

March 20, 1928.

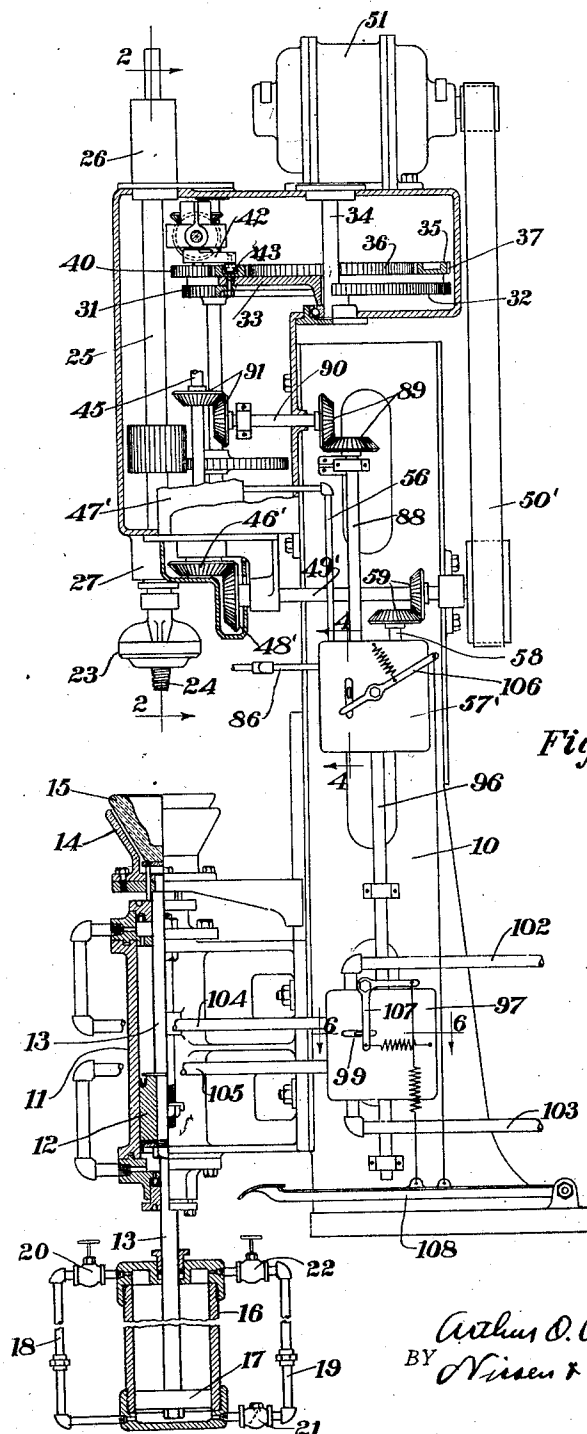
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A. O. AUSTIN

FORMING AND TAPPING MACHINE

Filed Feb. 12, 1925

7 Sheets-Sheet 1



March 20, 1928.

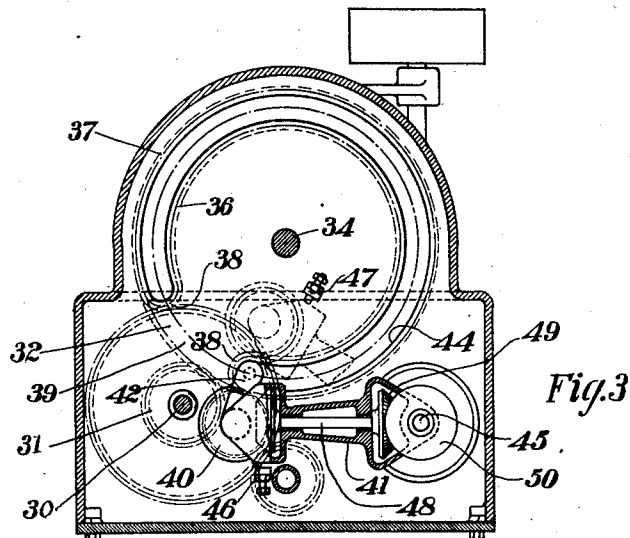
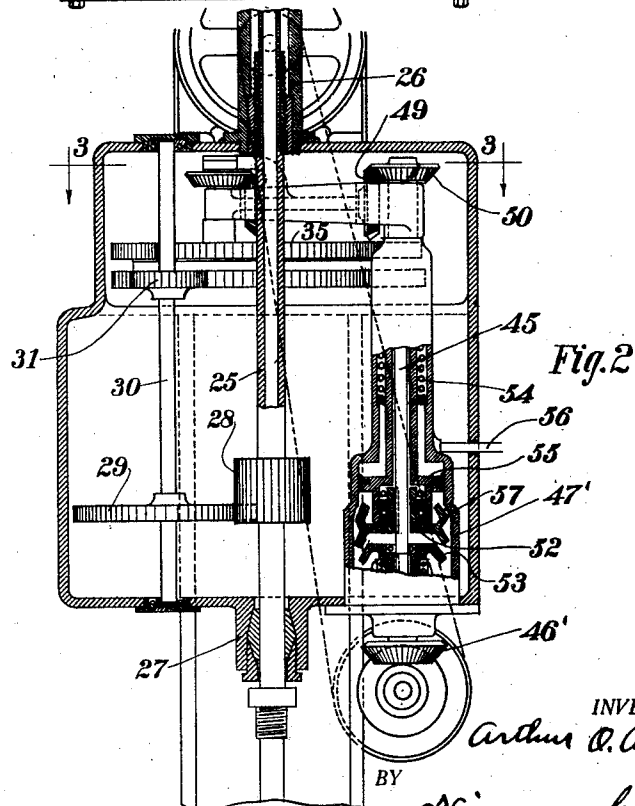
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FORMING AND TAPPING MACHINE

