

J. M. RICHARDS.
Pill-Machine.

No. 216,107.

Patented June 3, 1879.

FIG. 1.

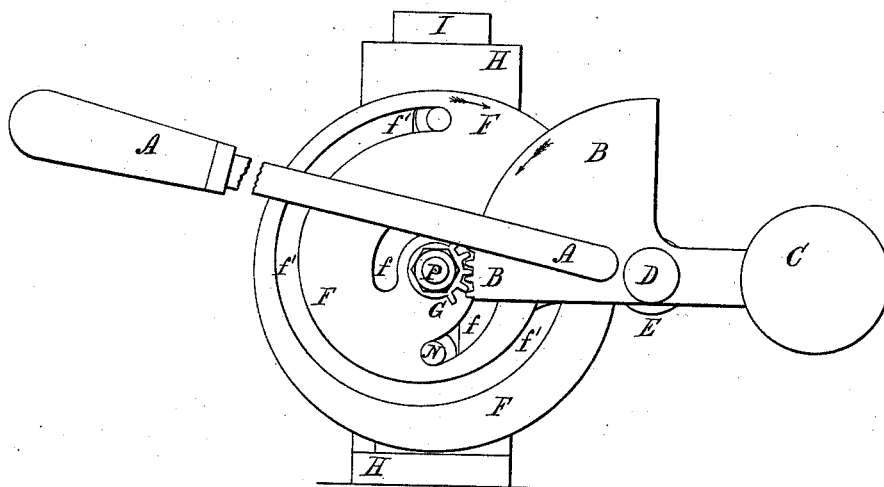


FIG. 2.

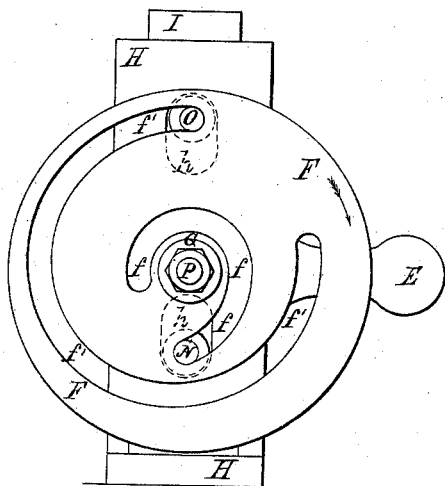
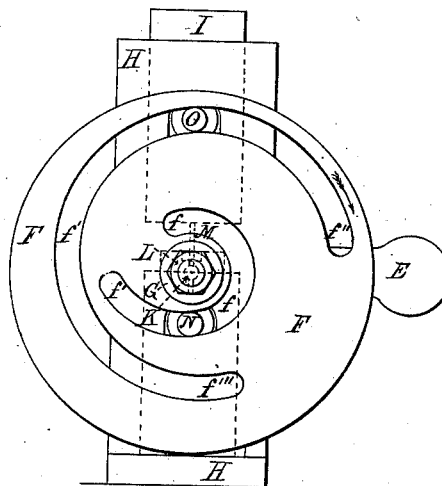


FIG. 3.



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FIG. 4.

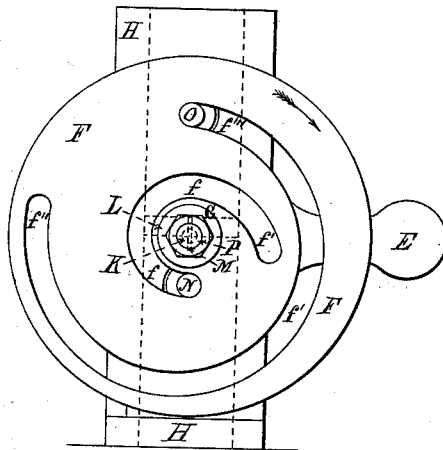


FIG. 5.

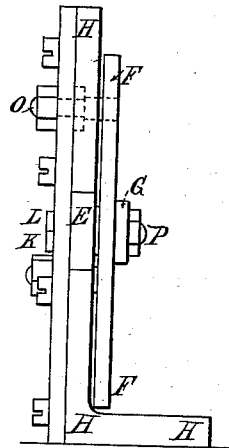


FIG. 6.

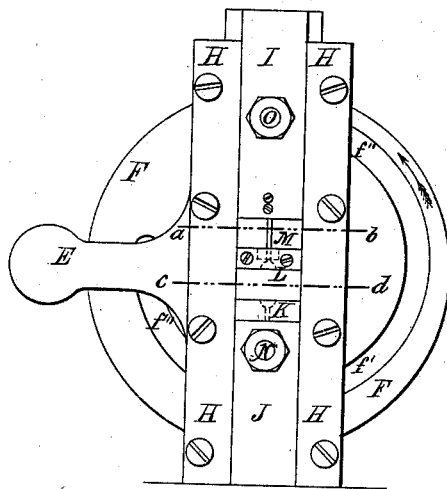


FIG. 7.

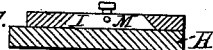


FIG. 8.

