(No Model.) 3 Sheets—Sheet 1.

J. R. CLARK.

PILL MACHINE.

No. 497,532. Patented May 16, 1893.

Fig. 1.

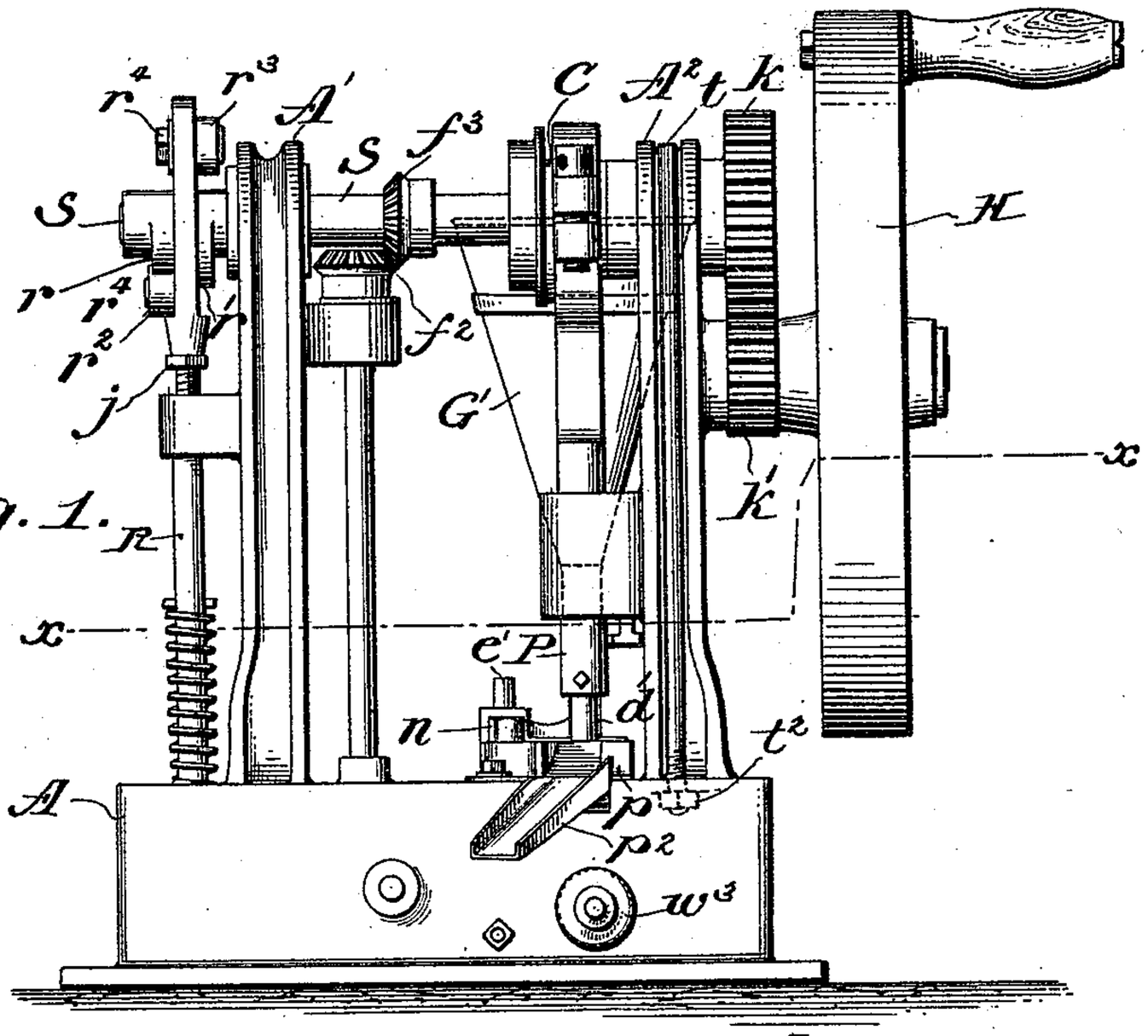
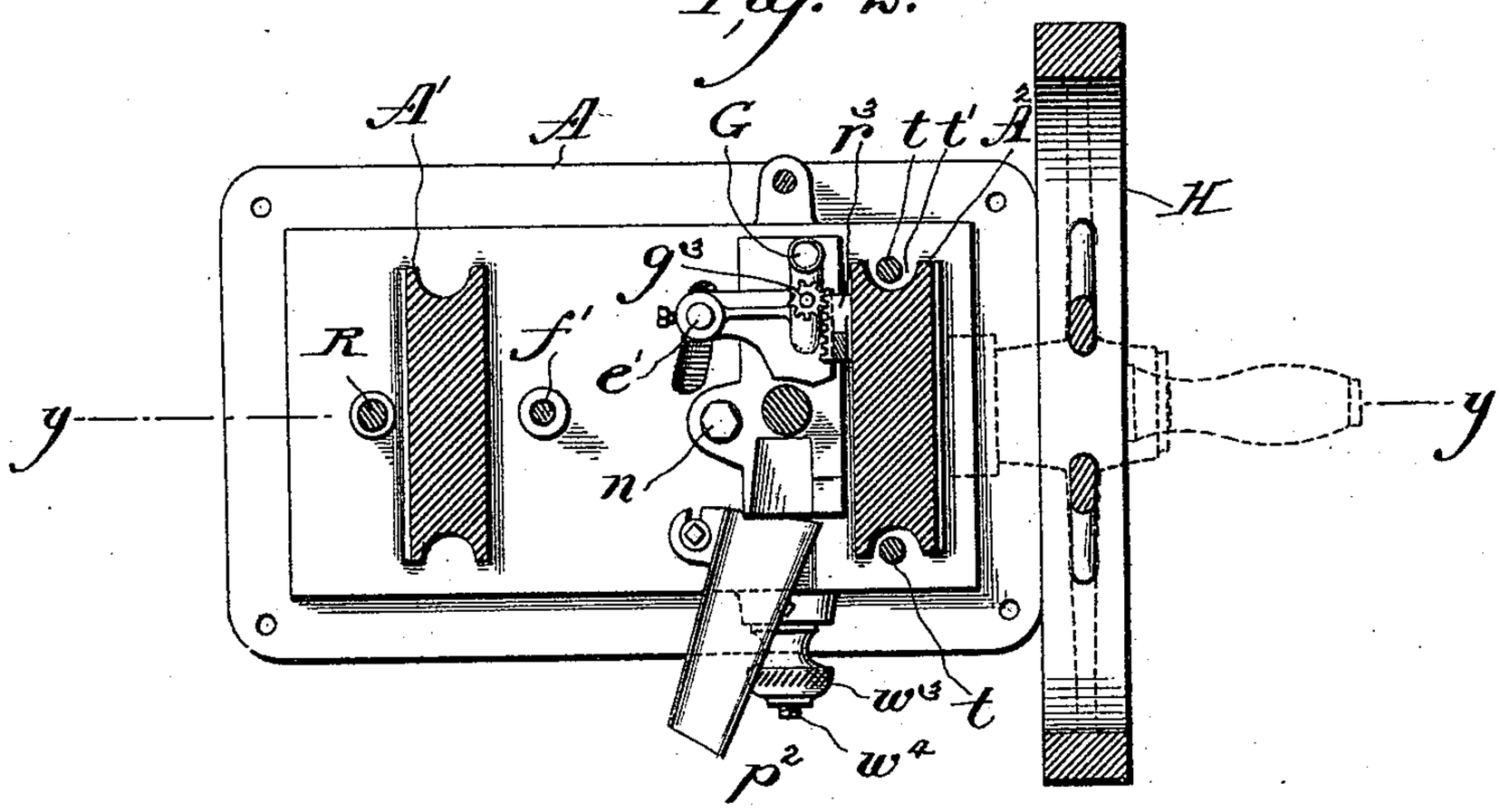


