

(No Model.)

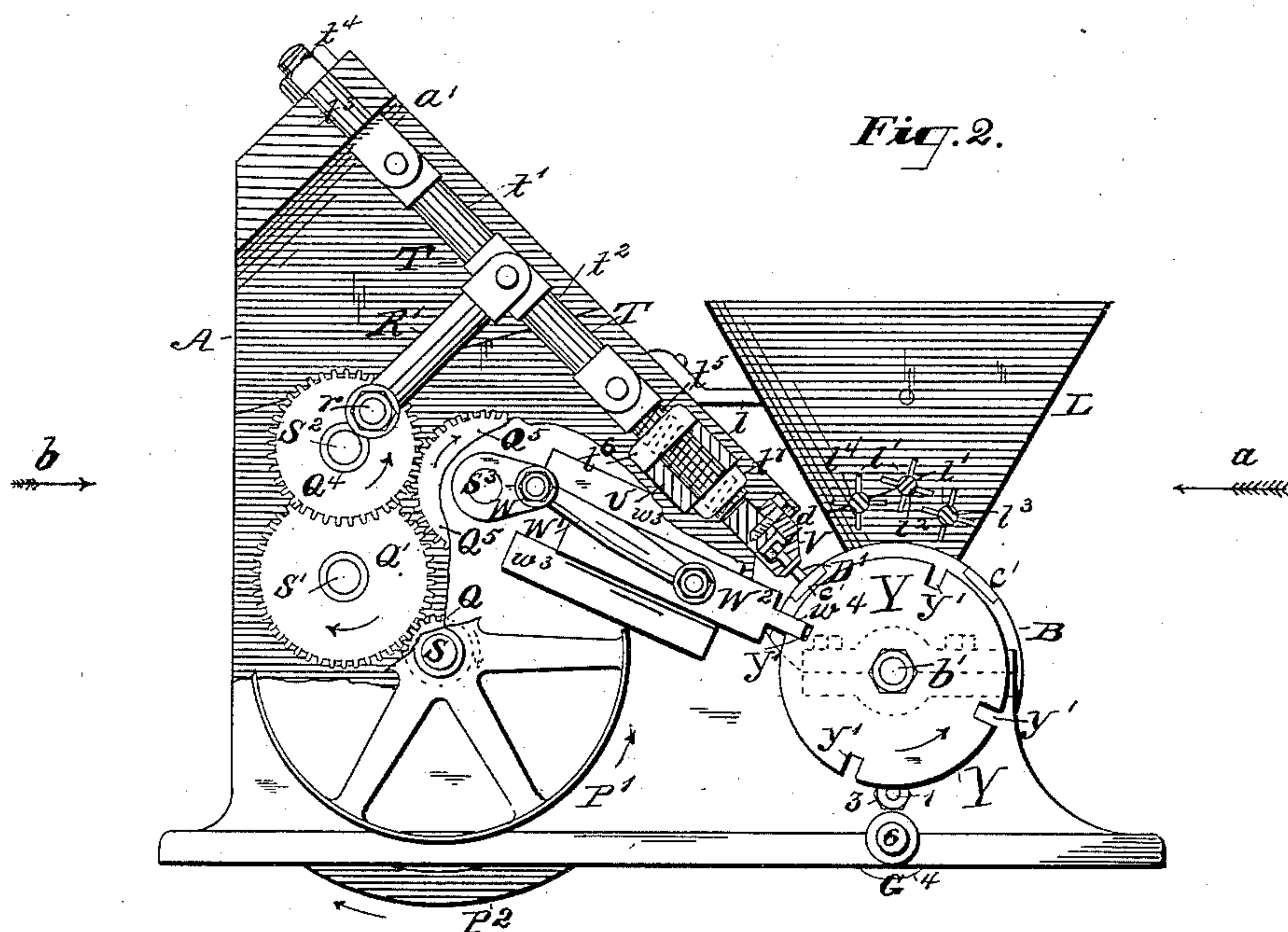
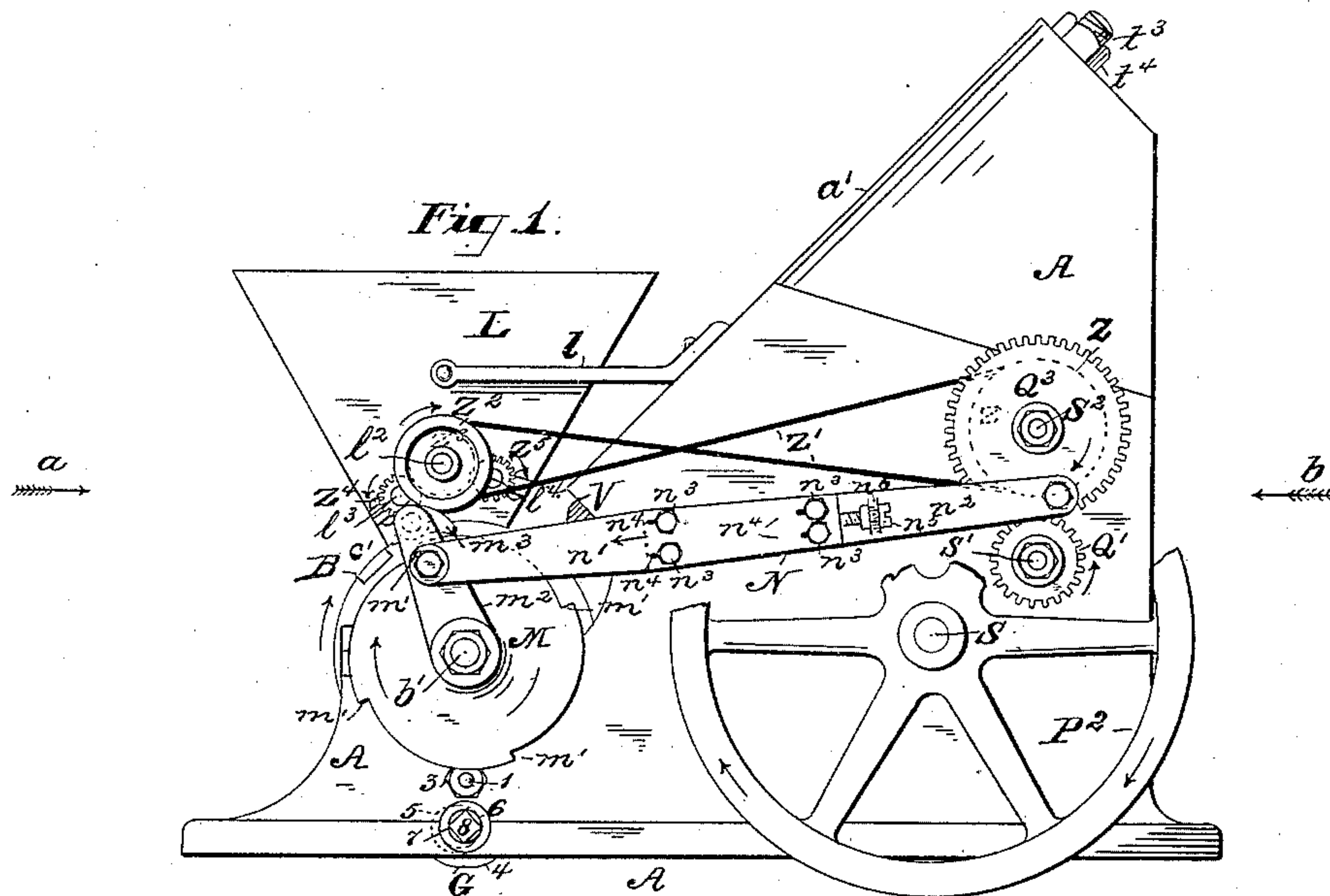
3 Sheets—Sheet 1.

