March 17, 1925. 1,530,053

H. MUELLER

CERAMIC PRESS AND THE LIKE

Filed Jan. 11, 1923 4 Sheets-Sheet 1

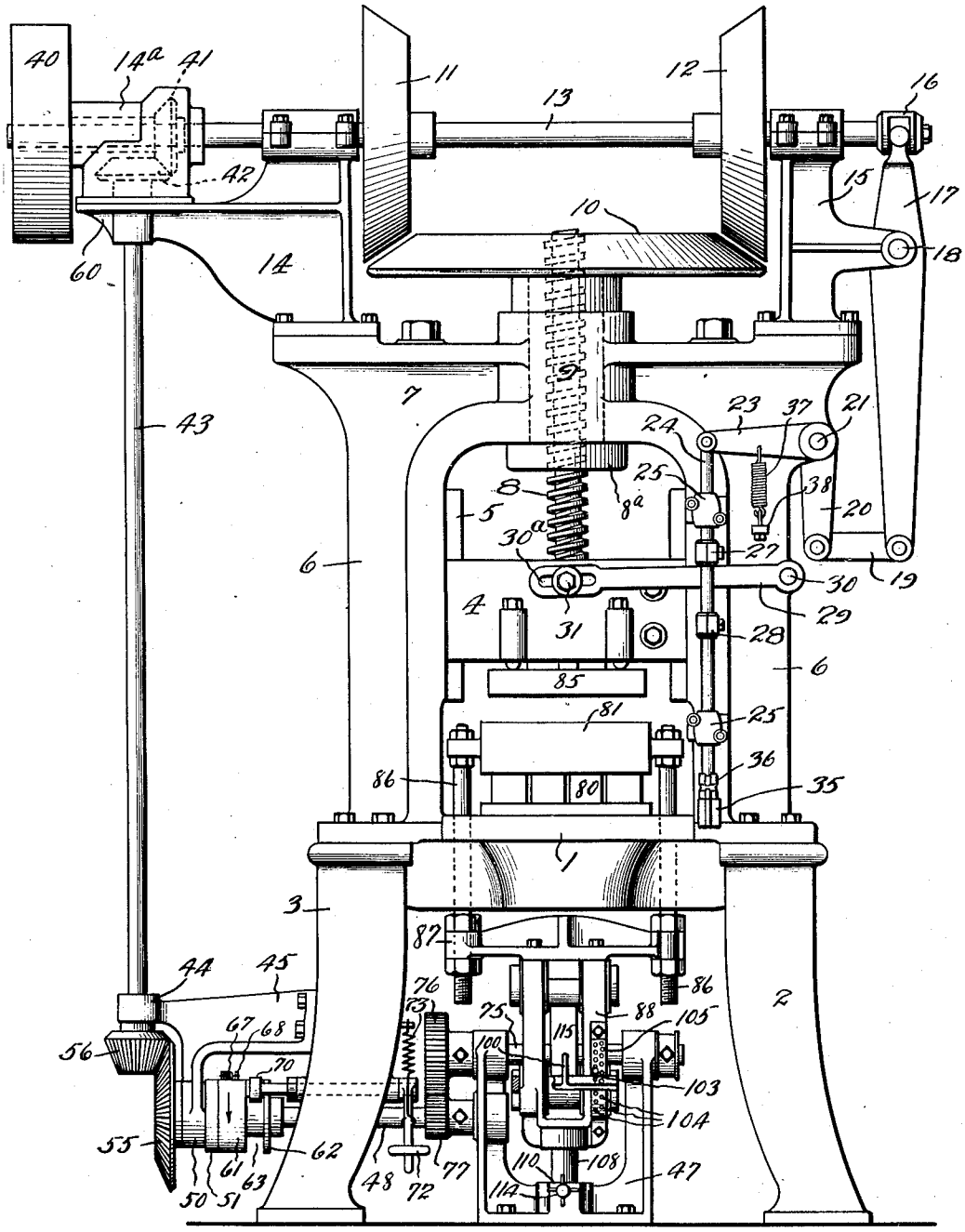

Fig. 1

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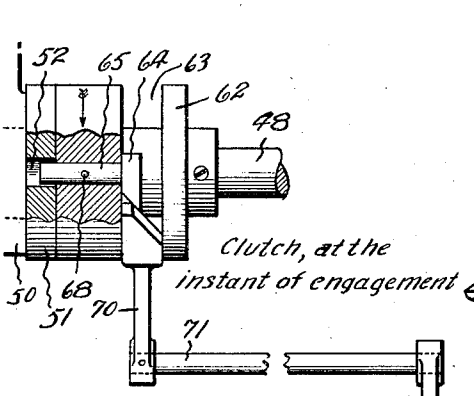

