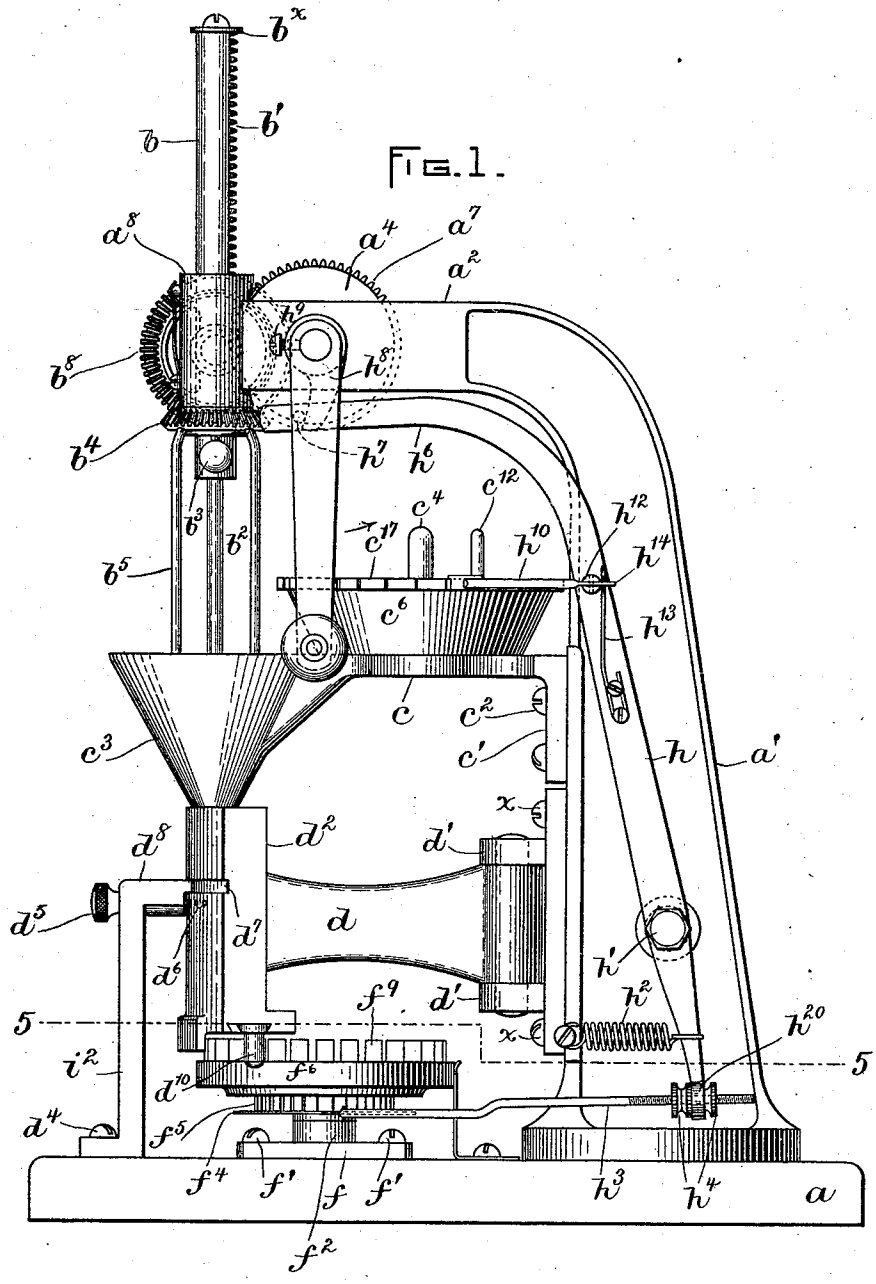
(No Model.) 3 Sheets—Sheet 1.

C. SCHINDLER.

CAPSULE FILLING MACHINE.

No. 566,098. Patented Aug. 18, 1896.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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CAPSULE FILLING MACHINE.

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FIG. 2.

