No. 724,436. PATENTED APR. 7, 1903.

E. C. CLARK.

PILL COATING MACHINE.

APPLICATION FILED JULY 15, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

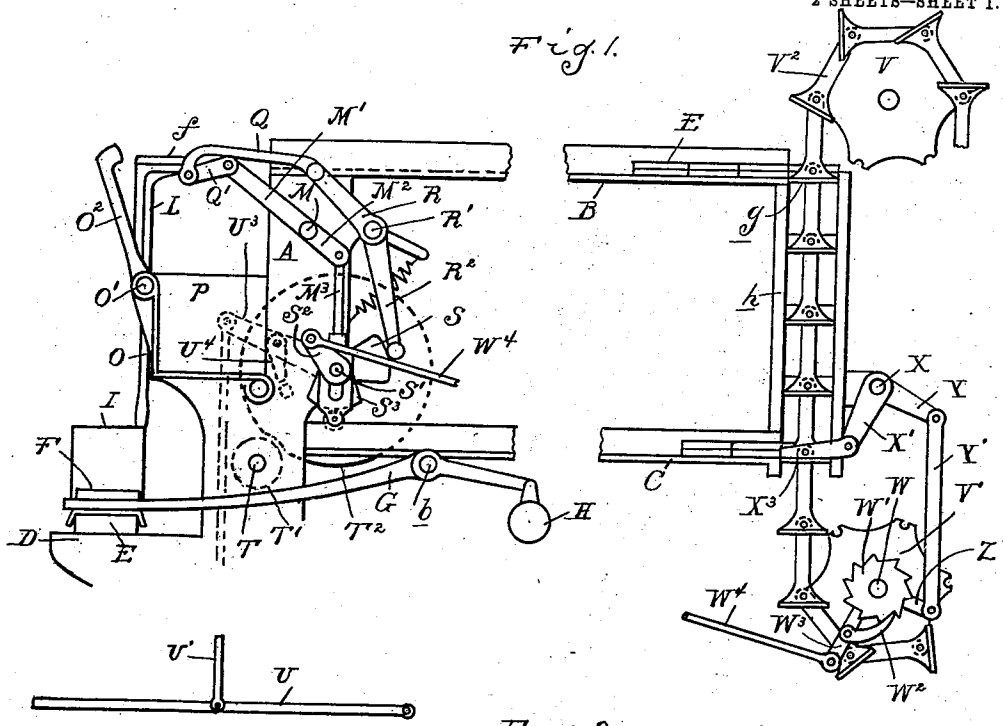
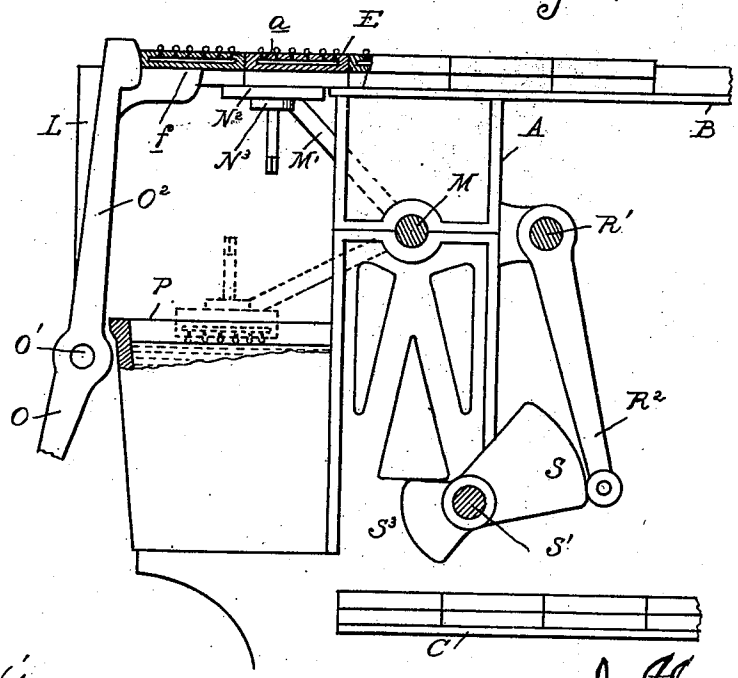


Fig. 2.