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

J. R. CLARK.

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Fig. 3.

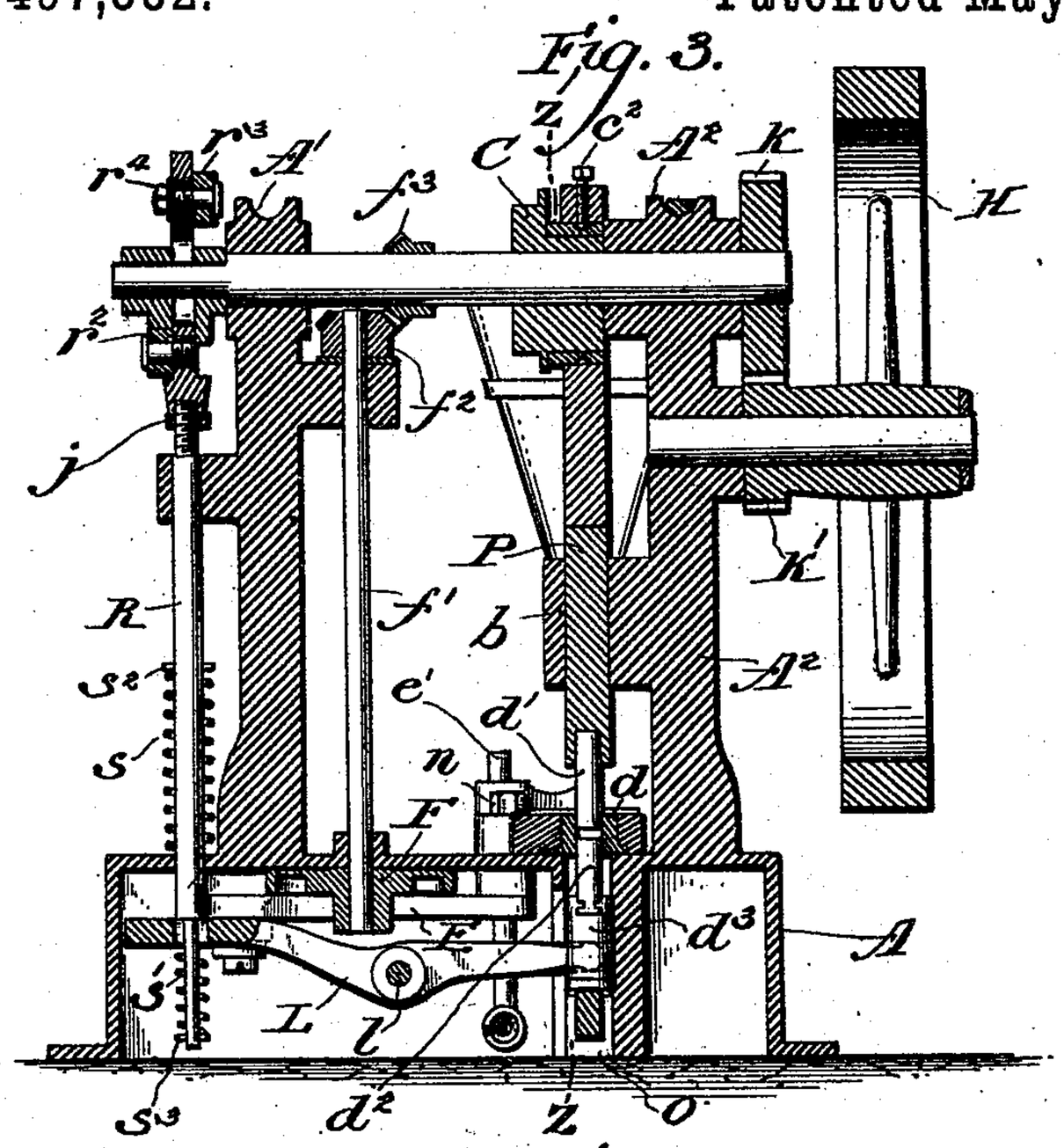
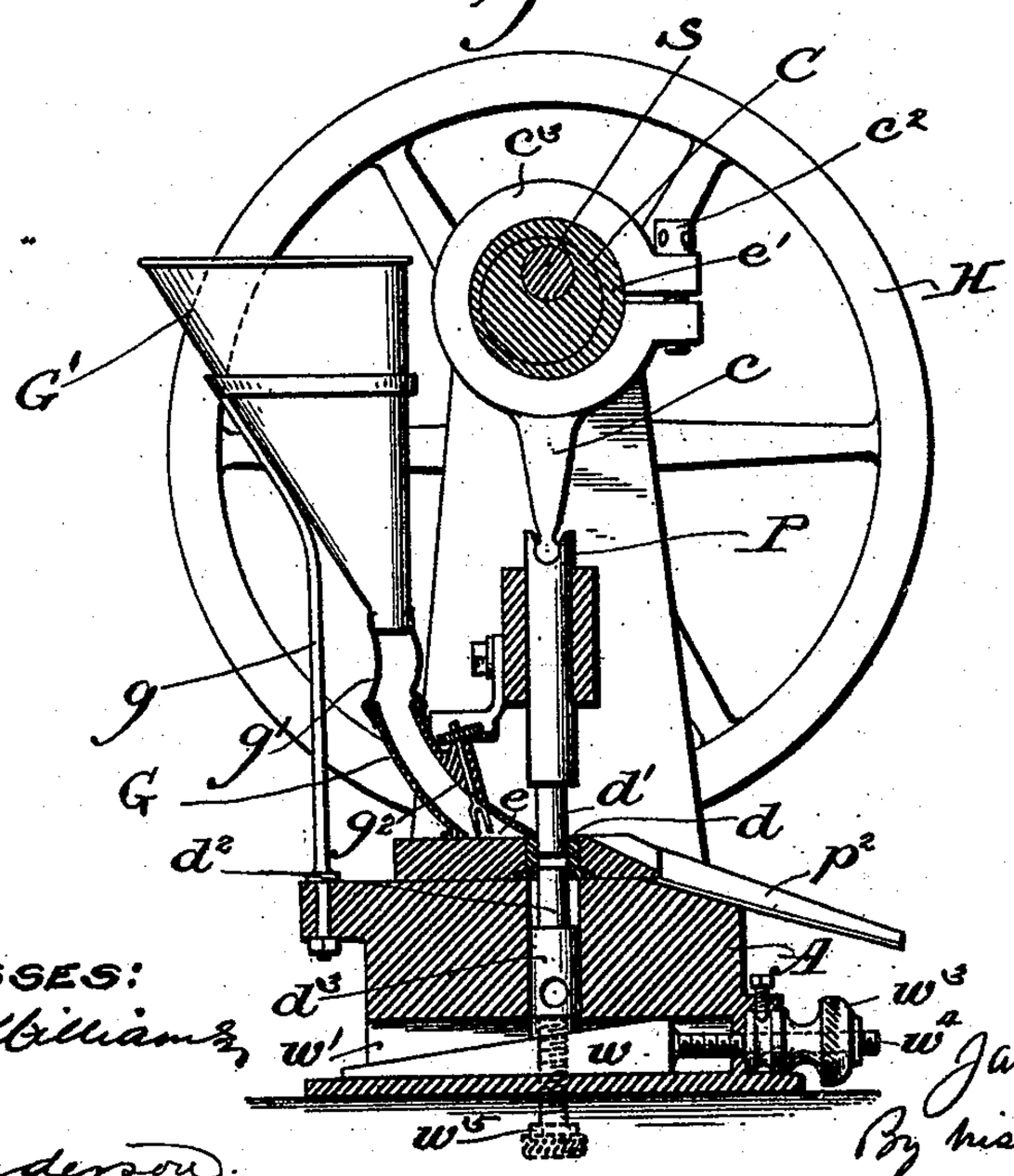