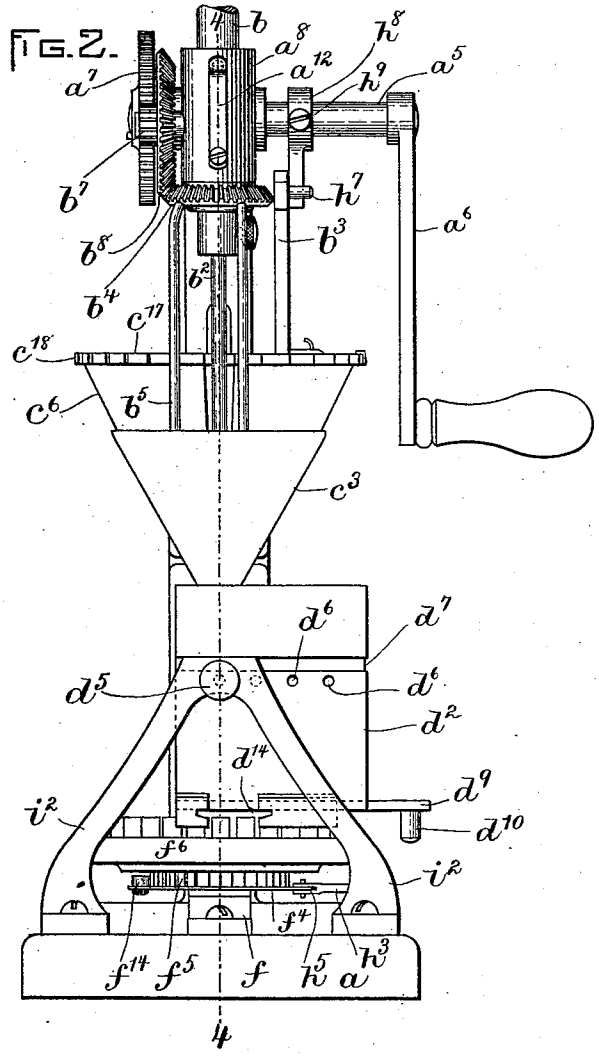


FIG. 3.

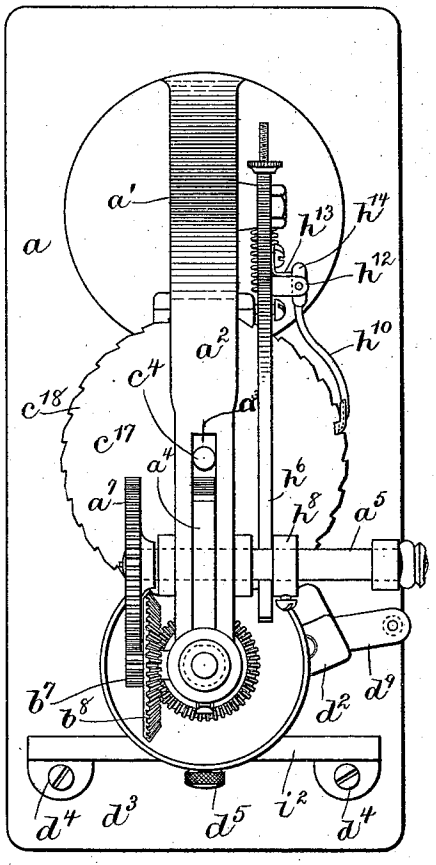


FIG. 6.

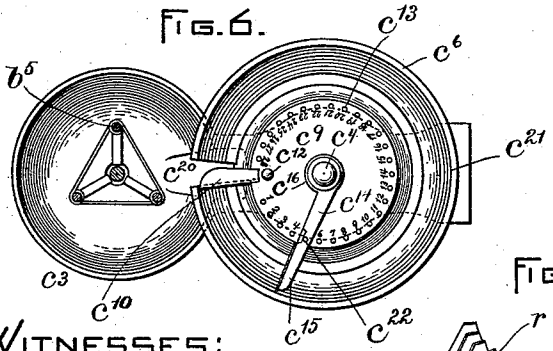


FIG. 8.

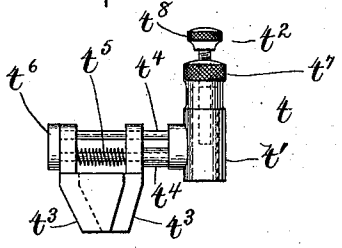
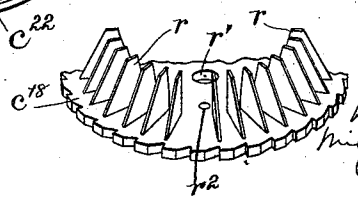


FIG. 7.



