

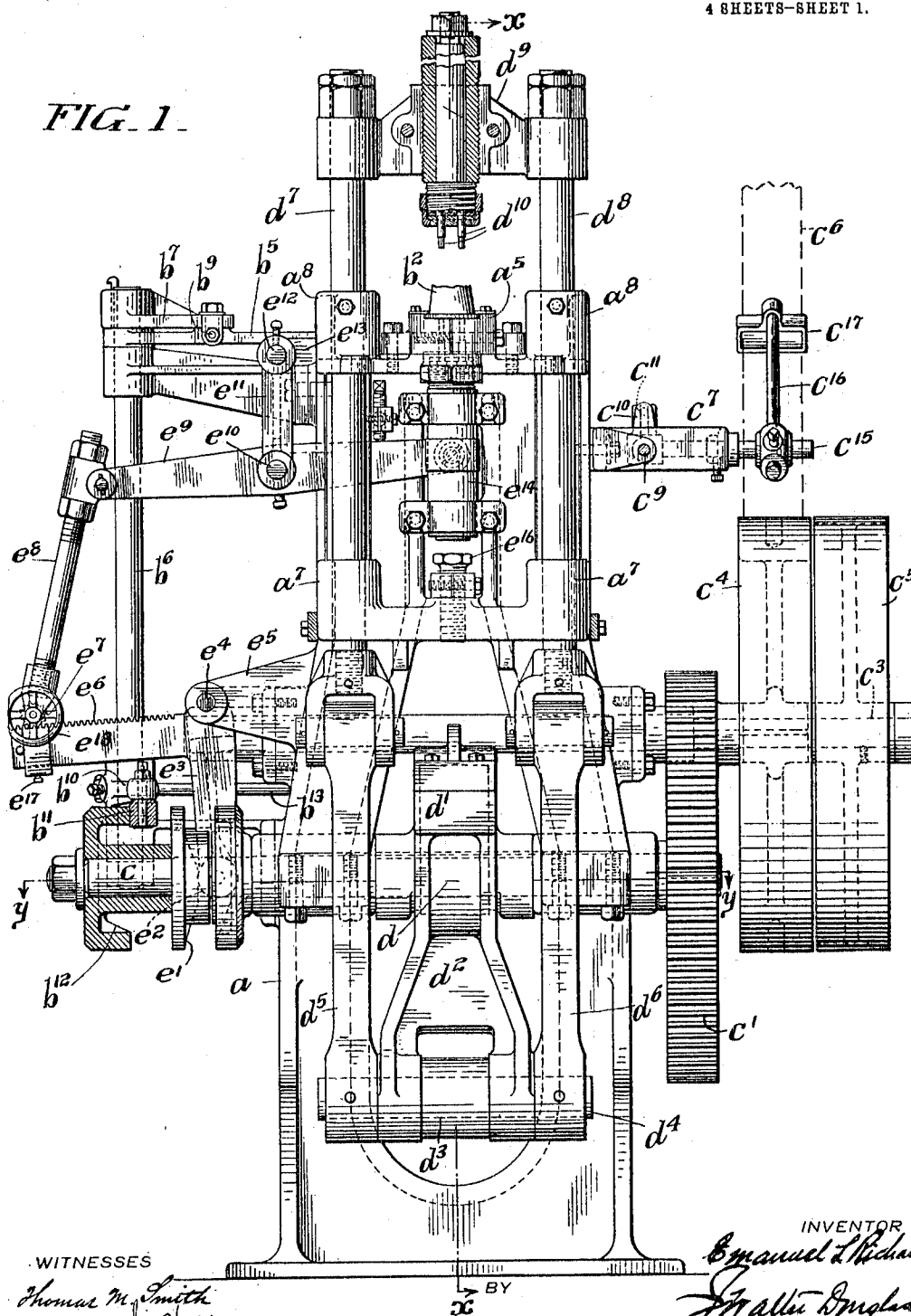
E. L. RICHARDS.  
TABLET MACHINE.  
APPLICATION FILED NOV. 13, 1913.

