June 28, 1938. H. W. DAVEY 2,121,789

ROOF CONSTRUCTION

Filed Jan. 18, 1937 3 Sheets-Sheet 1

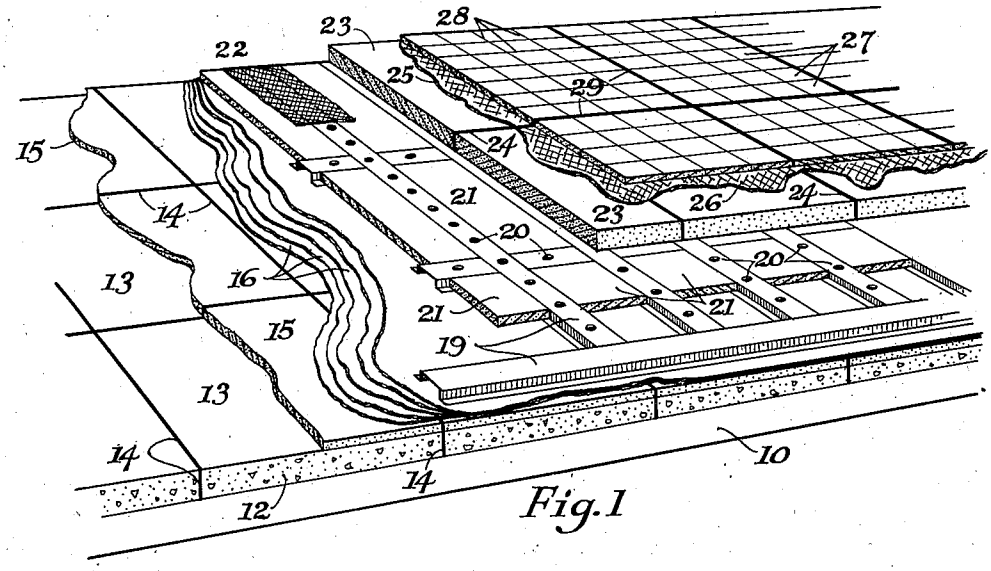


Fig. 1

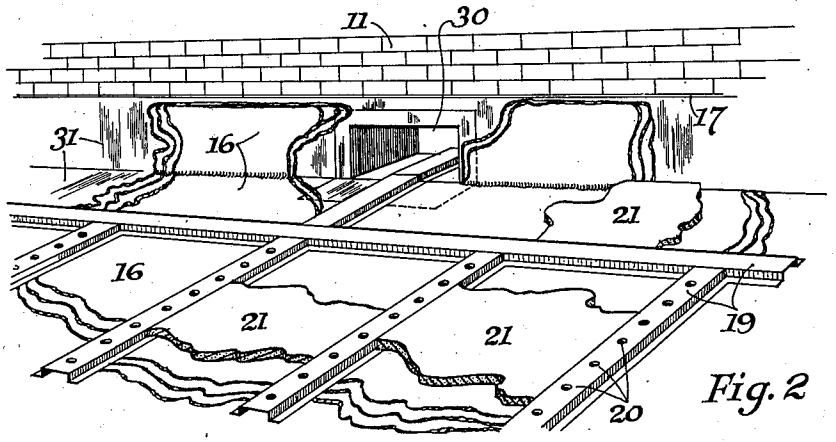


Fig. 2

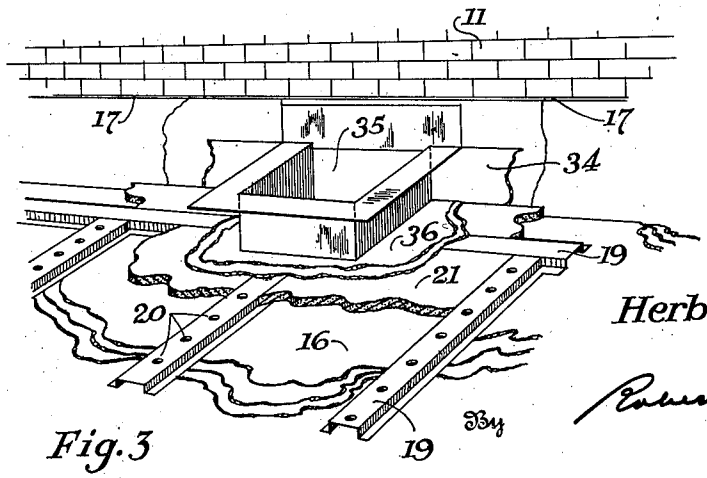


Fig. 3

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ROOF CONSTRUCTION

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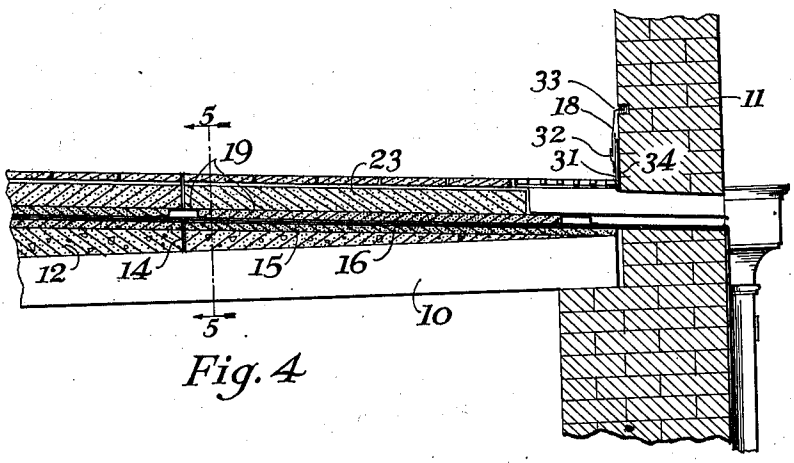


