Dec. 31, 1935. F. B. YINGLING 2,026,337

PROCESS OF MAKING TILE DIES

Filed May 29, 1931 2 Sheets-Sheet 1

FIG. 1.

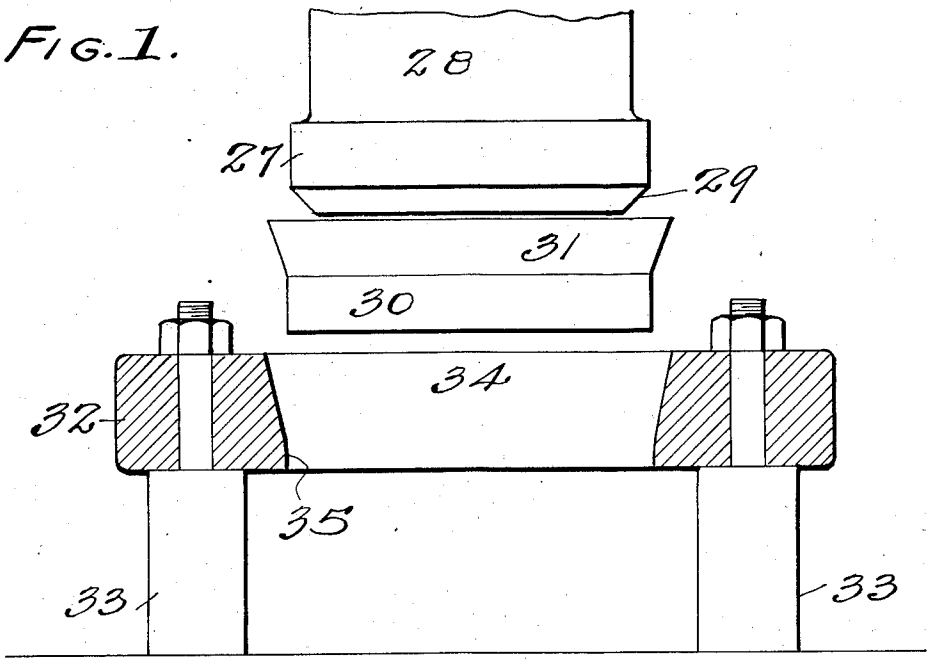
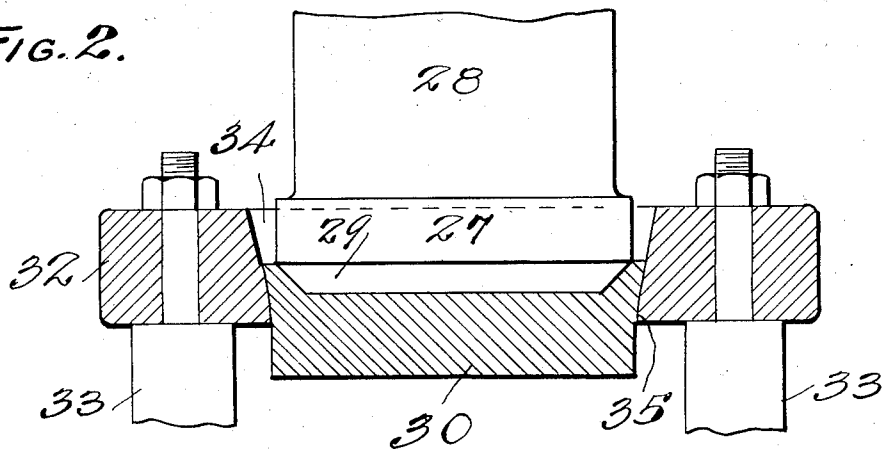


FIG. 2.



