May 14, 1957 Z. D. RUBEN 2,791,900

WALL TILE AND MEANS FOR MOUNTING THE SAME

Filed May 8, 1950 3 Sheets-Sheet 1

Fig. 1

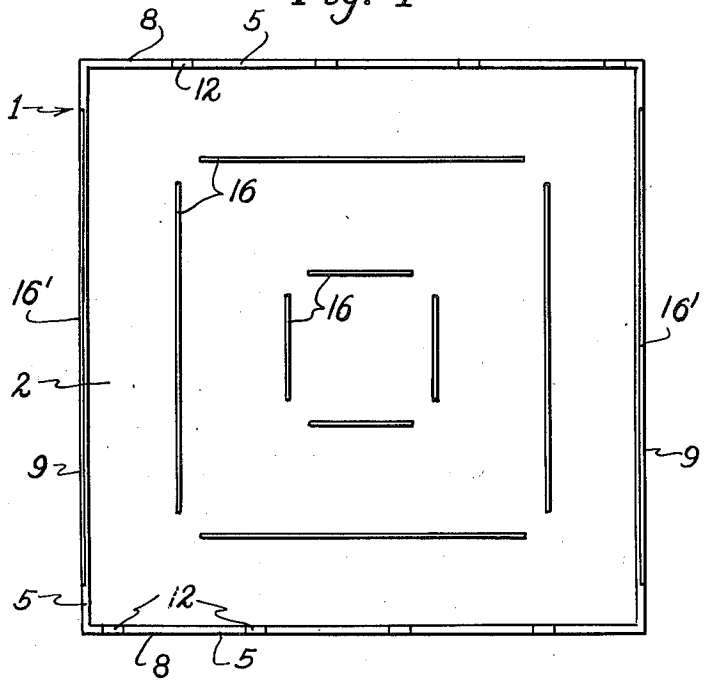


Fig. 3

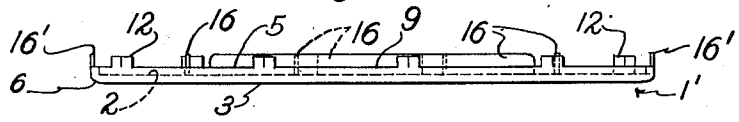


Fig. 4

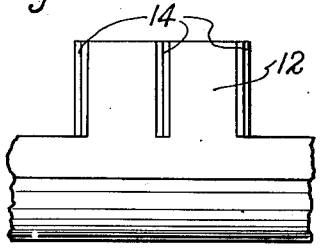
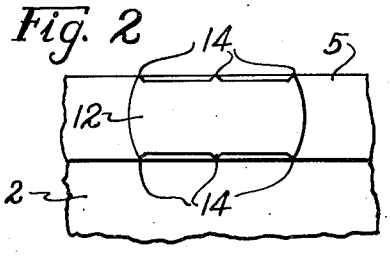


Fig. 2



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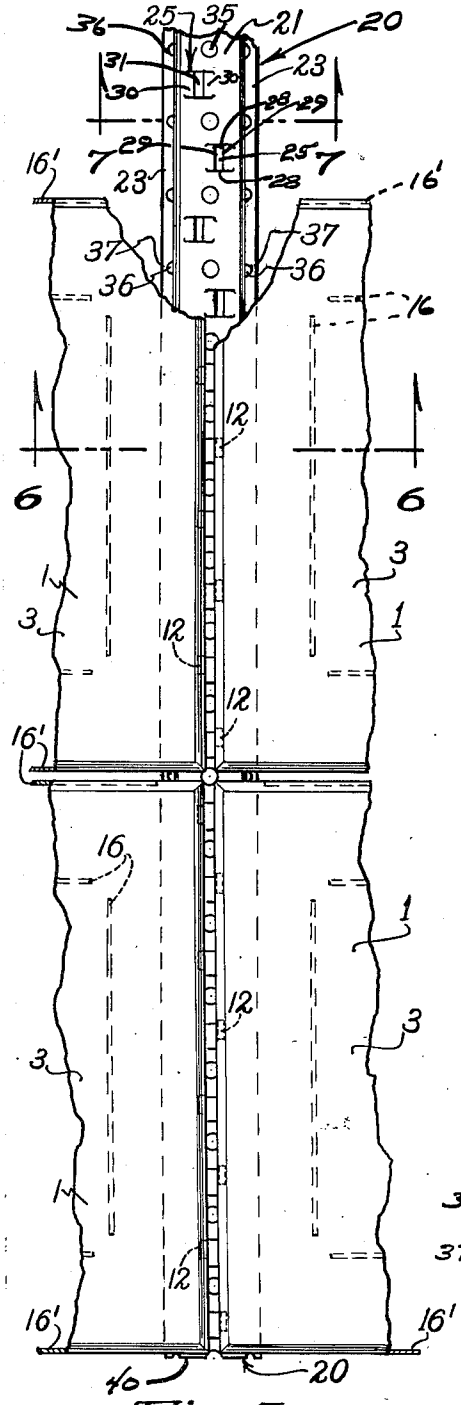