Fig. 5

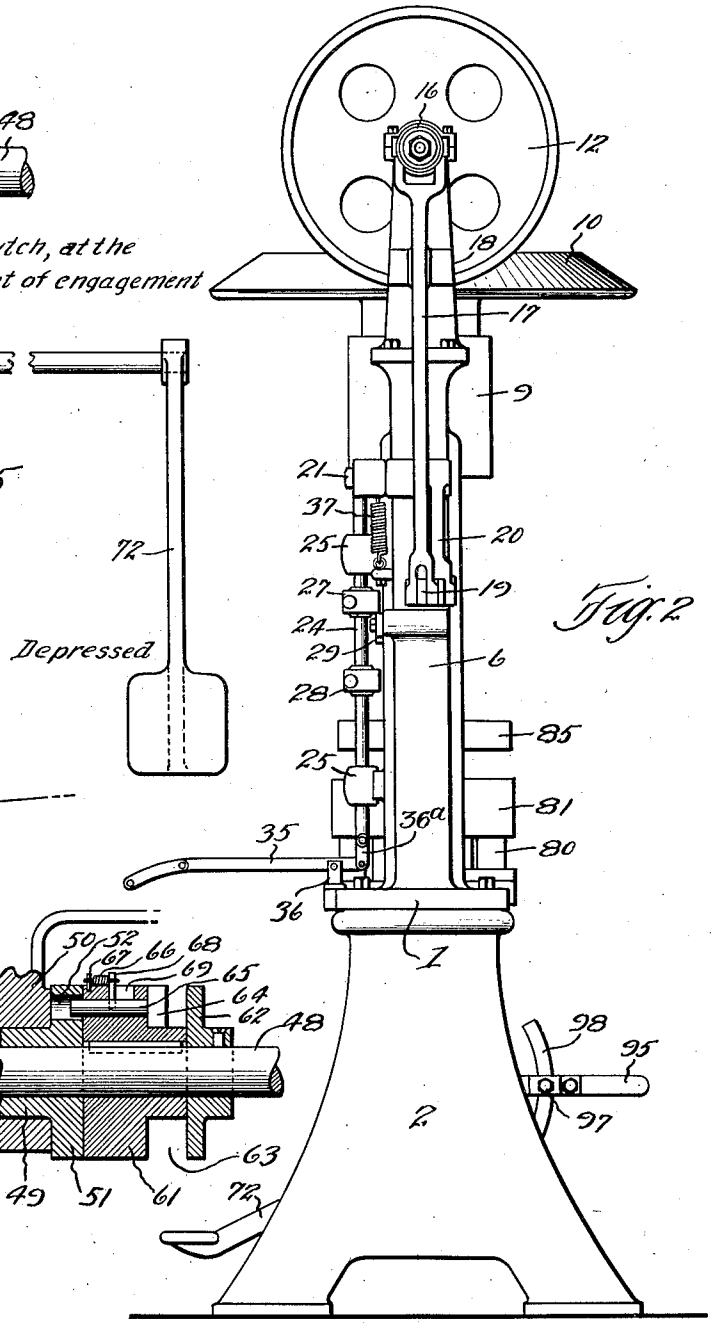

Fig. 2

Fig. 6

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CERAMIC PRESS AND THE LIKE

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