J. A. FERGUSON.

MULTIPLE MOLD FOR TILES AND THE METHOD OF FORMING ITS COMPLEMENTALLY FUNCTIONING MATRIX UNITS.

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1,298,027.

Patented Mar. 25, 1919.

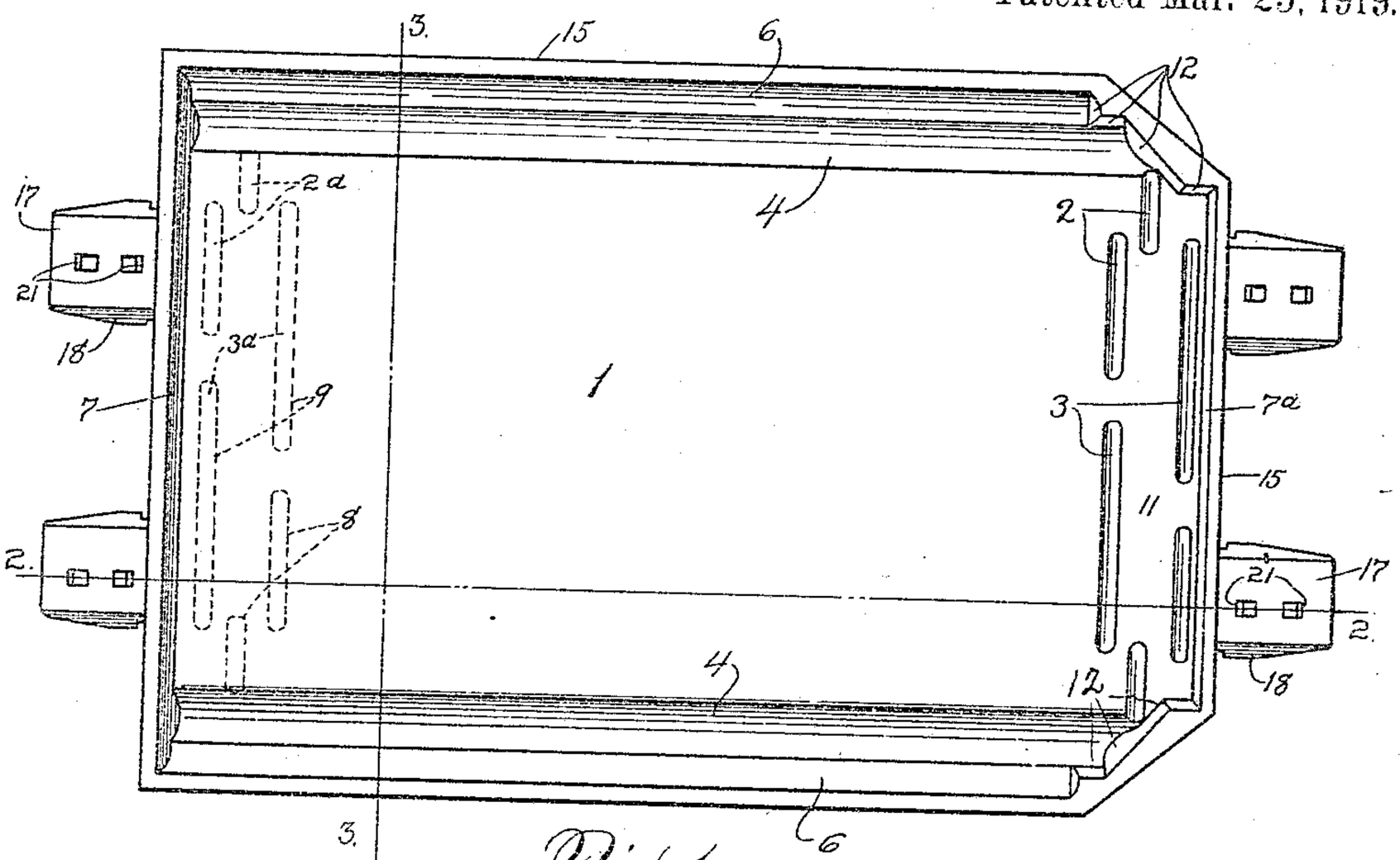

Fig. 1.

