(No Model.) 2 Sheets—Sheet 1.

G. A. SMITH.

PILL AND LOZENGE MACHINE.

No. 385,326. Patented June 26, 1888.

Fig. 1.

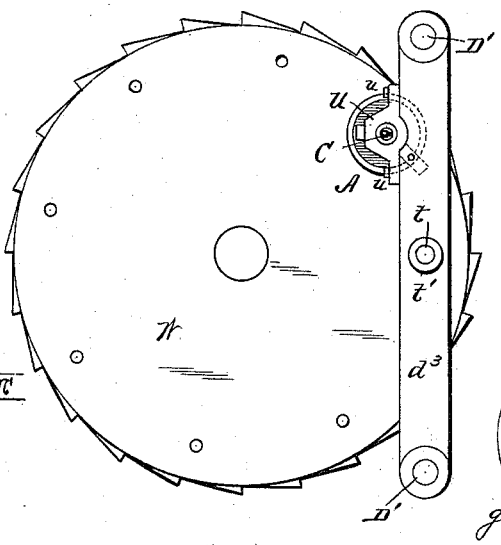


Fig. 2.

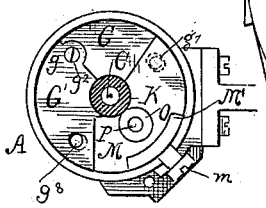


Fig. 6.

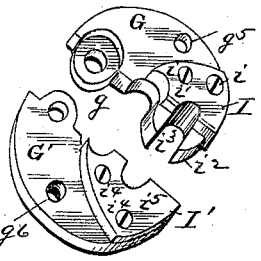


Fig. 3.

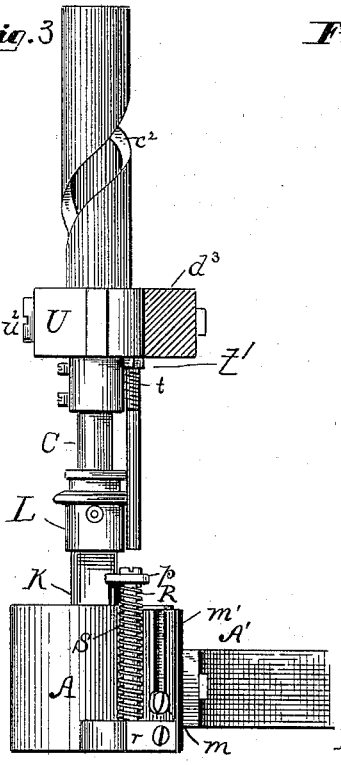


Fig. 4.

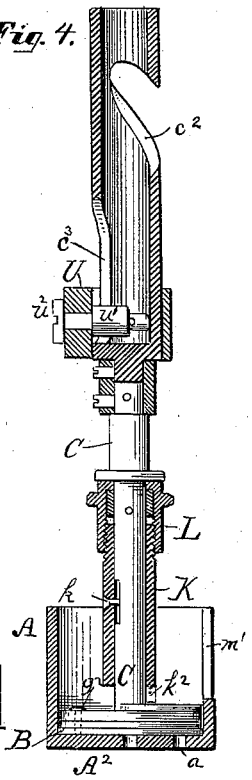
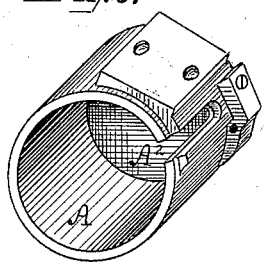


Fig. 5.



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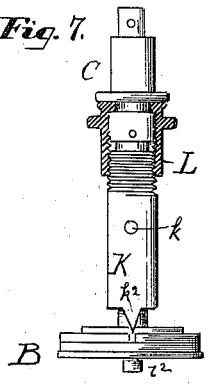

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 8.

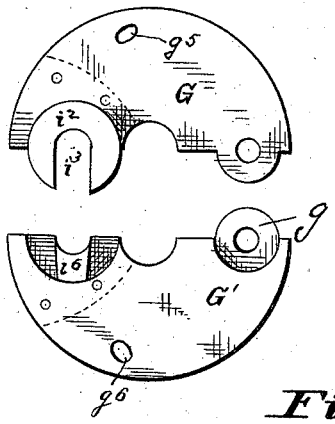


Fig. 9.