1.105,838.

Patented Aug. 4, 1914.

4 SHEETS-SHEET 1.

FIG. 1.



WITNESSES

Thomas M. Smith  
Helen J. Holt

BY  
X

INVENTOR

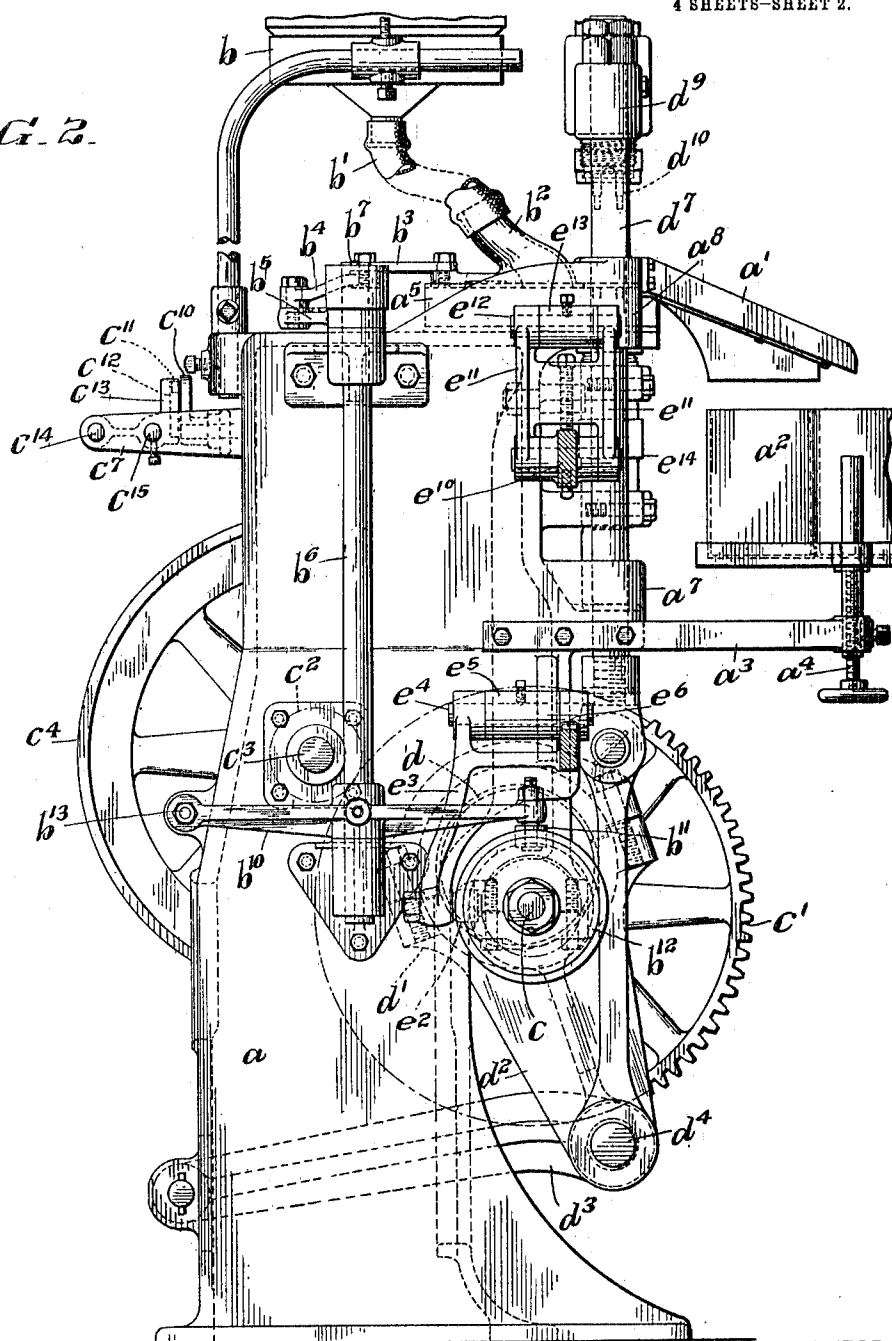
Emanuel L. Richards

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ATTORNEY

1,105,838.

