

No. 677,861.

Patented July 9, 1901.

E. G. DURANT.

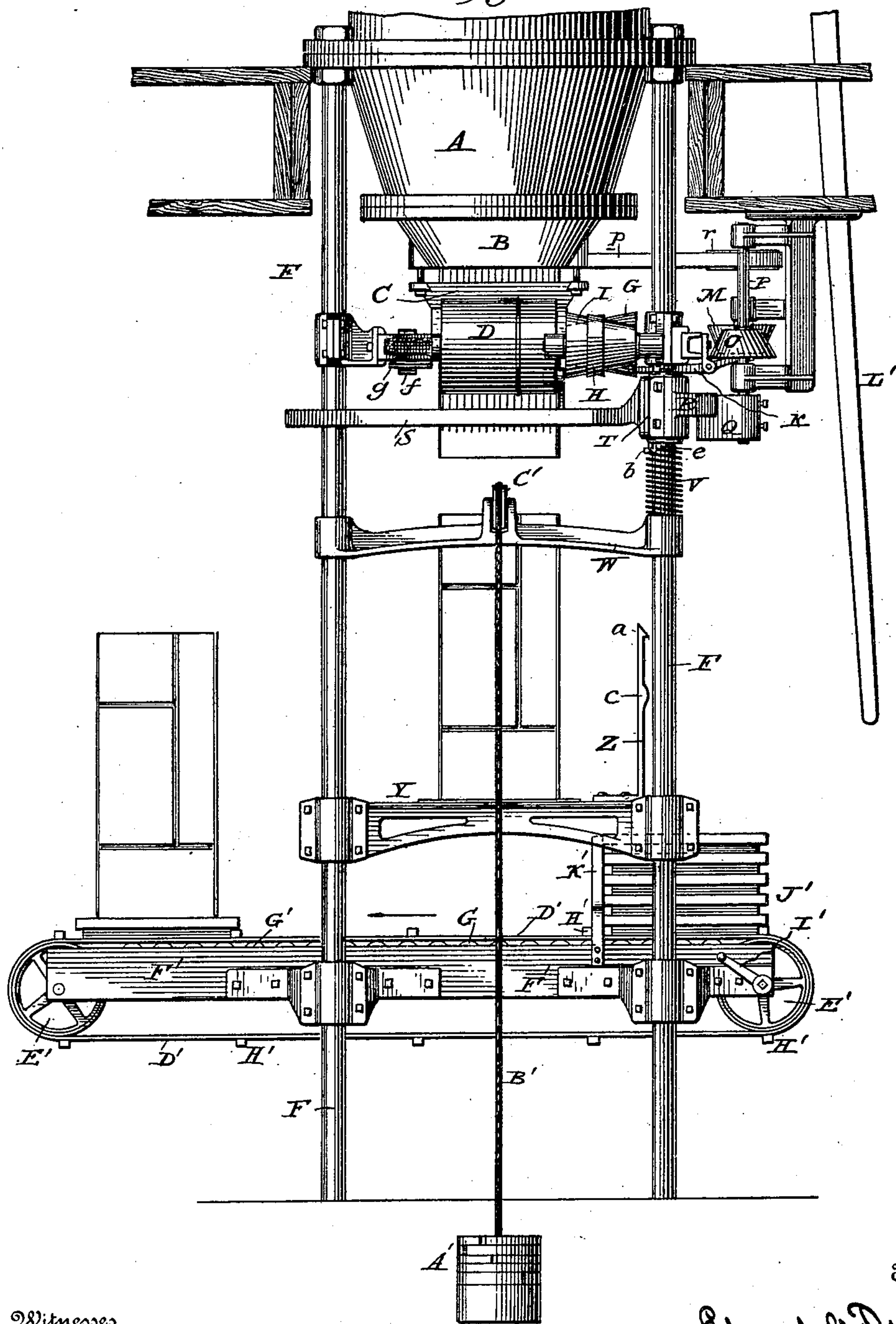
MACHINE FOR THE MANUFACTURE OF HOLLOW TERRA COTTA AND CLAY WARE.