C. L. JENSEN.

MACHINE FOR MAKING MEDICINAL TABLETS, &c.

No. 354,319.

Patented Dec. 14, 1886.



WITNESSES:

*Geo. A. Talan*  
*Thos. H. Carson*

INVENTOR

*Carl L. Jensen*  
per *Joshua Pusey*  
*Atty*

(No Model.)

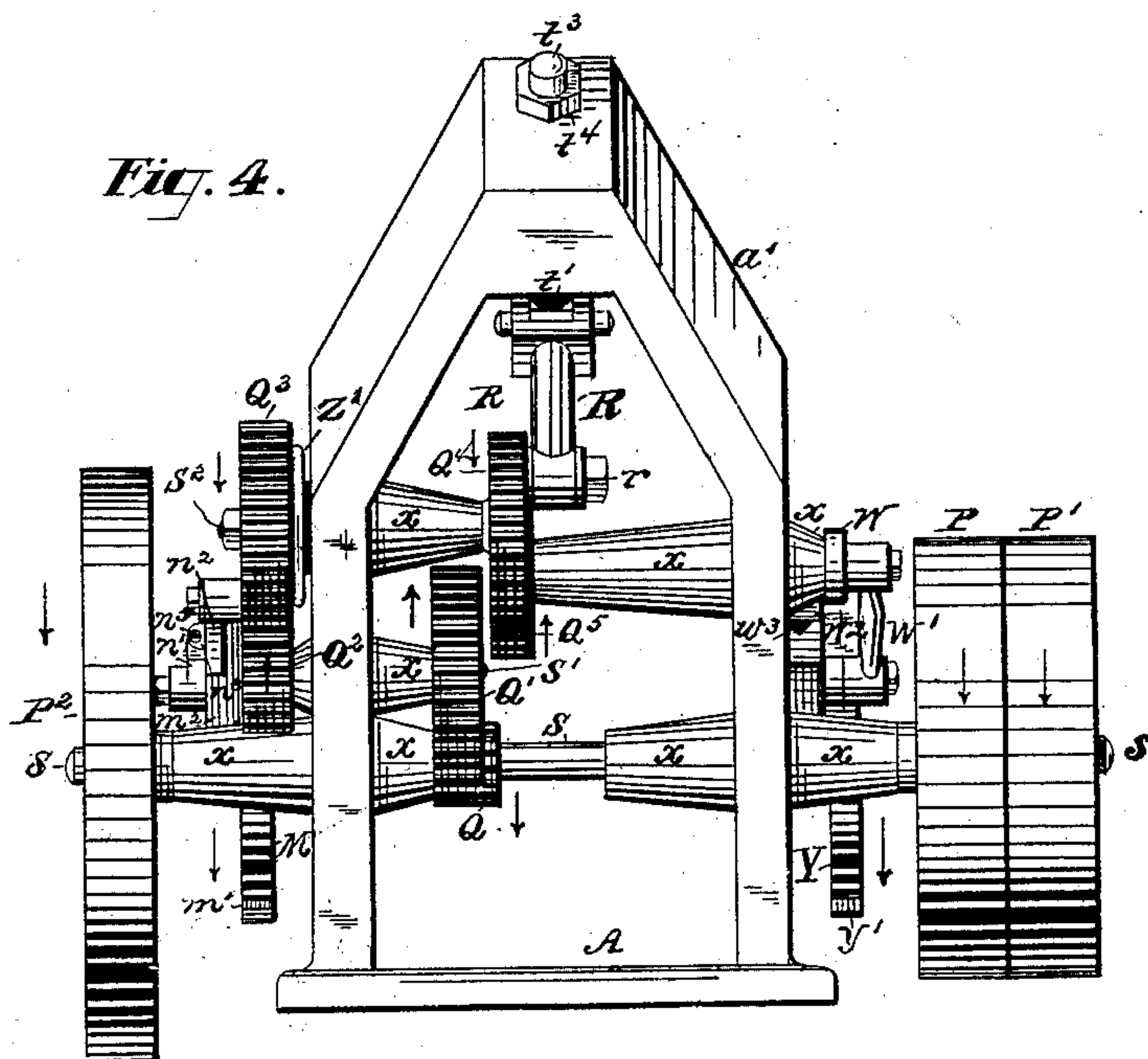
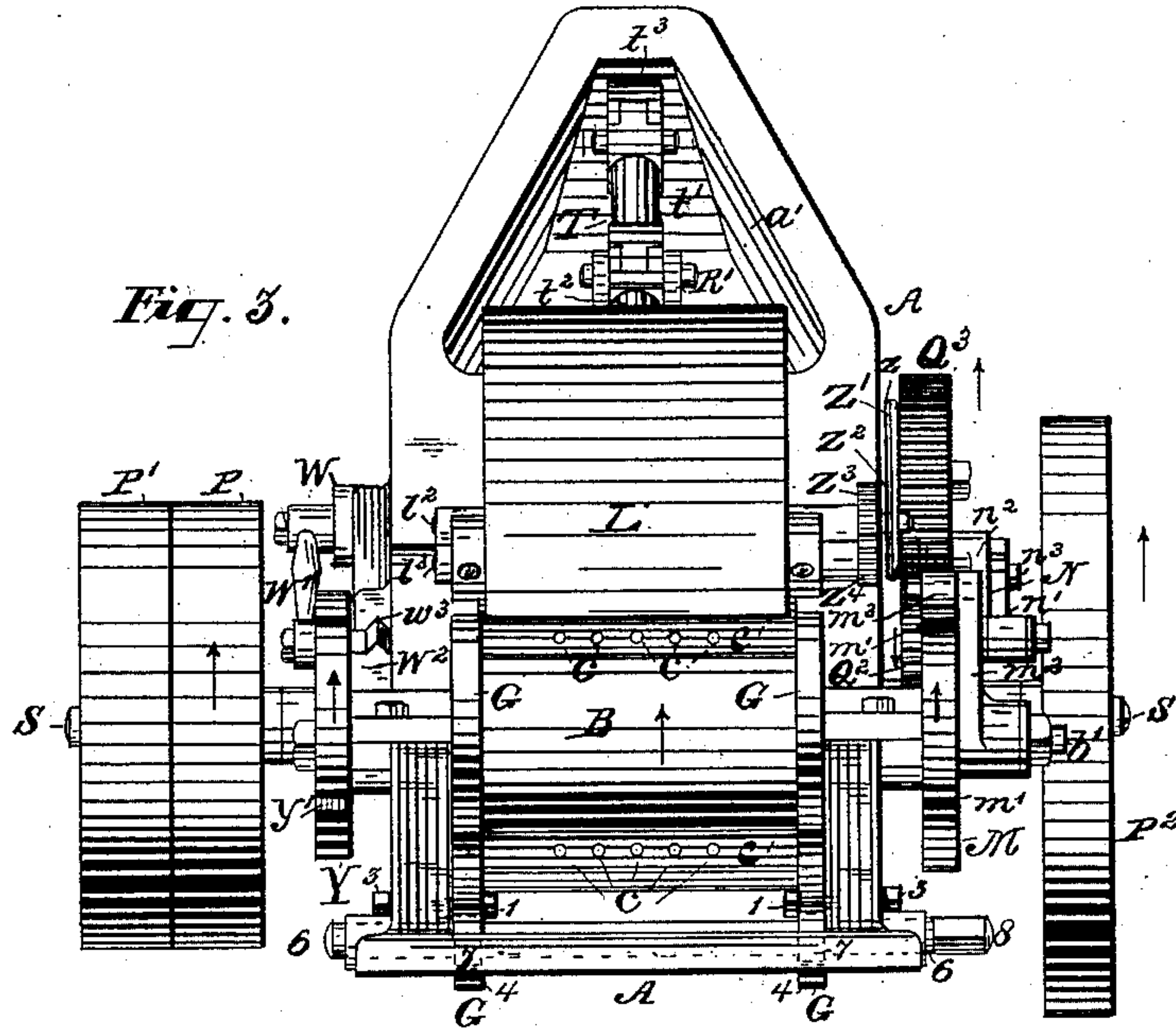
3 Sheets—Sheet 2.