Fig. 4.



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(No Model.) 3 Sheets—Sheet 3.

J. R. CLARK.

PILL MACHINE.

No. 497,532. Patented May 16, 1893.

Fig. 7.

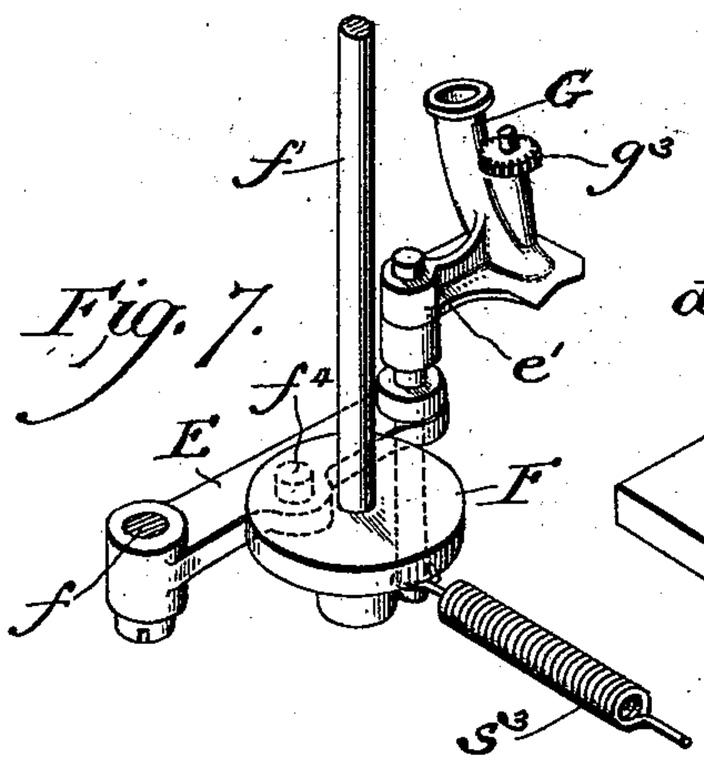


Fig. 8.

Fig. 5.

