3 Sheets—Sheet 1.

W. E. HEEREN.

Machine for Putting up Medical Powders.

No. 199,645. **Patented Jan. 29, 1878.**

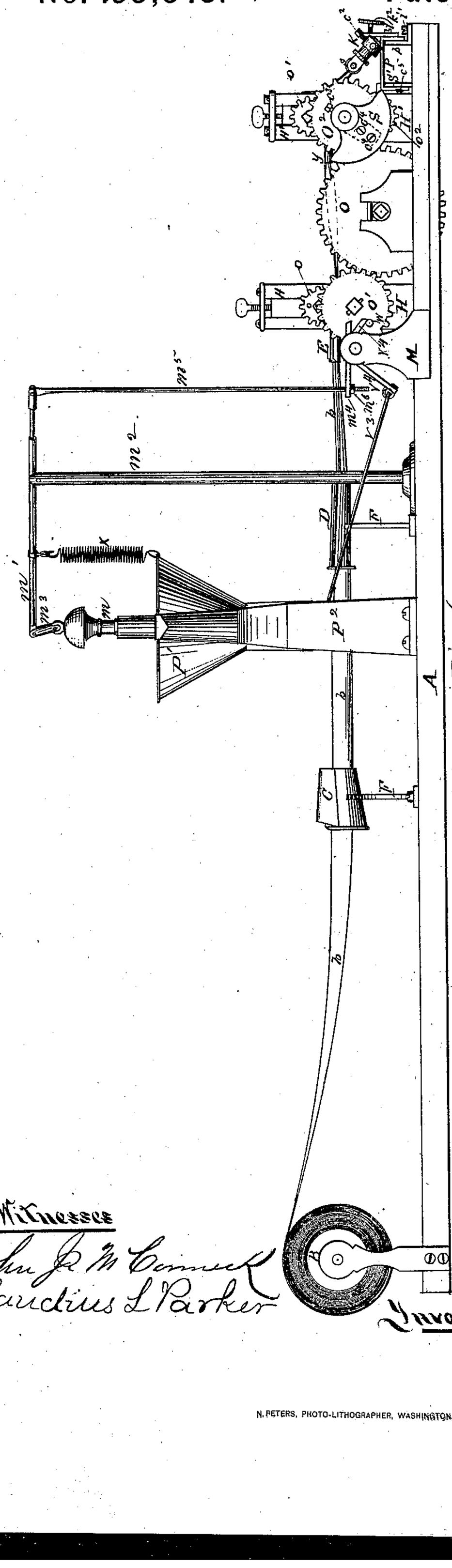

Fig. 1.

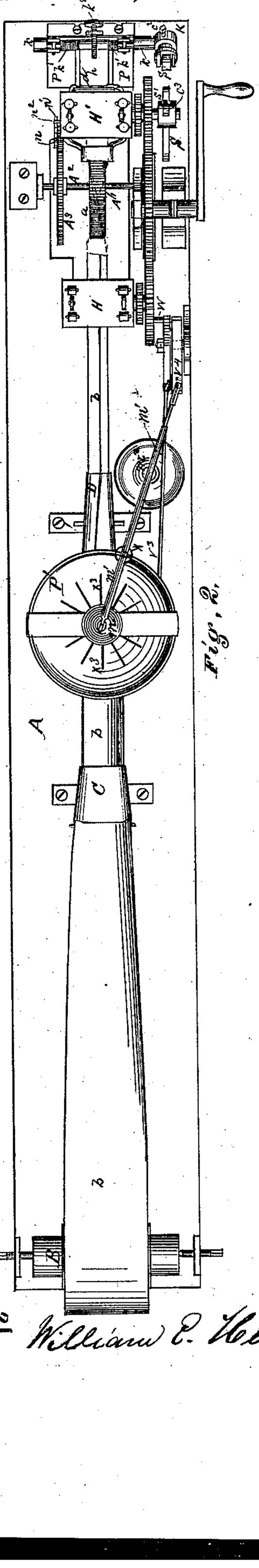

Fig. 2.

Witnesses
John F. McCormick
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3 Sheets—Sheet 2.