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7 Sheets-Sheet 2



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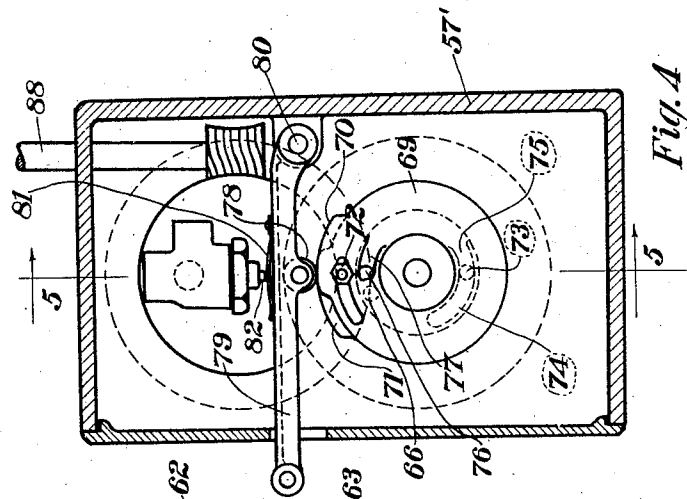
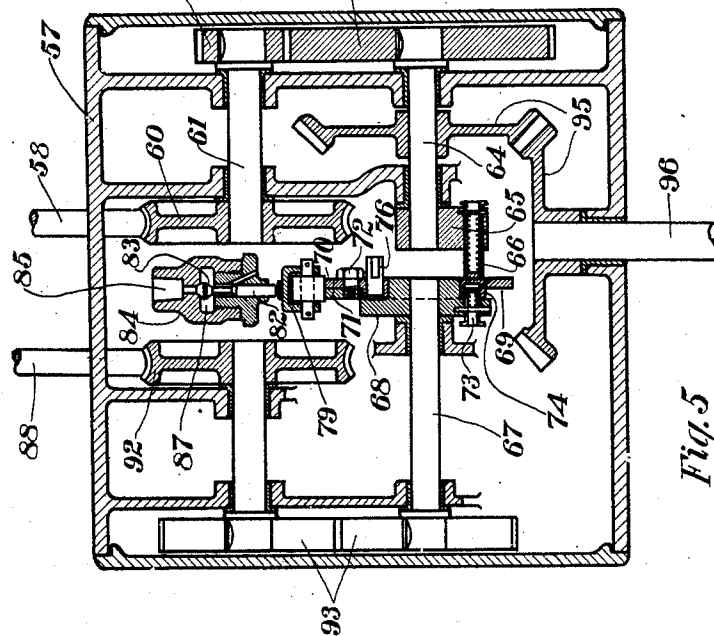
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FORMING AND TAPPING MACHINE

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7 Sheets-Sheet 3



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FORMING AND TAPPING MACHINE

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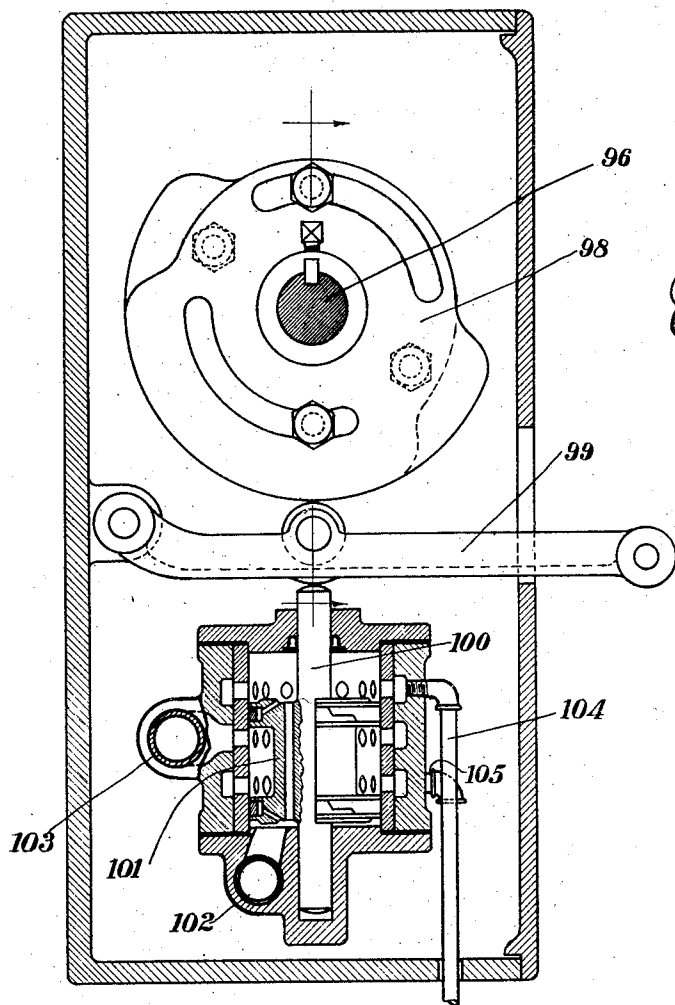


Fig. 6

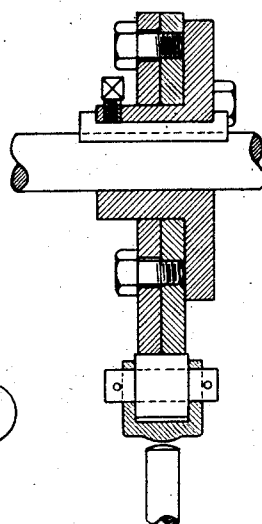


Fig. 7

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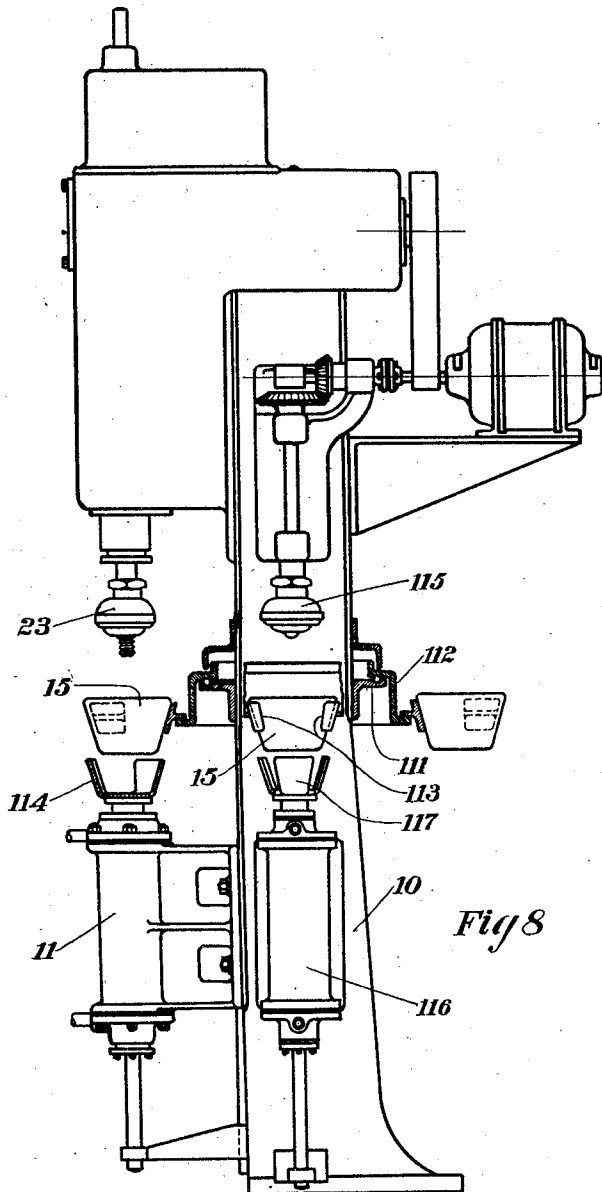


