

July 7, 1964

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3,139,713

PILL COUNTING AND FILLING MECHANISM

Filed March 5, 1962

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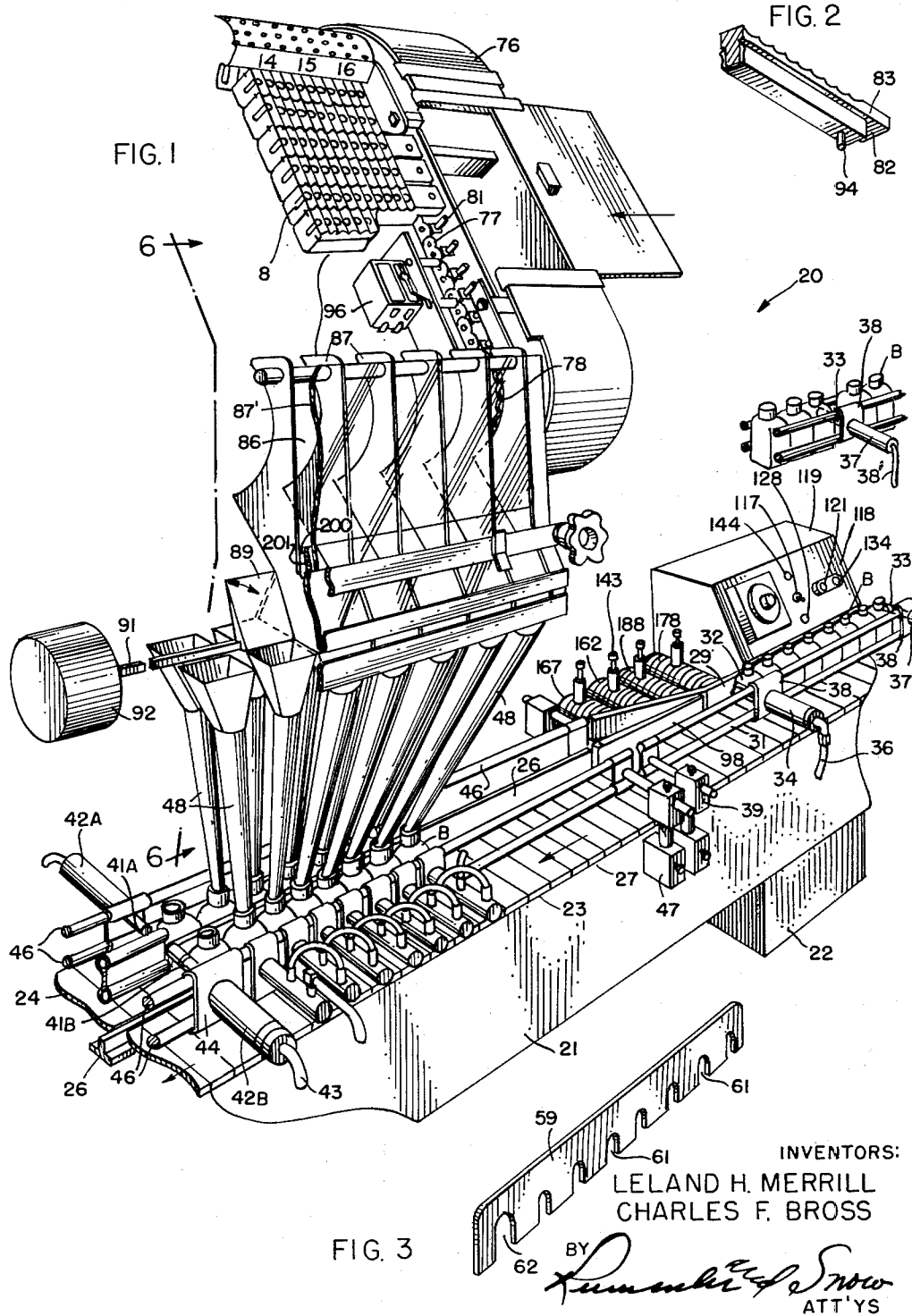


FIG. 2

FIG. 1

FIG. 3

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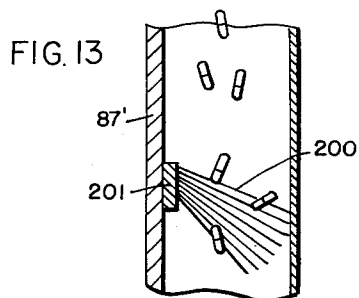
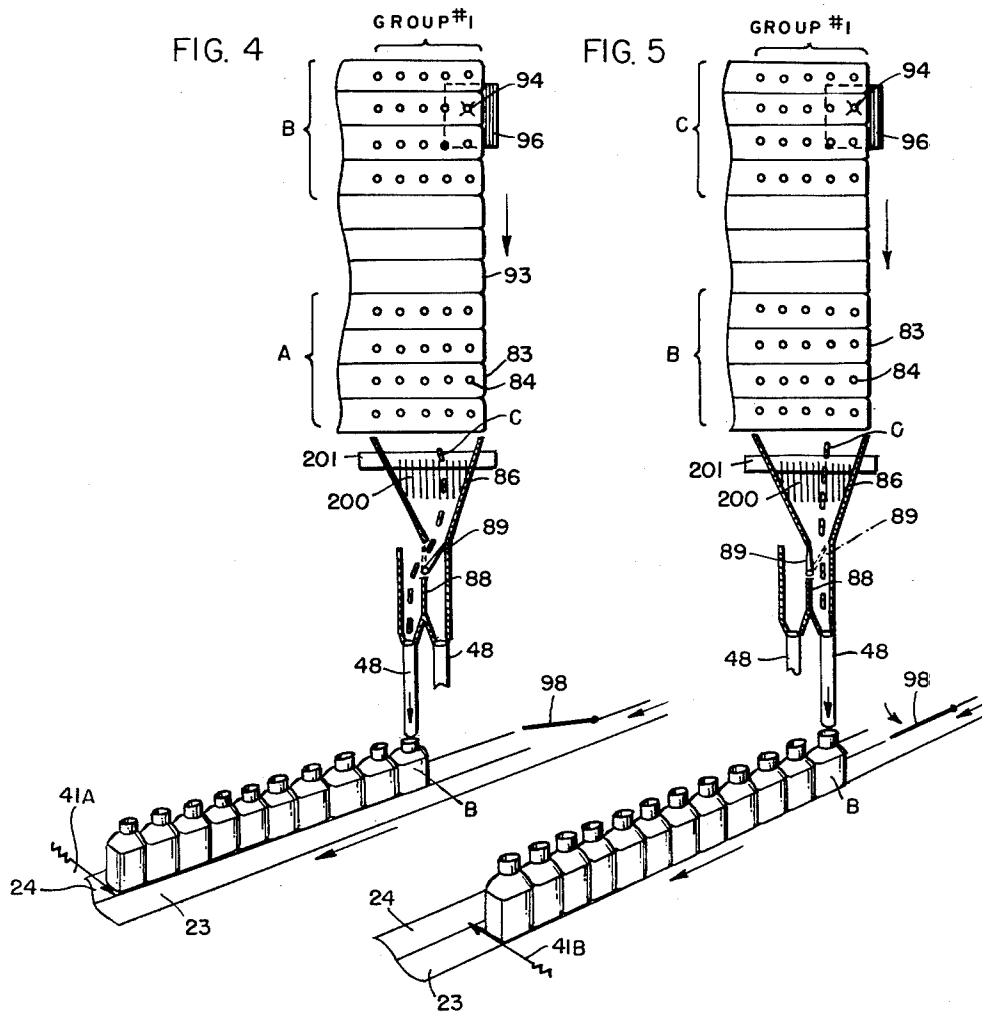
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5 Sheets-Sheet 2