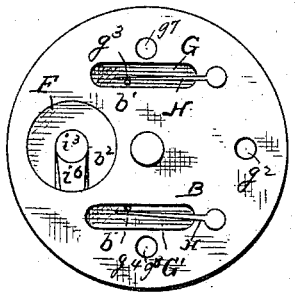


Fig. 10.

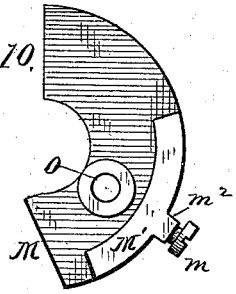


Fig. 11

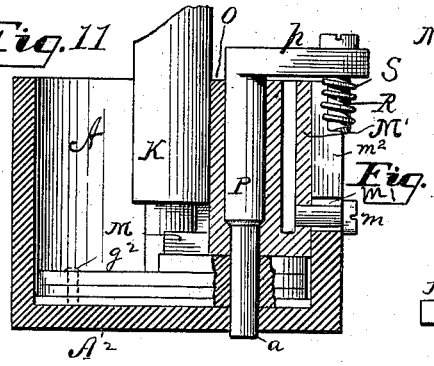


Fig. 12.

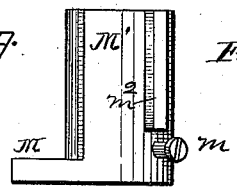
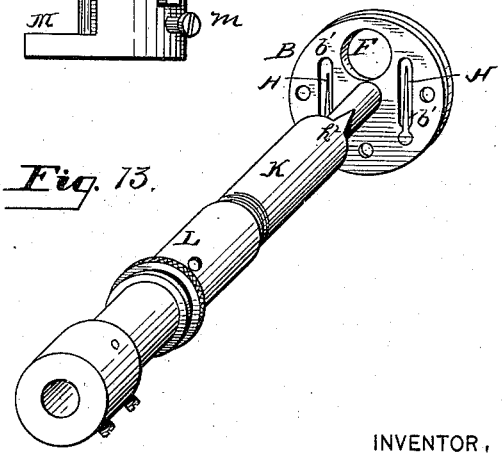


Fig. 13.



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UNITED STATES PATENT OFFICE.

GEORGE A. SMITH, OF NORRISTOWN, ASSIGNOR TO SMITH & CALDWELL, OF PHILADELPHIA, PENNSYLVANIA.

PILL OR LOZENGE MACHINE.

SPECIFICATION forming part of Letters Patent No. 385,326, dated June 26, 1888.

Application filed June 18, 1887. Serial No. 241,770. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. SMITH, a citizen of the United States, residing at Norristown, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Pill or Lozenge Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a plan view of the matrix of a pill or lozenge machine with my improvements applied thereto. Fig. 2 is a horizontal section through the spindle and a plan of the feed-cup. Fig. 3 is an elevation of my improvements in position, showing the operating cross-head of the pill-machine in vertical section. Fig. 4 is a vertical section of my improvements. Fig. 5 is a perspective of the feed-cup. Fig. 6 is a perspective of the jaws. Fig. 7 is a side elevation, partly in vertical section, of the lower part of the spindle and attached parts. Fig. 8 is a plan of the adjustable jaws separated and inverted. Fig. 9 is a plan, inverted, of the false bottom. Fig. 10 is a plan of the sweep-plate and standard. Fig. 11 is a detail vertical section of the feed-chamber or charging-box. Fig. 12 is a vertical detail section. Fig. 13 is a perspective of the spindle and false bottom.

My improvements relate particularly to the pill and lozenge machine for which Letters Patent of the United States were granted to me, dated January 16, 1885, No. 320,447, said improvements having for their principal object to provide a force-feed for such machine, said feed being adjustable to regulate the quantity of material to form a pill or lozenge, or the extent of compression thereof.

My improvements consist in the peculiar construction and combinations of parts, hereinafter fully described and claimed.

Referring to the accompanying drawings, A represents a charging-box for supplying the powder to the holes in the matrix W, in which the compression of the pill or lozenge is effected, said charging-box in use being located directly over said matrix, the latter revolving below it. Said charging-box is provided with an arm, A′, by means of which it is secured to one of the standards D′ of the machine. The charging-box is open at the top and has a discharging-hole, *a*, in its bottom A^2, through which the powder fed to the matrix is ejected.