Fig 8

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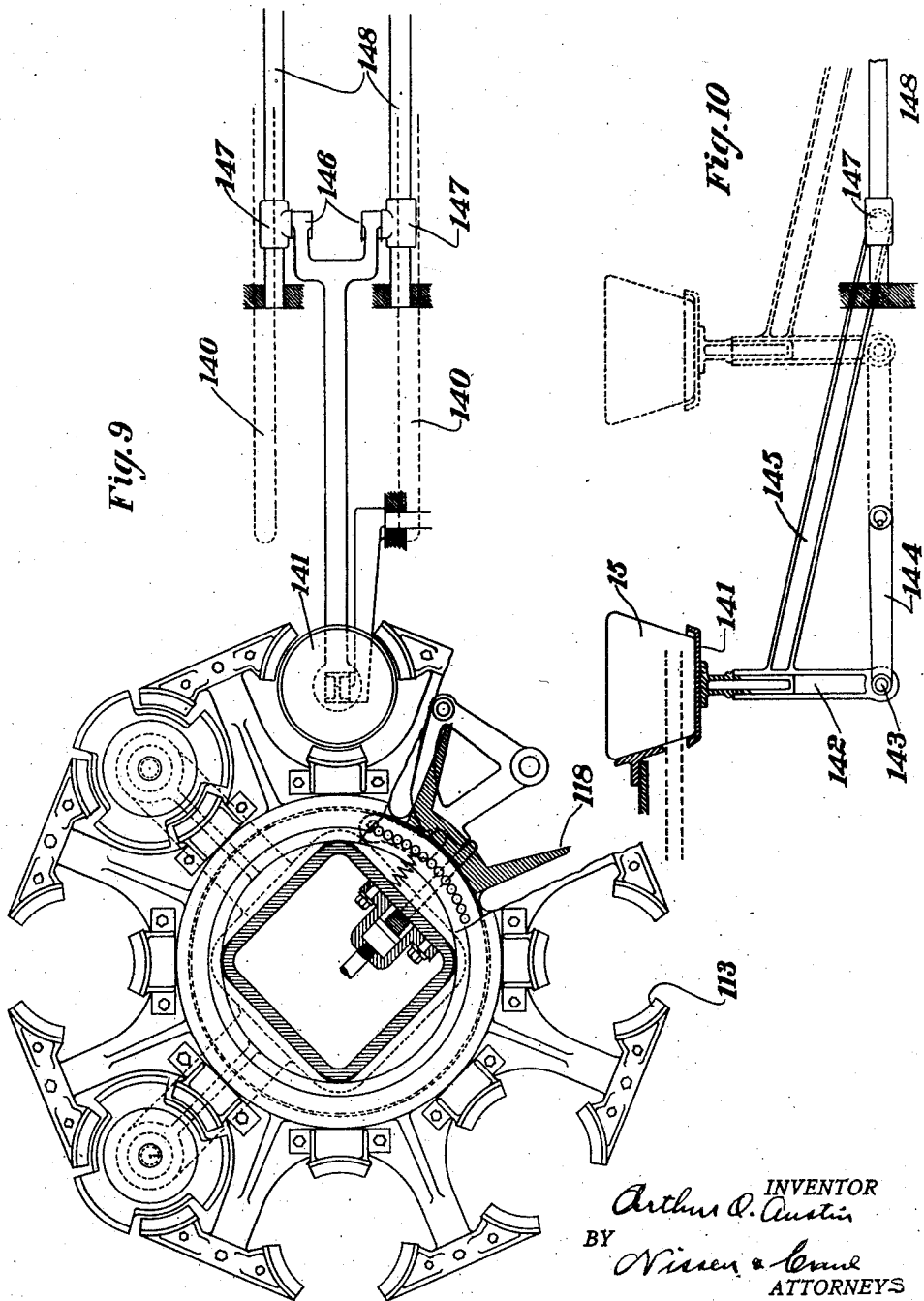
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FORMING AND TAPPING MACHINE