Inventor

FRANK B. YINGLING

By Fenelon B. Brock

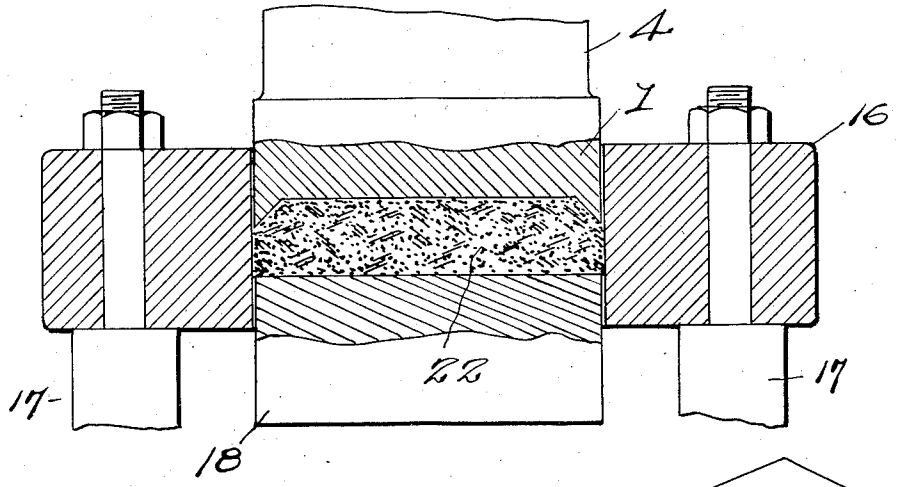
Attorney

Dec. 31, 1935. F. B. YINGLING 2,026,337

PROCESS OF MAKING TILE DIES

Filed May 29, 1931 2 Sheets-Sheet 2

FIG. 3.



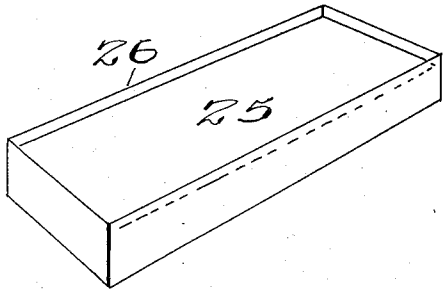


FIG. 6.

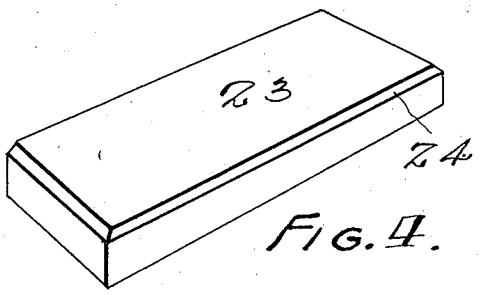


FIG. 4.

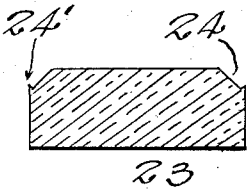


FIG. 5

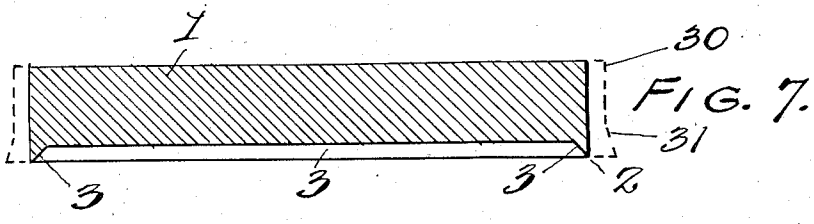


FIG. 7.

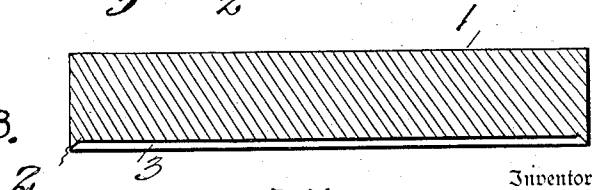


FIG. 8.

Inventor

FRANK B. YINGLING

By

Henelon B. Brock.

Attorney

Patented Dec. 31, 1935

2,026,337

UNITED STATES PATENT OFFICE

2,026,337

PROCESS OF MAKING TILE-DIES

Frank B. Yingling, Hamilton, Ohio

Application May 29, 1931, Serial No. 541,081

2 Claims. (Cl. 76—107)

My present invention relates to an improved process or method of making dies, and the invention is especially applicable for use in the ceramic art, in the manufacture of flat tile from dust or clay, by presses or other tile manufacturing machines employing relatively movable, co-acting dies. In the production of tile by these presses or other machines, it is imperative and essential that the top and bottom dies, preparatory to pressing the dust or clay, shall enter the enclosing die-ring or mold with adequate or ample clearance sufficient to permit free operation of the dies, and also to permit the air that has been unavoidably trapped in the clay or dust to escape therefrom as the material is being compressed.

As a result of this common practice now employed of allowing the necessary clearance for the dies in the die-ring or mold, a slight fin is fashioned by the dies on the edges of the upper face of the pressed tile. This fin is objectionable and undesirable for the reason that it must be removed in order to insure a perfect tile, after it leaves the press. For the removal of this fin from the tile the operation of edge-fettling is required, which operation, by abrasion, not only removes the fin, but also produces bevel edges on the face of the tile that are advantageous in use when the tile is being set in a building wall.