Fig. 4

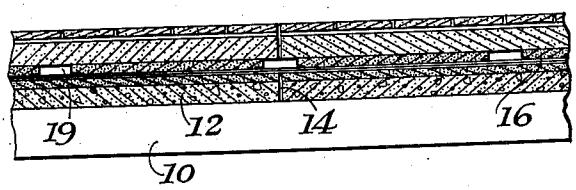


Fig. 5

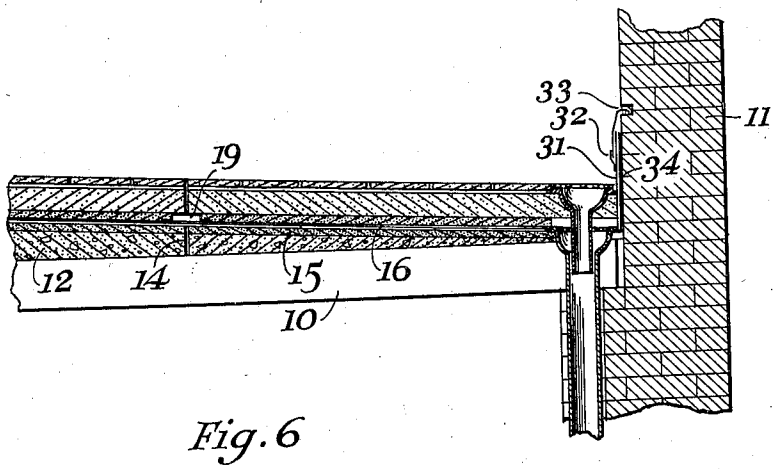


Fig. 6

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ROOF CONSTRUCTION

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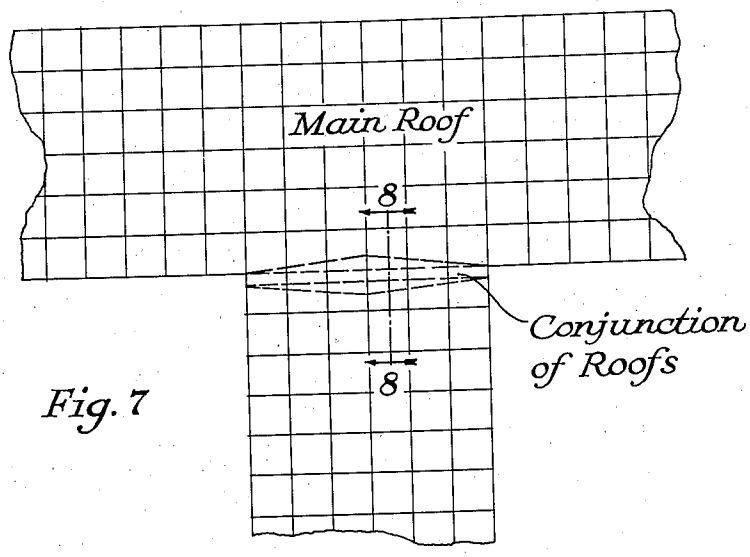


Fig. 7

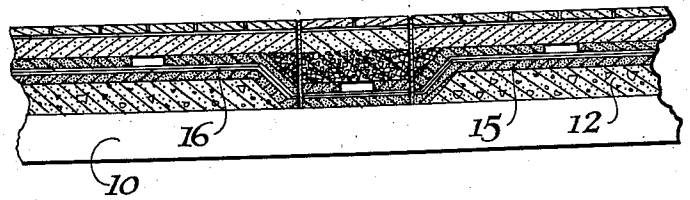


Fig. 8

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UNITED STATES PATENT OFFICE

2,121,789

ROOF CONSTRUCTION

Herbert W. Davey, Annapolis, Md.

Application January 18, 1937, Serial No. 121,161

4 Claims. (Cl. 108—6)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

This invention relates to roofs and it has particular relation to roofs of the promenade tile type.

One of the objects of the invention is the provision of a roof of the character described which is of sectional construction to form lines of cleavage for permitting the individual sections to expand and contract with changes in temperature without subjecting the entire roof area and walls to the destructive effect of an accumulated strain.

Another object of the invention is the provision of a roof comprising a substructure and a superstructure with a plurality of channels located therebetween for conducting moisture, that may penetrate the superstructure, toward the gutters and drainage outlets at the edges of the roof.

A further object of the invention is the provision of a roof embodying certain materials and the arrangement and treatment thereof such as will render the structure practically leakproof.

With these and other objects in view, as well as other advantages that may be incident to the use of the improvements, the invention consists in the parts and combinations thereof hereinafter set forth and claimed, and with the understanding that the several necessary elements constituting the same may be varied in proportion and arrangement without departing from the nature and scope of the invention, as defined in the appended claims.

In order to make the invention more clearly understood, there are shown in the accompanying drawings, means for carrying the invention into practical use, without limiting the improvements in their useful application to the particular construction, which, for the purpose of explanation, have been made the subject of illustration.

