

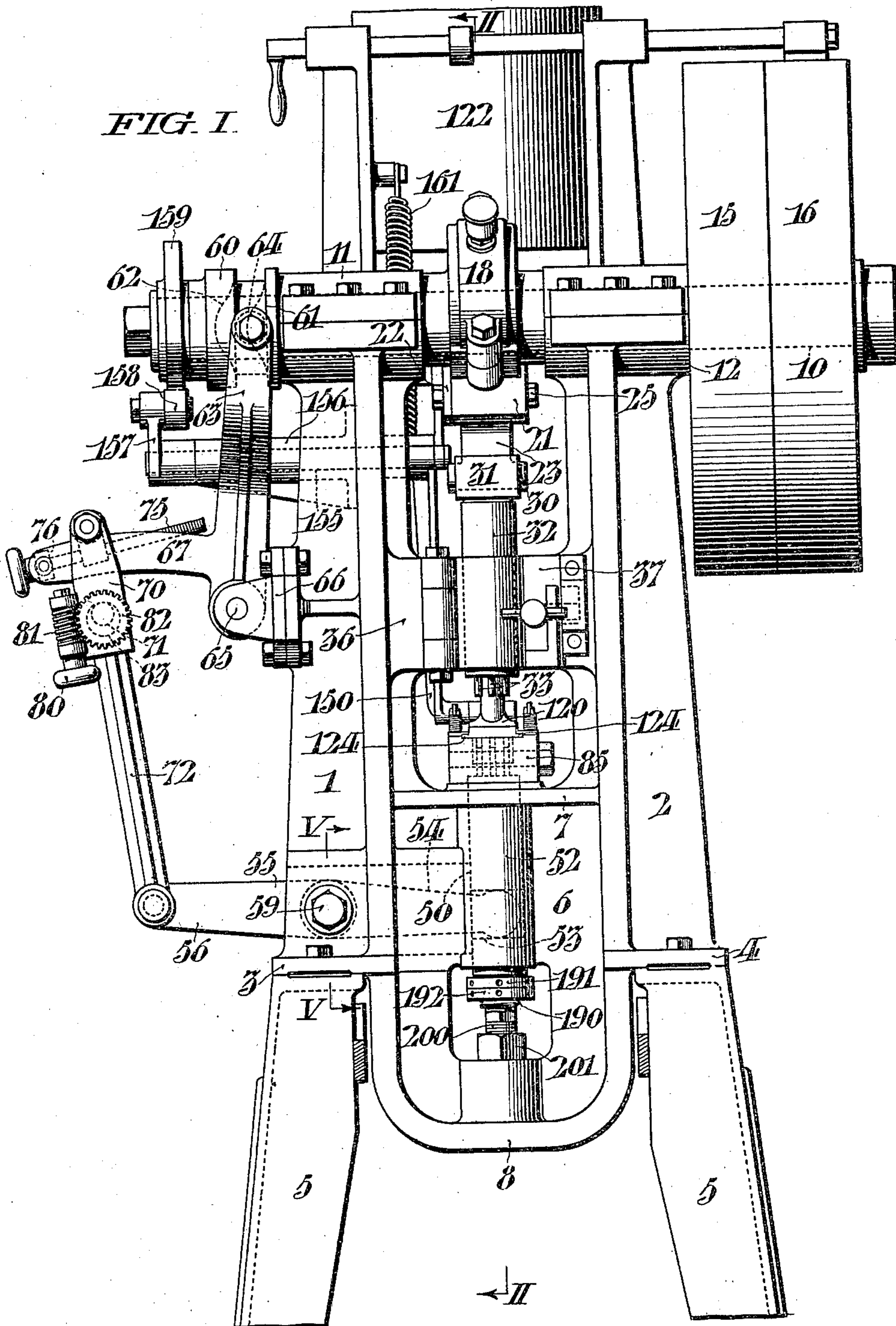
A. M. HANCE.
TABLET MACHINE.

APPLICATION FILED JUNE 12, 1909.

Patented June 7, 1910.

2 SHEETS—SHEET 1.

960,902.



WITNESSES:

John C. Bergner.
James H. Bell.

