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APPARATUS FOR MAKING TILE PANELS

2,855,653

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Fig. 1.

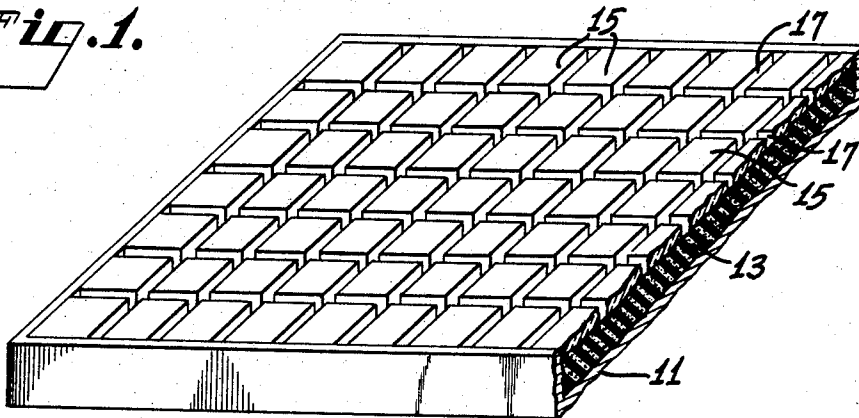


Fig. 2.

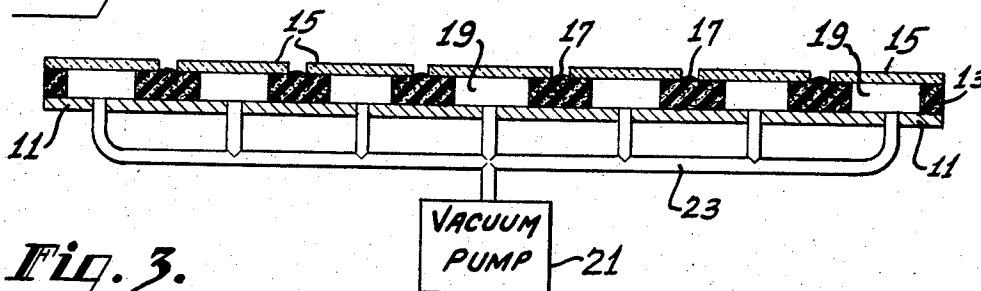


Fig. 3.

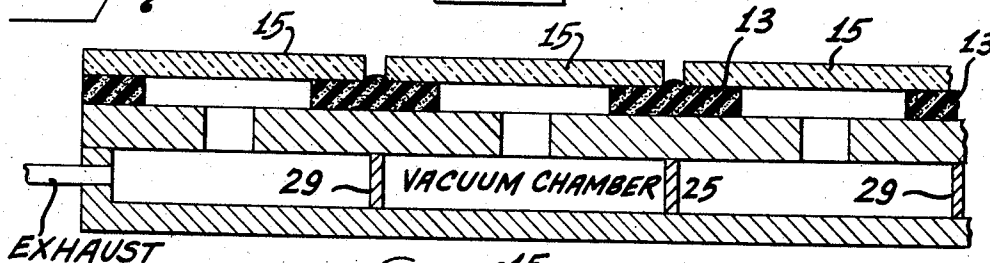
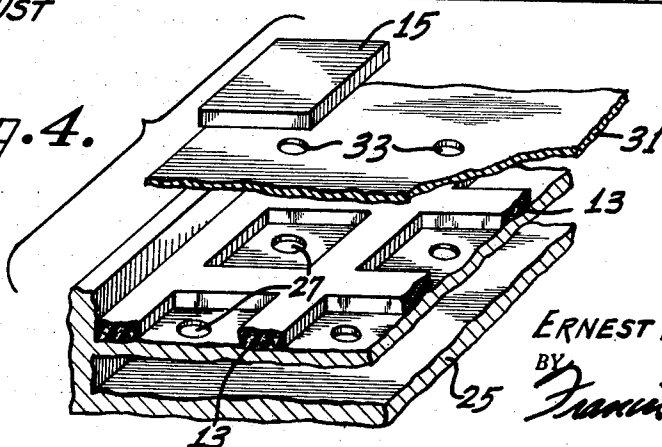


Fig. 4.