Fig. 5.

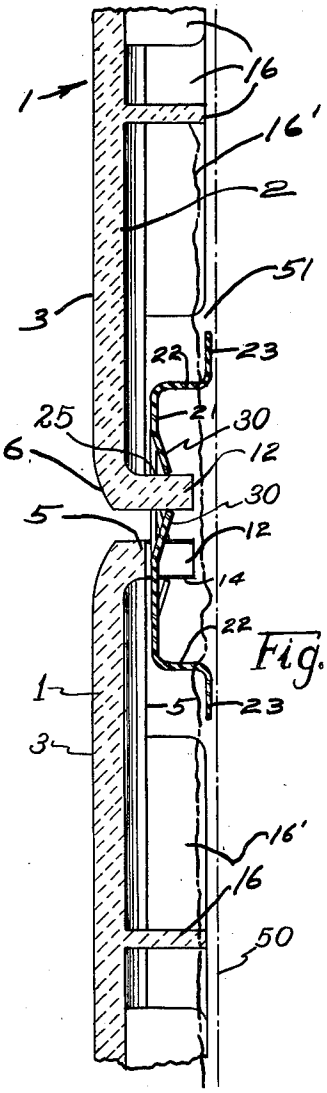


Fig. 6

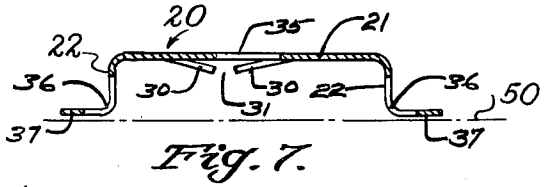


Fig. 7.

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WALL TILE AND MEANS FOR MOUNTING THE SAME

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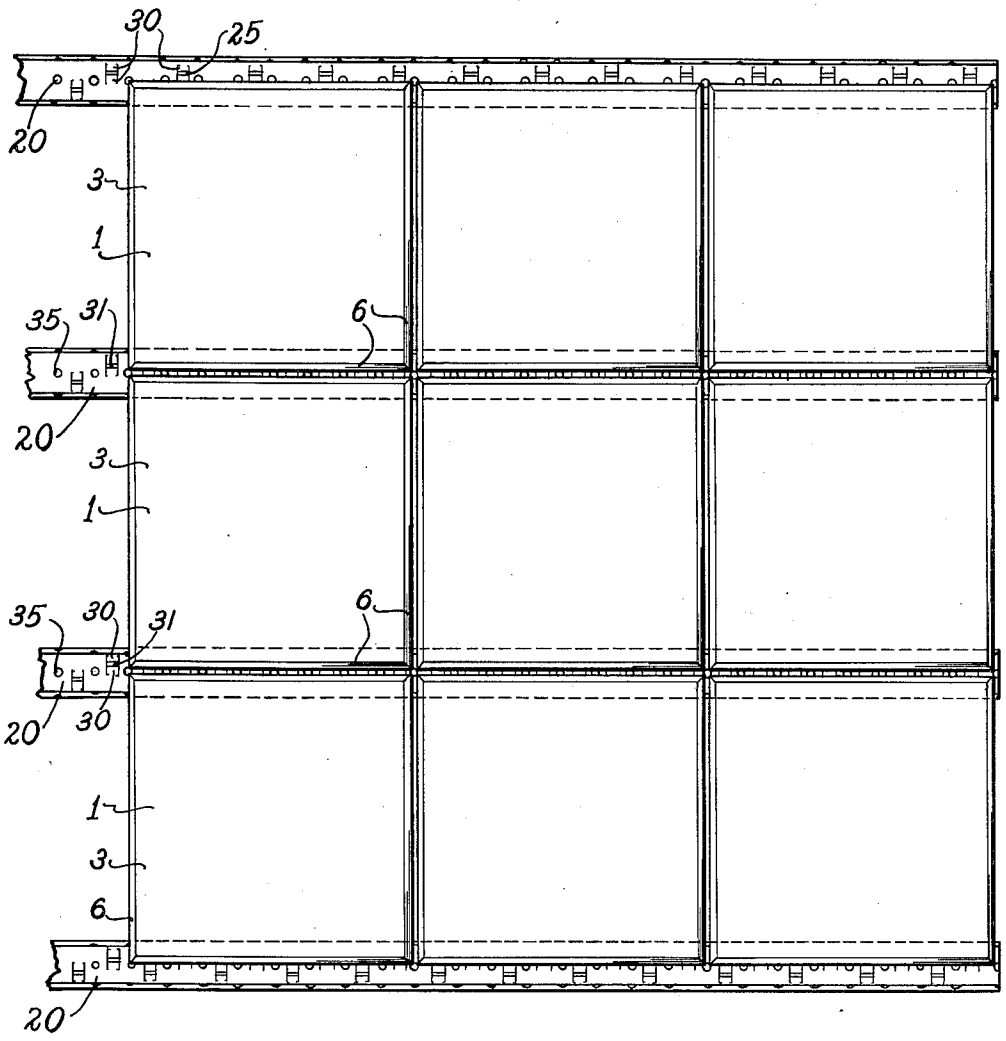


