Dec. 19, 1939. M. A. SCHWEIKER 2,183,699

METHOD OF FASHIONING TILES

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Fig. 1.

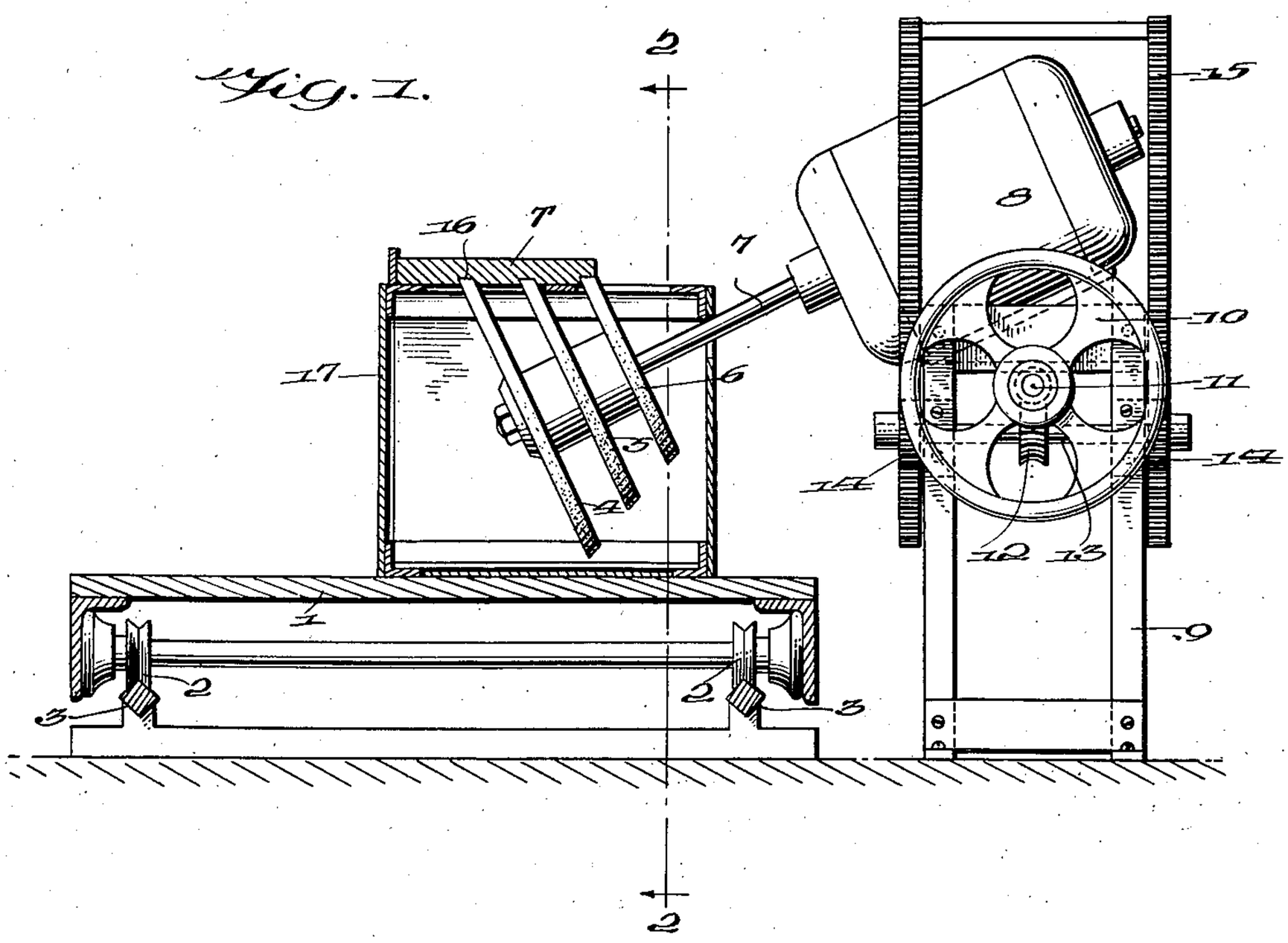
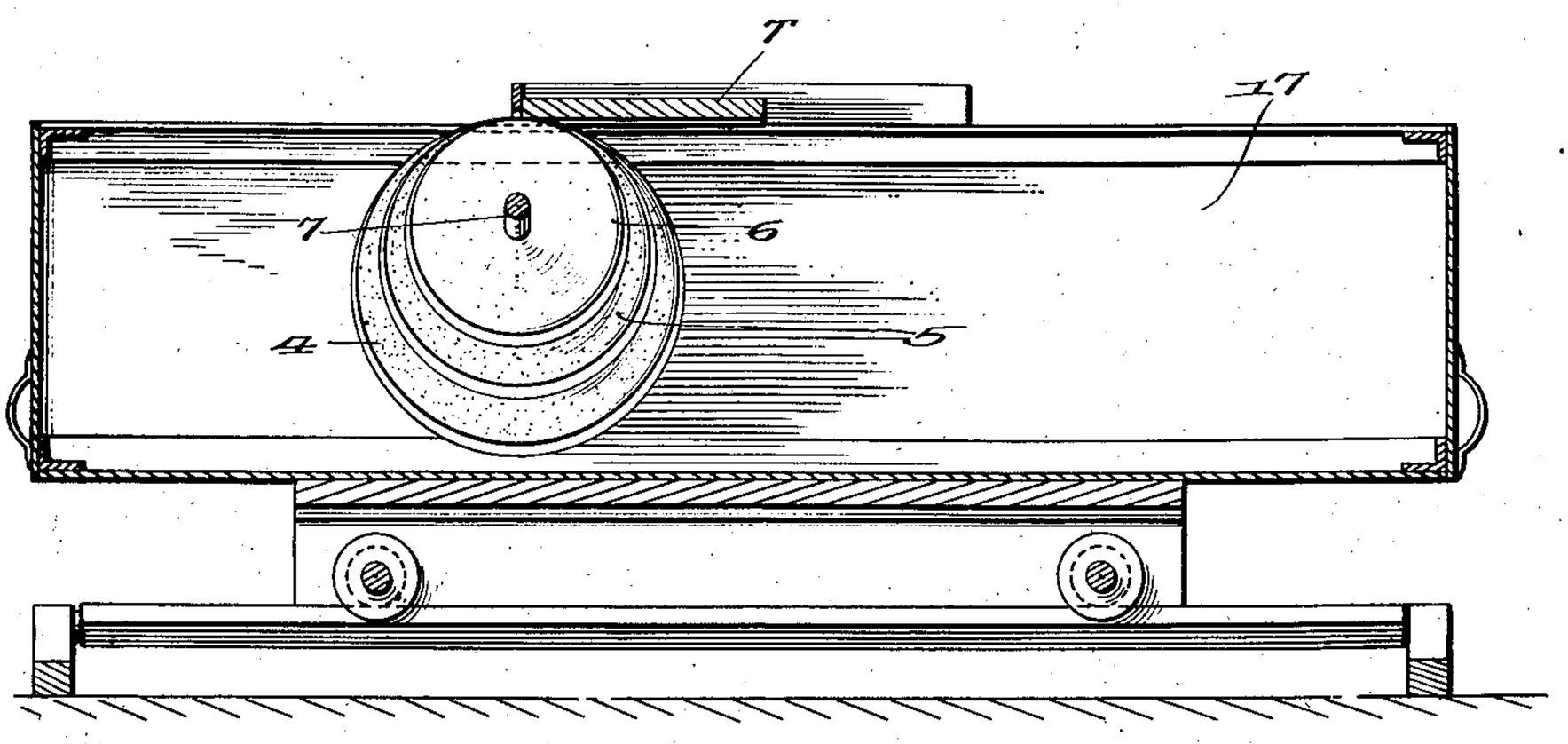