C. L. JENSEN.

MACHINE FOR MAKING MEDICINAL TABLETS, &c.

No. 354,319.

Patented Dec. 14, 1886.



WITNESSES:

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INVENTOR

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(No Model.)

3 Sheets—Sheet 3.

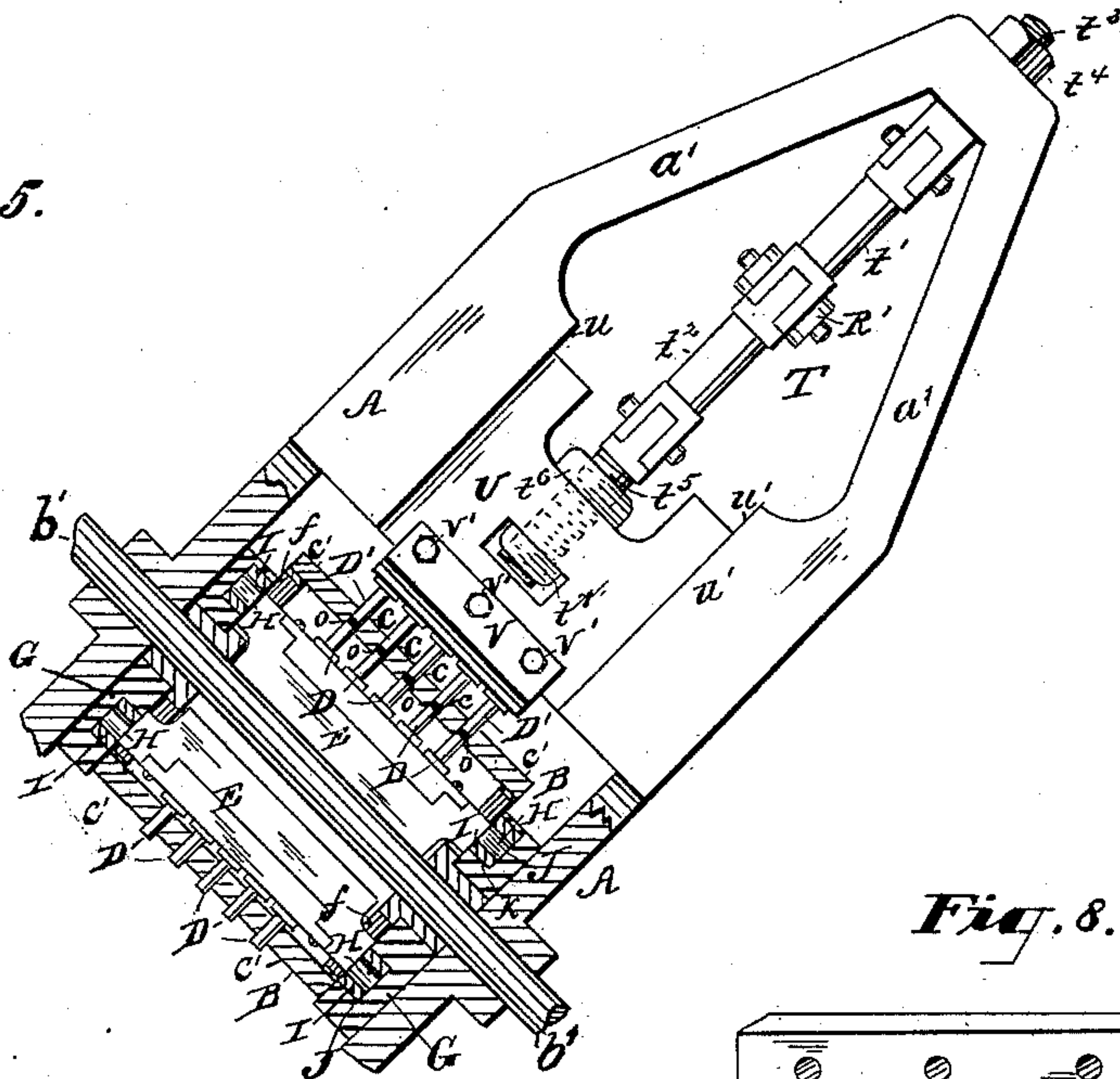
C. L. JENSEN.