INVENTOR:

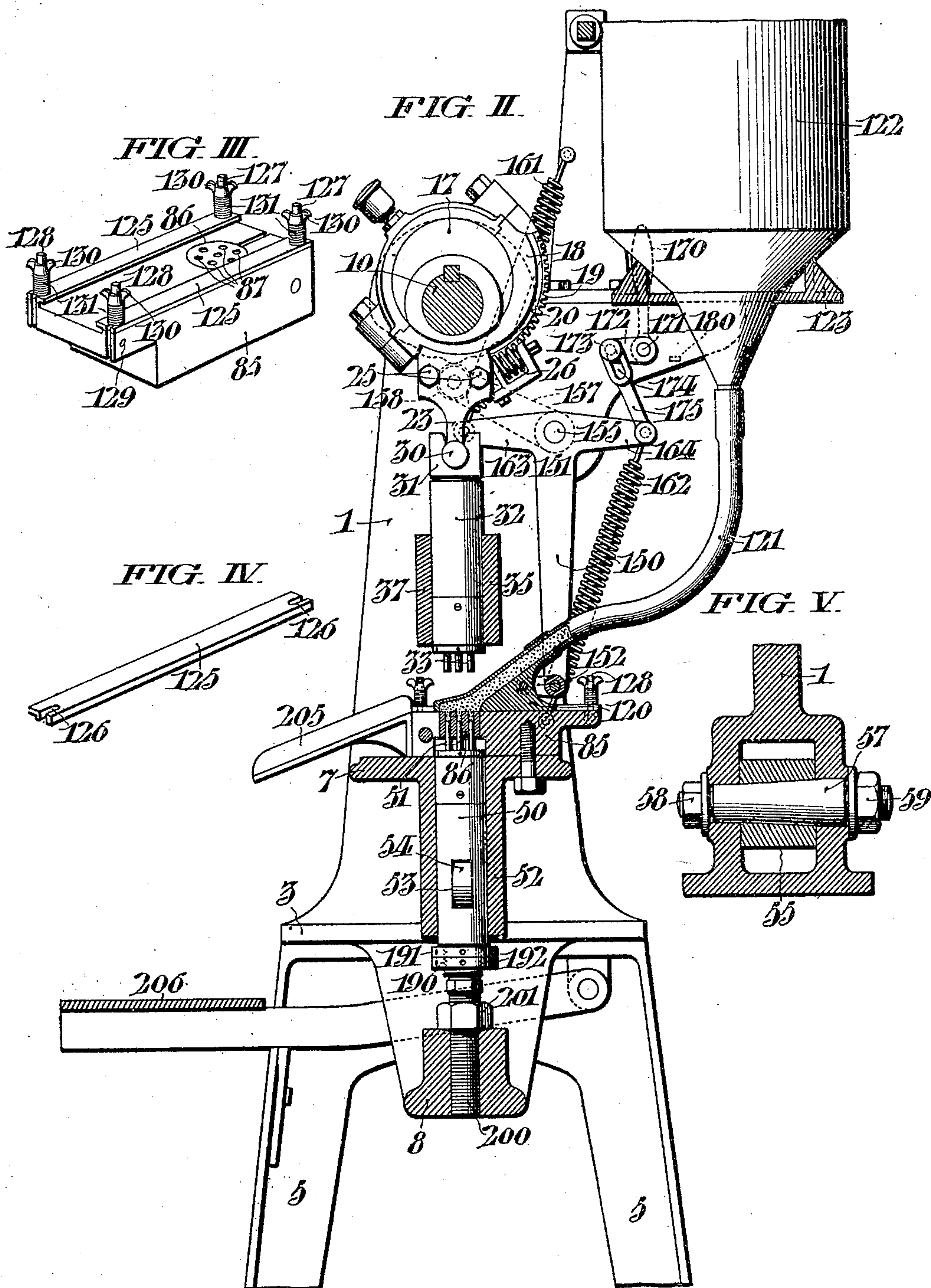
Anthony M. Hance,
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UNITED STATES PATENT OFFICE.

ANTHONY M. HANCE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HANCE BROTHERS & WHITE, OF PHILADELPHIA, PENNSYLVANIA, A FIRM.

TABLET-MACHINE.

960,902.

Specification of Letters Patent.

Patented June 7, 1910.

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To all whom it may concern:

Be it known that I, ANTHONY M. HANCE, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Tablet-Machines, whereof the following is a specification, reference being had to the accompanying drawings.

My invention relates to certain improvements in machines for making tablets or pills by compression.