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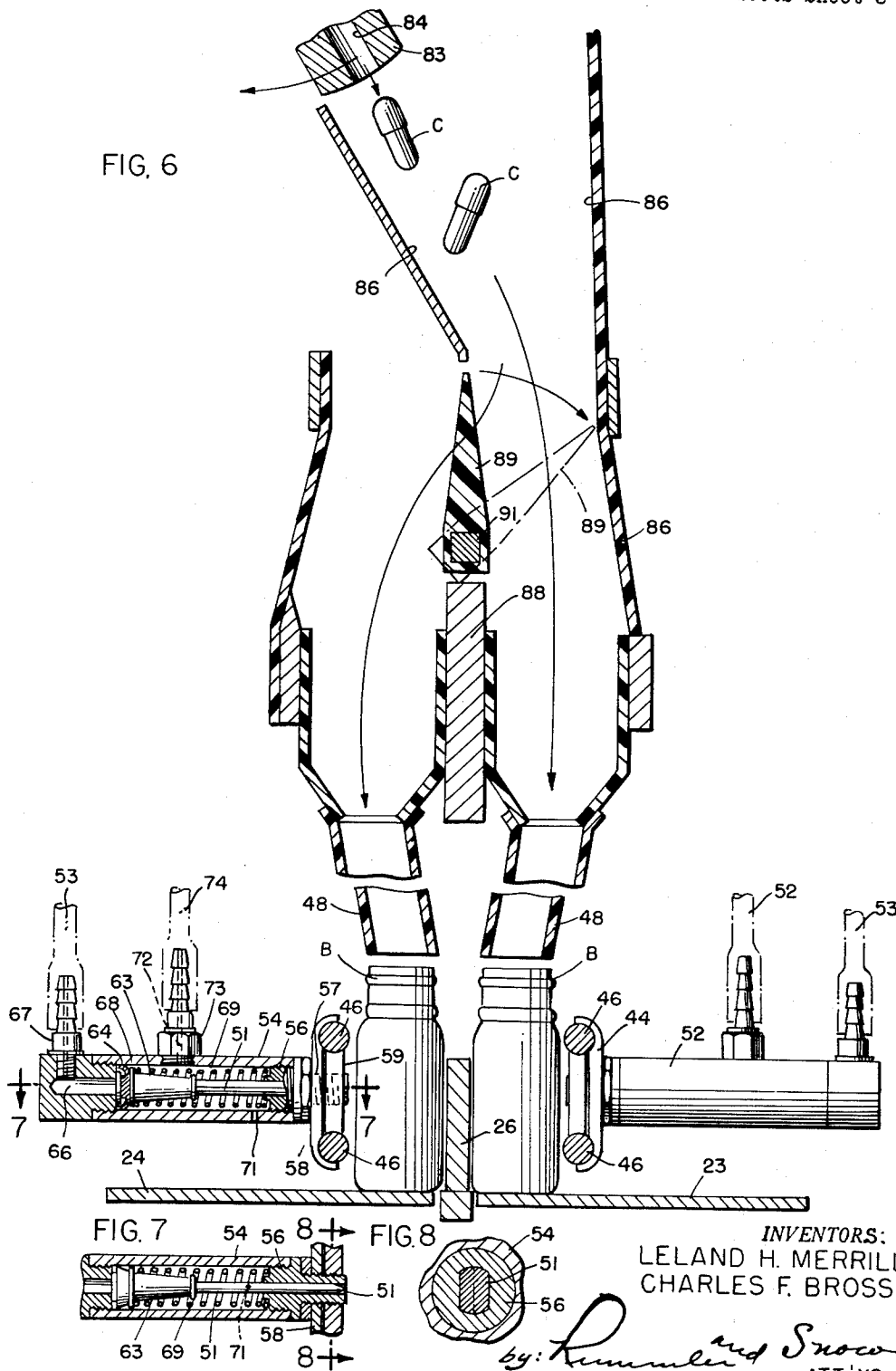
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FIG. 6



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PILL COUNTING AND FILLING MECHANISM