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(No Model.) 3 Sheets—Sheet 3.

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CAPSULE FILLING MACHINE.

No. 566,098. Patented Aug. 18, 1896.

FIG. 4.

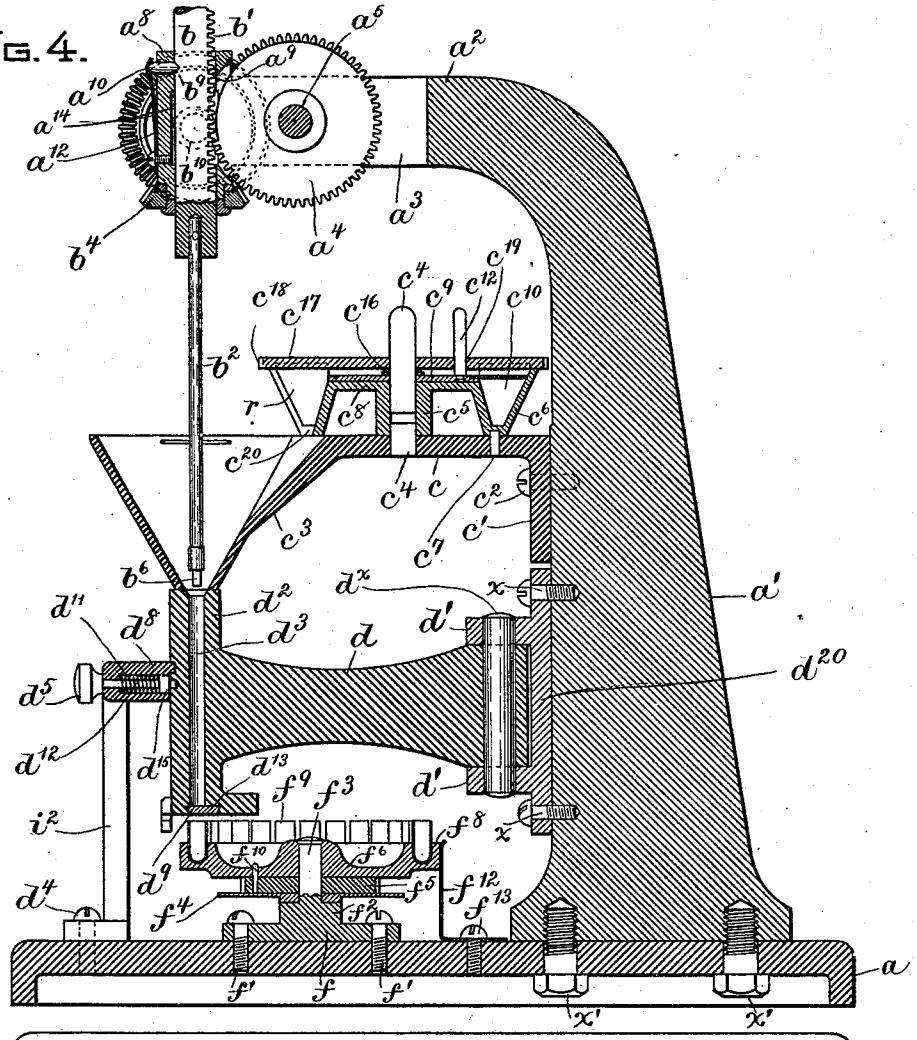
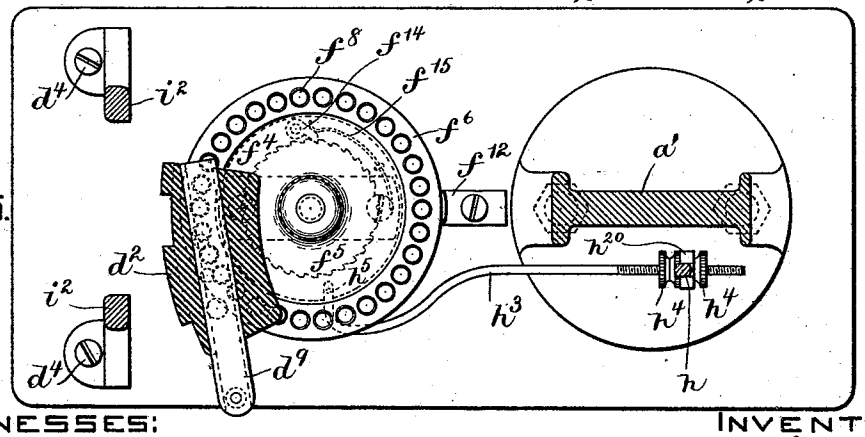