4 SHEETS—SHEET 2.



Thomas M. Smith  
Helen J. Stolt

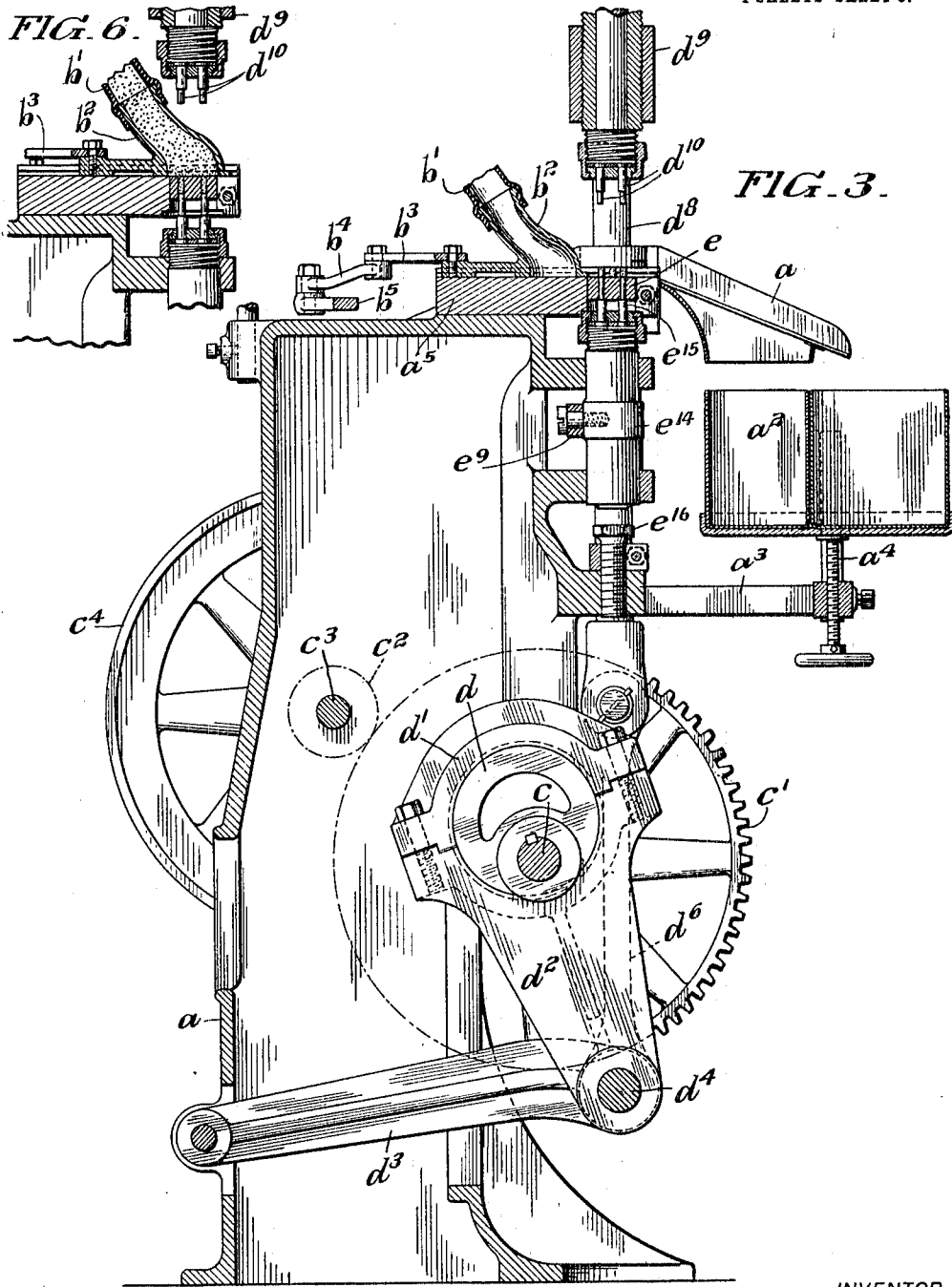
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 Helen S. Stolt