Fig. 2.



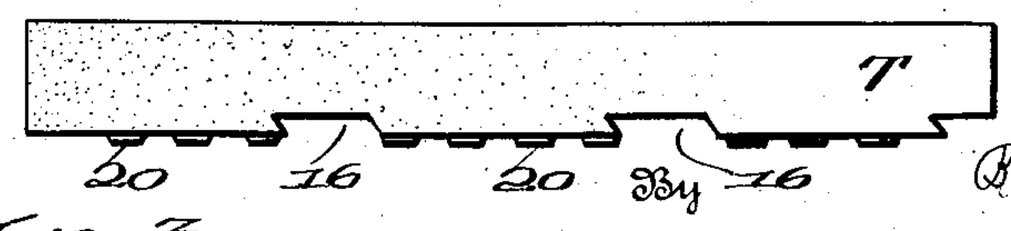


Fig. 3.

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Fig. 4.

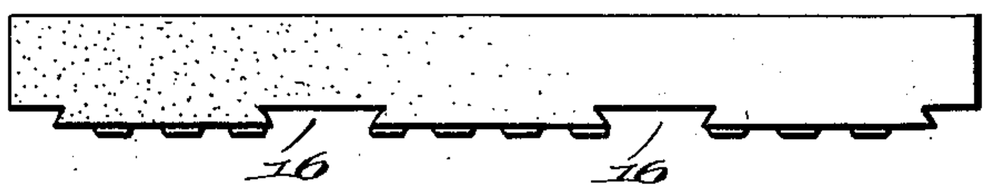

Fig. 5.

