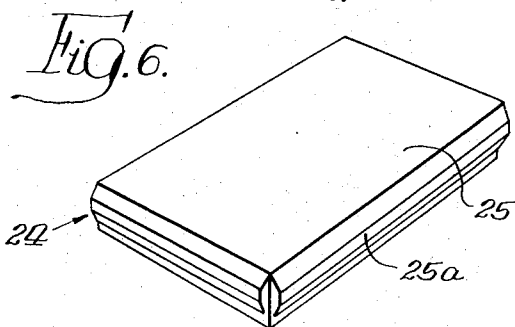
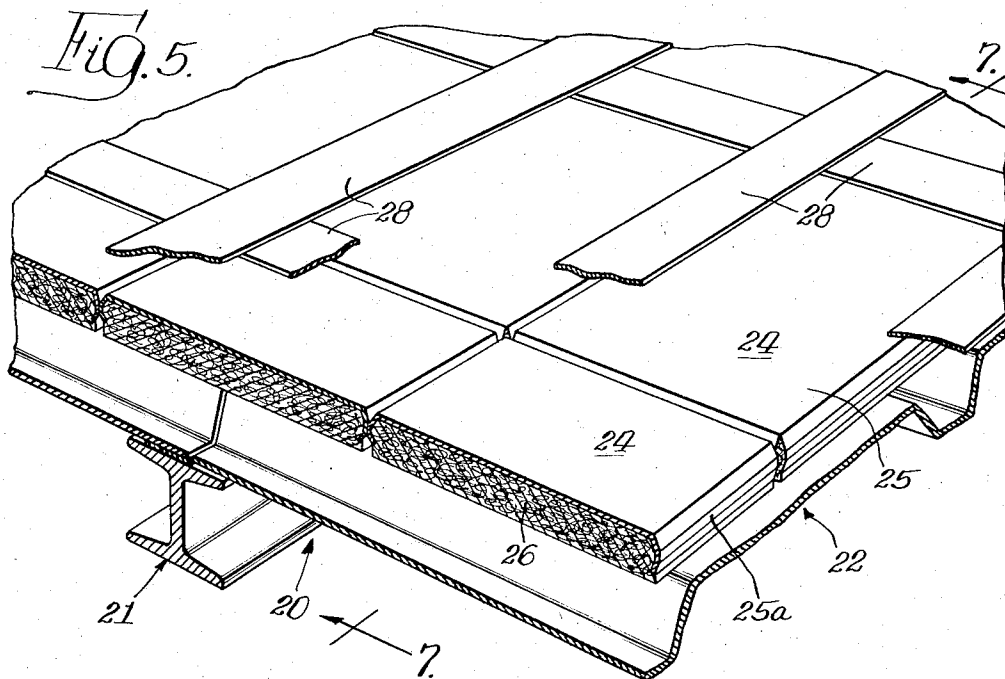
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ROOF CONSTRUCTION AND TILE THEREFOR

Filed Nov. 2, 1955

2 Sheets-Sheet 2



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2,874,652

ROOF CONSTRUCTION AND TILE THEREFOR

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Application November 2, 1955, Serial No. 544,547

5 Claims. (Cl. 108—6.5)

This invention relates to improvements in roof construction and to an improved tile structure for use in the roof assembly. The purpose of the invention is to provide a fireproof roof.

It has been found that the generally accepted and approved roof structures heretofore in use as supposed fireproof structures were not in fact fireproof for the reason that substantial portions of the materials used in their construction have themselves been capable of supporting combustion. For example, a roof consisting basically of a base formed of sheet metal or concrete slabs and covered with layers of insulating material, roofing felt and asphalt covered with gravel has commonly been considered to be fireproof. However, the felt and asphalt in such a roof has been found to burn with such vigor as to distort the underlying sheet metal and thus permit the molten and burning material to drop into the interior of the building with disastrous consequences.

It is therefore the principal object of the present invention to provide an improved roof construction which is in fact fireproof. A further object is to provide an improved roof construction which is comparatively light in weight so that less structural steel is required to support it. A further object is to provide an improved roof tile which may be readily assembled in a fireproof roof structure. Other objects relate to various features of construction and arrangement which will appear more fully hereinafter.