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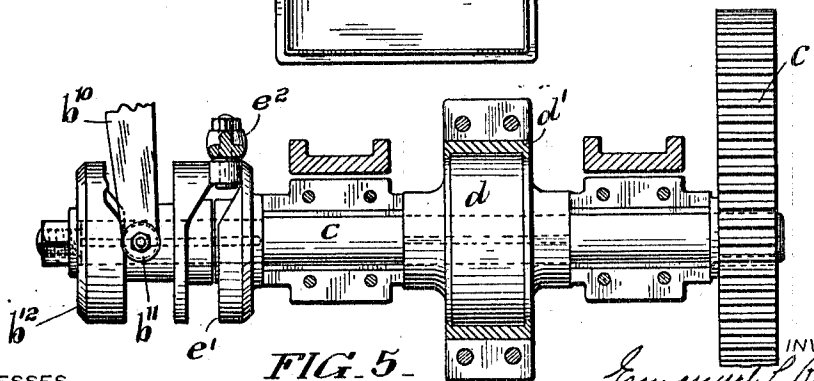
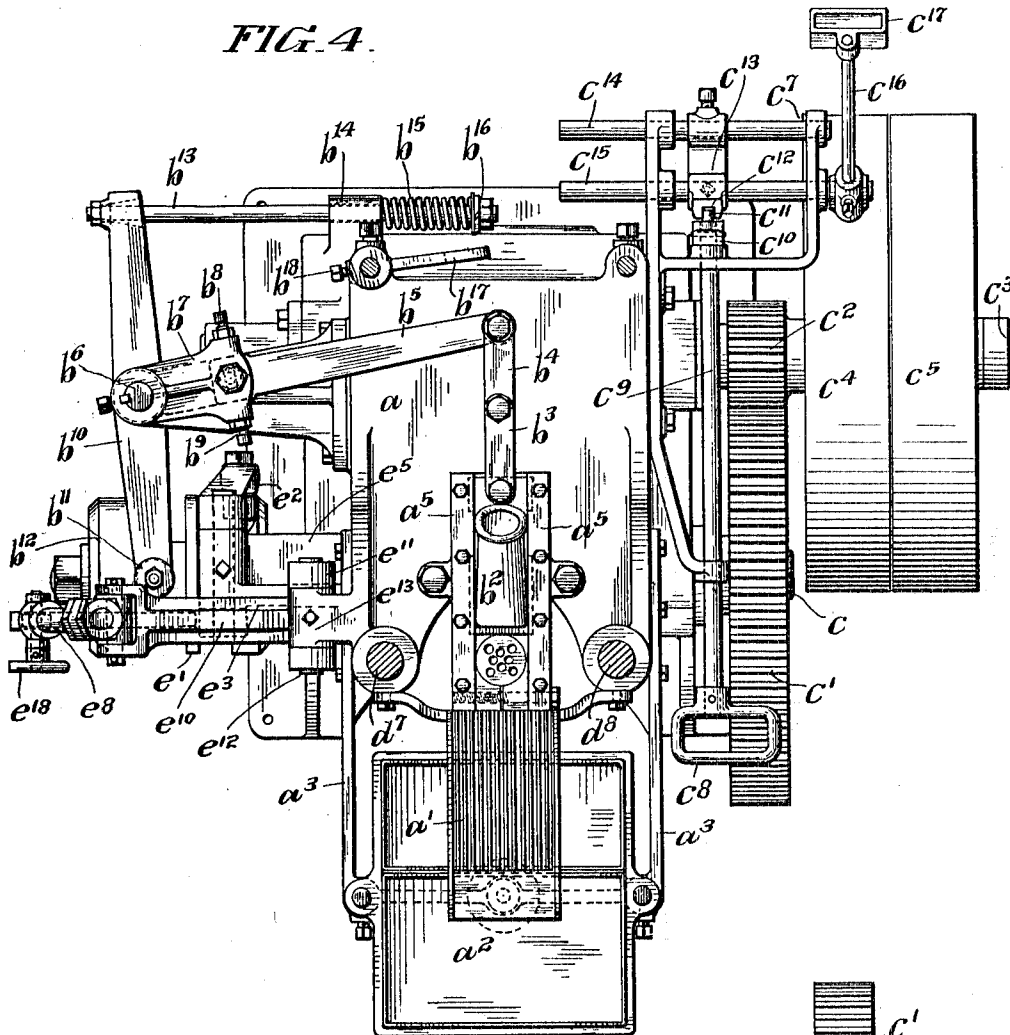
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4 SHEETS—SHEET 4.

