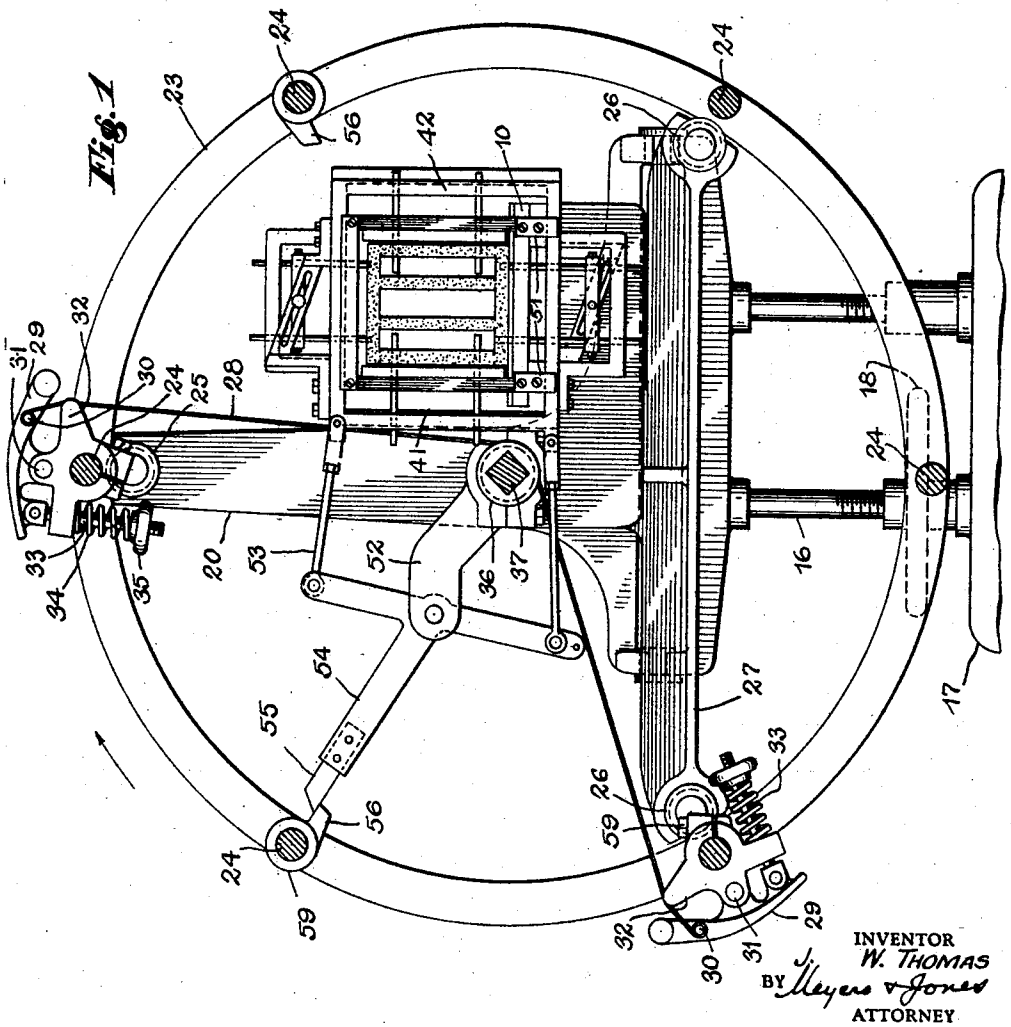
Nov. 18, 1930. J. W. THOMAS 1,781,992

APPARATUS FOR MAKING TILES

Filed July 24, 1928 3 Sheets-Sheet 1

Fig. 1




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Filed July 24, 1928 3 Sheets-Sheet 2

