March 20, 1928. 1,663,106

J. R. WARFIELD

METHOD AND MEANS FOR PRODUCING HAND MADE TILE

Filed June 23 1926 3 Sheets-Sheet 1

Fig. 1.

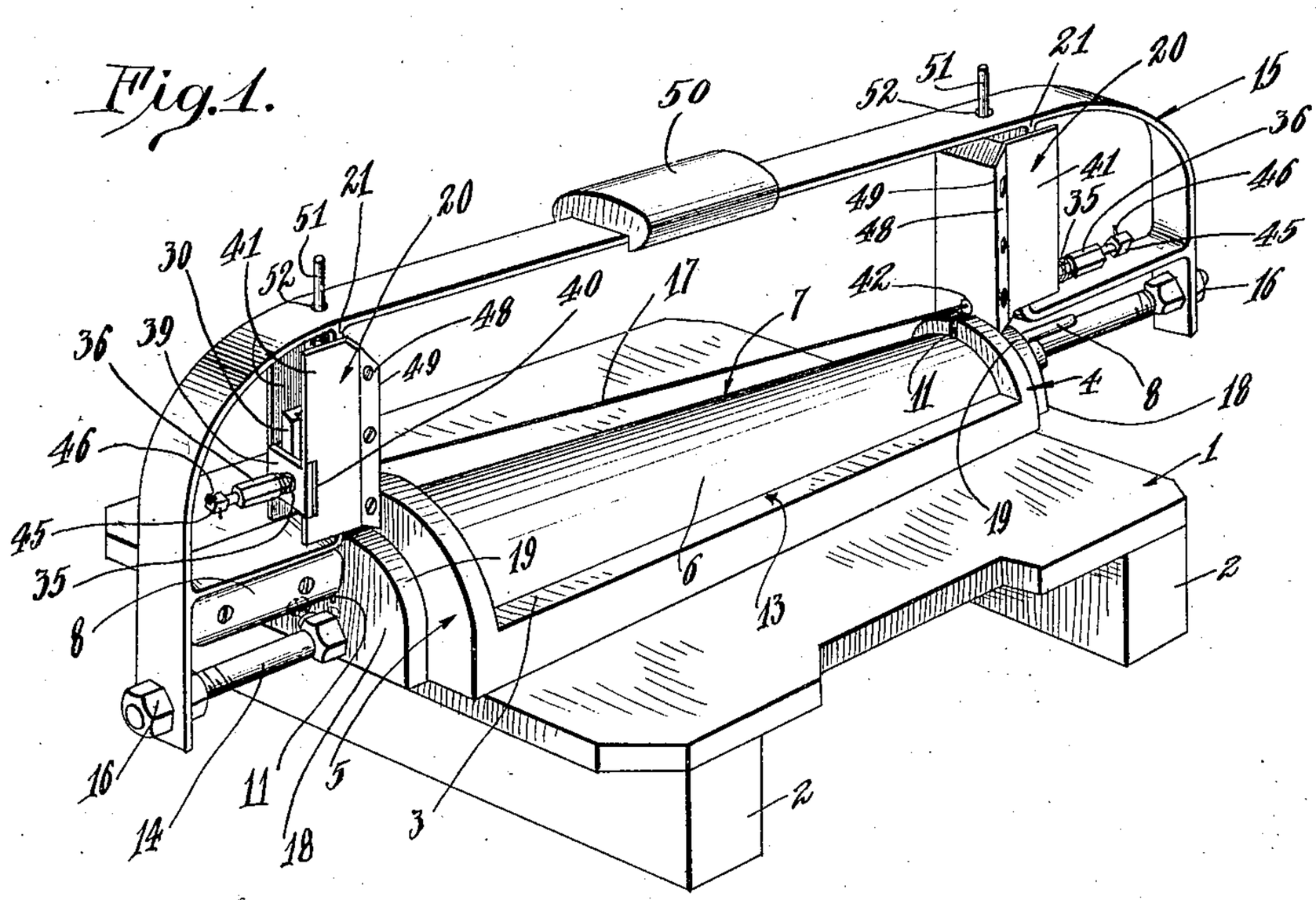
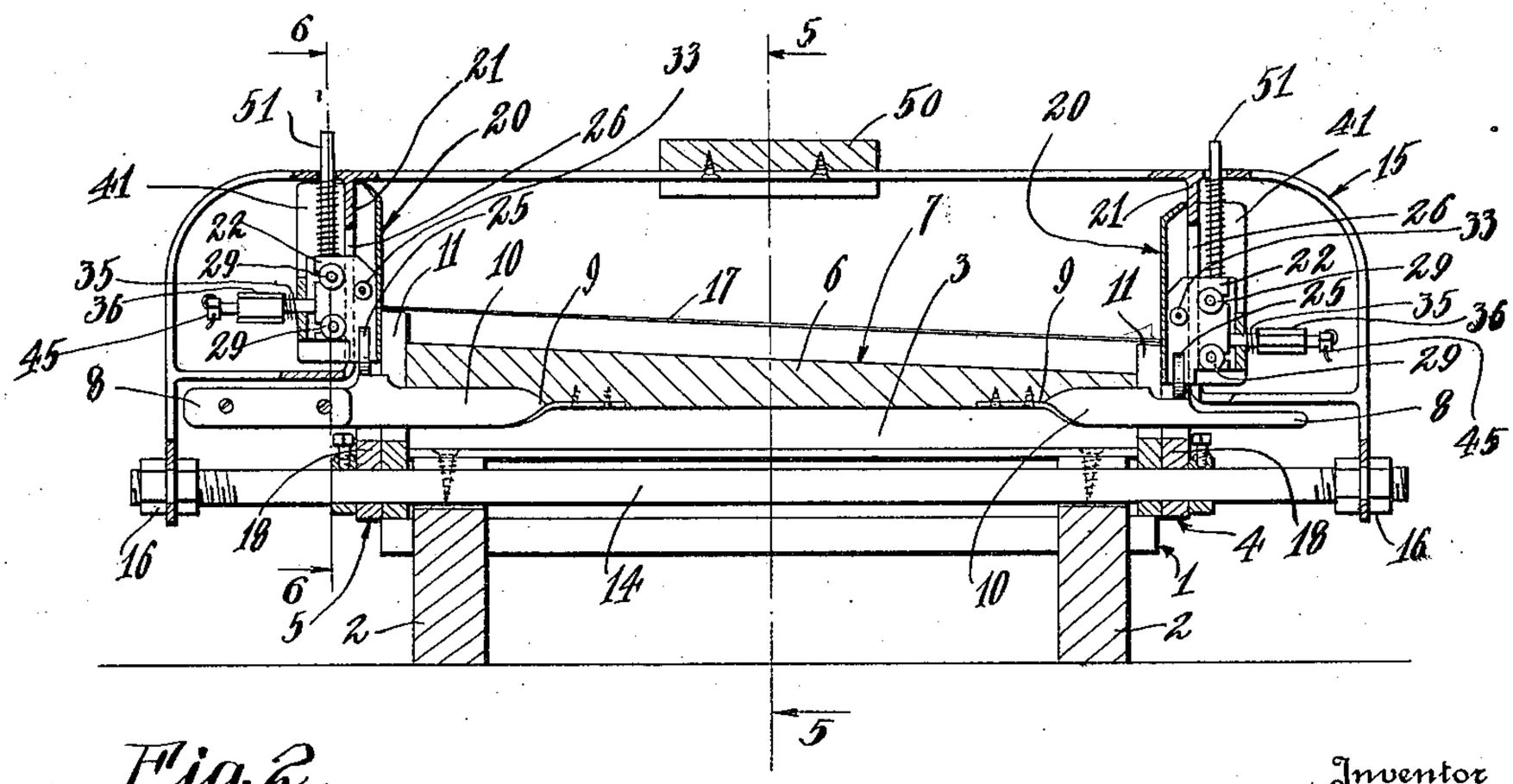


