

No. 805,299.

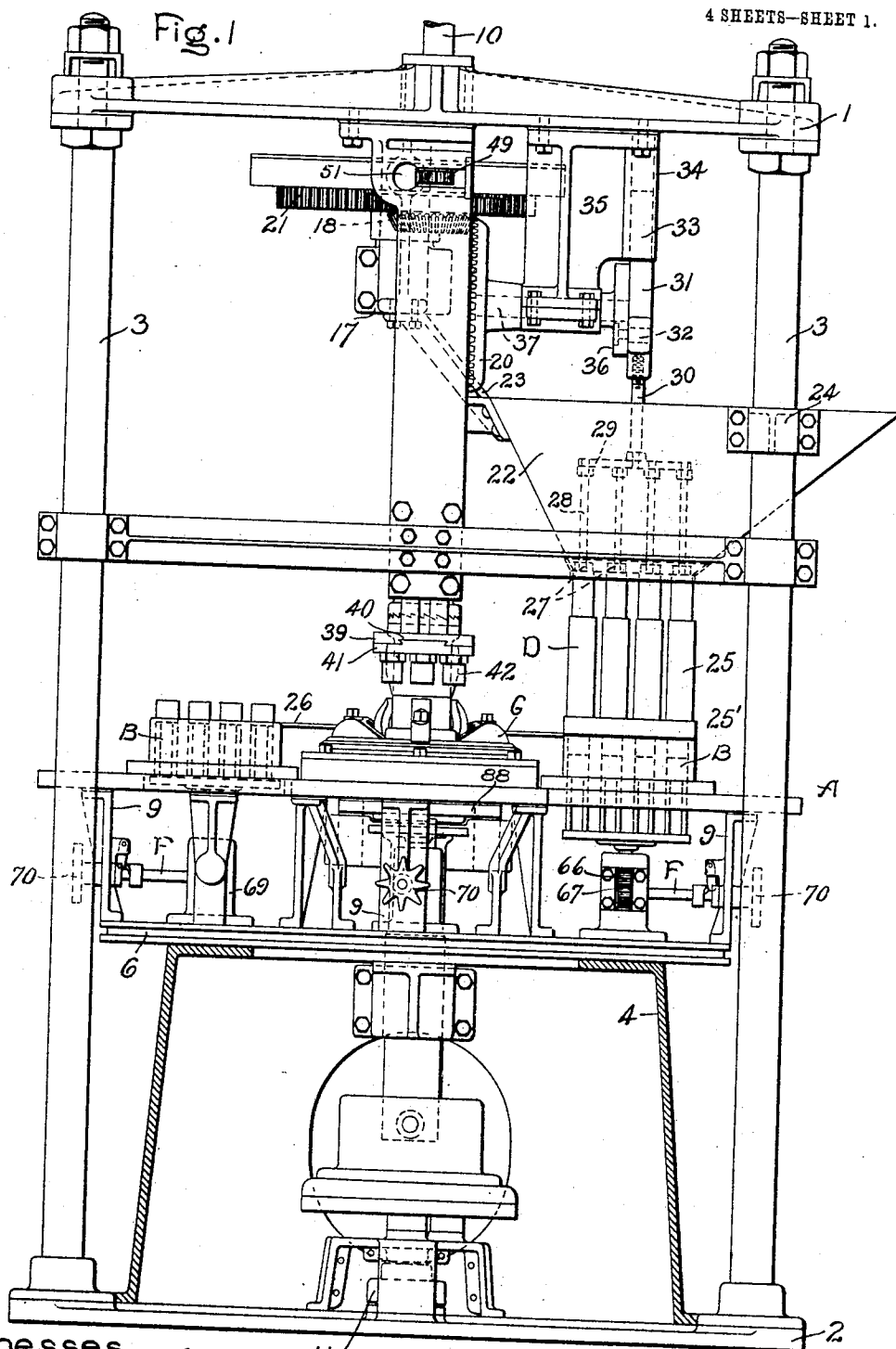
PATENTED NOV. 21, 1905.