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NO MODEL. 2 SHEETS—SHEET 2.

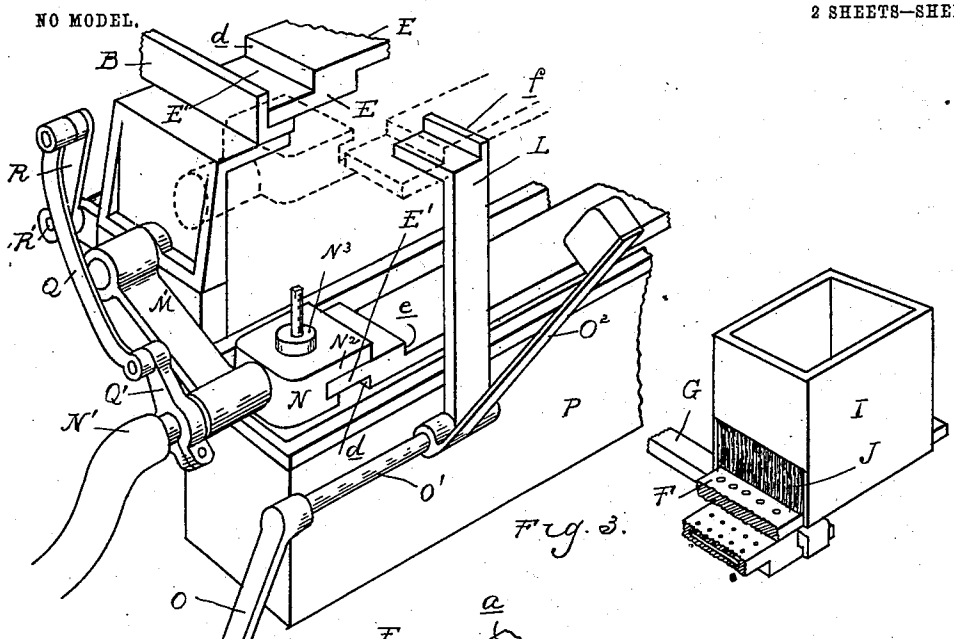


Fig. 3.

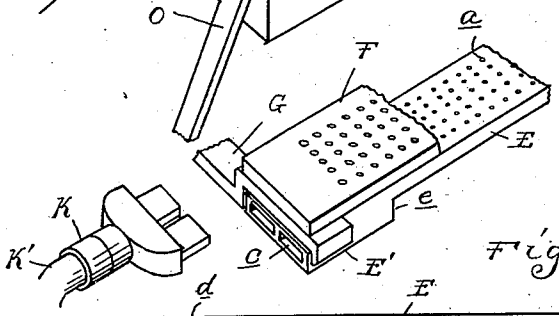
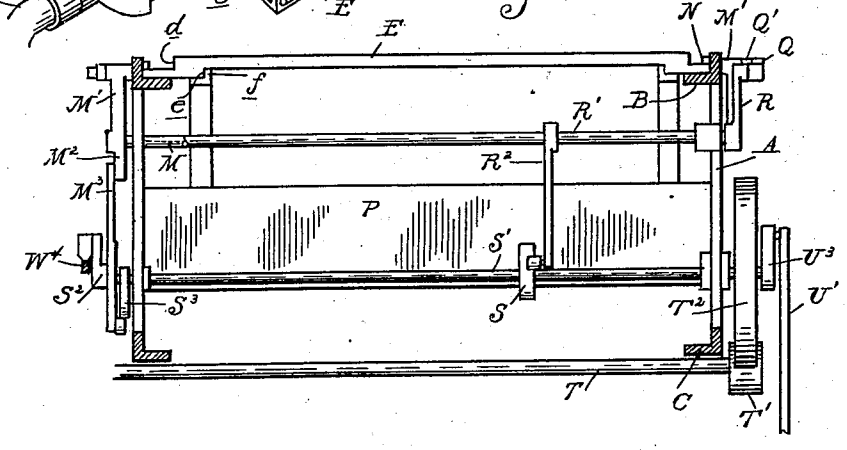


Fig. 4.



