No. 610,029. Patented Aug. 30, 1898.

E. C. CLARK.

POWDER COMPRESSOR.

(Application filed Jan. 3, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

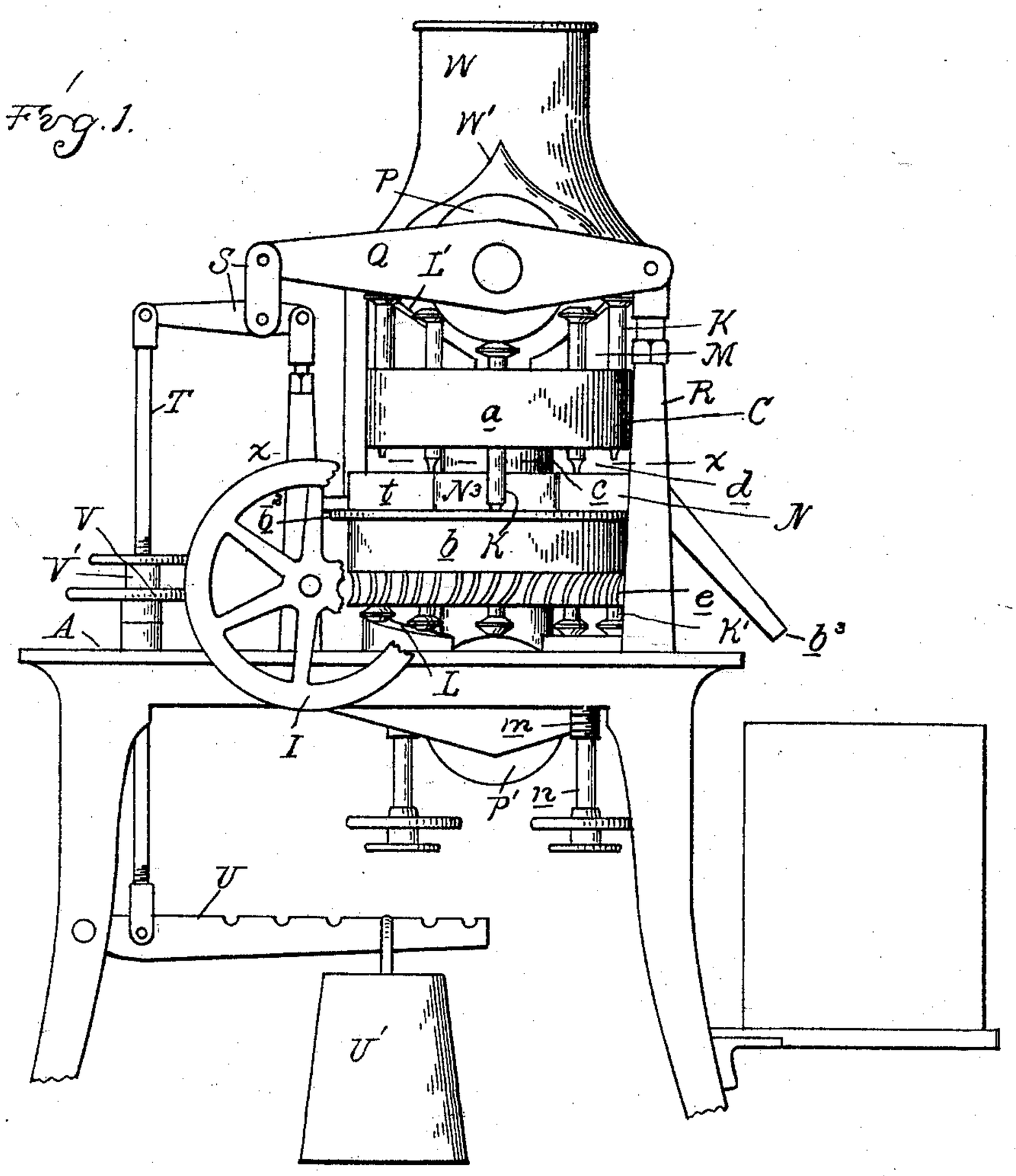

Fig. 3.

