

[54] **PILL COUNTING APPARATUS HAVING CHUTE SHIFTING ON PREDETERMINED COUNT**

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[51] Int. Cl. ....G07f 11/00

[58] Field of Search .....221/2, 4-7, 9; 53/51, 78

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[57] **ABSTRACT**

Apparatus for counting and dispensing articles such as pills, having a vibratory device for automatically separating, spacing and feeding the separated, spaced and counted pills to a chute. A photoelectric cell and a light source function to energize a solenoid of a counter as the pills slide down the chute and interrupt a beam of light between the light source and the photoelectric cell. A lower part of the chute is divided and pivoted and is actuated from the normal position whereat the counted pills are conveyed to a container therefor to a position whereat the remaining pills are conveyed to a container for the oversupply, excess, surplus, remainder or extra pills which can then be returned to a large storage container or to the hopper of the separating and feeding device.

**6 Claims, 7 Drawing Figures**

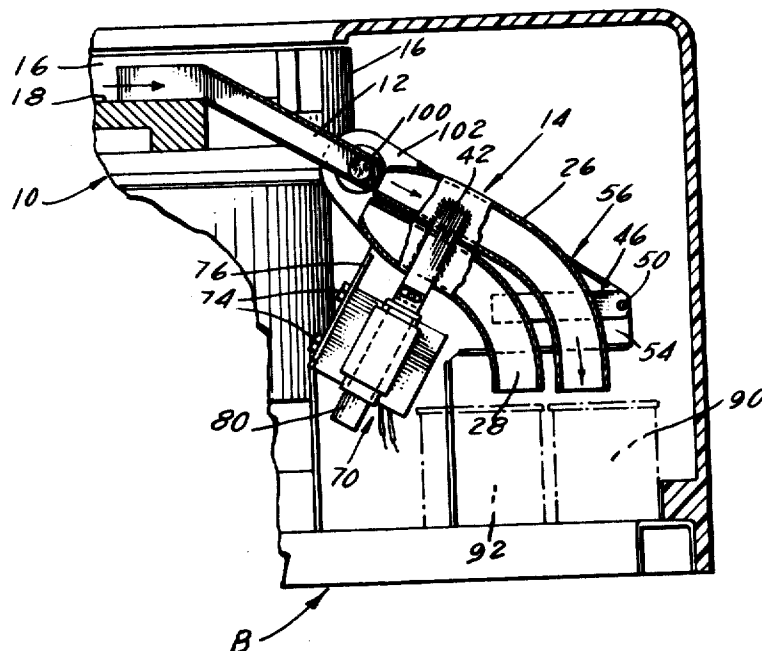


Fig. 1.

