(No Model.) 2 Sheets—Sheet 1.

S. E. HEINEMAN.

METHOD OF AND APPARATUS FOR MANUFACTURING PILLS.

No. 499,542. Patented June 13, 1893.

Fig. 1.

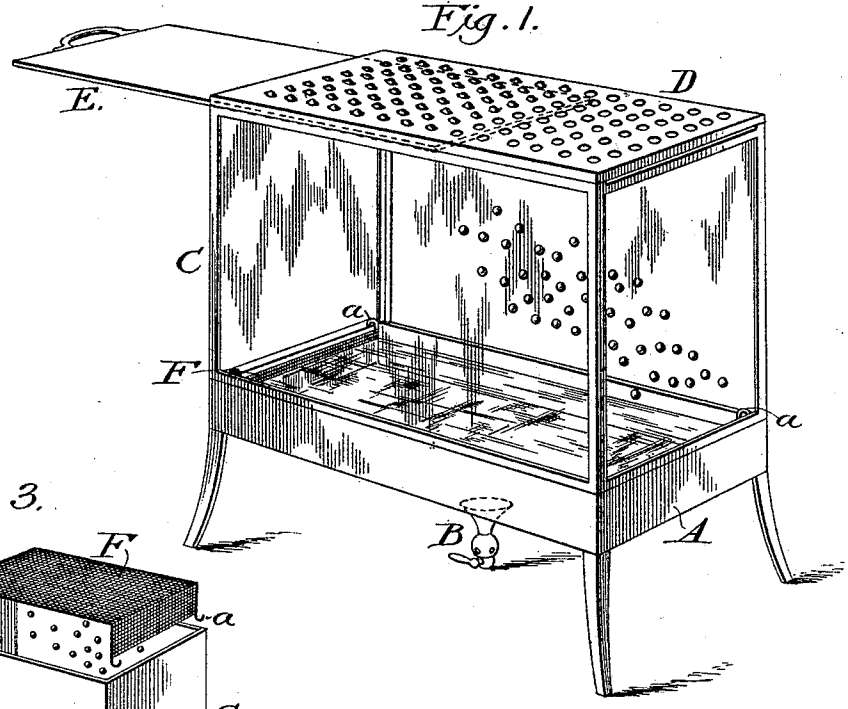


Fig. 3.

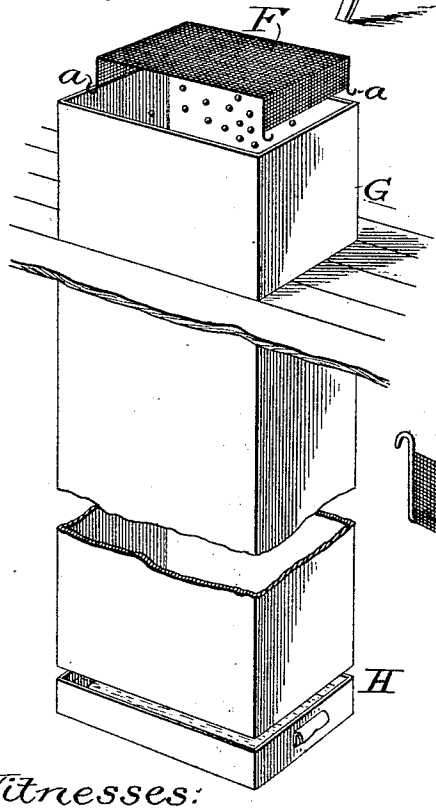
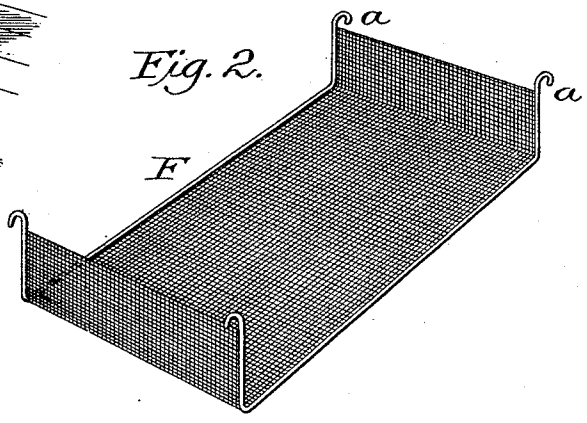


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

S. E. HEINEMAN.

METHOD OF AND APPARATUS FOR MANUFACTURING PILLS.

