Jan. 20, 1931. J. F. MAKOWSKI 1,789,558

TILE FORMING MACHINE

Filed May 18, 1928 3 Sheets-Sheet 1

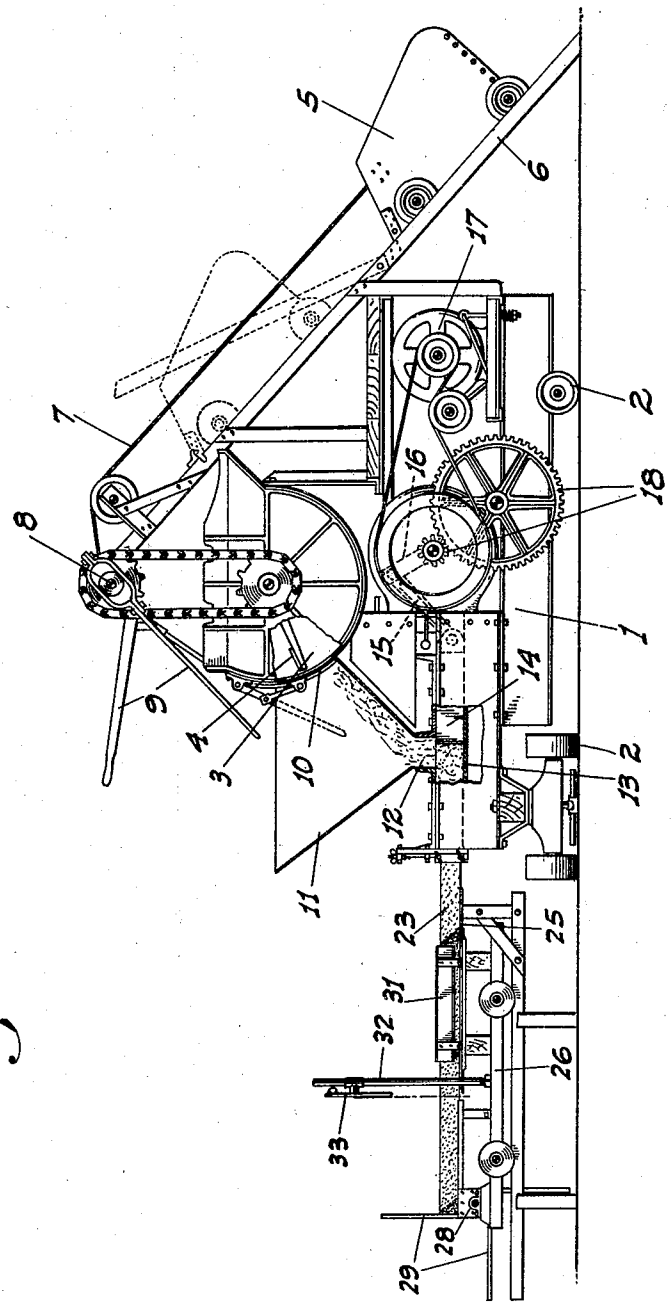


Fig. 1

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Filed May 18, 1928 3 Sheets-Sheet 2