Such machines normally include a die with plungers reciprocating therethrough, both from above and from below, a horizontally reciprocating feed shoe, by which the material is fed to the die, and by which also the tablets made by the last stroke ejected, and means for operating the opposed plungers, so that their ends meet within the die to effect compression of the tablet, whereupon the upper plunger is raised from the die and the lower plunger advanced to bring the compressed tablet flush with the surface of the die, for ejecting by the feed shoe.

Machines comprising the elements thus recited are of standard construction, and include among other things, mechanism for regulating with great nicety the movements of the feed shoe and of the plungers. It is upon the delicacy of the regulating means that the efficiency of the machine depends.

My present invention relates specifically to certain improvements in machines of this type, designed to overcome difficulties which have been experienced in the use of such machines, and particularly relates to the guides within which the feed shoe reciprocates over the surface of the plate, to certain means for rendering the motion of the lower plungers more accurate, and to means for withholding the feed shoe from its reciprocatory motion, while permitting the motion of the plungers to continue as usual.

For the more ready understanding of my invention, it is necessary to describe briefly the entire machine, and at the proper point of this description, I will include a description of the parts to which my present invention relates, with more full statement of the difficulties which are overcome by said invention.

In the accompanying drawings, Figure I,

is a front elevation of a tablet machine containing my invention. Fig. II, is a central vertical section of the same taken on the line II, II, of Fig. I. Fig. III, is a perspective view of the guide block upon which the feed shoe traverses. Fig. IV, is a detail perspective view of one of the guide plates of the block, shown in Fig. III. Fig. V, is a fragmentary sectional view taken on the line V, V, in Fig. I.

In the said figures, the machine is supported by a frame formed by standards 1, and 2, terminating at their bottoms in base plates 3, and 4, which rest upon suitable legs 5. The standards are united at the region of their base plates by a web 6, which terminates at its top in the plate 7, and at its lower end in a downwardly extending yoke 8. A driving shaft 10, is journaled in the bearings 11, and 12, formed at the tops of the standards, and carries tight and loose pulleys 15, and 16. Secured upon the shaft 10, between its bearings, is an eccentric 17, having a strap 18, whose outer periphery is provided with gear teeth 19. Concentric with the curvature of the strap 18, and on each of its faces, is formed a groove 20, in close proximity to the periphery. Within the grooves 20, are received lugs on the block 21, and plate 22, of the eccentric arm 23, which is clamped upon the strap 18, by bolts 25. The arm 23, carries a worm 26, which is arranged to engage the teeth on the strap 18. Upon loosening the bolts 25, the arm 23, and strap 18, may be relatively and accurately adjusted within the range of the slots 20. By the construction of the adjustable parts the throw of the eccentric is unaltered, but the timing of its motion, may be very accurately regulated. A horizontal cylindrical pin 30, in which the arm 23, terminates is pivotally connected to the squared end 31, of the upper plunger case 32, which carries at its lower end a convenient plurality of plungers 33. The plunger case is guided in its motion within a box 35, formed on a web 36, which extends between the standards. A lower plunger case 50, also provided with plungers 51, is slidably mounted within a cylindrical sleeve 52, formed on the web 6, already described. The lower plunger case 50, is provided with a slot 53, which receives one end 54, of the

lever 55, which receives oscillation as follows:—

Upon the driving shaft 10, and directly adjacent to the outer face of the bearing 11, is mounted a cylindrical cam 60, having the cam groove 61, with an offset 62, whereby an oscillating motion is imparted to the lever arm 63, which carries at its outer end a roller 64, which engages the said cam groove 61. The lever 63, is fulcrumed upon a pin 65, mounted in a bearing 66, and is provided with a lateral curved arm 67, which carries an adjustable sliding block 70, to which is pivoted at 71, a link 72, which is in turn pivoted to the outer arm 56, of the lever 55.

Upon the accurate relation of the parts just described, and upon the niceness of their adjustment depends the control of the movement of the lower plungers, and I have found that a very slight variation in the relation of these parts so affects the motion of the lower plungers as to alter the amount of material received within the die and compressed with each stroke of the plungers. The point where the result of wear is most likely to effect a disadjustment of these relations, is the fulcrum of the lever 55, which is pivoted within the standard 1. Accordingly, with a view to making possible the maintenance of accurate centering at this point, I fulcrum the said lever upon a tapered pin 57, received within a correspondingly tapered aperture piercing said lever 55. The position of the lever within the slot of the standard 1, which receives it is accurately maintained, by the corresponding dimensions of the parts. Accordingly a slight lateral movement of the tapered pin is sufficient to compensate for any lost motion occasioned through wear of the parts. This is more clearly illustrated in Fig. V, where the tapered pin 57, is provided at its end with nuts 58, 59, by the proper adjustment of which wear may be compensated for and the proper regulation of the size of the tablet produced by the machine accurately maintained.