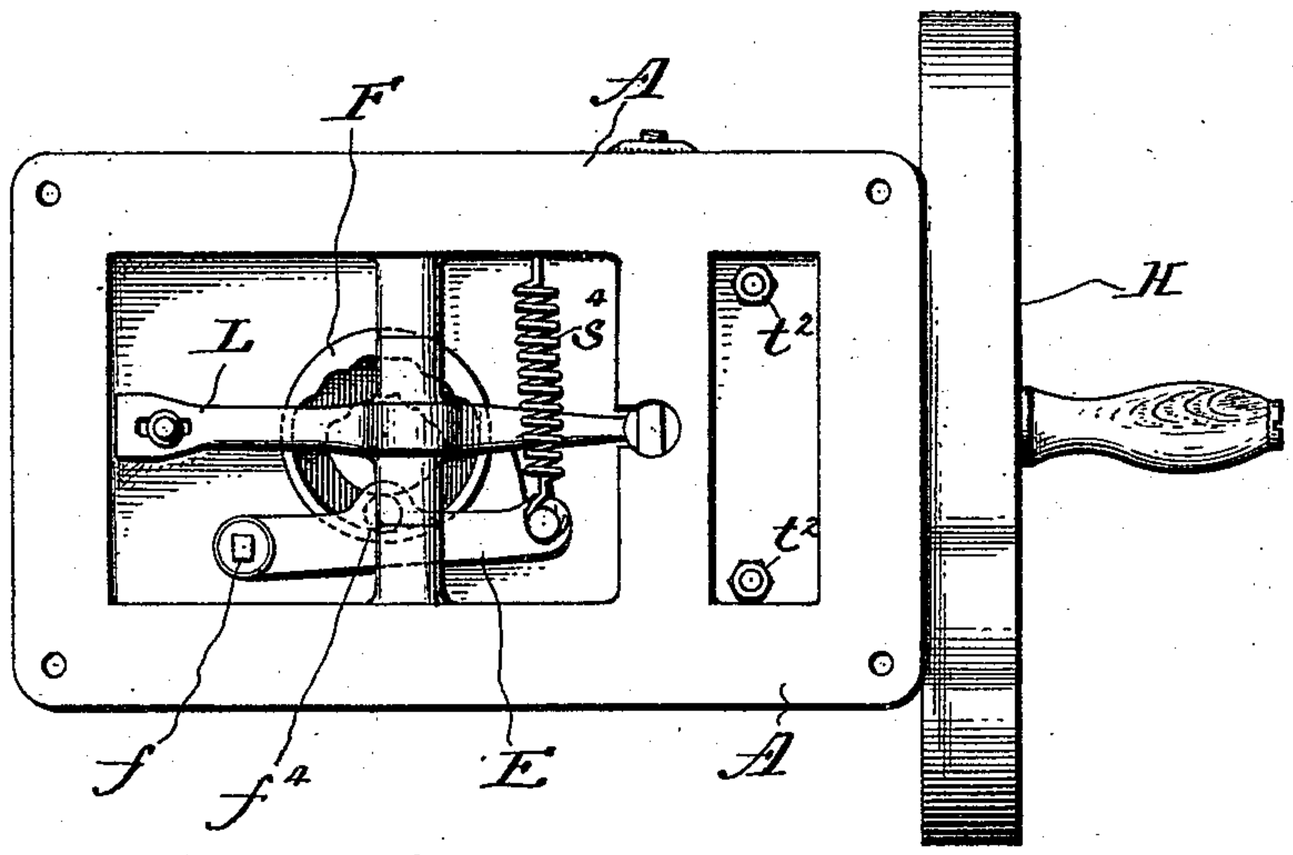
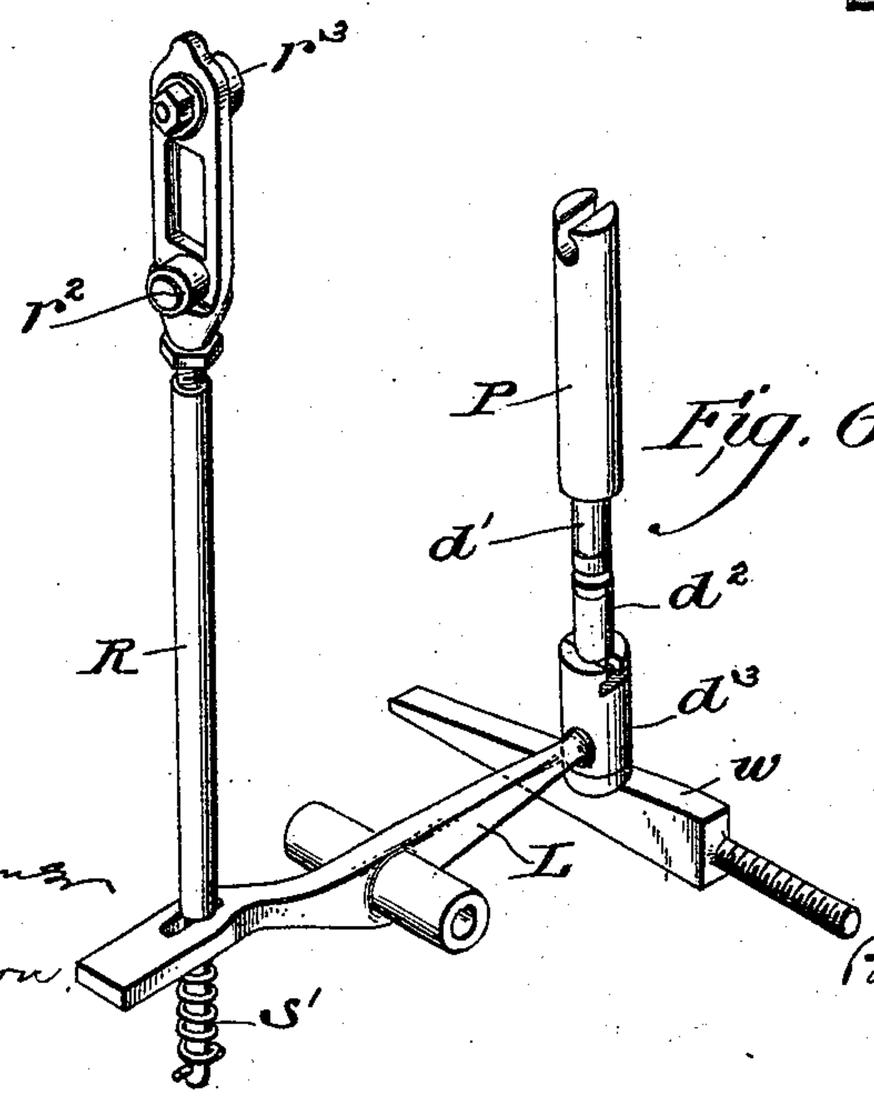


Fig. 6.



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INVENTOR:
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By his Attorney,
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UNITED STATES PATENT OFFICE.

JAMES R. CLARK, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO ALFRED LEGGOE, OF SAME PLACE.