Fig. 8

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United States Patent Office

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WALL TILE AND MEANS FOR MOUNTING THE SAME

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Application May 8, 1950, Serial No. 160,747

11 Claims. (Cl. 72—23)

My invention relates to improvements in tile and the means and method for mounting or installing same on structural surfaces.

Certain types of tile are relatively light in weight per unit of area, and a plurality of tiles could therefore, if assembled in sheets having from one to twenty or more square feet in area, be handled and applied to structural surfaces by one or two workers. It is an object of my invention to provide an improved wall tile with simple, inexpensive means of rapidly assembling same into sheets or panels having a plurality of tiles, thus reducing the labor cost attendant installation of same.

Savings in labor costs by preassembly of tiles into panels may be effected in numerous ways. If the means are rapid and the spacing is automatically accurate as provided in this invention, the panel may be assembled and then placed, on a wall for example, in much less time than required to accurately place each tile upon the wall. Furthermore, the panel may be cut in assembly which will take less time than the cutting of each individual tile.

Cleaning of the tiles may be accomplished as soon as the panel has been placed, while the cement is still soft, wet and easy to clean. Pressure applied in cleaning an individually placed tile would displace it were it supported only by soft cement or mastic. However, the adherence of the entire panel to the wall is sufficient to support the tiles subject to the pressure of cleaning.

For this reason, also, the bond of the entire panel to the surface provides a factor of safety or insurance that single tiles will be supported if, for some reason, their bond has been impaired.

As a means toward this end, and in accordance with the principles of this invention, a strip is used along parallel sides of the tiles to join them in spaced relation to each other and to the strip. Preferably the tiles are molded of a plastic material such as polystyrene, which becomes hard but not as hard as the strip which is preferably stamped from a sheet of light gauge metal.

It is a primary function of the strip, which is usually placed horizontally on a wall surface, to hold the tiles apart on the order of one-sixteenth of an inch, both vertically and horizontally. By providing a projection of the strips at the sides of a panel, of one-half the space, the adjacent panel will be spaced properly when the ends of the strips are butted. This spacing is important in tile setting to accommodate dimensional tolerances or inaccuracies in manufacturing and dimensional changes due to temperature changes and movement of the structure. It likewise serves to provide a space where a moisture sealing compound may be placed or calked in, and as joints are generally conceded to improve the appearance of the surface, it enhances this by providing accurate spacing.

It is a further object to provide a tile holding and assembly strip which will be strong, light and inexpensive to manufacture. The material may be on the order of seven-eighths inch wide, ten to twelve thousandths inch thick, one-half to three-quarters hard, cold rolled steel.

It is a further object to provide said strip with means of being broken by hand to multiples of approximately one-half inch, although it is relatively rigid and strong. This, as will be later shown in detail, is made possible not only by the small cross section of the thin metal strip, but also by its modified channel shape and by openings therein of specific size and location. This improvement eliminates the need of cutting the strip when spaces require the fitting of partial tiles.