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FIG. 9

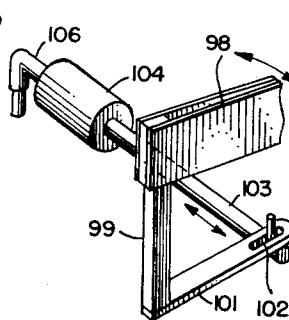
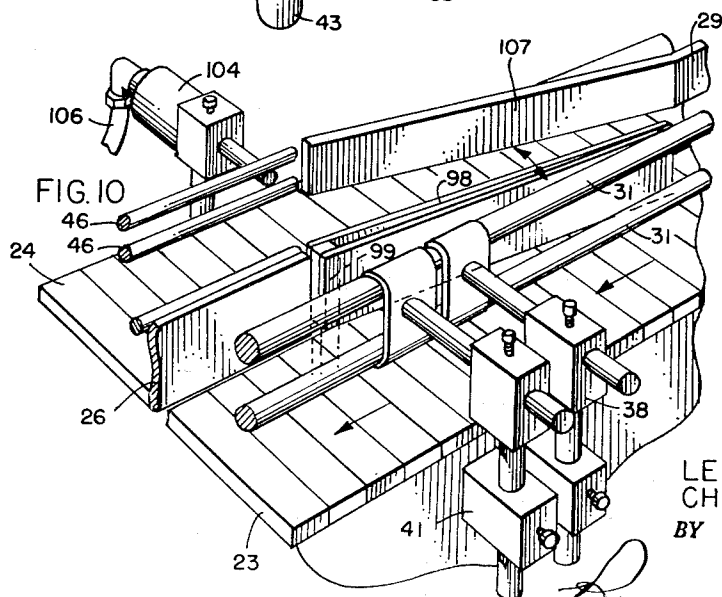
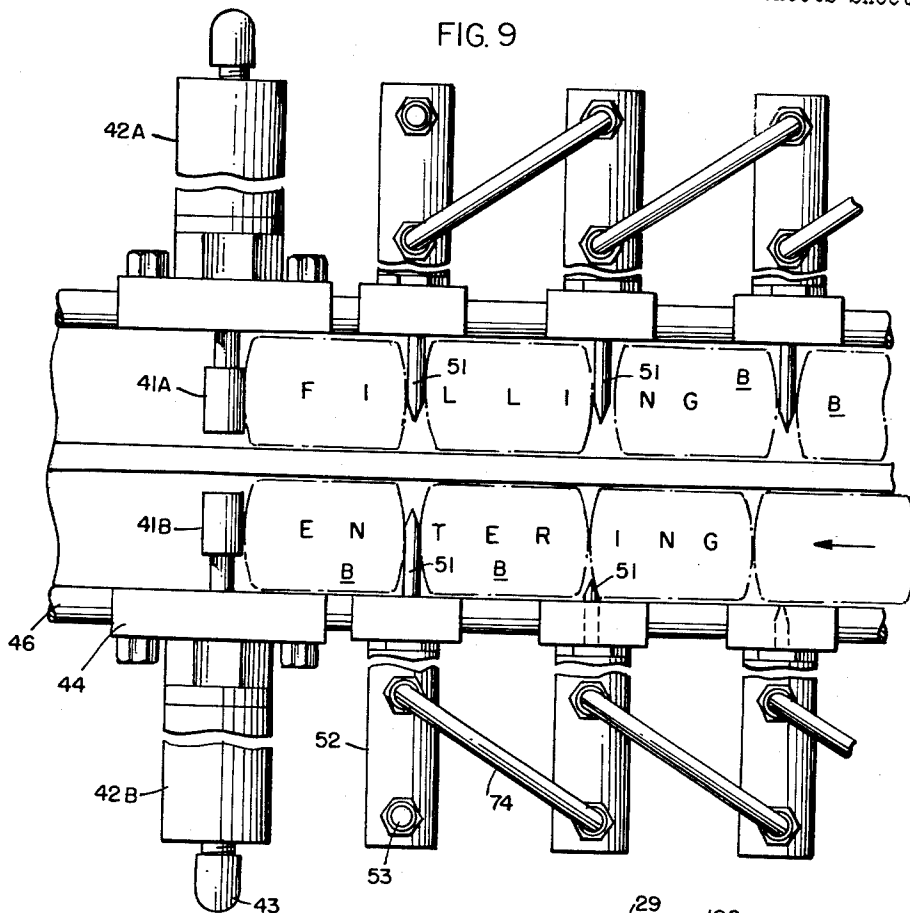


FIG. 11

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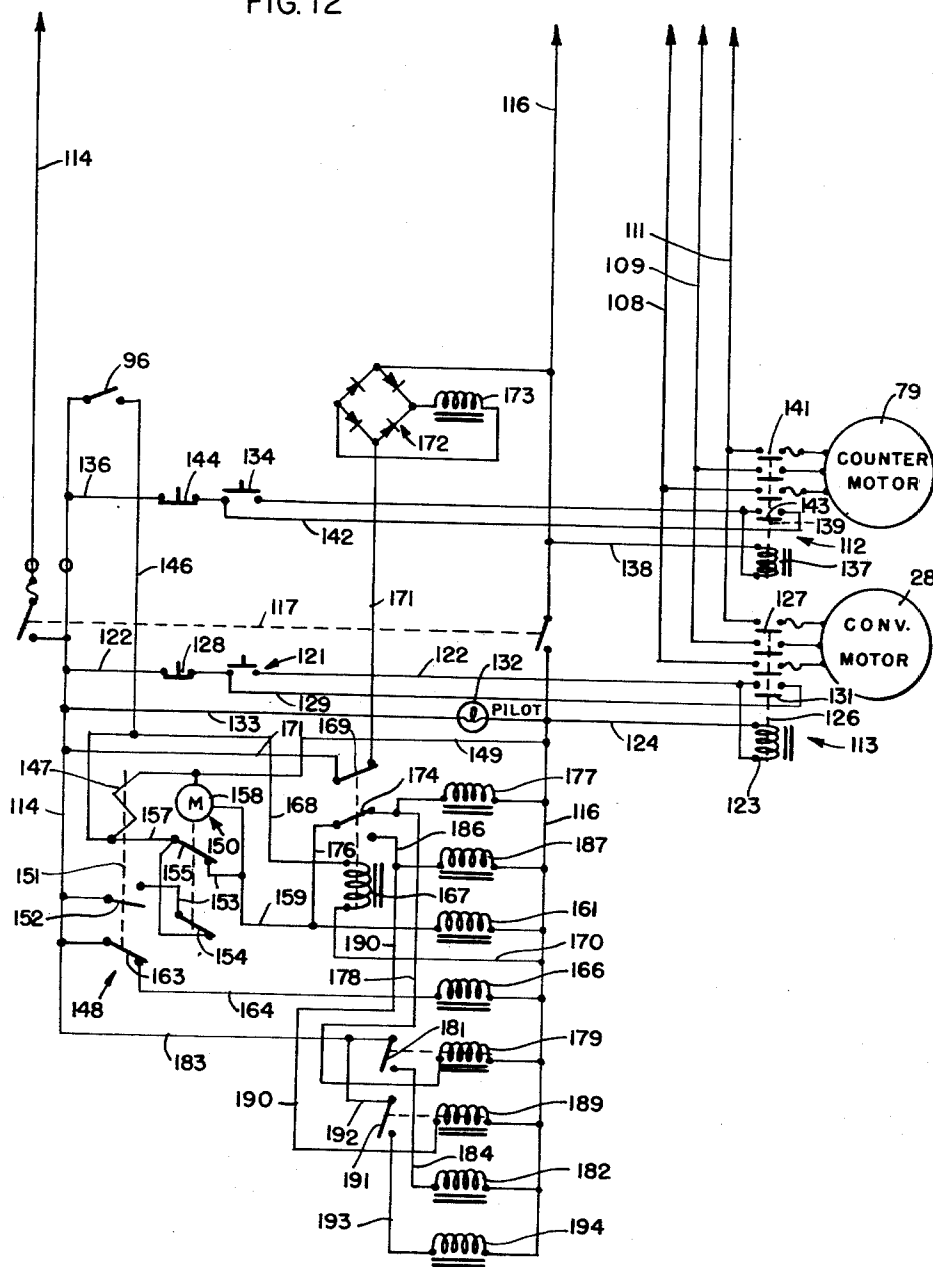
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PILL COUNTING AND FILLING MECHANISM