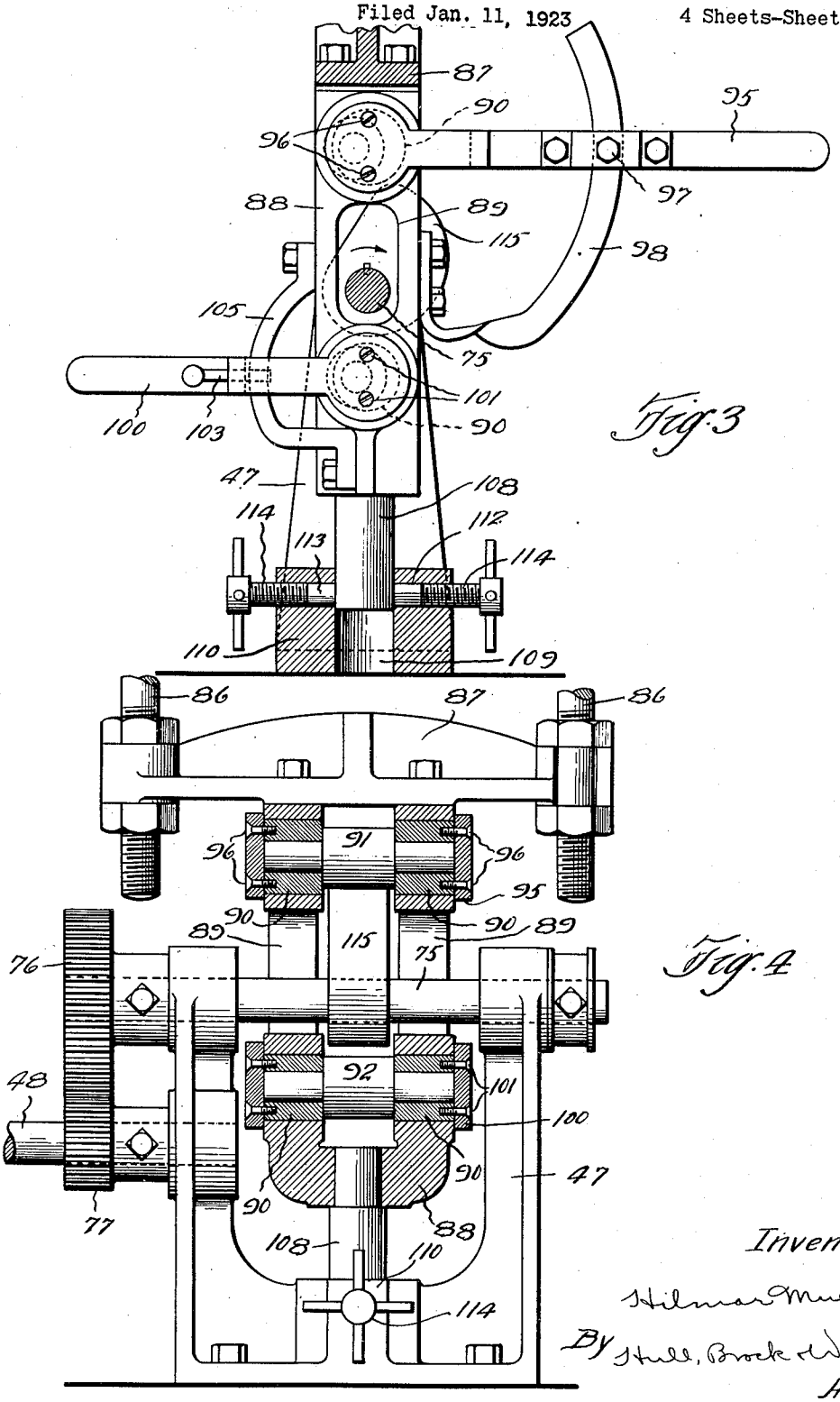

Fig. 3

Fig. 4

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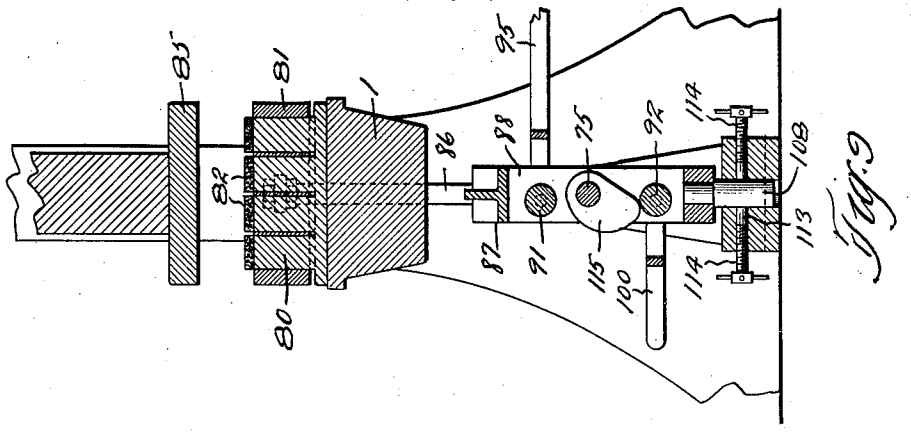