Tiles which are applied to walls and ceilings must adhere thereto with a durable and effective bond subject to moisture, temperature changes, and movement in and about the structure. A deep mechanical lock, which is desirable, cannot be economically provided in thin tiles made of polystyrene or other plastics. It is an object of my invention to provide an improved multi-purpose sheet metal clip with which to assemble tiles into a sheet or panel and then, either to anchor same into a plastic or setting adhesive or cement, bonded to a structural surface, or otherwise to fasten same thereto, thus suitably bonding the tile to the structure. The clip is so designed as to provide a mechanical lock with a setting cement as described above when cement is used to provide the bond to the surface.

This type of lock or key is a function of the modified channel shape of the strip as will be later described. Other functions of the channel shape are as follows:

1. The type of fastening between the tiles and the strip requires the insertion of studs on the rear faces of the tiles into openings on the strips. The channel form provides space below the openings to permit the strips to be laid on a work table with clearance for the studs when pressed into place.

2. The channel form provides rigidity in the thin sheet metal so that substantial bending of the panel at the tile joints is prevented. This allows large panels to be handled and set in place conveniently. It also provides enough rigidity in the assembly for the panel to span slight depressions or concavities in the structural surface and provide a straighter finish wall.

3. The modified channel shape, in cooperation with perforations therein as elsewhere mentioned, permits the strips to be broken to required lengths by hand.

In accordance with the principles of my invention three types of regularly spaced openings are provided in the strip to perform the following functions:

1. Holes are placed in the web and flanges on the channel to anchor bonding cement which is pushed therethrough in installation. Holes in the web also serve to anchor grout cement or for nails or screws as fasteners to the wall.

2. Holes placed in the bend of the flange on the channel permit the section to be broken in bending by hand.

3. Tongued openings in the web of the channel grip stud projections on the tiles and hold same in position for panel assembly.

Further objects of the invention are accomplished by locating stud projections, which are gripped in the aforesaid tongued openings in the strip, near the edges of the tiles. One object is to reduce the necessary width of the tile assembly strip to a minimum. Another is to improve the appearance of molded tiles. These often show "sink" marks, or slight depressions on the front face thereof, when projections on the rear are integrally molded having a substantial thickness and depth as compared with the wall thickness. As tiles are usually provided with a peripheral rib, the wall thickness is greater at the periphery. This extra thickness coupled with a radius on the face at the periphery tend to minimize the appearance of "sink" marks if stud projections are located there.

It is a further object of my invention to provide improvements in the means of fastening parts of molded plastic to parts of sheet metal so that the labor of making assemblies can be substantially reduced. Conventional methods of threadless quick fastenings by means of plastic studs being inserted into sharp tongued openings in sheet metal require substantial pressure to assemble and accurate dimensional control in manufacturing. It is a part of the teaching of this invention to provide a stud for insertion into a tongued opening with one or more substantially sharp edged ridges. These ridges are easily sheared by the metal tongue when being assembled if the opening is not quite large enough or not exactly located, thus allowing greater dimensional tolerances than heretofore. Furthermore, a very firm grip and intimate contact of the parts are assured with but slight pressure required to make same.

One of the difficulties with thin plastic wall tiles of the past has been that the tile requires a filling or backing on the rear side, for otherwise the tile will have a hollow sound when tapped. The filler used is quite expensive. It is one of the objects of the present invention to provide a plastic wall tile which can be made exceedingly thin and which will not emit the hollow sound when it is tapped, even though the tile is mounted without a complete filling of mastic behind it. This result is obtained by providing the rear surface of the tile with a number of very thin fins that are spaced apart and are of a height sufficient to reach the wall or surface on which the tile is mounted. These fins bear against the mounting wall or mastic support and prevent vibration of the thin tile when it is tapped.

It has heretofore been proposed to use mounting studs on the rear side of tile. Such studs have generally been placed a short distance inwardly of the periphery of the tile. This precludes the formation of exceedingly thin plastic tile because they are prone to show "sink" marks on their faces and, if such tile is made exceedingly thin there will be a tendency for the tile to curl between the mounting lug and the edge of the tile. It is one of the objects of the present invention to overcome this difficulty. This is accomplished by locking the mounting lugs at the very rim of the tile thus holding the tile against curling at its very rim.

The attainment of the above and further objects of the present invention will be apparent from the following specification taken in conjunction with the accompanying drawing forming a part thereof.