FIG. 5.



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UNITED STATES PATENT OFFICE.

CHARLES SCHINDLER, OF TOLEDO, OHIO.

CAPSULE-FILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 566,098, dated August 18, 1896.

Application filed April 2, 1895. Serial No. 544,179. (No model.)

To all whom it may concern:

Be it known that I, CHARLES SCHINDLER, of Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Apparatus for Filling Capsules, of which the following is a specification.

This invention relates to a new and useful apparatus for filling capsules; and it consists in the novel features of construction and relative arrangement of parts hereinafter fully described in the specification, clearly illustrated in the drawings, and particularly pointed out in the claims.

Reference is to be had to the accompanying three sheets of drawings, forming a part of this specification, in which like characters indicate like parts wherever they occur.

In the drawings, Figure 1 represents a side elevation of an apparatus made in accordance with my invention. Fig. 2 represents a view taken at right angles to the view shown in Fig. 1. Fig. 3 represents a top plan view of the machine shown in Figs. 1 and 2. Fig. 4 represents a vertical sectional view taken on the line 4 4 of Fig. 2. Fig. 5 represents a cross-sectional view taken on the line 5 5 of Fig. 1. Fig. 6 represents a top plan view of the divider-trough and the hopper. Fig. 7 represents a detail perspective view of a portion of the divider-plate. Fig. 8 represents a front elevation of the leveler.

To a suitable base a is secured a standard a' by means of screws x', that pass up through the top of the base and into the bottom of the standard, as clearly shown in Fig. 4. This standard is formed with an overhanging arm a^2, said arm being provided with a slot a^3, in which there is located a mutilated spur-gear a^4, rigidly mounted upon a spindle a^5, that is arranged to turn in suitable bearings in the complemental parts of the overhanging arm a^2 that form the slot. The end of the overhanging arm is constructed in the shape of a vertical cylinder a^8, provided with a central bore a^{14}. The side of the cylinder a^8 adjacent to the spur-gear a^4 is cut away, as at a^9, to permit said spur-gear to project into the bore a^{14}. Upon a stud b^{10}, projecting from the cylinder a^8 in a plane parallel to the spindle a^5, are loosely mounted a pinion b^7 and a bevel-gear b^8. Said pinion and gear are preferably cast in one piece, but they may be joined together in any suitable way so that they will rotate in unison, and motion imparted to the pinion will be transmitted to the bevel-gear.

Rigidly mounted upon one end of the spindle a^5 is a spur-gear a^7, positioned and arranged to engage the pinion b^7. A crank-arm a^6 is rigidly secured to the spindle a^5 on the opposite end of the spindle from the gear a^7. A bevel-gear b^4 is mounted upon the exterior of the lower part of the cylinder a^8 and arranged to turn thereon and to engage the bevel-gear b^8 and be turned by said gear. The bevel-gear b^4 carries a stirrer-frame composed of arms b^5, that extend down into a funnel or hopper c^3, to be hereinafter described, all as shown in Figs. 1, 2, and 6. A bar b is arranged in the bore a^{14} of the cylinder a^8 of a size to fit said bore, but to permit of movement therein. This bar is provided upon one side with the rack-teeth b', arranged to engage the teeth of the mutilated gear a^4. To the lower end of this bar b is connected by a screw b^3 a plunger-rod b^2, arranged to be reciprocated in a chamber d^3, formed in a mold-block d^2, hereinafter described, the bar b and the plunger-rod b^2 forming what I term a "plunger."