MACHINE FOR MAKING MEDICINAL TABLETS, &c.

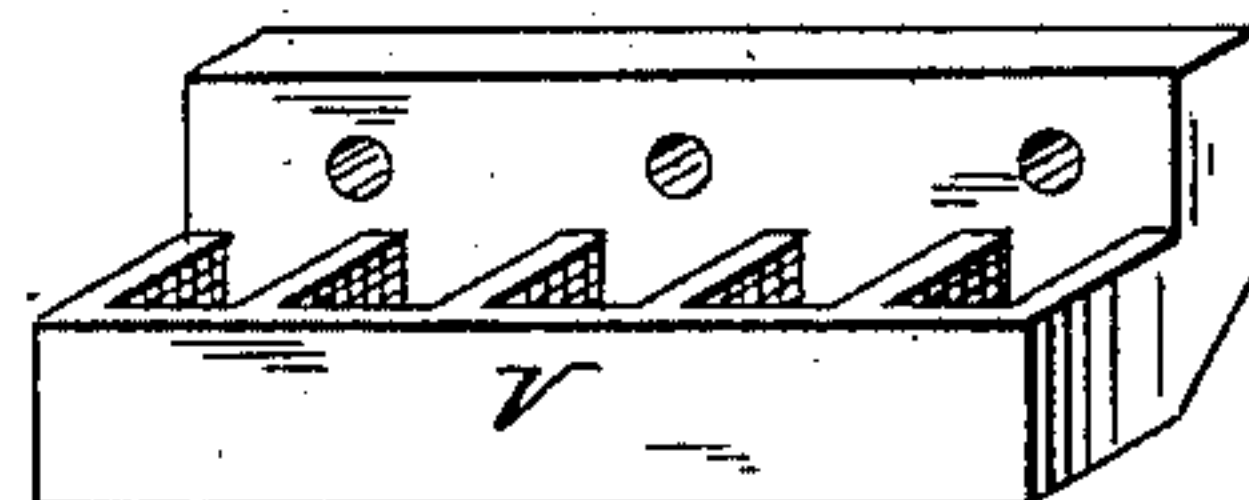
No. 354,319.

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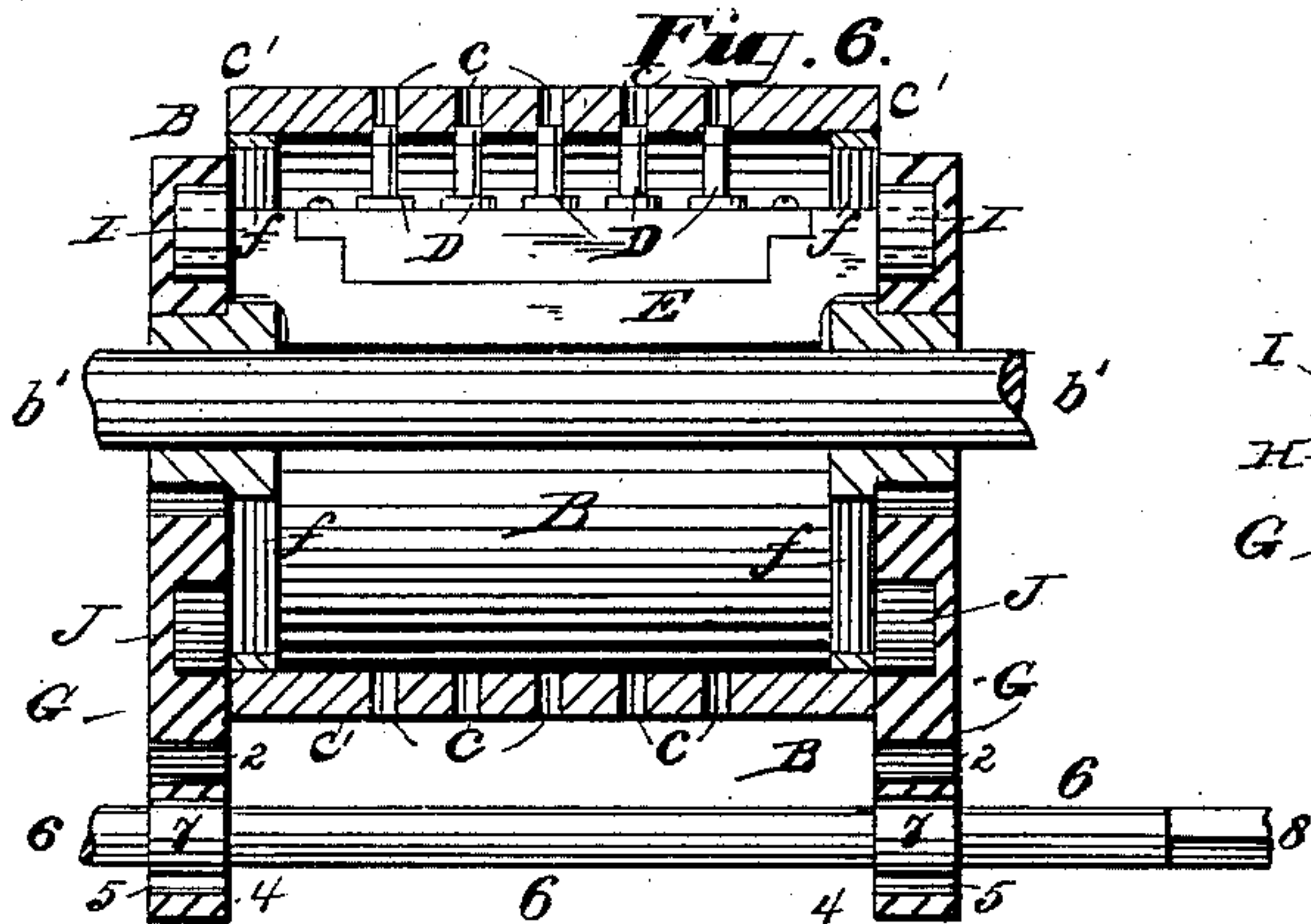
*Fig. 5.*