In the drawing:

Figure 1 is a rear face view of a tile embodying the present invention;

Figure 2 is a magnified fragment of Figure 1 detailing a stud **12** of Figure 1;

Figure 3 is an end view of the tile of Figure 1;

Figure 4 is a magnified fragment of Figure 3 detailing a stud **12** of Figure 3;

Figure 5 is a fragmentary front face view or elevation of a tile and clip assembly as it would appear on a wall surface before pointing;

Figure 6 is an enlarged sectional view taken along the line **6—6** of Figure 5;

Figure 7 is an enlarged section taken along the line **7—7** of Figure 5; and

Figure 8 is a front elevation of part of a panel of assembled tiles and strips.

Reference may now be had more particularly to the drawings wherein like reference numerals designate like parts throughout.

In Figure 1 there is shown at **1** a back view of a plastic wall tile embodying the present invention. The tile here shown is of a generally square shape, although it is within the province of the present invention to have a tile of any other shape, preferably polygonal. The tile **1** has a planar rear surface **2** and a planar front surface **3**. A peripheral flange or rim **5** extends around the entire

back surface of the tile for reasons which will be apparent as this description proceeds. The front planar surface **3** of the tile is curved along a smooth curve **6** at its periphery, the curve being tangent to the planar surface **3**. The face of the tile between the rear and the front surfaces **2** and **3** is exceedingly thin, and the rim **5** extends from the rear surface a distance approximating the thickness of the tile. On each of the two opposite edges **8—8** of the tile the rim **5** has a number of studs **12** projecting therefrom, the other two opposite edges **9—9** having no such studs. Each stud is integral with the rim and projects therefrom a height approximating the distance of the rear face of the rim **5** from the front surface of the tile, although the exact height of each stud may be made more or less than this amount as required to satisfy the functions to be performed by the stud. Each stud **12** is of a thickness approximately the same as the thickness of the rim **5** of which it is a part. Each stud has a number of outwardly projecting ridges **14** each ridge extending the full height of the stud. Each ridge is exceedingly minute in width and in thickness. The purpose of these ridges is to facilitate gripping of the stud by the mounting strip on which the tile is to be mounted, as will be more fully explained as this description proceeds. The studs **12** are uniformly spaced apart on the rims on the edges **8—8**, with the studs on one edge starting from a position close to the left hand side of the edge and studs on the other edge starting from a position equally close to the right hand side of the rim, as may be seen in Figure 1.

The tile **1** also has a series of spacing fins **16** formed integrally therewith and projecting rearwardly of the rear surface **2** thereof. When the tile is in use these fins bear against the surface on which the tile or tile assembly is ultimately mounted and thus prevent or substantially reduce vibration or movement of the thin tile when the same is tapped or pressed as by the hand, thereby substantially eliminating the hollow sound that would otherwise be emitted and the bending that would otherwise occur.

Additional fins **16'**, similar to the fins **16**, extend rearwardly from each rim **5** that is at the edges **9—9**. The back edge of the fin **16'** is in the same plane as the back edges of the fins **16**. When the tile has been mounted on the wall the fins **16'** bear against the mounting surface and during the following grouting or pointing operation serve to keep the grouting cement from being wasted by flowing under the tile.

Individual tiles of the present invention are adapted to be assembled into panels for mounting on walls or other structural surfaces. In accordance with the present invention I have provided assembly strips, preferably of metal, for holding the individual tiles in a panel assembly, which strips also thereafter serve to hold the panel on the wall. One of these strips is indicated at **20**. Each strip is provided with holes to facilitate mounting of the strip on the wall and for facilitating breaking of the strip by hand into units of desired length. Each strip **20** is substantially of a channel shape having a web portion **21**, sides **22** at substantially right angles to the web portion, and having flanges **23** at the ends of the sides **22** and parallel to the web **21**. The web of each strip **20** has a row of stud-receiving openings **25** spaced from one another and of the same spacing as are the studs **12** of the tile, and located on one side of the longitudinal center line of the web, and a similar row of stud-receiving openings similarly spaced and in alignment with one another on the opposite side of the longitudinal center line of the web **21**. Each stud-receiving opening consists of transverse lines of cut **28—28** and longitudinal lines of cut **29—29** leaving a pair of tongues **30—30** spaced from one another, as indicated at **31**. The tongues are bent slightly into the trough of the channel. In addition, the web has a series of holes **35** formed along the center thereof and the strip has additional series of holes **36**