In the accompanying drawings:

Fig. 1 is a fragmentary perspective view with portions broken away of a roof constructed in accordance with the invention;

Fig. 2 is a similar view showing the parapet wall and a drainage outlet;

Fig. 3 is a similar view showing another form of drainage outlet;

Fig. 4 is a fragmentary vertical sectional view of the roof structure;

Fig. 5 is a vertical sectional view taken on line 5—5 of Fig. 4;

Fig. 6 is a view similar to Fig. 4 but showing another form of drainage outlet;

Fig. 7 is a diagrammatic plan view of two roof areas joining one another at right angles; and

Fig. 8 is a vertical sectional view taken on line 8—8 of Fig. 7.

Referring to the drawings, the improved roof preferably comprises a reenforced concrete substructure 10 which is supported by the parapet walls 11.

The surface of this substructure being flat, is first graded by applying a layer 12 of cement, sand and slag, preferably in the proportion of one, three and six, respectively, which is sloped to approximately one-quarter of an inch to the foot of run toward the drainage outlet of the roof hereinafter to be described. This layer 12 is laid to the desired grade and divided by suitable retainers or forms into rectangular units 13 (Fig. 1) of approximately six feet, one inch by six feet, seven and one-half inches, or an area corresponding to that built from the size of the particular tile employed, which, in the present instance, measures eight nine-inch tiles for the width of the unit, by thirteen six-inch tiles for the length, inclusive of the compressible material interposed between the tiles. The space occupied by the retaining strips or forms during the construction of the units 13 is filled with a compressible road joint material 14 so as to form expansion joints, the same being substantially one-half inch thick and filling the spaces for the full depth of the units 13. The layer 12 is then coated to a depth of approximately one inch with a two-to-one mixture of sand and cement so as to provide a finished lower subdrainage surface 15. The material of the expansion joints 14 preferably extends to the upper plane of the subdrainage surface 15 so as to insure complete cleavage between the several units 13.