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Fig. 4.

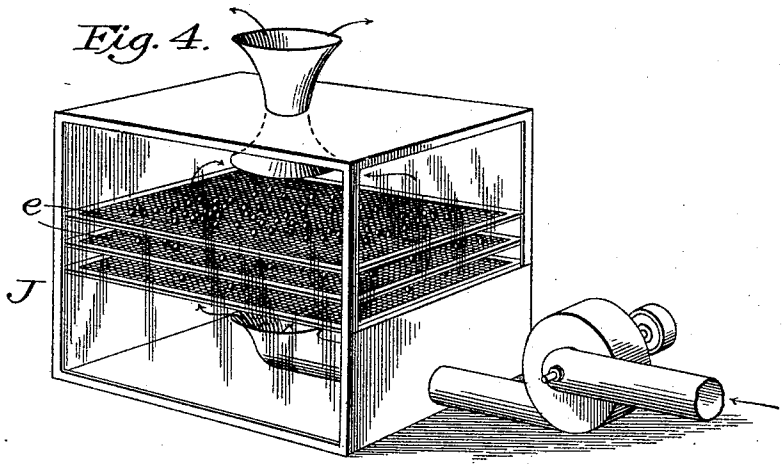
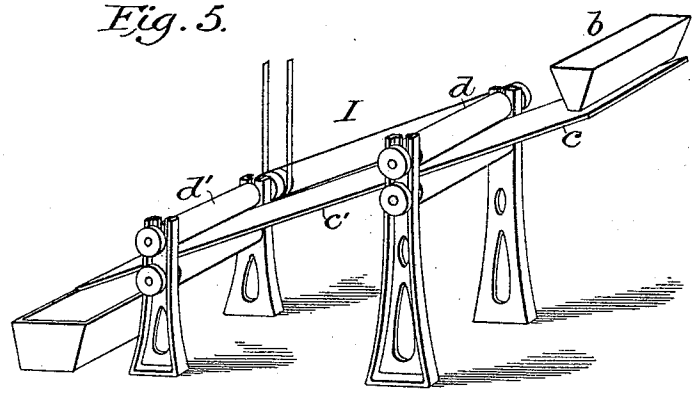


Fig. 5.



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UNITED STATES PATENT OFFICE.

SOLOMON E. HEINEMAN, OF DETROIT, MICHIGAN.

METHOD OF AND APPARATUS FOR MANUFACTURING PILLS.

SPECIFICATION forming part of Letters Patent No. 499,542, dated June 13, 1893.

Application filed December 29, 1892. Serial No. 456,696. (No model.)

To all whom it may concern:

Be it known that I, SOLOMON E. HEINEMAN, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in the Method of and Apparatus for Manufacturing Pills, of which the following is a specification.

My invention consists in a novel method of and apparatus for the manufacture of gelatine coated pills, tablets, &c., and has for its object the rapid production of such articles with uniform and perfect coatings throughout.

In the drawings,—Figure 1 is a perspective view of the apparatus for coating the pills; Fig. 2, a perspective view of a removable tray, placed in the gelatine receptacle, and serving to remove the pills from the bath without excess of gelatine; Fig. 3, a view illustrating the manner of dropping the pills through space in order to effect an even distribution of the gelatine, and to cause the gelatine to set; Fig. 4, a perspective view of the drying box or chamber in which the gelatine coating is dried and hardened; and Fig. 5, a perspective view of apparatus suitable for crushing or breaking down the body of the pill, or the excipient within the gelatine shell.

The apparatus above illustrated is merely given as one of many types suitable to the purpose,—it being understood that the entire method or process can be carried out without special appliances, though not so economically as with a completely organized apparatus such as shown and described herein.

For the purpose of more clearly distinguishing my invention from existing plans, I shall briefly state the two modes commonly practiced in the manufacture of gelatine coated pills, tablets &c.