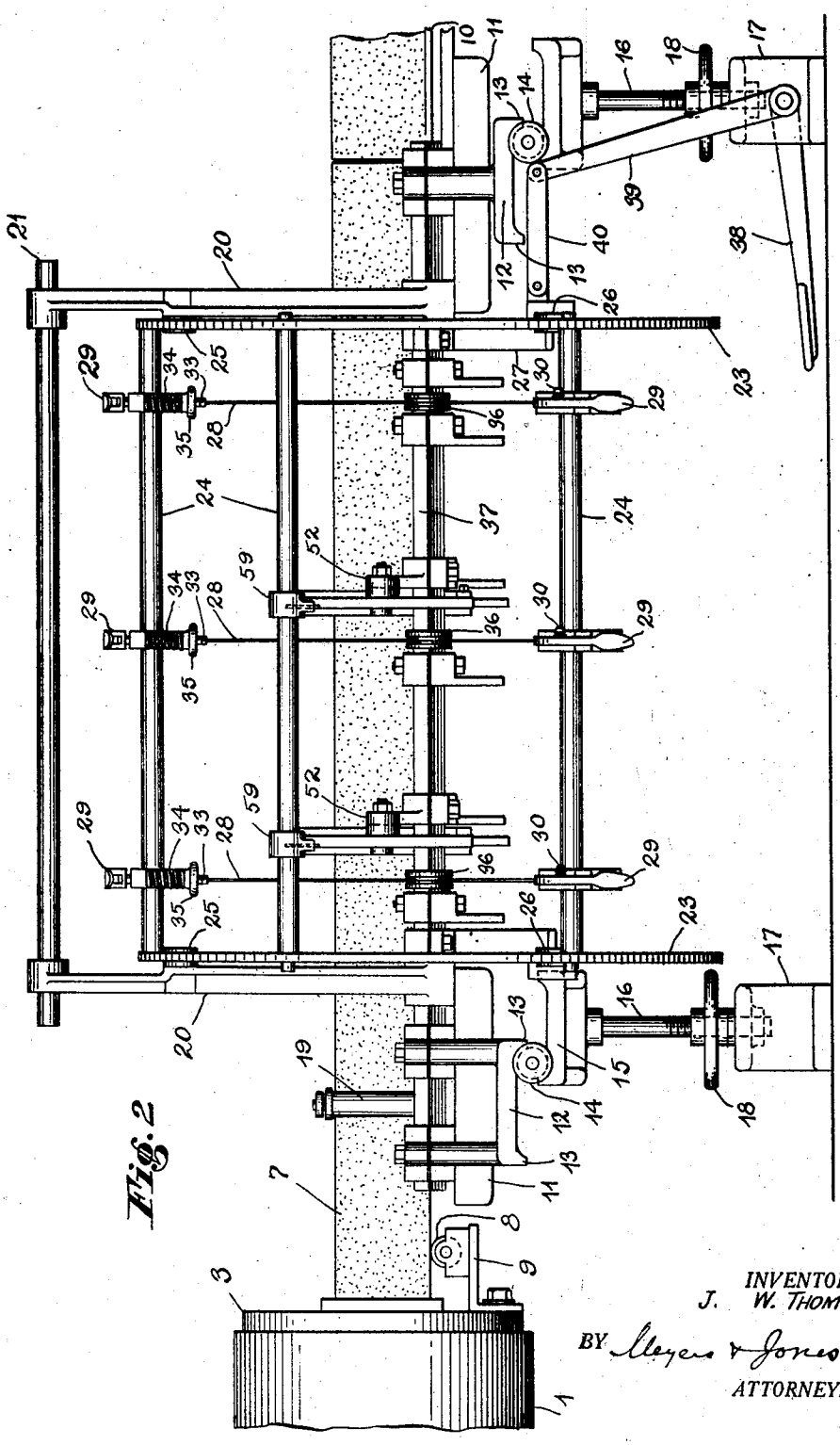


Fig. 2

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APPARATUS FOR MAKING TILES

Filed July 24, 1928 3 Sheets-Sheet 3

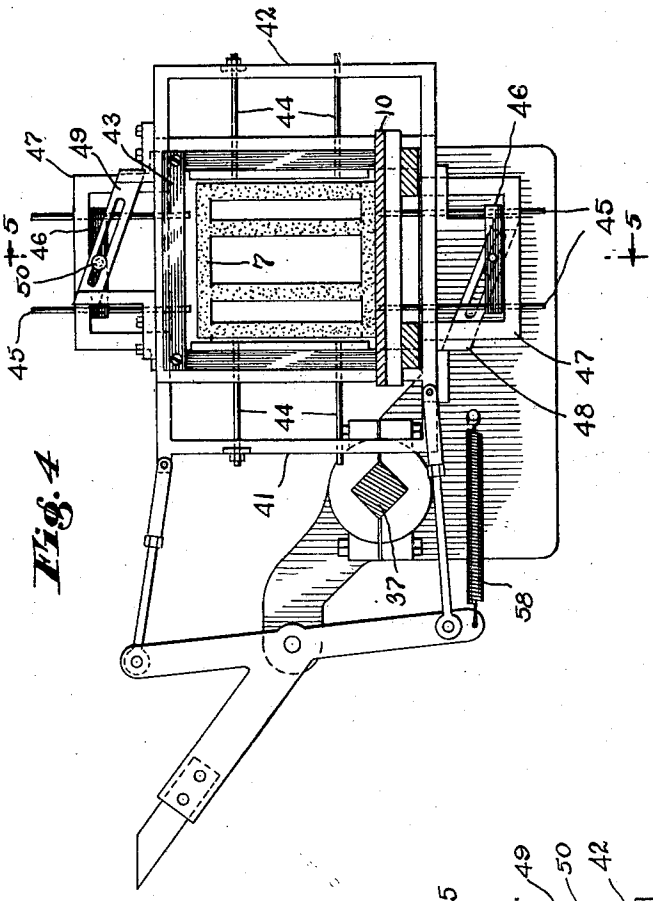



Fig. 4

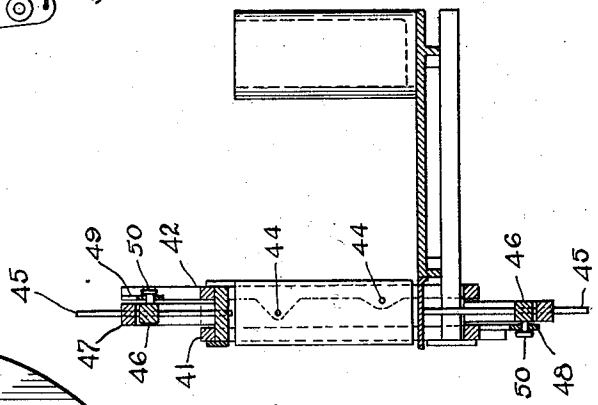



Fig. 5

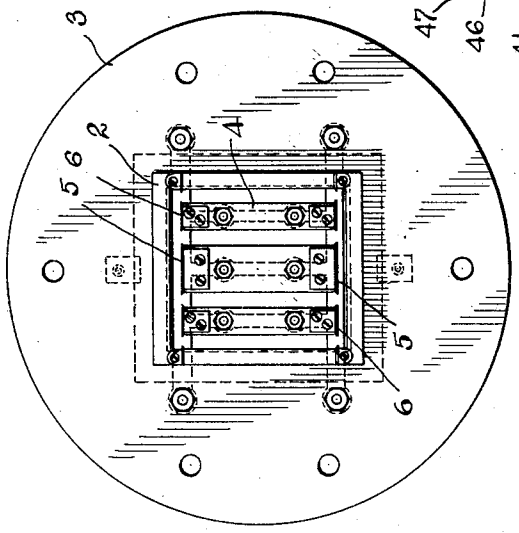



Fig. 3

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# UNITED STATES PATENT OFFICE

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## APPARATUS FOR MAKING TILES

Application filed July 24, 1928. Serial No. 295,101.

This invention is an improvement in apparatus for making tiles, and relates more particularly to apparatus for making roofing tiles of substantially flat formation.

Tiles of the character in question are formed from plastic material, such as properly tempered clay, which is molded or otherwise formed to shape by extrusion through a die. The formed tiles are then baked, and before baking it is necessary, or at least desirable, that nail holes be formed in the tiles, to enable them to be secured to a building.

One of the primary objects of the present invention is the provision of an apparatus enabling the formation of a continuous tubular structure embodying a number of formed sheets, which structure may be separated transversely into suitable lengths, which after baking may be easily separated into the several tiles by which it is constituted.

Another object is the provision of a composite tile structure, composed of a plurality of similar tiles connected in such manner so that stress applied to the structure in a certain manner will separate it into the component tiles.

Another object is the provision of a die especially adapted for producing the tubular structure and for partially separating the individual tile sheets of the structure, so that when the structure is cut into lengths, each length will be partially separated into a plurality of individual tiles.