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7 Sheets-Sheet 6



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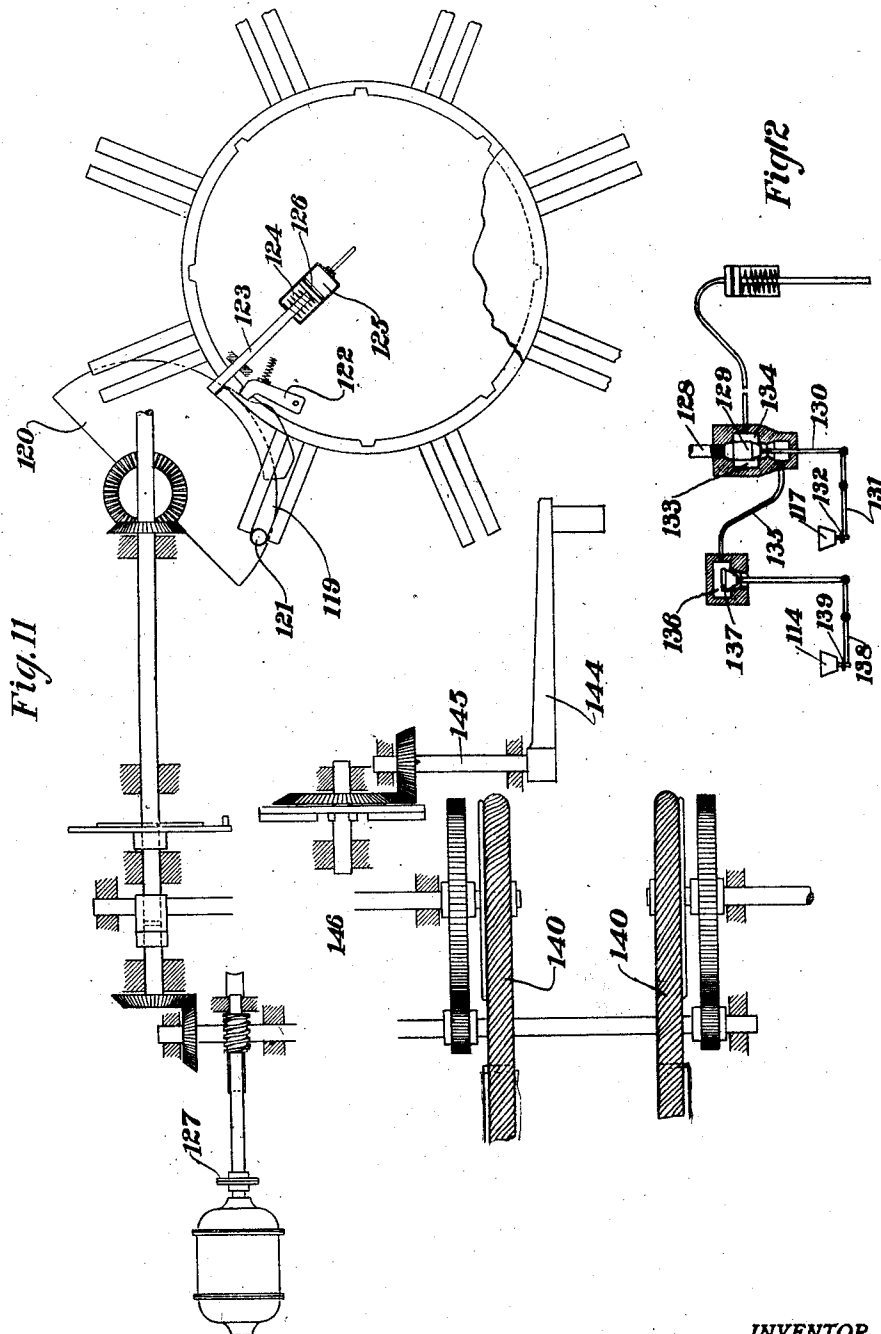
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FORMING AND TAPPING MACHINE

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7 Sheets-Sheet 7



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UNITED STATES PATENT OFFICE.

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FORMING AND TAPPING MACHINE.

Application filed February 12, 1925. Serial No. 8,824.

This invention relates to mechanism for forming articles and especially articles having threaded openings therein. The embodiment shown and described illustrates the invention as applied to the formation of ware for plastic material such as insulator parts having threaded pin holes. It will be understood, however, that the invention may be applied to operation on a variety of manufactured articles other than insulators.

The object of the invention is to provide a forming and tapping machine which shall be efficient and accurate in operation, which shall be of improved construction and which will contain automatic features of control.

The invention is exemplified in the combination and arrangement of parts shown in the accompanying drawings and described in the following specification, and it is more particularly pointed out in the appended claims.

In the drawings—

Figure 1 is an elevation with parts in section showing one embodiment of the present invention.

Figure 2 is a vertical section substantially on line 2—2 of Figure 1.

Figure 3 is a horizontal section substantially on line 3—3 of Figure 2.

Figure 4 is a vertical section substantially on line 4—4 of Figure 1.

Figure 5 is a vertical section substantially on line 5—5 of Figure 4.

Figure 6 is a horizontal section substantially on line 6—6 of Figure 1.

Figure 7 is a fragmentary sectional view substantially on line 7—7 of Figure 6.

Fig. 8 is an elevation with parts in section showing a modified form of the invention.

Fig. 9 is a top plan view of the device shown in Fig. 8 with parts in section and parts broken away.

Fig. 10 is a somewhat diagrammatic side elevation of the mold remover, with parts in section.

Fig. 11 is a diagrammatic plan with parts in section showing the drive for the mold handling mechanism of Fig. 8.

Fig. 12 is a diagrammatic sectional view of the safety interlock for the drive shown in Fig. 11.

The invention deals with improved equipment for the forming of plastic materials or for tapping holes where it is desired to

definitely limit the depth of thread as in the case of blind holes or in holes where it is not advisable to run the tap entirely through. The invention deals particularly with the forming of plastic materials where one of the forming parts is equipped with a threaded member such as the forming of the shells of insulator parts having a threaded pinhole.

In Figure 1, 10 designates the main frame or body to which a hydraulic or air lifting cylinder 11 is attached. The cylinder is equipped with a piston head 12 and piston rod 13, the upper end of which is attached to a pot 14 for lifting and holding the mould 15. In order to control the rate of movement of the mould, particularly where air is used in the operating cylinder 11, a dash pot having a cylinder 16 is used. The piston rod 13 is extended through the bottom end of the operating cylinder and provided with a head 17 which operates in the cylinder 16. The necessary stuffing box is provided to maintain a tight chamber. The dash pot is preferably filled with oil. The control of the dash pot is effected either through proper openings in valves in the piston head 17 or by a by-pass 18 and 19 which accomplishes the same result and is readily controlled at any time. A valve 20 is placed on the by-pass 18, connecting the two ends of the cylinder. When the piston moves upward, the oil or water in the chamber will be forced through the by-pass 18 and the rate of flow may be controlled by opening and closing the valve 20 to set up the desired difference in pressure on the two sides of the piston 17. In most cases, it is desirable to move the mould or pot very quickly in one direction and at a different rate in the other. This may be accomplished by placing a valve in the by-pass 18 having a limited amount of flow in one direction and free in the other, or by placing another by-pass 19 with a valve 21 permitting free movement in one direction only. A valve 22 which may be controlled will regulate the amount of free movement. The valve 21 may be inoperative in one direction in which case the rate of movement is controlled by the valve 20 in the by-pass 18.