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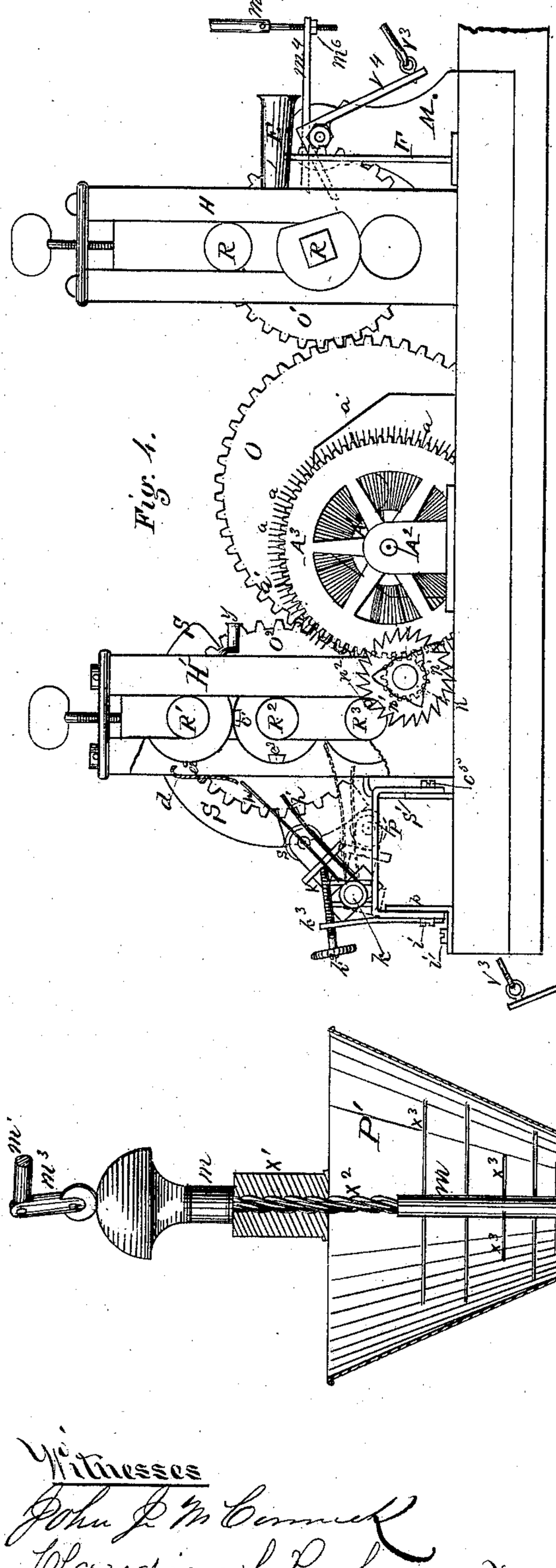

Fig. 1.