New dies are accurately made to permit the proper clearance above noted, which results in the formation of this objectionable fin, and of course, after these dies have become worn, the clearance is increased, and consequently the size of the fin is increased, and the fin is formed at the edge of the tile where a bevel edge is necessary.

By the utilization of my improved process in the formation of the die and the use of this die in the tile press, the resulting tile is fashioned with the necessary beveled edge on its face, instead of the objectionable fin as heretofore produced, and therefore the necessity for employing a fettling operation to finish the tile is eliminated, and the tile comes directly from the tile-press ready for brushing. After the tile has been brushed to remove dust therefrom, it is placed in a sagger for burning in usual manner.

Thus, by the employment of the improved die made according to my invention, economy in time and labor are secured, together with reduced cost in the manufacture of the tile; the appearance of the finished tile is enhanced; and the building wall structure fashioned from such tile is also enhanced in its appearance.

My invention consists in certain novel steps in the process or method of making the tile-die as will hereinafter be more fully set forth and claimed.

In the accompanying drawings I have illustrated one mode I have thus far devised for the practical application of the principles of my invention. It will be understood that changes and alterations are contemplated, and may be made in the exemplification illustrated and described, within the scope of my claims, without departing from the principles of my invention.

Figure 1 is an enlarged, diagrammatic view, partly in section, illustrating the first stage in fashioning the tile-die.

Figure 2 is a view similar to Figure 1 showing the manner in which the power operated die forms the tile-die, from a block or blank of softer steel. Figure 3 is a detail sectional view showing, in exaggerated form, two dies and the die-ring or mold used in the formation of the tile. Figure 4 is a perspective view of the finished tile as it comes from the press. Figure 5 is a transverse sectional view of the tile enlarged and showing in an exaggerated manner, fins at the bases of the bevel edges.

Figure 6 is a perspective view of a tile with fins as it comes from the tile machines now in general use. Figure 7 is a sectional detail view of the finished tile-die, the dotted lines indicating the material that is trimmed by a planing machine. Figure 8 is a sectional view of the finished tile-die ready for attachment to the press.

In Figures 3 and 7, the upper die 1 of the press is shown of rectangular shape, and fashioned on its lower face with an integral comparatively thin continuous, projecting edge 2 having an inner beveled face 3, and the outer sides of the edge are flush with the rectangular die.

While I have shown the die adapted to fashion oblong tile, and while the beveled face is shown at approximately an angle of 45° to the bottom face of the die, it will be understood that other shapes of die and tile may be produced, and the 45° angle may be varied for the beveled face of the die-edge.

The upper die 1 of the press is mounted on and reciprocates with the plunger 4, in the mold or die ring 16, which is supported on posts 17, and this die ring also may be reciprocable to permit withdrawal of the tile after pressure has been applied thereto.

The clay or dust for the formation of the tile is indicated at 22 in Figure 3 where it is being compressed in the mold or die ring 16 between the upper die 1 and a lower die 18, and it will be observed that the required clearance is present

(in exaggerated showing) between the dies and the die ring, to permit escape of air as the pressure is applied to the clay or dust. Ordinarily the upper die 1 descends approximately one-half the depth of the die ring 16 to compress the dust or clay, thereby compressing the material on the lower die 18 to the required density and thickness. After pressing the tile, the upper die is raised from the die ring to its uppermost position; then the die ring 16 is depressed to permit access to the pressed tile; and the tile is removed.

During the compression of the tile between the dies, the finished tile 23 of Figure 4 is fashioned with a continuous beveled edge 24 about its face, instead of being fashioned like the old style tile 25 that has a fin 26 in Figure 6. In Figure 5 where the new style tile is shown exaggerated for convenience of illustration, a slight fin is indicated at 24' which may be formed in the press, but as will be noted, the fin occurs at the base of the beveled edge of the tile. Inasmuch as this slight fin, if formed, is located at the base of the bevel edge and thus back from the face of the tile, it will be of no consequence or significance, and will disappear during the brushing operation to which the old style tile and the new style tile are subjected. The fin 26 at the face of the old style tile, however, is an objectionable excess element, and must be removed from the old style tile by means of a special fettling operation that is required to fashion the bevel edge on the old style tile.

In the drawings, the bevel of the tile-die 1, and the bevel to the edge of the tile 23 are magnified in order to more clearly illustrate the construction and arrangement. In actual practice the angle of the bevel face 3 is approximately 45° to the front face of the die, and the bevel edge of the die is approximately $\frac{1}{32}$'' deep and $\frac{1}{32}$'' wide, more or less, for the ordinary wall tile 23. The angle and these dimensions may be varied to suit different conditions, but in all cases the fin 26 is eliminated from the new style tile, and the proper space is provided for the cement between adjoining tiles in a wall structure.