Filed March 5, 1962

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FIG. 12



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3,139,713

PILL COUNTING AND FILLING MECHANISM
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Filed Mar. 5, 1962, Ser. No. 177,409
4 Claims. (Cl. 53—55)

This invention relates to machines for counting pills or capsules, and filling the proper count into each of a number of bottles brought to a stationary position at a filling station.

The machine according to the present invention is characterized by an endless conveyor comprised of capsule receiving flights adapted to discharge into side by side chutes having discharge tubes in turn discharging to a suitable receptacle such as a pill bottle or the like. Each of the flights is of a length so its contents can be suitably divided and so that each flight delivers the same amount to each chute. The given number of filled flights will thus load each bottle with a desired number of pills or articles.

In order that there be no waiting period for the removal of a filled group of bottles, and the subsequent positioning of a succeeding group of bottles to be filled, the bottles are diverted by a diverter gate acting along a common endless conveyor for the bottles, so that a group of bottles can be diverted to positions beneath another group of filler tubes connected to the discharge chute, one such group awaiting filling, while the other group is being filled and subsequently removed after the filling operation, a new group being moved by the conveyor into the position of the removed group while the first group is being filled.

One row of bottles is thus in position to receive the counted articles, and the other row of bottles awaits its filling, and a diverter gate is accordingly provided at the discharge chute which determines the path or flow of the articles into the filler tubes for the row of bottles being filled.

Since the bottles vary in their outside dimension structure is provided for accurately centering the bottle beneath its filler tube prior to the filling thereof. The centering devices together with a stop finger act also to hold the bottles in position as the conveyor reach slides beneath the bottles.

The flights carrying the pills are arranged to control switch means which control the diverter gate at the discharge chutes, the diverter gate along the bottle conveying reach, the positioning devices for the bottles at the filler tubes, and a stop along the conveyor reach together with a stop measuring off the number of bottles to be filled at the filler tubes.

With the foregoing considerations in mind, it is a principal object of this invention to provide an improved pill or article counting machine adapted to fill a large number of bottles in a single operation, and to fill a second number of bottles all without any time lag between the two filling operations.

Another object is to provide mechanism for filling bottles with a counted number of articles, and to move both the filled and the unfilled bottles along a common conveyor.

Still another object is to fill a row of bottles while in stationary proper filling position along one side of a conveyor reach, and to move another group of bottles into filling position to another side of the conveyor or reach, the bottles being counted at an inby end of the conveying reach and then being released to move to one or the other side of the reach by a diverting structure interposed between the counting position of the bottles and the filling position thereof.

Yet another object is to provide structure according to the previous object in which the filled bottles will move

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out of position, and the other row of bottles will be filled, while a new group of bottles moves into position for filling.

A further object is to provide structure which will fill a row of bottles of predetermined number, each with a proper count of articles, and to provide control structure which will insure a proper number of properly spaced bottles and filler tubes for each row.

Other objects and important features of the invention will be apparent from a study of the following specification taken with the drawings, which together describe and illustrate a preferred embodiment of the invention, and what is now considered to be the best mode of practicing the principles thereof. Other embodiments may be suggested to those having the benefit of the teachings herein and such other embodiments are intended to be reserved especially as they fall within the scope and spirit of the subjoined claims.

In the drawings:

FIGURE 1 is a perspective view showing a pill counting and filling machine having the improvements according to the present invention embodied therein;

FIG. 2 is a perspective view of a typical flight for conveying a number of articles to be counted and filled by the apparatus according to the invention, said flight showing switch actuating mechanism on the bottom side thereof for determining the sequence of bottle filling operations;

FIG. 3 is a perspective view showing a guide for determining the even spacing of the bottles while in the bottle filling position;

FIG. 4 is a schematic perspective view showing the manner in which the flight conveyors for the pills or articles cooperate with a switching mechanism to control the position of structure controlling the diverting of both the rows of bottles and the flow of articles into a proper discharge tube for the filling of a row of bottles;

FIG. 5 is a view similar to FIG. 4, but showing the diverter structure shifted to another position so as to fill the bottles of a second row;

FIG. 6 is a sectional view looking substantially in the direction of the arrows 6—6 of FIG. 1, showing details of the discharge chute, a diverter gate for the filler tubes for the bottles, together with the structure for holding a row of bottles in position while being filled, certain parts being shown in side elevation;

FIG. 7 is a view taken substantially along the line 7—7 of FIG. 6, looking in the direction of the arrows, showing details of mechanism for properly spacing the bottles at the filler tubes;

FIG. 8 is a transverse section taken along the line 8—8 of FIG. 7, looking in the direction of the arrows;

FIG. 9 is a plan view showing a pair of rows of bottles, one in the filling position and the other in the entering position, together with structure for maintaining the bottles in their proper spaced relationship for filling;

FIG. 10 is a perspective view showing structure for diverting a row of counted bottles so that such row of counted bottles takes one or the other side of a conveying reach for movement to a filling position;

FIG. 11 is a detailed perspective view showing parts of the diverting structure of FIG. 10;

FIG. 12 is a circuit diagram showing circuitry for controlling the apparatus seen in FIGS. 1 to 11 inclusive, and

FIG. 13 is a detailed fragmentary view of the structure for breaking the fall of the capsules and/or tablets as they fall downwardly from the flights.

Referring now particularly to FIG. 1 of the drawings, the improved pill counting and filling mechanism according to the present invention is referred to generally by the reference numeral 20, and includes a frame 21 resting upon spaced legs 22, only one such leg being seen.