The nature of the invention will be understood from the following specification taken with the accompanying drawings in which two embodiments are illustrated. In the drawings,

Figure 1 shows a perspective view of a portion of a roof embodying one form of the improved roof structure, with parts thereof broken away, and including one form of the improved roof tile;

Fig. 2 shows a top plan view of the roof structure shown in Fig. 1, with parts thereof broken away;

Fig. 3 shows a perspective view of the roof tile shown in Fig. 1, with the cover film of the roof partially applied thereto;

Fig. 4 shows an enlarged transverse section taken on the line 4—4 of Fig. 1;

Fig. 5 is a perspective view of a portion of a roof embodying a modified form of the invention, with parts thereof broken away;

Fig. 6 is a perspective view of the roof tile included in the roof structure shown in Fig. 5; and

Fig. 7 shows an enlarged transverse section taken on the line 7—7 of Fig. 5.

In the form of the invention shown in Figs. 1 to 4, inclusive, the roof is carried by a supporting structure 10 made up of I-beams 11 on which there is mounted a roof deck 12 preferably made up of corrugated sheet metal plates 12a which are arranged with their edges overlapping above the I-beams as shown at 12b. The plates 12a may be formed of sheet steel which is gal-

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vanized or otherwise provided with protective coatings.

On the roof deck 12 a plurality of roof tile 14 are arranged in abutting relationship and in longitudinal and transverse rows. They are shown as rectangular and oblong in shape but they may be square. Each tile comprises a sheet metal inverted pan 15 having depending resilient flanges 15a which are creased or bent along the lines 15b so that they bulge outwardly to form flat upright faces 15c along their middle portions. These flat faces on adjacent tiles abut against each other and the portions 15d and 15e of the side flanges 15a which are, respectively, above and below the flat faces 15c, diverge away from each other on adjacent tile. The side flanges 15a are separated from each other at the corners of each tile, as shown at 15f.

This outwardly bulging formation of the resilient side flanges 15a of the pans permits expansion and contraction of the tile in response to temperature changes, so that adjacent tile are at all times in contact with each other. The flat vertical contacting surfaces 15c of these side flanges on adjacent tile permit one tile to slide on another in case of extreme expansion so that one tile will not be elevated by a movement of an adjacent tile under those conditions.

Each pan 15 is filled by a rectangular block 16 formed of fibreglass, foamed plastic or other insulating material of substantial thickness. When the block is placed in the pan its edge portions are compressed to fit the side flanges 15a of the pan, and the lower portions of the block are indented by the bottom edges of the portions 15e of the flanges 15a when these flanges are bent against the sides of the block. The upper faces of the blocks 16 are secured to the top walls of the pans 15 by a suitable adhesive such as resin glue or the like. A similar adhesive may be used to secure the side flanges 15a to the sides of the blocks 16.

Each of the tiles 14 is covered over a rectangular area 15g on the top of its pan 15 with an adhesive by which the tile is secured to an overlying cover sheet or film 17 formed preferably of neoprene which is a synthetic rubber composition marketed by E. I. du Pont de Nemours & Co. of Wilmington, Delaware. The adhesive used on the area 15g of each tile is preferably neoprene paint or neoprene cement which may be obtained from the source just mentioned. The area 15g covered by the adhesive is less than the area of the tile, thus leaving a rectangular border 15h around the margin of each tile. The sheets 17 of neoprene film are larger in area than the tiles 14 to which they are secured so that the edges of the sheets on adjacent tile overlap above the borders 15h of the pans on which there is no adhesive as shown at 17a. When the tiles 14 have been assembled on the roof deck 12, the cover sheets 17 are put in place with their edge portions overlapping and with a neoprene adhesive applied to the contacting surfaces of these overlapping portions. A heated roller 18 may then be run over the overlapping marginal portions 17a of the film sheets 17 to heat seal them together along the lines 19 to make water tight joints. The use of the heated roller may not be necessary to secure a bond between the overlapping edge portions, but it may be found desirable to use it in order to hasten the drying of the adhesive and to insure a continuous uninterrupted bond. The neoprene adhesive is preferably of a type which dissolves the overlapping surfaces so that upon drying there is a continuous union between these overlapping parts.

The neoprene film has the properties of being non-combustible, highly resistant to oils and chemicals and capable of withstanding exposure to the weather for long periods without deterioration. The term "non-combustible" is used to describe that property of the neoprene film according to which it will not itself support

combustion although it will burn in conjunction with other burning material. It is preferably applied as a thin film about ten-thousandths of an inch (0.010") thick and it is also preferably impregnated with aluminum or white pigment to give it a light reflective outer surface. When the sheets 17 of neoprene film have been applied to the tile and their overlapping edges secured together, there is provided a fireproof film over the entire roof. Instead of applying the neoprene film by the use of a large number of sheets each of which is only slightly larger than an underlying tile, sheets of larger area may be employed with a lesser number of overlapping joints.