In actual practice in the machine shops, up to the present time, it has been found impracticable to machine or plane a recess in the face of the die to form the small comparatively thin continuous, beveled edge 2 on the face of the die, and I have therefore invented a process or method of making the new style tile-die, by means of which a perfect die is assured.

Thus in Figures 1 and 2 I have disclosed a method of compressing, flowing, peening, or forcing the material into a beveled edge 2 on the face of the tile-die, by means of which tile-dies, as 1, may be produced with accuracy, facility, and low cost of production.

In carrying out my improved or new method of producing the tile-die 1, I employ a hard steel, master-die 27, which is mounted on the plunger 28 of a forging press, or other suitable power operated means may be employed, and this master-die is provided with a cap 29 having beveled edges as indicated, complementary to the beveled faces 3 of the tile-die 1.

The tile-die 1 is fashioned from a blank 30 of steel softer than the steel of the master-die, and this blank, as indicated in Figure 1 is furnished with an excess or surplus portion 31 which is flowed, compressed, peened, or forced into the shape of the projecting edge 2 of the tile-die.

The blanks 30 are fashioned in suitable sizes and shapes, and with accuracy, in order that the finished tile-die shall be approximately perfect for the proper performance of its functions in the tile-press, and the flaring portion 31 of the blank provides an excess or surplus width and length for fashioning into the upset edge of the tile-die 1.

Various means may be employed for compressing, flowing, peening, or forcing the excess material into the upset edge of the tile-die and fashioning the same into proper dimensions for co-operation with the die-ring 16 and the lower die of the press. One of these means is shown in Figures 1 and 2 where the blank 30 is forced through a forming die 32 having supports 33, and provided with an opening 34 which is only slightly larger than the master die 27 and sufficient to produce the sharp edge 2 of Figure 7. The opening is tapered to receive the blank 30—31, and it is preferably fashioned with curved or concave lower walls 35 bounding the lower side of the die-opening.

As indicated in the drawings, the blank 30—31 is forced by the master-die through the die-opening of the mold 32, and the resistance of the blank is such that the pressure, or successive impacts, of the master-die, is sufficient to enable the master-die to form the required recess in the face of the blank as shown in Figure 3, where the beveled die-cap 29 is embedded in the upper face of the blank, in the process of forming the beveled faces 3 of the edge 2 of the tile-die.

The relative sizes and dimensions of the blank and the die-opening 34—35 and their relation to the master die are such that the excess or surplus material 31 of the blank is squeezed and upset between the walls of the die-opening and the outer walls of the master-die, in the formation of the tile-die with its comparatively thin, continuous, projecting edge 2.

Any suitable means, such as hydraulic power, may be employed for imparting the required pressure to the master-die, in the operation of forcing the blank through the hard die-ring or mold 32.

By dotted lines in Figure 7 an exaggerated illustration indicates the transformation of the dotted blank into the tile-die, the tile-die, of course, being reversed or inverted from the position in which it emerges from the mold or die-ring 32 in Figure 3. In Figure 8 the tile-die is shown after it has been cut to size and preferably case hardened, for use in any suitable tile press.

Various changes and alterations may be made in the invention thus set forth, and are contemplated, within the scope of the appended claims, as for instance modifications, to include a radius or other form of projecting edge, may be made. The solid, substantially integral projecting edges may be fashioned by welding, fusing, or otherwise forming these edges on the die.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The method of making a die from an integral blank having a laterally enlarged excess portion, which consists in pressing a master die against a major portion of the face of the excess portion of said blank and compressing the blank entirely through a mold having a minimum opening of less area than the area of the excess portion and slightly larger in area than the master die thereby reducing the periphery of the enlarged portion to coincide with the body

of the die, simultaneously forming a depression in the face of the excess portion, and thereby fashioning a comparatively thin continuous projecting edge on said face.

2. The method of making a die from an integral blank having a laterally enlarged excess portion, which consists in pressing a master die having a continuous beveled edge against the major portion of the excess portion of said blank and compressing the blank entirely through a mold having a minimum opening, of less area than the area of the excess portion and slightly larger in area than the master die, simultaneously forming a depression in the face of the excess portion, and thereby fashioning a comparatively thin, continuous edge having a continuous inner beveled face on the finished die.

FRANK B. YINGLING.