Another object is the provision as an article of manufacture, of a structure containing a plurality of substantially flat tiles similar and equal in superficial area, and partially separated so that the structure may be easily broken into the component parts.

With these and other objects in view the invention consists in the construction and novel combination of parts fully described hereinafter, illustrated in the accompanying drawings and pointed out in the claims appended hereto, it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claims, may be resorted to without departing from the spirit of the invention.

In the drawings forming a part hereof:—

Fig. 1 is an end view of the improved machine.

Fig. 2 is a side view.

Fig. 3 is a front view of the die.

Fig. 4 is a horizontal section on the line of perforators.

Fig. 5 is a transverse vertical section on the line of the perforating mechanism.

The present embodiment of the invention is shown in connection with a part of a tile making machine indicated at 1, of usual construction, for grinding, tempering and extruding a tubular structure of plastic material, such as clay of substantially rectangular cross section, capable of being separated into suitable lengths, and so formed that after baking, the individual lengths may be easily separated into a plurality of flat tiles, each provided with openings for securing means, such for instance as nails or screws.

A special form of die is provided for shaping the plastic material as it is extruded from the machine. This die as shown in Fig. 3, comprises a frame 2 secured to a suitable die plate 3, which is connected to the outlet of the machine. The frame is provided with a plurality of vertically extending plates 4, which are arranged parallel with the sides of the frame, and in spaced relation with respect thereto and each other. Thus the improved die is shaped to form a tubular structure of rectangular cross section having two vertical partitions, it being understood that the plates 4 have their ends spaced from the top and bottom from the frame.

Blades 5 and 6 are arranged at the ends of the plates 4 and at the tops and bottoms of the sides of the frame 2, and the said blades extend into the passage through which the clay is extruded. The arrangement is such

that when the tubular structure is forced through the die, there will be lines of partial separation at the tops and bottoms of the side walls, and at the tops and bottoms of the partitions. This enables the structure to be separated into individual tiles, after it has been cut into lengths and baked.

The structure 7 of plastic material extruded from the machine passes over a supporting roller 8 journaled in a bracket 9 connected with the bed plate 3, and over a fixed table 10, which extends a suitable distance to support several individual lengths of the structure, and may be as long as is necessary or desirable. Mechanism for cutting the structure into suitable lengths, and perforating mechanism for providing openings in the side walls of the partitions is arranged adjacent the table, and is mounted to move with respect thereto, with the moving structure, during the cutting and perforating and to be returned to normal position after such operations. The support for the cutting and perforating mechanism consists of bed plates 11 spaced apart longitudinally of the table, each having connected therewith and depending therefrom a shoe 12.

Referring to Fig. 2, it will be seen that the underfaces of the shoes 12 are concave so that stops 13 are formed at each end of said surfaces, and the shoes engage grooved rollers 14, which run upon the similar shoes 15, supported by threaded stems 16, journaled in base members 17 on the supporting surface for the machine. The stems 16 are vertically adjustable, by means of wheel nuts 18, which bear at their lower ends on the base members 17. Thus the height of the table, which is supported by the stems, may be changed. Rollers 19 are journaled at opposite sides of the table 10, near the roller 8, and serve also to support and guide the structure, the rollers being journaled on the vertical axes at opposite sides of the structure.

Standards 20 extend upwardly from the inner ends of the bed plates, and the standards are connected at their tops by a shaft 21, each standard having a bearing for the adjacent end of the shaft. A wheel frame is supported between the standards with its axis at about the level of the bed. The wheel includes a paid of rings 23, one ring being adjacent each standard, and the rings are connected at suitable intervals by rods 24, four rods being provided in the present instance.

The frame is supported and guided in its rotating movement, by means of grooved rollers 25 and 26, the rings engaging the grooves of the rollers. The roller 25 of each set is journaled on the adjacent standard 20, and the rollers 26 are journaled at the ends of the cross plates 27, which are supported by the bed plates 13 before mentioned. The rollers of each set are arranged at angular intervals of 120°, so that the frame has perfect support in its rotating movement.