PILL-MACHINE.

SPECIFICATION forming part of Letters Patent No. 497,532, dated May 16, 1893.

Application filed June 29, 1892. Serial No. 428,393. (No model.)

To all whom it may concern:

Be it known that I, JAMES R. CLARK, of the city of Philadelphia, and State of Pennsylvania, have invented a certain new and useful Improvement in Pill-Machines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification.

My invention has relation to machines for compressing pulverized materials into tablets or pills, and consists in the mechanism hereinafter particularly described and claimed.

The object of my invention is to provide a strong, light and efficient compressing machine of simple construction capable of rapid operation and which may be produced at a comparatively small cost.

In the accompanying drawings similar letters refer to similar parts throughout.

Figure 1 is a front elevation of the machine illustrating my invention. Fig. 2 is a partial cross sectional view on the line x—x of Fig. 1. Fig. 3 is a sectional view on the line y—y of Fig. 2. Fig. 4 is a partial cross sectional view on the line z—z of Fig. 3. Fig. 5 is a bottom view. Fig. 6 is a detached perspective view representing the plunger and ejector operating mechanism in detail. Fig. 7 is a detached perspective view representing the tubular feeding section and operating mechanism. Fig. 8 represents the die-chamber and the die plate detached.

A represents the base of the machine upon which is located the two vertical standards, A′, A², preferably formed in one casting with the base or lower frame A. The die-chamber, d, is provided in the die plate, p, which is secured in position upon the base, A, by the screw, n, which passes through said plate, p, and is screwed into the base, A, or attached by other suitable means. A horizontal shaft, S, is journaled in the upper portion of the standards, A′, A², in suitable journal bearings, and is operated from the wheel, H, by hand or other power through the gearings, k, k'. The plunger, P, into the lower end of which the upper die, d', is secured, is operated in its vertical bearing, b, by means of the cam, C, the cam strap, c^3, and rod, c, provided upon the horizontal shaft, S. An auxiliary bearing or eccentric bushing, c', is provided on the cam, C, and within the cam strap, c^3, as shown in Fig. 4 to regulate the thrust of the plunger, P, and to govern the amount of pressure upon the pulverized material in the die-chamber, d; by releasing the screw-threaded bolt, c^2, in the rod, c, the eccentric bushing, c', may be so adjusted that the cam, C, will give to the plunger, P, a greater or less thrust, according to the pressure desired; when the bolt, c^2, is screwed down it will be seen that the bushing, c', will be firmly held in position in the cam strap, c^3, while the cam, C, revolves within. The ejector, or lower die, d^2, reciprocates vertically in the die-chamber, d; during the compression and while in its lowermost position it acts as an anvil, and when the tablet has been compressed and the upper die, d', withdrawn it operates as an ejector to eject the compressed tablet; this ejector, d^2, is secured in a groove or by other suitable means removably in the vertical guide rod or lower plunger, d^3, and is operated in a guideway or vertical orifice, O, by the lever, L, pivoted at l. The lever, L is connected at one end with the lower plunger, d^3, by a pivotal or loose joint, preferably in the nature of a ball and socket joint, as shown in the drawings, Figs. 3 and 6. The other end of the lever, L, is connected with a vertical cam operated rod, R, operated at its upper end by the double acting cams, r, r', upon the shaft, S, which operates respectively to elevate and depress the rod, R, by contact with the pulleys, r^2, r^3, provided upon it; the cam, r', operating upon the pulley, r^3, to elevate the rod, R, and the cam, r, operating upon the pulley, r^2, to depress it; the pulleys, r^2, r^3, are preferably adjustably secured upon the rod, R, through the medium of the bolts, r^4, provided in slotted orifices in the rod; the rod, R, is also preferably provided with a screw-threaded joint, j, so that it may by this means be lengthened or shortened as desired. The spiral springs, s, s', are preferably located on the rod, R, and confined thereon by the pins, s^2, s^3, so as to render the movement of the lever, L, operated by the rod, R, positive and even, and to allow of the regulation of the

thrust of the ejector as desired. In the construction shown the rod, R, passes through one end of the lever, L, in a slotted orifice, and has a shoulder bearing thereon upon the upper portion to depress the lever while it is raised when the rod is elevated by contact on the under side with the spring, s'.

As will be seen from the drawings the cams, rods and levers operating the upper die and the ejector are so adjusted with respect to each other that as the upper die descends the ejector is at its lowermost position in the die chamber, d, while it rises to eject the tablet after the upper plunger and die commences to ascend.