In the forming of plastic materials such as porcelain insulators, the material to be formed is placed in the mould 15. The

mould is then raised by the operating cylinder through proper control mechanism which will be explained later. The plunger 23 which forms the other end of the piece then advances downward as it rotates, moving into the plastic material and forming one side of the piece. If provided with a threaded pin 24 for forming the pin hole, it is necessary that the forming plunger be backed out of the plastic material so that the threaded portion 24 will not tear. By allowing the spindle 25 to which the plunger is attached to move in a vertical direction at the same time it rotates, it is possible to use a nut 26 for one of the bearings of the spindle 25. The spindle will have a thread which meshes in the nut so that as it rotates it will be driven either up or down in accordance with the pitch of the nut in the bearing 26. The lower bearing 27 allows the spindle to slide up and down, holding in position only. By keeping the threaded portion of the spindle in the nut of the bearing 26 at all times, it will be seen that the longitudinal motion of the spindle 25 and the plunger 23 will be determined by the number of rotations from a definite point. In order then to obtain a definite stroke or longitudinal movement of the forming plunger 23 with its threaded member 24, it is only necessary to provide a definite number of revolutions either forward or backward.

Automatic reversing mechanism, shown more clearly in Figures 2 and 3 is provided for alternately rotating the spindle definite amounts in opposite directions. Spindle 25 is provided with an elongated pinion 28 which meshes with a gear 29 and permits longitudinal movement of the spindle without disengaging the pinion from its driving gear. The gear 29 is mounted on a shaft 30 having a pinion 31 thereon. The gear 31 meshes with a continuous gear 32 fixed to a plate 33 secured to an upright shaft 34. An interrupted gear 35 having internal teeth 36 and external teeth 37 is also fixed to the plate 33. The teeth 36 and 37 are connected by teeth arranged upon curved lines 38 at each side of a gap 39 in the interrupted gear. The pinion 40 is arranged to mesh either with the teeth 36 or 37 on the gear 35. The pinion 40 is journaled at the end of the frame 41 and a link 42 is mounted concentric with the pinion 40 and carries a roller 43 at its opposite end in position to travel in a groove 44 between the sets of teeth 36 and 37. The frame 41 is mounted to swing about a shaft 45 from the position shown in full lines in Figure 3 to the position shown in broken lines. Stops 46 and 47 limit the movement of the frame 41, the stops being arranged to engage the frame when the pinion 40 is enmeshed with the teeth 36 and 37 respectively. The pinion 40 is driven by a shaft 48 having beveled gear connec-

tion with the upright shaft which carries the pinion 40. The shaft 48 is driven by beveled pinion 49, meshing with a similar pinion 50 on the upright shaft 45.

It will be apparent that rotation of the pinion 40 will rotate the gear 35 until the pinion reaches the gap in the interrupted gear. At this point, the link 42 will constrain the pinion to travel from one side of the gear 35 to the other, thus effecting reversal of the interrupted gear. By this arrangement, the gear is alternately driven in opposite directions for a definite amount of rotation and the reversal is effected at a definite point in the travel of the oscillating gear. This movement is transmitted through the train of gearing distributed to the spindle 25 so that consequently the spindle is rotated a definite amount and simultaneously advanced to a definite position by the nut 26. The movement will be gradually retarded as the spindle approaches the end of its travel and will be arrested at a definite fixed position by the driving mechanism itself without the necessity of any interposed stop.

After the forming tool has reached its advance limit, it will be reversed and retracted by a reverse rotation so that the tap 24 will be unscrewed from the threads formed in the piece supported by the mould 15. The shaft 45 is driven by a gear 46' through a clutch mechanism disposed in a housing 47'. The gear 46' meshes with a gear 48' on a shaft 49' which is driven by a belt 50' from a motor 51. The clutch mechanism contained in the housing 47' comprises a movable element 52 arranged to engage with a rotating member 53 driven in unison with the gear 46'. The member 52 is splined on the shaft 45 and is normally held retracted from the live clutch element 53 by means of a spring 54. A piston 55 actuated by fluid pressure which enters the housing 47' through a pipe 56 operates to move the clutch member 52 into engagement with the driving element 53. When the pressure is released on the piston 55, the element 53 is retracted into contact with a brake surface 57 for arresting the rotation of the shaft 45. A control box 57' is mounted on a frame 10 and provided with mechanism shown in Figures 4 and 5 for periodically actuating the clutch 52 to provide interruptions in the operation of the spindle 25 and thus permit a dwell in the movement of the spindle when the forming tool 23 is at or near the upper end of its stroke. This is for the purpose of permitting removal of finished work and the insertion of a newly filled mould 15 after each operation of the forming die. A shaft 58 is connected by gears 59 with the drive shaft 49' and extends into the control box 57'. A worm wheel 60 is driven by the shaft 58 and rotates a

counter shaft 61 which carries a pinion 62. The pinion 62 meshes with a gear 63 which in turn drives a shaft 64. The shaft 64 is provided with a crank arm 65 having a
 5 spring pressed pin 66 mounted therein. A shaft 67 is mounted in the control box 57' in alignment with the shaft 64 and carries a disc 68 having a slip ring 69 mounted thereon. The slip ring 69 is provided with a cam
 10 projection 70 having an adjustable extension 71. A cap screw 72 holds the extension 71 in its adjusted positions. A spring pin 73 is carried by the disc 68 and operates in a groove 74 in the slip ring 69. The groove
 15 74 tapers outwardly at one end as indicated at 75 so that the spring pin 73 permits free rotation of the slip ring 69 in one direction but provides a stop for constraining the two
 20 members against relative rotation in an opposite direction. The ring 69 carries a pin 76 disposed in the path of the pin 66. The pin 76 provides a contact face for the pin 66 on one side thereof, and an inclined approach 77 at its opposite side so that the
 25 parts 65 and 69 may be freely rotated relative to one another in one direction but are constrained to rotate in unison in the opposite direction when the pins 66 and 76 are in contact.