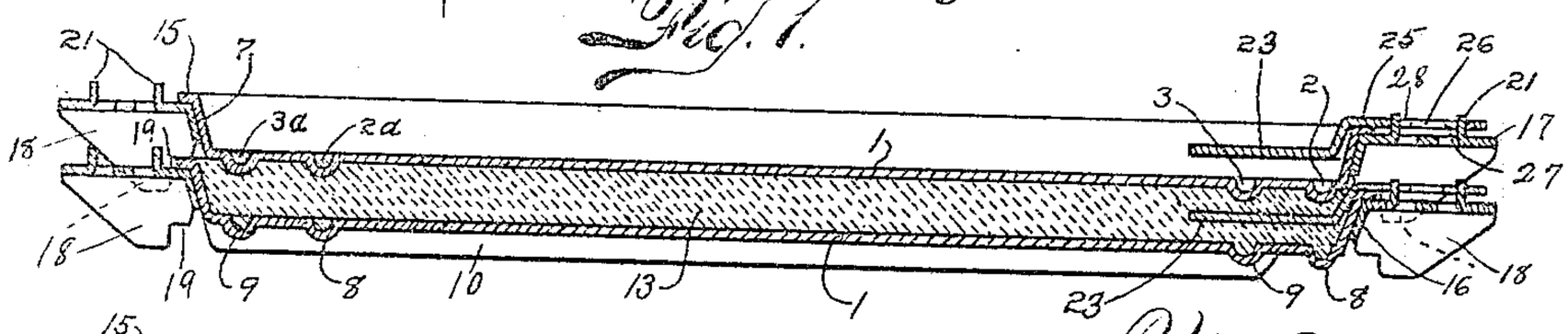

Fig. 2.

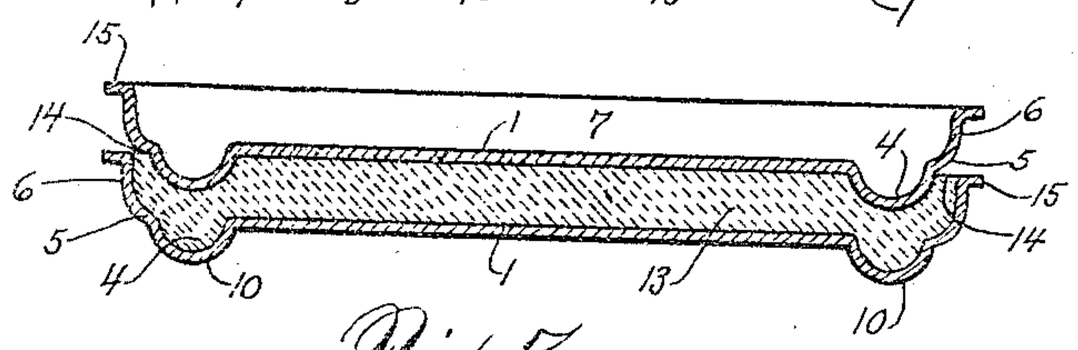

Fig. 3.

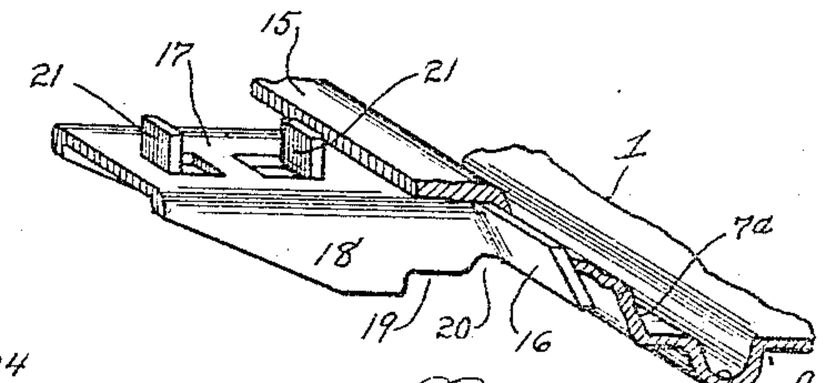

Fig. 4.