FIG. 4.



WITNESSES

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FIG. 5.

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# UNITED STATES PATENT OFFICE.

EMANUEL L. RICHARDS, OF PHILADELPHIA, PENNSYLVANIA.

## TABLET-MACHINE.

1,105,838.

Specification of Letters Patent.

Patented Aug. 4, 1914.

Application filed November 13, 1913. Serial No. 800,719.

*To all whom it may concern:*

Be it known that I, EMANUEL L. RICHARDS, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Tablet-Machines, of which the following is a specification.

My invention has relation to certain improvements in a machine for compressing granular or powdered materials into different size tablets and freeing loose matter from the formed tablets during their delivery, for which U. S. Letters Patent No. 686,765 were granted under date of November 19th, 1901; and my present invention particularly relates in such type of machine, first, to mechanism to actuate upper tablet forming plunger-dies in a downward direction by a positive drawing motion into the path of co-operating positively actuated lower plunger-dies, operating in an upward direction to complete and in a cleanly manner deliver the tablets and at the same time that they are being discharged to free loose matter separated from the formed tablets during their discharge; second, to provide an adjustable rack and pinion means to adjust the stroke in the movements of one set of said plunger-dies so as thereby to vary quickly and effectively the size or thickness of the tablets to be produced; and third, to certain other details in constructive arrangement of the machine as to further improve its working as well as the character of the product obtained, as hereinafter more fully explained and pointed out in the claims.

My invention stated in general terms, consisting of a tablet machine, will be more fully understood from the following description taken in connection with the accompanying drawings forming part hereof, in which

Figure 1, is a front elevation of a machine with the upper plunger head shown in central section and with the divided receiving receptacle for loose matter and formed tablets, removed; the said machine as so illustrated and explained, embodying essential main features of my present invention. Fig. 2, is a side elevational view looking from the left in Fig. 1, showing certain parts thereof, in section and also showing the supported divided receptacle for loose matter and compressed tablets. Fig. 3, is a vertical central section on the line *x, x*, of Fig. 1, showing

more in detail, the power driven mechanisms to respectively, operate the upper plunger-dies downward by a positive drawing motion into the path of co-operating positively actuated lower plunger-dies in an upward direction and controlled by an adjustable rack and pinion means of the mechanism actuating said lower plunger-dies. Fig. 4, is a plan view, partly in section, showing general and particular detail arrangements of parts of the said machine. Fig. 5, is a sectional elevation of the main drive shaft on the line *y, y*, of Fig. 1, showing the operating cam for controlling the movement of the lower plunger-dies, the operated reciprocating feed-slide and the eccentric means for controlling the positive action of the upper plunger-dies in co-operation with the lower of said plunger-dies; and Fig. 6, is an elevation in broken section of the feed-slide in an operative position and the upper and lower plunger-dies in respectively, the positions occupied by them during feeding of matter to the perforated die-block of the machine.

Referring to the drawings, *a*, is a standard having bolted thereto a slitted discharge chute *a*<sup>1</sup>, located above a divided trough or receptacle *a*<sup>2</sup>, supported from a bracket *a*<sup>3</sup>, projecting from the standard *a*, and which receptacle by means of an adjusting screw bolt *a*<sup>4</sup>, holds the same in whatever required adjusted position desired, below the slitted discharge chute *a*<sup>1</sup>.