E. G. KASTENHUBER.

APPARATUS FOR MOLDING PORCELAIN AND SIMILAR WARE.

APPLICATION FILED JULY 31, 1903.

4 SHEETS—SHEET 1.



Witnesses.

George A. Thimble.
Helen Orford

Inventor:
Edwin G. Kastenhuber,
by *Allen H. Adams* Atty.

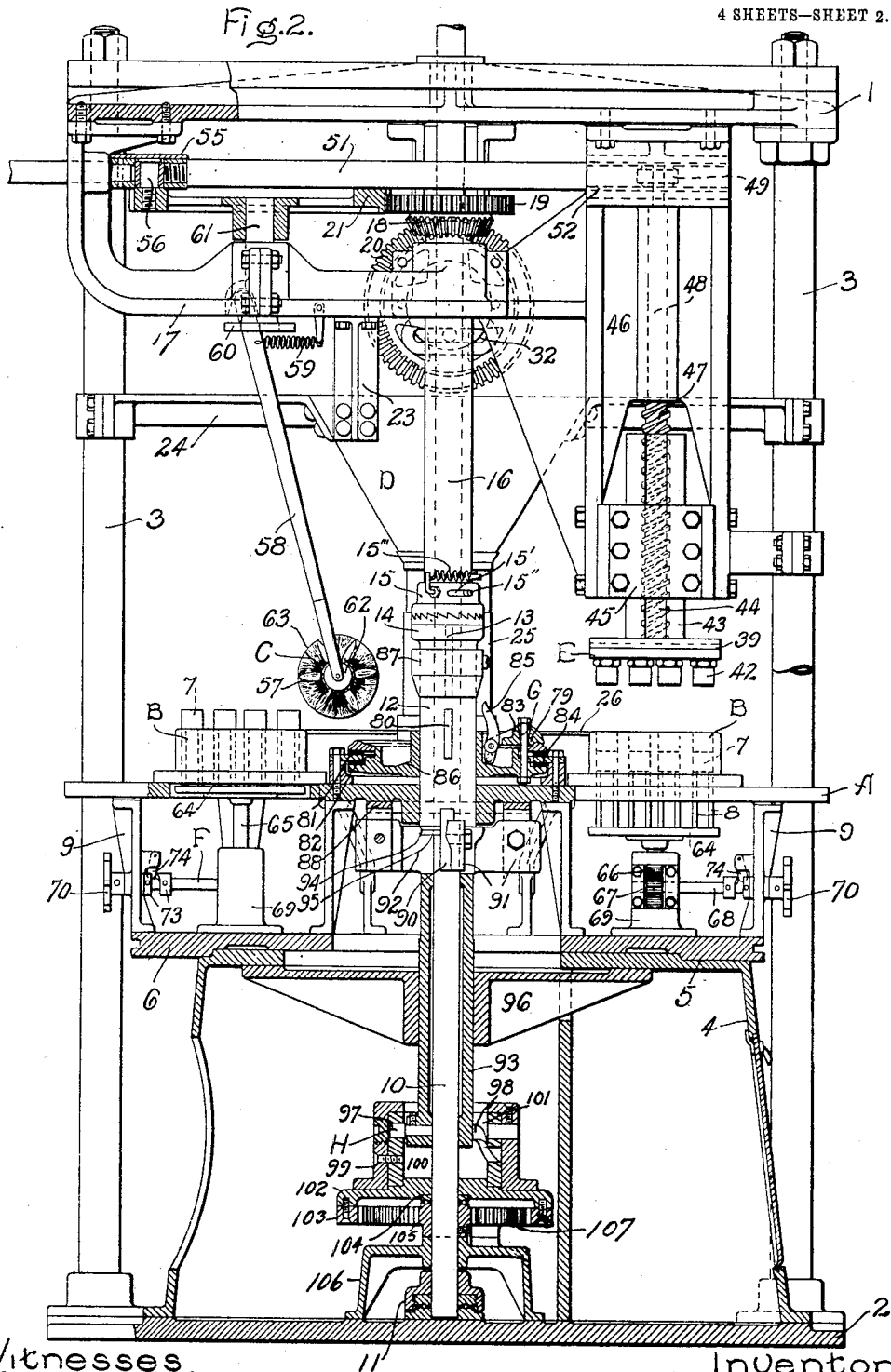
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4 SHEETS—SHEET 2.