30 A roller 78 is mounted on a lever arm 79 pivoted at 80 on the wall of the container 57'. The arm 79 is provided with a contact spring 81 which engages a plunger 82 having a double cone valve 83 thereon arranged
 35 to slide in a valve housing 84. The valve housing 84 is provided with an opening 85 connected to the pipe 56 which leads to the clutch housing 47'. Fluid under pressure is admitted through a pipe 86 to the chamber
 40 87 in the valve 84. When the arm 79 is lifted by the cam 70, the valve 83 will be raised and fluid pressure will be cut off from the clutch housing 47' so that the spring 54 will disengage the clutch elements and the
 45 parts operated by the shaft 45 will be arrested by the brake surface 57 in contact with the clutch element 53. When the arm 79 is released from the cam 70 fluid under pressure will be admitted to the pipe 56 through
 50 the discharge opening 85 of the valve 84, thus establishing driving connection with the shaft 45. The cam mechanism is actuated by a shaft 88 which enters the housing 57' from the top and is connected by gear-
 55 ing 89, shaft 90 and gears 91 with the shaft 45 which actuated the oscillating drive for the spindle 25. The shaft 88 is connected by a worm wheel 92 and meshing gears 93 to the shaft 67. When the clutch 52 is in
 60 operative engagement with the shaft 45, the two shafts 58 and 88 will be operated by the drive shaft 49' at equal rates of speed. Because of the reduction gears 62 and 63, the shaft 64 will be driven at a slower speed
 65 than the shaft 67. If we now assume that

the parts are in the position shown in Figures 4 and 5, the clutch 52 will be disengaged so that the oscillating drive for the spindle 25 will be arrested with the spindle in the upper portion of its stroke. This illustrates
 70 the position of the parts during the dwell in the operation of the spindle for changing the work. The shaft 88 will be at rest since it depends for its operation upon the shaft 45. The shaft 64, however, will be
 75 rotated since it is connected directly with the drive shaft 49'. The position of the pin 66 is shown in broken lines in Fig. 4 and as the shaft 64 continues to rotate the pin 66 will engage the pin 76 and thus carry
 80 the cam 70 in a clockwise direction as viewed in Fig. 4 and release the lever arm 79. This same rotation will carry the contact end of the groove 74 away from the spring pin 73. As soon as the lever arm 79 is released,
 85 the valve 84 will be actuated to admit pressure to the chamber 47' and actuate the clutch 57 to start operation of the shaft 45. This will drive the interrupted gear 35 a sufficient amount to advance the spindle 25
 90 into engagement with the work and return it to its retracted position by the time the pin 73 has overtaken the contact end of the groove 74 and rotated the slip ring 69 a sufficient amount to cause the cam 70 again to
 95 raise contact arm 79 and permit a second dwell in the operation of the spindle.

Since the pin 73 travels at a more rapid rate than the pin 66, the rotation of the slip ring 69 by the pin 73 will carry the pin
 100 76 away from the pin 66 so that there will be a dwell period until the pin 66 again overtakes the pin 76. The operation will then be repeated. It will be seen that the control mechanism thus provides a cycle of
 105 operation for the spindle in which the spindle is driven by the interrupted reversing gear to its forming position and is arrested at the advance end of its stroke by the reversal effected by the interrupted gear. At
 110 the return of the spindle to its retracted position, a dwell period is provided for repeating the work in the mould. This period is automatically determined by the control mechanism and at the end of the dwell pe-
 115 riod, the operation is repeated. The timing may be changed by adjusting the cam extension 71 or by changing gears 62 and 63 to provide a different ratio of gear transmission.
 120

A pair of gears 95 connect the shaft 64 with a shaft 96 extending downwardly from the control box 57'. The shaft 96 enters a second control box 97 for controlling the ad-
 125 mission of pressure fluid to the cylinder 11 to actuate the cylinder in synchronism with the movement of the forming tool 23.

The mechanism within the box 97 is shown in Figs. 6 and 7. The shaft 96 carries at its lower end an adjustable cam 98 which oper- 130

ates a contact arm 99 engaging a plunger 100 having a piston valve 101 mounted thereon. Pressure fluid is admitted through a pipe 102 and pipe 103 is connected to the exhaust. The pipe 104 is connected to the upper end of the cylinder 11 while the pipe 105 is connected to the lower end of the cylinder. When the valve is in the position shown in Fig. 6, the pressure is admitted to the upper end of the cylinder through the pipe 104, thus causing the cylinder to be lowered. When the cam 98 is rotated to release the arm 99, pressure will be admitted to the lower end of the cylinder 11 through the pipe 105 to raise the piston. The mechanism is timed through the connecting shaft 96 so that the piston 12 will be raised to meet the forming tool 23 on its advance stroke. The piston will be retained in its uppermost position until the forming tool has been retracted a sufficient distance to clear the work. The piston will be permitted to remain in its lowermost position during the dwell period of the forming tool to permit the work to be changed in the pot 14.

Safety levers 106 and 107 are provided for engaging contact levers 79 and 99 respectively to arrest the operation of the spindle 25 and automatically lower the pot 14. The safety levers are connected to a foot lever 108, the connection being such that the first part of the depression of the foot lever 108 will lower the pot 14 and further depression will arrest the operation of the spindle 25. If the operator should notice that the work is not properly in place when the pot begins to rise, he may press the pedal 108 and arrest the movement of the pot before injury is done. If necessary, further depression of the foot lever will stop operation of the entire machine.

The forming and threading machine may be provided with automatic means for supplying the moulds having the plastic material deposited therein.

In Fig. 8, the supporting frame 10 is provided with a bracket 111 having a turn table 112 rotatably mounted thereon. The table 112 is provided with a plurality of sectional pots 113 peripherically spaced about the table. The cylinder 11 is provided with a sectional pot 114 having its sections arranged to alternate with the sections of the pots 113 when a pot on the turn table is moved into registration with the pot on the cylinder. The forming tool 23 is operated by mechanism similar to that already described. It is sometimes desirable to perform a preliminary forming operation on plastic material in the moulds 15 and for this purpose a preliminary forming tool 115 is provided and the turn table 112 is operated to move the moulds 15 successively into registration with the forming tools 115