The powdered material is fed into the die-chamber, d, through the medium of a swinging powder feeder, G, which is operated on the arc of a circle and constructed to swing over the die-chamber, d, when the upper die, d' has ascended and to retreat away from the line of travel of the upper die, d', after the powdered material has been supplied to the die-chamber and the upper die, d', commences to descend. In order to accomplish this I provide about on a level with the surface of the die-plate, p, a swinging powder feeder, G,—preferably slightly curved,—open at the upper and lower ends, and mounted indirectly upon a horizontally disposed arm, E, pivotolly secured within the base, A, on a pivot or axis, f. The powder feeder, G, is secured directly, by thumb screw or otherwise, to a vertical pin, e', which is rigidly secured upon the outer end of the arm, E, which pin, e', passes up through a slot in the base, A; the powder feeder, G, is preferably so adjusted to the vertical pin, e', that it has little or no frictional bearing upon the surface of the plate p, as it swings in the segment of a circle over the same, yet it is in such close contact as to prevent the powdered material from escaping out of its lowermost orifice, e, except when said orifice is swung over and registers with the die-chamber, d. This construction reduces the friction materially and also prevents the discoloration of tablets or oxidation by contact with particles of the metal as where acid is contained in the powder. The arm, E, and powder feeder, G, secured thereto is preferably swung by means of a horizontal cam, F, operated from the main shaft, S, through the medium of the vertical shaft, f', and beveled gear wheels, f^2, f^3. The cam, F, is what might be termed a recessed cam, as shown in Fig. 5; the arm, E, is located below the cam, F, and has a stud or friction roller, f^4, secured thereon, and protruding within the recessed portions of the cam, F; a spring, s^4, is secured to the frame, A, at one end and to the end of the lever, E, at the other end, so as to produce an even steady movement of the cam-operated lever and the parts thereto attached though the spring may be dispensed with; the cam, F, is preferably fluted or corrugated at the portions nearest to the center so as to perceptibly agitate the arm, E, and the powder feeder G as when it is over the die-chamber, d, to more effectually precipitate the powder into the die-chamber. The cam, F, is so adjusted upon the shaft, f', that the powder feeder G, is reciprocated on its axis, f, over the die-chamber, d, while the plunger and upper die are in elevated position and is receded, after supplying the die-chamber, as the upper plunger and upper die descend. The tube section or powder feeder, G, is supplied from a hopper, G', rigidly secured in position to the machine by the rod, g, or by other suitable means, and is connected with the said hopper through the medium of a flexible tube, g', secured at its upper end to the hopper, G', and at its lower end to the upper portion of the powder feeder, G.

In order to facilitate the feeding of the powder from the feeder, G, into the die-chamber, d, a stirrer or agitator, g^2, is journaled in the casing of the powder feeder, G, with the lower ends, preferably pronged, protruding into the lower part of the tube section a little above the discharge orifice, e; the upper part of the agitator g^2, is provided with a small gear-wheel, g^3, constructed to mesh in the stationary rack, r^3, located upon the standard, A^2, so that as the powder feeder, G is operated by the arm, E, the agitator, g^2, will rotate, or partially rotate, by engagement with the rack, r^3, and thus assist in insuring a free flow to the powder into the die-chamber, d. The agitator is not an essential feature though it is preferably employed.

The size of the tablet to be compressed is regulated by the extent of the downward thrust of the ejector or lower die, d^2; to accomplish this desired regulation I preferably provide a wedge, w, beneath the vertically reciprocating rod or plunger, d^3, as an adjustable bearing therefor, said wedge, w, being preferably located in a horizontal slot, w', in the casting, A, and adjusted by means of a nut, w^3, and bolt, w^4. The adjustment of the lower die or ejector may, however, be regulated by other means, such as by a vertical set-screw, w^5, provided in the casting, A, immediately below the part, d^3, as shown in dotted lines in Fig. 4.

The die-chamber, d, is preferably provided with a flange, d^5, at its lower end, as shown in Fig. 8, and is introduced into the die-plate, p, from beneath, as shown in section in Fig. 3, and is removable and interchangeable; in this construction by simply removing the screw, n, a die of any desired interior size can be introduced into the die plate, p, in the same orifice. A gutter, p', is preferably provided in the die-plate, p, which is continuous with the removable chute, p^2, secured to the casting, A, as a medium of discharge to carry off the finished tablet after it has been compressed and raised by the ejector, d^2, to a level with the die-plate, p; at this

juncture the nose of the powder feeder, G, in its forward travel on its axis over the die-chamber, *d*, will knock the tablet off the die-plate and into the gutter and chute.

I provide in my invention a light, efficient, rapid and strong compressing machine; as great power is required to compress many of the materials employed in the compressing of tablets great strength and rigidity of parts is necessary, yet at the same time a desirable feature of compressing machines, while combining strength, is lightness; in order to accomplish these desired results I provide a comparatively light casting and brace the vertical standard, A^2, upon which is the most severe strain with a U-shaped metallic rod, *t*, which is provided around the standard, A^2, in a groove, *t'*, and tightly drawn and secured by the screw-threaded nuts, t^2, adjusted on the ends of the rod, *t*, and on the inside of the casting, A.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a pill compressing machine the combination with the die-chamber, an upper plunger and ejector and operating mechanism, of a pivoted powder feeder rigidly secured on an arm, said arm pivotally secured to the frame of the machine a rotative agitator provided in said feeder and means for moving the powder feeder on its pivoted arm in the arc of a circle and shaking and vibrating the feeder over the die-plate for supplying the die-chamber with powder and receding the said feeder out of the line of the plunger as it descends in the manner substantially as described.