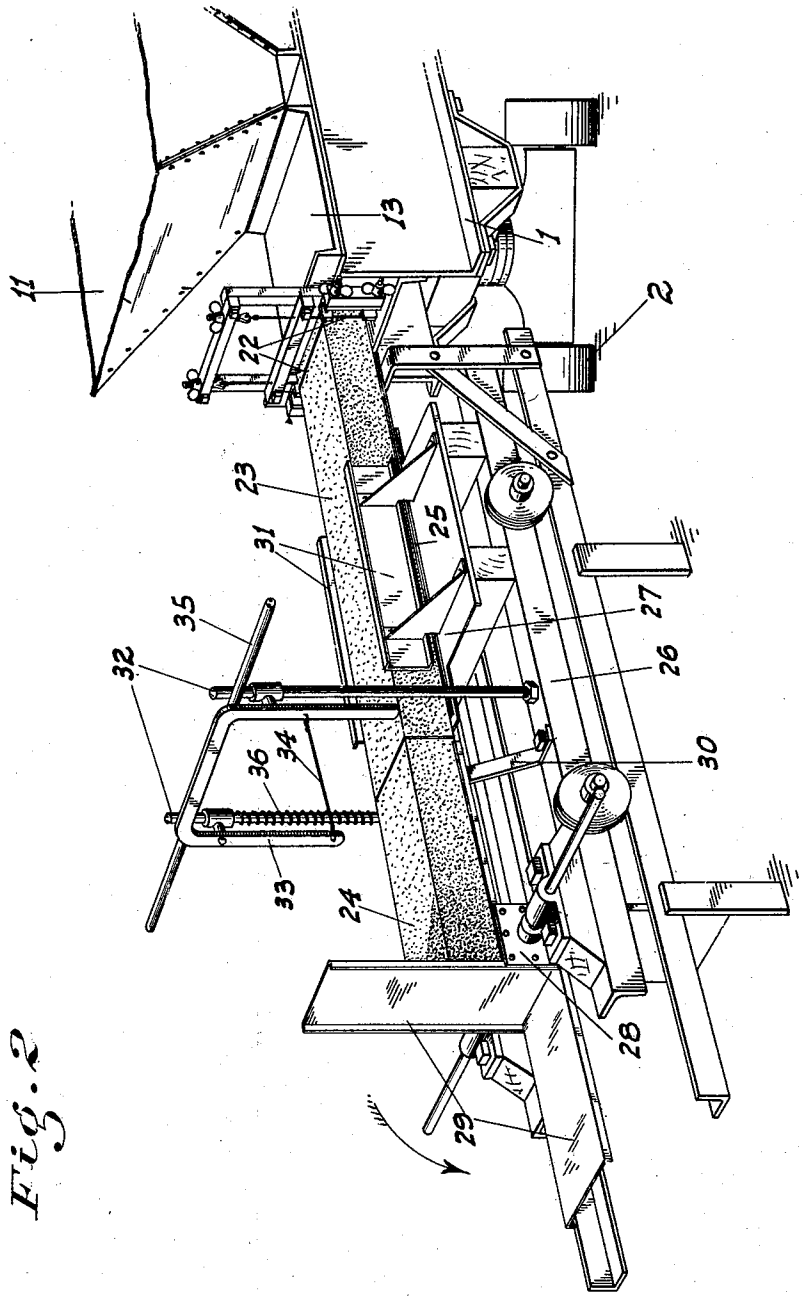


Fig. 2

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Filed May 18, 1928 3 Sheets-Sheet 3