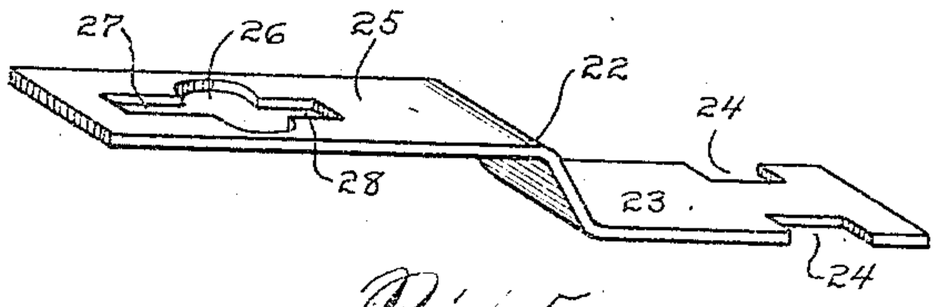

Fig. 5.

Witnesses
John B. Dade.

Inventor
John A. Ferguson.
by Wilkinson & Ginsta
his Attorneys

UNITED STATES PATENT OFFICE.

JOHN A. FERGUSON, OF DENVER, COLORADO.

MULTIPLE MOLD FOR TILES AND THE METHOD OF FORMING ITS COMPLEMENTALLY-FUNCTIONING MATRIX UNITS.

1,298,027. Specification of Letters Patent. Patented Mar. 25, 1919.

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To all whom it may concern:

Be it known that I, JOHN A. FERGUSON, a citizen of the United States, residing at the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Multiple Molds for Tiles and the Method of Forming Its Complementally-Functioning Matrix Units; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to molding apparatus for the multiple manufacture of tiles, especially "roofing" tiles, from any properly prepared cement or other plastic mixture, and it further resides in the improved method of forming the matrix units thereof, which consist solely of uniform settling mold pans, adapted to be stacked in superposed association for functioning as will hereinafter appear, and as more fully stated in my former Patents #1,244,845 of October 30, 1917 and #1,272,647 of July 16, 1918, over which the present invention is designed as embodying substantially important, although appearingly minute, improvements.

Also, those patents set forth fully the advantages of molding the tiles in shallow settling pans, to provide a glaze-like finished top surface for the tiles in the nature of a thoroughly indurated facing, when the quaky plastic substance is fully set, thus also reinforcing the whole body structure of the tile.

While the principles involved, in my former patents before mentioned and the instant invention, are quite analogous in the main, still in those patents the transverse end pattern grooves, depressed from the inside bottom of the pan, form corresponding molded beads on the top finished face of the tiles at both ends thereof.

When the tiles are laid, therefore, in interlocked or inter-engaged relation, as they are when tiling a surface whether as a roofing or otherwise, the finished top facings thereof present, at their lower ends, transverse beads having no particular utility, as the upper end of each tile is disposed underneath the overlapping lower end of the tile located immediately above.

In reality, it has actually been found that the transverse beads, at the lower ends of the tiles, are rather objectionable, if not positively disadvantageous, for they form raised obstructions, which not only mar the symmetrically smooth surface appearance of the roofing but also cause a serious barrier to the free flow of the water, being drained off, by the retardation and accumulation of dust, gritty, or earthy substances, which become packed or caked, and even leaves, paper, or other flying particles are similarly caught and held, thereby choking up or forming a miniature dam, as it were, above the level of which the drained water has to rise to escape thereover, thus leaving little pools at the lower ends of each tile, after rains or melting snows, a feature which is seriously objectionable for obvious reasons.