(Application filed Aug. 1, 1899.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



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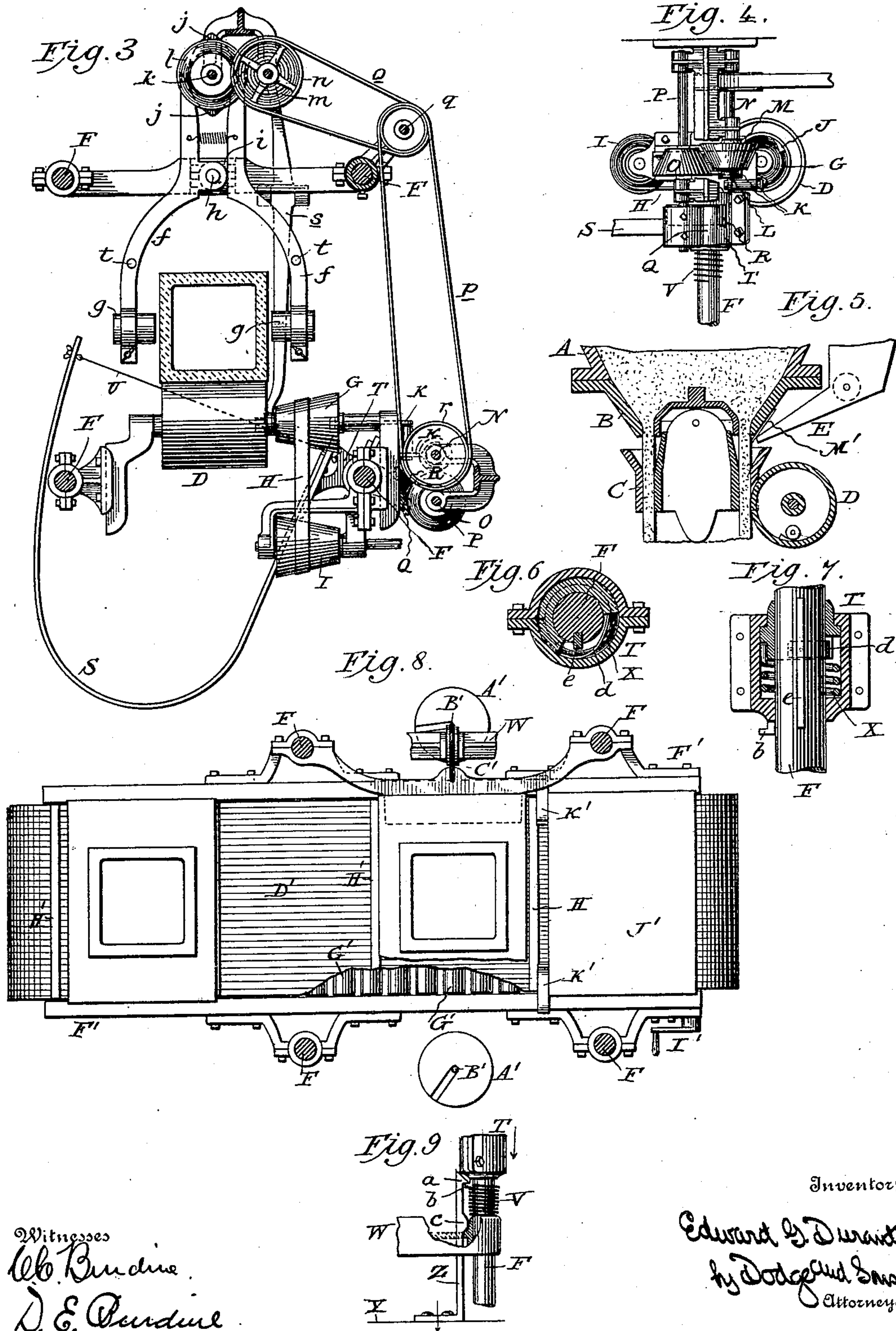
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MACHINE FOR THE MANUFACTURE OF HOLLOW TERRA COTTA AND CLAY WARE.

(Application filed Aug. 1, 1892)

3 Sheets—Sheet 3.

(No Model.)