Fig. 3

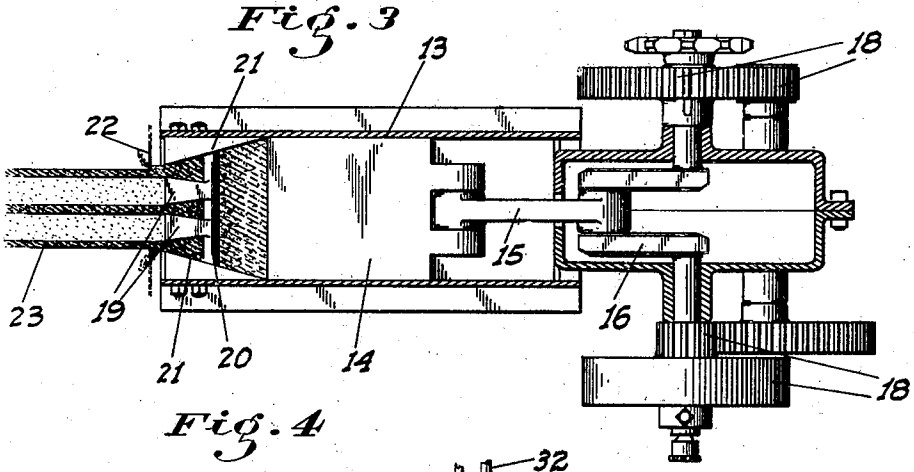


Fig. 4

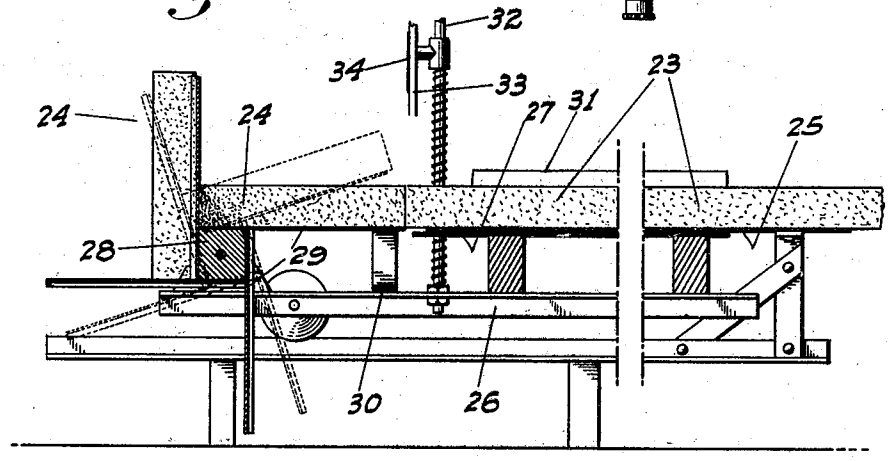


Fig. 5

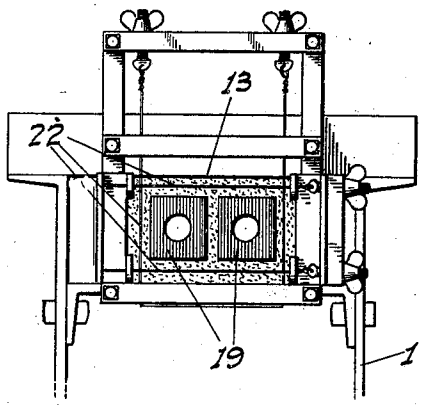
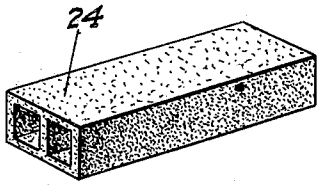


Fig. 6



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Patented Jan. 20, 1931 1,789,558

UNITED STATES PATENT OFFICE

JOHN F. MAKOWSKI, OF STOCKTON, CALIFORNIA, ASSIGNOR TO FIREPROOF WALL CO., A CORPORATION

TILE-FORMING MACHINE

Application filed May 18, 1928. Serial No. 278,786.

This invention relates to machines for making tile or blocks of plastic, cementitious material for use in the erection of walls, and especially relates to the manufacture of hollow tile of the nature shown in my co-pending application for patent, Serial No. 269,081, filed April 11, 1928, which has become Patent No. 1,779,007.

The principal object of my invention is to provide a machine for the purpose having a reciprocating plunger to act on a supply of material intermittently fed in front of the plunger, and to force such material from the machine in the form of a continuous length of material in a highly compressed state and having a cross sectional shape the same as that of the tile; and to arrange the movement of the plunger, in connection with the chamber in which the loose material is initially received, in such a manner that the tile will issue from the machine in a continuous unbroken length as above stated, in which length the material is all compressed to an equal extent throughout and firmly knitted together notwithstanding the intermittent compressing action of the plunger on the material at various and recurring portions of its length due to the reciprocation of the plunger.

A further object of the invention is to provide a novel means for severing the length of tile material into separate units of the proper length to form the individual tile; and to arrange for the support of these tile units so that after the cutting or separation has been effected, the tile may be withdrawn from the remainder of the uncut mass in such a manner as to quickly move the separated or cut ends from each other and avoid any possibility of a dragging or reuniting action of the still wet material being had; and to then cause the tile units to be successively positioned so that they may be easily handled and removed from the supporting means without danger of them sagging due to their still plastic or green condition.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a side elevation of my complete apparatus partly broken out.

Fig. 2 is a perspective view of the delivery end of the apparatus showing the tile cutting and subsequently supporting means.

Fig. 3 is a sectional plan of the forming and compressing chamber showing the plunger and its driving mechanism.

Fig. 4 is a fragmentary side elevation of the delivery end of the apparatus showing the tile cutting and supporting arrangement.

Fig. 5 is a fragmentary end view of the machine showing the tile forming chamber and sizing or gauging means.

Fig. 6 is a perspective view of a tile.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 denotes the supporting frame of the forming machine which is preferably supported on wheels 2 so as to be portable. Supported on the frame is a stationary material mixing drum 3 having rotating paddles 4 or the like therein. The material is delivered into the drum from the ground by means of a bin 5 mounted on wheels which ride on tracks 6 which are mounted in connection with the frame and which slope to the ground from a point above the drum. The receptacle is hauled up so as to discharge into the top of the drum by means of a cable 7 extending about a drum turnably mounted on a drive shaft 8. The turning of the drum and the winding of the cable is controlled by hand levers 9 and suitable interconnected mechanisms between said levers, shaft and drum; such mechanisms, however, forming no part of the present invention.