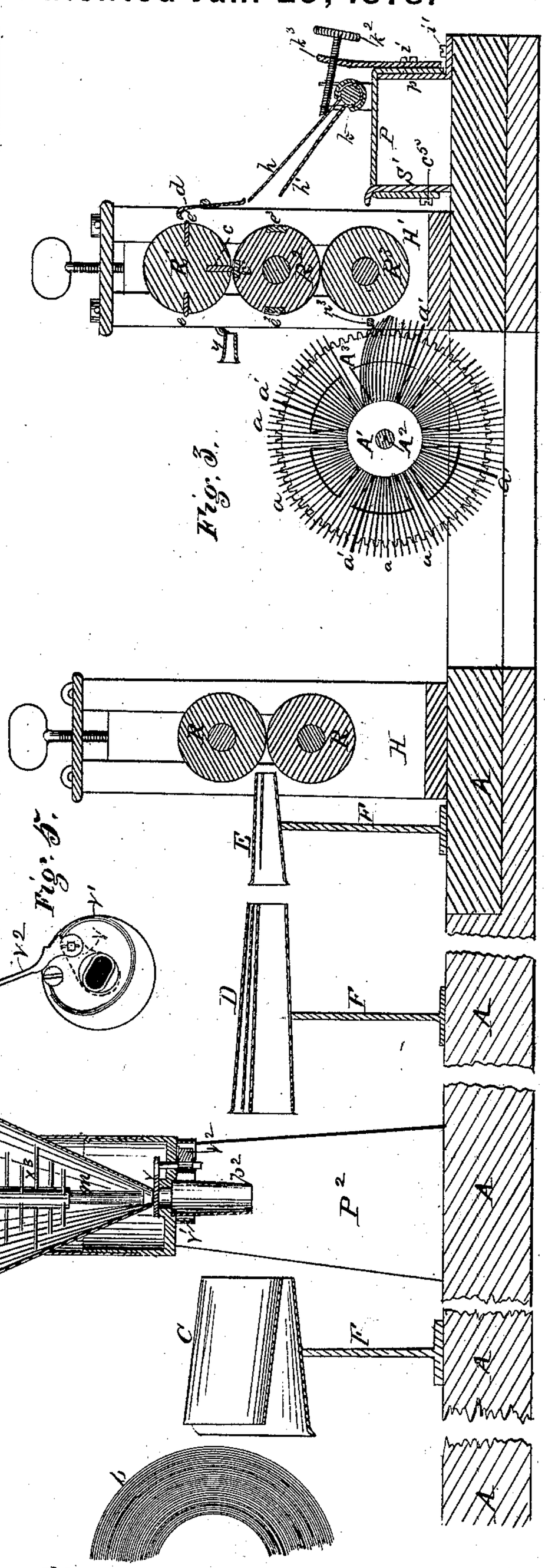

Fig. 3.

Fig. 2.

Fig. 4.

Fig. 5.

Witnesses

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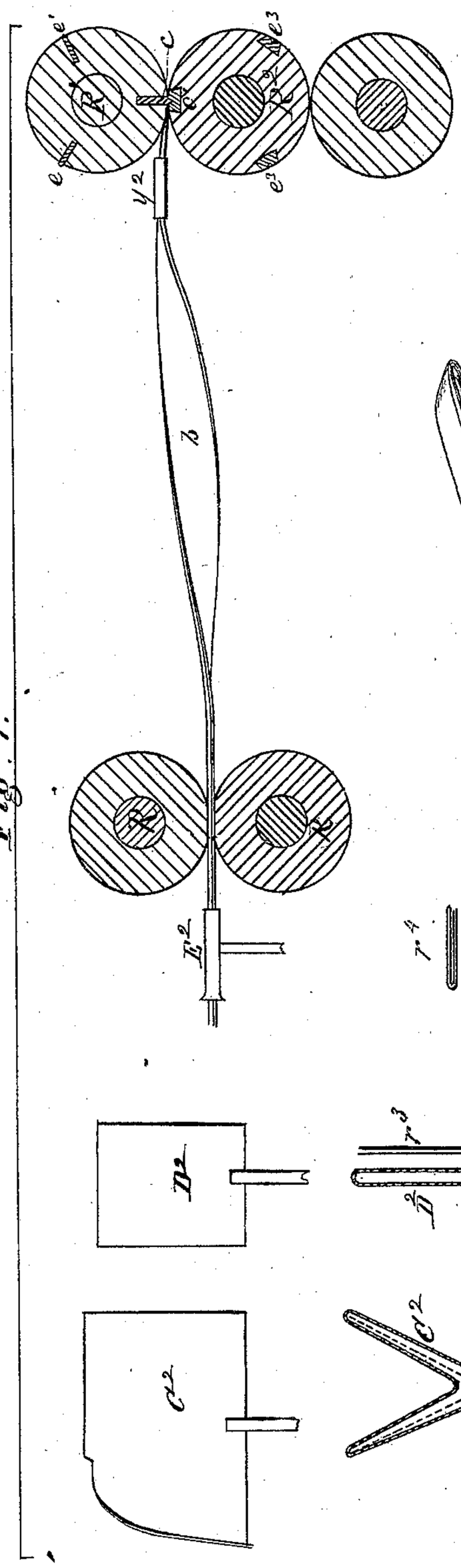

Fig. 9.

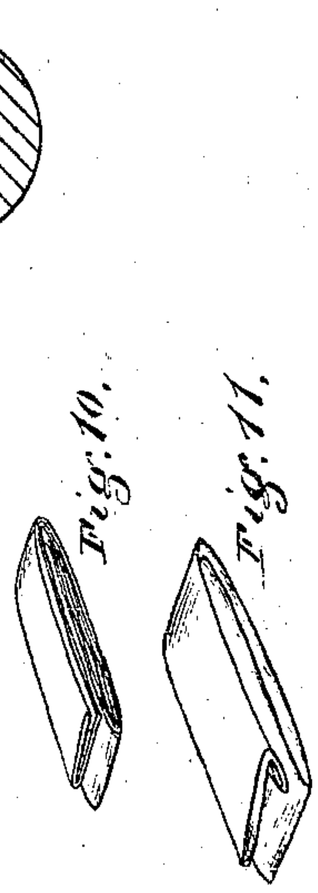

Fig. 10.

