

J. A. McFERRAN.
Pill-Machines.

No. 152,666.

Patented June 30, 1874.

FIG. 1.

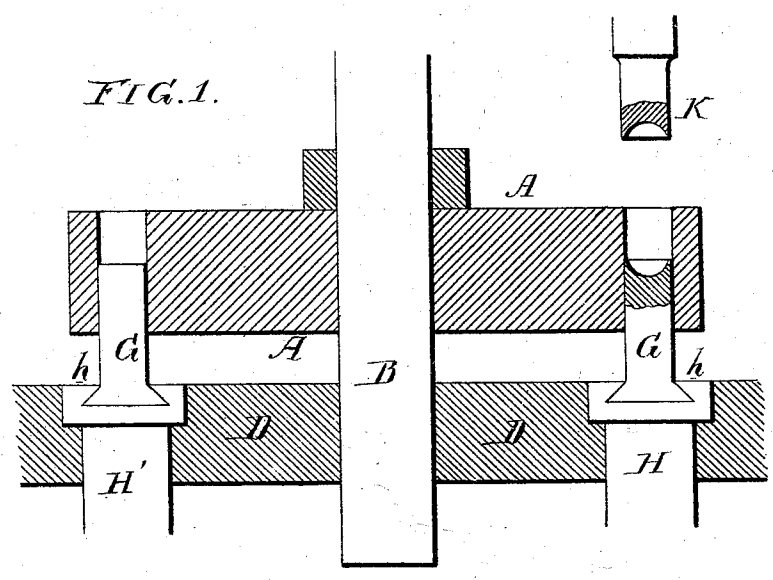


FIG. 2.

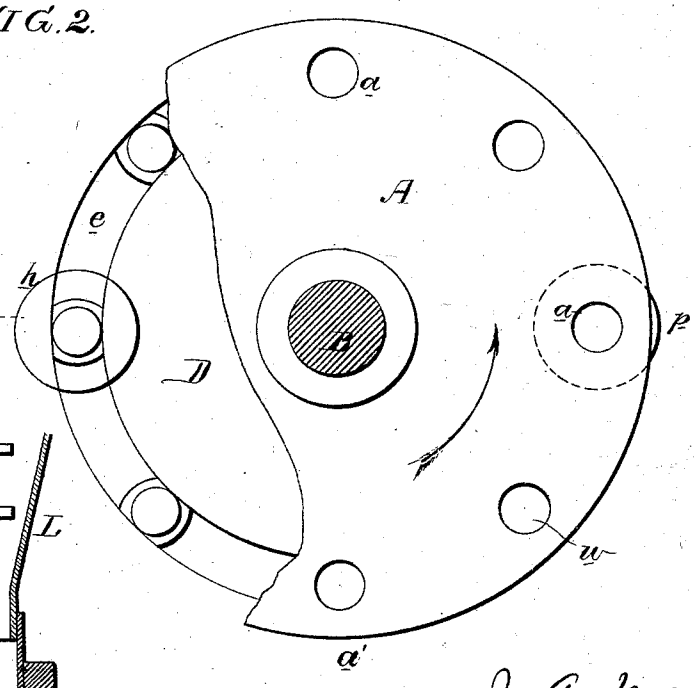
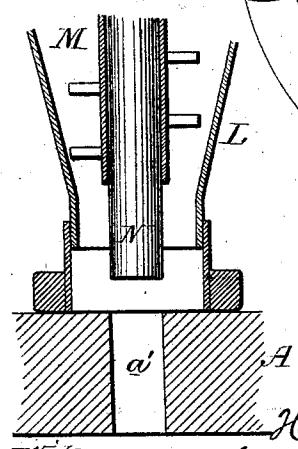


FIG. 3.



Henry Smith
Witnesses, Thomas McElroam.

J. A. McFerran
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Howden and Son

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FIG. 4.