Witnesses
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4 SHEETS—SHEET 3.

Fig. 3.

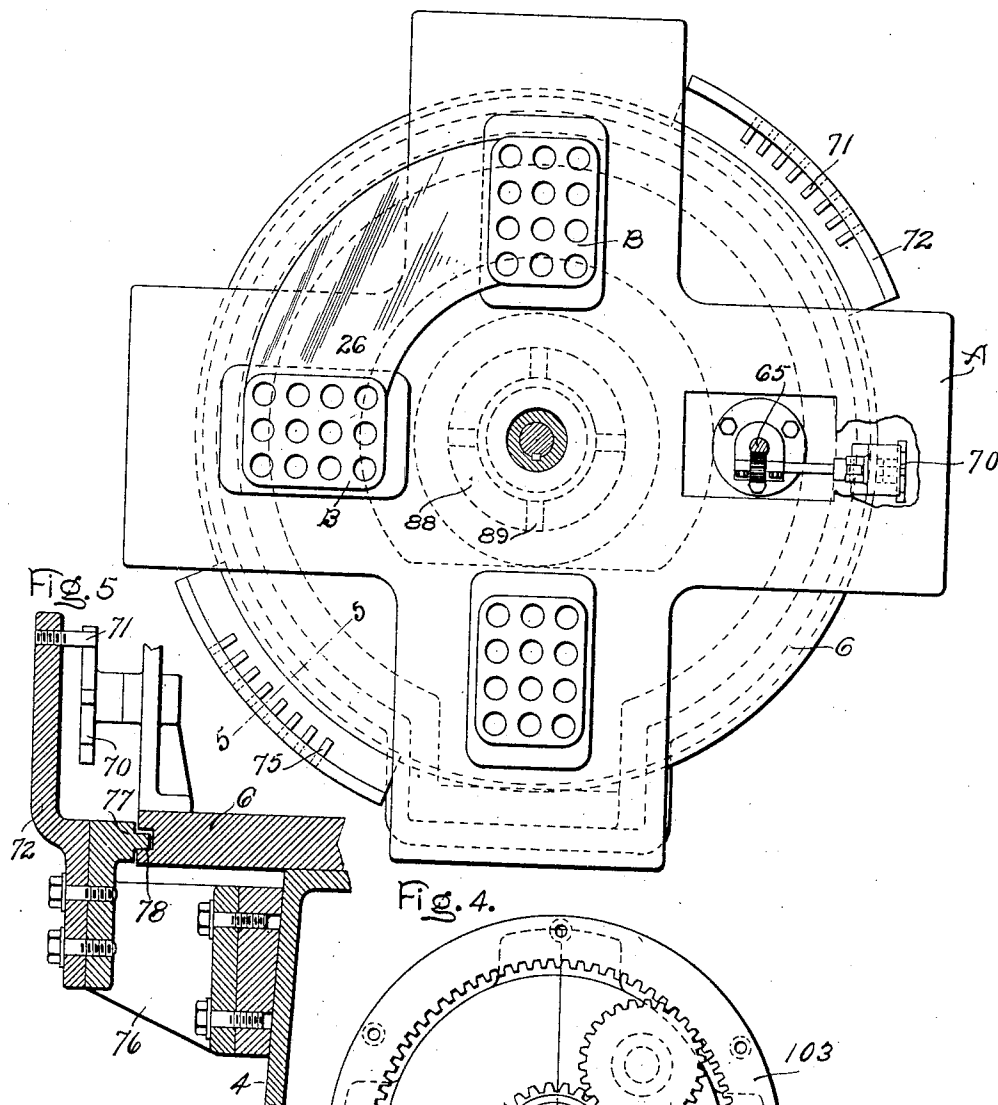
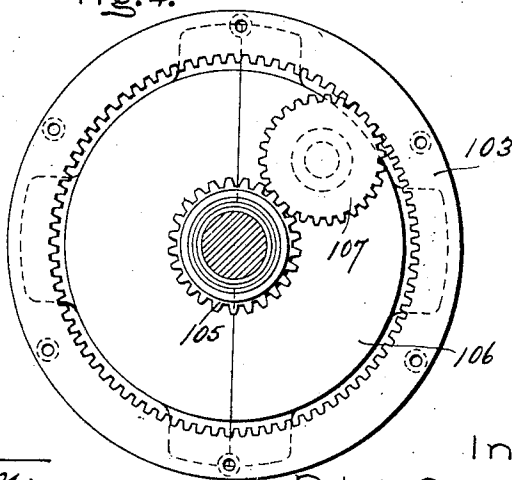