Fig. 11.

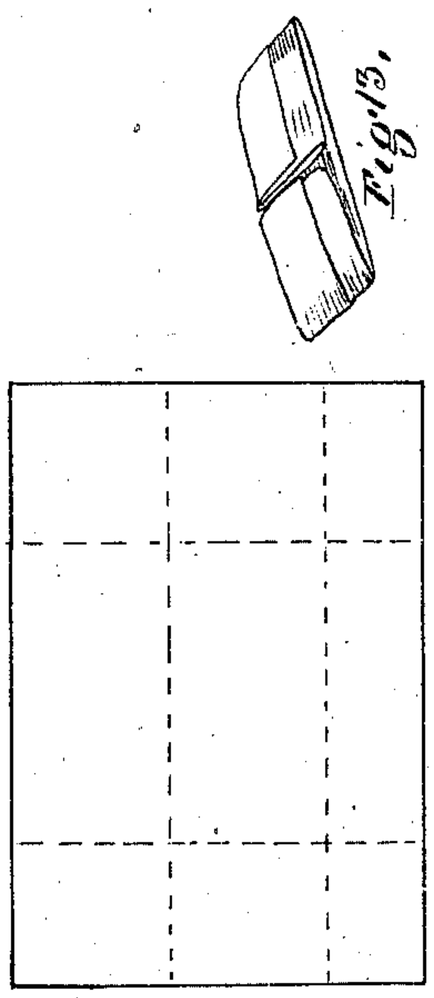

Fig. 12.

Fig. 13.

Fig. 8.

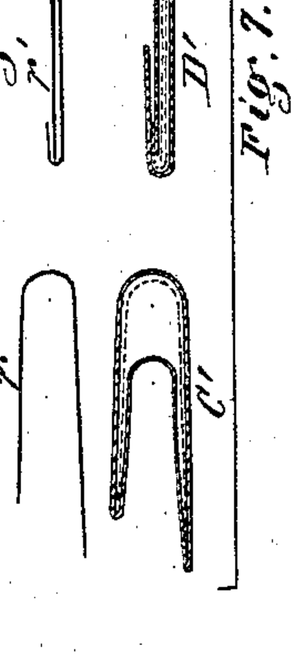

Fig. 7.

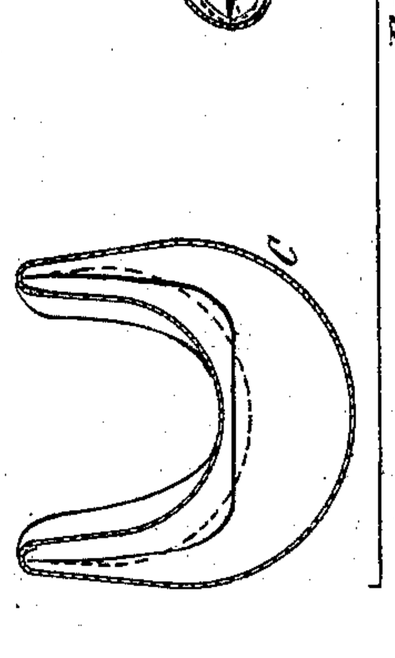

Fig. 6

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UNITED STATES PATENT OFFICE.

WILLIAM E. HEEREN, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN MACHINES FOR PUTTING UP MEDICAL POWDERS.

Specification forming part of Letters Patent No. **199,645**, dated January 29, 1878; application filed August 10, 1877.

To all whom it may concern:

Be it known that I, WILLIAM E. HEEREN, of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Machines for Putting Up Medical Powders; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1 shows, in elevation, my improved machine for putting up medical powders. Fig. 2 is a top plan view of the same. Fig. 3 is a vertical sectional view of detached parts, showing them in their proper order of succession. Fig. 4 is a side elevation of the folding devices, showing also the gearing which operates the several parts, the view being on the opposite side from that in Figs. 1 and 2. Fig. 5 is a detached plan view of the valve which regulates the charge of powder. Fig. 6 is a transverse sectional view of folders employed for giving one form of fold. (Shown in Figs. 12, 13.) Fig. 7 is a like sectional view of folders employed for giving a second form of fold, as shown in Fig. 11. Fig. 8 is a like sectional view of still another form of folders, used for making a package, as shown in Fig. 10; and Fig. 9 shows, in section, the rolls employed in my machine, with an outline view of the position of the paper as it passes through the rolls, and also an outline of folders employed.