2. In a pill compressing machine in combination with a plunger, ejector and die-chamber and their operating mechanism a powder feeder, G, pivotally secured through the medium of the arm E, to the frame of the machine, mechanism for moving the powder feeder, G, in the arc of a circle over the die-plate and vibrating the feeder as it arrives over the die-chamber, agitator, g^2, provided in said powder feeder having gear wheel, g^3, provided at the upper end thereof engaging in the rack, r^3, secured to the frame of the machine for giving a rotative movement to the agitator as the powder feeder swings over the die-plate in the manner and for the purpose substantially as described.

3. In a tablet compressing machine the combination of a die-chamber, plunger and ejector and their operating mechanism, of a powder feeder pivotally secured to the frame of the machine through the medium of the arm, E, cam, F, engaging with the arm, E, and thereby operating the powder feeder, G, in the arc of a circle over the die-plate, said cam having indentations provided on the face thereof for agitating and vibrating the feeder, G, as it arrives over the die-chamber to assist in the discharge of the powder, agitator, g^2, provided in the said feeder, G, having serrated wheel, g^3, engaging in fixed rack, r^3, operating said agitator, g^2, as the feeder travels in the arc of a circle in the manner substantially as described.

4. The combination in a machine for compressing powdered substances of a fixed die-plate and die-chamber, vertically operating upper and lower plunger dies, a horizontal driving shaft provided in the upper part of the framework, an eccentric or crank provided thereon connecting with and operating the upper plunger die, a reciprocating vertical rod operated by a cam from the horizontal shaft, said rod connecting with and operating a horizontally disposed pivoted lever said lever connected with and operating the lower die or ejector, a vertical rotating shaft operated by beveled gearing from the horizontal shaft, a horizontally disposed cam located upon and operated by said vertical shaft, a pivoted arm connected by a stud with said cam and operated thereby, a vertical rod provided upon said horizontal arm connected with and operating a powder feeder carrying said feeder over the die-chamber when the upper plunger die is elevated and away from the line of travel of the upper plunger die when it is depressed, an agitator provided in the powder feeder connected with said powder feeder and means for regulating the extent of the thrusts of the upper and lower dies substantially as described.

5. The combination in a machine for compressing powdered substances of a base, A, vertical standards A', A^2, horizontal shaft, S, gearing mechanism connected therewith, cam, C, plunger, P, connected to said cam, by shaft, *c*, and strap, c^3, upper die, *d'*, vertical rod, R, provided with friction pulleys, r^2, r^3, adapted to engage with cranks, *r*, *r'*, provided on the shaft, S, lever, L, pivoted at *l* to the base, A, connected with said rod, R, at one end and communicating at the other end with the vertically disposed ejector plunger, d^3, operating in the vertical guide, *o*, lower die or ejector, d^2, secured to the upper end of the lower plunger, d^3, and guided in the die-chamber, *d*, die-plate, *p*, secured to the surface of the base, A, and removable die-chamber, *d*, contained in said die plate, *p*, vertical shaft, *f'* driven from the main shaft, S, through the medium of the bevel gear wheels, f^2, f^3, cam, F, provided at the lower end of the shaft, *f'*, in the base, A, pivoted horizontal arm, E, pivotally secured at *f* to the base, A, at one end, stud, f^4, provided on said arm, E, engaging with the cam, F, and operated thereby, vertical pin, *e'*, provided on the outer end of the arm, E, protruding in a slot through the base, A, powder feeder section, G, provided rigidly to the rod, *g*, on a line with the surface of the guide plate, *p*, adapted to travel over said plate in the arc of a circle and over the die-chamber, *d*, when the upper plunger, *d'*, is elevated and away from the line of the plunger, *d'*, when it is depressed, agitator, g^2,

provided in the powder feeder, G, at or near the orifice, *e*, operated by the gear wheel, g^3, and rigid rack, *r*, fixed hopper, G′, connected with the feeder, G, through the medium of the flexible tube, *g′*, and means for regulating the thrusts of the upper and lower dies respectively substantially as described.

In witness whereof I have hereunto set my hand this 28th day of June, A. D. 1892.

JAMES R. CLARK.

Witnesses:
J. BAYARD HENRY,
HORACE PETTIT.

Correction in Letters Patent No. 497,532.

It is hereby certified that in Letters Patent No. 497,532, granted May 16, 1893, upon the application of James R. Clark, of Philadelphia, Pennsylvania, for an improvement in "Pill-Machines," an error appears in the printed specification requiring the following correction, viz.: In line 127, page 3, the reference letter "*g*" should read e^1; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 23d day of May, A. D. 1893.

[SEAL.]

JNO. M. REYNOLDS,
Assistant Secretary of the Interior.

Countersigned:

JOHN S. SEYMOUR,
Commissioner of Patents.