Fig. 4.



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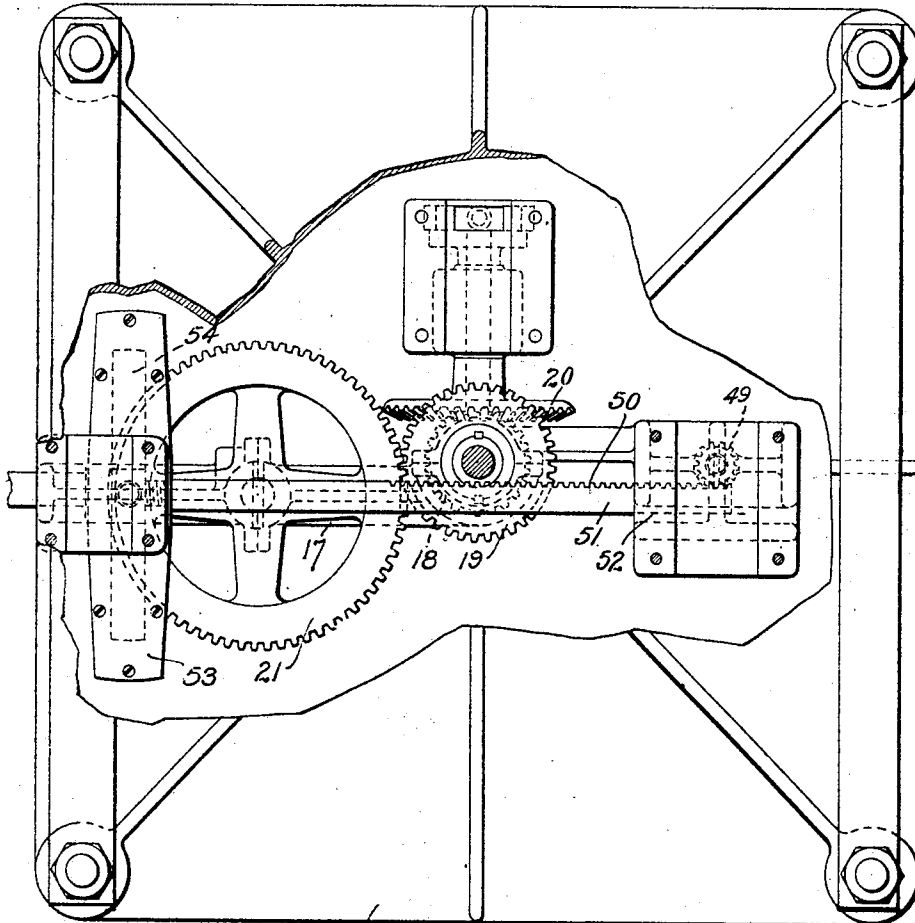
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APPLICATION FILED JULY 31, 1903.