My present invention relates to a machine for putting up medical powders, the paper being taken from a continuous roll, divided, and folded into separate packages, each package being charged with a determinate amount of sugar or powder, and the several packages arranged upon a counting device, ready for packing.

In the drawings, A represents the bed-plate of the machine, which may be supported in any suitable way. B, Fig. 1, is a reel supported on the bed-plate, and carrying a roll of paper, *b*. This paper *b* is prepared of proper width, and is wound in a continuous strip upon the reel, in any convenient way.

The paper is carried through the length of the machine in the following way and with the following steps: It is first passed through a guide or folder, C, which is shown in section, Fig. 6. This folder C gives a **U** form to the paper. From this folder the paper is passed to a second folder, D. The form of this folder is also shown in section, Fig. 6, and the form given the paper is there shown in dotted lines, the edges of the paper being carried or bent over, one upon the other, somewhat. From this folder D, I prefer to pass the paper through still a third folder, E, which is also shown in Fig. 6. The effect of this folder E is to bend the edges of the paper still closer upon each other, and carry the under edge up to, or nearly to, the fold of the upper edge, as shown in dotted lines, section E, Fig. 6. The proper relation and position of the upper and under edges of the folded paper is also secured, in a measure, by the proper alignment of these several folders with relation to each other and the rest of the apparatus, a slight lateral adjustment varying somewhat the position of the edges and of the folds. These folders may be two or more in number. I have shown them mounted on stands or supports F, which rest on and are attached to the bed-plate. This attachment may be made by screws, or in any convenient way which will admit of adjustment. The relative positions in which I prefer to place these formers or folders are shown in Figs. 1 and 2. The distance between them and the other parts of the machine will, however, depend somewhat on the character of the paper used, stiff and heavy paper requiring more room in which to bend than light paper.

After leaving the third former, E, the paper is passed between two pressure-rolls, R, which operate to draw or feed forward, and also to press down and make tight the folds in the paper made by the folding-guides. I prefer to coat these rollers, one or both, with rubber or other elastic coating, so that they may give somewhat and pass over the charges of sugar or powder which are previously deposited in the paper, as hereinafter described, and not crush or force the same out through the paper.

These rolls R are mounted in suitable housings H, and are provided with the usual pressure-blocks and adjusting-screws. They are also driven at proper speed by a system of gear-wheels, as hereinafter described.

After leaving the rolls R the paper is given a half twist or turn, as shown in Fig. 9. This turn is given the paper so as to bring the lon-

gitudinal fold on the opposite side from the folded ends in the finished package, or, in other words, so that the ends may be folded away from the side on which the longitudinal fold is made, as a tighter package is thus secured. The paper is then passed through a guide or thimble, *y*, and between the upper two of a series or train of three-high rolls, R^1 R^2 R^3. These upper rolls R^1 R^2 operate to feed or carry forward the paper, and also further compress the same, as in the case of the rolls R, and in addition to this they also crease the paper transversely by means of ribs or creasers *e* and e^1 on the roll R^1, working against metallic strips e^2 and e^3 on the roll R^2. The creases thus formed facilitate the bending over of the ends of the package, as hereinafter described, and they also serve to indent and compress the package at these points, so as to prevent the inclosed powder from sifting out through the ends.

A knife, *c*, is also arranged upon the face of the roll R^1, which works against a metallic or other suitable strip, c^1, on the roll R^2. By means of this knife the several blanks or sections are cut from the continuous strip of a length corresponding to the circumference of the rolls.

The face of the middle roll R^2, between the strips e^2 e^3 and c^1, is, by preference, covered with some elastic substance, as in the case of the rolls R, and for a like reason. These rolls R^1, R^2, and R^3 are mounted in housings H′, and are provided with the usual pressure-blocks and adjusting-screws for securing the desired adjustment. They are also driven by suitable gearing, as presently described.