Fig. 9

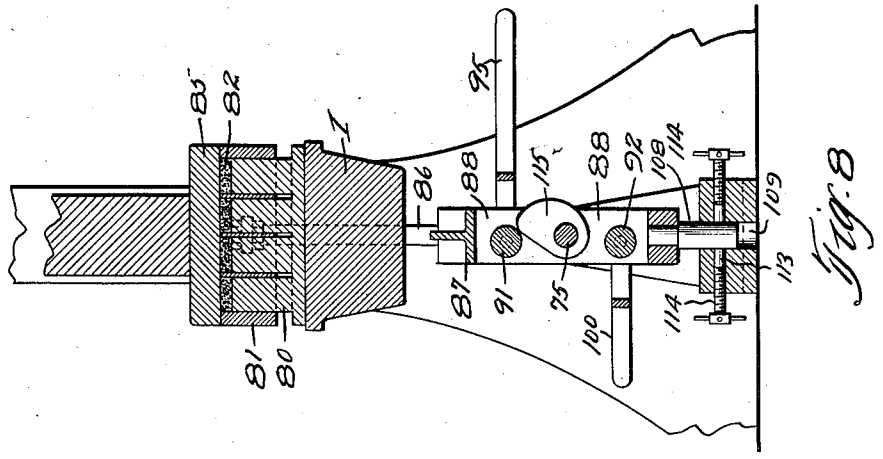

Fig. 8

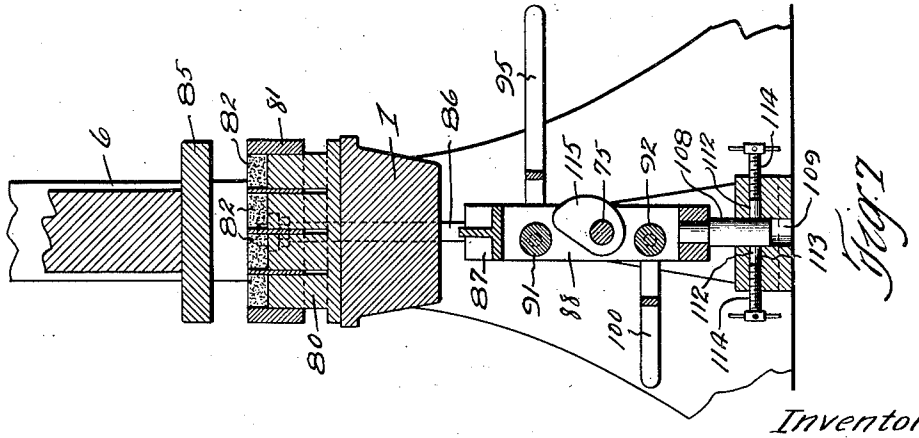

Fig. 7

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Patented Mar. 17, 1925. 1,530,053

UNITED STATES PATENT OFFICE.

HILMAR MUELLER, OF TRENTON, NEW JERSEY.

CERAMIC PRESS AND THE LIKE.

Application filed January 11, 1923. Serial No. 611,919.

To all whom it may concern:

Be it known that I, HILMAR MUELLER, a citizen of the United States, residing at Trenton, in the county of Mercer and State of New Jersey, have invented a certain new and useful Improvement in Ceramic Presses and the like, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to improvements in power presses, particularly of the kind used in the ceramic art, and it has to do more especially with a unique power driven means for raising and lowering the die case which forms a part of the mold, said power driven means replacing the hitherto manually operated mechanism.

The objects of the invention are to provide a thoroughly reliable power driven means for incorporation in such machines as ceramic presses for raising and lowering the die case, and which is readily adjustable to change the depth of the die cavity for the purpose of altering the thickness of the product and to compensate for variations in the density of the clay dust due to different atmospheric conditions; which, upon being actuated, performs a half cycle of its operation to lift the die case to its highest position and yieldingly sustain it in such position thereby to allow for the usual comparatively slight depression of the case by the face plate and, upon being actuated again, completes its cycle of operation, to positively retract the case; and to provide means of the aforesaid character which is particularly convenient of manipulation, is efficient, durable, is not liable to get out of order, and is not affected by the presence of dust or grit.

These objects, with others hereinafter appearing, are attained in the construction illustrated in the accompanying drawings and set out in the claims annexed hereto.

In the drawings, Fig. 1 represents a front elevation of a ceramic press incorporating my invention; Fig. 2 is a right hand side elevation of the press; Figs. 3 and 4 are enlarged vertical sectional details, at right angles to each other, of the power driven means for raising and lowering the die case; Figs. 5 and 6 are details of the clutch mechanism through which the operation of said means is controlled; and Figs. 7, 8 and 9 are sectional views, somewhat in the nature of diagrams, showing the various positions of the means for raising and lowering the die case, and the corresponding positions of the press parts and die.

Except for the improved means for raising and lowering the die case, the press herein disclosed is of the usual construction and comprises a table 1 that is supported a suitable distance above the floor by standards 2 and 3, and a head 4 is slidably supported for movement toward and from the table 1 by guides 5 that are carried by uprights 6 which are connected together at their upper ends by a top 7, the top and uprights being shown as integral. A screw 8 has its lower end suitably connected to the head 4 and is threaded through a nut 8^a that is journaled in a boss 9 of the top 7. The nut has secured to its upper end a bevel friction gear 10 wherewith are adapted to cooperate similar gears 11 and 12 which are secured to a constantly driven shaft 13 that is supported from the top of the press through brackets 14 and 15.