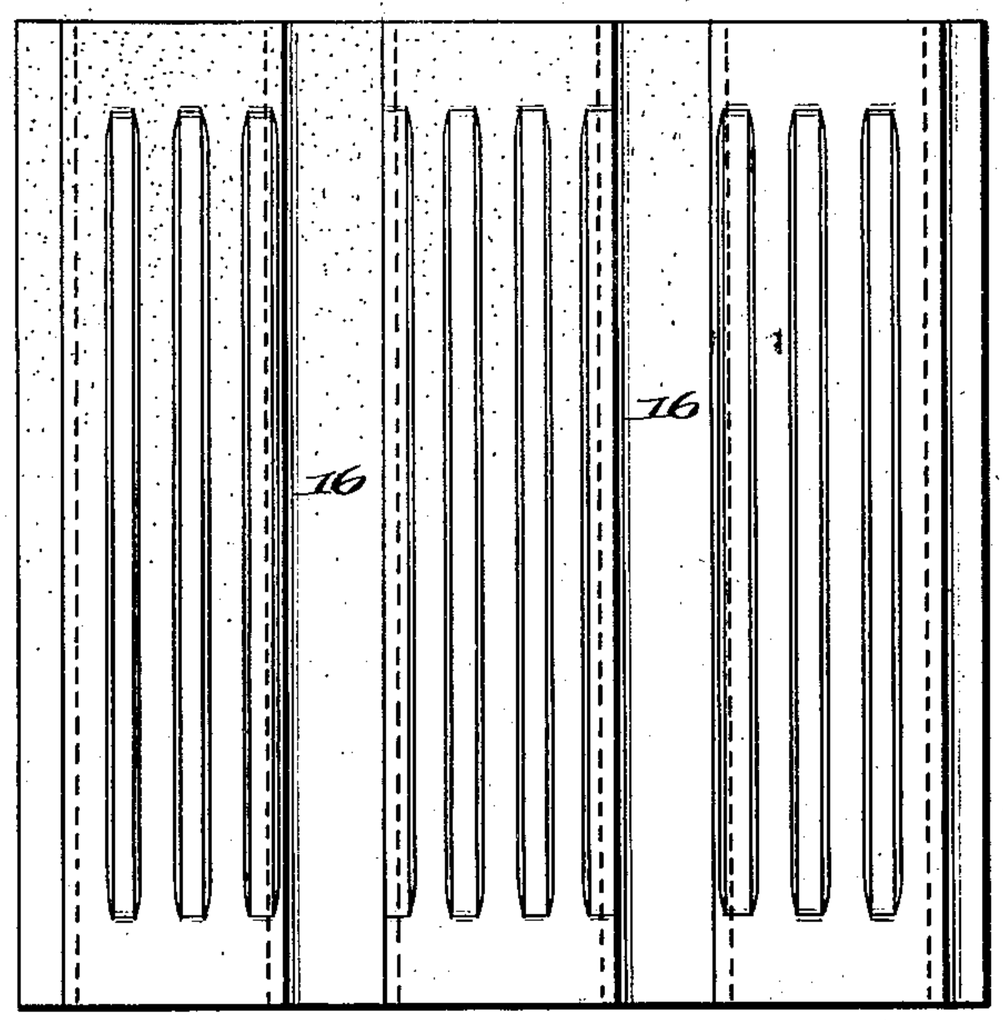

Fig. 6.

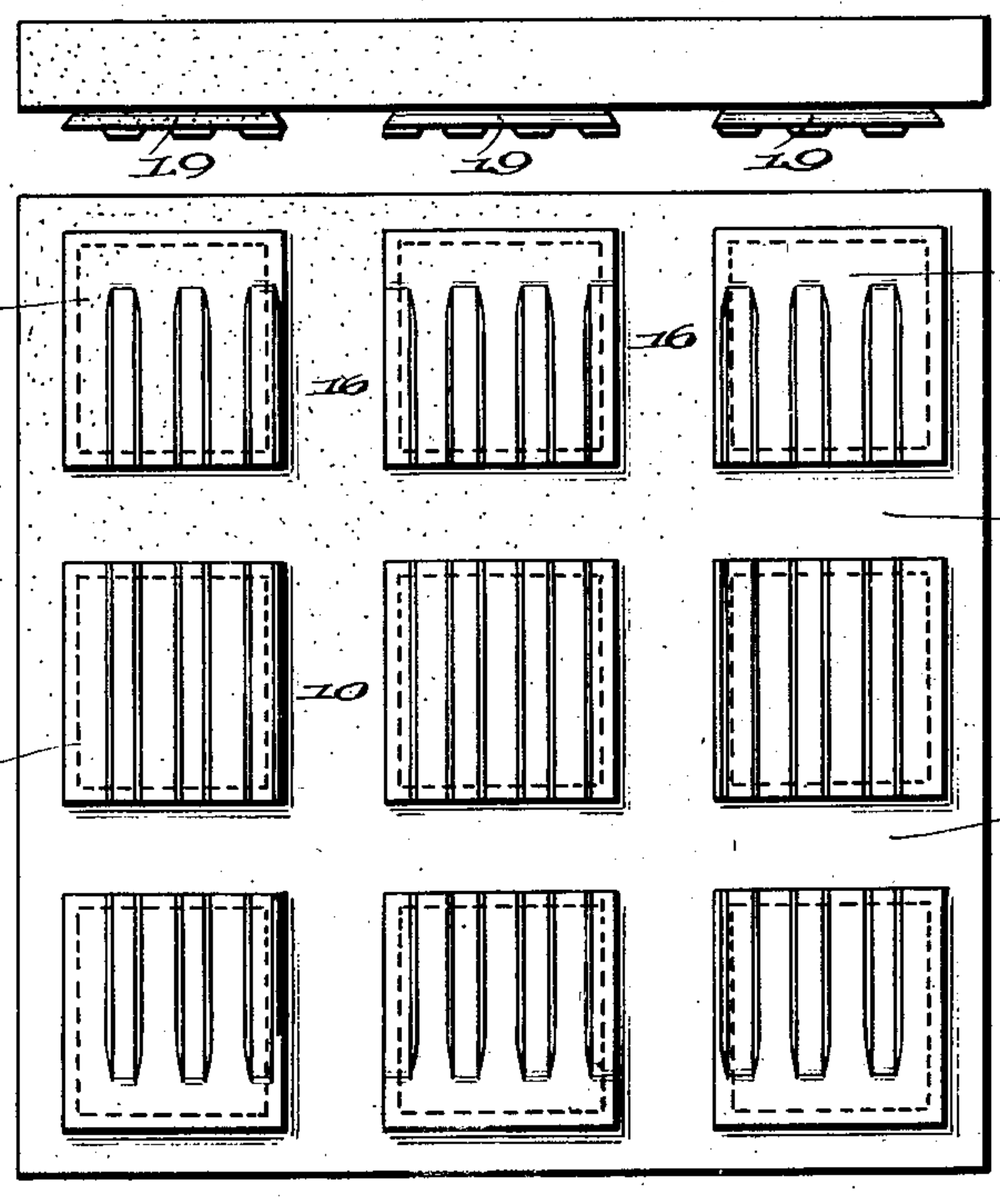

Fig. 7.