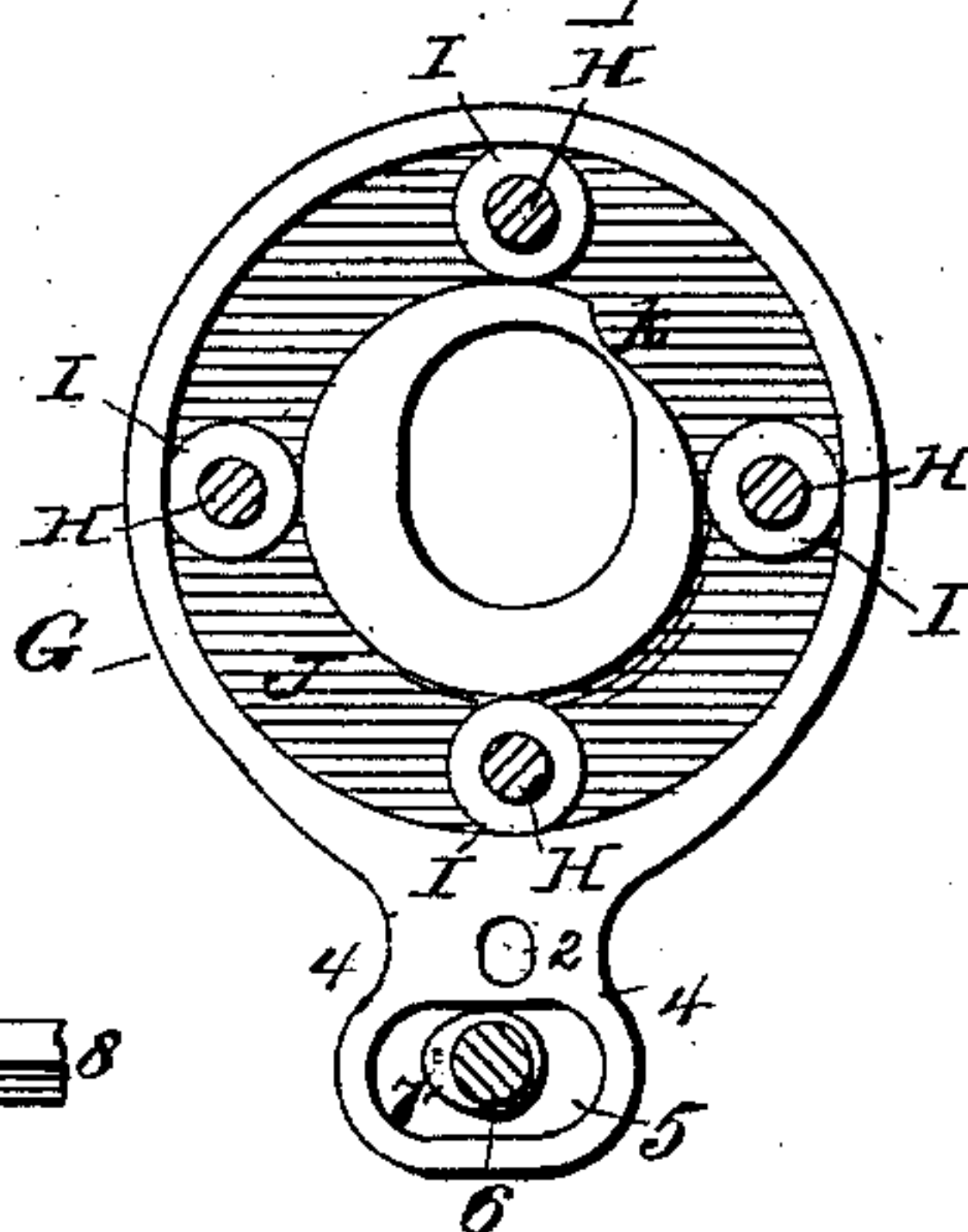
*Fig. 8.*



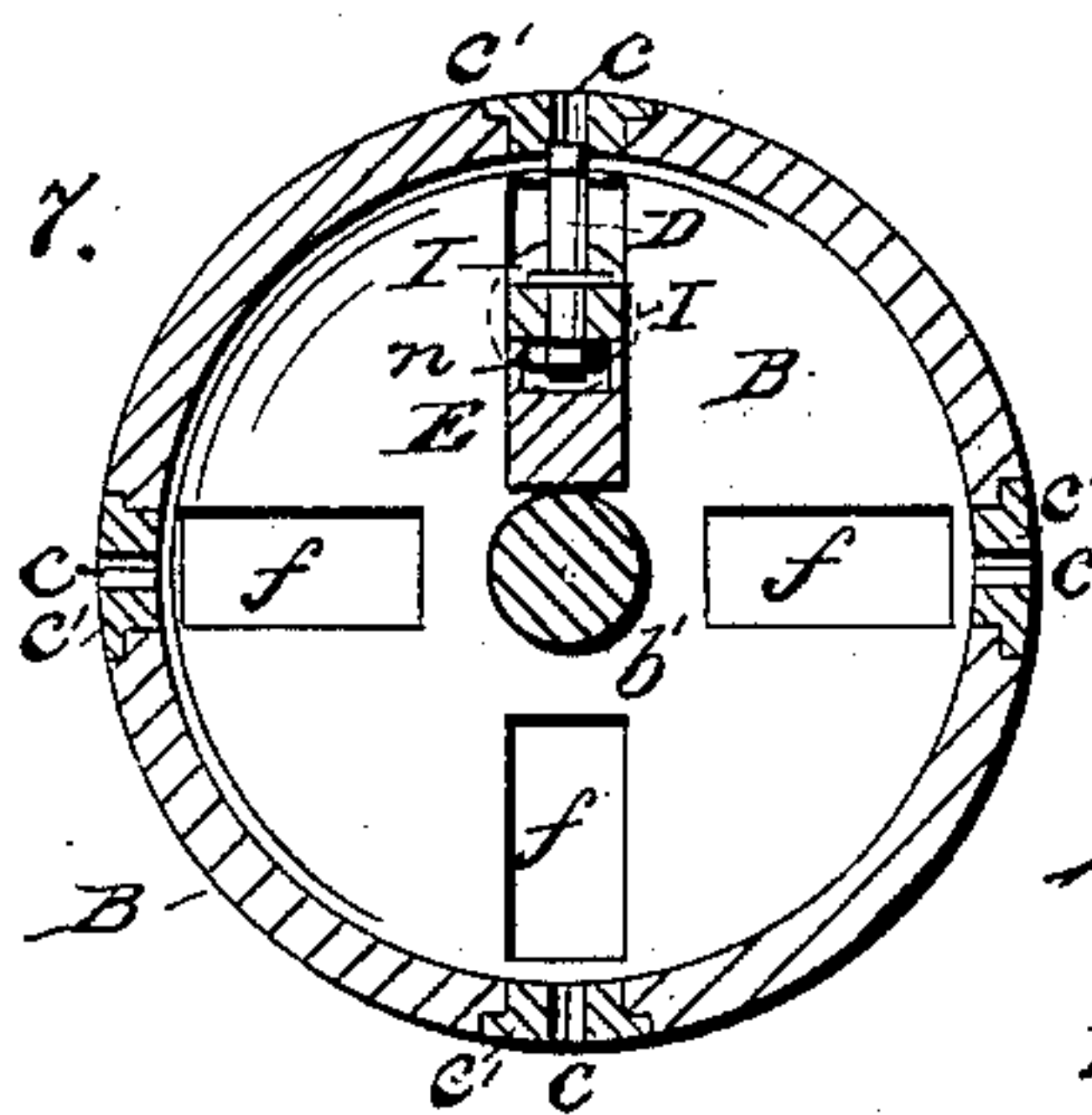
*Fig. 6.*



*Fig. 9.*



*Fig. 7.*



WITNESSES:

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INVENTOR

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# UNITED STATES PATENT OFFICE.

CARL L. JENSEN, OF PHILADELPHIA, PENNSYLVANIA.

## MACHINE FOR MAKING MEDICINAL TABLETS, &c.

SPECIFICATION forming part of Letters Patent No. 354,319, dated December 14, 1886.

Application filed May 5, 1886. Serial No. 201,153. (No model.)

*To all whom it may concern:*

Be it known that I, CARL L. JENSEN, a citizen of the United States, residing at the city and county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Making Medicinal Tablets, &c., of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, of which—

Figure 1, Sheet 1, is a side elevation, part of the fly-wheel  $P^2$  being broken off. Fig. 2 is a like elevation of the opposite side of the machine, a portion of the side of the main frame and adjuncts being broken away in order to show parts otherwise concealed from view. Fig. 3, Sheet 2, is a front elevation, looking in the direction of the arrow  $a$ , Figs. 1 and 2. Fig. 4 is a partial rear view, looking in the direction of the arrow  $b$ , Figs. 1 and 2. Fig. 5, Sheet 3, is a front elevation of the toggle-frame, toggle-lever, and adjuncts, showing also the "mold-cylinder" and the eccentric heads in longitudinal section. Fig. 6 is a vertical longitudinal section of the mold-cylinder, showing one of the series of dies at the top, and the sliding bar to which they are connected, also the eccentric heads and devices for vertically adjusting the same. Fig. 7 is a transverse section of the mold-cylinder. Fig. 8 represents the bracket detached—that is, secured to the toggle cross-head for holding the punches. Fig. 9 is a view of one of the channeled eccentric heads and rollers working therein, looking toward the inside, the device for adjusting said heads vertically being shown in section.

The nature of this invention is an organized machine or combination of mechanism for forming by pressure, from material in a powder form or mass, tablets of pepsin and other substances, for medicinal or other uses; and it consists, as stated generally, in the combination, with a hollow cylinder, hereinafter termed the "mold-cylinder," having a series of sockets in its periphery, with movable dies or punches working therein, said cylinder being actuated at intervals by a pawl and ratchet, of an arm or lever carrying punches, which, by the movement of said lever, are caused by suitable mechanism to coact at predetermined intervals with similar movable punches or dies working in the sockets of said cylinder, in a