Journaled upon the end of the shaft 13 beyond the bracket 15 is a head 16 that is grooved to receive the opposed branches of a bifurcated upper end of a lever 17 that is pivoted at 18 to a lateral extension of the bracket 15. The lower end of the lever 17 is connected through a link 19 to an arm 20 that is secured to a shaft 21, journaled in an off-set portion of the right hand upright 6, and to the forward end of the shaft 21 is fastened an arm 23 that has its outer end pivotally connected to a rod 24 that is guided through brackets 25, carried by the aforesaid upright. Stops 27 and 28 are secured to the rod 24 in a manner permitting them to be adjusted, and arranged for cooperation with said stops is an arm 29 which is pivoted at 30 to the right hand upright 6 and which has a slot 30^a in its free end through which a stud 31 is extended and screwed into the head 4. A hand lever 35 is pivotally supported within a post 36 that

rises from the front right hand corner of the press table 1, and the rear end of the lever is connected, through a link 36ª, with the lower end of the rod 24. A spring 37, which has one of the ends connected to the arm 23 and its opposite end anchored to a lug 38 that projects forwardly from the right hand upright 6, tends to swing the arm 23 downwardly for a purpose which will be explained during the description of the operation of the press.

Splined to the left hand end of the shaft 13 is a driving pulley 40 which has suitably secured to it a bevel pinion 41 that meshes with a similar pinion 42 secured to the upper end of a vertical shaft 43 that is journaled at its upper end in a lateral extension of the previously mentioned bracket 14 and at its lower end in a boss 44 of a bracket 45 that extends outwardly from the standard 3. The pulley 40 and pinion 41, connected together through an elongated hub or sleeve, are retained against axial movement with the pinion 41 constantly in mesh with the pinion 42, by the housing 14ª which encloses the pinions and is carried by the bracket 14.

Secured to the floor or base below the press table 1, and central with respect thereto, is a U-shaped stand 47, and journaled within the left hand branch thereof is the inner end of a shaft 48. The outer end of said shaft (see Figs. 5 and 6) has mounted upon it a sleeve 49 that is journaled within a boss 50 of the previously mentioned bracket 45. The sleeve carries a disk 51 at its end that is provided with an aperture 52. A bevel gear 55 is secured to the outer end of the sleeve 49 and it meshes with a similar pinion 56 that is fastened to the lower end of the vertical shaft 43.

While I have indicated a pulley as the means for driving the machine, it is to be understood that any equivalent medium may be substituted therefor without in any way affecting the operation of the machine. The pulley is adapted to be driven, through means of a belt, from any suitable source of power, and while it is driven the shafts 13 and 43 will be constantly rotated, as well as the sleeve 49 and disk 51. Keyed to the shaft 48, adjacent the disk 51, is a clutch member 61 that is retained in position by a collar 62 that is secured to the shaft. The clutch member 61 is reduced at its end adjacent the collar 62 to effect, between its larger end and the collar, a groove 63 within which reposes the head 64 of a pin 65 that is slidable through a bore in the larger end of the clutch member and which is spaced from the axis of the shaft 48 a like distance with the recess 52 of the disk 51. A spring 66, which has one of its ends anchored, through a pin 67, to the clutch member 61, and its opposite end connected, through a peg 68 that extends through a slot 69 in the clutch member, with the pin 65, tends to move the pin 65 in a direction to project its inner end into the recess 52 of the disk 51 when the pin and recess are in register. Considering the direction of rotation of the clutch member (as indicated by the arrows in Figs. 1 and 5) what may be regarded as the front face of the head 64 of pin 65 is beveled for cooperation with the correspondingly beveled rear face of a trip arm 70. The trip arm is fastened to one end of a rock shaft 71 which is journaled within the adjacent standard 3 and has connected to its opposite end a foot pedal 72. A spring 73 tends to elevate the pedal and at the same time depress the trip arm 70. When the foot pedal is depressed, it will elevate the rear end of the trip arm and move it out of engagement with, and out of the path of, the head 64 allowing the spring 66 to project the pin 65 into the recess 52 when said recess comes into register with the pin. The parts are shown in this condition in Fig. 5. Thereupon, the constantly driven sleeve 49 will pick up the clutch member 61 and through it rotate the shaft 48. The foot pedal is depressed only long enough to allow the head 64 to pass it, after which it is released to permit the trip arm 70 to return to its former position in the path of the head 64 so that the forward inclined face of said head will engage the oppositely inclined rear face of the trip arm and ride up the same so as to withdraw the pin 65 from the recess 52, thereby to arrest rotation of the shaft 48.