and 23. A sectional cylinder 116 is provided with a pot 117 similar to the pot 114 to raise the mould when in registration with the forming tool 115. After the forming operation the pot 117 will be lowered to permit the mould to be returned to the pot 113. The turn table 112 is given a step by step rotary movement by means of arms 118 which form radially extending slots 119. The arms 118 are attached to the turn table so that rotation of these arms imparts a rotary movement to the pots 113. A rotary member 120 carries a pin 121 for engaging the slots 119 and driving the turn table intermittently by a form of Geneva movement. A yielding detent 122 is provided for accurately positioning the turntable at its different stations. A lock pin 123 is provided for preventing rotation of the turn table except when the pots 114 and 117 are in their lowermost position. A friction drive 127 is provided in the operating mechanism for the rotating member 120 to prevent injury to the mechanism in case the turn table is locked at a time when the pin 121 engages a slot 119. The lock pin 123 is normally held in retracted position by a spring 124 and is moved forwardly by a fluid pressure medium introduced into the chamber 125 in the rear of piston 126. Fluid under-pressure is admitted to the chamber 125 from a supply pipe 128 controlled by a valve 129. The valve 129 is provided with a stem 130 connected to a lever 131 which extends beneath a stop 132 on the pot 117. The valve 129 is provided with two contact faces, the lower face co-operating with a seat between chambers 133 and 134 controlled by the valve 129. A conduit 135 connects the chamber 134 with a chamber 136 controlled by a valve 137. The valve 137 is connected to a lever 138 which extends beneath a stop 139 on the pot 114. When both pots are down, the valves 137 and 129 will be lifted so that the chamber 125 will be connected to the atmosphere, thus permitting the withdrawal of the stop pin 123 and the rotation of the turn table. When either pot is raised the connection to atmosphere will be closed and the pressure fluid will be retained in the cylinder 125 to prevent operation of the turn table. The moulds containing the finished work may be automatically lifted from the turn table and deposited on a conveyor consisting of a pair of spaced travelling members 140. For this purpose, a lifting tray 141 is mounted on a standard 142 pivoted at 143 to a crank arm 144. The crank arm 144 is driven by a shaft 145 suitably geared to a drive shaft 146. The standard 142 is held in upright position by a brace 145 having pivotal connection at 146 with slides 147 arranged to travel on guides 148. As each pot reaches a position opposite the conveyor 140, the tray 141 will move upwardly be-

neath the pot and lift the mould 15 from its support and deposit it upon the conveyor 140. The only manual operation necessary is to properly ball the clay and place it in the moulds and deposit the moulds in the pots 113 before the pots are brought into registration with the forming tool 115. The operation of the machine and the handling of the moulds is automatic after they have been once placed in the pots carried by the turn table.

I claim—

1. The combination with a thread forming device of a spindle for rotating said device, means for moving said spindle longitudinally when rotated and a drive for rotating said spindle, said drive including an interrupted gear for reversing the rotation of said spindle at a definite position in the movement thereof.

2. In combination, a thread forming device, a spindle for rotating said device, means for moving said spindle longitudinally when rotated and a drive for rotating said spindle, said drive comprising a pair of racks, a pinion for engaging one or the other of said racks for rotating said spindle in opposite directions and means for shifting said pinion to reverse the rotation of said spindle at a definite position of said thread forming device.

3. In combination, a thread forming device and a drive for rotating said device, said drive comprising a pair of racks and a pinion movable from one to the other of said racks to effect the reversal of said thread forming device at a definite position thereof.

4. In combination, a thread forming device, a drive for rotating said device, threaded means for advancing and retracting said device when rotating in opposite directions respectively and a drive for rotating said device comprising a double rack and a pinion movable from one portion to the other of said rack to effect reversal of said thread forming device at a definite position thereof.

5. In combination, a thread forming device, a spindle for rotating said device, threaded means for moving said spindle longitudinally when rotated and a drive for rotating said spindle comprising a gear having internal and external teeth and means for driving said spindle from either of said sets of teeth, said driving means being shiftable to reverse the direction of said thread forming device at a definite predetermined position thereof.

6. In combination, a thread forming device, a spindle for rotating said device, threaded means for moving said spindle longitudinally when rotated and a drive for said device comprising an interrupted gear having internal and external sets of teeth, said sets of teeth being connected by curved continuations thereof and a pinion mounted

to travel from one of said sets of teeth to the other to effect reversal of said spindle at a definite position thereof.

7. In combination, a thread forming device, a spindle for rotating said device, threaded means for moving said spindle longitudinally when rotated and a drive for said spindle comprising a gear having a continuous set of teeth thereon and an interrupted set of teeth thereon, said interrupted set of teeth having internal and external portions and a pinion movable from one of said portions to the other to effect reversal of said spindle at a definite position of said thread forming device.

8. The combination with a thread forming device of a pair of racks for driving said device in opposite directions, said racks being connected at the ends thereof by teeth arranged on a curved line and a pinion arranged to travel from one of said racks to the other in mesh with said curved line of teeth to effect reversal of said thread forming device.

9. In combination, a thread forming device, means for rotating said device and simultaneously advancing and retracting the same, said rotating means comprising mechanism for gradually retarding and accelerating said device including a pair of racks connected by teeth arranged upon a curved line and a pinion for traveling about said curved line from one of said racks to the other.

10. In combination, a thread forming device, a spindle for rotating said device, means for moving said spindle longitudinally to advance and retract said device when said spindle is rotated and a drive for rotating said spindle, said drive comprising a continuous gear connected with said spindle, an interrupted gear for actuating said continuous gear, said interrupted gear having internal and external teeth connected by teeth arranged upon curved lines and a pinion meshing with said interrupted gear and movable from one set of teeth to the other to effect gradual retardation and acceleration of said spindle and reversal thereof.

11. A device for forming plastic material comprising a forming die, and mechanism for advancing said die into the work to be formed thereby and for retracting said die from said work, and a control device for interrupting the movement of said mechanism for a period of time when said die is in retracted position.

12. Mechanism for forming plastic material comprising a die and a reciprocating drive arranged to rotate said die for advancing said die into the work to be formed thereby, said drive including means for reversing said die at a definite position at one extremity of the path of travel thereof and control mechanism for producing a dwell

in the operation of said drive when said die is at a definite position in its path of travel.

13. In combination a die for forming plastic material and mechanism for reciprocating said die to and from forming positions, said mechanism including means for rotating said die and for reversing the movement of said die at a definite position at the forming end of its path of travel and a control device for producing a dwell in the operation of said rotating mechanism when said die is at or near the end of its travel away from forming position.

14. The combination with a die for forming plastic material, of a reciprocating drive for rotating said die to move the same in the direction of the axis thereof and for reversing the movement of said die at a definite predetermined position at the forming end of its stroke, mechanism for actuating said reciprocating drive and a control device for interrupting the operation of said actuating mechanism to produce a dwell in the movement of said die when said die is at or near the end of its stroke away from its forming position.