One effect of the creaser *e*, which follows next after the knife *c*, is to indent transversely the upper side of the paper and give the free end an upward direction. As the paper is carried along by the rolls R^1 R^2 it strikes against the curved guide *d*, which is attached to the housings H′. This guide deflects the end of the paper upward still more, bending it along the crease made, and as the operation proceeds the strip of paper will pass out from under the guide, the point of bend being foremost, and the free end bent back upon the strip. As the strip is passed along it is creased by the second creaser, e^1, preparatory to folding over the other end of the package, and in due time this creased blank or section is cut from the strip by the knife *c*.

In order to bend back this last-creased end, I make use of the following device: A spring-clip, *h h′*, is secured to a rock-shaft, *k*, which is mounted in suitable bearings on an adjustable table-frame, P. This table is secured to an angle-iron, *p*, by means of bolts and slots *i*, so as to be adjustable up or down, and the angle-iron *p* is secured to the bed-plate A by means of bolts and slots *i′*, so as to be adjustable to and from the rolls. I am thus enabled to place the shaft *k* and clip *h h′* in any desired relation to the rolls.

A coiled or spiral spring, k^1, is arranged between the shaft *k* and table P, in such manner as to press the clip upward, and a thumb-screw, k^2, working through a suitable support, k^3, furnishes a counter stop or rest for the clip, as against pressure from the spring k^1. By turning the screw k^2 in or out the clip *h h′* may be so adjusted that the paper will pass in between the upper and lower plates of the clip as it passes out from under the guide *d*. The clip thus receives and holds the blank or partially-folded package.

An arm, K, is adjustably attached to the end of the shaft *k*, and a set-screw, c^2, or other convenient device, binds the arm to the shaft in the desired position. A friction-roller, *s*, is mounted in any convenient way in the outer end of the arm K.

A wiper or sector, S, is carried by the shaft of the middle roll R^2, and an adjustable connection is secured by means of a sleeve, s^1, which has a projecting arm, to which the wiper is secured by bolts or screws c^4, the sleeve being bound to the shaft by a set-screw, c^3. This wiper S is adjusted to engage the arm K as it turns with the shaft, and press the arm downward until the arc or periphery of the wiper can travel over the friction-wheel *s*. Depressing the arm K rocks the shaft *k* and depresses the clip *h h′*. When the wiper S passes the arm K, the arm, shaft, and clip will be raised to their original position by means of the spring k^1.

The wiper S is arranged on the roll R^2 in such position that it will depress the clip immediately after the inclosed package or section has been severed from the main strip of paper by the knife *c*. The upper plate *h* of the clip is made of such length as to reach to or nearly to the second crease in the package, and as the clip is carried down it will bend the package at this crease, the free end resting against the roll R^2.

A stop, S′, is attached to the inner edge of the table P by slots and screws c^5, so that it may be adjusted up or down. This stop S^1 arrests the descent of the clip in proper position for the rolls R^2 and R^3 to take a bite upon the package, and pass it through between them. If the clip reaches the stop S′ a little before the arm K and shaft *k* reach the limit of their descent, the upper plate *h* of the clip will be made to act as a spring, and press the inclosed package against the face of the roll R^3, or between the rolls R^2 and R^3, and it will also operate to hold the first folded end down upon the package until such end passes into the rolls. The adjustment and arrangement of the wiper S and arm K are such that they are freed from engagement, and the clip is carried up in time to receive the next package as it is passed out from under the guide *d*.

The final bend being made in the package between the descending clip and roll R^2, as before described, the rolls R^2 and R^3 will first take a bite upon the package at such point of bend, and in passing the package through they will not only bend and compress this

last end upon the package, but also will give the whole package a final compression, by which its several folds are more securely fixed. The package is thus complete, and may be dropped from the rolls R^2 R^3 into any convenient receptacle; but I prefer to deposit them in regular succession in a counting device, as much time is thus saved which would otherwise be consumed in counting and arranging the packages for packing. This device consists of a wheel, A^1, having a series of radial spring-plates, *a*, attached to and projecting out from its face. These plates may be of any desired number, and I prefer to divide them into determinate divisions of, say, twenty-five or other convenient number, by different-colored plates a^1. These plates may be either straight, as shown, or curved in the plane of the wheel.