Of course, the transverse beads, at the upper end of each tile, are quite essential, as they inter-engage or interlock with the corresponding grooves formed in the underneath face of the lower end of the tile above, which overlaps and covers it. Likewise, the transverse grooves, disposed along the underneath face of the lower ends of the tiles, are equally essential for the same reason, while the corresponding beads at that end are not.

Thus in employing pan matrix units solely, for properly shaping the tiles, it has been found desirable to invent an expedient yet simple method or means for forming such pans, so that they will mold these transverse grooves on the bottom faces of the tiles, while leaving the top finished surfaces thereof, at the lower ends, smooth or free from molded beads.

It is the primary object of the instant invention, therefore, to attain this desired end, in a specifically novel manner, and this and other objects will be so clearly apparent, as incidental to the following description, that further initial reference thereto would only cause unnecessary and undesirable repetition.

To more fully understand the improvements and the novel method of forming the matrix pan units, reference will now be had to the accompanying drawings, which fully disclose the same when supplemented by the

description thereof, and in which drawings—

Figure 1, is a top plan view looking down into the interior of one of the matrix units of the settling pan type; Fig. 2, is a vertical sectional view through a pair of said units, in their plurally stacked relation, the section being indicated longitudinally along the plane of the line 2—2 of Fig. 1, and the lower unit only being filled with the plastic mixture for better illustration; Fig. 3, is an analogously stacked vertical sectional view, but taken transversely along the plane of the line 3—3 of Fig. 1; Fig. 4, is a detail perspective view of an improved end supporting, guiding and centering member shown as attached to a fragmentary portion of the pan unit; and Fig. 5, is a detail perspective view of a metallic end securing element for the molded tile, novelly supported by the said guiding and centering member, to permit of the former being firmly embedded at one end in the tile while being molded.

As many of the detailed features are self-evident, especially from my aforementioned patents, for the sake of brevity some of these features will only be casually referred to by proper reference numerals, as their functioning will be made clear by a later description of the molding operations.

Also, while the pan matrix units might be formed with the transverse pattern grooves and pattern beads pressed out as heretofore, at one end, leaving the interior bottom of the pan smooth at the other end, and then soldering on suitable pattern beads at the exterior face of that end of the pan bottom, still the preferred method, according to the instant invention, is to form the whole pan, at one operation between proper pressure dies, and afterward employ the step of filling the transverse pattern grooves, at that end of the pan desired to be left smooth, by an insert preferably of molten metal.

The tiles themselves are laid in separated rows, with spanner tiles covering the spaces between rows, and as some of the tiles are laid in reverse positions relatively to others, all of them are provided with rabbeted corners at one end, for interfitting purposes. Therefore, as the aim is to leave the top surface of the tiles unobstructed at that end disposed downwardly in the roof, it is evident that two sets of pans are required, in one set of which the transverse grooves, at the smaller end of the pan forming the rabbeted corners, are filled up, and vice versa, although to avoid unnecessary drawings and description, this feature has only been shown at the larger end of the pan, Figs. 1 and 2.

1 designates the bottom of the pan unit, 2 and 3, a series of short and longer end transverse grooves, and 4 elongated side pattern grooves of suitable depth, the outer walls of the grooves 4 curving outwardly and upwardly from positions in line with the bottom of the pan, as indicated at 5, and from thence extend upwardly in offset planes, providing the side walls 6 of the pan proper, which preferably are slightly flaring.

The end walls 7 and 7ª also flare upwardly at a slight inclination, but do not surmount lower bulged portions like the offsetting curved sections 5 relatively to the side walls 6.

In consequence of the depressions 2, 3 and 4, it will be apparent that congruent transverse and longitudinal patterns or beads 8, 9 and 10, respectively, will be likewise formed on the exterior face of the bottom 1, and the pattern grooves and beads 4 and 10 extend from one end wall of the pan to the other end wall thereof.