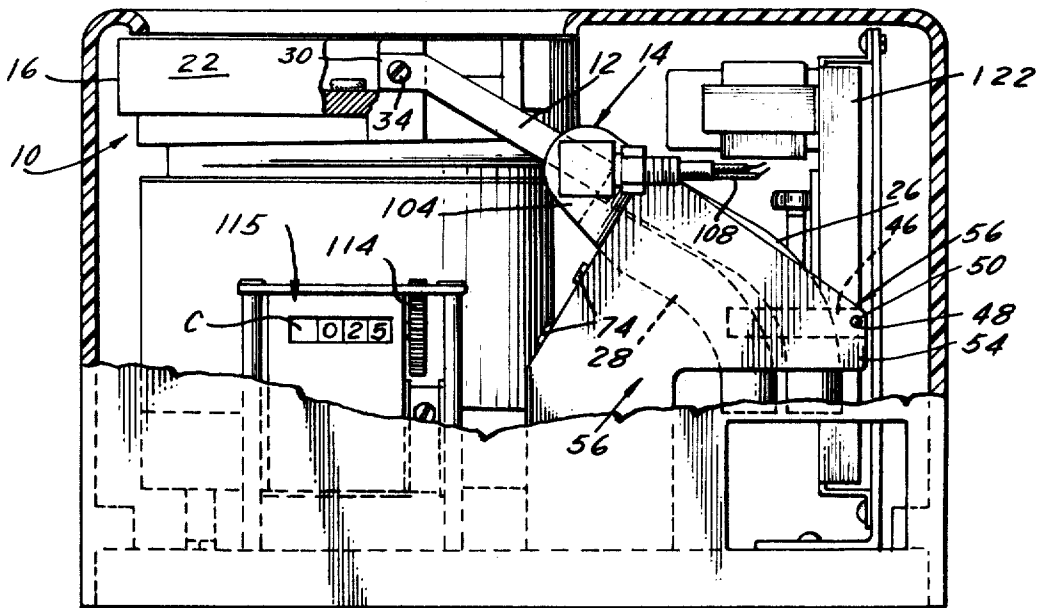
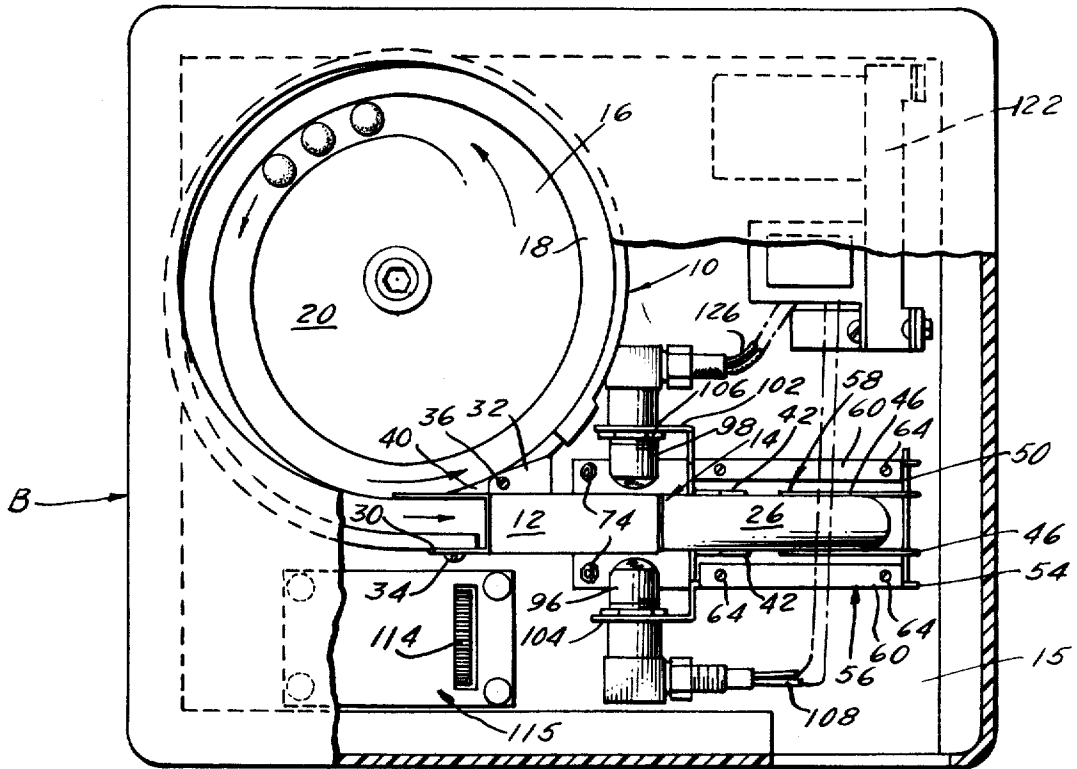