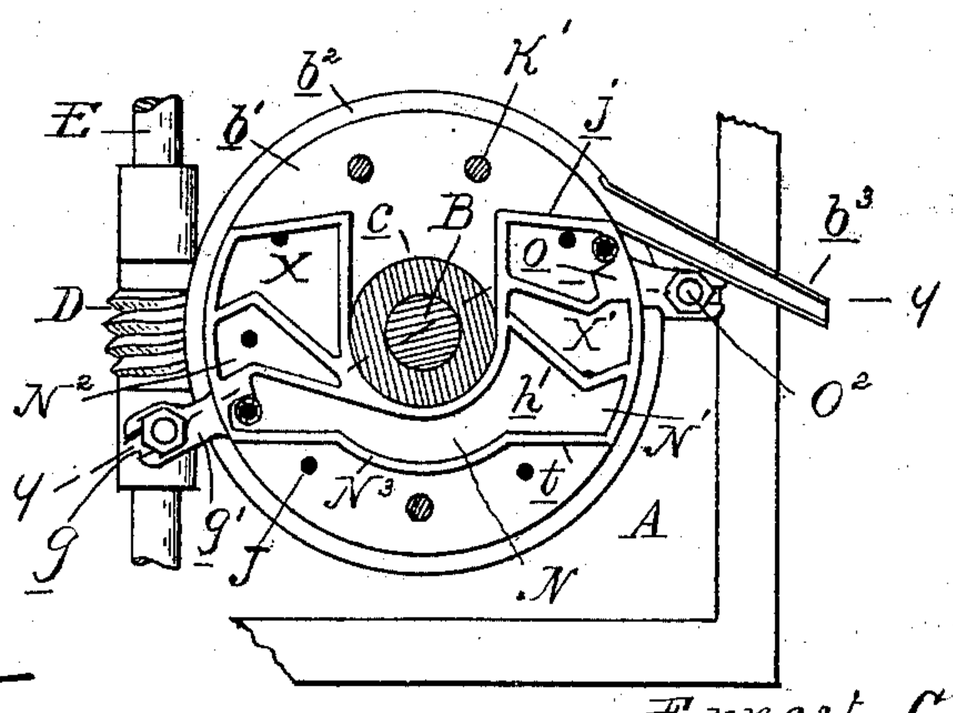

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Fig. 4.

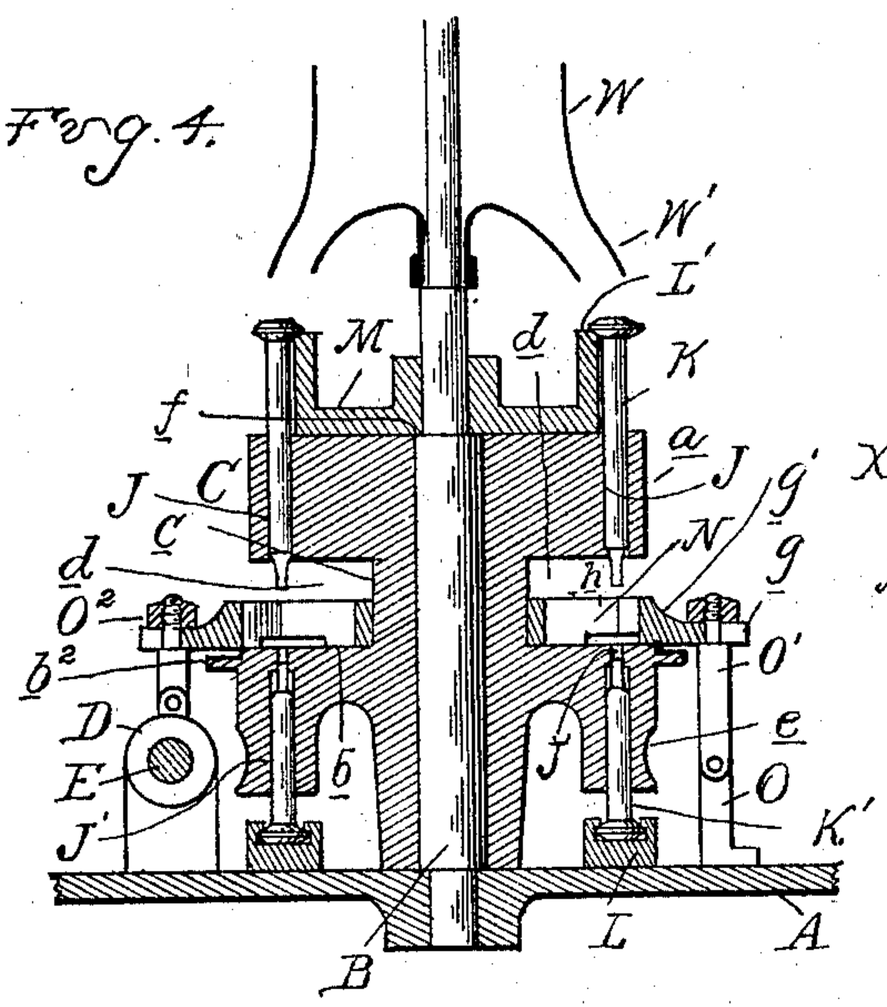


Fig. 5.