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The frame 21 affords a support for side by side conveying reaches 23 and 24, these being separated by a central guide 26 supported by the frame 21. The conveying reaches 23 and 24 are each formed of individual flights 27 which are secured to endless conveyor chains, not shown, and driven by a conveyor motor 28, see FIG. 12. The chains for driving the conveyor reaches 23 and 24 are reversed in direction at opposite ends of the frame 21 and are reeved about sprockets, not shown. In lieu of side by side conveying reaches 23 and 24, as shown, there may be provided but one such reach, as will be evident as this specification proceeds.

Bottles B to be filled are first counted, and are guided between a rail 29 and a pair of rails 31 spaced from rail 29 and lying in a common vertical plane at the inby or upstream end of the conveyor reaches 23 and 24. A stop finger 32 holds a numbered group of bottles B in position reach to move with the conveying reaches 23 and 24 upon withdrawal of finger 32, the reaches 23 and 24 sliding beneath the bottles B while they are held in position by the stop finger 32. A second stop finger 33 holds back a number of bottles which are to be counted, and subsequently adapted to be held by the counting stop finger 32.

Stop finger 32 is moved to the extended position by means of an air operated motor 34 supplied by a hose 36 with air from any suitable source. Motor 34 is held to the vertical rails 31 by a yoke 28 embracing the same and forming part of air motor 34.

A stop finger 33 is actuated by means of an air operated motor 37 supplied with air under pressure by a supply line 38'. Motor 37 is held to the vertical rails 31 by a similar yoke 38. The guide rails 31 are held in position by means of a series of adjusting frames 39 held to the main support frame 21. The frames 39 may be manually adjusted individually or mechanically all at one time as would be obvious.

Upon release of the stop finger 32, the counted bottles B move by means of a conveying reach 23 into a filling position against a stop finger 41A or 41B which is actuated by a corresponding air operated motor 42A or 42B, supplied with air by a supply hose 43. The stop motors 42A and 42B are identical and each includes a yoke 44 at one end thereof which embraces a pair of rails 46, 46 co-extending with rails 31, 31 and extending along the conveying reach 23. Rails 46, 46 are supported in position adjustably by a support structure 47 similar to the structure 39 previously described.

The bottles B are adjusted in their position so as to be properly centered with respect to a plurality of evenly spaced filler tubes 48, and each bottle B is properly adjusted in position with respect to its filler tube 48 by means of spacing pins 51 which interdigitate with the bottles B as seen more clearly in FIG. 9. Each of the spacing pins 51 is moved to the operative position seen in FIG. 9 by means of an air operated motor 52. Motors 52 are connected in cascade so that the pins 51 extending therefrom interdigitate with the several bottles B in a sequential fashion. As seen in FIG. 9, the first of the cylinders 52 reading from left to right is connected by a fitting 53 to a source of compressed air, to move the pin 51 of the first of such motors to an operative position, and the pin 51 of each succeeding motor 52 in cascade fashion, as will now be described.

Referring now particularly to FIGS. 6 to 9 of the drawings, each of the motors 52 comprises an open end cylinder 54 which is closed at one end by a guide 56 for the spacer pin 51. The guide 56 is threaded into cylinder 54 and has a threaded extension 57 which is threaded into the yoke 58 straddling the two guide rails 46, 46. A spacer plate 59, see FIG. 3, maintained in position between the two guide rails 46, 46 has open end slots 61 which properly space the motors 52. Spacer plate 59 also has an open end slot 62 determining the proper

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spacing of stop air motor 42A and 42B with respect to the first space air motor 52.

Spacer pin 51 is threaded into a retainer 63 for packing cup 64 to urge the retainer 63 and the spacer pin 51 to the right. An end closure 66 for the spacer finger motor 52 has an intersecting passageway therein, and a nipple 67 is attached to the end closure 66 to provide a point of attachment for the air supply hose 53.

The retainer 63 has a shoulder 68 thereon and a spring 69 is biased between the shoulder 68 and end closure 56 for the opposite end of the cylinder 54. The pressure against the packing 64 causes the spacer pin 51 to move to the right against the bias of spring 69, and the air is relieved from in front of the packing 64 by means of a bleed hole 71 in the wall of cylinder 54.

The motors 52 are connected in cascade relationship as seen more clearly in FIG. 9, and when the packing 64 moves past a port 72 of a fitting 73 air is admitted under pressure to the next motor 52 so as to move its spacer rod 51 to interdigitating relationship with the bottles B, the air being connected through all the previous motors to the next motor 52 by means of an air hose 74 connected to a fitting 73 which is threaded into the side wall of the cylinder 54. Air hose 74, in the case of the succeeding motors 52, is connected to the nipple 67 of such succeeding motors.

Referring again to FIGS. 1 and 9 of the drawings, a row of bottles has entered the proper filling position as seen in FIG. 9, each of the bottles B being spaced by the spacing fingers 51 previously referred to, and being adapted to be filled with a proper count of small articles such as pills.

Structure for providing the proper count to each of the bottles when positioned as seen in FIG. 9 comprises a frame 76 disposed in overlying relationship to the conveyor reaches 23 and 24. Frame 76 affords a support for a pair of laterally spaced endless conveyor chains 77, one such conveyor chain only being shown in FIG. 1. The conveyor chains 77 are reeved between a chain sprocket 78, one such pulley being seen in FIG. 1. Chain sprocket 78, which is the driving sprocket, is driven by a counter motor 79, see FIG. 12.

The two spaced endless chains 77 are each provided with lug pins 81 which are engaged in corresponding apertures 82 at each end of the article carrying flight 83, see particularly FIG. 2. Each of the flights 83 is provided with a plurality of article carrying pockets 84 therein, see also FIGS. 2 and 6, each of the pockets 84 being adapted to discharge its contents such as capsules or pills C, seen in FIG. 6, to a discharge chute 86.

A suitable hopper (not here shown) for receiving bulk quantities of capsules C, would be arranged on the frame 76 where the conveyor chains 77 move the flights 83 through their upper arc. The hopper would have a discharge slot disposed longitudinally of the flights 82 for a gravity feeding of the capsules to the pockets 84.