Also, as illustrated by the modified form of the invention shown in Figs. 5, 6 and 7, the neoprene film sheets do not necessarily cover the entire roof nor the entire upper surfaces of the tiles, but are replaced, in part, by neoprene paint. In this modified form, the roof 20 comprises a supporting structure including I-beams 21 on which there is secured a roof deck 22 made up of corrugated metal plates which overlap the I-beams and are secured thereto. On this roof deck there are mounted a plurality of rectangular roof tiles 24 each comprising an inverted sheet metal pan 25 which are arranged in abutting relationship and in longitudinal and transverse rows. Each pan 25 fits over a fibreglass block 26 to which it is secured by resin glue or the like and the blocks are secured by this adhesive to the underlying roof deck 22. The pans 25 have side flanges 25a which are identical in construction with those previously described, having outwardly bulging portions which abut against the flat faces of the pans of adjoining blocks and have bottom edges interlocking with grooves in the blocks 26.

The pans 25 are formed of metal sheets which are coated with a layer 27 of neoprene paint and then bent into the form of the pans shown in Figs. 6 and 7. In Fig. 7 the neoprene coating is shown greatly magnified in thickness and extending throughout the entire areas of the outer surfaces of the pans.

When the blocks 24 have been assembled in abutting relationship on the roof deck 22, the joints between adjacent blocks are covered by strips 28 of neoprene film which overlap substantial portions of the blocks and extend longitudinally and transversely of the roof in parallel relationship, overlapping each other at their places of intersection. These strips are coated on their undersides with neoprene adhesive and, they then become bonded to the underlying coatings 27 of neoprene paint to make the roof surface water tight, an action which may be accelerated by the use of a heated roller. The paint 27 and the strips 28 are preferably impregnated with aluminum or white pigment for light reflecting purposes.

Two forms of the invention have been shown and described by way of illustration, but it will be understood that both the roof structure and the roof tile may be constructed in various other embodiments which come within the scope of the appended claims.

I claim:

1. A roof structure comprising, a roof deck, a plurality of tiles supported on said roof deck in side-by-side position, each of said tiles having a resiliently flexible edge portion thereon in abutting contact with the corresponding resiliently flexible edge portion of the next adjacent tile to compensate for expansion of said tiles due to temperature changes, and an elastic, waterproof sealing element bonded to each pair of adjacent tiles and extended across the juncture of their abutting edge portions to render said juncture waterproof, the elasticity of said

sealing element accommodating the expansion and contraction of said tiles due to temperature changes.

2. A roof structure comprising, a roof deck, a plurality of metallic tiles supported on said roof deck in side-by-side position, each of said tiles having an integral, resiliently flexible edge portion thereon in abutting contact with the corresponding resiliently flexible edge portion of the next adjacent tile to compensate for expansion of said tiles due to temperature changes, and an elastic, waterproof, sun and weather resistant, rubber-like sealing element bonded to each pair of adjacent tiles and extended across the juncture of their abutting edge portions to render said juncture waterproof, the elasticity of said sealing element compensating for expansion and contraction of said tiles due to temperature changes.

3. A roof structure comprising, a roof deck, a plurality of metallic tiles supported on said roof deck in side-by-side position, each of said tiles having a resiliently flexible outwardly bulging flange on each of its edges, the flanges of one tile being in abutting contact with corresponding flanges of next adjacent tiles, the resiliency of said flanges compensating for the expansion of said tiles due to temperature changes, and an elastic, waterproof sealing element bonded to each pair of adjacent tiles and extended across the juncture of their abutting flanges to render said juncture waterproof, the elasticity of said sealing element compensating for expansion and contraction of said tiles due to temperature changes.

4. A fire resistant roof structure comprising, a roof deck, a plurality of metallic tiles supported on said roof deck in side-by-side position, each of said tiles having an edge portion thereon in abutting contact with the corresponding edge portion of the next adjacent tile, and a sealing element comprised essentially of neoprene bonded to each pair of adjacent tiles and extended across the juncture of their abutting edge portions to render said juncture waterproof.

5. A roof structure comprising, a metal roof deck, a plurality of roof tiles in side-by-side position on said roof deck, each of said tiles including a block of insulating material resting on said deck and a metal cover of inverted pan-like shape supported by said block out of contact with said roof deck, the edge portions of the metal cover of one tile being in abutting contact with the edge portions of the metal covers of the next adjacent tiles, and an elastic, waterproof sealing element bonded to the metal covers of each pair of adjacent tiles and extending across the juncture of their abutting edge portions to render said juncture waterproof, the elasticity of said sealing element accommodating the expansion and contraction of the metal covers of said tiles resulting from temperature changes.

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