The wheel A^1 is carried by the shaft A^2, which is mounted on the bed-plate A by suitable supports. The shaft A^2 also carries a gear-wheel, A^3, the teeth or cogs of which correspond in number to the number of spring-plates on the wheel A^1. This gear-wheel A^3 gears with an idler-pinion, *n*, which is mounted on the housing H′. Connected with the pinion *n* is a ratchet-wheel, n^1, which is operated intermittingly by a pin or wrist, n^2, placed in the end of the journal of the roll R^3. The pin n^2 is adjusted to give the ratchet n^1 a positive and definite movement for each revolution of the roll R^3, and the amount of this movement is sufficient to cause the pinion *n* to pass one cog of the wheel A^3.

A detent or stop-rod, n^3, is attached to the inner edge of the housings H^1 in such position as to engage the ends of and bend down the radial plates *a;* and the adjustment of the several parts is such that upon each movement of the shaft A^2, given through the devices just described, one of these detained plates *a* is freed from the detent n^3. This wheel A^1, with its radial plates *a*, is arranged in front of the rolls R^2 R^3, and in such position that, as a finished package is passed through these rolls, it will pass onto the detained plate, such plate operating as a table to receive it. When the plate is liberated from the detent n^3 it will, by its spring-power, carry the package up and hold it next to the preceding plate.

The devices described being properly arranged, each package will be received in turn by these spring-plates *a*, until all are full, or until one or more of the divisions are full, when the packages may be removed in definite numbers, arranged ready for packing in boxes.

I will now describe the gearing by which the folding devices in my machine are driven. O is the driving-wheel, and may be mounted in suitable bearings resting on the bed-plate. The rolls R are driven by a wheel, O^1, on the shaft of the lower roll, which gears with the drive-wheel O. The upper one of the rolls R carries a pinion, *o*, which gears with a corresponding pinion on the lower roll.

The middle roll, R^2, is driven by a wheel, O^2, gearing with the drive-wheel, and the rolls R^1 and R^3 are driven by pinions o^1 o^2, which gear into a corresponding pinion on the roll R^2. These gear-wheels are all arranged with reference to driving their respective rolls at proper rates of speed, so as to keep the several parts of the machine in proper working relation.

I prefer to make the several rolls equal, and arrange them and the other devices so that a complete package shall be made at each revolution of the rolls.

I will now describe the device by which powder or sugar is deposited in the several packages during the course of their construction.

A hopper or funnel, P^1, is supported on suitable standards P^2, and is placed directly over the strip of paper *b*, and between the first and second folders or guides, where the paper has a U form, as described. The nozzle p^2 of this hopper or funnel is opened and closed by a rotary or other suitable valve.

Fig. 5 shows one form of valve, that may be employed where the valve *v* is closed by a spring, v^1, and opened by the action of a pivoted lever, v^2. This lever is operated by means of a connecting-rod, v^3, which passes from the outer end of the lever v^2 to one end or arm of a bell-crank lever, v^4, which is pivoted to a standard, M. The other arm of this bell-crank is engaged and raised at each revolution of the wheel O^1 by a pin or wrist, *w*, which projects out from the wheel. As this bell-crank v^4 is thus operated, the valve *v* will, through the described connections, be alternately opened by it, and closed by the action of the spring v^1 as soon as the pin *w* passes the lever v^4. When these devices are properly arranged the valve *v* will be opened at proper intervals for the passage of powder from the hopper to the paper.

In order to secure a certain and uniform deposit of powder, I make use of a plunger, *m*, which is drawn upward by means of a lever, m^1, pivoted to a standard, m^2. One end of this lever m^1 is connected to the top of the plunger *m* by means of a link, m^3, and the opposite end is connected by a rod, m^5, with one arm of a bell-crank lever, m^4, which is pivoted and operated in the same manner as the bell-crank v^4. As the bell-crank m^4 and connections are thus operated the plunger *m* will be raised, and while so raised the sugar or powder in the hopper will fill the space between the lower face of the plunger and the valve *v*. The valve being opened, as described, and the pin *w* having passed the bell-crank m^4, the plunger *m* will be forced down by the coiled spring *x*, and a definite amount of powder will be forced out through the valve-port to the paper. In order to regulate the amount of this discharge, as desired, I make

use of an adjusting-screw, m^6, on the connecting-rod m^5. By means of this screw m^6 the connecting-rod m^5 may be lengthened or shortened, and the working position of the plunger m, or rather the time and extent of its operation, is varied in relation to the action of the valve v. This results in varying the amount of powder forced out by the plunger, and by means of this or an equivalent device for securing the requisite adjustment the desired amount of discharge may be secured.