*b*, is a feed hopper, for powdered or granular material having a flexible tube *b*<sup>1</sup>, connected therewith and with a feed-slide *b*<sup>2</sup>, which latter is mounted in a guide *a*<sup>5</sup>, secured to the top of the standard *a*, as clearly shown in Fig. 2. This slide is connected with a link *b*<sup>3</sup>, and the latter with a link *b*<sup>4</sup>, and it in turn with a lever-arm *b*<sup>5</sup>, loosely mounted on a rotary shaft *b*<sup>6</sup>. A clamp *b*<sup>7</sup>, is keyed to the said shaft above the lever-arm *b*<sup>5</sup>. This clamp is provided at one end with adjusting bolts *b*<sup>8</sup> and *b*<sup>9</sup>, bearing against said lever-arm as clearly shown in Figs. 1 and 4, to thereby permit of change in position of the said lever-arm and as well as variably alter the position of said feed-slide *b*<sup>2</sup>, for complete discharges of both formed tablets and loose matter from the feed-slide guide-way *a*<sup>5</sup>, of the machine through the chute *a*<sup>1</sup>, into the partitioned adjustably supported trough *a*<sup>2</sup>, of the machine. The rotary shaft *b*<sup>6</sup>, is operated by a rocking-arm

5  $b^{10}$ , carrying a roller  $b^{11}$ , actuated by a cam  $b^{12}$ , mounted on the main drive shaft  $c$ . The roller  $b^{11}$ , is held against the working face of the said cam  $b^{12}$ , by a rod  $b^{13}$ , mounted in a bearing  $b^{14}$ . The rod  $b^{13}$ , carries a coiled spring  $b^{15}$ , and a nut  $b^{16}$ , with which bearing and nut, the respective extremities of the spring  $b^{15}$ , are in contact.

10  $b^{17}$ , is a locking-lever pivoted to the standard  $a$ , and provided with tightening nut  $b^{18}$ . This lever is provided for locking the slide  $b^2$ , in its forward position, when the machine is at rest, so that thereby extraneous matter may be excluded from the perforated die-block  $e$ , at such time.

15 The main shaft  $c$ , is provided at one extremity with a gear  $c^1$ , meshing with a pinion  $c^2$ , on a shaft  $c^3$ , of the standard  $a$ , as clearly shown in Figs. 1, 3 and 4. The shaft  $c^3$ , has secured thereto fixed and loose pulleys  $c^4$  and  $c^5$ , and on one of them as shown is a belt  $c^6$ , and a belt-shifting device  $c^7$ , connected therewith. This device  $c^7$ , extends from a bracket  $a^6$ , secured to the standard  $a$ .  
 20 The said belt-shifting device  $c^7$ , comprises a hand-hold  $c^8$ , with a rod  $c^9$ , carrying at its rear end a crank  $c^{10}$ , having a pin  $c^{11}$ , operating in a slot  $c^{12}$ , of a movable block  $c^{13}$ , secured to the rods  $c^{14}$  and  $c^{15}$ ; one of these rods carries at its outer end a rod  $c^{16}$ , having a loop  $c^{17}$ , through which the belt travels. By turning the hand-hold  $c^8$ , the rod  $c^9$ , is revolved to cause the pin  $c^{12}$ , to move to the right as in Fig. 4, and thus to shift the block  $c^{13}$ , and parts connected therewith, whereby the belt can be readily shifted from the fast pulley  $c^4$ , to the loose pulley  $c^5$ , or vice versa.  
 30 On the said main shaft  $c$ , centrally thereof, is secured an eccentric  $d$ , carrying a pillow block  $d^1$ , the arm  $d^2$ , of which is pivoted at  $d^4$  to a longitudinal rocking arm  $d^3$ , journaled in the rear lower portion of the standard  $a$ , as clearly shown in Fig. 3. On the pivot  $d^4$ , is secured links  $d^5$  and  $d^6$ , the upper end of which are pivoted to vertical plunger rods  $d^7$  and  $d^8$ , held in bearings  $a^7$  and  $a^8$ , of the standard  $a$ , as clearly shown in Fig. 1. On the upper ends of the said rods  $d^7$  and  $d^8$ , is mounted the upper head  $d^9$ , for a series of plunger-dies  $d^{10}$ .