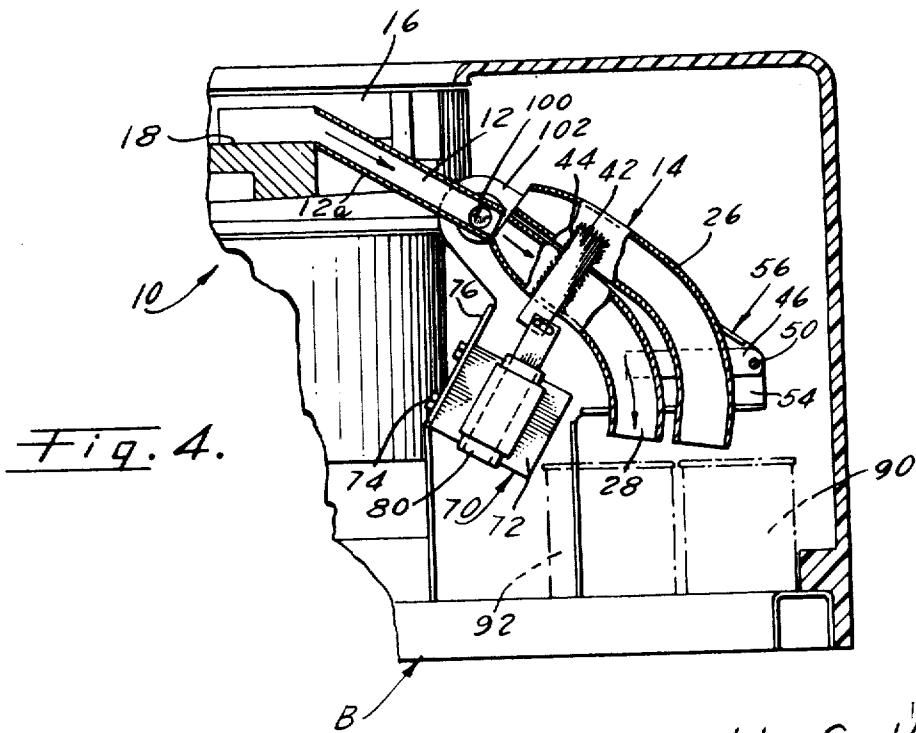
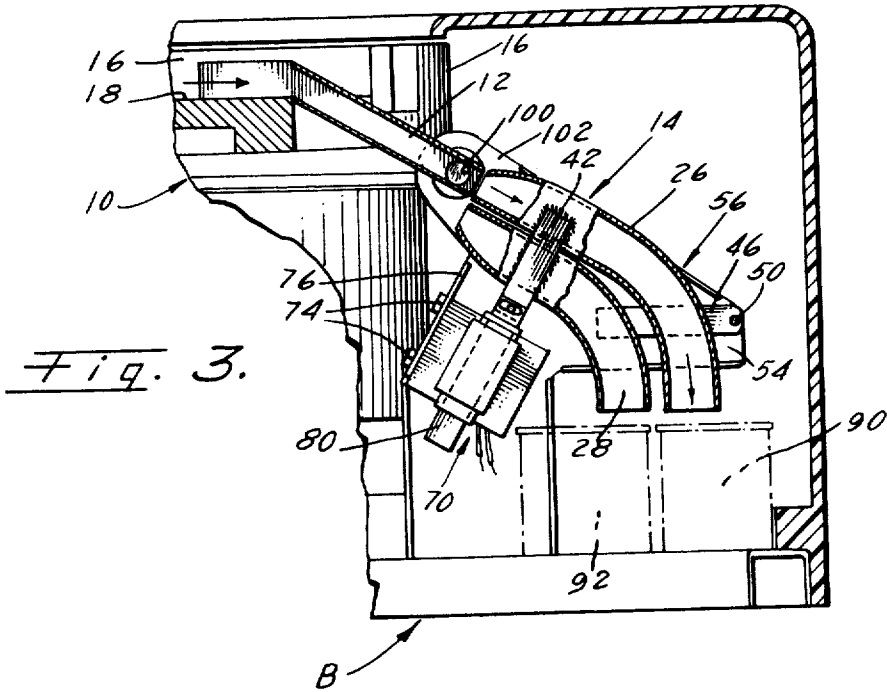


