Aug. 27, 1929. P. LIESE 1,725,808

STRUCTURE COMPRISING GLASS TILES

Filed July 29, 1927

Fig.1

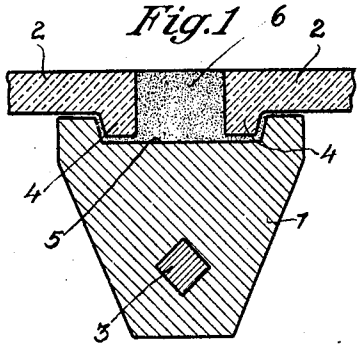


Fig.2

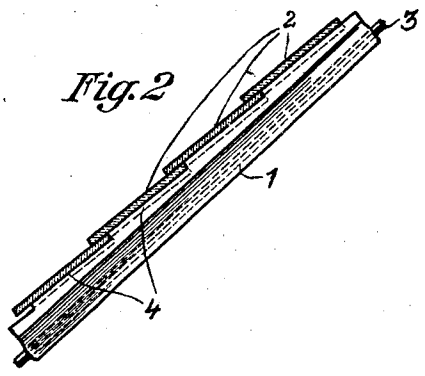


Fig.3

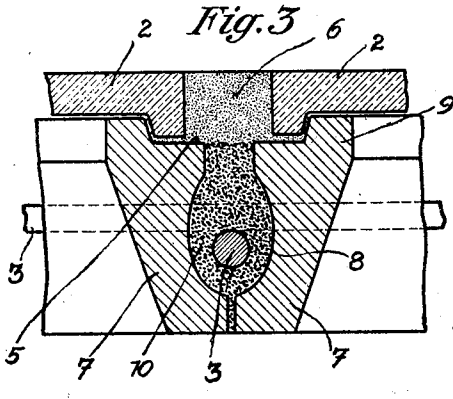


Fig.4

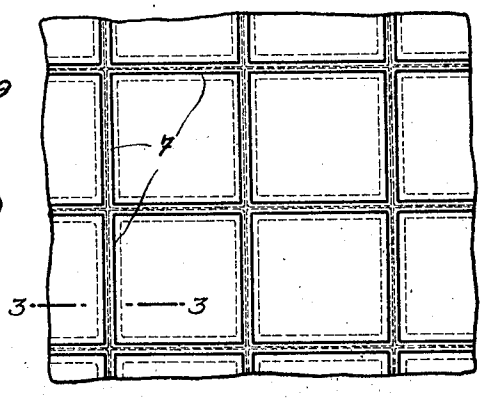


Fig.5

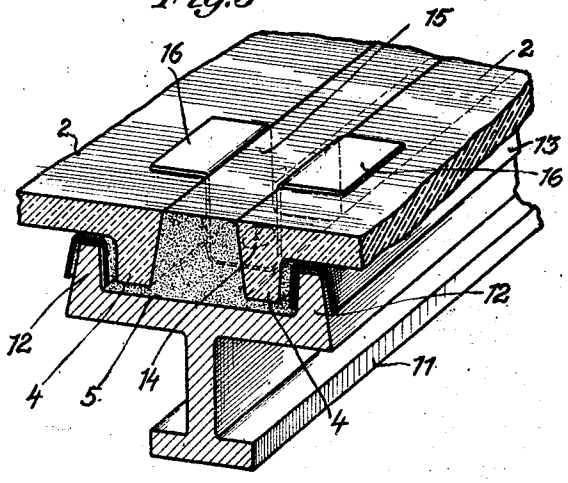
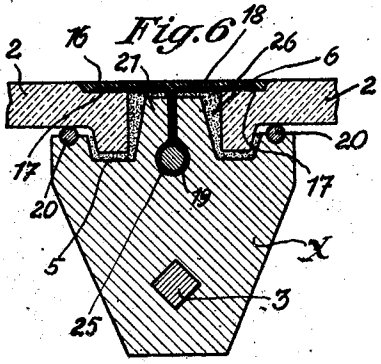


Fig.6



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UNITED STATES PATENT OFFICE.

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STRUCTURE COMPRISING GLASS TILES.