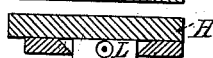


FIG. 9.



FIG. 10.

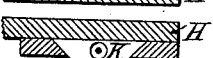


FIG. 11. FIG. 12.



FIG. 13. FIG. 14.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN PILL-MACHINES.

Specification forming part of Letters Patent No. **216,107**, dated June 3, 1879; application filed May 11, 1878; patented in England, September 21, 1876.

To all whom it may concern:

Be it known that I, JOHN MORGAN RICHARDS, of Great Russell Street Buildings, Great Russell street, (Bloomsbury,) in the city of London, in England, have invented certain new and useful Improvements in the Manufacture of Pills, and in the machinery or apparatus to be used in such manufacture, of which the following is a full, clear, and exact description.

This invention relates to the manufacture of every description of medicinal pill for man or beast, having reference to mechanical means for increasing the efficiency of such pills.

The exhibition or administration of medicines in the form of pills offers so many advantages that it is obviously desirable to adopt means to insure the proper action of the medicinal substances of which such pills are composed.

There is no doubt that ordinary pills, being hard, solid, spherical bodies, often pass through the stomach undissolved, owing to the resistance which their structure opposes to the digesting process.

The primary object of the present invention is to remedy this defect; and this is effected by perforating the pills, so as to admit the gastric juice freely to the interior of each one, and, by thus insuring a proper and ready solution of the ingredients, to enable the medicine to produce the desired effect promptly and without fatiguing the digestive organs.

Although such perforations of the pills may at first sight appear to be a very simple matter, it has been found, in practice, to require special instruments or apparatus to effect the operation in a satisfactory and economical manner.

Another object of the said invention is, therefore, the production of efficient means for perforating pills, which I have accomplished by constructing a simple machine with a pair of dies which clamp the pills successively, and one or more punches which pierce or penetrate each pill while it is held between the dies.

The said invention consists, first, in the process of perforating pills while in a soft or fresh state and as a final operation, so as to leave open orifices therein; secondly, in the combination of a punch or punches and a pair of

dies, with mechanism for actuating the same, for convenient use in carrying out said process; and, thirdly, in a perforated pill having one or more open orifices, as a new article of manufacture, as hereinafter more fully set forth.

The subject-matter of the said invention was patented in England September 21, 1876, Letters Patent No. 3,703 of 1876.

Figure 1 of the accompanying drawings is a back elevation of the said machine for perforating pills. Figs. 2, 3, and 4 are additional back views, illustrating the operation, certain parts being omitted. Fig. 5 is an edge view of the machine as shown in Fig. 4. Fig. 6 is a front elevation of the machine as shown in Fig. 2. Figs. 7 and 8 are partial horizontal sections on the line *a b* of Fig. 6, the views being from below and from above, respectively. Figs. 9 and 10 are similar partial sections on the line *c d* of Fig. 6. Figs. 11 and 12 are sections of a perforated pill, illustrating a modification, the plane of Fig. 12 being indicated by the line *e f*, Fig. 11. Figs. 13 and 14 are sections of two pills perforated by the illustrative machine, as shown.

Like letters of reference indicate corresponding parts in the several figures.

In carrying out my invention, ordinary spherical pills may be compounded and rolled or molded without reference to the present special treatment. Such pills, while still moist or fresh, are supplied to a perforating-machine, Figs. 1 to 10, and therein perforated, so as to retain open orifices, one or more in each pill.

The pills, when perforated, are ready to be put up in boxes or otherwise for sale and use, and when administered the pills will dissolve quickly and without fatigue to the stomach, owing to the free admission of the gastric juice to the interior of each pill, as hereinbefore stated.

The construction and operation of the perforating-machine above referred to are fully illustrated in the drawings.

A, Fig. 1, represents a hand-lever; and B, a spur segment or sector, by which the machine is worked; and C, a balance-weight. The parts A B C are rigidly connected together, and turn on a horizontal pivot, D, which is screwed into a stationary bracket, E, Figs. 1, 6.

F, Figs. 1, 6, represents a cam-wheel; and G,

a pinion rigidly united to said cam-wheel, and meshing with the spur-sector B. H represents the frame of the machine, which consists of a casting, of which the bracket E is a part, and a parallel pair of vertical bars, Fig. 6, attached to the face of the casting by screws, so as to form undercut vertical ways.

I, Figs. 1, 2, 3, 6, and 7, and J, Fig. 6, represent a pair of slides working in said ways, to which they are fitted at top and bottom, respectively.

K, Figs. 6 and 10, represents a movable die, carried by the upper end of the slide J; and L, Figs. 6, 8, and 9, a fixed die, attached by screws to the face of the frame H above the die K.

The opposite faces of the dies K L are constructed with hemispherical recesses or half-chambers, which, when the die K is elevated, form a spherical cavity or chamber of the proper size to receive and hold a pill of a given diameter.

M, Figs. 6 and 7, represents a punch, carried by the lower end of the slide I, in which it is fastened by a set-screw, and accommodated by perforations in the dies K L, which it is designed to penetrate. These perforations in the dies are shown in Figs. 8, 10, and in dotted lines in Fig. 6.