35 The main shaft  $c$ , has secured thereto outside of the standard  $a$ , the cam  $e^1$ , operating by a roller  $e^2$ , carried by one end of a bell crank-lever  $e^3$ , journaled at  $e^4$ , to a bracket  $e^5$ , projecting from the standard  $a$ , and the opposite end of the said bell crank-lever  $e^3$ , is provided with gear-teeth  $e^6$ , meshing with teeth of a pinion  $e^7$ , carried at the lower end of a rod  $e^8$ . This rod at the opposite end is in pivotal connection with a cross rocking arm  $e^9$ , journaled to a floating pivot  $e^{10}$ , supported by links  $e^{11}$ , to a shaft  $e^{12}$ . This shaft is journaled to a bracket  $e^{13}$ , in the upper part of the standard  $a$ . The opposite  
 40 45 50 55 60 65 end of the rocking arm  $e^9$ , is in pivotal con-

nection with the head  $e^{14}$ , for a series of lower plungers  $e^{15}$ . The rack  $e^6$ , and pinion  $e^7$ , are provided so that the position of the upper plunger-dies with respect to the lower plunger-dies may be quickly varied to furnish tablets of variable size of thickness, as may be required, without altering other parts of the machine, it being only necessary to stop the machine long enough to effect the required change of adjustment of the rack  $e^6$ , and pinion  $e^7$ . Directly below the lower plunger-head  $e^{14}$ , is provided an adjustable buffer  $e^{16}$ , to relieve shock or strain on the working parts that actuate the respective plunger-dies, to which subject, in the ordinary operation of the machine.

70 75 80 The mode of operation of the machine as hereinbefore described will now be explained. The first step in the operation is to feed the pulverized or granular material through the hopper  $b$ , to the slide  $b^2$ , to deposit a definite quantity of the material into the perforated die-block  $e$ , and to effect such result the cam  $b^{12}$ , on the main driven shaft  $c$ , is started by the shifting of the belt  $c^6$ , onto the fast pulley  $c^4$ , to set in action the said shaft  $c$ . By the operation of the cam  $b^{12}$ , the roller  $b^{11}$ , riding on the face of the said cam causes the rocking arm  $b^{10}$ , to reciprocate about and with the shaft  $b^6$ , to thereby cause a rotary motion of the shaft  $b^6$ ; the upper end of the said shaft carries the adjusting block  $b^7$ , and lock-bolts  $b^8$  and  $b^9$ , and in contacting with the lever  $b^5$ , imparts reciprocating motion to the sliding feed block  $b^2$ , to shift it back and forth in its guide  $a^5$ , over the plunger die-block  $b$ , and to thereby deposit a certain definite quantity of material thereinto for being subsequently acted upon by both sets of plunger-dies  $d^{10}$  and  $e^{15}$ , in coöperating to compress the said material so deposited into the particular size or thickness of tablet required. The front edge of the said slide  $b^2$ , serves in its forward shifting action in the guide  $a^5$ , to free the formed tablets as well as loose matter in the tableting separated from each other from the machine, the formed tablets being deposited along the slitted chute  $a^1$ , dropping into the divided receptacle or trough  $a^2$ , and away from the deposited loose matter deposited through the slits of said chute into another division of the same.

85 90 95 100 105 110 115 120 125 130 In order to control the required thickness or size of tablet to be formed, the rack  $e^6$ , and pinion  $e^7$ , must be adjusted to the required degree and this accomplished by simply loosening the lock-bolt  $e^{17}$ , and by means of the hand-wheel  $e^{18}$ , shifting the pinion  $e^7$ , along the rack  $e^6$ , to either lengthen or shorten the stroke movements of the lower plunger-head  $e^{14}$ . The buffer  $e^{16}$ , may be adjusted either up or down to compensate for such change in the stroke of the said plunger-head  $e^{14}$ , and by such adjust-

ment relieving undue shock or strain on the lever arms  $e^3$  and  $e^8$ , and cross-head or rocking arm  $e^9$ . Motion is imparted to these several members by the roller  $e^2$ , operating against the working face of the cam  $e^1$ , on the main shaft  $c$ , of the machine.