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UNITED STATES PATENT OFFICE.

EDWARD G. DURANT, OF PASADENA, CALIFORNIA.

MACHINE FOR THE MANUFACTURE OF HOLLOW TERRA-COTTA AND CLAY WARE.

SPECIFICATION forming part of Letters Patent No. 677,861, dated July 9, 1901.

Application filed August 1, 1899. Serial No. 725,780. (No model.)

To all whom it may concern:

Be it known that I, EDWARD G. DURANT, a citizen of the United States, residing at Pasadena, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Machines for the Manufacture of Hollow Terra-Cotta and Clay Ware, of which the following is a specification.

My present invention relates to improvements in machines for the manufacture of hollow terra-cotta and clay ware, the construction and advantages of which will be hereinafter set forth, reference being had to the accompanying drawings, wherein—

Figure 1 is a front elevation of the machine; Fig. 2, a side elevation; Fig. 3, a horizontal sectional view taken on the line 1 1 of Fig. 2; Fig. 4, an elevation of a certain portion of the driving mechanism; Fig. 5, a vertical sectional view of the dies and impression or embossing roll; Fig. 6, a horizontal sectional view of one of the vertical uprights or columns and the hub of the cutting mechanism; Fig. 7, a vertical sectional view of the same parts; Fig. 8, a top plan view of the table or support, and Fig. 9 a detail view illustrating the connection between the table or support and the cut-off mechanism.

The main object of my invention is to produce a machine in which hollow ware—such as architectural building-blocks, pipes, tiles, and the like—may be automatically and perfectly produced.

With the machine hereinafter set forth the clay passes from an auger or like machine through a forming-die to a finishing-die, past an ornamenting or embossing roll, is treated with enamel, coloring-matter, or the like, punched, and cut off in equal lengths. These various steps are carried out automatically and the result is a finished article which is ready to be placed in a kiln without the necessity of further handling or treatment.

Referring to the drawings, A represents the discharge end of an auger or like machine, to which is connected a forming-die B. (Shown in detail in Fig. 5.) Suspended from said die and detachably connected thereto is a finishing-die C, the upper end of which, as is clearly indicated in Fig. 5, is made to flare outwardly. One side of the finishing-die is cut away at its lower edge, and mounted ad-

jacent thereto is an embossing or finishing roll D, which is designed to work against the clay and emboss or impress the pattern formed upon its face upon the clay.

It will be noted upon reference to Fig. 5 that the upper end of the lower finishing-die stands at a slight distance below the discharge end of the forming-die, and leading into this space is a chute or hopper E, through which the enamel, coloring-matter, or the like which is to be applied to the face of the tile passes, the outwardly-flaring edge of the finishing-die serving to facilitate application of the finishing material.

While in the drawings I have shown but one embossing-roll, it is manifest that a roll may be applied to each side of the finishing-die or to two or three sides, as desired.

Connected to or extending down from a point adjacent to the discharge end of the auger-machine are four upright columns F, which form the support for the various parts of the mechanism.

The clay as it passes down between the inner portion of the finishing-die and the embossing-roll serves to rotate said roll; but in order that there may be no drag on the roller I connect to the axle thereof a pulley G, (best shown in Fig. 3,) which is connected by a band H to a pulley I. Motion may be imparted to said pulley I from any source, and the adjustment of the belt H between the driving-cones G and I is such as to keep the speed of rotation of the embossing-roll equal to the rate of descent of the clay as it passes out of the finishing-die. Thus there can be no drag of the roller upon the clay, and the impression made by the roll will be sharp and clear cut.

The outer end of pulley G is provided with a cam J, which serves to actuate a lever K, one end of which extends out in line with said pulley, as is indicated in Figs. 1, 3, and 4, while the opposite end of the lever is forked and embraces a sleeve or collar L, connected to a pulley M, which is slidably mounted upon a live shaft N. Said pulley M is normally held up by a spring. (Not shown.)