One end of the pan is shaped to provide a laterally restricted space 11 between the side walls thereof, which in turn will mold a tongue portion at that end of the tile, this space 11 being exteriorly bounded by the irregularly contoured end wall consisting, in this instance, of a shortened central portion 7ª, terminating at its corners in the angularly disposed sections 12, which obviously will form corresponding rabbeted corners or recesses at the opposite corners of that end of the tile, adapted to fit complementary portions in the ends of reversely disposed tiles in the tiling surface when laid, but this manner of laying the tiles is not illustrated, being no part of the invention for molding the tiles themselves.

Means should preferably be provided to permit of the escape of any of the surplus filling plastic mixture, which will naturally be displaced upon superposing another filled pan thereover, owing to the pressure weight of the latter, and a satisfactory means for accomplishing this, as set forth and claimed in my Patent #1,272,647, is the provision of the peculiar formation of the offsetting curved shoulders 5, terminating in the correspondingly offset side walls 6 of the pans, which will leave open longitudinal spaces 14, between the lower curved surfaces 5 of a superposed pan and the flanged upper ends 15 of the side walls 6 of the pan below, as clearly seen from Fig. 3.

Also, in my former patent, just referred to, I found it desirable to provide end supporting members for the stacked pans, to make the correlative adjustment of the pans certain, guarding against any undue telescoping of the same, while functioning as guiding and centering means therefor.

In the instant case, however, I have found it preferable to construct these end supporting, guiding and centering members in a substantially different manner, for additionally functioning, as will hereinafter appear, to also retain in place, end securing elements

for the tiles, associated with the pans during molding operations, whereby the inner ends of these tile securing elements are caused to be firmly embedded in the body of the tiles.

As shown in the enlarged detail view (Fig. 4) these end supporting, guiding and centering members may be formed from sheet metal, bent or pressed into shape to provide a vertical rear attaching wall 16, an outwardly projecting top web section 17, pressed down at its sides to provide the downwardly disposed side webs 18, the whole forming a channeled space underneath the top web 17. The side webs 18 are slightly flaring and the bottom rear edges thereof are notched or cut-away, as at 19 and 20, to properly follow the contour of the flanged tops 15 of the end walls of a pan below, permitting the flaring webs 18, of these members of a pan above, to partially encompass their similar coöperating members on the pan below, thus guiding and centering the upper pan relatively to the lower one. Also, the upper web portions 17 are provided each with a pair of upwardly projecting and spaced alining lugs 21, which may be conveniently formed by properly slitting the top webs 17, and bending up the lugs 21, all of which is self-apparent from the drawings.

As many of these members as desired may be secured to each end walls of the pans, and this may be conveniently done by welding the vertical portion 16 to the exterior faces thereof, the top webs 17, preferably lying immediately below the underneath faces of the flanged tops 15 of the pan wall, while the substantially triangular-shaped side webs 18 project slightly below the bottom of the pan, so that when the pans are filled and stacked in molding relation, the notched portions 19 seat over the flanged rims 15 of a pan below, and will regulate the extent to which an upper pan will telescope within one below. At the same time, the lower portions of the side webs 18 will slightly encompass the upper portions of the side webs 18 on the pan below, thus guiding and centering the upper pan when placed over a lower one.

Thus, it will be seen that the superposed pans are not only supported above the lower ones but they are also guided into place and held centered in proper vertical positions relative thereto, insuring of the accurate alined molding of the respective grooves in the bottom faces of all of the tiles, while the interior of each pan acts as a matrix for shaping the top and side faces of its tile being molded therein.