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UNITED STATES PATENT OFFICE.

ERNEST C. CLARK, OF DETROIT, MICHIGAN.

PILL-COATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 724,436, dated April 7, 1903.

Application filed July 15, 1902. Serial No. 115,658. (No model.)

To all whom it may concern:

Be it known that I, ERNEST C. CLARK, 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 Pill-Coating Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to pill-coating machines; and it is the object of the invention to obtain a construction in which the pills may be completely coated—that is, dipped on each side—before leaving the machine, the machine requiring the attendance of but a single operator.

In the present state of the art machines have been constructed comprising, essentially, a frame constituting a drying-rack having ways thereon on which the pill-bars are placed after the dipping operation and upon which they remain until the coating has set. At each end of this frame is arranged a dipping-vat, and in the use of the machine an operator is stationed at each vat. The operator at one end takes the uncoated pills, engages them with the bar or pneumatic holder, dips to coat one side of the pill, and then places the bar upon one of the ways of the frame. This operation is repeated, and each time a new bar is placed in the ways the whole series is moved forward. By the time the first bar has reached the opposite end of the machine the coating has set and the operator at that end engages the pills with a new bar, the uncoated portions being exposed. The pills are then again dipped and placed upon the other way, being successively fed along until they are returned to the starting-point.

The machine just described requires two attendants, and, moreover, the entire operation is performed by hand.

The invention consists in the peculiar construction of a machine in which the dipping of the pills is accomplished by automatic mechanism and in which the pill-bars fed upon the drying-rack are automatically returned, so that the coating of the opposite surface of the pills may be accomplished by the same operator.

The invention further consists in the peculiar construction, arrangement, and combination of parts, as hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of the machine, showing the opposite ends thereof, the central portion being broken away. Fig. 2 is a sectional elevation illustrating the manner of dipping the pills. Fig. 3 is a perspective view of the pill-dipping mechanism. Fig. 4 is a cross-section illustrating the operating mechanism.

A is a suitable framework. B represents ways arranged upon opposite sides and extending longitudinally of said frame at the upper end thereof.

C represents parallel ways arranged beneath the ways B.

At one end of the frame is a shelf D, upon which the pill-bars may be placed for filling. These pill-bars E consist of a hollow bar, upon one side of which are a series of perforations *a*, connecting with the hollow space within the bar. Each of these perforations constitutes a pill-holding socket adapted when the pill is registered therewith and when suction is applied to the space within the bar to hold said pill in position during the operation of dipping. The pills may be engaged with the sockets by any suitable construction of filler, such as shown, in which F is a bar similar to the pill-bars E, but having apertures therein of sufficient size to permit of the passage of the pills. These apertures are arranged to register with the perforations *a* in the pill-bar when the two bars are placed in juxtaposition. The filler-bar F is preferably connected to arms G, which are pivotally secured at *b* to the frame and are provided with a counterweight H for balancing the bar F. The latter is thus free to be swung up or down, so that the pill-bars may be placed upon the shelf D beneath the bars F, which may then be swung down to cover the same.

The uncoated pills are placed in a suitable hopper I, which, as shown, is arranged to slide longitudinally of the bar F and is provided with a brush J for sweeping the pills over said bar. In its normal position the hopper I is arranged at one end of the bar F, which is imperforate; but whenever one of the pill-bars E is placed in registration with

the bar F, said hopper I may be reciprocated, with the result that the apertures therein will be filled with pills.

For applying suction to the bars E one end has formed therein a socket *c*, with which a coupling K is adapted to be engaged. This coupling is connected with a flexible conduit K′, connecting with the suction apparatus. Thus whenever the coupling K is engaged with the socket *c* the suction is placed on the bar, which will hold the pills in registration with the perforations *a*.