As seen in FIG. 1, the discharge chute 86 is divided into a number of discharge compartments corresponding to the number of bottles B being filled at filling operation, and partitions 87 thus divide the discharge chute into such corresponding number. As seen in FIGS. 4 to 6 of the drawings, each such discharge chute is divided into two parts by means of a central wall 88 which supports the side-by-side filler tubes 48, 48 one row of such filler tubes 48 being adapted to fill the row of bottles held in position along the conveyor reach 24, and the other row of such filler tubes 48 being adapted to fill the row of bottles held in position along the conveyor reach 23. A clear plastic plate 87' is secured to the forward edges of the divider plates 87 to prevent the tablets or capsules from accidentally falling out of the chambers.

In the embodiment of the invention herein each of the bottles B is adapted to be filled with one-hundred pills

or articles, and the flights 83 are each provided with 40 such article holding cavities 84. There being eight discharge chutes 86, each discharge chute is adapted to receive five of the articles from the pocket when the flight 83 reaches the discharge position seen in FIG. 6, and in order to fill each bottle with 100 articles or capsules C, there are provided twenty article carrying flights for the filling operation of a row of bottles in the filling position seen in FIG. 9.

In order to fill the bottles of the other row when the bottles B of such row have been stopped and have been properly spaced, such bottles being marked in the "entering" position, as seen in FIG. 9, structure is provided for diverting the articles C to the other of the group of side-by-side filling tubes 48. As seen in FIGS. 1 and 6 particularly, a diverter gate 89 is mounted fast on a shaft 91, which is rocked by a rotary solenoid 92 as seen in FIG. 1. The diverter gate 89 first occupies the full line position seen in FIG. 6, so that the capsules C fall by gravity into the right hand row of filler tubes 48, to be deposited into the row of bottles B in such right hand row as seen in FIG. 6. Upon energization of the solenoid 92 the diverter gate 89 is pivoted to the dotted line position seen in FIG. 6, so that the capsules C fall into the left hand row of filler tubes 48, the capsules ultimately dropping into the left hand row of bottles B as seen in FIG. 6.

Referring now to FIGS. 4 and 5 of the drawings, a group of flights are shown as discharging their capsules C so as to fall into the left hand group of bottles B seen in FIGS. 1 and 6, and filling of these capsules from group A of the flights ceases upon the occurrence of non-article carrying flights 93.

The next group of article carrying flights which are marked B are then arranged to drop their capsules C into the right hand row of bottles B as seen in FIGS. 6 and 9, such bottles B of the right hand row adopting proper positions which respect to their filler tubes 48 by means of spacer pins 51 as previously described.

In the embodiment according to the present invention circuitry is provided for controlling, among other things, the position of the diverter gate 89 so that it will in the case of the capsules in group B adopt a vertical position as seen in FIGS. 5 and 6. In the embodiment according to the present invention a selected one of the flights 83 is provided with an actuator 94 which controls the actuation of a control switch 96, see FIGS. 1 and 12, which through circuitry controls the actuation of the rotary solenoid 92 and the position of the gate 89. Such actuation of the control switch may take place at a time taking in account the time lag necessary for the actuation of various devices as will be described and in such a fashion that all of the contents of flights in group A will have been discharged into the bottles B prior to the actuating of the diverter gate 89 to the opposite position.

Referring now to FIG. 5, there is shown the last of the group of flights 83 of group B which are filling the bottles of the right hand row of bottles seen in FIG. 6, the gate 89 being in the vertical position and being adapted by the control switch 96 and the actuator pin 94 of a successive group of flights C to move the diverter gate 89 to the dotted line position so as to divert the capsule C into the other row of discharge tubes 48.

Structure is provided for diverting a counted row of bottles on to the conveyor reach 23 so that the left hand row of bottles seen in FIG. 6 can be filled, and so that the counted row of bottles moves along the conveyor reach 23 to the filling positions seen in FIGS. 6 and 9. As seen particularly in FIGS. 10 and 11, such diverter structure for causing the bottles to move along the conveyor reaches 23 and 24 includes a diverter gate 98 which is fast on a vertical shaft 99 suitably journaled in an opening not seen in the frame 21 supporting the conveying reaches 23 and 24. An arm 101 is fast to the lower end of the shaft 99 supporting the diverter gate 98 and has a sliding link connection 102 with a piston rod 103

of a diverter gate operating motor 104 supplied with air under pressure by a supply tube 106.

The diverter gate 98 is able to adopt the position as seen in FIG. 1 at which time the counted row of bottles B move along conveying reach 23 to the filling position for the right hand row of bottles as seen in FIG. 6. When the motor 104 is actuated, the gate 98 is moved to the position seen in FIG. 10, against the rails 31 at which time the bottles are diverted on to conveyor reach 24, between an extension 107 from rail 29 and co-extensive with the guide rails 46, 46 for the conveyor reach 24, the bottles moving along the conveyor reach 24 finally adopting the left hand filling position as seen in FIG. 6.

The structure thus far described together with circuitry now to be described performs the following functions upon the bottles B so that they can move to a filling position, and be filled and removed therefrom all in a continuous operation. For purposes of description at this point a counted row of bottles is held by the stop finger 32 of the air motor 34, and assuming the diverter gate 98 is in the position seen in FIG. 1, a counted number of bottles moves on the conveying reach 23 to a position against the stop finger 41B of the air operated motor 42B. At such time the cascade operated spacing motors 52 come into operation to space the bottles properly as seen in the lower row of such bottles in FIG. 9. When the bottles are properly spaced the loaded flights 83 discharge their contents into the filler tubes 48 for the right hand row of bottles, the magazine diverter gate 89 occupying the solid line position shown in FIG. 9. During the filling operation for the right hand row of bottles B, the stop finger 32 moves to the extended position to stop a counted group of bottles for the other row of filler tubes 48. By reason of the actuation of the switch 96, the diverter gate 98 is moved to the position seen in FIG. 10, and the newly counted row of bottles is adapted to move along the conveyor reach 24 into position beneath the left hand row of discharge tubes 48 seen in FIG. 6 against the stop finger 41A of the stop motor 42A therefor, the spacing fingers 51 moving into position as for the right hand row of bottles B.

The proper number of articles having been deposited in the right hand row of bottles seen in FIG. 9, and the left hand row of bottles being ready for filling, the same switch 96, by circuitry as will be described, moves the magazine diverter gate 89 to the dotted line position seen in FIG. 6, at which time the left hand row of bottles commences their filling operation.

Meanwhile, the right hand row of bottles, which are now filled, then moves to a packing or loading position along the conveyor reach 23, the spacing fingers 51 and the stop finger 41B for such row of bottles being first retracted.