Cutting wires 28 are supported by the frame, the said wires being connected at their ends to levers 29, which are pivoted on rockers 30 on the rods 24. Each of the rockers, as shown in Fig. 1, is pivoted intermediate its ends, and the lever 29 which is also pivoted intermediate its ends, has its pivotal mounting 31 in substantial radial alinement with the pivotal mounting 32 of the adjacent rocker.

The cutting wire is connected with one end of the lever, and the other end is provided with a screw 33 pivoted to the lever, and passing through an opening in the adjacent end of the rocker. A spring 34 encircles the screw between the rocker and a nut 35 threaded onto the screw. This arrangement enables the tension of the spring, and the tension of the cutting wires to be varied. A set of two rockers and two levers is provided for each wire, the sets being spaced apart at 120°, and the wires pass over grooved wheels 36, which are mounted on a shaft 37 journaled in the standards at the axis of the frame. It will be apparent from the description that when the frame is rotated, the cutting wires will be passed through the tubular structure on the table 10, thus cutting it into suitable lengths, the wires being spaced apart from each other a distance to provide the desired lengths.

The table 10 and associated parts move with the tubular structure as it is being extruded from the machine, moving on the rollers 14. A treadle 38 is provided for moving the table and associated parts in one direction, that is, toward the machine, and the moving structure moves it in the opposite direction, the wires being engaged with the structure at this time. The treadle is rigid with an arm 39, which is connected by a link 40 with the adjacent bed plate 11, and it will be apparent that when the table and associated parts move with the structure away from away from the machine, the treadle will be lifted. As soon as the cutting is complete and the wires disengaged from the structure, pressure on the treadle will return the parts to the position of Fig. 2.

Referring to Figs. 1 and 4, it will be apparent that each length of the structure will provide six tiles, two being constituted by the top and bottom walls of the structure, two by the side walls, and two by the partitions, and all of the tiles are of the same width, the top and bottom walls of the structure being of the same width as the width of the partitions and the side walls between the top and bottom walls. In order to provide complete tiles ready for attachment after baking and separating, it is desirable that all of the tiles be provided with openings for securing means, such as nails or screws, and that the

openings be similarly placed in all of the tiles.

Mechanism is provided for simultaneously perforating the top and bottom walls, side walls and partitions. Since two lengths are separated from the structure at each operation of the cutting wires, the wire remote from the die serving as a guide for the cutting by its register with the end of the structure, two mechanisms are provided for perforating, the said mechanisms being shown more particularly in Figs. 1, 4 and 5.

The said mechanism includes a pair of U-shaped frames 41 and 42, one, 41, being arranged adjacent the shaft 37, while the other 42 is at the opposite side of the structure. Each of these frames includes a body extending parallel with the adjacent side wall of the structure and arms which have guided movement in a substantially U-shaped frame 43 supported by the table 10. Each frame carries a pair of perforating pins 44, which are of a length to pierce the adjacent side walls, and the adjacent partition of the structure when the frames 41 and 42 are moved toward each other.

Other pins 45 are provided for piercing the top and bottom walls, the said pins being connected with supports 46. The pins 45 have guided movement in the top of the frame 43, in the table 10, and in substantially U-shaped brackets 47, secured to the upper cross bar of the frame 43, and to the table respectively.

Each of the frames 41 and 42 is provided with a cam for operating one of the elements 46. The cam 48 connected with the frame 41 operates the pins which extend through the table, and the cam 49 connected with the frame 42, operates the pins which pierce the top of the structure. These cams as shown in Fig. 4, are substantially U-shaped in form, with the body thereof arranged at an incline, and the body of each cam is longitudinally slotted for engagement by a wrist pin 50 on the adjacent bar 46.

The cam plates move with the frames 41 and 42 respectively, and it will be apparent from the description that when the frames 41 and 42 are moved toward each other the elements 46 will be also moved toward each other, while when the frames 41 and 42 move away from each other, the elements 46 will be moved with them. That is, the four sets of pins operate simultaneously. The arms of the frames 41 and 42 have guided movement in the top member of the frame 43, and in guides 51 depending from the table.