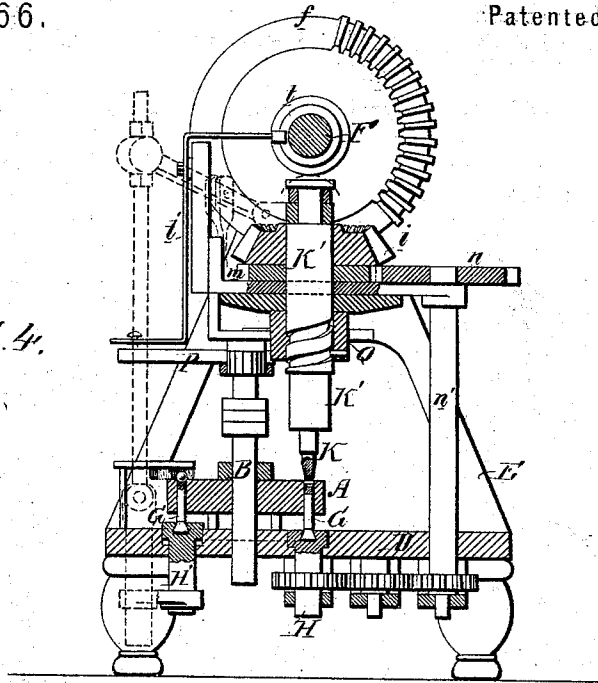


FIG. 5.

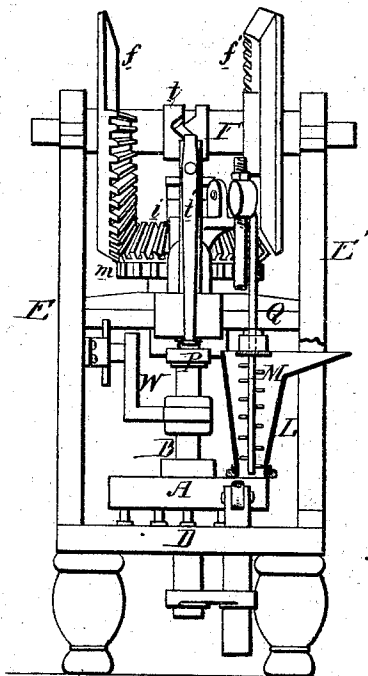
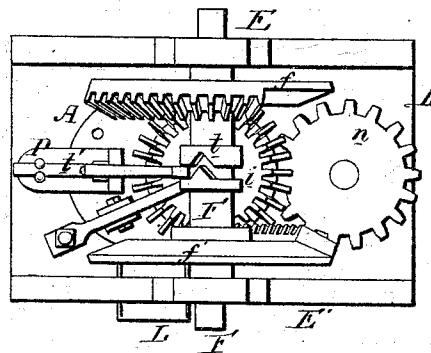


FIG. 6.



Witnesses, Harry Smith
Thomas W. Sloan

J. A. McFerran
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UNITED STATES PATENT OFFICE.

JOSEPH A. McFERRAN, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN PILL-MACHINES.

Specification forming part of Letters Patent No. **152,666**, dated June 30, 1874; application filed June 18, 1874.

To all whom it may concern:

Be it known that I, JOSEPH A. McFERRAN, of Philadelphia, Pennsylvania, have invented an Improved Pill-Making Machine, of which the following is a specification:

The object of my invention is to rapidly manufacture that class of pills which are composed of pulverized ingredients solidified by pressure; and this object I attain by the mechanism illustrated in the accompanying two sheets of drawings.

The most prompt understanding of my invention can be derived from an explanation of Sheet 1 of the drawings, in which—

Figure 1 represents a vertical section, and Fig. 2 a plan view, of the main part of the machine deprived of the devices through which the operating parts derive their motion.