Under one plan, a properly medicated excipient constituting a mass sufficiently firm to mold into proper shape is formed into pills or tablets either by rolling, or by a pill or tablet machine. The pills or tablets thus formed are impaled on needles and dipped into a solution of gelatine, which forms a coating upon their surfaces at all points except where the needles enter. At this point, however, the pills are uncoated The operation is, moreover, slow and tedious, and the result is not wholly satisfactory.

Under the second of the plans referred to, perforated tubes are brought into contact with the uncoated pills, and, the air being exhausted from the tubes by suitable means, the pills are held against the tubes and over the perforations therein. While thus held the pills are dipped into gelatine sufficiently to coat one half of each, after which the operation is repeated and the other half is coated. By this latter plan the holes left by the needles under the first plan, are avoided; but the operation is comparatively slow,—requires rehandling of the pills, and produces a somewhat uneven coating.

Briefly stated, my process consists in immersing the uncoated pills in a bath of suitably prepared gelatine, which forms the coating mixture; then quickly removing the pills by a suitable contrivance, from the coating bath; then dropping the coated pills from a suitable height through space; and finally drying the pills. The immersion effects a complete coating of each pill; the falling through space causes an even distribution of the fluid gelatine over the entire surface, the gelatine setting as the pills fall through the air; and the final drying hardens the gelatine to the required degree.

The uncoated pills or tablets may be prepared by means of an ordinary pill machine or tablet machine, without excipient, if preferred, and need only be compressed sufficiently to enable them to be handled conveniently in performing the coating operations. I am therefore enabled to produce as a finished product, gelatine coated pills or tablets of uniform shape and coating, with or without excipient.

It is sometimes desirable that the contents of the gelatine shell or envelope be in the form of a powder, a result hitherto unattained, so far as I am aware.

By subjecting the pills or tablets to slight pressure after the gelatine coating is applied and has become set, but before it has become dry and hard, or in other words, while the coating is still pliable and elastic, the contents may be restored to their original pulverulent form without affecting the shape or impairing the integrity of the coating or envelope.

As above stated, the various steps in the

coating of the pills or tablets may be carried out without specially constructed apparatus; but in manufacturing on a commercial scale, and to insure the most perfect results, it will be found advisable to employ apparatus embodying the essential features of that represented in the drawings, wherein—

A indicates a tank or vat to contain gelatine, which may be maintained in proper fluid condition by the heat of a gas burner B or otherwise. Rising from the tank A is a framework C, designed to support a tray or perforated board D, which is furnished with a removable bottom board or slide E. The cells or perforations of the tray are advisably made of a size to freely accommodate one pill or tablet each, but not more than one, so that the pills or tablets shall be separated, and shall fall freely and separately into the gelatine bath when the bottom board or slide E is withdrawn.

Within the tank or vat A, and sustained therein by hooks or hangers *a*, is a tray, F, of wire gauze, or other foraminous material, the openings in which are too small to permit the pills or tablets to fall through them, but large enough to permit the escape of any excess of gelatine when the tray is lifted out to remove the pills or tablets from the bath.

G indicates a vertical shaft or well-way, of suitable length and area, through which the coated pills or tablets are caused to fall. To effect such fall without collision or interference of the pills or tablets, care should be taken to quickly and squarely invert the tray F over the shaft or well-way, as indicated in Fig. 3. In descending, the pills rotate, and the axis of rotation changes frequently. Hence the gelatine coating, still quite fluid, is distributed with great uniformity over the entire surface of each pill, and before the bottom of the shaft is reached the gelatine becomes sufficiently set to prevent the pills from adhering to one another, or from being injured by handling. The pills are received at the bottom of the shaft in a box or receptacle H, advisably containing a more or less viscid fluid, such as a heavy oil, into which the pills fall without rebounding, and in which they float or remain partially suspended owing to the substantially like specific gravity of the coated pills and the oil. The oil is subsequently cut and removed by alcohol or equivalent agent. The gelatine, though set, is now tough and elastic, and the pills in this condition may be subjected to pressure and manipulation sufficient to reduce the contents of the shells or envelopes,—that is to say, the medicine or medicated excipient as the case may be, to a powdered state. The requisite pressure or manipulation may be given by hand, as by pressing and rolling between the fingers, or between boards or plates; but for greater rapidity and uniformity of action it is deemed advisable to employ the apparatus I, shown in Fig. 5. This comprises a feed hopper *b*, into which the pills or tablets are placed, and from which they are delivered upon an inclined board *c*, over which they roll down to the bite or line of nearest approach of a pair of rollers *d*, suitably adjusted to give a proper degree of pressure. By giving the rollers a slightly differential speed, or by rotating them in reverse directions, a rolling as well as a pressing action will be produced, which will be highly conducive to the loosening and separation of the particles of matter constituting the body of the pill or tablet. From the rollers *d* the pills or tablets may pass by a second board or chute *c'* to a second pair of rollers *d'*, and if deemed expedient, to other rolls in succession, and finally into a suitable receptacle. This step in the process may be omitted if not deemed desirable in any particular instance.