The sequence of operations described is under control of a circuit best seen with respect to FIG. 12 comprising three-phase leads 108, 109 and 111, providing power to the counter conveying motor 79 and the conveyor motor 28 through starter devices indicated respectively by reference numbers 112 and 113. The control power for the motors 79 and 28 and for the other elements of the structure according to the present invention is supplied by single phase power leads 114 and 116 having a master switch 117 connected thereacross. Master switch 117 is mounted on a front panel 118 of a control box 119 seen in FIG. 1. The conveyor motor 28 is started by a start switch 121 connected in a line 122 having a start coil 123 for the starter device 113 connected therein and a line 124 connected from coil 123 to the other supply lead 116. The energization of the starter coil 123 actuates an armature 126 having contacts 127 closing the circuit to the conveyor motor 28.

Conveyor motor 28 is stopped by a normally closed stop switch 128 connected in series with the line 122 and between the supply lead 114 and the start switch 121,

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which is normally opened. The starter winding 123 is maintained in an energized state while start switch 121 is released by means of a holding circuit including supply lead 114, lead 122, normally closed stop switch 128, a lead 129, a holding contact 131 of the starter 113, the winding 123 and the lead 124 connected to the opposite supply lead 116.

The energization of the conveying motor 28 is indicated by a pilot light 132 connected in series with a lead 133 and across the two control leads 114 and 116.

The counter motor 79 for driving the conveyor chains 77 and the flights 83 is energized by a normally opened stop switch 134 connected in series with a lead 136 in turn connected to the supply lead 114 and a winding 137 of starter 112 for the counter motor 79, the circuit being completed through the starting winding 137 by means of a lead 138 connected to the opposite control lead 116. The starter coil 137 operates an armature 139 to close contacts 141 controlling the supply of power to the counter motor 79 by the leads 108, 109 and 111.

The starting switch 134 is but momentarily closed and a holding circuit for the starting coil 127 comprises a lead 142, the holding contact 143, the starter coil 137 and thence by the lead 138 to the opposite control lead 116. A normally closed stop switch 144 is interposed between the control lead 114 and the start switch 134 to stop the counter motor 79 as desired.

As was described previously, each bank of article carrying flights has a single actuator 94 thereon which causes the bottles B to move in the counting, loading and removing cycles as previously described, and the actuator 94 on the flight 83 closes the switch 96 seen in FIGS. 1 and 12 to initiate and complete the cycle of operations as will now be described.

The actuation of switch 96 closes a circuit including lead 146, winding 147 of a timer relay 148, and a lead 149 to the other control lead 116. The winding 147 controls an armature 151 including a holding contact 152 connected in series with a lead 153 and a contact 154 of a timer motor driven switch 155, a lead 157 being connected to winding 147 and thence by the line 149 to the other control lead 116.

A motor 158, which operates motor driven switch 155, is connected in parallel with the winding 147, and in series with a lead 159 and a winding 161 of a solenoid operated valve 162 controlling the air motor 34 and its stop finger 32 to release a group of counted bottles, see also FIG. 1. As will be shown in more detail, motor 34 is actuated each time switch 96 is operated.

It should be noted that timer motor switch 155 is of any suitable commercial form which can be adjusted in its timing sequence to correspond to the time of transit of a group of bottles from its position at the inby end of the conveyor where they are counted, to the position where they are filled.

Motor 158 accordingly is energized for a period of time to insure the initiation and completion of a cycle of operations necessary to initiate and complete a bottle filling cycle. Motor 158 is accordingly adapted to maintain contacts controlled thereby in closed condition irrespective of the condition of switch 96 and to maintain relay winding 147 energized for a period corresponding to the time setting of motor 158.

The holding contact 154 for relay winding 147 is thus maintained in closed position to maintain winding 147, motor 158 and solenoid winding 161 energized. Winding 161, it will be remembered, controls stop finger 32 to release a group of bottles which have been counted. When contact 154 is closed, contact 155 is closed and motor 158 is also energized. At the end of the cycle of motor 158, contact 155 opens to de-energize winding 161 and cause stop finger 32 to adopt a position stopping a group of bottles for counting.

The energization of timer relay winding 147 opens a contact 163 connected in a circuit with a lead 164 and

a winding 166 of a solenoid valve 167, see again FIG. 1. Solenoid valve 167 controls motor 37 to retract pin 33 thereof, but pin 33 is retracted only when winding 166 is energized and pin 33 therefore holds back a row of bottles while the counted group moves with conveying reach 23, after pin 32 is retracted.

It should be borne in mind that motor 158 operates during a selected time interval during which time the contacts 155 and 154 remain closed. At the end of the time interval these contacts open momentarily and then reclose.

Each time switch 96 is actuated, a circuit is made through a selector relay winding 147 which determines the position of diverter gate 98 and rotary solenoid 92 seen in FIG. 1. Such circuit includes switch 96, lead 146, lead 168 branching therefrom, relay winding 167 and thence by lead 170 to the other control lead 116. Relay 167 controls a contact 169 connected by lead 171 in series with a rectifier 172 and a winding 173 of solenoid 92. Each time solenoid 173 is energized, diverter gate 89 moves to the dotted line position seen in FIG. 6.

Relay 167 is preferably of a stepper or ratchet type operating at each of two positions. In the position as seen in FIG. 12, a contact 174 thereof is connected by a lead 176 in parallel with the winding 161 of solenoid valve 162 to energize a winding 177 of a solenoid operated valve 179, see also FIG. 1. Valve 178 controls the supply of air to the motor 104 controlling diverter gate 98 stop cylinder 42B. At such time diverter gate 98 is in the position seen in FIG. 1 and finger 41B of cylinder 42B is extended to stop the bottles moving to the loading position on reach 24.

At the same time a circuit is made by way of lead 179 through a bottle positioning relay winding 179, and a contact 181 closed by relay winding 179 when it is energized closes a circuit through a bottle positioning valve solenoid 182 by way of a lead 183, contact 181, lead 184 and solenoid 182. Bottle positioning relay 179 is of the dash pot type and it has a return rate of approximately one-half second to keep its contact 181 closed for a time sufficient to maintain solenoid 182 properly energized to maintain the supply of air to bottle stopping air motor 41A. The bottles B of the right hand row of bottles seen in FIGS. 6 and 9 will be then properly positioned prior to filling. When de-energized at the end of the delay period of relay 179, solenoid 182 controls the admission of air to the first motor 52 of the right hand row, subsequently motor 52 operating in cascade relationship as previously described.