B represents a false bottom or circular plate above the bottom A^2, said false bottom being secured to a vertical spindle, C, to which a rotary motion on its axis is communicated, as hereinafter described, the spindle and false bottom rotating together. Said false bottom has a discharging-opening, F, which once at every revolution of the false bottom passes over the opening *a* in the bottom A^2. To regulate the size of the opening in the false bottom so as to adjust or increase or decrease the amount of powder discharged at each revolution, I provide the following construction:

G G′ are two segmental plates, fastened to each other by a rule-joint connection at *g*, the pivot or pintle of said joint being a screw, g^2, which passes into the false bottom B. Such jaws may be swung apart or brought toward each other at their free ends, or the ends diametrically opposite their joint. They are constantly urged to move toward each other by two pressure-springs, H H, in openings *b′ b′* in the false bottom B, and pressing against pins g^3 g^4, which pass down from the segmental plates G G′ into the openings or slots *b′ b′*. The plates G G′ have slots g^5 g^6, through which pass the shanks of screws g^7 g^8, which enter threaded openings in the false bottom B, whereby the said plates may be held fast to the bottom B or prevented from springing up from the latter. The plate G has secured to it by screws *i i* a block, I, of the peculiar shape shown, said block comprising a plate, *i′*, and a depending boss, i^2, which enters the opening F in the false bottom, said boss being slotted at i^3, the inner end of the slot being of curved or circular form, as shown. The plate G′ has a similar block, I′, secured by screws i^4, passing through its plate i^5, its boss i^6 being of such size that it will enter the slot in the boss i^2. When the segments G and G′ are brought as close together as possible, the opening between them will be circular in form and of the minimum diameter, while when such segments are moved apart such opening assumes a slotted or elongated form of increased diameter or capacity; hence by moving the segments G G′

toward or from each other the cubical area or capacity of the discharge-opening of the false bottom may be adjusted. To move said segments apart against the influence of the springs H, which tend to press them toward each other, I provide a sleeve, K, which encircles the spindle C, and may be slid thereon by means of a swivel-nut, L, on the spindle C, which nut engages with the upper threaded end of said sleeve, the latter having a lateral screw, *k*, which enters a vertical slot in such spindle, so as to permit the sleeve to be slid up and down thereon, but to prevent independent rotation of the said spindle and sleeve. The lower edge of the sleeve K is formed with a bevel projection or wedge, k^2, which passes down between the segments or plates G G', so that when said sleeve is caused to descend it will force the segments apart, and when it is caused to ascend it will permit said segments to come together. To increase the depth of the opening in the false bottom or between the bosses i^2 i^6, the blocks I I' may be removed and others of greater depth or thickness substituted therefor; or, in other words, interchangeable blocks I I' may be adapted to the segments G G'.

M represents a stationary adjustable segmental plate, which is fitted in the charging-box A at any desired distance above the bottom A^2. The false bottom B, with its segments G G', rotates in the space between this plate M and the bottom A^2 below it. The plate M may be adjusted vertically by means of a set-screw, *m*, which passes through a slot, *m'*, in the side of the charging-box A and enters a standard, M', which rises from the plate M and is formed with a rib, m^2, on its back, which enters the vertical slot *m'* and is guided therein.

O represents a hollow post or socket rising from the plate M, and which receives a plunger, P, said plunger being secured to a horizontal bar, *p*. The opposite end of the bar *p* has a slotted opening for the reception of a guide post or rod, R, which is screwed into a projection, *r*, extending from the side of the charging-box A. Between the bar *p* and the projection *r* is a spiral spring, S, which tends to elevate said bar, and with it the plunger P. The descent of the plunger is effected by means of the contact with its bar *p* of a stud, *t*, which projects downwardly from a cross-head, d^3, that connects the rods to which is secured the compression plunger or die E' of my aforesaid patent. The stud *t* has a screw-shank and is adjustable in a nut or bearing, *t'*, so as to regulate the extent of vertical movement of the plunger P. When the die descends to produce a compression of the powder in the matrix, the plunger P is also caused to descend, and as the discharging-opening in the rotating false bottom of the charging-box is then in alignment with said plunger the powder in said opening is ejected or forcibly discharged from the charging box into the opening of the matrix registering therewith. I thus secure a force-feed or forcible ejection of the powder from the charging box, instead of relying, as heretofore, upon the flow of such powder to the openings in the matrix.