A is a metal disk, containing, in the present instance, eight circular openings, *a*, within which the pulverized drugs are compressed into the desired pills; and this disk is secured to a shaft, to which an intermittent rotating movement is imparted, each movement being equal to one-eighth of a revolution, and the pause between each movement being of sufficient duration to enable the operating parts described hereafter to perform their duties properly. Below the disk A is the fixed base-plate D, in which are arranged two pins, H H', one coinciding with one of the openings *a*, and the other with another opening of the disk, both pins being capable of sliding vertically to a limited extent, while the pin H can also rotate in its bearings. In the upper surface of the base-plate is a dovetailed groove, concentric with the disk B, for the free admission of the dovetailed head of the dies G, one of which is adapted to each opening *a* of the disk, and is carried round with the latter. Each pin H has a circular head, *h*, contained within a recess in the base-plate, and the dovetailed groove *c*, above referred to as being formed in the upper surface of the base-plate, is continued through these heads, so that, while the dies G can traverse the groove freely, each die is, at times when the disk A is stationary, under the control of one or other of the pins H or H'. K is a plunger, which, during the stoppage of the disk, enters

one of the openings *a*, and compresses the pulverized drugs against the die G. A hopper, L, is situated directly above the opening *a'* of the disk, Fig. 2, this hopper, which contains the pulverized drugs, fitting close to the upper surface of the disk, or being so packed that the material cannot pass from beneath it over the surface of the disk, and in this hopper is a rotating tubular shaft, M, having projections for mixing the drugs. Within the shaft is a reciprocating rod, N, which, at intervals, forces a portion of the contents of the hopper into one of the openings *a*.

We will suppose that the rod has just completed its duty as regards furnishing the opening *a*, Fig. 2, of the disk with a supply of pulverized drugs. The disk now receives two movements, until its said opening *a'* arrives at the point *p*, where it is immediately below the plunger K. During the stoppage of the disk at this point the plunger descends, and compresses the material against the die G, but is quickly withdrawn from the opening, so that the disk may continue its intermittent course. When the opening *a'* arrives at the position *q*, Fig. 2, the dovetailed head of its die G is within the head *h* of the pin H', which is elevated by the mechanism described hereafter, or by other suitable devices, so as to cause the die to force the compressed pill from the opening of the disk, the pill, when it reaches the surface of the disk, being brushed away into any suitable receptacle.

It may be remarked that the pills may be easily sugar-coated by depositing a small quantity of powdered sugar into each opening before it reaches the hopper, another small portion of sugar being deposited in the opening above the drugs therein when it reaches the point *w*, and before it arrives at the point where the plunger K descends.

The difficulty in molding many pill ingredients by compression is their tendency to adhere to the dies. To obviate this difficulty, when such ingredients are used, by causing the plunger K to turn as it descends, and while it is acting on the pulverized material, the die G being also turned, but in a contrary direction, while the pressure takes place, this turning of the die being accomplished while its dove-

tailed head is within the head *h* of the pin *H*, by simply turning the said pin in the manner explained hereafter.

If desired, the pin *H* may be elevated simultaneously with the descent of the plunger *K*, so that pressure may be applied simultaneously to both upper and under surfaces of the pulverized drug in the opening *a*.

The disk *A* may be so adjusted vertically that more or less of the pill ingredients may be introduced into each opening, the plunger, or rather the lower portion of the same, being also made adjustable.

Having now described the main features of the machine, and their mode of operation, I will proceed to explain briefly the mechanism by which the movements may be imparted to the main operating parts, reference being had to Sheet 2 of the drawings, in which—

Fig. 4 is a vertical section of the machine; Fig. 5, an end view, and Fig. 6 a plan view.