4 SHEETS—SHEET 4.

Fig. 6.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR MOLDING PORCELAIN AND SIMILAR WARE.

No. 805,299.

Specification of Letters Patent.

Patented Nov. 21, 1905.

Application filed July 31, 1903. Serial No. 167,710.

To all whom it may concern:

Be it known that I, EDWIN G. KASTENHUBER, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Apparatus for Molding Porcelain and Similar Ware, of which the following is a specification.

The present invention relates to the manufacture of molded porcelain and analogous ware, and more particularly to the apparatus for shaping and compressing the clay or kaolin into its desired forms with the necessary degree of compactness. The apparatus most commonly employed heretofore for this purpose has consisted of a press provided with one or sometimes two female dies in which the kaolin or clay was placed by hand, corresponding male dies adapted to compress the material in the female dies and actuated by hand-operated levers or other power devices, means for ejecting the formed articles operated either by hand or foot, and hand-operated means for brushing off the particles of clay adhering to the dies and applying oil to their surfaces preparatory to refilling. The great amount of effort and number of operations required of the operator to produce each article by means of these prior devices has rendered their manufacture unavoidably slow and expensive.

The object of my invention is to provide a power-driven device in which articles of ceramic material may be formed without manual effort or attention on the part of the operator other than that of keeping the device supplied with kaolin or clay and the removal of the completed articles.

The invention will be readily understood by reference to the following description and the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a right side elevation of a molding-machine with certain parts omitted for clearness of illustration, embodying one form of my invention. Fig. 2 is a front side elevation thereof with certain parts shown in section. Fig. 3 is a top plan of the molding-table and associated parts. Fig. 4 is a top plan of the lower set of gears. Fig. 5 is an enlarged section of the operating-rack for actuating the devices for ejecting the articles from the molds, taken on the line 5 5 of Fig. 3; and Fig. 6 is a top plan of the machine with

the frame-plate broken away and showing the actuating-gears of the clay delivering and compressing devices.

In the construction shown in the drawings a revoluble supporting-table A is provided with four sets of female dies B, which as the table is turned step by step through angles of ninety degrees are successively brought into position to be operated upon by the brushing and oil-distributing means C, the clay-delivering means D, the reciprocating male dies E at which the clay in the female dies is compressed, and the ejecting means F. As each set of female dies B is brought to the front of the machine the attendant transfers the molded product therefrom to suitable trays, upon which they are dried and finally delivered to the kiln.

The main frame of the machine comprises rectangular top and bottom supporting-plates 1 and 2, connected at the corners by upright posts 3. A frusto-conical base 4 is secured to the bottom plate and provided at its upper end with a circular bearing-surface 5, upon which a circular supporting-disk 6 for the table A rotates. The table A is in the form of a Greek cross, each arm of which is secured to the supporting-disk 6 by means of brackets 9, secured at their upper ends to each edge thereof and at their lower ends to the upper surface of the disk 6.

Power is applied to the device by means of a vertical shaft 10, supported at its lower end in a thrust-bearing 11 and provided intermediate its length with a sleeve 12, feathered thereto at 13 for independent axial movement. The upper end of the reciprocating sleeve 12 is enlarged and provided with a crown-ratchet 14, which engages when in elevated position with a corresponding ratchet carried by a collar 15, having a yieldable lost-motion connection with a hollow shaft 16, concentric with the main drive-shaft 10 and journaled at its upper end in a horizontal bracket 17. To the upper end of the hollow shaft are fixed a bevel-gear 18 and a spur-gear 19, the former engaging a larger bevel-gear 20, which actuates the clay-feeding device D, and the latter engaging a spur-gear 21, having a diameter twice as great and connected to actuate the compressing means E and the brushing and oil-distributing means C. The central section of the sleeve 12 passes through and is feathered to a clutching device G, adapted to be actu-

ated by the movement of the sleeve to its lower position to engage some part fixed to the table A and carry the latter, with the sleeve, through an angle of ninety degrees. The means for periodically raising and lowering the sleeve 12 comprises a cam-drum H, geared to the main shaft 10 so as to make one revolution to three of the shaft and arranged to reciprocate a non-rotatable quill swiveled to the lower end of the sleeve 12.