formed at the junction of the sides 22 and the flanges 23, thus leaving an exceedingly small section of metal 37 between each hole 36 and the outer edge of the flange 23. The holes 35 and 36 are in alignment transversely of the strip 20, as may be seen from Figures 5 and 7. Each hole 36 extends through the side 22 for a height almost equal to the height of the side. As a result, if an attempt is made to bend the strip transversely it will bend along a line such as the section line 7—7 of Figure 5, and the metal at 37 will be easily broken apart, as will the metal of the side between the top of the hole 36 and the web 21. Each group of holes 35—36 is centered between one of the stud-receiving openings 25 on one side of the longitudinal center line of the strip and the adjacent stud-receiving opening 25 on the opposite side of the longitudinal center line of the strip.

In practicing the present invention a number of pieces of tile 1 are assembled into a panel by means of a number of strips 20, as shown in Figure 8. The assembly is made by placing each piece of tile in an appropriate position over a strip 20 with the studs 12 thereof over the stud-receiving openings 25, as illustrated in Figure 5. The tongues 30 of each of the stud-receiving openings 25 are spaced apart a distance slightly less than the thickness of the studs 12. As the studs 12 are pressed into the openings 25 the tongues 30 flex from the web 21 of the channel in a direction inwardly of the channel, thereby increasing the space 31 between the tongues and permitting the stud to enter that space. At the same time the edges of the tongues exert a scraping or gripping action into the ridges 14 of the studs thereby firmly gripping the studs and permitting inward movement of the studs into the channel 20 but preventing retraction therefrom by wedging. If an attempt is made to retract the studs by pulling outwardly on the plastic tile the tongues 30 wedge against the studs 12 due to the natural resiliency of the metal of the tongues and the sharp corners of the tongues bite into the studs and prevent their retraction. As a result the tongues firmly hold the studs and thereby firmly hold the tile to the strip 20 along the opposite longitudinal edges of the tile, the holding action being at the very edges of the tile. To facilitate centering of the studs 12 over the openings 25, the bottoms of the studs may be made with a small radius at the edges.

The stud-receiving openings 25 in one row on the strip 20 are spaced from the corresponding stud-receiving opening in the opposite row of the same strip an amount such that the two pieces of tile are mounted as in Figure 5. The spacing between the two pieces is the required spacing between adjacent pieces of tile on the wall. This space is later to be filled with cement. The locations of the holes in the strip 20 are so correlated with respect to the size of the tile that when the strip 20 is broken by a line of break across aligned holes 35—36, if the break is chosen to be at the end of the tile, as illustrated in Figure 5, the broken end 40 of the strip (Fig. 5) projects past the adjacent edge of the tile by an amount exactly half of the desired spacing between the tiles, as seen in Figure 5 Consequently in the assembled panel of Figure 5 the edges of the strip project beyond the pieces of tile by that amount, so that if two assembled panels are placed with the strips 20 thereof in abutment the adjacent tiles of the two assemblies will be spaced apart the same distance as the spacing between adjacent tiles of the same panel assembly.

The panel assembly of Figure 8 may be made of any size, for instance, from less than one square foot in area to upwards of twenty square feet in area. Such pre-assembled panels are light in weight and therefore easy to handle. Such a panel may then be mounted on a structural wall surface, indicated, for instance, at 50 (Fig. 6). The flanges 23 of the strips and the fins 16 of the tiles bear against the mounting surface 50 and they may be held in place thereon as by a coating of mastic cement, indicated at 51. The mastic is troweled, brushed or otherwise applied to the wall. As the flanges are pressed against the wall the mastic passes through the holes 36 in the strips 20. Also, slight unavoidable side motion at the panel in being positioned on the wall causes the flanges 23 to cut into the mastic on the wall. Thus the strips become anchored in the cement on the wall. Thereafter, before the mastic has set, the spaces between adjacent tile are filled or pointed with cement. This cement is provided chiefly for ornamental and water-proofing purposes and is not relied upon to hold the tile in place. Cleaning of the tile can be accomplished immediately after the pointing cement has been placed and while it is still wet and easy to clean. Any pressure that may be applied to the individual tiles during such cleaning operation will not tend to displace the tile, as would be the case if each tile were individually held on the wall by fresh cement.