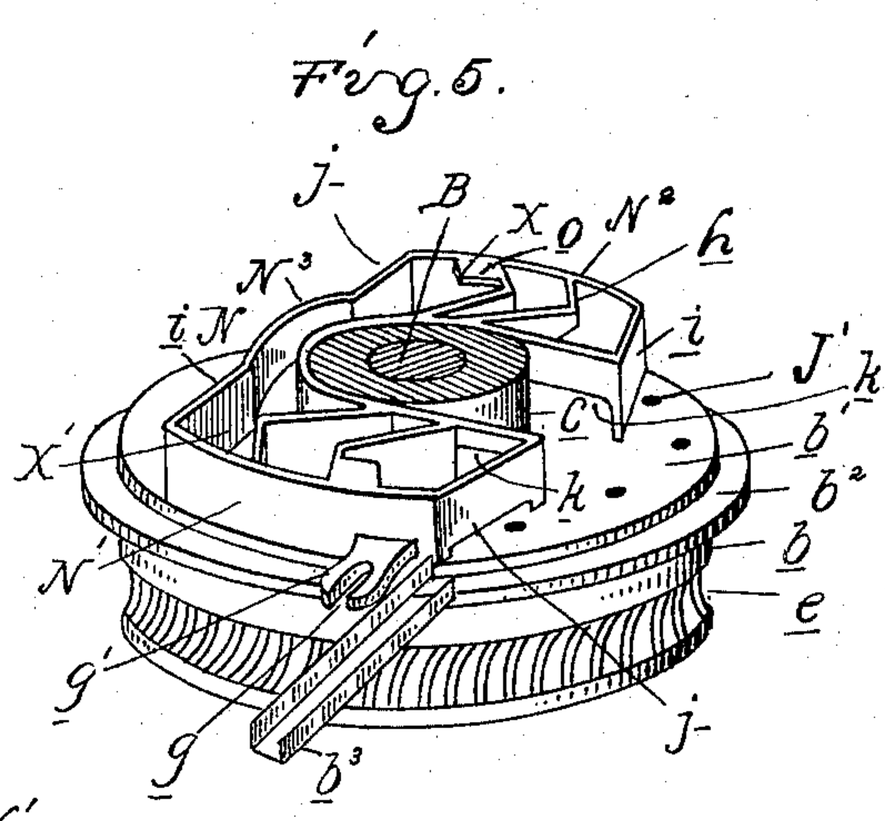


Fig. 2.