The adjustment and timing of the motion of the lower plungers is obtained as follows:—The block 70, may be adjusted to any desired position along the curved lateral arm 67, of lever 63, by the manipulation of the hand screw 75, which is rotatably mounted in a swivel 76, at the outer end of the said arm 67, and is in threaded engagement with a pivoted nut 77, on the block 70. By this means the extent of motion imparted to the lower plunger may be regulated so as to determine the amount of material used in producing the tablets, as will be hereinafter more fully explained.

The motion of the plunger 50, may also be further regulated by a hand wheel 80, whose axis carries a worm 81, and is mount-

ed upon the block 70. The said worm 81, engages a toothed wheel 82, also mounted on the block 70, whose axis 83, carries the eccentric pin 71, about which the upper end of the link 72, is pivoted.

To the table 7, already mentioned, is bolted a die block 85, in which is clamped a die 86, provided with a plurality of apertures 87, corresponding to the plungers mounted on the ends of the plunger cases 32, and 50. A feed shoe 120, is adapted to traverse horizontally a slideway on the face of the die block 85, thus carrying a supply of material forward to the die, in position to be drawn therein by the descent of the lower plungers. This feed shoe is in communication, by means of a flexible pipe 121, with a reservoir 122, supported on brackets 123, which reservoir contains the material from which the tablets are to be formed. It is important that the feed shoe during its reciprocatory motion shall rest firmly and tightly upon the face of the die block, in order that air may not be drawn in under its edges, and in order that there may be as little escape of powdered material as possible with accompanying clogging of the moving parts. To this end the guide shoe runs in the slideway subject to the pressure of spring pressed plates 125, 125, one on either side of the feed shoe, and which engage and press down upon its side flanges 124, 124. These plates, as shown in Fig. IV, are provided at each end with notches 126, and are removably secured to the die block 85, by engagement of the bolts 127, and 128, of which the former are stud bolts and the latter swivel bolts, pivoted on pins 129, at the rear end of the die block. All these bolts carry wing nuts 130, and springs 131, whereby the plates 125, are yieldingly maintained under strong pressure against the block. By this construction, the ready removal of the plates 125, is permitted by loosening the thumb nuts 130, on the swivel bolts 128, which may thereby be swung back and the plates 125, withdrawn from under the springs on the bolts 127, at the other end of the block. This ready removal of the plates is desirable, in order to permit cleaning of the slideway, which occasionally becomes clogged by accumulation of material escaping from under the feed shoe. At the same time, the springs 131, afford constant but adjustable pressure, holding the feed shoe firmly in its seat on the slideway.

Reciprocatory motion is imparted to the feed shoe 120, by the arm 150, of the lever 151, which is pivotally attached to the said shoe by means of the link 152. The said lever 151, is secured to a rock shaft 155, which is journaled within a bearing 156, on the standard 1, of the machine, and carries on its outer end the roller arm 157, having a roller 158, which is maintained against a

cam 159, on the left outer end of the driving shaft 10, by the action of the springs 161, and 162, which are secured to the frame of the machine, and exert their tension upon the lateral arms 163, and 164, of the lever 151. Thus the springs draw the feed shoe forward over the die at the proper time, while the cam 159, in turn positively retracts it. The contour of the cam 159, is clearly shown in dotted lines in Fig. II, and its low portion 160 (corresponding to the forward throw of the shoe 120), is notched so as to agitate the material in the shoe, and thus help fill the cavities formed in the die 86, when the lower plungers 51, are in their lower position within the apertures 87, of the said die.

In order to render the shoe inactive, without the necessity of stopping the machine, (as for instance to adjust dies or to permit lubrication of the punches), I provide a hand lever 170, which is secured to a shaft 171, which is journaled within and extends through the standard 1, and carries at its inner end the arm 172. The said arm 172, supports at its outer end a pin 173, which is received in the slot 174, of the link 175, which is pivoted to the outer end of the arm 164, of the lever 151.

In the normal position of the hand lever 170, as shown in Fig. II, the link 175, slides idly along the pin 173, in the arm 172, but by turning the said lever to the right, against the pull of springs 161, and 162, until it encounters the lug 180, on the standard 1, the said pin 173, is thrown to the opposite side of the dead center, and thus retains the shoe 120, in its retracted or idle position, against the pull of the springs 161, and 162.