In order to keep the powder in the hopper light and pulverized, I give a rotary or spiral movement to the plunger m in addition to its vertical movement, already described. This is accomplished by means of spiral ribs or threads x^2 on the stem of the plunger, working through a corresponding nut, x^1, which may be fixed in any convenient way to the top of the hopper. As the plunger is moved vertically it will also be turned or rotated by this spiral thread and nut. Radial wires or filaments x^3 project out from the lower end of the plunger within the hopper. These filaments move with the plunger, and, by their combined vertical and rotary motion, they effectually stir up and pulverize the contents of the hopper, so that it readily fills the space between the plunger and valve, as already described. The downward action of the plunger, and the discharge made thereby, is prompt, and the powder is left in the paper in separate and well-defined deposits.

The position of the hopper P^1 is such that the deposit is made at a point in the paper which will be midway between the creases made for folding the ends, and the rolls having elastic faces, as described, the powder will not be spread out by them, so as to get outside of such creases.

I have shown in Fig. 13 a package folded in the manner hereinbefore described, and Fig. 12 shows the lines of fold. Some practitioners, however, prefer other forms of packages, specimens of which I have shown in Figs. 10 and 11. These or other forms may be made when required by using properly-shaped folders or guides. I have shown sectional views of folders used in making such packages in Figs. 7 and 8.

In Fig. 7, C^1, D^1, and E^1 show transverse sections of folders used in making package as in Fig. 11, $r\,r^1\,r^2$ showing the folds given the paper by folders D^1 and E^1, and Fig. 8 shows, at $C^2\,D^2\,E^2$, like sections of folders used in making package as in Fig. 10, $r^3\,r^4$ showing the successive longitudinal folds given the paper.

Fig. 9 shows side views of the folders shown in section, Fig. 8, and also shows the proper arrangement of creasers and cutter for folding the ends of the package, as in Fig. 10.

These modifications shown will suffice to indicate to the skilled operator the form of folding-guide necessary to produce the required form of package.

I claim herein as my invention—

1. In a machine for folding packages for medical powders, the combination of a series of two or more pairs of compressing-rolls, and a pair of rolls having in their peripheries longitudinal creasers and cutters for the transverse creasing and cutting of the packages, substantially as set forth.

2. In a machine for putting up medical powders, the combination of a series of two or more folding-guides, a device adapted to give an intermittent feed of powder arranged between such folders, one or more pairs of rolls having on their peripheries longitudinal creasers and cutters for the transverse creasing and cutting of the packages, substantially as set forth.

3. As a means of folding the ends of a package for medical powders, the combination of a pair of creasing-rolls, a guide for bending back the free end, a pair of compressing-rolls, and a device for carrying the package from the creasing to the compressing rolls, substantially as described.

4. In a machine for putting up medical powders, the combination of a folding device and a counting device, substantially as described, whereby the finished packages are arranged in regular order and number.

5. In a machine for folding packages for medical powders, a pair of rolls having longitudinal creasers and cutters in their peripheries for the transverse creasing and cutting of the packages, in combination with compressing-rolls R, R^1, R^2, and R^3, substantially as set forth.

6. In combination, with the hopper of a machine for putting up powders, a vertically and rotary moving plunger, substantially as and for the purpose specified.

7. The combination of a hopper for holding the powder, a valve to regulate the discharge, and a vertically and rotary moving plunger to pulverize the powder and facilitate the discharge, substantially as set forth.

8. As a means of conveying packages from one set of rolls to another, the combination of clip $h\,h'$, shaft k, spring k^1, arm K, and wiper S, substantially as set forth.

9. As a counting device in a machine for putting up powders, the combination of a detent or stop, n^3, and a wheel, A^1, having a series of spring-plates arranged radially thereon, such wheel being connected with the folding apparatus by suitable gearing, for giving intermittent motion, substantially as set forth.

In testimony whereof I have hereunto set my hand.

WILLIAM E. HEEREN.

Witnesses:
J. J. McCORMICK,
CLAUDIUS L. PARKER.