15. The combination with a die for forming plastic material, of a reciprocating drive for rotating said die to effect movement thereof in the direction of its axis, said drive having continuous connection with said die and being arranged to reverse the movement of said die at a definite position at one end of the travel thereof, mechanism for actuating said reciprocating drive and a control device for said actuating mechanism for interrupting the movement of said actuating mechanism when said die is away from the forming end of its stroke, said control device having an operative connection with said die to insure interruption of said die at the position in its path of movement predetermined by the setting of said control device.

16. In a machine for forming plastic material, the combination with a reciprocating die, of a continuously connected reciprocating drive for rotating said die to effect movement thereof in the direction of its axis and for reversing said die at a predetermined position at the forming end of its travel and a control device having operative connection with said die to produce a dwell in the operation of said die at a predetermined position in the path of movement thereof removed from the forming position of said die.

17. A machine for forming plastic material comprising a reciprocating forming member, a drive for rotating said forming member to effect movement thereof in the direction of its axis and for reversing the movement of said forming member at a definite position at the forming end of its travel, actuating mechanism for said drive and a

control for said actuating mechanism, said control including mechanism operable in unison with said drive for interrupting the operation of said drive and mechanism operating independently of said drive for restoring the operation of said drive after an interval following the interruption thereof.

18. A machine for forming plastic material comprising a reciprocating forming member, and a control for said forming member, said control including an interruptor operatively connected with said forming member and a restoring device operable at a less speed than said interruptor to restore the operation of said forming member after a dwell period in its cycle of operation.

19. A machine for forming plastic material comprising a reciprocating forming member and an interruptor for controlling the operation of said forming member, said interruptor including a movable device having operable connection with said forming member and operating to interrupt the movement of said forming member at a predetermined position in its path of movement and means movable at a slower rate of speed than said movable device and arranged to overtake said device when said forming member is stationary and to restore the operation of said forming member.

20. A machine for forming plastic material comprising a reciprocating forming device and an interruptor for controlling the operation of said device, said interruptor including a rotary member having operative connection with said forming device and operating periodically to interrupt the movement of said forming device and a second rotary member concentric with said first named rotary member and driven independently of said forming device and at a slower rate of speed than said first named rotary member, said second named rotary member having means thereon for overtaking a contact member on said first named rotary member to impart rotation to said first named rotary member after a period of dwell in the movement thereof and thus, restore operation of said forming device.

21. A machine for forming plastic material comprising a reciprocating forming member, a drive for said member, a control for interrupting the operation of said forming member at a predetermined position in the path of travel thereof and means for automatically restoring the operation of said forming member after a dwell in the movement thereof.

22. A machine for forming plastic material comprising a reciprocating forming member, an interruptor for arresting the movement of said member at one position in its cycle of movement, means for automatically restoring the movement of said forming member after a dwell in its operation

and means controlled at the will of the operator for actuating said interruptor to arrest the movement of said forming member.

23. A machine for forming plastic material comprising a support, a forming member for engaging material on said support, means for raising said support toward said forming member, means for advancing said forming member toward said support and mechanism for automatically correlating the movements of said forming member and support.

24. A machine for forming plastic material comprising a support, mechanism for raising said support, a forming member, mechanism for advancing said forming member to engage material on said support and interconnected means for automatically timing the movement of said support and forming member relative to each other.

25. A machine for forming plastic material comprising a support for a mould, a forming member for engaging plastic material in said mould, automatic means for periodically raising said support to a predetermined position and for holding said support in said position for an interval of time, automatic means for advancing said forming member to engage the material in said support while said support is raised and for subsequently retracting said forming member and a control device for interrupting the movement of said forming member for a dwell period while said forming member is retracted.

26. A machine for forming plastic material comprising a support for a mould, automatic means for periodically raising said support to a predetermined position and for retaining said support in said position for a period of time, a thread forming tool, means for advancing said tool to engage the material in said mould while said mould is in its raised position, means for reversing the operation of said tool at a definite position in the movement thereof and a control device for interrupting the operation of said tool for a dwell period when said tool is in its retracted position.

27. A machine for forming plastic material comprising a support for a mould, mechanism for periodically raising said support, a thread forming tool, mechanism for advancing said tool to engage material in said mould when said mould is in its uppermost position, means for reversing said thread forming tool to retract said tool when said tool has reached a definite predetermined position, an interruptor for arresting the movement of said tool for a period of time, when said tool is in its retracted position and means operable at the will of the operator for permitting said mould support to be lowered.

28. A machine for forming plastic mate-

rial comprising a support for a mould, a movable member having a plurality of mould supports thereon and means for imparting intermittent motion to said movable member to bring the mould supports thereon periodically into registration with said first named mould support.

29. A machine for forming plastic material comprising a stationary mould support, a turn table having a plurality of mould supports thereon, means for imparting intermittent movement to said turn table to bring the mould supports thereon into registration with said stationary mould support and means for raising said stationary mould support to lift a mould from said turn table into position for forming plastic material therein.

30. A machine for forming plastic material comprising a die, a support arranged in registration with said die, an intermittently operating member for periodically moving moulds into registration with said support and die and means for actuating said support to move the moulds on said movable member into operative position relative to said die.

31. A machine for forming plastic material comprising a mould carrier, a plurality of forming tools, means for intermittently driving said carrier to bring the moulds thereon successively into registration with said forming tools and a mould lifter arranged in registration with each of said forming tools to raise the moulds from said carrier into position to co-operate with said forming tools and to return the moulds to said carrier after the operation of said forming tools.

32. A machine for forming plastic material comprising an intermittently movable carrier for moulds, forming tools for operation on material supported by the moulds carried by said carrier and means for removing the moulds from said carrier after the material therein has been formed by said tools.

33. A machine for forming plastic material comprising a turn table having a plurality of mould supports thereon, a plurality of forming tools, lifters arranged in registration with said forming tools, means for intermittently driving said turn table to bring the moulds thereon successively into registration with said forming tools and lifters, means for actuating said lifters to present the moulds from said turn table to said forming tools and means for automatically removing the moulds from said turn table after the material therein has been formed by said moulds.

In testimony whereof I have signed my name to this specification on this 7th day of February, A. D. 1925.

ARTHUR O. AUSTIN.