On one side the drum is provided with an opening controlled by an adjustable gate 10, through which opening the mixed material discharges into a hopper 11. The bottom of the hopper is connected to a short vertical chute 12 which delivers into a horizontal chamber 13 intermediate the ends thereof.

Slidable in the chamber is a plunger 14 which is connected by a rod 15 to a crank shaft 16. This shaft is driven at a suitable slow speed from an electric motor 17

mounted on the frame 1 by means of reduction gearing and other connections indicated at 18.

The end of the chamber 13 opposite the shaft 16 is open, and mounted in the chamber and extending from said open end inwardly a certain distance are transversely spaced tapered cores 19 rigidly connected at their inner ends to a horizontal bar 20 which extends across and is secured to the sides of the chamber. The stroke of the plunger is so arranged that when at the limit of its stroke nearest the cores, it is still some distance inwardly of the bar 20 as shown in Fig. 3. From such point of limit of movement of the plunger, the sides of the chamber slope inwardly to the open end thereof as shown at 21 in Fig. 3, so that the width of said open end or mouth of the chamber is considerably less than the portion in which the plunger reciprocates. The top and bottom of the chamber, however, are substantially parallel to each other throughout their extent. The area of the mouth of the chamber though considerably smaller than the plunger containing portion is somewhat larger than the end area of the tile to be formed. The exact cross sectional form and size of the tile is therefore gauged by wires 22 disposed a short distance outwardly of the chamber and arranged in rectangular form, and past which the material is pushed when being forced from the chamber.

The operation of the machine is as follows: During the back stroke of the plunger, the chute 12 is uncovered, and the material from the hopper 11 falls into the chamber 13.

With the forward stroke of the plunger the chute is covered and the material previously deposited in the chamber is moved along and forced into the restricted mouth area, the restriction of whose area is of course increased by the presence of the cores. As a result the material issues from the mouth in a highly compressed state as is necessary to form the tile. The forward stroke of the plunger being terminated ahead of such restricted area, the material in the chamber immediately ahead of the plunger, is not compressed to any extent but is still in a loose state. Therefore, with a subsequent complete reciprocation of the plunger, the new charge of material deposited in the chamber from the hopper and engaged by the plunger on its forward stroke, becomes thoroughly merged and intimately mixed with the material already in the chamber between the plunger and the cores. This as will be evident avoids the possibility of a poor bond being had between the initially separated charges of material. As a result the formed and compressed material issues from the machine in an unbroken length of thoroughly knitted and homogeneous character as shown at 23, and it is only necessary to cut this material into the proper lengths to form the tile units 24.

To accomplish this the following structure is associated with the forming machine: The formed material as discharged from the presser chamber is received onto a stationary table 25 along which the material slides. A carriage 26 is mounted in longitudinally slidable relation with and under the table, said carriage also having a table 27 disposed immediately under the table 25. Mounted on the carriage beyond the table 27 is a rotatable tile supporting spider. This spider comprises a central hub 28 on which is fixed a number of shelves 29, each of sufficient length to support a tile for the full length thereof. These shelves are not radial with the axis of the hub but are tangential thereto and some distance from the axis thereof. The shelves are also disposed at right angles to each other. The shelves are arranged to longitudinally aline with and face the table 25 in successive order, and when one is so alined it is above the axis of the hub, being adapted to move upwardly from such position with the rotation of the spider. Any shelf when in the above position is held from dropping by means of a laterally yieldable spring supporting member 30 which is mounted on and projects upwardly from the carriage.

The continuous length of formed material as it moves out of the forming machine passes over the table and onto a shelf of the spider positioned to receive the same, until such material abuts against the under face of the adjacent upstanding shelf as shown in Fig. 4. During this movement, the material is guided against lateral deflection by side plates 31 mounted in connection with the carriage; the shelf also having shallow side flanges projecting upwardly therefrom as shown. The continuous strip or length of material is then cut through to form the individual tile by the following means:

Upstanding from the carriage on each side and ahead of the spider are posts 32 on which a frame 33 is vertically slidable. This frame supports a severing wire 34 which is disposed in a transverse vertical plane between the end of a horizontally disposed spider shelf and the adjacent end of the table 25 and is set at an angle to a horizontal plane. The frame 33 is provided with laterally projecting handle bars 35 so that it may be pulled down to cause the wire to cut through the material, and spring means 36 may be provided if desired to raise the frame from its lowered position.