E and *E'* are the opposite frames of the machine, and are secured to the above-mentioned base-plate *D*. In the upper portion of these frames turns the driving-shaft *F*, two bevel-wheels, *f f'*, on which are adapted to a pinion, *i*, on the vertical shaft *K'*, to the lower end of which the above-mentioned adjustable plunger *K* is secured. This shaft *K'* is arranged to turn and slide in a cross-piece, *Q*, of the frame, and has on it a screw-thread, into which projects a pin attached to the said cross-piece *Q*. The teeth of the two bevel-wheels *f f'* are so cut away that on rotating the shaft *F* the vertical shaft *K'* must turn in one direction, and then in the other, and, owing to the screw-thread, must be alternately depressed and elevated as it is turned; hence the plunger *K* must have the desired movement explained above imparted to it. Below the pinion *i* is a wheel, *m*, gearing into a like wheel, *n*, on a vertical shaft, *n'*, through which, and through the system of wheels clearly shown in Fig. 4, a rotary motion is imparted to the pin *H*, and thence to the lower die *G*, simultaneously with the rotation of the upper die.

It should be understood that so many of the teeth of the bevel-wheels *f f'* are cut away that the shaft *K'* shall remain stationary for a short time while it is in its most elevated position, or when it is clear of the disk *A*, so as to permit other operations explained above to be effectually accomplished. It should also be understood that while the pinion *i* and wheel *m* turn with the shaft *K'*, the latter can slide freely in the said wheel and pinion.

The shaft *B*, which carries the disk *A*, has the desired intermittent motion imparted to it by a scroll-cam, *t*, on the driving-shaft *F*, through a lever, *t'*, lever *P*, and ratchet, which need not be minutely explained, as they constitute no part of my invention, and as the desired intermittent motion may be imparted to the disk by different appliances.

The shaft *B* revolves in and is carried by a bracket, *W*, (shown in Fig. 5,) this bracket being so secured to one of the frames of the machine that it can be readily adjusted vertically and secured after adjustment. The disk can thus be raised or lowered in accordance with the quantity of ingredients to be deposited in its openings, as explained above.

As many different devices may be employed for raising and lowering the pin *H'*, in order to cause one die after another to force the compressed pills from each opening in the disk in succession, it will be unnecessary to explain mechanism adapted in the present instance for that purpose.

It will suffice to say in this connection that during each of the temporary stoppages of the disk the pin *H* is elevated, thereby causing one of the dies *G* to push out the compressed pill, after which the pin falls, and with it the die, preparatory to a new supply of pill ingredients being deposited in the opening and above the die, in the manner described above.

It will also be needless to explain how a rotary motion may be imparted to the mixing-tube *M* in the hopper *L*, and how the rod *N* may be reciprocated within the tube.

When it is desirable to impart a combined vertical and rotating movement to the pin *H*, so that each die *G* may ascend and turn simultaneously with the descent and rotation of the plunger *K*, the said pin *H* may be provided with a screw-thread in the same manner and for the same purpose as the shaft *K'* is threaded.

It may be remarked, however, that some pill ingredients are not so liable to adhere to the plunger and dies as others, and that consequently no turning of the plungers and dies may be required in some cases; or the turning of the upper die only may be sufficient to prevent adhesion.

Although I have alluded to the manufacture of pills, the machine may be used for making granules, suppositories, troches, lozenges, and other articles composed of pulverized medical ingredients having the property of cohesion under pressure.

I claim as my invention—

1. The combination of the intermittent rotating disk *A* and its openings *a*, with the reciprocating plunger *K*, dies *G*, and pins *H* and *H'*.

2. The disk *A* and its dies *G*, having dovetailed heads, in combination with the annular dovetailed groove in the base *D*, and continuations of the groove in the heads *h* of the pins *H*.

3. The combination of the disk *A* and its openings *a* with dies *G* and a plunger, *K*, to which a combined rotating and reciprocating movement is imparted, all substantially as described.

4. The combination of the disk *A*, its openings *a*, the plunger *K*, having a combined re-

reciprocating and rotary movement, and dies G, to which a rotary motion in a direction contrary to that of the plunger is imparted, all substantially as specified.

5. The combination of the vertically adjustable disk A with the dies G and adjustable plunger K.

6. The combination of the disk A and its

openings *a* with the rotating mixing tube and reciprocating rod N in the hopper L.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

Witnesses: JOSEPH A. McFERRAN.

WM. A. STEEL,

THOMAS McILVAIN.