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My invention relates to improvements in structures comprising glass tiles, and more particularly in structures such as roofs, ceilings, floors, side walls and the like comprising a frame composed of longitudinal bars or longitudinal and transverse bars having the glass tiles fixed thereto by means of a suitable binding medium such as putty. The object of the improvements is to provide a structure of this class in which the bars do not project beyond the glass tiles, and in which therefore the said bars are protected from atmospheric influences, so that the structure is made more durable and cleaning thereof is facilitated. With this object in view my invention consists in providing the tiles at the parts to be supported on the bars with ribs engaging in corresponding recesses made in the top faces of the said bars, the dimensions of the parts being such that there is a clearance between adjacent tiles and between the tiles and the bars for filling in the putty. By the ribs engaging in the recesses of the bars, large surfaces are provided between the tiles and the bars to which the putty will adhere, so that the putty is sufficient for preventing the tiles from being removed from the bars by wind pressure acting thereon from below. Therefore the clearances between the tiles can be filled out with putty to the surface of the tiles, so that no part projects beyond the surface of the structure. Thus the ceiling presents an uninterrupted plane surface which does not permit accumulation of water, so that the roof may have a small slope and therefore the height of the structure is small. Further, the ceiling can be readily cleaned. Rusting of the bars or members for fixing the tiles thereto is impossible, and the putty is confined between the adjacent glass tiles, and between the said tiles and the bars so that it does not break off. The water which might pass between the margin of the bars and the glass tiles cannot readily get into the room covered by the ceiling, because such water is confined within the recesses of the bars by means of the elevated margins thereof. The glass tiles are free of expansion by heat, and they can be readily exchanged independently of one another.

For safely connecting the glass tiles to the bars and preventing the same from being removed upwardly by wind pressure acting from below, metal strips may be secured to the bars, which metal strips are passed upwardly within the spaces provided between the tiles and have their ends bent downwardly on the surfaces of the tiles. By such members the aforesaid advantages of my improved glass ceiling are not interfered with, because the metal strips hardly project beyond the surface of the ceiling. To protect the said metal strips from atmospheric influences I prefer to dispose the ends thereof in recesses made in the surface of the glass tiles, and to coat the same by means of impermeable matter such as bituminous matter, which is weather-proof.

To prevent injury of the putty by persons going over the ceiling, the bars may be provided with ribs projecting upwardly therefrom and between adjacent glass tiles, and nearly to the surfaces thereof.

For the purpose of explaining the invention several examples embodying the same have been shown in the accompanying drawing, in which the same letters of reference have been used in all the views to indicate corresponding parts. In said drawing,

Fig. 1, is a sectional elevation showing a part of a structure, viz one of the bars and the ends of adjacent tiles fixed to the said bar,

Fig. 2, is a sectional elevation showing a part of a roof provided with tiles of the construction shown in Fig. 1,

Fig. 3, is a sectional elevation similar to the one shown in Fig. 1 and illustrating a modification in which the tiles are disposed on a frame composed of longitudinal and transverse bars, the said section being taken on the line 3—3 of Fig. 4,

Fig. 4, is a top plan view on a reduced scale showing the ceiling made from tiles of the structure shown in Fig. 3,

Fig. 5, is a perspective sectional view showing a modification of the structure, and

Fig. 6, is a sectional elevation similar to the one illustrated in Fig. 1 and showing another modification.

In Figs. 1 and 2 I have illustrated an inclined ceiling or roof consisting of longitudinal bars 1 providing supports for glass tiles 2. The bars consist of reinforced concrete having longitudinal iron bars 3 embedded therein. At their longitudinal margins the tiles 2 are formed with downwardly directed ribs 4 cut away at their bottom ends so far that successive tiles can be placed one upon the other. The bar 1 of reinforced concrete is formed at its top with a groove 5

having a depth and a breadth such that the glass tiles disposed transversely of the bar one beside the other engage in the said recess with their ribs 4 and are spaced from each other.

When placing the tiles 2 on the bars the recess 5 of the bar 1 is filled with putty 6, and the tiles are pressed with their ribs 4 into the said putty so that there is a layer of putty of a suitable thickness between the ribs 4 and the bars. Now the gap between the end faces of the tiles 2 is filled with putty 6 to the top face of the tiles.

Now the tiles 2 are connected with the bars 1 only by the mass of putty 6, the said putty surrounding the tiles 2 not only at the end faces thereof, but on the whole length of the tiles and around the ribs 4. Therefore, the putty adheres to the tiles on a comparatively large surface, so that the tiles 2 cannot be raised by the pressure of the wind acting on the bottom faces thereof.