O represents another pulley, mounted upon a dead shaft P, which shaft carries a cam Q. Cam Q is designed to come into contact with a cam R for actuating the severing or cutting

mechanism. Said cutting mechanism comprises a steel bow S, one end of which is connected to a hub T, which is mounted upon one of the uprights or columns F, as is indicated in Figs. 1, 2, and 3. Between the fixed end of the bow S and its outer end is a wire U, the spring of the bow serving to keep said wire under tension and taut at all times.

It is of course essential that the cutting device have a vertical movement as well as a swinging movement, for as the clay is descending while being severed it is necessary that the severing device should travel with it in order to make a cut at right angles. To this end the hub T is slidably mounted upon the upright and is sustained in its highest position by a spring V, which bears at its lower end upon one of two cross members W, extending between the uprights F. Hub T is made hollow, as shown in Figs. 6 and 7, and a coiled spring X serves to hold the cutting-bow in the position indicated in Fig. 3 in opposition to the action of the cams Q and R. In order, however, that the cutting device may be lowered at the same rate of speed as the descent of the clay, I fasten or secure to a vertically-movable table Y a rod Z, formed of suitable spring metal and provided at its upper end with a catch *a*, which when the table is in its highest position will engage with a suitable projection *b*, formed on the lower edge of the hub. As the carriage begins to descend (as will be hereinafter more fully set forth) the catch *a*, which is in engagement with the projection *b*, draws the cutting member down with it, while at the same time the cam R, which is in contact with the cam Q, will cause said cutting member to swing about its axis and sever the material in a line at right angles to the body thereof. When, however, the material or tile which has been severed counterbalances or overweighs the table, the table will begin to descend with the tile thereon, and the spring-arm Z or a projection *c*, formed thereon, will come into contact with a suitable stop or projection formed on one of the members W adjacent thereto and release the catch *a* from the projection *b*. As the cutting member descends with the table and has made its full cut the free end of a spring-arm *d*, connected to the hub T, comes into contact with and locks against a spline or feather *e*, formed upon the upright or column F, and prevents the cutting mechanism from swinging back under stress of the spring X. As soon, however, as the table has descended to such an extent as to carry the hub T free of the lower end of the spline or feather, and thus free the end of spring *e*, spring X will swing the cutting-frame back to its original or normal position, ready for another cut, while the spring V will serve to elevate it and bring the cams Q and R again into alignment. The cam J or cams J, as the case may be, are so proportioned and arranged upon the driving-pulley G that the cutting mechanism will be actuated at the precise moment

desired—that is to say, the severed length of tile will have the figure or figures embossed thereon, so that when they are placed end to end indiscriminately they will match or make up.

Ordinarily the embossing-roll is designed to make one complete revolution to each length of tile or two complete revolutions to each length of tile, and consequently the cutting mechanism must begin its action immediately the roll has made one or two revolutions, as the case may be. At the same time the embossing and severing operations are taking place the punching mechanism is also brought into operation. Said mechanism comprises two levers *f*, carrying suitable dies *g* in line with the descending clay or finishing-die. The levers are pivoted upon an upright or vertical axis *h*, which in turn is mounted in an elongated bearing *i*, Fig. 2, which connections permit the levers to swing in toward the tile and at the same time tip and follow the tile down in a right line. Were the levers pivoted upon a fixed bearing, they would not make a clean cut in the tile, but would drag and tear the same. To actuate the levers, I employ a cam *j*, which is mounted upon a shaft *k*, extending down between the rear ends of said levers. Mounted upon the shaft *k* is a fixed pulley *l*, designed and adapted to receive its motion from a companion pulley *m*, which is normally held up out of contact with the pulley *l*. Motion is imparted to the driving-pulley *m* by means of a pulley *n*, mounted upon the same shaft therewith, and belts *o p*, passing about suitable pulleys mounted upon a shaft *q*, the belt *p* receiving its motion from a pulley *r*, mounted upon the live shaft N. These connections are best shown in Figs. 2 and 3. In order to govern the position of the friction-pulley *m* and bring it down into contact with the pulley *l*, I employ a lever *s*, which is pivoted to the uprights and has one end working in a sleeve or collar connected to the pulley *n*, while its opposite end extends into line with one end of the embossing-roll.