Journaled in the upper ends of the side branches of the stand 47 is a shaft 75 which carries a gear 76 that meshes with a pinion 77, fastened to the shaft 48. The ratio of the gear to the pinion is two-to-one so that the gear will be rotated through 180° while the pinion is making a complete revolution. Thus, upon each depression of the foot pedal, the shaft 75 will make a half rotation.

Turning for the present to the die or mold wherein the articles are formed, the same consists of a bottom plunger 80 and a die case 81, the former resting upon and being secured to the table 1 of the press. The present die or mold is designed to produce small tile, and is in multiple, the plunger having a plurality of individual die elements and the die case a like number of through openings within which the individual elements of the multiple plunger fit and produce therewith what are referred to as the die cavities designated 82. Sustained by the press head 4 above the die case 81 is a face plate 85. The die case is supported through rods 86 from a cross member 87 which extends transversely beneath the

table 1, the rods 86 passing through holes in the table. A yoke 88 is secured to, and depends from the cross member 87 and has slots 89 in its side branches for the accommodation of the shaft 75. Near the top and bottom of the yoke 88 its side branches are provided with apertures which contain bushings 90 having eccentric bores wherein are journaled the trunnions of rollers 91 and 92. As a consequence of the eccentricity of the bushings 90, the rollers 91 and 92 may be adjusted toward and from each other by an angular adjustment of the bushings. For conveniently accomplishing this end I provide the following means: A lever 95, having a forked inner end, is connected through its opposed branches to the bushings which support the roller 91, the branches of the lever being shown as secured to the bushings by screws 96. The lever is adapted to be secured in any adjusted position by clamping it, as by means of a set screw 97, to a sector 98 that is secured to and extends rearwardly from one of the side branches of the yoke 88. A similar lever 100 has its branches connected, as by screws 101, to the bushings which support the trunnions of the roller 92. One of the branches of the lever 100 carries a removable or retractable pin 103 which is arranged to enter any one of a series of holes 104 in a sector 105 that is carried by and extends forwardly from the yoke 88. By this means, the roller 92 may be adjusted very quickly and accurately to a very fine degree. A post 108 is secured to and depends from the lower end of the yoke 88 and slidably fits within a cavity 109 that is formed in a vertical boss 110 incorporated in the bottom of the stand 47. Transversely disposed bores 112 enter the cavity 109 and contain friction blocks 113 which are adapted to be urged with the required degree of pressure against the post 108 by screws 114 that are threaded in the outer ends of the bores 112. The friction blocks 113 may be of fiber, brass, or any other suitable material. In this way the yoke 88 is yieldingly sustained at any elevation to which it is moved. A cam 115 is secured to the shaft 75 between the opposed branches of the yoke 88 for the cooperation with the rollers 91 and 92.

The press may be equipped with the usual accommodations for the slide box by means of which the clay dust is deposited in the die cavities and smoothed off flush with the top of the die case; and with the shelf for receiving the pressed articles, all of which is well understood by those familiar with the subject, and accordingly, and because they do not enter into the present invention, detailed illustration of said parts is deemed unnecessary.

In considering the operation of the machine, the parts may be regarded as in the position illustrated in Fig. 7, with the head of the press elevated, the die case in its highest position, and the die cavities filled with clay dust. The operator now depresses the hand lever 35 which, through the intervention of the rod 24, arm 23, shaft 21, arm 20 and link 19, causes the lever 17 to be swung so as to move the shaft 13 in a direction to engage the friction gear 11 with the friction gear 10 and rotate the nut 8^a in a manner to feed the screw 8 downwardly and depress the head 4. The operator holds the lever 35 depressed to maintain the parts in this condition in opposition to the spring 37. The head, descending, moves the face plate 85 into engagement with the top of the die case 81, depressing the die case and compressing the clay dust within the die cavities to the final thickness of the tile or other article that is being molded. This condition is illustrated in Fig. 8, and attention is particularly called to the fact that the cam 115 is far enough beyond the roller 91 to permit this action, the friction blocks 113 serving to yieldingly sustain the die case in its elevated position until the face plate depresses it as described. As the head 4 reaches the bottom of its stroke, the arm 29 engages the stop 28 and forces the rod 24 downwardly in spite of the manual depression of the lever 35, reversing the former position of the lever 17 and shifting the shaft 13 in a direction to engage the friction gear 12 with the gear 10, thereby to rotate the latter gear in the opposite direction and through the screw 8 retract the head. The head continues to move upwardly until the arm 29 engages the stop 27 and through said stop shifts the rod 24 so as to return the lever 17 and shaft 13 to their original or neutral positions thereby to centralize the friction gears 11 and 12 with respect to the gear 10 whereupon the head comes to rest in its elevated position. The operator then momentarily depresses the foot pedal 72 which releases the pin 65 and renders the clutch effective, thereby to impart a half rotation to the cam 115 as previously described. During this half rotation, the cam engages and moves beyond the roller 92, depressing the yoke 88 and consequently the die case to the position shown in Fig. 9 wherein the tops of the elements of the multiple plunger are shown as flush with the top of the die case so that the pressed articles or tiles may be slid off. Before the operator is ready to begin another molding operation, he depresses the foot pedal 72 to release the pin 65 and render the clutch effective to impart another half rotation to the cam 115 which returns it, and the parts controlled thereby, to the positions which they occupy in Fig. 7.