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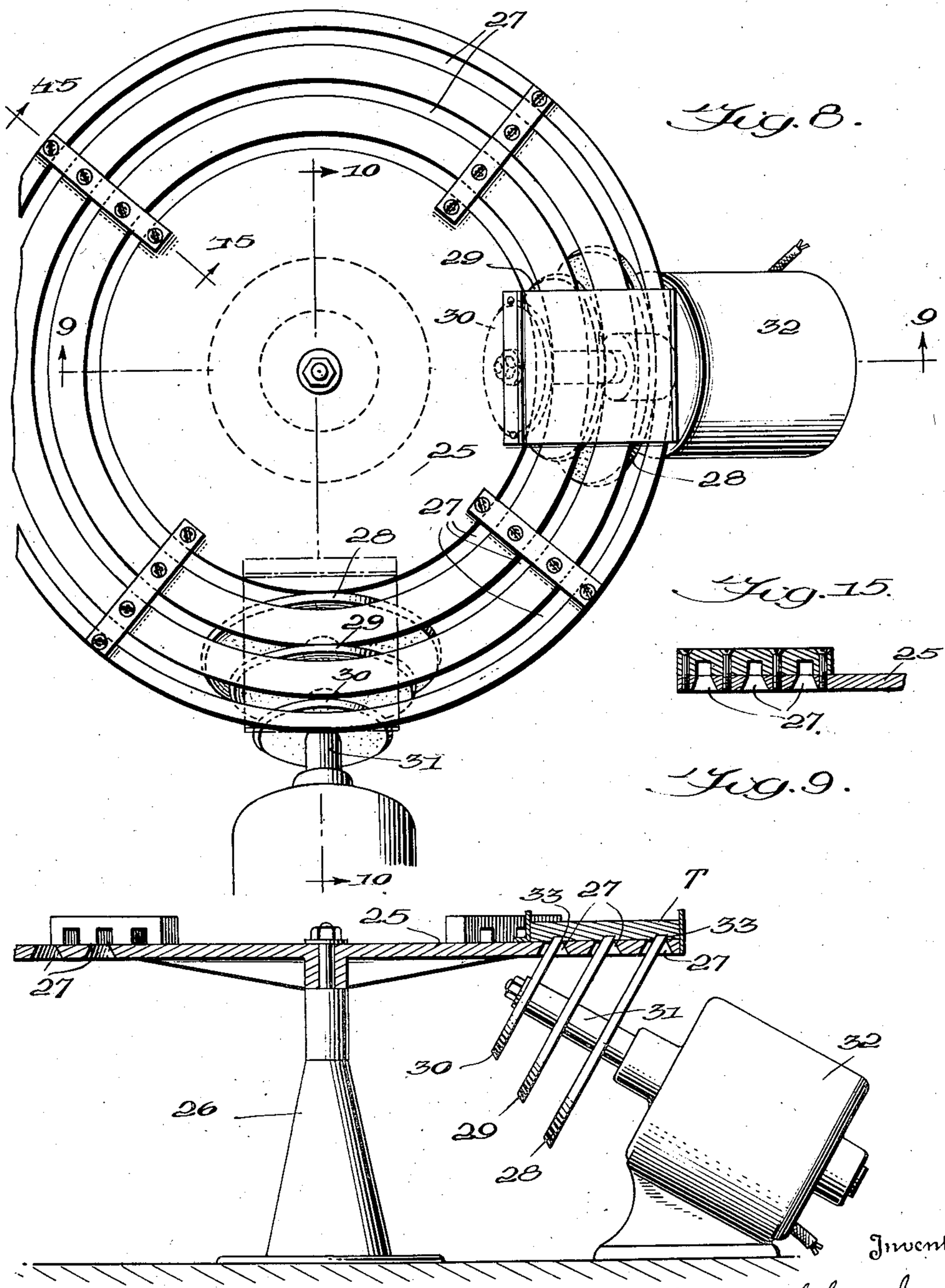

Fig. 8.

Fig. 15.

Fig. 9.

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METHOD OF FASHIONING TILES

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Fig. 10.