The frames 41 and 42 are operated by the wheel frame previously mentioned. A bracket 52 extends from the shaft 37 in opposite direction to the table, and a three arm rocker is pivoted to each bracket 52. Each of the rockers is T-shaped as shown, the body portion thereof being connected by links 53 with the respective frames 41 and 42. The links 53 are adjustable in length as shown, and the stem portion 54 of the rocker has a socket at its outer end, in which is received a cam block 55, the cam block being held in any suitable manner. Referring to Fig. 1, it will be seen that the outer end of each cam block is inclined, and the cam blocks are designed for engagement with lugs 56, on one of the rods 24 before mentioned.

The lugs 56 are arranged at opposite sides of one of the rods which supports a rocket 30 and a lever 29. In the normal inoperative position of the wheel frame, one end of the cutting wire is directly above the shaft 37, (Fig. 1) and in this position the lugs 56 are at approximately the same level and at opposite sides of the shaft 37. The shaft 37 is as shown in Fig. 1, polygonal in cross section, and does not rotate, so that the brackets 52 are held in the position shown.

In the operation of the device, when a cut is to be made, the wire 28 remote from the die is alined with the last cut made in the structure, and the wheel is rotated, causing the remaining wires to cut transversely of the structure. As the wheel frame moves from the position of Fig. 1, the lug 56 at the left engages the cam block 55, swings the rocker 54, and moves all of the pins toward the structure, providing openings in each of the individual tiles. As soon as the lug 56 passes the cam block, a spring 58 arranged between the rocker and the adjacent bed plate 11 returns the pins to normal inoperative position.

The lugs 56 will pass the cam blocks 55 on the return movement of the wheel frame. The rockers 30 are adjustable on the rods 24, each rocker having a split bearing, which is cranked on the shaft by a bolt and nut 59. It will be apparent from the description that each length of the tubular structure is constituted by six or more similar flat dies, and that this number might be more or less if desired, as for instance, five or seven. The cutting and perforating mechanism travels with the tubular structure when in operation, so that there is no hindrance to the continuous movement of the structure. The cutting wires are resilient to a certain extent longitudinally, because of the spring mounting 34, and the tension of the springs may be adjusted when desired.

What is claimed as new is:—

1. In a tile making machine, the combination with a die shaped to form a substantially rectangular tubular structure having vertical partitions parallel with opposite side walls, the structure partially separated at the junction of the partitions and the side walls with the top and bottom walls to enable easy separation of the walls and partitions into individual tiles after baking, means moving with the structure for cutting it

transversely into similar lengths, and means moving therewith for perforating all of the walls and partitions to provide openings for nail holes.

2. In a tile making machine, the combination with a die shaped to form a substantially rectangular tubular structure having vertical partitions parallel with opposite side walls, the structure partially separated at the junction of the partitions and the side walls with the top and bottom walls to enable easy separation of the walls and partitions into individual tiles after baking, means moving with the structure for cutting it transversely into similar lengths, and means operated thereby for providing all of the walls and partitions with a plurality of openings, and with the openings of all of the walls and partitions similarly placed.

3. In a tile making machine, the combination with a die shaped to form a substantially rectangular tubular structure having vertical partitions parallel with opposite side walls, the structure partially separated at the junction of the partitions and the side walls with the top and bottom walls to enable easy separation of the walls and partitions into individual tiles after baking, means moving with the structure for cutting it transversely into similar lengths, and means operated thereby for providing all of the walls and partitions with a plurality of openings, and with the openings of all of the walls and partitions similarly placed, said means including a plurality of pairs of pins, each pair mounted to move toward and from a side wall of the structure, and of a length at the side walls to traverse the partitions.

4. In a tile making machine, the combination with a die shaped to form a substantially rectangular tubular structure having vertical partitions parallel with opposite side walls, the structure partially separated at the junction of the partitions and the side walls with the top and bottom walls to enable easy separation of the walls and partitions into individual tiles after baking, means moving with the structure for cutting it transversely into similar lengths, means moving therewith for perforating all of the walls and partitions to provide openings for nail holes, and a common support for the cutting and perforating means.

5. In a tile making machine, the combination with a die shaped to form a substantially rectangular tubular structure having vertical partitions parallel with opposite side walls, the structure partially separated at the junction of the partitions and the side walls with the top and bottom walls to enable easy separation of the walls and partitions into individual tiles after baking, means moving with the structure for cutting it transversely into similar lengths, means moving therewith for perforating all of the walls and partitions to provide openings for nail holes, a common support for the cutting and perforating means, said support having rolling movement in opposite directions, and adapted to be moved by the structure in one direction, and manually operating means for moving it in the opposite direction.