Fig. 2.



Inventor

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By Lyon & Lyon Attorneys

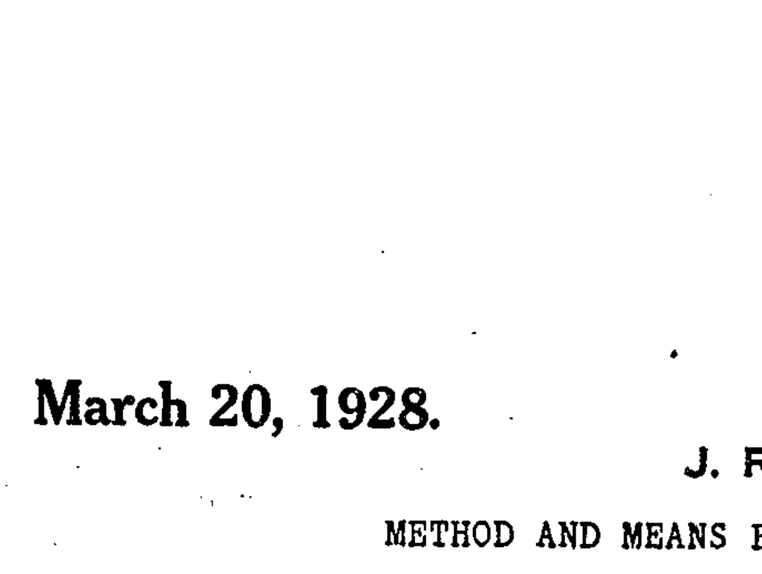
March 20, 1928. 1,663,106

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METHOD AND MEANS FOR PRODUCING HAND MADE TILE

Filed June 23 1926 3 Sheets-Sheet 2

Fig. 9.