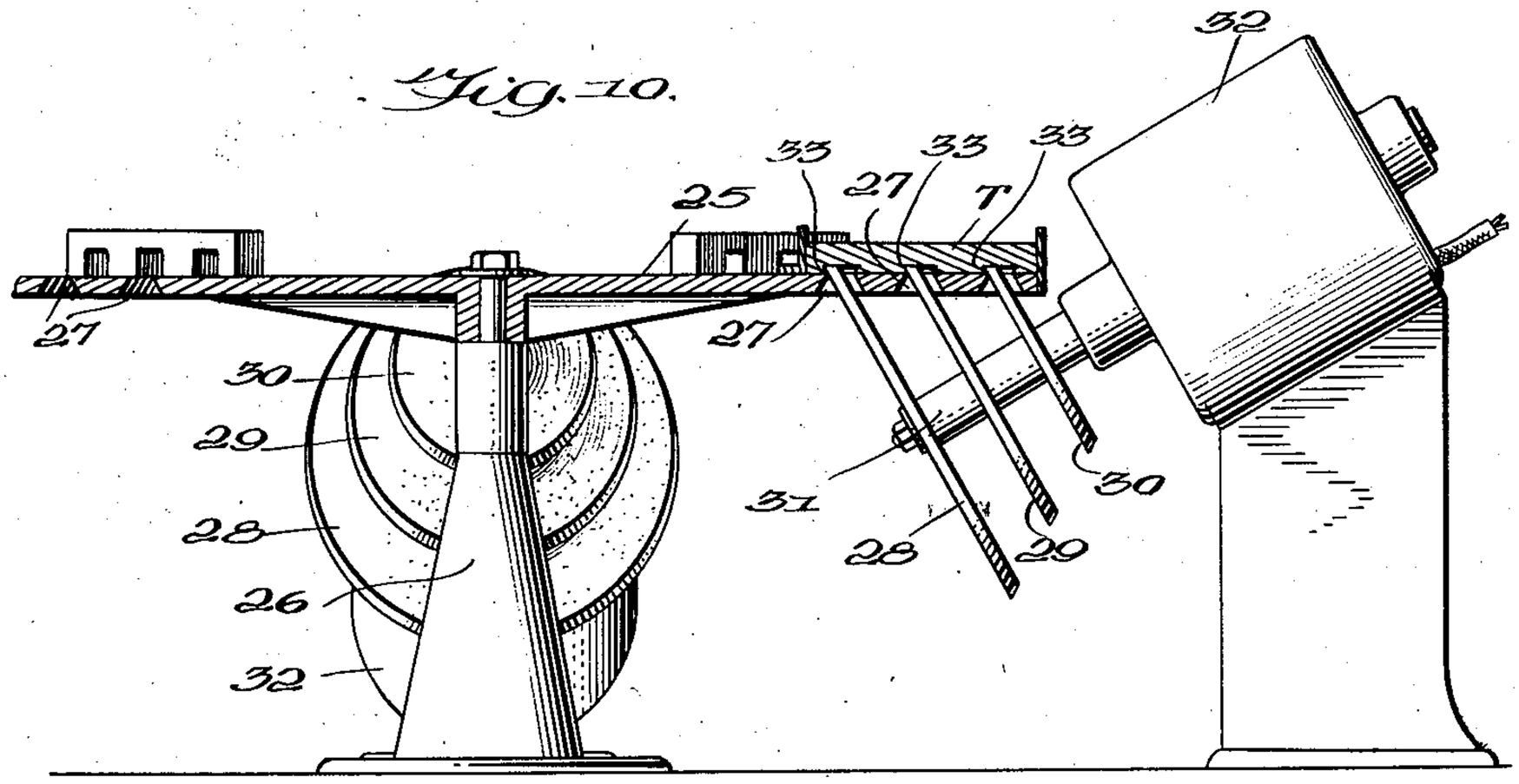


Fig. 11.

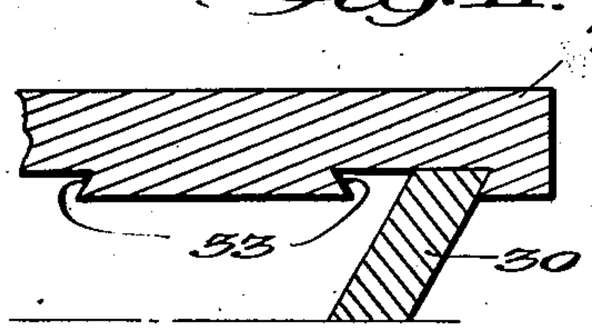


Fig. 12.