Fig. 2.

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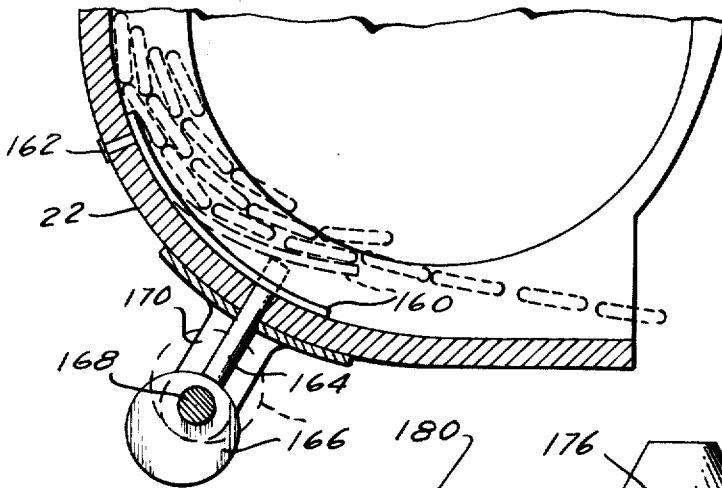


Fig. 6.

Fig. 7.

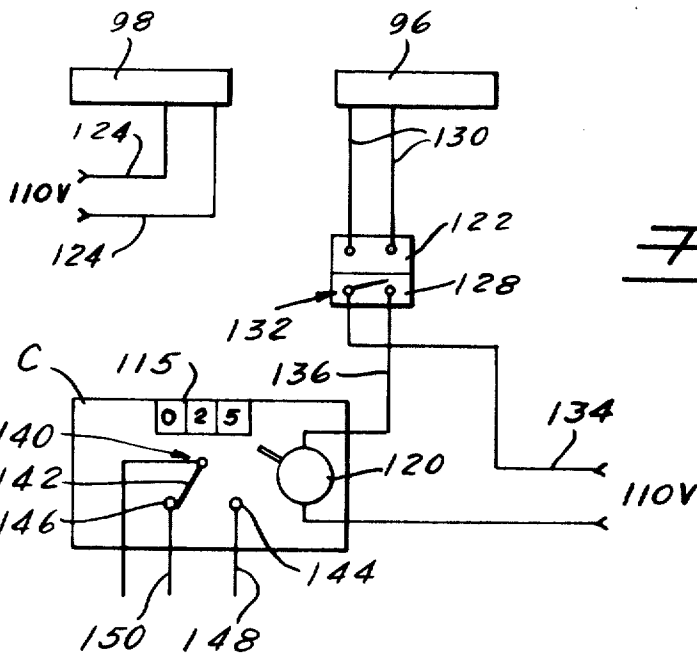
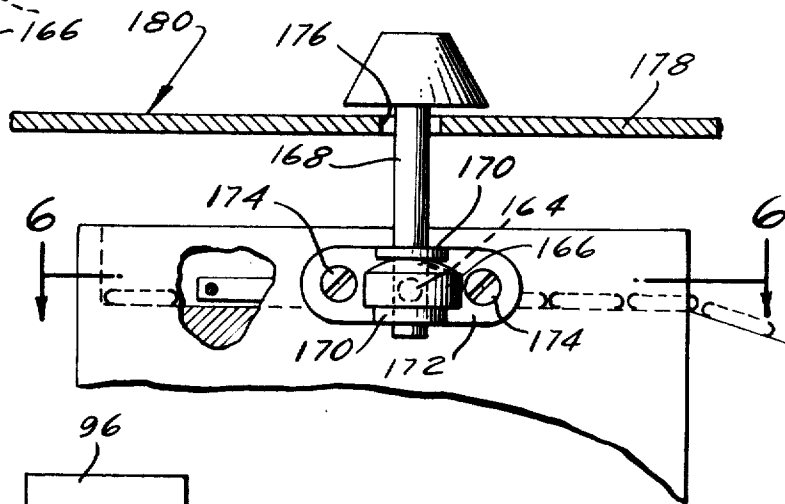


Fig. 5.

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## PILL COUNTING APPARATUS HAVING CHUTE SHIFTING ON PREDETERMINED COUNT

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

This invention relates generally to article separating and dispensing apparatus and relates more particularly to apparatus for use in small establishments, such as drug stores and the like, for automatically separating, counting and dispensing pills and the like for individual prescriptions.

#### 2. Description of the Prior Art.

Various apparatuses are known for counting and dispensing pills and the like, most of these being for use in large establishments for filling many containers with predetermined numbers of pills. Apparatus, of which I am aware for use by druggists, requires adjustments for each size of pill being put up for a prescription. This takes time and the adjustment of the apparatus must be very accurate. Also, after the number of pills have been put in a container as determined by the setting of the apparatus, the motor is shut off. After the container with the predetermined number of pills has been removed, the apparatus is restarted and the excess pills collected in another container.

### SUMMARY OF THE INVENTION

The invention comprises means for automatically separating, spacing, aligning in single file and then feeding articles such as pills to a chute mechanism, down with these pills slide by gravity past an electric eye or photoelectric cell and a light source, the counter functioning in response to interruption of a beam of light between the light source and the photoelectric cell.

The number of pills to be deposited in a container is determined by setting the counter for the predetermined desired number of pills.

The chute mechanism has a primary chute and a pair of terminal chutes, termed herein the counted pill chute and the surplus pill chute, respectively. These chutes are pivoted to move simultaneously between a position whereat the pills sliding down the primary chute enter the counted pill chute and, thence, into a container for counted pills. When the predetermined number of pills have passed the photoelectric cell and the last counted pill has been registered by the counter, a solenoid is energized to move the terminal chutes to a position whereat no more pills will enter the counted pill chute but will enter the second terminal or surplus pill chute, which has its discharge end so positioned that surplus pills will be deposited in another container, termed the surplus pill container, without said pills being counted.

The apparatus is then turned off, whereupon the terminal chutes will return to the position whereat pills from the primary chute will pass into the counted pill chute, the surplus pill chute being out of operable alignment with the primary chute. The pills in the surplus pill container may be then returned to the hopper of the means for automatically separating, spacing, aligning and feeding the pills, or such surplus pills may be returned to a large storage bottle or other container.

By making a simple adjustment the apparatus will count capsules and the like.

### OBJECTS AND ADVANTAGES OF THE INVENTION

It is an object of the invention to provide pill counting apparatus, particularly adapted for use in drug stores and the like, for counting pills for individual prescriptions.