From the above description it is apparent that the tile of the present invention can be made exceedingly thin. Notwithstanding the thinness of the tile there are no sink marks apparent at the front face of the tile opposite the studs 12 because the studs project from the rim 5. With very thin tile, as is here made possible, if the studs 12 were located appreciably inwardly of the edge of the tile there would be some danger that the edge of the tile might curl outwardly or break off where it is unsupported. In the present instance curling is avoided because the studs are located near the two opposite parallel edges and hold the edges of the tile. Furthermore, by having the studs 12 close to the very edge of the tile the mounting strip 20 may be made very narrow, since the studs of two adjacent pieces of tile are close together. Providing the ridges 14 on the studs assures intimate contact and pressure of the tongues against the studs or ridges and yet allows maximum tolerance in manufacturing as to the locations of the studs and as to the locations and sizes of the openings between adjacent tongues 30—30 that grip the stud. Furthermore, the ridges 14 provide a firm grip between the tongues and the stud even though the stud fits lightly between two tongues. This requires less pressure for assembling the tile in the strip 20 as the sharp edges on the minute ridges can easily be sheared off by scraping against the tongues 30. This also facilitates the maintenance of a proper locking angle, of the order of 15° between the tongue 30 and the normal to the stud.

By providing an arrangement as above described wherein a large number of tiles may be quickly preassembled into panels, for instance, one hundred twelve 4½ inch tiles being assembled into a panel 36" wide by 63" high, there is a substantial reduction in the labor costs of installation. An assembled panel can be trimmed along one edge as needed to fit a particular space instead of having to measure the individual tiles for trimming. Furthermore, the preassembly of tiles into panels allows for immediate cleaning of the cement that is placed between adjacent tiles and it allows a higher factor of safety for holding of individual tiles.

The metal strip assembly of tile into panels provides for the proper spacing of tiles vertically and horizontally, and for better appearance in that the spacing of tiles is accurately determined by the die formed strips 20. By making the strip 20 channel-shaped, as distinguished from a flat strip, the strip 20 may be placed on a work table and the web 21 will be spaced from the table a sufficient height to accommodate insertion of the lugs into the openings 25. Furthermore, the channel shape for the strip 20 provides rigidity of assembly so that the assembled panel may be handled conveniently. Slight concavities in the structural surfaces on which the panel is mounted will be spanned thus providing a better appearing tiled surface. The holes in the strip 20 provide for anchoring to the mastic and cement with which the strip is mounted and facilitate breaking of the strip into desired lengths by merely bending the same by hand.

In compliance with the requirements of the patent

statutes I have here shown and described a preferred embodiment of my invention. It is, however, to be understood that the invention is not limited to the precise construction here shown, the same being merely illustrative of the principles of the invention. One example of an alternate construction would be to replace openings 36 by chiselled grooves to provide the weakened section required for breaking by hand. What I consider new and desire to secure by Letters Patent is:

1. A molded tile comprising a rectangular body having two groups of two or more integrally molded, regularly spaced studs projecting from the rear face thereof, each said group of studs being aligned contiguous to each of two parallel sides of said tile for the purpose of being fastened to one side of a tile holding and assembly strip, the other two parallel sides of the tile each having a flange extending substantially the full length thereof and projecting rearwardly an amount at least equal to the rearward projection of each stud, said flanges terminating short of the extremities of said edge to provide clearance for the passage of said holding strip.

2. A molded tile comprising a rectangular body having two groups of two or more integrally molded, regularly spaced studs projecting from the rear face thereof, each stud having one or more substantially sharp edged ridges projecting from one or more of its sides, and extending substantially perpendicular to the face of said tile and along substantially the entire length of the stud and each said group of studs being aligned contiguous to each of two parallel sides of said tile for the purpose of being fastened to one side of a tile holding and assembly clip.

3. Tile mounting means comprising a flexible metal strip channel-shaped in cross section, the web of the channel having two rows of stud receiving openings, the rows extending lengthwise of the web on opposite sides of the longitudinal center line of the web, the strip being transversely weakened at a plurality of locations spaced from one another lengthwise of the strip to facilitate breaking of the strip by bending it by hand, the fracture occurring at a weakened portion, said weakening comprising holes formed in those flanges of the channel that extend at right angles to the web, and additional flanges projecting laterally from the ends of the flanges of the channel and bridging said holes.