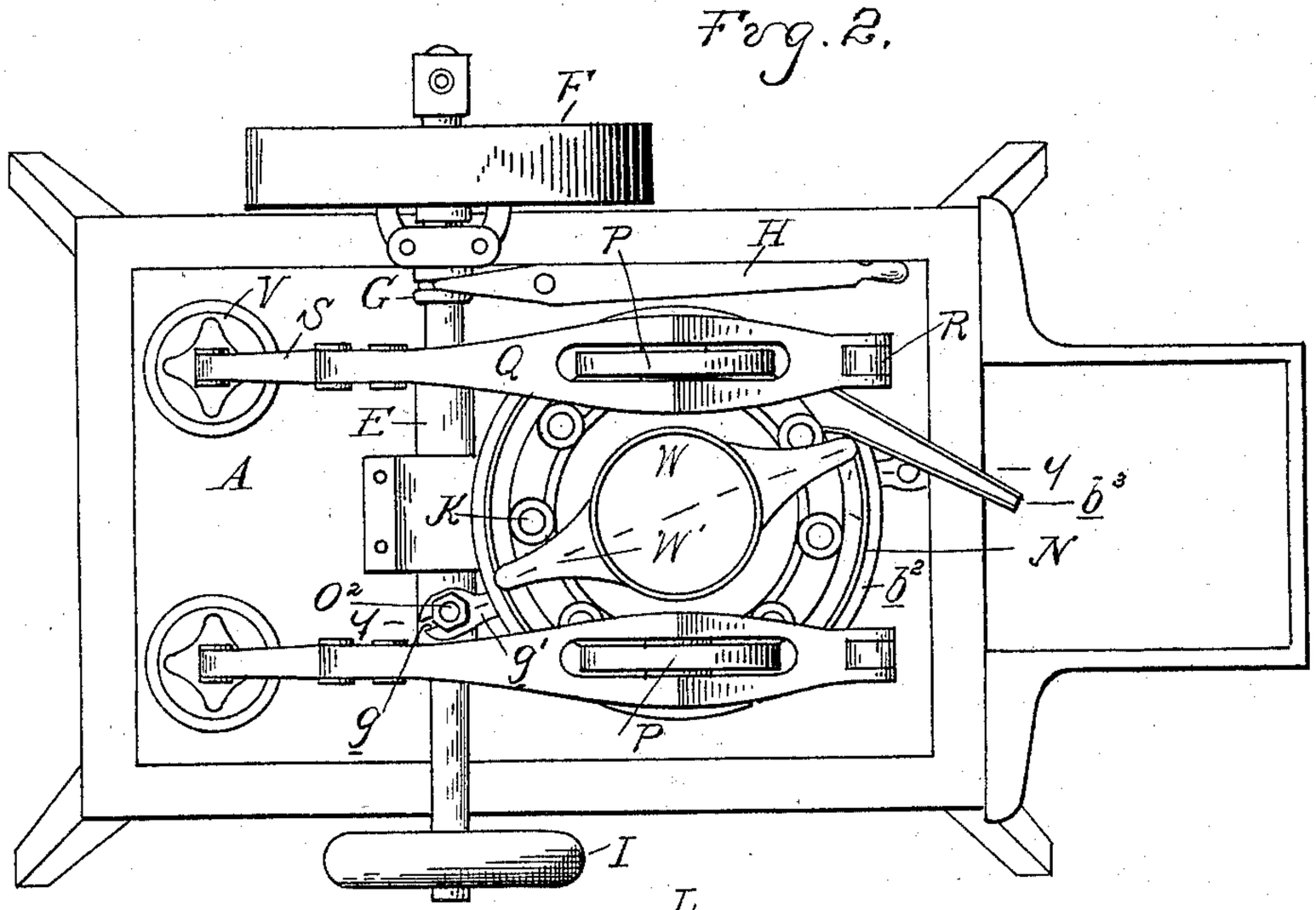
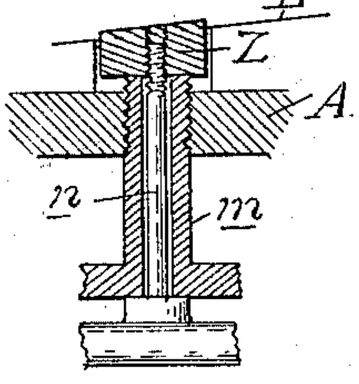


Fig. 6.



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UNITED STATES PATENT OFFICE.

ERNEST C. CLARK, OF DETROIT, MICHIGAN.

POWDER-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 610,029, dated August 30, 1898.

Application filed January 3, 1898. Serial No. 665,417. (No model.)

To all whom it may concern:

Be it known that I, ERNEST C. CLARK, a subject of the Queen of Great Britain, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Powder-Compressors, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to that class of compressors designed for the compression of powders into tablets and comprising a rotary head or table having one or more pockets formed therein, a stationary feed-frame above said table adapted to fill the pockets with the material to be compressed, and dies or plungers carried by said head or table adapted to compress the material contained in the pockets into tablets and discharge the latter from the machine.

The invention consists in certain features of construction whereby the output and life of the machine are increased and waste of the material to be compressed is prevented, all as more fully hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of my machine. Fig. 2 is a plan thereof. Fig. 3 is a horizontal section on line *x x*, Fig. 1. Fig. 4 is a vertical section on line *y y*, Fig. 2. Fig. 5 is a perspective view of the lower section of the rotary head and the feed-frame, and Fig. 6 is a detail view of the adjustable cam.

A is a suitable frame or table, upon which is mounted the vertical shaft or spindle B.

C is a rotary head sleeved upon the spindle B and consisting of the upper section *a* and the lower section *b*, connected by the contracted neck *c* and leaving an annular groove *d* between the sections *a* and *b*. Upon the periphery of the lower section *b* is formed a worm gear-wheel *e*, which meshes with the worm D on the horizontal shaft E, journaled on the frame A.

F is a pulley sleeved upon the shaft E and adapted to be driven from a suitable source of power.