The pills or tablets are taken either directly from the receptacle H, or after being operated upon by the apparatus I, to a drying chamber J of ordinary construction; or they may be dried in the open air. It is advantageous, however, to employ a drying chamber or box J, in which the pills are placed upon trays *e*, of netting, and through which a current of dry warm air is forced by a fan, blower, or other usual means.

With the aid of apparatus of the character herein described, I am enabled to produce pills and tablets having a perfect and remarkable uniform gelatine coating, cheaply and expeditiously,—the friable mass within the gelatine shells or envelopes being broken down or left in a solid mass as preferred.

In speaking of a well-way or shaft, I do not mean to restrict myself to a closely walled shaft or space, as all that is essential is a sufficiently elevated support from which to drop the pills or tablets through space; but a close-walled shaft is preferable in that it prevents interference by cross drafts or air currents.

No claim is herein made for the pills or tablets produced by the above described method and apparatus, but such claims are reserved for a separate application.

Having thus described my invention, what I claim is—

1. The herein-described method of manufacturing gelatine-coated pills and tablets, which consists in, first, making up a medicated mass or body of suitable form and size; second, immersing said body in a properly prepared gelatine bath; third, removing the coated body from the bath; fourth, causing said body to fall through space, thereby effecting the even distribution and setting of the gelatine; fifth, receiving the body in a suitable receptacle; sixth, subjecting the coated body to pressure to break down the contents of the shell or envelope; and lastly, drying the pill or tablet.

2. The herein-described method of manufacturing gelatine-coated pills and tablets, which consists in, first, making up a medicated mass or body of suitable form and size; second, immersing said body in a properly pre-

pared gelatine bath; third, removing the coated body from the bath; fourth, causing said body to fall through space, thereby effecting the even distribution and setting of the gelatine; fifth, receiving the body in a suitable receptacle; and lastly, drying the pill or tablet.

3. The method of coating pills and tablets with gelatine, which consists in totally immersing them in a gelatine bath at a single operation and without contact with other body or support.

4. The method of effecting complete separation and immersion of pills in a gelatine bath, which consists in separating the pills one from another, and while thus separated, withdrawing their support and permitting them to fall into the gelatine bath.

5. In the process of manufacture of gelatine pills and tablets, the following steps: first, coating the pills or tablets with gelatine in a fluid state, and second, causing the coated pills or tablets to fall through space, and thereby to effect the even distribution and setting of the gelatine.

6. In the process of manufacturing gelatine-coated pills and tablets, the following steps: first, producing medicated pills or bodies of suitable form and size; second, covering the same with fluid gelatine; third, causing the coated bodies to fall through air a distance sufficient to effect an even distribution and setting of the gelatine; and fourth, causing said bodies with the coating thus equalized and set, to fall into a liquid body; whereby they are prevented from rebounding, and from adhering one to another.

7. In the process of manufacture of gelatine pills and tablets, the steps, which consist in first coating them with gelatine, next permitting the gelatine to set; and, lastly, subjecting them to pressure after the gelatine has set but before it has become dry and hard.

8. In combination with a tank or vat, a perforated board located above the same and adapted to hold apart pills or tablets to be coated; and a removable board or bottom beneath said perforated board, for releasing the pills or tablets and permitting them to fall into the tank or vat.

In witness whereof I hereunto set my hand in the presence of two witnesses.

SOLOMON E. HEINEMAN.

Witnesses:

DAVID E. HEINEMAN,

JOSEPH M. WEISS.