manner to compress the powdered material into tablets between the opposing ends of the punches and the sides of the sockets, and when the tablets are formed the punches on said arm or lever are caused to be withdrawn from the sockets, and at a certain point in the revolution of the cylinder the tablets are ejected from the sockets or molds by the return movement of the cylinder-punches actuated by cam mechanism.

The invention also consists in certain devices and combinations of mechanism, which will be hereinafter fully set forth, and pointed out in the claims.

Referring now to the annexed drawings, A is the main frame-work of the machine, which is made of such strength as to resist the great strain to which it is to be subjected.

B is a hollow cylinder, termed the "mold-cylinder," mounted on a shaft,  $b'$ , that is journaled transversely in the forward end of the frame A. This cylinder is provided with a series of sockets,  $c$ , there being in the present instance four series each of five in line, the several lines or series being disposed equidistantly on the periphery of the cylinder. The diameter of each socket limits the diameter of the tablets which the machine is designed to make.

D is a series of punches or dies, adapted to reciprocate within the sockets and to coact with similar dies or punches,  $D'$ , on the end of the cross-head U of the toggle-lever T, hereinafter described, in order to compress the powder which is fed into the sockets  $c$ , and to eject therefrom the finished tablets at a certain point in the revolution of the cylinder.

Each series of punches D is secured to bars E, respectively—four in number in the present instance—the ends of which bars slide in radial slots  $f$  in the two heads of cylinder B, and whose inner ends bear against the side of the shaft  $b'$ , which receives the strain during the compression of the powder into tablet form, as hereinafter explained. The punches may be separately adjusted vertically by means of nuts  $n$ , Fig. 7, and they may also be readily removed and replaced when desired.

Upon studs H, Fig. 9, projecting laterally from the sides of bars E, are journaled rollers I, Figs. 5, 6, 7, and 9, which enter grooves or channels J on the inner sides of fixed heads



G, that are secured to the main frame of the machine, and are, as seen, eccentric to the mold-cylinder.

It will be obvious from the foregoing description that as the mold-cylinder is rotated the rollers I, being compelled to follow the channel-ways of the eccentrics, cause the punches to reciprocate a certain distance or stroke within the sockets *c* in the periphery of the cylinder.