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APPARATUS FOR MAKING TILE PANELS

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12 Claims. (Cl. 25—1)

The present invention relates to the fabrication of multiple elements or mosaic type objects and more particularly to the manufacture of multiple tile panels.

The use of prefabricated multiple tile panels offers a number of advantages which are not generally obtained by the construction of tile walls at their final location. Panels may be quickly installed. Prefabrication allows uniform spacing of the tile in the panel which makes the panel attractive.

In the co-pending application of John V. Fitzgerald, entitled Ceramic Tile Panels and Structural Members, Serial No. 471,748, filed November 29, 1954, there was shown and described various forms of ceramic tile panels consisting of a plurality of ceramic tiles positioned edge to edge. Such panels of the type shown and described in the application referred to immediately above provide a type of panel which lends itself to prefabrication.

A primary object of this invention is to provide improved apparatus for the fabrication of multiple tile panels.

It is another object of this invention to provide apparatus for the manufacture of tile panels which enables the operator to conveniently insert the grout between the tiles during the process of fabrication of the panel.

It is still another object of this invention to provide improved apparatus for the manufacture of tile panels and the like wherein the grout bonding the tiles will present a concave surface on the finished side of the panel.

According to this invention there is provided apparatus for the construction of multiple tile panels and the like in which a cushion is adapted to receive a plurality of tiles positioned edge to edge with finished side toward the cushion. Under each tile there is provided a cavity in the cushion which is arranged to be evacuated so as to cause the atmospheric pressure to force the tiles into the cushion in such a manner that the cushion material will bulge between the tiles thus forming a concave surface on the grout between the tiles. The pressure of the tiles against the cushion will also seal the joint between the edge of the tiles and the cushion so that there will be no feather edge of the grout over the glazed surface of the tile.

Other and incidental objects of the invention will become apparent after a reading of the following specifications and an inspection of the accompanying drawings wherein:

Figure 1 illustrates one form of this invention.

Figure 2 illustrates a cross section of the vacuum table of one form of this invention.

Figure 3 shows an enlarged cross section of one form of this invention, and

Figure 4 illustrates in detail still another form of this invention.

Throughout the various figures of the drawing the same numeral will be employed to designate the same element.

Turning now in more detail to Figure 1 there is shown the rigid support member or table top 11 supporting a cushion or other resilient member 13 upon which are

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placed a plurality of tiles 15 positioned edge to edge with finished surface downward. The tiles 15 are arranged so that there is a groove 17 between each of the tiles. Groove 17 is intended to be filled with grout in liquid form which is then allowed to set. Strips of 22 gauge metal may be used to properly space the tiles 15. The metal strips are removed before the grout is applied.

Many different types of mortars have been previously used for grouting tile. Typical of these mortars have been those consisting essentially of Portland cement. An improved mortar for grouting tile is described in a co-pending application of John V. Fitzgerald, entitled Dry Mortar Mix Comprising Portland Cement and Polyvinyl Acetate, Serial No. 471,910, filed November 29, 1954.

In order to cause the cushion 13 to bulge into the grooves 17 between the tiles to form a concave grout surface and to seal the bottom of the grooves 17 to prevent the grout from feathering out onto the surface of the tiles, pressure must be applied to cause the tiles to compress the cushion 13.

According to this invention the atmospheric air pressure is used to press the tiles 15 against the cushion 13. This is accomplished by evacuating the cavity under each of the tiles.

Figure 2 shows in detail one form of the invention wherein the support member 11 is provided with a cushion 13 supporting tiles 15. It will be seen from an inspection of Figure 2 that air cavities 19 are provided in the cushion 13. The air cavities 19 are operably connected to a vacuum pump 21 by pipes 23.