G is a clutch for connecting or disconnecting the pulley and shaft, controlled by the lever H, and I is a hand-wheel at the opposite end of said shaft.

J are apertures formed in the upper section *a* of the head and arranged in series concentrically around the axis. J′ are corresponding apertures of the section *b* in line with the apertures J.

K and K′ are plungers slidingly secured in the apertures J and J′, respectively, and forming the upper and lower dies for compressing the tablets. The lower ends of the plungers K′ engage with the stationary cam-track L, supported upon the frame A, and the upper ends of the plungers K engage with the cam-track L′, formed on the head M, the latter being secured to the spindle B and resting on the shoulder *f* thereon above the journal for the head C. The cams L and L′ are arranged to raise and lower the plungers K and K′ in the manner hereinafter more fully described.

N is a feed-frame yoked around the neck *c* in the annular groove *d* of the head C and bearing against the upper face *b′* of the lower section *b*. This frame is detachably secured to standards O, rising from the frame A, by means of the hinged arms O′ on said standard engaging with slots *g* in arms *g′*, extending from opposite sides of the feed-frame and clamped thereto by the nuts O^2, the arrangement being such that the frame may be first engaged with the neck *c*, and then by turning up the arm O into engagement with the slots *g* and adjusting the nuts O^2 the frame may be securely locked in position and held in close contact with the upper face of the section *b*. The frame N preferably covers as large a portion of the face *b′* as possible, leaving sufficient space outside thereof for the lowering of the upper plunger at one or more points in the revolution of the head in order to effect the compressing of the tablets.

In the drawings, in which I have shown a machine designed to cause a compression of the plungers at two points in the revolution of the head, the feed-frame comprises the two sections N′ and N^2, connected by the narrow yoke N^3 and having the opposite spaces X and X′ for the operation of the plungers. Each section is preferably provided with a series of V-shaped wings *h*, notched at their apexes and adapted to gather the powder contained in the box, which rests in the revolving face *b′*, into a ridge in line with the apertures J′. Each section is also provided

at its rear side (the side from which the head revolves) with a cut-off wall or portion *i*, bearing closely against the face *b'* and at its forward side with the inclined wall *j*, the latter being raised to give a slight clearance-space between its lower edge and the face *b'*. The yoke N^3 forms a connecting-passage between the sections N' and N^2, through which the material may pass from the former to the latter inside of the circle of apertures J', and upon the opposite side of the neck *c* the sections are apertured at *k* to permit the material to pass again from the section N^2 to the section N'. At the points at which the compression takes place the cam-tracks L and L' are cut away and the rollers P and P' are placed in their stead. The rollers P are journaled in a lever Q, fulcrumed at one end in the standards R, rising from the table A. The opposite ends of these levers are connected to the multiplying-levers S, which in turn are connected by the vertical rods T with the levers U, carrying the adjustable weights U'.

V is an adjustable stop secured upon threaded portions of the rods T and locked by the locking-nut V', which stop is adapted to strike against a fixed stop on the frame, and thus limit the movement of the levers.

The rollers P' are journaled in fixed bearings in the frame A.

Z is a block forming an adjustable portion of the cam-track L, which is sleeved to the upper end of a hollow screw-threaded rod *m* by passing through a threaded aperture in the frame by means of a screw-threaded rod *n*, passing through the rod *m* and engaging with a screw-threaded aperture in the block Z. At its lower end the rod *n* has a collar or shoulder bearing on the end of the rod *m*, and both rods are provided with wheels or handles for adjusting them, all so arranged that by adjusting the rods *m* the blocks Z may be raised or lowered, and then may be locked in their adjusted position by turning the rod *n*.

W is a box for holding the material to be compressed, secured to the upper end of the spindle B and having one or more discharge-pipes W' leading down to the feed-frame N. To form an adjustable cut-off for these discharge-pipes, the feed-box N is provided with the lugs or flanges *o*, and the box W is so secured to the spindle B that it may be given a slight rotating movement to move the ends of the pipes W' over the flanges *o*.