By reason of the angular setting of the cutting wire it will be evident that the cutting operation may be done with less initial pressure than would otherwise be the case. Due to the particular positioning of the tile supporting shelf relative to its axis of rota-

tion and the table 25, it will be seen that as the spider is rotated to raise a tile after the same has been cut, its cut edge moves quickly away from the remaining mass on the table, so that there is no chance for the edges just cut through to pull against each other and tend to distort the still plastic tile or damage the clean cut originally made. When the tile is raised to a vertical position by the rotation of the spider, it will be still supported against buckling or warping and in a position to be then raised and removed by hand—an operation which being accomplished by a grip on the end of the tile will not tend to cause the same to sag between its ends as would be the case if it were lifted from a horizontal position.

The sliding of the carriage (which is had by the push of the advancing material against the upstanding spider shelf) enables such advance to continue some distance even after the material actually abuts against the shelf.

This avoids the necessity of exactly timing the cutting operations to the reciprocations of the plunger, and also avoids the possibility of the material buckling as might be the case if the spider was immovably mounted relative to the table 25. The cutter being mounted on the carriage moves with the spider and is always the same distance therefrom so that the tile will always be cut to the same length, and such cutting operation may be carried out even though the carriage is actually being moved at the time. After the carriage is thus moved, it is of course returned to its original position by hand after a cut tile has been raised and another spider shelf has been moved to a horizontal position to receive the continuously advancing material.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the inventon as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

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

1. In combination, a tile forming chamber having a discharge opening from which the formed material issues as a continuous and unbroken unit, a stationary table onto which said material is received and along which it moves, longitudinally movable supporting means for the adjacent portion of the material unit disposed beyond and in alinement with the table and upon which the advancing material unit passes, stop means associated with the supporting means for engagement by the end of the unit after it has passed onto said supporting means whereby a continued advancing movement of the unit will cause the supporting means to move away from the table, and means for cutting the unit through between the table and supporting means mounted in connection with the latter to move therewith.

2. In combination, a tile forming chamber having a discharge opening from which the formed material issues as a continuous and unbroken unit, a stationary table onto which said material is received and along which it moves, a vertical frame beyond the table, supporting means for said frame to enable the same to move at right angles to the path of movement of the unit, and a cutter element mounted on the frame, said element being disposed in a plane transversely of the advancing material unit and being disposed from end to end at a constant angle to the line of movement of the frame.

3. In combination, a tile forming chamber having a discharge opening from which the formed material issues as a continuous and unbroken unit, a stationary table onto which said material is received and along which it moves, a rotatable spider disposed beyond the table, said spider comprising a hub portion whose axis extends transversely of and below the table, and tile supporting shelves projecting from the hub tangentially of the axis thereof; one of said shelves at a time being adapted to lie as a continuation of the table, and cutting means disposed to sever the material unit in a transverse plane between said shelf and the table.

4. A structure as in claim 3, with a carriage movable longitudinally of the table and on which the spider and cutting means are mounted.

5. In a tile forming machine, a forming chamber having a discharge opening through which the formed material issues as a continuous unit, a table then supporting the unit and along which the latter moves, shelves arranged as a rotary unit beyond the table, said shelves being disposed so that when the unit is rotated, the shelves will be successively disposed in alinement with the table to receive the adjacent portion of the unit thereon, and cutting means disposed between the shelf unit and table.

6. A structure as in claim 1, with an additional table disposed immediately under said first named table ahead of the cutting means and movable with said supporting means.

7. In a tile forming machine, means for advancing the formed material as a continuous unit, a table then supporting the unit and along which the latter moves, shelves arranged as a rotary unit beyond the table, said shelves being disposed so that when the unit is rotated the shelves will be successively

disposed in alinement with the table to receive the adjacent portion of the unit thereon, and cutting means disposed between the shelf unit and table to sever the unit and leave a length thereof lying on a shelf; the shelves being arranged so that the bottom face of one shelf forms the backstop for a length of material supported on an adjacent shelf.

In testimony whereof I affix my signature.

JOHN F. MAKOWSKI.