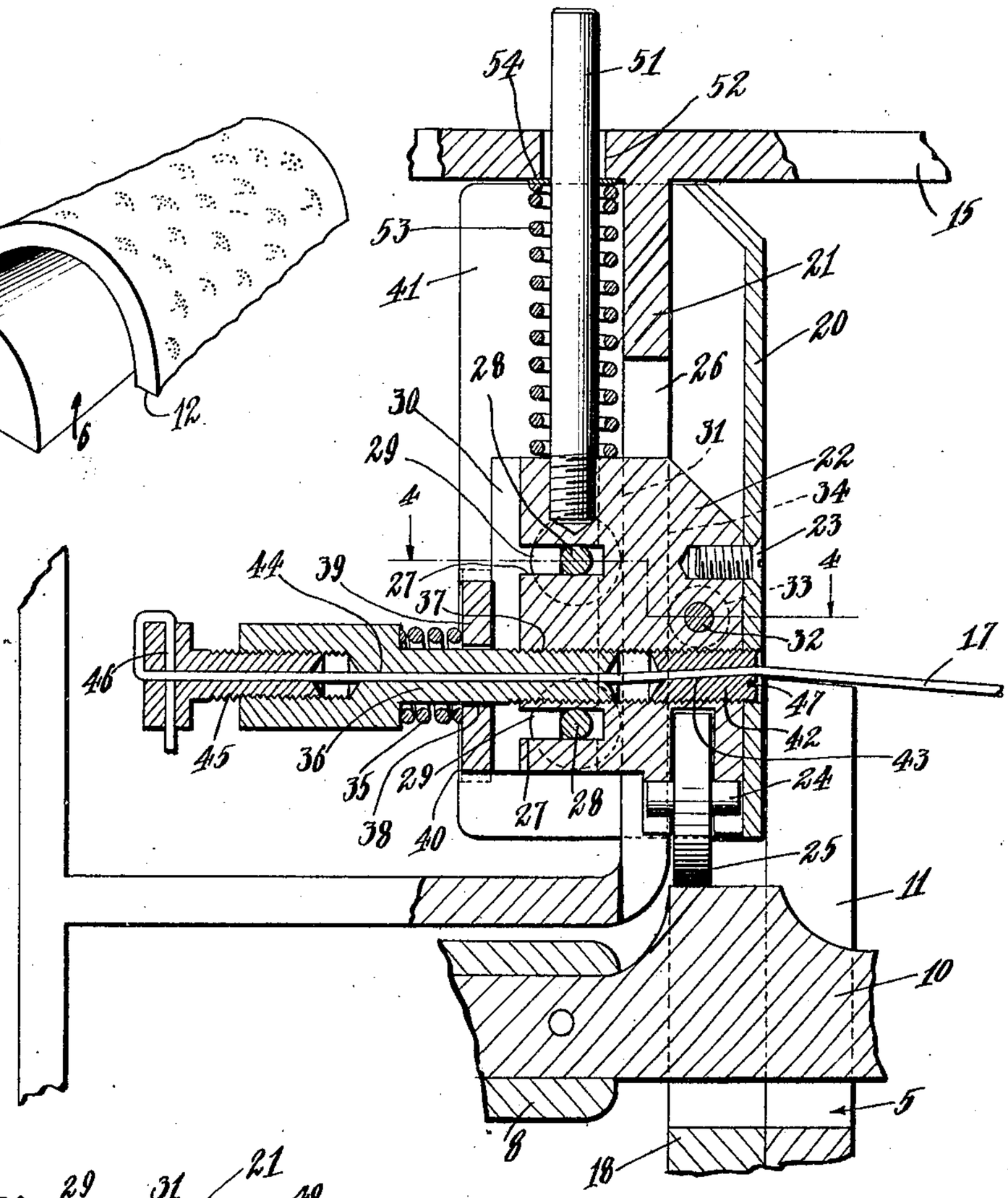


Fig. 3.

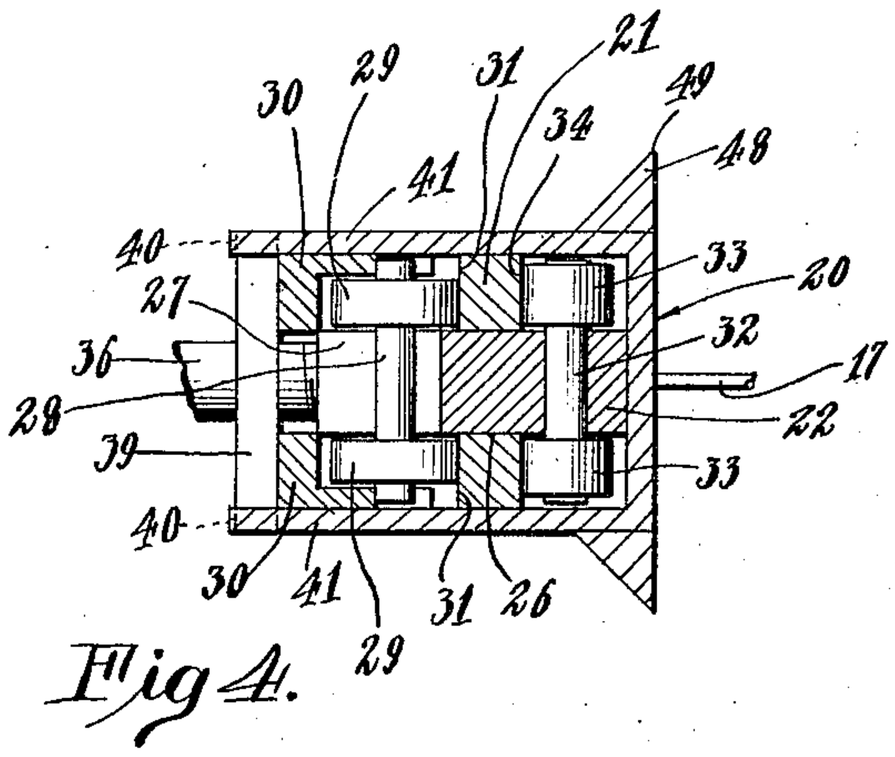


Fig 4.

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METHOD AND MEANS FOR PRODUCING HAND MADE TILE

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Fig. 5.