From the foregoing it will be seen that by turning the crank-arm a^6 motion will be imparted to the spindle a^5 and to the spur-gear a^4, thereby reciprocating the plunger. Motion will also be imparted to the spur-gear a^7 and by means of the gears b^7, b^8, and b^4 transmitted to the stirrer-frame b^5. The reciprocation of the plunger and the rotation of the stirrer-frame are simultaneous.

h^8 represents a lug rigidly secured to the spindle a^5 by means of a screw h^9. The portion of the gear a^4 that is mutilated is arranged to be on the opposite side of the spindle from that occupied by the end of the lug h^8, so that the lug h^8 will cease to be in engagement with the pin h^7 before the teeth on the gear a^4 engage the rack-teeth b', and on the return stroke the teeth of the gear a^4 will be out of engagement with the rack-teeth b' before the lug h^8 engages the pin h^7.

In operating the machine the handle is turned a little over one hundred and eighty degrees from the position shown in Fig. 1 in the direction of the arrow and reciprocated

back to the position shown in Fig. 1. It is not designed to give the handle a complete rotation, but only a partial one and to impart to the spindle a reciprocating motion as distinguished from a rotary motion.

A leaf-spring a^{12}, secured to the cylinder a^8, has its free end arranged to engage a pin a^{10}, (see Figs. 2 and 4,) mounted in said cylinder and adapted to engage a notch b^9 in the bar b to retain the plunger in its elevated position until operated upon by the gear a^4.

A bracket c is secured to the standard a' by screws c^2, passing through a depending flange c' on said bracket and into said standard. The bracket extends out from the standard beneath and in line with the overhanging arm and terminates in a funnel-shaped hopper c^3, the delivery-mouth of which is in line with the plunger b^2 and registers with the arc of movement of the chamber d^3 of the mold-block, so that the hopper can deliver into the particular chamber of the mold-block that it is desired to use.

A divider c^6 is removably and rotatively mounted upon the bracket by having a spindle c^4 on the upper side of the bracket engage a centrally-apertured hub c^5 of the divider. This divider is composed of a table portion c^8, a circular trough c^{21}, surrounding said table and provided with a delivery-opening c^{20}, arranged over the upper edge of the hopper and adapted to deliver the contents of the divider into the hopper, a circular plate c^9, an arm c^{14}, and a ratchet-disk c^{17}. The plate c^9 is mounted upon the spindle c^4 and rests on the table portion c^8. It is provided with consecutively-numbered indentations c^{13} near its periphery and with a blade c^{10}, that extends down into and fits the trough c^{21}. A pin c^{12} projects from the upper side of said plate in substantially a radial line with said blade. A pin c^7 (see Fig. 4) on the bracket projects into the lower part of the trough c^{21} and prevents the trough from rotating.

The arm c^{14} is provided at one end with a centrally-apertured hub c^{16}, that is mounted on the spindle c^4 immediately above the plate c^9, and at its other end with a blade c^{15}, arranged in and fitting the trough. The hub c^{16} fits snugly to the spindle c^4. The arm c^{14} is preferably flexible and provided on its under side with a pin c^{22}, arranged to engage any desired indentation c^{13} and in connection with the close-fitting hub to hold the blade c^{15} at any desired point.

c^{17} represents a ratchet-disk mounted upon the spindle c^4 above the arm c^{14} and provided upon its periphery with ratchet-teeth c^{18} and with a central aperture r' to engage the spindle c^4 and also with an aperture r^2 to engage the pin c^{12}. This disk is provided on its under side (see Figs. 4 and 7) with blades r, one for each tooth c^{18}. These blades are shaped, as in the case of the blades c^{10} and c^{15}, to fit the trough c^{21}. This disk with its blades is intermittently rotated by means of the pawl h^{10}, hereinafter described, whereby a predetermined quantity of powder, &c., (*i. e.*, the quantity held between two consecutive blades r and the sides of the trough c^{21},) is deposited into the funnel c^3 at each movement of said disk. As shown in Fig. 7, one of the teeth c^{18} of the disk has no corresponding blade, and the aperture r^2 in the disk is in the same radial line as the front edge of said tooth. When the parts are assembled, as hereinafter described, the pin c^{12} engages the aperture r^2, and the blade c^{10} is thus made to take the place of the missing blade on the disk c^{17}. The operation of this portion of my device is as follows: When it is desired to charge the divider, the disk c^{17} is removed, and the arm c^{14}, with its blade c^{15}, turned to separate the blades c^{15} and c^{10} the number of spaces apart that corresponds to the number of capsules into which it is desired to put the powder or other substance.