However, when relay 167 receives a succeeding pulse by switch 96 again being actuated, contact 174 of relay 167 is moved in the opposite direction to close a circuit by a lead 186 to a solenoid winding 187 of a valve 188 controlling stop finger 41A of the left hand stop cylinder 42A.

At the same time a circuit is made through a second bottle positioning relay winding 189. The circuit through relay 189 includes holding contact 152 of timer relay 147, closed contact 154, closed contact 155, lead 159, lead 176, contact 174, a lead 190 and winding 189. A contact 191 closes a circuit including lead 183, lead 192 branching therefrom, contact 191, a lead 193 and a solenoid winding 194 controlling the supply of air to the right hand group of bottle positioning motors 52 seen in FIGS. 6 and 9.

As with relay 179, relay 189 is of the time delay type, and when de-energized solenoid 194 is also de-energized so that air can be admitted to the cascading bottle positioning motors 52 of the right hand bank seen in FIG. 6.

When the contacts 169 and 174 of relay 167 move from the position first described to the second position, rotary solenoid 173 will be de-energized and the gate 89 will move to the full line position seen in FIG. 10, the left hand row of bottles now being filled. At the same time solenoid 173 will be de-energized as will also bottle

positioning relay 179. Stop finger 41B of stop motor 42B will be retracted to allow the filled bottles of the left hand row to move from beneath the filler tubes 48 seen in FIG. 6.

Summary of Operation

The operation of the machine according to the present invention is believed evident from the description above, but to summarize the operation it may be stated that a row of bottles is held by stop finger 32 along reach 23 and that bottles held on reach 23 at the filling station controlled by stop finger 41B and the spacing fingers 51 thereat are being filled. During such time the bottles on reach 24 are stopped by finger 41A and the spacing fingers thereat are properly positioning the bottles on reach 24.

The pulsing of the circuit by switch 96 first causes the filled bottles on reach 23 to be removed by retraction of stop finger 41B and the spacing fingers 51 thereat. Stop finger 32 retracts for a time sufficient to permit eight empty bottles to move to filling position on reach 23. Stop finger 33 maintains its extended position during this time until the counted empty bottles have moved past stop finger 32, at which time it extends and stop finger 33 retracts for a subsequent bottle count.

All during this period diverter gate 98 is in the position seen in FIG. 1. Prior to the removal of the filled bottles by the retracting of stop finger 41B, the bottles in filling position on reach 24 are properly positioned, and when the pulse of the circuit occurs by closing of switch 96 pill diverter gate 89 has moved to the dotted line position seen in FIG. 6. When the bottles on reach 24 are filled, the next pulsing of the circuit by switch 96 slips pill diverter gate 89 to the solid line position of FIG. 6. During the interim the new group of bottles at the filling station on reach 23 are properly spaced.

The same sequence of operations obtains, as before, except bottle diverter gate 98 is moved to the position seen in FIG. 10 so that a counted group of bottles are diverted along reach 24 to a filling position, when the filled bottles leave said reach.

In order to help break the fall of the capsules from the reach 83 to the tubes 48 we have provided a series of nylon bristles 200 extending across the interior of chamber 86 at a 45° angle with the upper end of each bristle secured to a plate 201 which in turn is secured to plate 87'. See FIG. 13. This will help prevent accidental separation of the two halves forming the capsule and retard the speed of fall of the capsule.

From the description foregoing it is believed evident that there has been provided some new and useful improvements in mechanisms for counting small articles such as pills and depositing each counted amount into a suitable receptacle.

While the invention has been described in terms of a preferred embodiment, its scope is not intended to be limited by the precise embodiment herein shown nor otherwise than by the scope of the subjoined claims.

We claim:

1. A mechanism of the class described comprising

(a) a continuous moving receptacle conveyor,

(b) a series of guide rails

disposed longitudinally above the conveyor and defining two parallel paths

extending forwardly from a single path for

the movement of predetermined groups of

receptacles from a counted position in the

single conveyor path into filling posi-

tions in the respective parallel paths,

(c) separate means for holding and for spacing groups of receptacles in article-receiving position in the same transverse relationship in each of the parallel conveyor paths,

(1) a motor-activated stop for each path movable transversely of the path

into and out of position to check the advancing receptacle of that group,

(2) a series of motor-activated pins

spaced along the conveyor rearwardly of the stop

at predetermined fixed spaced intervals slightly greater than the corresponding dimension of a receptacle, with

(3) the series of pin motors being connected for successive activation by the electrically-controlled mechanisms

(d) parallel rows of stationary article-discharge chutes positioned along the conveyor above each of the respective parallel paths, and connected to

(e) parallel rows of depending stationary article-discharge tubes having their lower ends disposed for registration with the respective receptacles as they come into filling position on the respective conveyor paths,

(f) a single receptacle diverter-gate

hinged on a vertical axis above the conveyor in interposition between the two parallel paths and the single path for back and forth swinging to alternate the advance of groups of receptacles from the single conveyor path into the respective parallel conveyor paths,

(g) a single article diverter-gate

located intermediate the chutes and the tubes swingable for alternating the flow of articles into one or the other of the rows of receptacles on the respective conveyor paths,

(h) article-delivery means for depositing predetermined quantities of articles in the discharge chutes,

(i) motors for driving

the conveyor and the article-delivery means, and

(j) electrically-controlled mechanisms

for effecting the coordinated operation of the diverter-gates, the article-delivery means and the receptacle-holding and spacing means.

2. A mechanism of the class described as set forth in claim 1 wherein the receptacle-stop and the spacing-pin activating-motors are fluid controlled.

3. A mechanism of the class described as set forth in claim 1 wherein a second motor-activated stop is located along the single conveyor path for movement transversely thereof into and out of position to arrest the advance of empty receptacles along the single conveyor path rearwardly of the receptacle-diverter-gate, this second stop-activating-motor being connected for coordinated action with the first above-mentioned motor-activated stop by the electrically-controlled mechanisms.

4. A mechanism of the class described as set forth in claim 1 wherein second and third fluid-motor-activated stops are located in spaced relationship along the single conveyor path for movement transversely thereof into and out of position to successively arrest the movement of empty receptacles along the single conveyor path rearwardly of the receptacle-diverter gate, the second and third stop-activating motors being connected for coordinated operation with the first above-mentioned motor-activated stop by the electrically controlled mechanisms, and a receptacle counting device juxtaposed to the single-path conveyor between the second and third stops.

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