Each pill-bar after being filled in the manner just described is disengaged from the filler-bar F by swinging the latter upward, after which the bar E is lifted by the operator and placed upon the support L. This support is arranged in alinement with the ways B and is preferably formed by a pair of separated standards. For holding the pill-bars E both when in registration with the filler-bar F and when upon the support L they are preferably formed as shown, being provided with the lateral offsets E′ at each end. These offsets form the oppositely-facing shoulders *d* and *e*, the former being adapted to fit against the arm G and the latter against the flange or shoulder *f* on the support L.

Intermediate the support L and the ways B is arranged the top frame, which is of the following construction:

M is a rock-shaft journaled in bearings upon the frame. M′ represents rock-arms extending from this shaft at opposite ends thereof, each of which arms has journaled therein a rotary head N. One of these heads is hollow and is connected through its trunnions with a flexible conduit N′, connected with the suction means. The head has also formed thereon a pair of guides or jaws N^2, with which the offset portion E′ of the pill-bar is adapted to be engaged. The hollow jaw has ports therein adapted to register with the ports *a* in the pill-bar when the latter is engaged therewith, and to control the air action with these ports a valve N^3 may be arranged in the head N.

With the construction just described the heads N are normally held in a position where the guides or jaws N^2 are in alinement with the opposite portion E of the pill-bar when resting upon the support L, so that when said pill-bar is moved rearward from said support it will be engaged with the jaws of said heads. This movement may be accomplished by a hand-lever O, connected to a rock-shaft O′ and provided with a pair of arms O^2, extending upward in adjacence to the bar E while supported upon the shelf L. Thus by moving the lever O the arms O^2 will be actuated to push the pill-bar off from its support and into engagement with the jaws.

Beneath the dipping-frame is arranged a tank P, containing the gelatin or other coating material. The liquid within this tank is kept in a fluid state by any suitable heating apparatus (not shown) and is also preferably kept in a state of agitation. The dipping is effected by the rocking of the shaft M, which will cause the arms M′ to carry downward the pill-bar in engagement with the jaws of the heads N, so as to dip the pills beneath the surface of the liquid in the tank. As the pills are upon the upper face of the bar when the dipping-frame is in its upper position, it is necessary to reverse the bar during its downward movement. This is accomplished through the medium of the links Q, connected to rock-arms Q′, secured to the trunnions of the heads N. These links Q are connected at opposite ends to rock-arms R, secured to a rock-shaft R′, journaled in bearings upon the frame.

R^2 is an arm upon the rock-shaft R′, which extends in operative relation to a cam S upon a shaft S′. This shaft is also journaled in bearings upon the frame and is provided at one end with a crank S^2. The rock-shaft M has secured thereto a rock-arm M^2, which is connected to a link M^3, extending into operative relation to a cam S^3 on the shaft S′. The cams S^3 and S are so formed and timed in relation to each other that whenever the shaft S′ is given a complete rotation the arms M′ will be rocked downward through the medium of the rock-arm M^2 and link M^3, and at the same time the links Q will be actuated, through the medium of the cam S, rock-arm R^2, shaft R′, and rock-arms R, so as to effect a partial rotation of the heads N in their bearing upon the rock-arms M′. The result is that by the time the pill-bar has reached a position for dipping it has been completely reversed, so that the pills will be immersed in the liquid. A further rotation of the shaft S′ will cause the reverse movement of parts, again raising the pill-bar and rotating it into its original position. The movements of the shaft S′ are controlled by any suitable construction of trip mechanism under the control of the operator, which when actuated will give one complete revolution of said shaft and will then arrest further movement thereof. As shown, this mechanism comprises a drive-shaft T, journaled in bearings and extending across the frame. Upon this shaft is arranged a small friction-wheel T′, adapted to engage with a larger friction-wheel T^2 upon the shaft S′. Normally the two wheels are out of engagement by means of a recess cut in the wheel T^2, which is arranged opposite the friction T′. So long as the wheel T^2 remains in this position no movement will be imparted thereto from the friction T′; but if the wheel T^2 is given a slight initial movement it will be thrown into contact with the friction T′ and will be driven through a complete revolution. This initial movement may be imparted through the medium of a trip-lever U, preferably operated by the foot of the attendant and connected by a link U′ with the

rock-arm U^3. This rock-arm carries a pawl or dog U^4 for engaging the wheel T^2 and imparting an initial movement thereto.