The clay-delivering means D comprises a hopper 22, supported at the back of the machine by suitable braces 23 and 24, secured to the main frame and connecting at its lower end with telescopic conductors or tubes 25, which are of a size and arrangement corresponding to the respective molds used. These tubes 25 have their lower ends attached to steadying-plates 25', which normally rest upon the upper surface of a die-box B, and when the table A is being rotated they slide along over the top surface of segments of a plate 26, supported in the plane of the tops of the boxes B, so that the clay is held from passing out except when a mold is presented thereto. Within the tubes 25 are a corresponding number of stirrers to insure the passage of the clay from the hopper 22 to and through the tubes. Each stirrer comprises a spider 27, secured to the lower end of a rod 28, which is supported at its upper end in a reciprocating head 29. The head 29 is carried by a rod 30, connected to the lower end of a piston 31, having a transverse crank-slot 32 and a guide projection 33 of rectangular cross-section at its upper end loosely engaging a guide-box 34 in a bracket 35, depending from the top plate 1. The actuating-crank 36 is mounted upon one end of a horizontal shaft 37, journaled in a bearing at the lower edge of the bracket 35 and to the other end of which is keyed a bevel-gear 20, which meshes with the gear 18 on the hollow shaft 16.

The compressing means comprises a vertically-reciprocating head 39, having a dove-tailed groove 40 in its lower surface for the reception of removable blocks 41, upon which the male dies 42 are mounted.

The head 39 is carried at the bottom end of a plunger 43, having guide-channels 44 formed in its sides, adapted to engage corresponding ways of a guide-box 45, carried at the lower end of a bracket 46, depending from the top plate 1, and connected to the corner-posts 3 and the horizontal bracket 17. The plunger 43 is bored out axially and screw-threaded for the reception of an actuating-screw 47, connected to a shaft 48, journaled in the bracket 46, and provided on its upper end with a pinion 49, which meshes with a rack 50, formed in a horizontal bar 51, supported at one end in a guide-bearing 52 near the upper end of the bracket 46 and at the other end in the bent-up end of the bracket 17. The rack-bar 51 is provided near its left end

with a long transverse head 53, having a crank-slot 54 and a strengthening cover-plate 55. Engaging with the slot 54 is a roller crank-pin 56, secured to the upper side of the large spur-wheel 21, meshing with the spur-gear 19 in the bottom shaft 16.

The means for cleaning and applying oil to the female dies B comprises a cylindrical brush 57, supported on the lower end of an oscillating arm 58 and adapted to be swung across in contact with the elevated dies as they are brought into position beneath it. A coiled spring 59 engages the arm 58 near its upper end and operates to move the brush into its innermost position after it has been moved outwardly by its actuating means, which consists of a star-wheel 60, carried at the lower end of a shaft 61, journaled in the horizontal bracket 17, and keyed at its upper end to the gear 21. The brush 57 consists of a central metallic drum 62, adapted to be filled with oil, and brush material 63, such as bristles, projecting through the walls of the drum.