The parts being thus constructed and arranged, the operation of the machine is as follows: Motion is imparted to the head C from the drive-pulley F through the medium of the clutch G, shaft E, worm D, and worm-gear *e*. The powder to be compressed is discharged from the box into the feed-frame N, where it is deposited on the face *b'* and is carried around by the rotation of the head, the V-shaped wings *h* of the feed-frame keeping it in a ridge in line with the apertures J'. The shape of the cam-track L is such that the lower plungers K' while passing beneath the feed-frame are held down, so as to leave open pockets in the upper part of the apertures J', which will be filled with the powder. Just before passing under the cut-off wall *i* the plungers engage with the adjustable portion Z of the track, which is so set that the depth of the aperture is accurately gaged to hold just the required amount of powder to form the tablet. The cut-off wall *i* is held in contact with the face *b'*, so as to scrape all of the material off therefrom and have the aperture filled to a level, the superfluous material being directed by the inclination of the cut-off into passage in the yoke N^3 from the section N' of the box and into the section N^2, or out through the aperture *k* from the section N^2 and back again through the corresponding aperture into the section N'. After passing the cut-off the further rotation of the head will bring the corresponding upper plungers K to a downward incline in the cam-track L', which will force that plunger downward into the aperture, compressing the material therein against the lower plunger. The final compression, however, is given when the plungers pass the rollers P P', which being free to rotate in their bearings, greatly reduce the friction of the machine. The pressure of this final compression is determined by the adjustment of the weights and levers, which accurately gage it. Thus, if the material in the aperture should be of greater density at one time than at another, so that the plungers could not move as close together without an increased pressure, the upper roll will yield when the desired limit of pressure is reached, and will then relieve the strain on the dies, preventing them from injury. When the point of greatest compression is passed, both upper and lower plungers are raised by their respective cams, thus forcing the tablet out from the aperture, where, in the continued rotation of the head, it will strike against the inclined wall *j* and be deflected to the outer edge of the face *b'*. In order to discharge the tablets compressed on both sides of the head with a common receptacle, I preferably provide the annular shelf b^2, surrounding the section *b'* of the head onto which the tablets are forced by the deflector-walls *j* and are carried around to the common discharge-chute b^3. As the inclined walls *j* are given a slight clearance from the face *b'*, any of the powder which remains on the said face after the compression is carried into the space within the feed-frame.

What I claim as my invention is—

1. In a compressor for powders, the combination of a frame, a stationary vertical spindle, a rotary head journaled thereon consisting of two sections connected by a neck, the two sections having alined apertures, a feed-frame secured to bear on the lower section for directing the material into the apertures in said section, the plungers in the apertures in both sections, and actuating means for the

plungers to compress the material at two points in their travel.

2. In a compressor for powders, the combination with the rotary head comprising upper and lower sections having alined apertures, plungers therein, with actuating devices at two points, and a neck connecting the two sections, of a feed-frame secured to rest on the lower section, comprising two sets of gathering devices located between the points of actuation of the plungers, and a connecting-frame at one side only of the neck for the purpose described.

3. In a compressor for powders, the yoke-shaped feed-frame, comprising two sets of gathering-wings, and a connection between the two at one end only.

4. In a compressor for powders, the combination with the two-part rotary head connected by a neck, of a feed-frame having a yoke-shaped opening adapted to embrace the neck, a series of gathering-wings thereon and a stationary support for the frame.

5. In a compressor for powders, the combination of a feed-frame, a series of wings converging to a common concentric line, an opening being formed in the wings on this line, and the rotary head having a series of apertures adapted to travel beneath these openings.

6. In a compressor for powders, the combination of the rotary apertured head carrying plungers which are adapted to form tablets during rotation, a stationary feed-frame on a portion only of the head leaving a portion or portions free, means at the free portion for forming tablets in the apertures and means for pushing them out of the apertures, and a wall at the beginning of the gathering-frame adapted to arrest the tablets, but permitting the powder to pass thereunder into the gathering-frame.

7. In a compressor for powders, the combination of the rotating head, carrying the plungers, means for gathering the material into the apertures in which the plungers work, of a cam-track for the upper die, a depression therein at the point of operation, a wheel or roller above the depressed portion of the track and beneath which the upper plunger passes, and a lever in which said roller is journaled, substantially as described.

8. The combination with a rotary apertured head carrying plungers which are adapted to form tablets during the rotation of the head, a stationary feed or gathering frame on a portion of said head leaving portions uncovered or free, means at said free portions for forming the tablets in the apertures, means for pushing them out of said apertures, inclined walls for pushing the formed tablets off from the head, and an annular shelf surrounding said head on which said tablets will lodge adapted to carry them to a common point of discharge.

In testimony whereof I affix my signature in presence of two witnesses.

ERNEST C. CLARK.

Witnesses:
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OTTO F. BARTHEL.