Suppose, for the sake of illustration, that it is desired to charge five capsules. The arm c^{14} is turned until its pin c^{22} engages an indentation c^{13}, that is, five indentations or teeth c^{18} away from the pin c^{12}, and thus spacing the blades c^{10} and c^{15} five teeth apart. The powder is then placed in the trough in the predetermined space between the blades c^{10} and c^{15} and leveled off to equally distribute it in this portion of the trough. The leveling of the powder may be done in any desired way, but for accuracy, as well as for convenience, I prefer to use the leveler t. (Shown in Fig. 8.) This is composed of a thimble t', centrally apertured, as shown in dotted lines, to fit the spindle c^4. Mounted to slide upon arms t^4 t^4, extending radially from the lower end of the thimble, are blades t^3 t^3, arranged side by side and pressed apart by a helical spring t^5, mounted upon one of the arms t^4 between said blades. A cap t^6 joins the outer ends of the arms t^4 and prevents the outer blade being forced off the arms by the spring. The blades t^3 are shaped to fit the trough c^6 in connection with which they are to be used. A set-screw t^9, mounted in the upper end of the thimble t' and projecting into the aperture in said thimble, serves as a stop to adjust the distance that the thimble can be pressed down upon the spindle c^4, and consequently the distance the blades t^3 will project into the trough. The powder being in the trough, as hereinbefore described, the leveler is placed upon the spindle, the blades adjusting themselves to the sides of the trough by means of the spring t^5. Now by turning the leveler the blades will distribute the powder evenly in the trough.

The thimble and set-screw may be milled, as at t^7 t^8, respectively, in order to the more readily manipulate these parts. The powder being leveled in the trough, the leveler is removed and the disk c^{17} placed upon the spindle c^4, the pin c^{12} engaging the aperture r^2 in the disk, the blades in said disk projecting into the powder, and in connection with the blades c^{10} and c^{15} dividing the powder in five

equal parts, which parts will be deposited into the funnel c^3 one at a time by the rotation of the disk c^{17}, which carries with it the blade c^{10} by means of the pin c^{12}. An arm d, pivoted by a pintle d^{16} to lugs d', projecting from a bracket d^{20}, secured to the standard a' by screws x, carries at its free end a mold-block d^2, apertured to form a series of vertical mold-chambers d^3.

The parts are so arranged that any particular mold-chamber may be brought under the mouth of the funnel c^3 to receive the powder thrown into said funnel by the divider, and in position also to permit the plunger b^2 to be forced into said mold-chamber to compress the powder.

The mold-block is provided with a groove d' and immediately below the groove with a series of holes d^6, corresponding to the mold-chambers d^3. A bracket i^2, secured to the base a by screws d^4, has a horizontal projection d^8 arranged to engage the groove d' of the mold-block to steady the latter and support it in its different adjustments as it is moved to make the different mold-chambers register with the mouth of the funnel. A sliding bolt d^5, mounted in a chambered portion d^{11} of the projection d^8, has its inner end arranged to engage the holes d^6 in the mold-block to retain said block in any desired position. A helical spring d^{12}, mounted upon said bolt between the end of the chamber d^{11} and a collar d^{15} on the bolt, serves to normally force the bolt toward the mold-block.

The lower end of the mold-block is formed with a dovetailed recess or groove d^{13}, extending lengthwise of said block, and with which all of the chambers d^3 communicate. A similar recess d^{14} extends crosswise of said block, intersecting the recess d^{13}. One or more chambers d^3 communicate with recess d^{14}. The recesses d^{13} d^{14} in cross-section have substantially the same dimensions. d^9 represents a dovetailed slide constructed to fit and slide in one of the recesses and be removably retained therein by the complemental dovetailed parts upon the slide and the sides of the recess. A finger-piece d^{10} on the slide serves as a convenient means for manipulating the latter. The slide when in place fills the recess in which it is inserted and closes the lower ends of the chambers d^3 under which it happens to be placed, and serves as a removable support upon which the powder or other material may be compressed by the plunger.