4. In combination, a wall tile comprising a molded body having a substantially smooth front face and a rearwardly projecting rim, the rim at two sides of the body having integrally formed mounting studs projecting therefrom, the rim at the remaining sides of the body being extended to a depth greater than the depth of the rim at said two opposite sides by an amount substantially equal to the depth of the mounting studs, and mounting means for the tile comprising an assembly strip, said strip having longitudinally extending flange means to provide rigidity and to space part of the strip from a tile mounting surface and said part of the strip having spaced openings for receiving the mounting studs, and means at the openings for gripping the mounting studs and holding them against retraction, said part of said strip providing a bearing surface for that edge of the rim from which the mounting studs project.

5. In combination, a number of similar pieces of wall tile and tile holding strips for securing the pieces together to form a panel for mounting on a wall, each of said pieces of tile having integrally formed mounting studs at the rear thereof, each of said strips having flange means to provide rigidity and having a tile mounting surface having spaced openings for receiving said mounting studs of adjacent tiles, means at the openings for holding the studs against retraction, said openings for studs of adjacent tiles being spaced apart sufficiently to leave a grouting space between adjacent tiles, each tile comprising a thin walled body having peripheral flange means, and means for inhibiting the flow of grouting material from between adjacent tiles to the space in back of the tiles, said last named means including said peripheral flange.

6. In combination, a number of similar pieces of wall tile and tile holding strips for securing the pieces together to form a panel, each of said pieces of tile having integrally formed mounting studs at the rear thereof, each of said strips having longitudinally extending flanges to provide rigidity and having a tile mounting surface having spaced openings for receiving said mounting studs of adjacent tiles, means at the openings for holding the studs against retraction, each tile comprising a thin walled body having integrally formed projections extending rearwardly thereof to such a depth that when the tile is positioned on the strips the projections extend from the tile mounting surface of the strip an amount substantially equal to the effective depth of the flanges of the strip.

7. In combination, a wall tile comprising a molded body having a rearwardly projecting rim, the rim at two sides of the body having mounting studs projecting therefrom, the rim at the remaining sides of the body being extended to a depth greater than the depth of the rim at said two opposite sides by an amount substantially equal to the depth of the mounting studs, and mounting means for the tile comprising an assembly strip, said strip having a longitudinal web and longitudinally extending flange means extending laterally from the web to provide rigidity and to space the web from a mounting surface, said web having spaced openings for receiving the mounting studs, and means at the openings for gripping the mounting studs and holding them against retraction, said web providing a bearing surface for that edge of the tile rim from which the adjacent mounting studs project, and said flanges having a depth providing clearance for the tile studs and rims from a tile mounting surface.

8. The combination of a number of similar pieces of wall tile and strips for securing the pieces together and to a wall and each strip including a portion adapted to bear against the wall on which the strip is to be mounted and a portion raised from said wall, each tile piece having mounting studs at the rear thereof which project through spaced openings in said raised portion of said strips, and the tiles bearing on the outer face of said raised portion of said strips, and said tiles having spacing fins extending rearwardly from the central portion thereof an amount approximating the height of said raised portion from the part of the strip that is adapted to bear against a wall.

9. Tile mounting means comprising a channel-shaped flexible metal strip having a web and stiffening flanges extending laterally from the web, the web of the channel having two rows of stud-receiving openings formed by tongues struck from the web and inclining therefrom in the direction of said stiffening flanges, said rows of stud-receiving openings extending lengthwise of the web on opposite sides of the longitudinal center line thereof, said flanges being transversely weakened at a plurality of locations spaced from one another lengthwise of the strip to facilitate breaking of the strip by bending it by hand, and the fracture occuring at a weakened portion.

10. Tile mounting means comprising a channel-shaped flexible metal strip having a web and stiffening flanges extending laterally from the web, the web of the channel having two rows of stud-receiving openings formed by tongues struck from the web and inclining therefrom in the direction of said stiffening flanges, said rows of stud-receiving openings extending lengthwise of the web on opposite sides of the longitudinal center line thereof, said flanges being transversely weakened at a plurality of locations spaced from one another lengthwise of the strip to facilitate breaking of the strip by bending it by hand, and the fracture occurring at a weakened portion between stud-

receiving openings, said weakening comprising holes formed in the flanges of the channel.

11. An assembly of polygonal tiles each having at least two parallel edges, each of said tiles having a number of spaced studs projecting from the rear thereof and located contiguous to the parallel edges of said tiles; and strips for mounting said tiles, each strip having openings therein and means at the opening which slide over and grip said studs, said studs being fully inserted into said openings and said means at the openings biting into said fully inserted studs.

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