I have found by experience that with some powders and under certain conditions the flow of powder would be seriously interfered with, and hence the matrix-openings would not be duly or sufficiently charged. This difficulty is entirely overcome by the use of the force-feed, as the required amount of powder can always be ejected by such feed from the charging-box, no matter what the condition of the powder itself, whether perfectly dry or in the gummy or sticky condition which some powders will acquire under certain conditions of temperature or humidity of the atmosphere. As it is also desirable to vary the amount of powder supplied to the matrix in order to increase or diminish the size of the pill or lozenge or the extent of compression of the latter, I obtain this result by the adjustable segments on the false bottom, which provide means for adjusting the area or capacity of the discharge-opening in the latter. The vertically-adjustable plate M, in connection with the interchangeable blocks I I' of various sizes, as already mentioned, serves as a medium for varying the size of the powder-charge, as said plate requires to be raised or lowered according to the height or depth of the blocks on the adjustable segments G G', as the blocks I I' on such segments pass just below the under side of said plate M, the latter operating to sweep off any excess of powder above the top of said plates I I'.

The rotation of the spindle C and false bottom is accomplished by means of a sleeve, U, which is fastened by screws *u u* to the die cross-head d^3, so that when said cross-head reciprocates vertically the sleeve will travel with it. Said sleeve is in the form of a smoothly cored or bored box having an internally-projecting pin, u^2, carrying an anti-friction roller or collar, *u'*, which enters a spiral incline or a groove, c^2, in the spindle C. Said spiral groove leads into a vertical slot or channel, c^3, below it, so that when the plunger P descends and forces the powder down out of the discharge-opening in the false bottom into the then registering opening in the matrix below said false bottom will dwell or be at a state of rest and will not begin its rotation until the plunger is out of the opening F.

In operation as the plate or false bottom B rotates its opening fills with powder from above. When the opening passes under the plate M, the latter sweeps off or removes any excess of powder. When the discharging-opening F comes beneath the plunger, the plate dwells and the plunger ejects the powder into the matrix-opening below. The size of the discharge-opening in the plate B may be regulated without stopping the machine by merely turning the nut L.

What I claim as my invention is—

1. The combination, with the charging box or chamber A, of the rotating plate or false

bottom B, having a discharge-opening, and a plunger P, arranged and operating to forcibly eject powder from said opening, substantially as shown and described.

2. The combination, with the charging-box A and a rotating plate or false bottom, B, having a discharge-opening, of a segmental plate, M, above said false bottom or rotating plate, substantially as shown and described.

3. The combination, with the charging-box A and false bottom or rotating plate B, of the adjustable segmental plates G G′, for adjusting the discharge-opening in said false bottom or rotating plate B, substantially as shown and described.

4. The combination, with the charging-box A and rotating plate or false bottom B, having a discharge-opening, of the vertically-adjustable sweep-plate M, substantially as shown and described.

5. The combination, with the charging-box A, of rotating plate or false bottom B, pivoted segmental plates G G′, springs H H, and adjustable sleeve K, having a wedge or tapered projection, substantially as shown and described.

6. The combination, with charging-box A, of rotating plate or false bottom B, having a discharging-opening, sweep-plate M, feed-plunger P, having bar p, and spiral spring S, with the die cross-head d^3 and rod t, whereby when the die descends the plunger will be moved downwardly, and when said die is raised the plunger will be elevated, substantially as shown and described.

7. The combination, with the charging-box A and rotating plate or false bottom B, having a discharging-opening, and plunger P, of spindle C and sleeve U, secured to cross-head d^3, said spindle having a spiral incline leading into a straight groove, whereby said plate will be rotated by the spindle and will dwell when the plunger is in the opening of the discharging-plate, substantially as shown and described.

8. The combination, with the rotating plate or false bottom B, having a discharge-opening, F, of the plates G G′ and the detachable interchangeable blocks I I′, substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 6th day of April, 1886.

GEORGE A. SMITH.

Witnesses:
M. D. CONNOLLY,
R. DALE SPARHAWK.