By having a smooth top face, no water can gather on the ceiling. Therefore, the ceiling can be made with a comparatively small slope so that the height of construction is small. Further, the ceiling can be readily cleaned. The mass of putty 6 is disposed between the glass tiles 2 and the bars 1, so that it cannot crack. Should water get between the tiles 2 and the mass of putty 6 it cannot flow into the room, because it cannot rise along the outer faces of the ribs 4. Notwithstanding the reliable connection between the tiles 2 and the bar 1, the tiles are capable of expansion by heat, because the mass of putty is sufficiently elastic and is not spoilt for a considerable length of time, by being protected against atmospheric influences. Further, an injured tile 2 can readily be removed and replaced by a new tile without breaking the adjacent tiles, because the tiles 2 are separated from each other by the mass of putty 6, so that they can be readily broken away.

In the modification shown in Figs. 3 and 4 rectangular frames 7 made from reinforced concrete are used for constructing the ceiling, the said frames being provided around their circumferences with grooves 8. At its top face each frame 7 is formed with an inner rib 9.

For constructing the glass ceiling, the frames 7 are assembled so as to provide a gap between the same which is oval in cross-section, and which is filled out with cement 10 having iron bars 3 disposed therein. Now the adjacent frames 7 provide longitudinal and transverse bars which by reason of the inner circumferential ribs 9 provide recesses 5 at their top faces. The glass tiles 2 are placed with their ribs 4 into the said groove in the manner described with reference to Figs. 1 and 2, the ribs and bars being separated from each other by gaps filled out with putty 6.

In Fig. 5 I have shown a modification of a ceiling in which the tiles are supported on bars 11 made from iron. As shown the upper flange of the said bar 11 is formed with upwardly directed ribs 12 providing an elongated recess adapted to receive the ribs 4 of the tiles 2. Preferably, the glass tiles are not directly placed on the said bar, but U-shaped caps 13 of lead are placed between the glass plates and the ribs 12.

The tiles are fixed in position on the bars 11 by means of U-shaped strips 15 of sheet metal such as copper fixed to the bars by means of screws 14, the said strips having their ends 16 bent over the margins of the tiles 2. Thereby the tiles 2 are further secured in position so that they cannot be lifted from the bars by wind pressure acting from below. The strip of metal 15 is comparatively thin, so that the advantage of the structure consisting in having no part projecting beyond the surface thereof is not interfered with.

The ends 16 of the strips 15 projecting from the mass of putty 6 are exposed to atmospheric influences. Therefore, in the modification shown in Fig. 6 the ends 26 of the strips 25 are disposed in recesses 17 made in the marginal top parts of the tiles 2, and they are covered by a weather-proof and impermeable layer 18 of bituminous matter or the like. Thereby the said strips are perfectly protected from atmospheric influences.

In the construction shown in the figure the tiles are mounted on a bar x of reinforced concrete, and the strips 25 are fixed in position by being bent around a bar 19 of iron embedded in the concrete. Between the tiles 2 and the marginal ribs of the bars cables of lead are interposed.

The bar 1 of reinforced concrete is formed with a rib 21 raising from the bottom of the recess of the bar and extending nearly to the bent ends 26 of the strip 25. The gap between the tiles 2, the bar 1, the strips 25, 26, and the rib 21 is filled out with putty 6. By providing the rib 21 the structure is made more resistant at the part included between the tiles, so that the structure is not injured by a person walking on the same.

I wish it to be understood that my improved structure may also be used for making floors or walls from glass.

While in describing the invention reference has been made to particular examples embodying the same I wish it to be understood that my invention is not limited to the constructions shown in the drawing, and that various changes may be made in the general arrangement of the apparatus and the construction of its parts without departing from the invention.

I claim:

1. A structure, comprising bars formed with longitudinal recesses, tiles formed at their margins with ribs engaging in said re-

cesses, and a binding medium filling out the gaps between adjacent tiles and the bars, the upper surface of the structure being smooth and free from projections above the surface of the tiles.

2. A structure, comprising bars formed at one of their faces with grooves, tiles formed with marginal ribs engaging in said grooves, strips fixed to said bars and bearing with their ends on the surfaces of said tiles, and binding matter filling out the spaces between adjacent tiles and the bars, the ends of said strips being embedded in recesses of said tiles and covered with weather-proof material.

3. A structure comprising bars formed with longitudinal recesses, tiles formed at their margins with ribs positioned within said recesses and a relatively yielding binding material positioned between said tiles and said bars and filling the gaps between adjacent tiles, the upper surface of said binding material conforming generally to the upper surface of the tiles which it contacts, the upper surface of the resultant structure being smooth and free from upward projections.

Signed at Berlin, Germany, this 7th day of July, 1927.

PAUL LIESE.