The molds or female dies are of ordinary construction with movable lower sections 7, but arranged in groups in boxes B, which are removably secured to the table A over rectangular apertures formed therein. The movable sections 7 are carried at the upper ends of rods 8, secured to reciprocating heads 64. After the compressing operation has taken place these heads 64 are moved into their upper positions to eject the molded articles from the female dies by the following means: The short plungers 65, upon which the heads are mounted, are provided with racks 66, which mesh with pinions 67, fixed upon horizontal shafts 68, journaled at their inner ends in the guide-blocks 69 for the plungers and at their outer ends in the outermost table-brackets 9. To the outer ends of the shafts 68 are fixed star-wheels 70, which engage at their lower edges with a row of pins 71, constituting a stationary rack to give the wheels a complete rotation as they are carried thereover in the rotation of the table. The pins 71 are fixed in a bracket 72, secured to the side of the base 4 to the right of the front position, so that by the time any arm of the table, with its compressed product, reaches the operator the completely-formed articles have been ejected from the female molds and are ready to be removed from the machine. In order to hold the removable sections in elevated position until after the brushing and oiling operation, the shafts 68 are provided with pairs of crown-cams 73, having sharp offsets with which pivoted latches 74 coöperate. After the brushing and oiling operation the sections 7 are lowered to place the female dies in condition for refilling by means of a second stationary row of pins 75, which engage the star-wheels 70 at their upper edges. The pins 75 are secured to a bracket, as shown in Fig. 5, con-

nected through a block 76 to the side of the base 4. The block 76 is provided with an overhanging tongue 77, which engages a shoulder 78, formed in the periphery of the supporting-disk 6, and acts to hold the latter from accidentally being raised out of contact with the base.

The means for periodically rotating the table A through an angle of ninety degrees consists of a clutch 79, concentric with the reciprocating sleeve 12, to which it is feathered at 80, and comprising opposed friction-surfaces 81 82, adapted to be actuated by levers 83 to clamp a friction-ring 84, secured to the upper surface of the table A. The levers 83 are provided at their inner ends with pivoted fingers 85, adapted to ride up an inclined surface 86 when their upper ends are forced outwardly by a conical-ended collar 87, adjustably secured to the sleeve 12, when the latter is lowered. According to this arrangement the table can be rotated only after the reciprocating sleeve 12, which is rotated continuously, has moved out of operative engagement with the brushing and oiling means, the clay-delivering means, and the compressing means.

In order to arrest the motion of the table A in exact position for the female dies to aline with the male dies and other operative means, a ring 88 is secured to the under side of the table and provided with four equally-spaced shoulders 89, into which enter bolts 90, which are reciprocated in fixed vertical planes. The bolts 90 are secured to arms 91, extending radially from a split head 92, clamped to the upper end of a polygonal quill 93 and provided with an inwardly-projecting lip 94, which engages a groove 95, turned in the lower end of the sleeve 12, whereby the latter is swiveled relatively thereto. The polygonal quill 93 passes through a correspondingly-shaped bearing in a horizontal beam 96, secured to the upper end of the base 4, whereby it is free to move freely up and down, but securely held from rotary movement. Near its lower end the quill 93 is provided with a projecting friction-roll 97, which engages a cam-slot 98 in the drum H. The drum H comprises an outer cylindrical shell 99, to the inner surface of which are secured two oppositely-disposed cam-rings 100 and 101. These rings are so shaped that the roll 97, which is located between them, together with the parts supported thereby, are held in elevated position during two-thirds of a revolution of the drum H and moves them into lowered position and returns them to elevated position during the other third of the revolution. The lower end of the shell 99 is secured to a plate 102, journaled upon the main shaft 10 and provided on its lower side with a peripheral gear-ring 103 and a thrust-plate 104, which engages an end of the hub of a pinion 105, keyed to the shaft and bearing upon a hous-