Over this entire surface, including the expansion joints 14, is next laid a ten-ply impregnated roofing felt 16 which is thoroughly mopped with a waterproofing material such as asphalt at a temperature not exceeding 450° F. or less than 350° F. so as to provide a smooth surface covering all expansion joints, the location of which must be unmistakably known by suitable markings such as chalk lines or the like made on parapet walls. The waterproofing material should extend to all outer edges of the roof and continue up the parapet walls 11 to the point where the counterflashing 18 is secured.

Over the entire waterproofed surface above described, a plurality of inverted channel members 19 are laid in parallel relation and spaced apart approximately sixteen inches from center to center, certain of the channel members being centered over the longitudinal and transverse

expansion joints 14 in the units 13 therebeneath. The members 19 are preferably one inch deep and three inches wide, the top surfaces of the members being provided with one-half inch holes 20 spaced apart about four inches, center to center.

After the channel members 19 are positioned laterally and longitudinally, as shown in Figs. 2 and 3, a two-to-one mixture of sand and cement 21 is laid therebetween to a depth corresponding to the depth of the members and leveled to provide a smooth upper subdrainage surface. Strips 22 of non-impregnated felt are next laid over the channel member 19 to prevent structural material from entering the holes 20 during the succeeding operations. Concrete blocks 23 of gravel concrete, one to two and one-half to five and about three inches thick, and provided with metallic marginal bands 24, are next laid over the concrete 20 and channel members 19. The areas of these blocks 23 are equal to those of the units 13 but are not sufficient to overlap the expansion joints 14 in the subroof covering beneath these blocks.

This entire concrete area is then given a thorough coating 25 of hot asphalt which is preferably applied at temperatures between 350° F. and 450° F., so as to provide a smooth surface upon which cold process clay emulsified asphalt 26 is next applied in a layer of about three-eighths of an inch thick and combed to provide a serrated surface. Upon this prepared adhesive surface the promenade tile 27 is laid, between each of which a strip 28 of three-ply rubberoid felt is positioned. As previously explained, the tile should not overlap the expansion joints 14 in the units 13 and preferably are of six inches by nine inches in dimensions. Only sufficient asphalt should be applied at one time as may be found, under existing atmospheric conditions, to remain adhesive. Hot asphalt joint material 29 is next poured around and between the tile to a depth slightly less than the thickness of the tile.

The outer edges of the roof surface and the parapet walls 11, as well as the areas set aside for gutters and scuppers 30, are lined with hot rolled copper sheeting 31 in shapes consistent with the needs of the work.

The counterflashings 18 of cold rolled copper sheeting formed into the necessary shapes are held in position by copper straps 32 attached about twenty-four inches apart to the flashing 31, and are secured to the parapet wall by lead wedges as indicated at 33. The joint at this point is sealed against moisture by a bitumastic material thoroughly pressed into the wall before the counterflashing is secured in position. Packs 34 of cold asphaltic road joint material are positioned between all structural materials and flashings for the full depth of the work to form pressure cushions to accommodate expansion.

Between all galvanized drainage pipes and copper outlet boxes 35, and all places where galvanized metal and copper come in contact, a three-ply layer of water-proof material 36 is laid, separating these metals completely.

When roof surfaces are so designed that large areas are perpendicular to one another, as shown in Fig. 7, a specially designed juncture is employed to permit greater flexibility, and avoid rupture.

The valleys 39 formed at these junctures are filled to the elevation of the upper surface of the subdrainage 21, with a mixture 40 consisting of blue-stone and a bituminous binder, and the space between expansion joint material is also filled to a level immediately below the surface tile 27 with relatively narrow concrete blocks 41.