6. In a tile making machine, the combination with a die shaped to form a substantially rectangular tubular structure having vertical partitions parallel with opposite side walls, the structure partially separated at the junction of the partitions and the side walls with the top and bottom walls to enable easy separation of the walls and partitions into individual tiles after baking, means moving with the structure for cutting it transversely into similar lengths, means moving therewith for perforating all of the walls and partitions to provide openings for nail holes, a common support for the cutting and perforating means, including spaced connected shoes, a shoe cooperating with each of the first named shoes, rollers between the cooperating shoes, and means for adjusting said last named shoes vertically.

7. In a tile making machine, in combination with a die shaped to form a substantially rectangular tubular structure partially separated at the junctions of the walls to enable easy separation into individual tiles after baking, means for cutting the structure into similar lengths, means for perforating the walls of the structure to provide openings for nail holes, and a common support for the cutting and perforating means mounted to move with and to be moved by the structure during the cutting operation.

8. In a tile making machine, in combination with a die shaped to form a substantially rectangular tubular structure partially separated at the junctions of the walls to enable easy separation into individual tiles after baking, means for cutting the structure into similar lengths, means for perforating the walls of the structure to provide openings for nail holes, a common support for the cutting and perforating means mounted to move with and to be moved by the structure during the cutting operation, the cutting means including a frame mounted to rotate in the common support and having spaced cutting wires for cutting the structure transversely, and means whereby the rotation of the frame will operate the perforating means.

9. In a tile making machine, in combination with a die shaped to form a substantially rectangular tubular structure partially separated at the junctions of the walls to enable easy separation into individual tiles after baking, means for cutting the structure into similar lengths, means for perforating the walls of the structure to provide openings for nail holes, and a common support for the cutting and perforating means

mounted to move with and to be moved by the structure during the cutting operation, the perforating means including sets of pins having guided movement toward and from the respective walls, a rocker connected with the sets for simultaneously moving them in opposite directions and spring biased to inoperative position, a frame mounted to rotate in the common support and provided with cutting wires for cutting the structure, the rocker including an arm extending toward the periphery of the frame, and the frame having a lug for engaging the arm to swing it in one direction.

10. In a tile making machine, having a die shaped to form a substantially rectangular tubular structure having partitions parallel with opposite walls, and with the structure partially separated at the junction of the partitions with the walls, and at the junction of the wall with each other to enable easy separation of the walls and partitions into individual tiles after baking, a supporting table for the structure over which the structure moves, and cutting and perforating mechanism for severing the structure into lengths and for perforating the walls and partitions mounted to move with the structure, and having means for returning the same to normal position.

11. In a tile making machine, a die shaped to form a substantially rectangular tubular structure having partitions parallel with two of the opposite walls, and blades extending from the partitions and from the two opposite side walls at the ends thereof to partially separate the structure at the junction of the partitions with the walls, and at the junction of the walls with each other, to enable easy separation of the walls and partitions into individual tiles after baking.

12. In a tile making machine, the combination with a die shaped to form a substantially rectangular tubular structure having vertical partitions parallel with opposite side walls, the structure partially separated at the junction of the partitions and the side walls with the top and bottom walls to enable easy separation of the walls and partitions into individual tiles after baking, means for cutting it transversely into similar lengths, and means for perforating all of the walls and partitions to provide openings for nail holes.

13. In a tile making machine, in combination with a die shaped to form a substantially rectangular tubular structure partially separated at the junctions of the walls to enable easy separation into individual tiles after baking, means for cutting the structure into similar lengths, and means for perforating the walls of the structure to provide openings for nail holes.

14. In a tile making machine, in combination with a die shaped to form a substantially rectangular tubular structure partially separated at the junctions of the walls to enable easy separation into individual tiles after baking, means for cutting the structure into similar lengths, and means for perforating the walls of the structure to provide openings for nail holes, said cutting and perforating means being mounted to move with and to be moved by the structure during the cutting operation.

Signed at Daisy in the county of Hamilton and State of Tennessee this 20 day of July, A. D. 1928.

JOHN W. THOMAS.