In Fig. 5, there is shown, in enlarged detail, a specific form of an end metallic securing element for the finished tile, and in Fig. 2, these are shown in their supported positions, relatively to the mold pans, during the molding operation. These elements comprise a flat angularly bent metallic strip 22, of substantially Z-shaped construction and with elongated arms, the inner arm 23 of which is adapted to be embedded within the body of the tile when the latter is being molded. In order to prevent the displacement or pulling out of the securing element, the inner arm is provided with notched edges providing recesses 24, within which the cement 13 of the tile body is embedded, providing anchoring means for these end securing elements. The other arm of this securing element projects outwardly beyond the upper end face of the tile, substantially flush with the bottom face thereof, and is provided with any suitably shaped attaching slot, illustrated as a dually formed keyhole aperture, the enlarged opening 26 of which is disposed centrally of the reversely disposed extensions 27 and 28, so that when a tile is being laid in place, the enlarged opening is slipped over a headed stud or nail in the tiling support, and the tile slid downwardly, with the nail riding in the restricted outer slot 27, thus not only providing for the ready attachment of a tile in initial laying, but also a means for readily detaching and replacing a new tile, without substantially disturbing other adjacent tiles of the roofing. Also both of the slots 27 and 28 provide for any undue expansion or contraction of the tiles, owing to the different seasons or other climatic conditions, as it is understood that indurated cement mixtures will expand and contract, and oftentimes buckle up and crack in extremely severe weather.

The tiles being reversely laid, as heretofore stated, it will be understood that one set of tiles will be provided with the securing end strips at the larger end of the tile, although I have only illustrated them as associated with the smaller end or tongue portion, the idea being that the securing strips are embedded in that end of the tile that is to be disposed upwardly in the roofing, or at the end opposite to the end of the tile that has an unobstructed top facing.

In carrying out the method of shaping the pans for molding the tiles with their lower top faces smooth and free from obstructions (while at the same time providing the necessary locking beads at the opposite end, and the interlocking transverse end grooves on the bottom surfaces of the tiles) I first shape up the pans, preferably by pressure dies, providing the flaring confining walls, while at the same time depressing the bottom so as to form the side edge pattern grooves and beads 4 and 10, and the transverse end pattern grooves and beads 2 and 3 and 8 and 9 respectively. Then I fill up the transverse grooves 2 and 3 at one end

of the pan (indicated at 2^a and 3^a at the large end of the pan, Figs. 1 and 2) by introducing a suitable filling. This filling could be in the nature of an insert, secured in the grooves in any desired way, but as a matter of preference and expediency, I contemplate pouring in molten metal that will adhere, such as solder or the equivalent, until the interior surface of the pan bottom, at that end, is quite smooth and even. Thus the transverse pattern beads 8 and 9 are still left intact, for forming the necessary grooves in the bottom of the finished tile, while the top facing of the tile, at that end which is laid downwardly of the roofing, is molded smooth and free from transverse beaded obstructions. This may not appear to be so consequential, from a plain casual statement, yet in actual practice, especially where the tiles are manufactured by the sole employment of stacked uniform pan matrix units, it becomes an important factor (no separate pattern plate for the bottom face of the tile being required) and a decided improvement over my former arrangements of plurally stacked mold pans, not only because of their effectiveness in the multiple molding operation, but also owing to the simple manner of first forming the pans as a whole, with both sets of transverse grooves and congruently alined pattern beads, and then filling up one set of grooves, as and for the purposes set forth, thus saving time and the labor of soldering on separately manufactured pattern beads at that end of the mold pan. Of course, where the reduced or tongue portion of the tile is to be the lower end when laid, then the transverse grooves at that end of the mold pans are filled up or effaced, and the grooves at the large end are left open, or just the reverse to that shown in Figs. 1 and 2.

While in some instances, one supporting, guiding and centering member 17—18 may suffice at each end of the pans, still it is preferred to employ a pair of such members at each end thereof, in properly spaced relation, and these elements may be suitably affixed by soldering or welding the vertical rear walls 16 to the exterior faces of the end walls of the pans.

In the operation of molding, a pan is first filled with the quaky mixture, and then may be properly jiggered to cause an even distribution of the mass therein. A pair of the metallic securing elements 22 are then set in place, at the end of the pan opposite to that end where the transverse grooves are obliterated, the inner arms being pressed down into the soft mixture, for embedding the same therein, where it will obviously become firmly anchored when the tile is fully set. At the same time, these securing elements 22, are firmly held supported in fixed relation, against displacement, and in properly disposed positions, while the tile is setting, by virtue of the simple expedient of the upturned lugs 21, on the top webs 17 of the supporting, guiding and centering members, over which lugs the slots 27 and 28, of the outer arm 25 of the securing elements, snugly fit, as will be understood from Figs. 4 and 5, and as clearly illustrated, in assembled relation, in Fig. 2.