If only one or two capsules are to be filled, and consequently but two chambers to be employed, the slide may be inserted in the groove d^{14}, but ordinarily the slide will be in the groove d^{13}.

I do not wish to be understood as limiting myself to any precise number of chambers in the mold-block or to their size, or to any precise number of blades on the disk c^{17}. The particular number of each will be determined by the use to which the particular machine is to be put.

The divider and the mold-block form important features of my invention. By means of the divider I am enabled to readily and, what is more important, to accurately divide the powder or other substance to be used, while by means of the mold-chambers I am enabled to compress the powder or other material into practically the smallest space it will occupy, if desired, before it is dropped into the capsule below, as will be hereinafter described. Owing to the extremely fragile material of which the capsule is composed, it is not possible to compress to any extent the material after it is in the capsule. Large capsules are objectionable, owing to the difficulty in swallowing them. By my improved apparatus these difficulties are overcome. The material may be compressed into a small space, thus permitting a comparatively small capsule to be used.

A plate f, secured to the base a by means of screws f', has a reduced projecting hub f^2, from the center of which projects a pintle f^3. Mounted upon this pintle f^3 and resting on the hub f^2 is a disk f^4. A pawl f^{14} is mounted upon the upper side of this disk, and a spring f^{15} on said disk engages the free end of said pawl and tends to force it inward and into engagement with the teeth of a ratchet-wheel f^5, rotatably mounted upon the pintle f^3 and resting upon the disk f^4. This ratchet-wheel is connected by a pin f^{10} to a capsule-carrier f^6, mounted upon the pintle f^3 and resting upon the said ratchet-wheel. A leaf-spring f^{12}, secured by a screw f^{13} to the base a, has its free end arranged to bear against the periphery of the carrier to hold the latter against accidental displacement and in the position into which it and the ratchet-wheel are moved by the pawl on the disk f^4. A series of sockets f^8 are formed in the carrier at such a distance from the pintle that by rotating said carrier any socket may be brought into the same vertical plane as that occupied by the plunger b^2, and hence in such a position under the mold-block that the capsule f^9 in said socket will receive the contents of the mold-chamber as they are forced out by the plunger after the slide d^9 is withdrawn. The carrier is moved by the ratchet and pawl to present a fresh capsule just in advance of the descent of the plunger, while the divider is operated to discharge a fresh portion of material into the hopper after the plunger has been withdrawn from the mold-block.

Any desired mechanism may be employed to operate the divider and the carrier and to regulate their movements in relation to the reciprocations of the plunger. For simplicity and cheapness of construction I prefer to make use of the instrumentalities to be hereinafter described. A lever h, pivoted to the sides of the standard a' by means of a screw or bolt h', is provided at its lower end with an

apertured enlargement h^{20}. In this aperture is arranged the screw-threaded end of a rod h^3. This rod is secured to the lever h by means of screws h^4, mounted upon said rod on either side of said enlargement and screwed tightly against the latter. The other end of this rod is connected by a pin h^5 to the disk f^4.

A spring h^2 connects the lower end of the lever h with the standard a' and tends to pull the lower end of said lever toward the carrier. The upper end of the lever is formed with an arm h^6, that extends under the spindle a^5 and beside the lug h^8. A pin h^7 on said lever near its end is arranged to be engaged by said lug. When the crank-arm a^6 is moved in the direction of the arrow, the lug h^8 will leave the pin h^7 and the spring h^2 will pull the lower end of the lever inward and throw the upper end of the lever outward. As the crank-arm a^6 is returned to the position shown in Fig. 1 the lug h^8 will, during the last part of its movement, engage the pin h^7, and thus impart to the lever a movement opposite to that given it by the spring h^2. In other words, the lug operates the lever in one direction, while the spring operates said lever in the opposite direction. A pawl h^{10}, pivoted to a lug h^{12} on the standard, is arranged to engage the ratchet-teeth c^{18}, being kept in engagement with said teeth by a spring h^{13}, secured to the lever h and bearing on an extension h^{14} of the pawl h^{10}. The pawl h^{10} and the rod h^3, with the pawl f^{14}, are located on opposite sides of the pivot h', so that when one pawl is turning its particular ratchet-wheel the other pawl is shifting to engage another tooth. The mutilated portion of the gear a^4 is shown in Figs. 1 and 3, and is of sufficient extent to permit the movement of the crank-arm a^6 after the plunger is in its elevated position to operate the lever h. After the material has been compressed in the mold-chambers, as hereinbefore described, the slide d^9 is withdrawn and the material pushed into the successive capsules as they are presented automatically by the turning of the carrier. When but one capsule is to be filled, the material may be thrown directly into the hopper and the work completed as if the material had been deposited into the hopper by the divider.