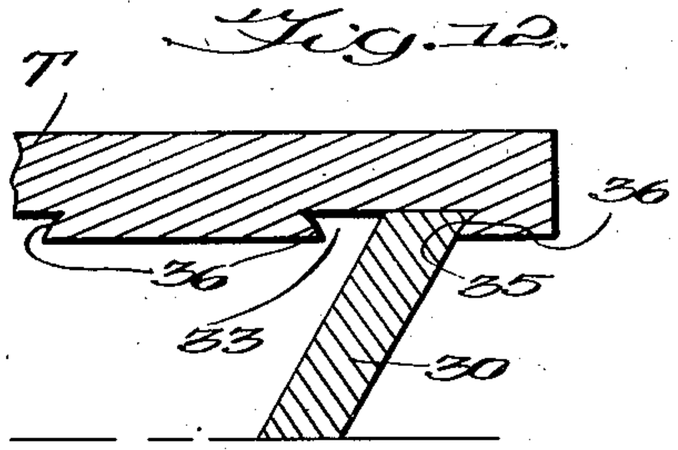


Fig. 13

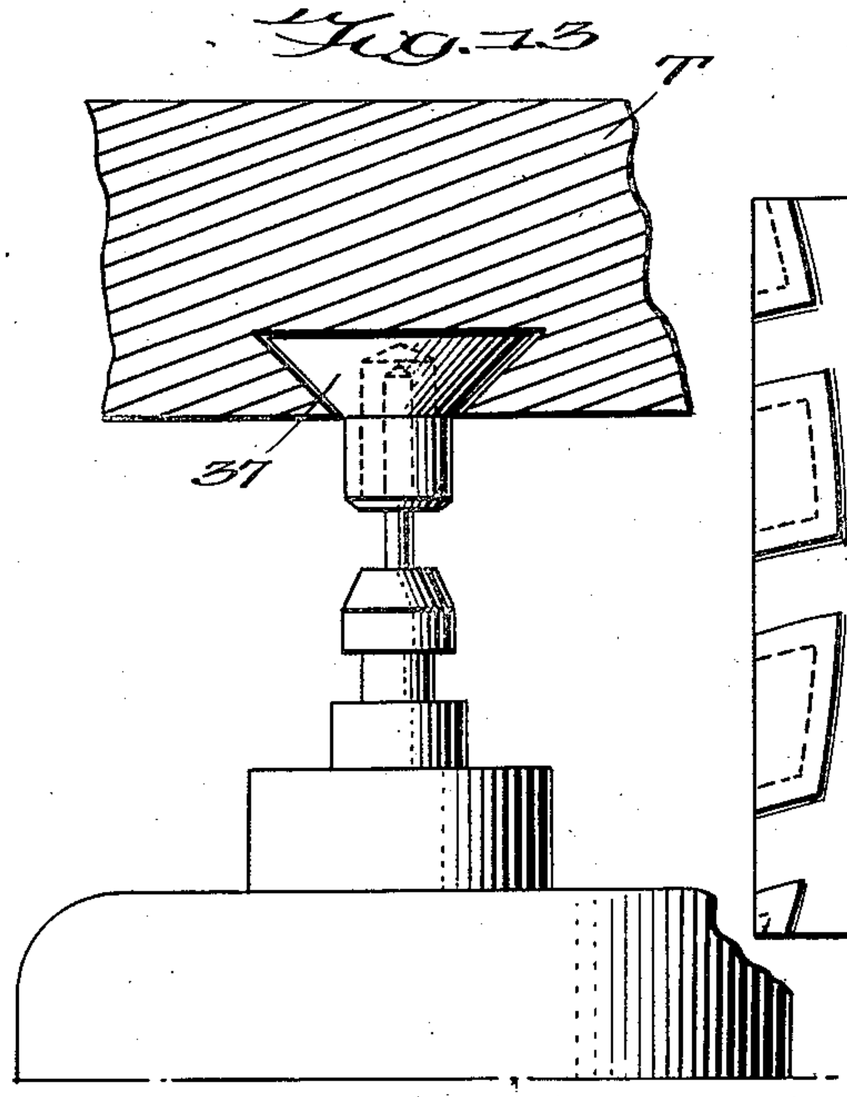
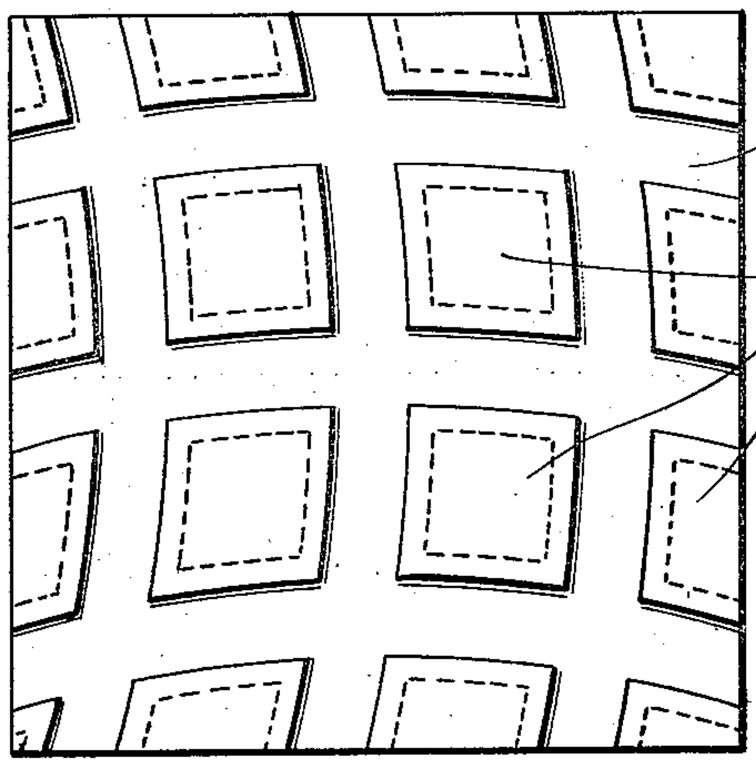


Fig. 14.



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Patented Dec. 19, 1939

2,183,699

UNITED STATES PATENT OFFICE

2,183,699

METHOD OF FASHIONING TILES

Malcolm A. Schweiker, Lansdale, Pa., assignor to Franklin Tile Company, Lansdale, Pa., a corporation of Pennsylvania

Application April 14, 1936, Serial No. 74,371

4 Claims. (Cl. 51—278)

My present invention relates to an improvement in a method and machine for fashioning tile.

The primary object is to fashion a tile which will afford the maximum resistance to shearing from the mortar-bed, and in my present invention I accomplish this by forming on the back of the tile undercut sections of angular or curved form which stand apart one from another, in grids, pads or islands.