A similarly filled pan may now be superposed upon the next lower pan, and the weight thereof, or other external pressure applied, will cause the transverse and longitudinal patterns or beads 8, 9 and 10 of the upper pan to press down into the quaky mixture in the pan below, forming corresponding grooves in the bottom face of the tile being molded in the lower pan, the congruent unfilled or open grooves 2, 3, and 4 in the pan below also molding the interlocking beads desired, at the sides and at one end (the upper end) of the top face of the tile being molded therein, but leaving the other end (the lower end) smooth or unobstructed by any transverse beads.

At the same time any surplus material displaced, in this operation, from the pan below, will be exuded through the longitudinal spaces 14, and by the use of a proper scraping implement, run along the top flanged faces 15 of the side walls 6 of the lower pan, this exuded mass may be smoothed off evenly with the bottom face of the tile being molded therein.

These operations may be repeated indefinitely until a desired number of the mold pans, filled with the plastic mixture, have been built up in stacked assembly—no tying or binding means being required therefor, as the downwardy flaring side webs 18, of the supporting, guiding and centering members, will function, as heretofore stated, to support and maintain the several pan units in their proper correlative molding positions.

The stack of mold pans may not be set aside to allow the mixture to become fairly hardened, when the stack may be knocked down, by simply removing the filled pans one by one, and upon inverting the same the finished tiles readily slide out of their respective matrix units. The tiles may then be set aside, independently of their mold pans, for more thorough induration before actual commercial use.

Having thus fully disclosed my improved multiple molding apparatus, the novel method of forming the pan matrix units thereof, and their operation and functioning in associated stacked relation, what I claim, as new and patentable, is:—

1. In the multiple manufacture of tiles, employing a stacked series of uniform units, a suitably constructed shallow settling pan, the bottom of which is depressed to provide

an interior transverse groove, at each end of the pan, and a longitudinal groove at each side thereof, forming corresponding congruent pattern beads exteriorly of said bottom, the transverse groove at one end of the pan being subsequently effaced by the introduction of a suitable filling, for smoothly leveling the interior bottom surface at that end of the pan, and the assembled units individually functioning both as a matrix, for the body proper and top face of a tile being molded therein, and also as a pattern element, for the bottom face of a tile being molded in a unit below, substantially as described.

2. In multiple molds, for tiles having end attaching elements, a plurality of uniform shallow settling mold pans, formed with end and side walls and a bottom suitably patterned, on its interior and exterior surfaces, for molding congruent inter-engaging beads and grooves substantially as set forth; in combination with supporting means for guiding and centering said pans in superposed stacked relation, said means consisting of channeled members, fixedly secured to the end walls of a pan, and each comprising a top web, having upwardly projecting lugs, and downwardly flaring side webs, the latter functioning as set forth; and end attaching elements for the molded tiles, each comprising an angularly bent metal strip, having an outer arm suitably slotted for attaching purposes, which slotted portion is also adapted to fit over a set of said lugs, while the inner arm thereof is held projected within the pan, in position to be embedded in the mixture forming the tile body, substantially as described.

3. The method of constructing uniform shallow mold pan units, employed in stacked relation for the multiple manufacture of tiles, which consists in first suitably shaping a pan with its side and end walls, and depressing the inside face of its bottom, to provide an interior transverse groove at each end together with a longitudinal groove at each side thereof, said transverse and side depressed grooves forming corresponding congruent pattern beads exteriorly of said bottom, and finally introducing a suitable filling within the transverse groove, at one end of the pan, for smoothly leveling the interior bottom surface at that end, while the remaining elements are left intact as originally formed, substantially as set forth.

In testimony whereof, I affix my signature.

JOHN A. FERGUSON.