From the foregoing it will be seen that I have invented an exceedingly simple and efficient apparatus for filling capsules. The powder or other material is accurately divided and compressed in a mold-chamber. As soon as the powder is compressed the slide is withdrawn and the downward movement of the plunger completed, the powder being forced out of the chamber and dropped into the capsule immediately beneath it, a new capsule being presented at each filling of the chamber. The mold-chambers are preferably of various sizes to correspond with the various sizes of capsules to be used or the shape and size into which it is desired to shape the material. There will be a separate plunger-rod to correspond with each different sized or shaped mold-chamber.

Attention is called to the stirrer-frame, whose side bars rotate in close proximity to the sides of the funnel during the movement of the plunger in order to prevent the powder from clinging to the funnel and to stir it about and direct it into the chamber.

As hereinbefore stated, I do not desire to limit myself to the number or size of the chambers in the mold-block or to the number of divisions in the divider. All these are a matter of selection for the particular machine to be built.

In addition to the filling of capsules the machine, or parts of it, may be used for other purposes. The powder-divider may be used simply as a powder-divider and independent of the balance of the machine. When thus used, it may be held in the hand and the powder discharged upon the papers in which they are to be folded.

The machine may be used in making tablets or compressed pills, in which the tablet or pill may be discharged into a suitable receptacle instead of a capsule.

Having thus explained the nature of my invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all of the modes of its use, what I claim, and desire to secure by Letters Patent, is—

1. In a capsule-filling machine, in combination, a movable carrier for holding capsules, a mold to stand over said carrier, and provided with a mold-chamber, a movable bottom arranged in said mold, and adapted to close said chamber, and to be withdrawn to permit the contents of said chamber to be ejected into a capsule carried by said carrier, a plunger to enter said mold to compress the material placed therein, and when the said bottom is removed, to eject the said compressed mass, or matter into a capsule, and means for reciprocating the plunger and removing the capsule-carrier to present an unfilled capsule under the chamber of said mold, substantially as and for the purpose set forth.

2. In a capsule-filling machine, in combination, a movable capsule-carrier, a mold-block arranged above said carrier provided with mold-chambers, a divider having a funnel arranged to discharge into the mold-chambers, a reciprocating plunger arranged to be moved into and out of said mold-chambers, a rotary spindle, and means for operating said parts, substantially as and for the purpose set forth.

3. In a capsule-filling machine, in combination, a movable capsule-carrier, a mold-block arranged above said carrier provided with mold-chambers, a divider having a funnel arranged to discharge into the mold-chambers, a reciprocating plunger arranged to be moved into and out of said mold-chambers, a rotary

spindle, a stirrer-frame arranged in said funnel, and means for operating said parts, substantially as and for the purpose set forth.

4. In a divider in combination a fixed circular trough provided with an outlet, movable spacing-blades arranged in said trough, and a pivoted plate having blades arranged to enter said trough to subdivide the space between said first-mentioned blades, and means for rotating said plate, substantially as and for the purpose set forth.

5. A leveler comprising in its construction a thimble, support connected thereto, and a spring-pressed blade mounted upon said support, substantially as and for the purpose set forth.

6. In a capsule-filling machine, in combination, a mold-block provided with a mold-chamber, a divider having provisions to discharge its contents into said chamber, a reciprocating plunger arranged to be moved into and out of said chamber, a rotary capsule-carrier arranged below said chamber, a rotary spindle, and connections between said spindle and said plunger, divider and carrier for operating said parts, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 25th day of March, A. D. 1895.

CHARLES SCHINDLER.

Witnesses:
A. J. BARSCH,
CHARLES E. KENT.