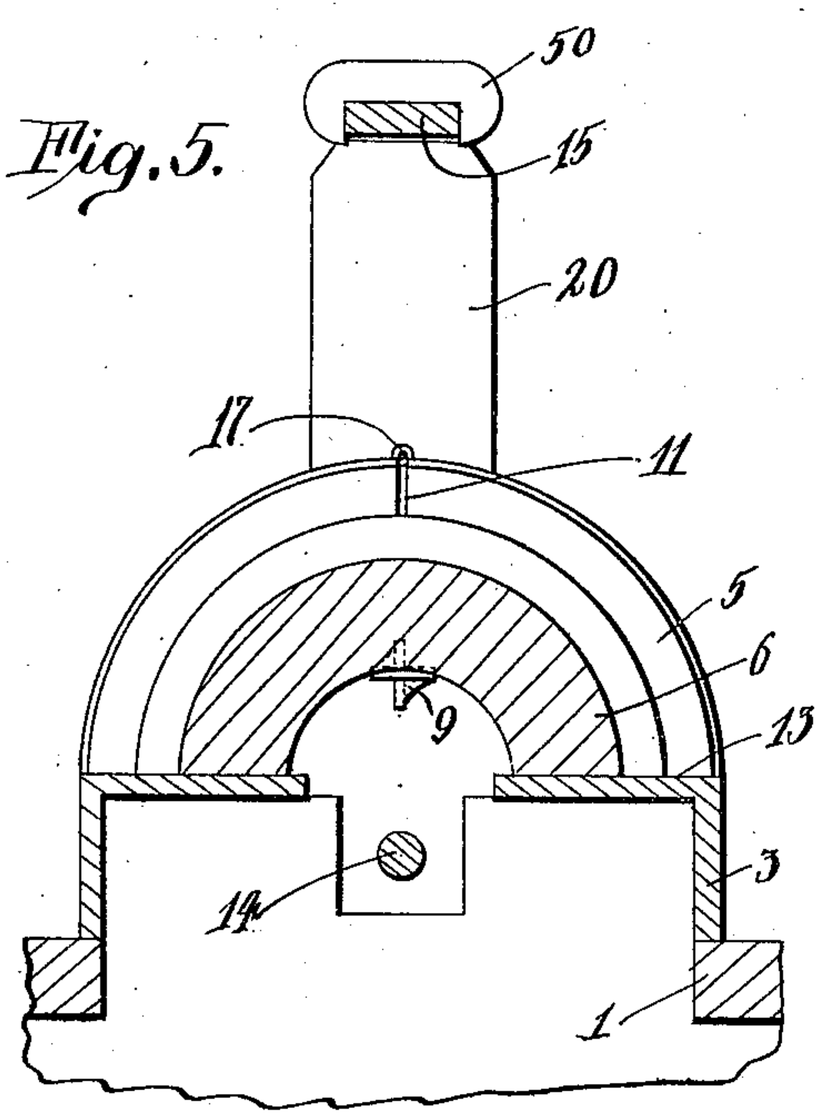
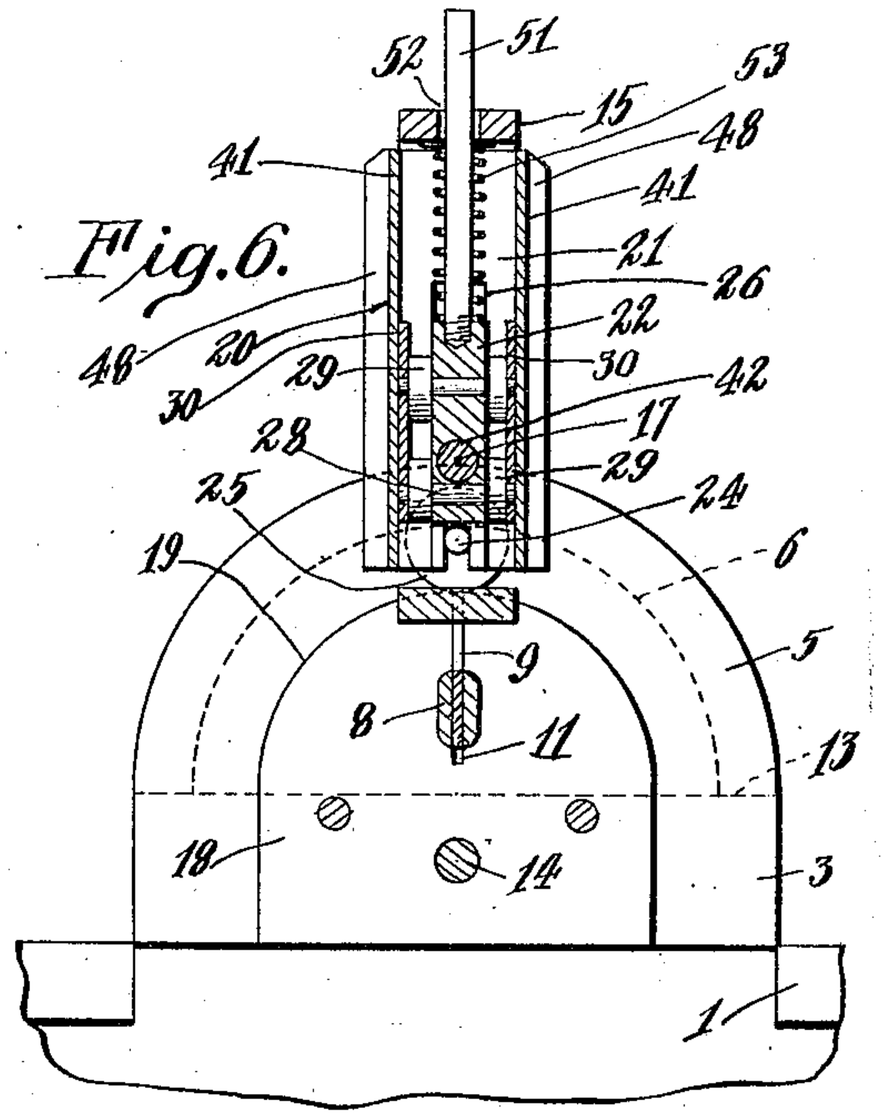


Fig. 6.



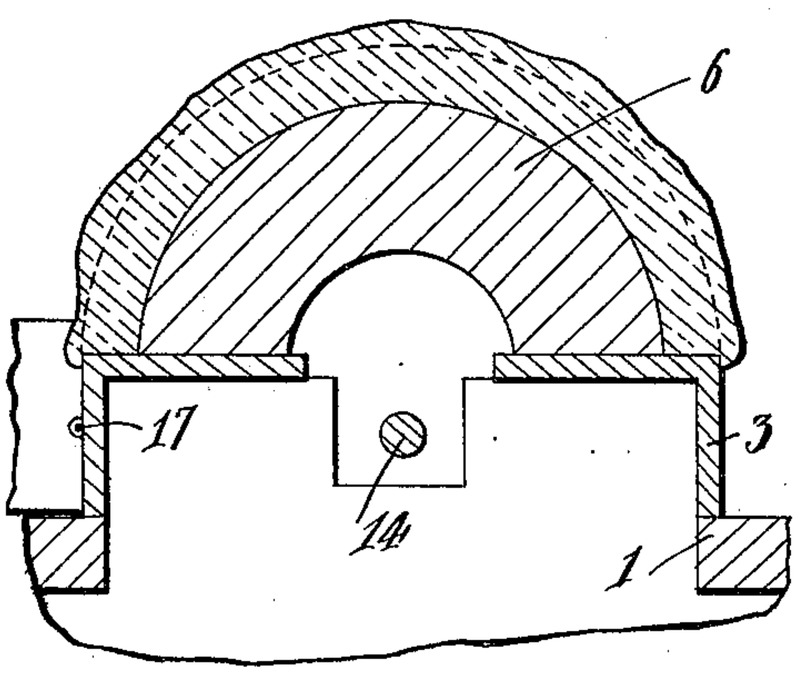


Fig. 8.