In the operation thus far described the pill-bar in engagement with the dipping-frame has been rocked to dip the pills and returned again to its initial position, and this movement has been effected by the mechanism just described, which is tripped by the lever U. During the interval while this movement is being performed the attendant may place a second bar in registration with the filler-plate F and repeat the operation previously described for engaging the pills. This second bar is then lifted and placed on the support L, after which it is shoved forward through the medium of the lever O and rock-arms O^2. The movement of this second bar will press the bar formerly in engagement with the jaws N^2 out of engagement therewith and onto the ways B. It is to be understood that before this operation can be performed it is necessary for the attendant to remove the coupler K from its engagement with the socket *c* in the bar E. This may be done without disengaging the pills, as the bar is supported and moved in a horizontal plane and as soon as it is pushed into engagement with the jaws N^2 the suction will again be applied. With each repetition of the operation the series of bars shoved upon the ways B will be advanced one step until finally the first bar will reach the opposite end of the frame. Here it will be moved into engagement with a transfer mechanism of the following construction:

V and V′ are pairs of sprocket-wheels arranged, respectively, above the ways B and below the ways C. V^2 represents chains passing around said sprockets, to which is connected a series of carrier-bars *g*. These bars are adapted to travel in vertical guides *h*, extending between the ways B and the ways C. The arrangement is such that whenever a bar E is pushed off from the ways B it will be engaged with one of the carriers *g*, and subsequently in the movement of the sprockets V and V′ said carrier will be lowered, so as to bring another carrier in alinement with the ways B. For actuating the sprockets V and V′ and chains V^2 the sprockets V′ are mounted upon a shaft W, and W′ is a ratchet-wheel upon this shaft, with which a pawl W^2 on a rock-arm W^3 is adapted to engage. The rock-arm W^3 is connected by a rod W^4 with the crank S^2 on the shaft S′. Thus with each rotation of the shaft S′ the crank S^2 will reciprocate the rod W^4, actuating the rock-arm W^3 and pawl W^2, so as to rotate the shaft W and turn the sprockets thereon. The parts are adjusted so that the amount of movement imparted to the shaft is just sufficient to move another carrier *g* into alinement with the ways B.

In the successive actuation imparted to the transfer mechanism the pill-bar E first engaged therewith will be brought into alinement with the lower ways C. When in this position, it will be disengaged from the carriers and moved onto the ways C by mechanism of the following construction:

X is a rock-shaft journaled in bearings on the frame. X′ represents rock-arms secured thereto, and X^3 pawls connected with said rock-arms and adapted to engage with the pill-bars when in registration with the ways C. The rock-shaft X is actuated through the medium of a rock-arm Y thereon, connected by a link Y′ with a rock-arm Z on the shaft W. Thus whenever the shaft W is actuated by the mechanism before described the pawls X^3 will be moved to press the pill-bar off from the carrier *g* onto the ways C and to advance the bars previously fed onto said way one step. It will be understood from the description given that the bars will be finally returned to the front end of the machine, and by the time this is accomplished the coating of the pills will be sufficiently dry to permit of coating the opposite side. As soon as the bar containing the pills first coated has been thus returned the operator transfers the pills thereon to another bar. This bar is then placed in engagement with the dipping-frame and the operation repeated to coat the opposite side of the pills. The transferring is continued until the entire series of bars has been fed around. The operator may then fill the bars with uncoated pills and so continue the operation indefinitely.