The drainage outlets consist of standard cast-iron drainage boxes and covers 37 where scuppers and outside drainage are desired (Fig. 4). For inside drainage, telescoping bell traps 38 are provided (Fig. 6). In this construction the upper or surface bell trap fits loosely into the lower bell trap, so that both surface and subsurface drainage may be conveyed through the same drain pipes.

The salient points of departure from the previous constructions of promenade tile roofs reside in the correct placing of expansion joints in the most effective locations; of establishing subdrainage surfaces and channels for conveying to the subdrains all moisture that may pass below the roof surface; and in the roof surface the establishment of flexible material sufficient to prevent the destruction of the whole through the accumulative expansion and contraction of each individual tile composing the roof's surface. The combined application of all these materials in a manner peculiar to the design herein described will result in completely eliminating destructive movement over large areas of roofs which naturally expand under rising atmospheric temperatures.

With regard to the laying of the waterproof surfaces herein mentioned, consideration must be given to the action of the waterproofing materials to the copper flashing materials. In all cases where waterproof felts are required to adhere to copper surfaces, the faces of these soft copper sheets must be thoroughly defaced. This has been found to be a very positive means of securing a bond between these elements. All parts of this roof are held in place by adhesion and gravity, as shown in the accompanying drawings.

The invention herein described may be modified in construction and arrangement of the parts by those skilled in the art without departing from the spirit and scope of the invention as defined in the appended claims.

The invention disclosed herein may be manufactured and used by or for the Government of the United States without the payment of any royalty thereon or therefor.

I claim:

1. A roof comprising a substructure supported by the walls of a building, a superstructure supported by said substructure and including a plurality of sections separated by expansion joints, a plurality of blocks, one supported by each of said sections and also separated by expansion joints coinciding vertically with said first mentioned expansion joints, and a tile covering for each block, the tiles adjacent to the edges of each block being separated from the corresponding tiles of an adjacent block by expansion joints coinciding with said first and second mentioned expansion joints to provide lines of cleavage extending vertically entirely through said superstructure and drainage passageways extending along said lines of cleavage.

2. A roof comprising a monolithic substructure supported by the walls of a building, a superstructure supported by said substructure and including a plurality of concrete sections separated by expansion joints, a plurality of concrete blocks, one supported by each of said sections and also separated by expansion joints coinciding vertically with said first mentioned expansion joints,

a tile covering for each block, the tiles adjacent to the edges of each block being separated from the corresponding tiles of an adjacent block by expansion joints coinciding with said first and second mentioned expansion joints to provide lines of cleavage extending vertically entirely through said superstructure, and channel members disposed between said sections and said blocks for conveying moisture toward the outer edges of the roof.

3. A roof comprising a substructure supported by the walls of a building, a superstructure supported by said substructure and including a plurality of sections separated by expansion joints, a plurality of blocks, one supported by each of said sections and also separated by expansion joints coinciding vertically with said first mentioned expansion joints, a tile covering for each block, the tiles adjacent to the edges of each block being separated from the corresponding tiles of an adjacent block by expansion joints coinciding with said first and second mentioned expansion joints to provide lines of cleavage extending vertically entirely through said superstructure, and channel members extending along said lines of cleavage between said sections and said blocks for conveying moisture penetrating said second and third mentioned expansion joints toward the outer edges of the roof.

4. A roof comprising a substructure supported by the walls of a building, a superstructure supported by said substructure and including a plurality of sections separated by expansion joints, a plurality of blocks, one supported by each of said sections and also separated by expansion joints coinciding vertically with said first mentioned expansion joints, a multi-ply waterproofed fibrous roofing material interposed between said section and said blocks, a tile covering for each block, the tiles adjacent to the edges of each block being separated from the corresponding tiles of an adjacent block by expansion joints coinciding with said first and second mentioned expansion joints to provide lines of cleavage extending vertically entirely through said superstructure, and a layer of clay and emulsified asphalt disposed between said blocks and said tiles and in which the latter are laid.

HERBERT W. DAVEY.