As hereinbefore mentioned, changes in

atmospheric conditions cause variations in the density of the clay dust and, accordingly, at some times, a given quantity of loose clay dust is compressible into a smaller space than at other times. Also, it is desirable to make tile or other articles of different thicknesses by means of the same equipment. The adjustments provided by the eccentric mountings of the rollers 91 and 92 with their convenient means of manipulation afforded by the levers 95 and 100 make it possible to very quickly and conveniently alter the relation of the die case to the plunger so as to compensate for the variations in the density of the clay dust and for the production of articles which differ in thicknesses.

Having thus described my invention, what I claim is:

1. In a machine of the character set forth, in combination with the plunger, die case and face plate, friction means yieldingly sustaining the die case at any elevation to which it is moved, and power driven mechanism for raising and lowering the die case and so acting as not to interfere with the depression of the die case by the face plate during the pressing operation.

2. In a machine of the character set forth, in combination with the plunger, die case and face plate, power driven mechanism for moving the die case in a direction to create the die cavity and so acting as not to interfere with a return movement of the die case by the face plate during the pressing operation, and friction means yieldingly sustaining the die case in cavity creating position.

3. In a machine of the character set forth, in combination with the plunger, die case and face plate, a structure movable with the die case and incorporating an abutment, an actuating element having a given course of movement during which it engages said abutment and raises the die case to high position and then withdraws from the abutment, and friction means yieldingly sustaining the die case in elevated position so that the same may be depressed by the face plate during the pressing operation.

4. In a machine of the character set forth, in combination with the plunger, die case and face plate, a structure movable with the die case and incorporating an adjustable abutment, an actuating element having a given course of movement during which it engages said abutment and raises the die case to high position and then withdraws from the abutment, and friction means yieldingly sustaining the die case in elevated position so that the same may be depressed by the face plate during the pressing operation.

5. In a machine of the character set forth, in combination with the plunger, die case and face plate, a structure movable with the die case and incorporating an abutment, a cam, means which upon being actuated moves the cam through a given course of movement, the cam during said movement engaging the abutment and raising the die case to high position and then passing beyond said abutment, and means yieldingly sustaining the die case in elevated position so that the same may be depressed by the face plate during the pressing operation.

6. In a machine of the character set forth, in combination with the plunger, die case and face plate, a structure movable with the die case and incorporating opposed abutments spaced apart in the direction of movement of the die case, a cam rotatable on an axis situated between said abutments and arranged to engage the abutments alternately to reciprocate the die case, mechanism through which the cam is rotated through two periods which approximate a complete rotation of the cam, the cam while rotating through one period engaging one of said abutments to move the die case in a direction to create the die cavity and then passing beyond said abutment, and means yieldingly sustaining the die case in cavity creating position so that the same may be moved by the face plate during the pressing operation.

7. In a machine of the character set forth, in combination with the plunger, die case and face plate, a structure movable with the die case and incorporating opposed abutments, a cam rotatable on an axis situated between said abutments so as to engage first one and then the other to raise and lower the die case, means controlling the rotation of the cam so as to divide a rotation thereof into two parts during one of which the cam engages one abutment and raises the die case to a high position and then moves beyond the abutment and during the other of which the cam engages the other abutment and lowers the die case, and means yieldingly sustaining the die case in an elevated position so that the same may be depressed by the face plate during the pressing operation.

8. In a machine of the character set forth, in combination with the plunger, die case and face plate, a structure movable with the die case and incorporating a yoke, rollers carried by the yoke and spaced apart in the direction of movement of the die case, a cam rotatable on an axis situated between said rollers and arranged to engage first one and then the other thereby to reciprocate the die case, mechanism for controlling the rotation of the cam which divides each rotation into two periods during one of which the cam engages and moves beyond the roller through which the die case is moved in a direction to create the die cavity, and means yieldingly sustaining the die case in

cavity creating position so that the same may be moved by the face plate during the pressing operation.