The upper plunger head  $d^9$ , is operated in an up and down direction by a direct action through the connecting rods  $d^7$  and  $d^8$ , and links  $d^5$  and  $d^6$ , pivotally connected with the shaft  $d^4$ , carried by the arm  $d^2$ , of the pillow block  $d^1$ , eccentrically mounted on said main shaft  $c$ , whereby through the pushing action of the said eccentric  $d^1$ , on its block  $d^1$ , the positive and powerful direct action thereby of the upper plunger-dies  $d^{10}$ , onto the material to be acted upon, thereby effects a far better product and a much more cleanly and symmetrical type of tablet. The pivotally supported longitudinal lever arm  $d^3$ , movably supported on the shaft  $d^4$ , serves to maintain the links  $d^5$  and  $d^6$ , and the rods  $d^7$  and  $d^8$ , always in true vertical alining position for action. Through the said coöperative positive action of both sets of plunger-dies, in unison, after the fed material by means of the slide block  $b^2$ , has delivered its required quota of such material onto and into the perforated die-block  $c$ , it will be quickly and efficiently then compressed by the said dies into the required size or thickness of tablet.

The machine, it should be borne in mind, will be so timed as that successive movements of the feed slide  $b^2$ , and plunger-dies  $d^{10}$  and  $e^{15}$ , will successively operate to accomplish the above defined objects and after the plunger-dies free themselves from formed tablets, the slide block  $b^2$ , will free the tablets aided by the lower series of plunger-dies  $e^{15}$ , as well as free all loose matter accumulating from the formed tablets into the divided adjustable trough  $a^2$ , for then pursuing similar operations of the machine, as hereinbefore described.

Having thus described the nature and objects of my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a machine of the character described, two sets of coöperating plunger-dies, a main shaft carrying a mechanism connected positively with one set of said dies and actuated in a downward direction by a positive draw motion, a cam mounted on said shaft and operated thereby, said cam actuating interme-

mediate mechanism having a rack and pinion connected adjustably with the other set of said dies, said rack and pinion adapted to permit of quick change of movement of said dies, another cam mounted on said shaft, a rotary shaft actuated by said cam through intermediate mechanism, a guide-way and feed-slide therefor, said slide connected by pivoted links with a lever-arm loosely mounted on said rotary shaft, a clamp keyed to said rotary shaft and provided with adjusting bolts bearing against said lever-arm to change the position of said arm and thereby to variably alter the position of said feed-slide for complete discharges of both formed tablets as well as loose matter from said guide-way, substantially as and for the purpose described.

2. In a machine of the character described, two sets of coöperating plunger-dies, a main shaft carrying a mechanism connected positively with one set of said dies and actuated in a downward direction by a positive draw motion, a cam also carried on said shaft and operated thereby and said cam actuating intermediate mechanism having a rack and pinion connected adjustably with the other set of said dies, said rack and pinion adapted to permit of quick change of movement of said dies, and another cam mounted on said shaft, a rotary shaft actuated by said cam through intermediate mechanism, a guide-way and feed-slide therefor, said slide connected by pivoted links with a lever-arm loosely mounted on said rotary shaft, a clamp keyed to said rotary shaft and provided with adjusting bolts bearing against said lever-arm to change the position of said arm and thereby to variably alter the position of said feed-slide for complete discharges of both formed tablets as well as loose matter from said guide-way, and a pivoted locking device adjustably supported and provided with tightening means, whereby said feed-slide is adapted to be locked in one position thereof, to exclude extraneous matter from the die-block of the machine, substantially as described.

In witness whereof, I have hereunto set my signature in the presence of the two subscribing witnesses.

EMANUEL L. RICHARDS.

Witnesses:

THOMAS M. SMITH,  
HELEN S. HOLT.