ing 106. An idler-gear 107 is mounted upon the upper side of the housing 106 and meshes with the pinion 105 and gear-ring 103 to transmit motion from the former to the latter. The diameter of gear 103 is three times that of the pinion 105, so that the main shaft 10 makes three revolutions to actuate the cam-drum H through a complete rotation. It will accordingly be seen that the sleeve 12 is held in operative relation with the brushing and oiling means, the clay-distributing means, and the compressing means during two revolutions and is then lowered out of operative relation therewith and as it approaches its lowest position actuates the clutch and causes the table A to rotate a quarter of a revolution and is then raised to release the clutch and return to its operative relation with the first-named means. The period of engagement with the clutch-fingers 85 may be regulated by adjustment of the collar 87, and the ratchet-teeth on parts 14 and 15 are permitted to engage throughout their full length before motion is transmitted to the hollow shaft 16 by means of the lost-motion device provided between the collar 15 and its shaft 16, consisting of a slot 15', formed in the collar, through which extends a stop-pin 15'', fixed to the end of the hollow shaft 16, and a retractile spring 15''', operating to normally hold the collar 15 turned to the right, with the pin 15'' engaging the opposite end of the slot 15' to that which it engages when the hollow shaft 16 is being rotated by the sleeve 12.

I do not desire to restrict myself to the particular form or construction of parts herein shown and described, for it is apparent that they may be changed and modified without departing from my invention.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an apparatus of the class described, the combination of a movable support upon which are mounted a series of molds, a stationary support upon which are mounted devices for delivering the material operated upon to said molds and for compressing said material therein, and a continuously-actuated drive-shaft arranged concentrically of said supports and adapted to be operatively connected alternately to the movable support and to the said devices mounted on the stationary support.

2. In an apparatus of the class described, the combination of a movable support upon which are mounted a series of molds and corresponding ejecting means adapted to be actuated by the movement of said support, a stationary support upon which are mounted devices for delivering the material operated upon to said molds and for compressing said material therein, and a continuously-actuated drive-shaft arranged concentrically of said supports and adapted to be operatively connected alternately with said movable support

and to the said devices mounted upon the stationary support.

3. In an apparatus of the class described, the combination of a reciprocating male die,
5 an actuating-screw operatively connected therewith and provided with a pinion, a suitably-supported rack-bar engaging said pinion and provided with a transversely-slotted head, and a gear-wheel adapted to be operatively
10 connected to the power-transmitting means and provided with a crank-pin entering said slotted head.

4. In an apparatus of the class described, the combination of a revoluble table provided
15 with a series of molds, devices for delivering and compressing the material operated upon having a common actuating-shaft 16, a vertical drive-shaft 10, a reciprocating sleeve 12 feathered upon said drive-shaft and adapted
20 to operatively engage said shaft 16 when in raised position and to operatively engage and rotate said table when in depressed position, and means for reciprocating said sleeve.

5. In an apparatus of the class described,
25 the combination of the shaft 16 connected at one end by a lost-motion arrangement with a ratchet-collar, a reciprocating drive-sleeve 12 provided at one end with ratchet-teeth, a clutch feathered to said sleeve, a collar 87 adjustably secured to said sleeve and adapted to
30 engage the operative member of said clutch, and means to periodically reciprocate said sleeve.

6. In an apparatus of the class described,
35 the combination of a rotary table provided with a friction-ring, a reciprocating drive-

sleeve having a clutch feathered thereto and adapted to engage said ring, means carried by said sleeve for actuating said clutch when reciprocated, and means for reciprocating said sleeve.

7. In an apparatus of the class described, the combination of a rotary table, a reciprocating drive-sleeve located concentrically and adapted to frictionally engage therewith, means for arresting the rotation of said table, and means for periodically reciprocating said sleeve.

8. In an apparatus of the class described, the combination of a rotary table provided with a series of notches, a non-rotatable reciprocating member 93 having a head provided with bolts adapted to engage said notches, a drive-sleeve 12 swiveled to said head and provided with means for rotating said table, and means for reciprocating said member 93.

9. In an apparatus of the class described, the combination of a movable support, a series of molds mounted thereon and provided with movable sections mounted on toothed plungers, and gears engaging said toothed plungers and fixed upon shafts mounted upon said movable support and adapted to engage some stationary part and actuate said movable sections.

In witness whereof I have hereunto set my hand this 29th day of July, 1903.

EDWIN G. KASTENHUBER.

Witnesses:

BENJAMIN B. HULL,
MARGARET E. WOOLLEY.