9. In a machine of the character set forth, in combination with the plunger, die case and face plate, a structure movable with the die case, rollers spaced apart in the direction of the movement of the die case, eccentric bushings carried by the structure and rotatably supporting said rollers, means for angularly adjusting the bushings thereby to adjust the rollers toward and from each other, a cam rotatable on an axis situated between said rollers and arranged to engage first one and then the other thereby to reciprocate the die case, the cam co-acting with the roller through which the die case is moved in a direction to create the die cavity so as to liberate said roller after the die case has been so moved and so that the die case may be moved by the face plate during the pressing operation, and means yieldingly sustaining the die case in cavity creating position.

10. In a machine of the character set forth, in combination with the plunger, die case and face plate, a structure movable with the die case and incorporating a yoke having two sets of opposed axially aligned apertures in its branches, eccentric bushings mounted in said apertures, rollers having trunnions journaled in the bushings, means for angularly adjusting the bushings and for maintaining them in any adjusted position, a cam rotatable on an axis situated between the rollers and so arranged as to engage first one and then the other of the rollers thereby to reciprocate the die case, and means controlling the rotation of the cam so that each rotation is divided into two parts during one of which the cam engages the roller through which the die case is moved in a direction to create the die cavity and then withdraws from the path of said roller so that the die case may be moved by the face plate during the pressing operation.

11. In a machine of the character set forth, in combination with the plunger, die case and face plate, a structure movable with the die case and having opposed parts that are provided with axially aligned apertures, eccentric bushings mounted in said apertures, a roller rotatably sustained by said bushings, a forked lever having its branches secured to the bushings so that the opposed bushings may be adjusted angularly in unison by a swinging of the lever, means for maintaining the lever in any adjusted position, said means consisting of a sector carried by the structure and an element carried by the lever for holding engagement with the sector, and a cam arranged to cooperate with the roller to move the die case.

12. In a machine of the character set forth, in combination with the plunger, die case and face plate, a structure movable with the die case and having opposed parts that are provided with axially aligned apertures, eccentric bushings mounted in said apertures, a roller rotatably sustained by said bushings, a forked lever having its branches secured to the bushings so that the opposed bushings may be adjusted angularly in unison by a swinging of the lever, means for maintaining the lever in any adjusted position, said means comprising a sector that is carried by the structure and is provided with a series of recesses, and a pin carried by the lever which is adapted to be engaged within any one of recesses, and a cam arranged to cooperate with the roller to move the die case.

13. In a machine of the character set forth, in combination with the plunger, die case and face plate, a structure movable with the die case and incorporating an abutment, a cam supported to rotate upon an axis adjacent said abutment and in such a position as to engage the abutment and move the die case in a direction to create the die cavity, a constantly rotating driving element, a driven shaft, a clutch through which the driving element may be coupled with the driven shaft, means which when actuated renders the clutch effective to impart a given rotation to the driven shaft, driving connections between the driven shaft and cam, the cam being so designed that upon each of its engagements with the aforesaid abutment it will withdraw therefrom so as to permit a return movement of the die case, and means yieldingly sustaining the die case in cavity creating position so that the said case may be moved by the face plate during the pressing operation.

14. In a machine of the character set forth, in combination with the plunger, die case and face plate, a structure movable with the die case and having opposed abutments, a shaft situated between the abutments, a cam on said shaft for engagement with first one and then the other of the abutments thereby to reciprocate the die case, a constantly rotating driving member, a driven shaft, a clutch through which the driving member and shaft are adapted to be coupled together, means for controlling said clutch which upon being actuated renders the clutch effective during a complete rotation of the driven shaft, a two-to-one reduction gearing through which the driven shaft and the first mentioned shaft are operatively connected, the cam being so designed and positioned upon the latter shaft as to come to rest with its high point beyond the abutment through which the cam acts to move the die case to cavity creating position, and means yieldingly sustaining the die case in said position so that the same may be depressed

by the face plate during the pressing operation.

15. In a machine of the character set forth, in combination with the plunger, die case and face plate, mechanism for moving the die case in a direction to create the die cavity and so acting as not to interfere with a return movement of the die case by the face plate during the pressing operation, friction means yieldingly sustaining the die case in cavity creating position, and an adjustment for varying the pressure of the friction means.

In testimony whereof, I hereunto affix my signature.

HILMAR MUELLER.