It is common to form tiles with parallel ridges to penetrate, take hold of, and adhere to the mortar-bed, and heretofore ridges have been most commonly formed with undercut edges running in one direction by extruding the material of which the tile is formed in a plastic state through a pugmill. This method results in the maximum resistance to shear being only at right angles to the single direction of the dovetail grooves.

The purpose of this present invention is to greatly increase the undercut area by the formation of additional dovetailed or undercut edges, which are so arranged as to withstand with equal resistance shearing force from any direction; and to do this grids, pads or islands are formed in a variety of different shapes, that is to say square, oblong, triangular, in any polygonal form, or even with curved edges.

Obviously, different mechanical means might be devised for forming these undercut grids, islands or pads. As one example, I have devised several successful machines for carrying out my method in which the undercut grooves are cut in the tile, preferably prior to the time the tile receives its highest point of firing.

These machines are intended to groove the tile from the under side for various reasons, and, primarily, to prevent scratching, blemishing, or otherwise damaging the surface of the tile, whether glazed or unglazed, which might result from resting the tile on the surface, which is ultimately to be the finished face of the tile, and applying cutting pressure from above. This plan has other advantages, such as uniformity of depth of cut and the easy and quick disposal of the cuttings.

In the accompanying drawings:

Fig. 1 is a view in elevation and partly in section of a form of machine for cutting straight undercut grooves;

Fig. 2 is a longitudinal section on line 2—2 of Fig. 1;

Fig. 3 is an edge view of a tile after the first cutting;

Fig. 4 is a similar view after the second cutting;

Fig. 5 is a plan view of the same;

Fig. 6 is an edge view of a completed tile;

Fig. 7 is a plan view of the same;

Fig. 8 is a top plan view of a turntable having a plurality of concentrically curved openings throughout the major portion of the surface of the table and showing the cutters therebeneath for cutting the opposite undercut edges of a curved cutting in the lower surface of a tile;

Fig. 9 is a section through the line 9—9 of Fig. 8;

Fig. 10 is a section on line 10—10 of Fig. 8;

Fig. 11 is an enlarged fragmentary sectional view showing a cutter in place forming one edge of a curve;

Fig. 12 is a similar view in which the edge of the cutter and the corresponding groove is slightly curved instead of straight;

Fig. 13 is a fragmentary view partly in section showing the entire form of rotary cutter for forming both edges of the undercut grooves simultaneously;

Fig. 14 is a view of a practical form of curved line undercut; and

Fig. 15 is a fragmentary section on the line 15—15 of Fig. 8.

Referring to Figs. 1, 2 and 3, the numeral 1 represents a table mounted on wheels 2, and 3 are tracks on which the table travels back and forth. The tile T is supported on the top of this table. A gang of cutters 4, 5 and 6 is mounted on the shaft 7, and the latter is driven by the motor 8, which latter is supported on a suitable frame 9, and is capable of being raised and lowered by turning the handwheel 10 which has a worm-shaft 11 which engages the worm-pinion 12 on the shaft 13, and the shaft 13 has pinions 14 on the ends, the teeth of which mesh with the racks 15, so that by turning the hand-wheel 10, the motor 8 with its shaft 7 and the previously-mentioned cutters 4, 5 and 6 may be raised or lowered to cut the grooves 16 the required depth.

Referring to the worm-shaft 11, the pitch of the worm is slight, so that the cutter stays in position. It was found that if the pitch was large, it would be necessary to have a lock to hold the motor and cutting wheels in position so as to provide a uniform depth of cut.

After the tile T is placed on the support 17 of the table (as shown in Figs. 1 and 2) the table is pushed forward the length of the tile, the gang of wheels 4, 5 and 6 making three parallel grooves

undercut on one side (as shown in Figs. 1 and 3). Then by turning the tile around 180° on the table, and pulling the table back, the opposite edges of the grooves are undercut. This gives the tile the formation shown in Figs. 4 and 5, namely with the dovetailing or undercut extending parallel and in one direction only. The support 17 for the tile is so arranged that the tile can be turned at any angle for subsequent cuts.

By giving the tile an extra turn, or to an intermediate position, the cross grooves 18 are cut by pushing the table forward in one direction, then by turning the tile around at 180° and bringing the table back the remaining undercut is made, with the result that the grids, islands or pads 19 are formed on the back of the tile.

Thus there is a cutting operation with each movement of the table past the wheels, that is to say there is no empty return so to speak.

By this method, I provide a tile with the separated or isolated pads or islands 19 having the undercut or dovetailed formation on four different sides or edges.

These pads or islands could be triangular in shape or polygonal, in other words formed so that they will have in excess of two undercut or dovetailed edges, thus providing a maximum hold or anchorage on the wall or surface which is to be lined or faced with tile.

While the abrasive wheels 4, 5 and 6 are arranged at an angle so that the tile may rest horizontally thereabove, as illustrated in Figs. 1 and 2, it is obvious that the same effect could be achieved in disposing the shaft carrying the cutting wheels in a horizontal position and tilting the tile, at an angle, in other words the common plane of the edges of the abrading wheels 4, 5 and 6 must always be at an obtuse angle to the surface of the tile to be grooved.

It has been customary to provide tiles of this character with parallel ribs, such as 20, this may be accomplished by first forming the tile in a die with a series of parallel ribs, after which the undercutting is done, as has been described, by moving the tile in contact with a gang of abrasive wheels in two or more different directions. It is obvious, however, that these ribs are by no means imperative and, in many instances, the undercut grooves forming the pads or islands, would be cut on a perfectly flat and unribbed surface.