To prevent the plungers 51, on the lower plunger case from flying up beyond the upper face of the die 86, by their momentum when the machine is running rapidly, I provide the lower end of said case with a reduced threaded portion 190, which carries the stop nut 191, and a jam nut 192, which when the upper limit of motion is reached, engage the lower face of the sleeve 52, in which the plunger case 50, is guided.

In order to confine the strain of compression to the frame of the machine, the lower plunger case 50, at the time of compression, rests upon an adjustable bolt 200, which is threaded into the yoke 8, and provided with a jam nut 201.

The operation of the machine is as follows:—The material is fed to the shoe 120, from the reservoir 122, by the gravitation and also by the motion of the said shoe, under control of the cam 159. The parts of the machine are so adjusted that the lower plungers retract in the die, while the shoe 120, is at its forward position, and the cavities thus formed in the die are effectively filled, in which operation the agitation of

the material due to the notched portion of the controlling cam materially assists. Further rotation of the driving shaft 10, causes the recession of the feed shoe and the descent of the upper plungers, which enter the now filled cavities in the die, and thereby compress the entrapped material into tablets or pills, the shape of whose faces depends upon the contour of the ends of the plungers. Motion of the upper plungers, depends on the eccentric 17, and that of the lower plungers on the action of the grooved cam 60, and these two motion-creating means, are so related to each other, as to bring about the position of the parts, as described in the foregoing paragraph. After the compression, both plungers rise and the finished tablets are thereby elevated to the plane of the upper face of the die block. At this time the feed shoe again advances to recharge the die cavities, and its forward end at the same time pushes the finished tablets to the chute 205, which is secured to the front of the die block whereupon they may be collected within a suitable receptacle which may be placed upon the shelf 206, supported on the frame of the machine.

Having thus described my invention, I claim:—

1. In a machine for compressing tablets, the combination with the die and upper and lower plungers; of means for reciprocating the lower plunger, comprising a pivoted lever, in engagement with both the plunger and a reciprocating member, the pivot hole of said lever being tapered, while the pivot is similarly tapered and screw threaded at either end with nuts upon both screw threaded ends whereby its endwise position may be accurately adjusted to take up wear of the pivot hole.

2. In a machine for compressing tablets, comprising a die and opposed reciprocating plungers; a slide-way for a feed shoe, flush with the face of the die; plates overhanging said slide-way at either side, and in engagement with the side flanges of the feed shoe, said plates being slotted at both ends, and being removably held in their position by bolts passing through said slots, and which are swiveled within the slide-way whereby they may be swung out of the slot to permit the ready removal of the plates.

3. In a machine for compressing tablets, comprising a die, and opposed reciprocating plungers; a feed shoe sliding over the face of the die; a pivoted lever through which motion is imparted to the feed shoe; a rotating cam engaging one end of said lever and by which the feed shoe is at intervals positively retracted from its position over the die; a spring by the tension of which said lever is moved to again force the feed shoe over the die; and means whereby said lever may be locked against the tension of

said spring, whereby it is prevented from returning the feed shoe over the die.

4. In a machine for compressing tablets, comprising a die, and opposed reciprocating plungers; a feed shoe sliding over the face of the die; a pivoted lever through which motion is imparted to the feed shoe; a rotating cam engaging one end of said lever and by which the feed shoe is at intervals positively retracted from its position over the die; springs by the tension of which said lever is moved to again force the feed shoe over the die; and means whereby said lever may be locked against the tension of said springs, and prevented from returning the feed shoe over the die, said means comprising a hand lever 170, a slotted link 175, in engagement therewith, and pivotal connections between the other end of said link

and the lever by which the motion of the feed shoe is controlled. 20

5. In a machine for compressing tablets, comprising a die and opposed reciprocating plungers, a lower plunger case; a cylindrical sleeve surrounding said plunger case; means for positively and vertically reciprocating said plunger case within said sleeves; and an adjustable stop nut on the lower end of the plunger case whereby the upward movement of the same is definitely limited. 25 30

In testimony whereof, I have hereunto signed my name, at Philadelphia, Pennsylvania, this ninth day of June, 1909.

ANTHONY M. HANCE.

Witnesses:

JAMES H. BELL,

E. L. FULLERTON.