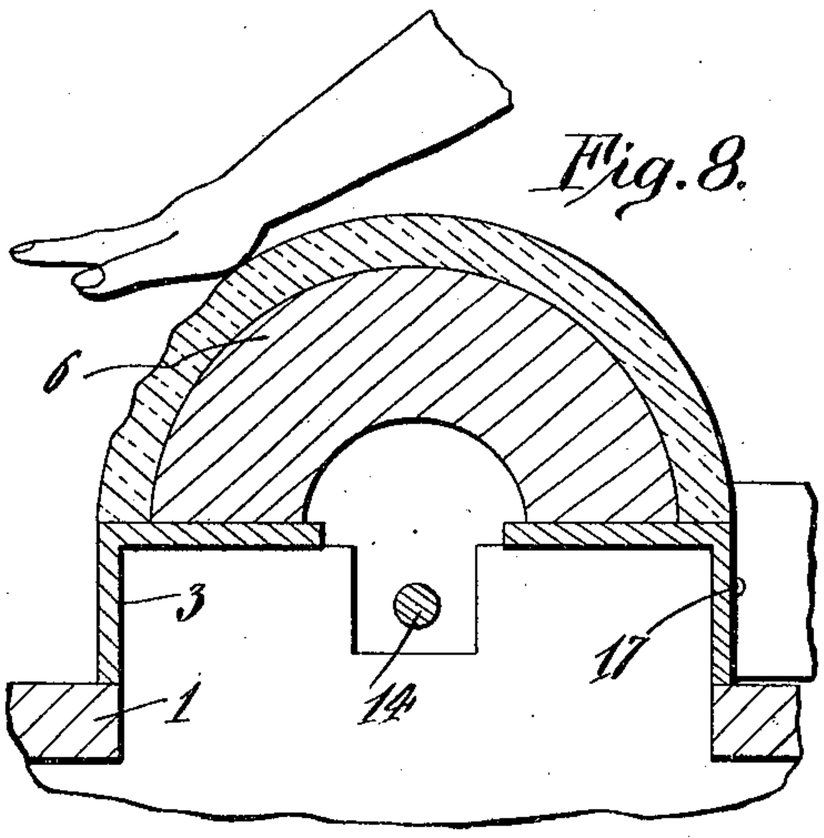


Fig. 7.

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Patented Mar. 20, 1928. 1,663,106

UNITED STATES PATENT OFFICE.

JOHN R. WARFIELD, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO TRUE-TILE CORPORATION, OF RENO, NEVADA, A CORPORATION OF NEVADA.

METHOD AND MEANS FOR PRODUCING HANDMADE TILE.

Application filed June 23, 1926. Serial No. 117,923.

This invention relates to a method and means for producing hand made tile and is more particularly directed to a method and means for producing hand made tiles having an exterior texture similar to that produced by the early mission fathers and as were employed in the construction of the early California missions and the old haciendas of Mexico.

Hand made tile were first used in California and Florida by the mission fathers and were made by Mexican Indians using the crude method of molding a flat piece of wet clay over a man's thigh so that it produced a semi-cylindrical shape, tapering to one end and by the hand action of kneading and forming the contour of the tile was made irregular and bumpy and an individual texture was thereby incorporated in each tile. This individual texture of each tile which produced, when the said tile were laid on the roof, a very soft, pleasing, harmonious and artistic effect of the lights and shades caused by the irregularities. This artistic effect produced by the tile having an individual exterior texture is apparent in the remains of the California missions and old haciendas of Mexico. Age has produced wonderful color effects in these tiles which is accentuated by the irregular effect on the hand finishing. In the old days when labor was cheap and plentiful, the element of time was not considered. Therefore the molder took all the time necessary to put a suitable texture into the tile and to knead and reknead the clay until the change in density of the tile caused by the bending down movement was restored to evenness or practically so. The change in density of a piece of flat wet clay, when the same is bent down over a curved form, is considerable and increases in proportion to its density. The inside arc or surface of the tile is compressed and the outside arc or surface is stretched, thereby opening the pores or grains of the mass so that if the density is not restored, the tile is porous, cracks in drying before burning and buckles out of shape.

In California at the present time, there has been a marked revival of Spanish and Mexican architecture which has created a large demand for hand made roof tiles which are being produced and used in large quantities, following very closely the shape of the old tiles of the missions or haciendas. The method now employed for the manufacturing of these tiles is only slightly in advance of the old Mexican method and is substantially as follows:

A billet of wet clay is kneaded into a frame to produce a flat piece of even thickness, the frame is then lifted away from the clay and the flat piece is bent downward over a mold or shaper which is the shape of the inside of the finished tile, the molder then wets his hands and rubs lightly over the molded tile, forming a grout or slush in an endeavor to fill up the pores and partially restore the density. At this state, the molder must handle the clay very carefully with a light touch because it is lying on the core without any frame to control it. Keen competition among the manufacturers forces them to keep costs down and very little time is spent in putting an irregular contour on the tile. This haste has resulted in the production of tiles which are not sound in density and the beauty and artistic effect of the old mission tile is lacking, thereby causing a cheapening effect on the industry in general.

It is therefore an object of this invention to produce a method and means of forming hand made tile, whereby the tile can be kneaded directly into its permanent shape on a mold without bending a billet of clay after the same has been formed to the desired thickness, thereby producing a tile of perfect even density of any contour desired.

Another object of this invention is to produce a method and means of forming hand made tile, whereby the contour or exterior texture of the tile can be made as irregular as desired by palm of the hand impressions rapidly with the wet clay under perfect control.

Another object of this invention is to produce a method and means of forming hand made tile, whereby the core supporting the wet tile can be removed rapidly and efficiently from a base and returned for continuous operation without loss of time, and which method generally increases the rapidity of production while not decreasing the articity of the tile because of the easy, simple and rapid manner through which the exterior texture can be formed while the clay is retained under control.