When all of the tiles 15 have been arranged properly on cushion 13 and spaced to provide the desired grooves 17 the vacuum pump 21 is started and the cavities 19 are evacuated. Upon evacuation of cavities 19 the atmospheric pressure will cause tiles 15 to compress the cushion 13. It is important to note, however, that the cushion 13 will bulge into the grooves 17 causing little bumps in each of the grooves 17.

Cushion 13 may consist of firm foam rubber, one inch thick. The upper surface of the cushion 13 should have a smooth surface. When the one inch thick foam rubber is employed 28 inches of vacuum has proven very satisfactory.

Cushion 13 may also be molded in such a manner that it has ridges under all the grooves 17 between the tiles 15. Molded cushions permit the use of lower vacuum to provide the necessary seal between the cushion 13 and the tiles 15.

By the use of a suitable air valve in connection with the vacuum pump 21 a predetermined degree of partial vacuum may be maintained in cavities 19. A suitable grout may then be poured into grooves 17 and allowed to set while the partial vacuum is maintained in cavities 19.

The bulging of the cushion 13 into the groove 17 will cause the bottom of the grooves to take a concave curvature thus properly forming the grout on the face of the tile panel which is positioned against the cushion. The pressure of the tile on the cushion is sufficient to seal the bottom corners of the grooves 17 and thus prevent the grout from leaking to the area between the tile 15 and the cushion 13. The finished surface of the tile may be coated with an agent to prevent wetting of the glazed surface of the tile by the grout. An agent such as silicone oil may be employed for this purpose.

When the grout in grooves 17 has thoroughly set the vacuum is removed from the cavities 19. This permits the panel to be lifted from the apparatus.

Turning now to Figure 3, there is shown still another form of this invention wherein the rigid support member takes the form of a vacuum chamber 25 which supports the cushion 13. The top of the vacuum chamber 25 is

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provided with holes 27 one of which is located beneath each of the tiles 15.

The vacuum chamber 25 may have support members 29 to prevent collapse of the vacuum chamber 25 due to air pressure.

The operation of the form of the invention shown in Figure 3 is similar to the operation of the form of the invention described above.

Turning now in detail to Figure 4, a cut away view shows a vacuum chamber 25 as described in connection with Figure 3. The vacuum chamber 25 supports a cushion 13 over which is spread an air proof membrane 31 in which there have been cut small holes 33 whose positions correspond with holes 27 in the upper section of the vacuum chamber 25. Tiles 15 are positioned as shown and described in connection with Figures 1, 2, and 3.

The membrane may be polyethelene film 1 to 10 mils thick or another material having similar properties.

The purpose of the air proof membrane 31 as illustrated in Figure 4 is to provide an improved air seal under the tiles 15. Membrane 31 allows the use of a cushion such as foam rubber which is air permeable. The membrane 31 insures a smooth surface for the grout.

By employing air pressure to compress the tiles into the cushion member it will be seen that no framework is necessary on the top of the machine. The operator, therefore, is not impeded in pouring the grout into the grooves between the tiles by framework or other apparatus. The operator's time in the fabrication of the tile panel is therefore reduced to a minimum and careful adjustment of complicated mechanical devices for exerting pressure is not necessary. Due to the uniformity of atmospheric pressure over the surface of the machine each of the tiles is subjected to the same amount of pressure. The fabricated tile panel will therefore present a uniform surface.

Having thus described the invention, what is claimed is:

1. Apparatus for holding tiles in position while the grout is setting in the grooves between the tiles during the fabrication of a tile panel, said apparatus comprising a cushion, said cushion adapted to receive a plurality of tiles in a prearranged spaced position and with a finished surface toward said cushion, a cavity in said cushion under each of said tiles, means for developing a partial vacuum, and means operatively connecting said partial vacuum developing means to each of said cavities to cause a partial vacuum in the cavities under the tiles whereby air pressure will push said tiles into the cushion, causing the cushion to bulge into the grooves between the tiles whereby there is formed a concave surface on the grout in the grooves of the tile panel.