The dies K L may be made of any suitable metal, such as type-metal. The punch M should be of steel.

N, Figs. 1, 6, represents a pin or stud, firmly screwed into the slide J, so as to project from the back of the slide; and O represents a similar pin or stud, projecting from the back of the slide I. These pins are accommodated by vertical slots *h h* in the frame H, as shown in dotted lines in Fig. 2, and by the slots *f f'* and *f'' f'''* of the cam-wheel F, the latter being occupied by smooth cylindrical portions of reduced diameter, with which the respective pins terminate.

P, Figs. 1, 6, represents a horizontal stud-shaft, screwed into the back of the frame H to form the pivot of the cam-wheel F and pinion G.

The operation of the machine is as follows: The lower die, K, being dropped and the punch M elevated, as represented in Figs. 1, 2, and 6, a pill is placed in the half-chamber of said die K. The lever A is then depressed, which causes the sector B to rotate the pinion G, and with it the wheel F, in the direction indicated by arrows. As the wheel F rotates, the cam-slots *f f'* and *f'' f'''*, acting on the pins N O, elevate the die-slide J and lower the punch-slide I, but not synchronously. At about the middle of the movement the dies are completely closed, as shown in dotted lines in Fig. 3, that portion of the cam-slot *f f'* between the pin N and the end *f* in said figure being concentric with the shaft P, and simply effective during this motion for holding the dies together until the end of the punching operation. On the contrary, that portion of the cam-slot *f'' f'''* between its end *f''* and the

pin O in Fig. 3 is concentric, or nearly concentric, with the shaft, and the remainder of its length is effective. Consequently the pill is first confined or clamped in the dies, and then perforated. Any liability of the pill to burst during the operation is thus restrained. The completion of the perforating motion is illustrated by the dotted lines of Fig. 4.

The lever A being now raised, the order of the work of the slots of the cam-wheel F is reversed. First, the punch M is lifted out of the pill, this being all the while firmly held between the dies. Then the die K is lowered, and the pill can be removed. The balance-weight C holds the lever in its raised position.

If more than one perforation is desired, it can be obtained by replacing the pill in the die K in such position that the punch will have another diameter of the pill to act upon.

Pills with one and two diametrical perforations, produced as above, are shown in Figs. 13 and 14, the section in each case being in the plane of the perforations.

It is not, however, an essential feature of the invention that perforations should be in the lines of diameters.

Figs. 11 and 12 represent a pill having two perforations through it, neither of which is in the line of a diameter, Fig. 11 being a longitudinal section through one of the perforations, and Fig. 12 a cross-section. Pills can be thus perforated at one operation by providing the slide I with a pair of punches, and correspondingly perforating the dies; and, if desired, the dies K L may each be furnished with two or more half-chambers, the slide I being provided with a corresponding number of punches for the desired style of perforations, and thus the machine can be made to operate on more than one pill at a time.

To adapt a given machine to perforate different sizes of pills, all that is necessary is to substitute the required dies and punch for the dies K L and punch M, which are made removable for this purpose.

A blunt punch is used in the illustration, an escape for the punchings being provided at the bottom of the die K in front. The small amount of material thus displaced is more than compensated for by the increased efficiency of the pills incident to their perforation. If preferred, however, a sharp-pointed punch may be used, so as to displace the material laterally, provision to be made in the dies for a slight increase in the size of the pill.

In perforating pills after they have become hard a drilling operation will be necessary. This forms no part of the present invention, except in so far that perforated pills may be manufactured according to my invention by this as well as by other processes. The machine also admits of modification in unessential details.

I am aware that pills have been pierced in the process of coating the same, the object being to impale them on the needles of dip-

ping-frames; but in this case the punctures have been carefully closed, and have been made as minute as possible, and too small to be effective if left open.

I am also aware that lozenges and other confections have been made in the form of rings; but these are not designed nor adapted to be taken into the stomach whole, there to be dissolved, while this is an essential characteristic of my perforated medicinal pill, the perforations of the latter operating to admit the gastric juice into the interior of the pill after it is swallowed.

Having thus described my said improvement, what I claim as new and of my own invention, and desire to secure by Letters Patent of the United States, is as follows, namely:

1. As an improvement in the art of manufacturing pills, the process of rendering the pills more easily digestible, consisting in the perforation of each pill while the same is soft or fresh and after it is otherwise finished, so

as to leave one or more open orifices in each pill, as hereinbefore specified.

2. The machine for perforating pills, having a pair of dies for holding the pills, and a punch or punches for producing one or more open orifices in each pill, in combination with mechanism for successively closing the dies, projecting the punch or punches, retracting the latter before the dies are opened, and finally opening the dies, substantially as herein illustrated and described.

3. As a new article of manufacture, a medicinal pill having one or more open orifices or perforations for the free admission of the gastric juice to the interior of the pill after the latter is taken into the stomach, as herein shown and described, for the purpose set forth.

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Witnesses:

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