Another object of this invention is to provide a method and means of forming hand

made tile, wherein the hand made tile is formed of even density without necessitating the bending of a billet of clay or the kneading of the billet of clay to return to the tile a substantially even density, and which means and apparatus can be employed and used by cheap labor without expert attention and which produces an article or tile superior to that produced by the method being employed at a cost less than the tile can now be produced under the same method as now employed.

Another object of this invention is to produce a means for producing hand made tile which is susceptible of adjustment so as to permit the manufacture or formation of a tile of any desired hollow shape, thereby widening the field of application of tile having hand made texture.

Another object of this invention is to provide a method and means of forming hand made tile, wherein the clay is kneaded and formed directly on a mold without the necessity of bending a billet of clay over the mold or the necessity of kneading the clay after the same has been formed into a mold to return the clay to a substantially even density.

Another object of this invention is to produce a method for forming hand made tile, in which the tile is cut automatically to any shape as desired.

Another object of this invention is to provide a method and apparatus for forming a tile which may be employed for forming tile of any desired shape, such as floor tile, hollow pans, and other hollow tile so as to widen the field of application of tile having hand made texture.

Other objects and advantages of this invention will be apparent from the following detailed description of a preferred embodiment thereof as illustrated in the accompanying drawings, in which drawings:

Figure 1 is an isometric view of an apparatus as embodied in this invention for forming hand made tile, illustrating the automatic cutting means as in a central position as passing over the kneaded clay on the mold to cut the tile to the curvature or shape desired.

Figure 2 is a sectional side elevation thereof.

Figure 3 is an enlarged fragmental sectional side elevation of one end of the automatic cutter control mechanism embodied in this invention.

Figure 4 is a fragmental plan view taken substantially on the line 4—4 of Figure 3.

Figure 5 is a fragmental end elevation taken substantially on the line 5—5 of Figure 2.

Figure 6 is a fragmental end elevation taken substantially on the line 6—6 of Figure 2.

Figure 7 is a sectional diagrammatic end elevation of the apparatus embodied in this invention, illustrating in section the clay as kneaded in position on the mold prior to the actuation of the automatic cutting mechanism to remove the surplus clay to form the tile to the desired taper and curvature.

Figure 8 is a like diagrammatic end section, illustrating diagrammatically the manner of forming the ancient exterior contour by the use of the palm of the hand.

Figure 9 is an isometric view of the mold and tile as removed from the molding apparatus and illustrates the mold as being removed from within the clay prior to the drying and burning thereof and illustrating the exterior texture or contour of the tile as kneaded to form the ancient irregular surface as provided in the old mission tile by illustrating the irregularities of the exterior contour of these tiles as exaggerated for the purpose of illustration.

In the formation of hand made tile, I have discovered that by employing a mold which has bottom and end retaining walls and over which mold loose clay is mounted in position between the said retaining walls so that the clay may be kneaded to produce a billet of the desired thickness of approximately even density so that the same, after being cut to the desired thickness and tapered contour, will dry evenly without the danger of cracking or warping.

I have also discovered that by employing a method of forming the original billet of clay in which the clay is first formed over a mold in which the ends of the billet, kneaded or formed, are retained, that the control had over the said billet of clay enables me to rapidly knead the clay with the palm of the hand to produce a tile of ancient contour or texture, very closely resembling that which was produced by the old mission Indians in the kneading of the clay over their thighs with their hands.

In order to carry out the method embodying this invention, wherein the clay is first kneaded upon a mould so as to maintain a control over the billet formed so that the same may be rapidly kneaded without being pushed off the core to produce the desired exterior texture and which billet of clay may, prior to the kneading of the exterior surface thereof, be cut to the desired shape and contour, I have herein illustrated what I deem a preferred form of apparatus for carrying out this method, and in which apparatus 1 illustrates a base which is supported upon spaced timbers 2 and upon which base a billet retaining base 3 is mounted which has formed at its ends end retaining plates 4 and 5, respectively, and which retaining plates 4 and 5 may be of any desired or preferred curvature or form and are herein illustrated as comprising semi-

circular retaining plates, the plate 4 being of a semi-circle of a less radius than the radius of the semi-circular end plate 5 so as to produce a tapered tile in approximately the shape in which the tile were produced by the kneading and forming of the same over a man's thigh.

A core 6 is mounted on the retaining base 3 and is of any desired or preferred exterior contour 7 and is herein illustrated as tapered from the end retaining plate 5 to the end retaining plate 4 so as to enable the formation of a tapered tile. The core 6 may be formed of wood or any desired metal but is preferably formed of cast aluminum or like metal and has a mineral oil or distillate and paraffine texture applied to its surface 7 so as to prevent the billet of clay from sticking to the core 6. This same result may be accomplished by the employment of brick dust or by the use of a sheet of paper, the use of which paper is specifically set forth and described in the patent to R. F. Angelo, No. 1,564,810.

The core 6 is at its opposite ends secured to handles 8, which handles 8 are twisted as illustrated at 9 so as to produce vertically extending shanks 10 which pass through narrow slots 11 formed in the end retaining plates 4 and 5, respectively. By means of the handles 8, the core 6 with the billet of clay kneaded, cut and formed thereon to the desired texture, is withdrawn from the molding machine and is carried to a tray or plate for drying and burning and the billet of clay, after being placed upon the plate or tray for drying or burning, supports itself upon the said tray at its lower edges 12 which are formed along the surfaces 13 of the base plate 3 so that the mold 6 may be withdrawn therefrom and returned to the molding machine for the molding of another tile. The clay is kneaded onto the core 6 to approximately the desired exterior curvature and means are provided for then cutting away the surplus clay and for cutting the billet so made upon the mold 6 to the desired curvature and thickness, which means are preferably of the following construction:

A shaft 14 is journaled in bearings formed in the base retaining plate 3 and passes longitudinally therethrough at or near the vertical center line of the end retaining plates 4 and 5. A frame 15 is secured to the shaft 14 at its opposite ends by any suitable means, such as illustrated at 16. The frame 15 carries a cutting element 17 which is preferably formed of a piano wire which is rotated across the surface of the billet of clay kneaded upon the core 6 to cut the billet of clay to the desired thickness at its respective ends and to the desired curvature, contour and taper.