The end of the embossing-roll is provided with a suitable cam, Fig. 5, which is placed in such relation as to actuate the lever and cause the pulley *m* to be depressed and impart motion to pulley *l*, and consequently the cam *j*, thereby separating the rear ends of the levers and forcing the cutting-dies *g* into the descending tile. A suitable spring is employed for holding or drawing the rear ends of the lever together, while other springs *t* are employed for elevating the levers *f* after the cut has been made and the cutting-dies are retracted from the tile. The various cams are so positioned and arranged that they will come into action at just the right moment. The length of the tile, the number of perforations made by the punching mechanism, and the number of revolutions imparted to the embossing-roll are all matters which can be regulated at will by simply varying the

number of cams employed and speeding the machine accordingly.

The receiving table or platform Y is arranged to move up and down on the uprights F, and to hold it in its elevated position it is provided with suitable counterweights A', connected to ropes or the like B', which pass over pulleys C', mounted in the cross members W. The platform or table when it has descended to its lowest position comes into line with an endless belt D', which passes about suitable pulleys E', mounted in the ends of a frame F'. Suitable rollers G' are placed in the upper part of the frame and form a bearing for the upper side of the belt. The belt, as will be seen upon reference to the drawings, is provided with a series of cross slats or bars H', projecting out from the surface thereof. These cross-slats as the belt is rotated through the medium of a crank I' come into contact with the lowermost member of a series of boards J', mounted on the belt, near one end thereof. As the belt is rotated in the direction indicated by the arrow in Fig. 1 the lowermost board will be forced out from beneath the others and onto the table or carriage Y, the remaining boards being held in place by two upright arms or bars K'. (Best shown in Figs. 1 and 2.) When the machine is first put in operation and before a tile has been severed, the board simply passes onto the table and is elevated therewith. When, however, the table descends with a tile resting upon the board, one of the cross-slats H' will as the belt is rotated come into contact with the edge of the board resting upon the table or carrier and draw it therefrom while another board is being withdrawn from the belt and onto the carrier. The rotation of the belt will of course take the completed tile free from the machine or apparatus into a position where it may be readily handled and taken to the kiln. As soon as the tile is withdrawn from the table the weights A' will serve to elevate it and bring it to a position directly below the end of the tile then being formed, the catch *a* of the spring-rod Z at the same time coming into engagement with the projection *b*, formed upon the cutting mechanism.

A lever L' extends down from the actuating mechanism of the auger-machine, or whatever type of machine is used, into a position where it may be readily used by the operator to start and stop the device. Instead of employing a crank I' for moving the belts said belts may be driven by power derived from any suitable source.

From the foregoing it will be seen that the machine is automatic in its operations throughout. It will also be seen that a uniform length of block is secured by governing the movement of the ornamenting or embossing roll, while at the same time this movement of the roll governs to automatic cut-off mechanism.

By introducing the clay enamel or coloring matter directly onto the raw tile before it passes into the finishing-die said matter or material becomes more thoroughly incorporated into the surface of the tile than could otherwise be done. Where the material is applied to the tile after it is finished, it is apt to be loose and uneven in its application. In order that the material may be thoroughly incorporated into the surface of the tile, I may employ a comb M' (shown in Fig. 5) to roughen or slightly scratch the surface to which said material is to be applied.

The framework F' is made adjustable upon the uprights F, so that the machine may be adjusted to carry off different lengths of tile, the carrier Y of course descending with the tile thereon until it comes into contact with and is stopped by the supports for said framework.