The heads G are held on the inner side of the frame, in close proximity to the ends, respectively, of the cylinder B, by means of bolts 1, which extend through vertical slots 2, Figs. 6 and 9, in a downward projection of each of the heads G, in conjunction with nuts 3, Figs. 1 and 2, on the threaded ends of said bolts, projecting beyond the outside of the main frame. By shifting these heads vertically the extreme actual height and depth of the travel of the rollers I may be changed at will, and consequently that of the bars E and the dies D. In this way the amount of pressure upon the powder in the sockets may be increased or diminished at pleasure—that is to say, the thickness of the tablets may thus be determined. In order to readily move the heads up or down, as may be desired, I provide each of the same with an extension, 4, Figs. 6 and 9, in which I make a horizontal slot, 5, Fig. 9, the slot of the one coming opposite to that of the other. Through said slots is passed a rod, 6, Figs. 1, 2, 3, 6, and 9, having an elliptical cam, 7, thereon and square-sided at one end, 8, to receive a wrench for turning said rod and cam. When the rod or cam is thus turned in one direction, the heads G will be forced upward, and when in the other direction downward.

In the side of the inner walls of the channel J is a notch or offset, *k*, Fig. 9. This is located at a point where the rollers I in succession can drop into said notch during the moment of compression of the powder in sockets *c* into tablets, so that the strain upon the bar E may be then taken entirely by the shaft *b'*.

L, Figs. 1 and 2, is a hopper, secured to the main frame by the angle-bars *l*, Figs. 1 and 2, its lower end resting upon or in close proximity to the periphery of the mold-cylinder, on the upper side thereof. This hopper is the receptacle for the pepsin or other powder, which falls into and fills the molds or sockets as the longitudinal series thereof in succession come underneath. The powder within the hopper is kept stirred, so as to insure the filling of the molds, by means of rotating brushes *l'* on shafts *l*<sup>2</sup>, *l*<sup>3</sup>, and *l*<sup>4</sup>, as hereinafter described.

One end of the shaft *b'* of cylinder B carries a disk, M, fixed thereon, Figs. 1, 3, and 4, and having in the present instance four ratchet-teeth, *m'*, on its periphery. On the same shaft is pivoted a crank, *m*<sup>2</sup>, whose free end bears a pawl, *m*<sup>3</sup>, adapted to engage with the ratchet-teeth *m'*. A rod, N, connects the crank and a spur-gear, Q<sup>3</sup>, on a shaft, S<sup>2</sup>, journaled transversely in the main frame A, and it is by the rotation of this gear Q<sup>3</sup>, actuating crank *m*<sup>2</sup>,

that, through the pawl-and-ratchet devices, a regular intermittent rotary movement is imparted to the disk M, and consequently to the cylinder B. I prefer to make the connecting-rod N longitudinally adjustable by making it in two parts, *n'* *n*<sup>2</sup>, held together with bolts *n*<sup>3</sup>, passing through slots *n*<sup>4</sup>, in connection with a set-screw, *n*<sup>5</sup>, in a lug, *n*<sup>6</sup>, which screw bears against the end of one of the parts, *n'*, of the rod.

S, Figs. 1, 2, 3, and 4, is the main shaft of the machine, which carries the driving-pulley P, loose pulley P', and the fly-wheel P<sup>2</sup>. This shaft, as well as others in the machine, is journaled in the main frame, from which extend bosses *x*, in order to provide a long bearing for the shafts, and thus keep the same steady. On shaft S is also a pinion, Q, that gears with a spur-wheel, Q', on a shaft, S', and a pinion, Q<sup>2</sup>, on the other end of the latter shaft gears with the spur-wheel Q<sup>3</sup> on shaft S<sup>2</sup>, upon which latter is the wheel, it will be remembered, to which the connecting-rod N is pivoted, as hereinbefore stated. This upper shaft, S<sup>2</sup>, has on its inner extremity a gear, Q<sup>4</sup>, that engages with a gear, Q<sup>5</sup>, on a shaft, S<sup>3</sup>, journaled in the opposite side of the main frame. On the side of gear Q<sup>4</sup> is a stud, *r*, to which is pivoted one end of a rod, R', whose other end is pivoted to one of the arms of a toggle, T, whereby the dies or punches D', coacting with the punches D of the mold-cylinder B, are caused to compress the powder into tablets in the sockets of said cylinder.

The upper arm, *t'*, of the toggle is pivoted to a bolt, *t*<sup>3</sup>, passing through the bow *a'* of the main frame, and is secured by a nut, *t*<sup>4</sup>. The other arm, *t*<sup>2</sup>, is pivoted to a threaded bolt, *t*<sup>5</sup>, that is secured by nuts *t*<sup>6</sup> *t*<sup>7</sup>, and thus longitudinally adjustable in a cross-head, U, that is adapted to slide in guideways *u'*, Fig. 5, projecting inwardly from the bow *a'* of the main frame. To the lower end of this cross-head is bolted a bracket, V, Figs. 2, 5, and 8, to which are secured the longitudinal series of punches or dies D', so arranged as to come opposite to and in position to enter into and to retreat from the sockets in the mold-cylinder at predetermined intervals, as hereinafter described. The punches D' are secured to bracket V by means of nuts *d*, Fig. 2, and the former is secured to the cross-head U by bolts *v'*, Fig. 5. By this construction the bracket may be removed and replaced when desired, as also each of said punches, separately.

The shaft S<sup>3</sup> has secured on its outer end a crank, W, which is connected by a rod, W', to a sliding head, W<sup>2</sup>, working in guideways *w*<sup>3</sup> on the side of the main frame. This sliding head ends in a tooth, *w*<sup>4</sup>, which, as the former is reciprocated, successively engages with and is disengaged from slots *y'* in the periphery of a disk, Y, fixed to the shaft *b'* on the opposite end thereof from the aforementioned ratchet-disk M.

The purpose and function of the devices just described are to securely retain the cylinder



in position while the punches  $D'$  are entered in the molding-sockets in the operation of forming the tablets.

There is a pulley,  $z$ , on shaft  $S^2$ , (shown in Figs. 3 and 4, and in dotted lines in Fig. 1,) from which passes a belt,  $z'$ , over a pulley,  $z^2$ , on the shaft  $l^2$ , journaled transversely in the ends of the hopper  $L$ . Two small gears,  $z^4$  and  $z^5$ , on shafts  $l^3$  and  $l^4$ , respectively, engage with a gear,  $z^3$ , on shaft  $l^2$ . These rotated shafts carry the stirring-brushes  $l'$ , which I usually make of wire.