Means are provided within the frame 15 for guiding the element 17 as the same is rotated across the billet of clay formed upon the mold 6 and cut the surplus clay from the said billet and which means are preferably of the following construction:

Mounted adjacent the end plates 4 and 5 and on the exterior thereof are cams 18, which cams 18 have cam faces 19 formed to the curvature desired of the exterior of the tile to be formed. Slides 20 are slidably mounted on vertically extending frame members or posts 21 which are secured to or formed integral with the frame 15.

The slides 20 form a cover or enclosed casing within which are mounted a cam roller block 22 which is secured to the guide 20 at a screw 23, and which cam roller block carries at a pin 24 a cam roller 25 which is adapted to ride upon the cam face 19 of the cam 18. The cam block 22 extends through a vertically extending slot 26 formed in the post 21 and is provided at its opposite end with grooves 27 through which pins 28 carrying guide rollers 29 extend. The pins 28 are mounted in guide blocks 30 which form a yoke in which the pins 28 are journaled. The rollers 29 engage the outer surface 31 of the post 21 and ride thereon during the passage of the guide 20. A pin 32 is journaled in the cam block 22 and carries guide rollers 33 at its opposite ends which engage the opposite face 34 of the post 21. The rollers 28 are mounted in position rigidly within the guide 20 and so as to engage the post 21 and so as to remove or compensate for the tension of the cutting element 17 and to prevent binding of the guide 20 and to permit free reciprocation of the guide 20 during the actuation of the cam roller 25.

The rollers 33, carried by the cam block 22, are yieldably urged toward the post 21 by means of a compression spring 35 which is mounted upon a pin 36 which is screw-threaded into the cam block 22 as illustrated at 37. The pin 36 passes through a bore 38 formed in the end plate 39 of the guide 20, which end plate 38 is secured to the guide 20 in recesses 40 formed in the side plates 41 of the guide plate. The members 30 engage at their outer edge the inner surface of this plate 38. A plug 42 is screw-threaded into the guide 20 and has a bore 43 formed therein and through which the cutting element 17 is extended and which cutting element 17 passes through a bore 44 formed in the pin 36 and into and through a retaining plug 45 which is screw-threaded at the outer end of the pin 36. The cutting element 17 is secured to the plug 45 by any suitable means such as illustrated at 46. The tension of the cutting element 17 may be regulated by adjusting the position of the plug 45 relative to the pin 36. The plug 42 has a screw-driver slot 47 formed in the

inner end thereof and the bore 43 is formed in offcenter position so that by rotating the plug 42 on its threads by means of a screw-driver or the like, the elevation or position of the cutting element 17 may be regulated.

Means are provided for maintaining the cam rollers 25 in engagement with the cam faces 19, which means preferably comprise pins 51 which are screw-threaded to the cam blocks 22 at one end and extend through holes 52 formed in the frame 15. Compression springs 53 are mounted on the pins 51 in position to engage the cam blocks 22 and the frame 15. Washers 54 are provided on the pins 51 to prevent the springs 53 from passing through the holes 52.

Means are provided on the sides of the guide 20 for cutting away the surplus clay at the end of the core 6, which means preferably comprise a pair of tapered cutting elements 48 which are secured in any desirable manner to the opposite side of the slide 20. The combination of the side cutting elements 48 which have sharpened edges 49 and the cutting element 17 which follows closely the curvature of the end retaining plates 4 and 5 cuts the clay formed to the desired shape.

The frame 15 is provided with a handle 50 for use in rotating the same to actuate the cutting element 17.

In Figure 7, I have diagrammatically illustrated an end section of the mold as the clay has been positioned thereon and kneaded to approximately the desired shape, prior to the rotating of the cutting element 17 thereover to remove the surplus clay which may then be curled or removed from the cut billet of clay on the mold so as to leave the same in the desired shape. After the cutting wire 17 has been rotated to remove this surplus clay, I have found that there is produced on the clay a texture which is extremely adaptable for some uses of tile and which needs no further kneading and the tile may then be removed by removing the core 6 from the mold and sliding the core 6 from under the billet of clay produced as diagrammatically illustrated in Figure 9 to leave the billet of clay on a drying plate for drying.

I have also discovered that a very pleasing exterior texture may be produced upon this tile by employing a wet sponge after the same has been cut to a desired shape and slapping the surface of the billet of clay with this wet sponge, which use of a wet sponge closes all of the pores of the billet of clay and leaves a surface texture which is quite irregular and extremely pleasing after the tile has been burned.

In order to produce the exterior texture on the tile similar to that produced in the ancient mission tiles, I have found that after the cutting element 17 has been rotated over the billet of clay mounted on the core 6, that the palm of the hand diagrammatically illustrated in Figure 8, may be employed to produce this texture by making a plurality of depressions in the surface of the billet of clay. The use of the palm of the hand in this manner is permitted by virtue of the fact that the billet of clay, mounted on the core 6, is retained or held in position from sliding off of the core 6 by the bottom and end retaining plates which are embodied in this core. These bottom and end retaining plates also hold during this kneading process the clay in the shape in which it was formed by the cutting element 17.

I have herein illustrated my invention as applied to the production of tile which may be classed as mission tile. However, by varying the shape of the end cams so as to produce a cam of a plurality of straight sides or so as to vary the curvature thereof, I am enabled to employ this apparatus in the production of floor tile by producing a plurality of floor tile of the desired thickness in one operation and then employing a cutting wire or the like to cut the said floor tile to the desired length and width. I am also enabled, by the use of this apparatus and by varying the curvature of the end cam, to produce in one operation a plurality of tile which are known as pans and other tile of different and pleasing curvature to all or any of which the desired hand made texture may be applied as desired.

Having fully described my invention, it is to be understood that I do not wish to be limited to the exact illustrated example herein set forth, which may obviously be varied without departing from the spirit of my invention as set forth in the appended claims.