2. The invention as set forth in claim 1 and wherein said cushion is of sponge rubber.

3. The invention as set forth in claim 1 and wherein an air proof membrane is positioned between said cushion and said tiles, there being a hole through said membrane under each tile.

4. Apparatus for holding mosaic elements in position during the setting of a bonding agent in the grooves between the mosaic elements during the fabrication of a mosaic, said apparatus comprising a cushion, said cushion adapted to receive said mosaic elements in desired spaced position and with a finished surface toward said cushion, a cavity in said cushion under each of said mosaic elements, and means for developing a partial vacuum in said cavities to cause the cushion to bulge into the grooves between said mosaic elements whereby the bonding agent in the grooves between the mosaic elements will have a concave curvature on the finished surface of the mosaic.

5. Apparatus for holding tiles in position during setting of grout to fabricate tile panels, said apparatus comprising in combination a rigid support member, a cushion covering said rigid support member, said cushion adapted

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to receive a plurality of tiles positioned edge to edge and having a finished surface toward said cushion, a hole in said cushion under each of said tiles, and means for developing a partial vacuum in each hole in the cushion to cause said cushion to bulge into the groove between the tiles whereby the surface of the grout on the finished surface of the panel has a concave curvature.

6. Apparatus for making panels of tile, said apparatus comprising a rigid support member adapted to support a plurality of said tile on its upper surface, said tiles positioned edge to edge and separated from each other by spaces to form grooves between the tiles, a flexible element distributed on the surface of said rigid support member under said grooves and under the edges of said tile, means for developing a partial vacuum between said rigid support member and said tiles to cause said flexible element to form a convex surface in the bottom of said grooves whereby a liquid bonding agent poured into said grooves will have a concave surface at the bottom of said grooves.

7. The invention according to claim 1 and wherein said means for developing a partial vacuum between said rigid support member and said tile consists of a vacuum chamber under said rigid support member and a series of holes connecting said vacuum chamber with the area under each of the tiles.

8. The invention according to claim 1 and wherein said means for developing a partial vacuum between said rigid support member and said tile consists of a vacuum pump and a hole in said support member under each of the tiles.

9. Apparatus for making panels of a plurality of elements comprising the combination of a rigid support member adapted to receive a plurality of said elements on its surface, said elements spaced from each other to form grooves between said elements, a resilient member distributed over said rigid support member and under said grooves, means for developing a partial vacuum between each of said elements and said rigid support member to hold said elements in position and form a convex surface in the bottom of said grooves between said elements, and wherein said grooves are adapted to receive a bonding agent.

10. Apparatus for making tile panels comprising a vacuum chamber, a surface of said vacuum chamber adapted to receive tile, the finished surface of said tile positioned toward said vacuum chamber, a grill work of resilient material positioned under the grooves between the tile, a hole in said vacuum chamber under each of said tiles whereby the resilient material is caused to bulge into the grooves between the tiles to form a convex surface in the bottom of the grooves between the tiles, and grout filling said grooves to bond said tile together to form a panel.

11. Apparatus for making panels from tiles comprising in combination a support member, said support member adapted to receive a plurality of tiles positioned edge to edge with space between each tile and with the finished surface toward said support member, a resilient member distributed on the surface of said support member under the grooves between said tiles, means for developing a partial vacuum, means connecting said vacuum developing means to the space under each tile to cause said tile to compress said resilient member, thus causing the resilient member to bulge into the grooves between the tile and form a convex surface in the bottom of the grooves, whereby grout allowed to set in the grooves between the tiles will have a concave surface.

12. Apparatus for making tile panels and the like comprising in combination a rigid support member, said rigid support member adapted to receive a plurality of tile positioned edge to edge, finished surface down, and spaced from each other so as to form grooves between the tiles; a pad of compressible material between said rigid support member and said tile, said pad extending

between said tiles; means for developing a partial vacuum between said rigid support member and each of said tiles to cause said pad to bulge into the grooves between said tiles; and means for applying a bonding agent to said grooves whereby the surface of said bonding agent between the finished surfaces of the tile will be concave when set. 5

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