I wish it to be understood that I do not limit myself to the specific mechanism hereinbefore described—as, for example, the toggle-lever  $T$  may be actuated by suitable cam devices in lieu of a train of gears, and, in fact, a simple head working in suitable guides may be substituted for the toggle, said head being actuated by known devices which will cause said head carrying the punches  $D'$  to coact with the cylinder  $B$  and its dies  $D$ , and thereby produce the same result in substantially the same way as is effected by the specific mechanism I have hereinbefore described.

Having described the construction of my invention, I will now proceed to explain its operation, presuming that it will of course be understood that all the gears and the moving parts are so proportioned, adjusted, and timed as to produce the results to be described in continuous succession.

In the drawings, Figs. 1, 2, 3, 4, and 5, the relative position of the operating parts is such as they occupy at the instant the body of powder within one of the lines of sockets  $c$  of the mold-cylinder has been fully compressed and the tablets  $o$ , Fig. 5, formed. It will be seen that the arms of the toggle are straightened out in line, the cross-head dies  $D'$  are entered their full distance within the sockets  $c$ , the tooth  $w^4$  of the sliding head  $W^2$  is engaged in one of the slots  $y'$  of the disk  $Y$ , and the bar  $B$ , in line with the punches  $D$ , is at its lowest point, with its lower surface bearing against the shaft  $b'$ , the two opposite rollers  $I$  having dropped into the notch  $k$ , so that the shafts of the rollers shall be relieved of the strain, as previously stated. As the several shafts and gears, &c., connected therewith continue their motion in the direction of the respective arrows, Figs. 1, 2, 3, and 4, the punches are withdrawn from the socket  $c$  by the action of the rod  $R$  on the toggle  $T$ . The tooth  $w^4$  is retracted from its engagement with slot  $y'$  by the operation of the connecting-rod  $W'$  and crank  $W$ , actuated by the gears before described. At the same time these operations are going on, the rotation of gear  $Q^3$  moving the connecting-rod  $N$  and crank  $m^2$ , the pawl  $m^3$  is being carried into position to engage with another tooth of the ratchet  $M$ , which it does immediately after the punches and tooth  $w^4$  are free from the mold-cylinder and disk  $Y$ , respectively. This advances the ratchet, and consequently the cylinder. The next series of

sockets are brought under the hopper, when the powder contained therein fills said sockets. The movement continues until the crank has reached the limit of its stroke, whereupon, by the operation of the suitably adjusted and proportioned mechanism hereinbefore described, the tooth and punches again occupy the position first mentioned, and as shown in the drawings. At the same time the movement of the rollers  $I$  in the eccentric grooves  $J$  throws the bars  $E$ , and consequently the punches  $D$ , gradually outward, until, when the particular line of sockets reaches the under side of the cylinder, the ejected tablets drop into a suitable receptacle underneath the cylinder.

I have omitted to state that the series of sockets or apertures  $c$  are in section-pieces  $c'$ , which are detachably secured onto the periphery of the mold-cylinder, so that they may be removed and others with sockets of different diameter substituted therefor, the punches  $D$  and  $D'$  being of course changed to suit.

Having thus described the construction and operation of my invention, I claim as new and desire to secure by Letters Patent—

1. In a tablet-making machine, the combination of the rotatable cylinder having a series of sockets in its periphery, a corresponding sliding bar or bars within said cylinder, with a series of punches or dies secured to said bar or bars, fixed heads having grooves or channels placed eccentrically to the aforesaid cylinder, studs or rollers on said sliding bar or bars adapted to work in said channels as the cylinder is rotated, together with a sliding head carrying a series of punches adapted to register with the said sockets in the cylinder, and mechanism for reciprocating said sliding head, so as to cause its dies to enter and retreat from said sockets at predetermined intervals, the parts being constructed and adapted to operate substantially as and for the purpose set forth.

2. The combination of the rotatable cylinder having a series of sockets in its periphery, one or more bars within said cylinder carrying corresponding dies working in said sockets, the fixed heads having the eccentric ways  $J$ , the rollers connected to said bars and working in said ways, the ratchet-disk, crank, and pawl, with mechanism for reciprocating said crank, whereby said cylinder is rotated regularly and intermittently, together with the toggle carrying the punches, and means for operating said toggle with reference to the movement of said cylinder in the manner described, the construction and operation being substantially as and for the purpose set forth.

3. In combination with the intermittently-rotatable cylinder having the series of sockets and dies therein and the punch-bearing toggle adapted to coact with said sockets and dies in the cylinder, as described, the disk  $Y$  on the shaft of said cylinder, having the slots  $y'$ , the sliding head  $W^2$ , provided with the tooth  $w^4$ ,



with mechanism for causing said tooth to engage with and to be disengaged from said slots, substantially as and for the purpose set forth.

4. In a tablet-making machine, the following  
5 elements in combination: the hollow cylinder having the series of sockets in its periphery, the dies D, with means for reciprocating said dies at predetermined intervals as said cylinder is caused to rotate, the train of gears Q, Q', Q<sup>2</sup>,  
10 Q<sup>3</sup>, Q<sup>4</sup>, and Q<sup>5</sup>, the toggle T, sliding head U, punches D on the free end thereof, and the rod R', connecting said gear Q' and the toggle, the disk M, provided with ratchet-teeth, the crank  
15 m<sup>2</sup>, pawl m<sup>3</sup>, and connecting-rod N, pivoted to gear Q<sup>3</sup> and crank m<sup>2</sup>, all constructed and adapted to operate substantially as and for the purpose set forth.

5. In a tablet-making machine, the combination of the hollow rotatable cylinder pro-

vided with radial slots *f* and the sockets *c* in 20 its periphery, the dies working in said sockets, the bars E, to which said dies are connected, the rollers I, the fixed heads G, having the channels J eccentric to said cylinder, and means, substantially as shown and described, 25 for adjusting said heads vertically, substantially as and for the purpose set forth.

6. The combination, with the sliding head U, of the detachable bracket V, adapted to receive the dies D', substantially as and for the 30 purpose specified.

In testimony whereof I have hereunto affixed my signature this 29th day of April, A. D. 1886.

CARL L. JENSEN.

Witnesses:

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FRANCIS S. BROWN.