Thus it has been my desire to cover the idea of forming undercut cross-sections on the back of a tile running in two or more directions, such forming to be accomplished by grinding the tile preferably prior to the time it is subjected to the highest firing temperature, or final bonding action, whether or not in the presence of heat, whether such highest firing temperature is accomplished by what is known as the two-fire process or the one-fire process.

In other words, it is intended to cover the situation whether the tile is made by one-fire or two-fire, or whether it is based upon a high fire biscuit and a low fire glaze, or a low fire biscuit and a high fire glaze, or upon unglazed tile subjected to one or more firing cycles.

As it is possible to make a curved undercut groove just as easily as a straight groove, I have illustrated in Figs. 8, 9, 10 and 15 a form of machine for doing this. The numeral 25 represents a turntable rotatably supported on the top of a supporting pedestal 26. A plurality of concentric cuts or slots 27 are formed in this table, and these taper or diminish in width upwardly as clearly illustrated in Figs. 9, 10 and 15, in order to provide clearance for the cutters which extend through these cuts or slots 27.

The cutters are represented by the numerals 28, 29, and 30, and these are keyed on a drive-shaft 31 extending from the motor 32.

As the turntable 25 is rotated, one edge of the undercut groove 33 is cut as shown in Fig. 9, and then in order to cut the opposite edges of the undercut grooves of the tile, the cutters 28, 29 and 30 must be reversed on the shaft 31, as shown in Fig. 10, that is to say so that the smallest cutter 30 is nearest the motor 32, and each cutter is reversed so that the beveled edges extend in the opposite direction from the edges of the cutters as shown in Fig. 9, and in both instances the edges must be in alignment in order to make the dovetail undercut, and the shaft 31 must be at the required angle with respect to the lower surface of the turntable.

When the cutters are thus rearranged, the position of the tile T is reversed or in other words turned around 180° and the turntable is again rotated from the starting point, whereupon the opposite undercut wall of the groove is formed.

Obviously, instead of removing the cutters, turning them over, and reversing their position on the shaft, two motors might be employed, one having the cutters arranged and on a mount as in Fig. 9 and the other as in Fig. 10.

The tile T is placed over the table with its back downwardly and in position over the cuts or slots 27 in the path of the cutter in position to be grooved by the cutters.

In Fig. 12, an edge 35 of the cutter 30 is slightly curved in order to form a correspondingly curved edge 36 in the groove 27 formed in the tile.

In Fig. 13, a single cutter 37 mounted on a vertical shaft, is shown for cutting both sides of the undercut groove simultaneously, the cutter starting in from an edge of the tile. This cutter can be used just as satisfactorily for cutting the grooves 16 where the tile slides back and forth, as shown in Figs. 1 and 2, as well as on the rotatable table shown in Figs. 8, 9 and 10.

In Fig. 14, the back of a tile is illustrated having grids, pads or holes 38 with curved undercut edges as distinguished from the straight undercut edges illustrated in Fig. 7.

This invention is just as practical for unglazed tiles as for glazed. and it is intended that this improvement should apply to both. By unglazed tile is meant such as are used on floors, and even in some cases on walls as distinguished from the glazed or glassy surfaced tile applied on biscuit.

Attention is called to the fact that there are known substitutes used in place of tile; and it is my intention that this process should be applicable to these substitutes, and it is, therefore, pointed out that any tile substitute, which is made by a chemical or physical bonding action, would be restricted from using this process to cut the grooves in the tile prior to the time the substitute or synthetic tile is subjected to the final bonding action, either chemical or physical, or some nature other than firing.

I claim:

1. An improved method of forming separated grids. pads or islands on the surface of a tile or the like, which consists in dovetailing or undercutting the said surface on all of the edges of said grids, pads or islands, by removing the material from the edges thereof, and from all of the surrounding surface of the tile intervening

between said grids, pads or islands, thus leaving them as isolated and separated projections with undercut edges.

2. An improved method of fashioning tiles with a plurality of isolated undercut grids, pads or islands and the like which consists in passing the tile in contact with an abrading surface in one direction, then reversing the position of the tile, repeating the process in the opposite direction, then turning the tile to an intermediate position, passing it in contact with the abrading device, and finally reversing the position and passing it again in contact with the abrading device, whereby to cut grooves extending under the surface of said tile and in at least two different directions and at angles to each other, and during the foregoing operations forming relatively wide areas around the grids, pads or islands by cutting the tile to a different plane from that of the outer surfaces of the isolated areas.

3. An improved method of fashioning tiles with isolated grids, pads or islands which consists in moving the tile in contact with a plurality of spaced apart abrading tools which cut at an angle other than a right-angle while held in different positions so that the different grooves cut will be at an angle to one another, and will reach a substantial depth below the outer surface of the isolated areas, leaving an area surrounding the latter beneath the outer surfaces of the isolated areas.

4. The herein-described method of fashioning tiles with isolated areas on at least one side thereof by a process of reducing the thickness of the tile throughout areas thereof, thereby forming and leaving intact a plurality of independent and separated grids, pads or islands, with the outer surface coinciding with the original surface of the tile, and the bottoms of the removed areas in a plane between the original opposite faces of the tile, and undercutting or dovetailing the edges of the isolated areas during the method of fashioning of the tile.

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