Having thus described my invention, what I claim is—

1. In combination with a clay-working machine; a vertically-disposed forming-die; and a separate and independent finishing-die located in a plane below the forming-die, and arranged to receive the material being operated upon directly from the forming-die and to act upon all of the faces of said material.
2. In combination with a clay-working machine; a vertically-disposed forming-die; and a separate and independent finishing-die having an outwardly-flaring upper edge, said finishing-die being located in a plane below the forming-die and adapted and arranged to receive the material being operated upon directly from the forming-die without the intervention of any intermediate support.
3. In combination with a clay-working machine, a vertically-disposed forming-die; a separate and independent finishing-die located in a plane below the same; and means for applying coloring-matter or the like to the various outer surfaces of the material being acted upon at a point intermediate the two dies.
4. In combination with a machine for working clay, a forming-die; a finishing-die adapted to receive the material directly from said forming-die without the intervention of any intermediate support, said finishing-die being arranged to act upon all the faces of the material; and an ornamenting-roll working in conjunction with the finishing-die.
5. In combination with a machine for working clay, a forming-die; a finishing-die adapted to act on all the faces of the material and to receive the material directly from the forming-die without the intervention of an intermediate support; means for introducing glaze or the like intermediate said die to one or all of the faces of the material being operated upon; and an ornamenting-roll working in conjunction with the finishing-die.
6. In combination with a machine for working clay, a vertically-disposed forming-die; a

finishing-die suspended therefrom; and an ornamenting-roll working in conjunction with the finishing-die.

7. In combination with a machine for working clay, a forming-die; a finishing-die; an ornamenting-roll adapted to work in conjunction with the finishing-die; and means for imparting motion to the roll, substantially as described, whereby the roll is caused to travel at a speed equal to that of the descending tile.

8. In a tile-machine, the combination of a forming-die; a finishing-die working in conjunction therewith, and an embossing-roll working in conjunction with the finishing-die; a comb adapted to bear upon the tile intermediate said dies; and means for introducing glaze or the like upon the surface acted upon by the comb.

9. In combination with a machine for working clay, a forming-die; a finishing-die; an ornamenting-roll adapted to work in conjunction with the finishing-die and to come into contact with and receive motion from the descending tile; and means independent of the tile for imparting motion to the roll, substantially as described, whereby the roll is caused to travel at a speed equal to that of the descending tile.

10. In a tile-machine, the combination of a die; an impression-roll working in conjunction therewith; punches; and connections intermediate said punches and the impression-roll for throwing said punches into operation.

11. In a tile-machine, the combination of a die; an impression-roll working in conjunction therewith; a punching mechanism; means for imparting motion to said punching mechanism; and devices independent of the impression-roll and the means for driving the punching mechanism, serving to throw the punch-operating means into and out of operative relation.

12. In a tile-machine, the combination of a die; an impression-roll working in conjunction therewith; punching-dies adapted to form perforations in the tile as it leaves the die; a severing device for cutting off the tile into determinate lengths; and connections between said parts for bringing them into operation at predetermined intervals.

13. In a tile-machine, the combination of a die; an impression-roll working in conjunc-

tion therewith; a severing device for the tile; and means controlled by the operation of the roll for swinging the severing device across the path of travel of the tile, and also in a direction in line with the travel of the tile.

14. In a tile-machine, the combination of a die; an impression-roll working in conjunction therewith; punching mechanism adapted to punch the tile as it descends from the die; a severing device for the finished tile, said device being movable across the path of travel of the tile and also downwardly in line therewith; and means for imparting motion to the impression-roll, the punches, and the severing mechanism, substantially as described.

15. In a tile-machine, the combination of a forming-die; a table or carrier movable toward and from said die; means for normally holding said table up toward said die; an endless belt mounted in the framework below the table; a series of boards held at one end of the belt; and means carried by said belt for withdrawing the boards one at a time and placing them in position on the carrier.

16. In a tile-machine, the combination of a forming-die; a pair of punching-levers located at one side of said die, said levers being pivoted and arranged so that they may close against the tile and also move downwardly therewith, substantially as described.

17. In combination with a clay-working machine, a die for forming hollow tile; a separate and independent finishing-die adapted to act upon the exterior faces of the tile; an ornamenting-roll working in conjunction with said finishing-die; and means for applying glaze or the like to all the faces of the tile at a point intermediate the dies.

18. In a machine for forming hollow terracotta ware, the combination of a die adapted to form a continuous length of hollow tile; a die for finishing the outer surfaces of said tile; an ornamenting-roll working in conjunction with said finishing-die; and means for introducing glaze or the like to the tile intermediate the dies.

In witness whereof I hereunto set my hand in the presence of two witnesses.

EDWARD G. DURANT.

Witnesses:

GRACE E. DURANT,
ROBERT D. DURANT.