What I claim as my invention is—

1. The combination of a frame, separated outgoing and return ways extending across the frame, a transfer mechanism at one end of the ways, pill-bars adapted to move along the ways and mechanism for moving the pill-bars along the outgoing way, transferring it to the return-way and moving it along the return-way.

2. The combination of a frame, a dipping-tank, a way from the tank and a return-way to the tank, a dipping-frame at the tank, pill-bars adapted to slide on the ways, and mechanism for feeding said pill-bars along the ways away from and back to the tank.

3. The combination of a frame, a dipping-frame at one end, separated outgoing and return ways on the frame, pill-bars adapted to the ways, and mechanism for feeding the pill-bars from the dipping-frame along the outgoing way, mechanism for transferring it to the return-way, and for moving it therealong.

4. The combination of the frame, outgoing and return ways from one point therein, pill-bars adapted to move on the ways, and mechanism for feeding the pill-bars along said ways away from and back to starting-point.

5. The combination with the tank and the dipping-frame, of pill-bars adapted to be detachably engaged with the dipping-frame, mechanism for feeding the pill-bar out of the dipping-frame onto a drying-frame, a way onto

which the pill-bar is fed, and along which it is actuated away from and back to the dipping-frame.

6. The combination of the frame, separated outgoing and return ways, to and from the dipping-frame, the pill-bars, the dipping frame and tank, and operator-controlled devices for feeding the pill-bars from the dipping-frame and along the outgoing way and back on the return-way.

7. In a pill-dipping machine, the combination of the pill-bars of a way for the pill-bars, a dipping-frame having holders opening in line with the way, means for lowering and reversing the pill-bars while held by the dipping-frame, and means for feeding the dipped pill-bars along the way.

8. In a pill-dipping machine a dipping-frame comprising rock-arms, rotary pill-bar jaws thereon, means for rocking the arms, and means for turning the jaws during the movement of the rock-arms.

9. In a pill-dipping machine, a dipping-frame, comprising a rock-shaft, rock-arms thereon, pill-bar jaws on the rock-arms, and means for turning said jaws during the movement of the rock-arms.

10. In a pill-dipping machine the combination of a frame, rock-arms, pill-bar jaws journaled therein, means for rocking the rock-arms, a lever device connected to the jaws, and means for actuating the lever device to reversely turn the jaws in the up-and-down movement thereof.

11. In a pill-dipping machine, the combination of a frame, rock-arms, pill-bar jaws journaled therein, means for rocking the rock-arms, a lever device connected to the jaws to reversely turn them in the up-and-down movement thereof, and a cam for actuating said lever device.

12. In a pill-dipping machine, the combination of a tank, pill-bars, a way for the pill-bars from the tank, and a return-way thereto, of mechanism returning the pill-bars along said way.

13. In a pill-dipping machine, the combination of a tank, pill-bars, a way for the pill-bars leading from and returning to the tank, and mechanism under the control of the operator for returning said pill-bars to the tank along the return-way.

14. In a pill-dipping machine, the combination of a frame, of two separated ways thereon leading from and returning to the same point, of a transfer-carrier between the two ways, the pill-bars adapted to move on the ways, and mechanism for actuating said transfer, and for moving the bars along the return-way.

15. In a pill-dipping machine, the combination of the frame, the outgoing and return ways thereon, an endless intermittently-actuated carrier forming a transfer device between the ways, and a coöperating push-bar for feeding the pill-bars from the carrier onto the return-way.

16. In a pill-dipping machine, the combination of the frame, the outgoing and return ways thereon, the pill-bars adapted to move on the ways, a transfer device at one end of the ways, a dipping-frame at the other end, a push-bar for moving the bars from the dipping-frame onto and along the outgoing way, a push-bar for moving the bars from the transfer device to and along the return-way, and actuating mechanism for the transfer and said last-named push-bar.

In testimony whereof I affix my signature in presence of two witnesses.

ERNEST C. CLARK.

Witnesses:
H. C. SMITH,
A. G. ROBERTSON.