I claim:

1. A method of forming clay tile, having an ancient exterior texture which comprises positioning loose clay on a core formed to the curvature of the tile, cutting the clay so positioned into the form desired, kneading the clay on the core and drying the tile.

2. A method of forming roofing clay tile which comprises positioning loose clay and kneading it onto a curved core, cutting away the surplus clay from the billet of clay formed on the said curved core to form the said billet to the desired shape and thickness, and kneading the clay on the mold with the palm of the hand to produce an ancient texture.

3. A method of forming clay tile which comprises positioning loose clay and kneading it on a core while retaining the clay at its ends, to approximately the desired shape, cutting away the surplus clay from the billet of clay kneaded on the core to form said billet to the desired shape and surface texture and drying and burning the said billet.

4. In an apparatus for forming hand made

clay tile, the combination of a base, a core removably supported on the base, retaining plates secured to the said base, a cutting element, and means secured to the said base for actuating the said cutting element to cut the surplus clay from a billet of clay kneaded on the said core.

5. In an apparatus for forming hand made tile, the combination of a base having curved end retaining plates, a core supported on the said base between the said plates, a cutting element supported by the said base, and means for actuating the said cutting element so as to cause the same to cut the surplus clay from a billet of clay kneaded on the said mold.

6. In an apparatus for forming hand made tile, the combination of a base, a core supported by the base, a cutting frame pivotally secured to the base, a piano wire held in tension in the said frame, means carried by the said cutting frame for guiding the said piano wire during the actuation of the said cutting frame.

7. In an apparatus for forming hand made tile, the combination of a base, a core removable on the said base, the said base being of greater width than the said core to provide retaining surfaces for the edge of the tile on the said base, end retaining plates for the said base, and a cutting frame pivotally supported by the said base, and a cutting element supported by the said cutting frame and extending over the said core.

8. In an apparatus for forming hand made tile, the combination of a base having curved end retaining plates, a core mounted on the said base intermediate the said retaining plates, slots formed in the said end retaining plates, and handles secured through the said slots for removing the said core from the said base when the clay has been kneaded.

9. In an apparatus for forming hand made roofing tile, the combination of a base, a core removably supported by the said base, a cutting frame pivotally supported by the said base, a cutting member, guides carried by the said cutting frame at the opposite ends of the said base and between which the said cutting member is held in tension, means for guiding the said guides so as to cause the said cutting member to follow a predetermined course.

10. In an apparatus for forming hand made tile, the combination of a base, a core supported by the said base, a cutting frame pivotally supported by the said base, a cutting member carried by the said cutting frame, guides carried by the said cutting frame, cams supported by the said base at the opposite ends of the said core for guiding the said guides to cause the said cutting member to follow a predetermined course.

11. In an apparatus for forming hand made roofing tile, the combination of a base having end retaining plates, a core supported by the said base intermediate the said end retaining plates, a cutting frame pivotally secured to the said cutting frame, a cutting member supported by the said cutting frame and extending over the said end retaining plates, means for causing the said cutting member to follow the curvature of the said end retaining plates, and means carried by the cutting frame for cutting the surplus clay from the ends of the said core.

12. In an apparatus for forming clay tile, the combination of a base having end retaining plates of predetermined edge contour, a core mounted on said base intermediate the said retaining plates, a cutting element, means for guidingly moving said cutting element over said core to follow the predetermined edge contour of the end retaining plates, and means for removing said core from the said base with the formed billet of clay thereon.

13. In an apparatus for forming clay tile, the combination of a base having end retaining plates of predetermined edge contour, a core mounted on said base intermediate the retaining plates, a cutting element, and means for guidingly moving said cutting element over said core to follow the curvature of the end retaining plates.

14. In an apparatus for forming clay tile, the combination of a base having end retaining plates, a clay cutting wire, means for guiding the cutting wire over a predetermined course and at a predetermined distance from and over the core, and means for securing the wire in position in predetermined tension.

15. In an apparatus for forming clay tile, the combination of a base having end retaining plates, a core mounted intermediate the said end retaining plates, a clay cutting wire, and means for moving said cutting wire over a predetermined path over the core.

16. A method of forming clay tile having an ancient exterior texture, which comprises positioning loose clay on a core, kneading the said clay to the curvature of the core, cutting away the surplus clay, removing the formed tile, and drying the tile as formed.

17. A method of forming clay tile having an ancient exterior texture, which comprises positioning loose clay on a core, kneading the clay to the curvature of the core, cutting away the sulplus clay to form the tile to a predetermined thickness, conditioning the exterior surface of the said clay to produce a predetermined exterior texture, removing the clay tile from the core, and drying and burning the same.

18. A method of forming clay tile having an ancient exterior texture, which comprises conditioning loose granular wet clay on a core, molding the clay to the curvature of

the core, cutting away the surplus clay to form the tile to a predetermined exterior contour and thickness, wiping the exterior of the clay tile with a wet porous member, removing the clay tile from the core, and drying and burning the tile so formed.

19. An apparatus for forming clay tile, comprising a base, end retaining plates, a core removably supported between the said retaining plates, a cutting element secured in tension over said core, means for rotating the said cutting element over said core in a predetermined path, and means for removing the core from between the retaining plates with the tile thereon.

20. A method of forming clay tile having an ancient exterior texture, which includes the steps of positioning loose clay on a core formed to the curvature of the tile, moving a cutting element longitudinally relative to the tile to cut the clay so positioned into the form desired, and drying and burning the tile so formed.

21. In an apparatus for forming hand made clay tile, the combination of a base, a core supported by the base, a cutting element extending substantially longitudinally relative to the axis of the core, and means for actuating the cutting element to cut the surplus clay from a billet of clay positioned on the core.

22. In an apparatus for forming hand made tile, the combination of a base, a core, a cutting frame pivotally secured to the base and supporting a cutting element extending substantially longitudinally of the core, means for guiding the cutting element, and means for actuating the cutting frame.

Signed at Los Angeles, California, this 16 day of June, 1926.

JOHN R. WARFIELD.