Another object of the invention is to provide apparatus of this character that automatically separates, spaces, aligns in single file and feeds pills of various sizes, without requiring adjustments to accommodate the various sizes of pills.

Still another object of the invention is to provide apparatus of this character that is simple in construction and operation.

A further object of the invention is to provide apparatus of this character that is relatively inexpensive.

The characteristics and advantages of the invention are further sufficiently referred to in connection with the following detailed description of the accompanying drawings, which represent one embodiment. After considering this example, skilled persons will understand that many variations may be made without departing from the principles disclosed and I contemplate the employment of any structures, arrangements or modes of operation that are properly within the scope of the appended claims.

### BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the drawings, which are for illustrative purposes only:

FIG. 1 is a top plan view of apparatus embodying the invention, a portion of the housing being broken away to show the interior mechanism;

FIG. 2 is a side elevational view of the apparatus with a portion of the housing broken away;

FIG. 3 is a side elevational view, partly in section, showing the chute mechanism with the counted pill terminal chute in operative position to receive counted pills from the primary chute;

FIG. 4 is a similar view showing the counted pill terminal chute out of alignment with the primary chute and the surplus terminal chute in operative alignment with said primary chute;

FIG. 5 is a wiring diagram for the invention;

FIG. 6 is an enlarged sectional view taken on line 6-6 of FIG. 7; and

FIG. 7 is an enlarged side elevational view of the feed adjustment mechanism with parts broken away showing the apparatus adjusted for counting capsules and the like.

### DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more particularly to the drawings, there is shown apparatus embodying the invention, said apparatus includes mechanism, indicated generally at 10, which is termed herein the feeder. The feeder 10 separates, spaces and feeds pills into the primary chute 12 of the chute mechanism, indicated generally at 14.

The feeder may be of any suitable mechanism that will separate the pills and move them, then feed them in single file into the primary chute 12. One such mechanism is a feeder manufactured by the Syntron Company, Homer City, Pennsylvania. The Model EB-00, Type B, Vertical-Vibratory Parts Feeder of the Syntron Company has been found to be satisfactory in providing the above-stated functions. The feeder 10 is attached to or mounted on the top wall 15 of a base, indicated generally at B.

This feeder has a hopper or bowl 16 with a spiral track, or ramp 18, starting at the bottom wall 20 of the bowl, and level therewith, and spiraling upwardly along the inside face of the cylindrical wall 22 which extends upwardly from the bottom wall 20 of the bowl, said cylindrical wall 22 defining the sides of the bowl. The upper end of the track 18 is aligned with the upper end of the bottom wall 12a of the primary chute 12, which is inclined downwardly and outwardly of the feeder.

Besides the primary chute 12, the chute mechanism 14 includes a pair of terminal chutes. One of these chutes is indicated at 26 and is termed the counted pill chute, while the other is indicated at 28 and is termed the excess pill chute.

The primary chute 12 has a side ear 30 and a lateral ear 32, each of which has an opening for respective screws 34 and 36 whereby the upper end of the chute 12 is secured to the wall 22 of the bowl and a shoulder 38 of the bowl formed where a portion 40 of the bowl wall 22 is relieved or notched. Thus, the primary chute 12 is fixed to the bowl.

The terminal chutes 26 and 28 are secured together by plates 42, adjacent their upper ends, there being one at each side of said terminal chutes, said plates being secured to the terminal chutes by welding, brazing or the like, as at 44.

Adjacent the opposite free ends of said terminal chutes are a pair of plates 46 secured to the respective sides of the ter-

minal chutes and securing same together. Plates 46 are brazed, welded or otherwise suitably secured to the terminal chutes. Plates 46 have aligned openings 48, adjacent their ends, for reception of a pivot pin 50 which is also received in aligned openings provided therefor in forwardly projecting parts 54 of a pair of oppositely arranged brackets, indicated generally at 56 and 58 respectively, said brackets being disposed at opposite sides of the chutes and having laterally turned flanges 60, secured to the top wall 15 of said base B by means of screws 64 disposed in openings provided therefor in said flanges which are aligned in openings provided therefor in the top wall 15 of the base and aligned with the openings in said flanges. Nuts, not shown, are disposed on the screws 64 at the under side of the top wall 15 of said base.

Means is provided for pivotally moving the terminal chutes on said pivot pin 50, said means comprising a solenoid, indicated generally at 70, best shown in FIGS. 3 and 4.

Solenoid 70 has a laminated field magnet 72, best shown in FIGS. 3 and 4, which is secured by screws 74 to flanges 76 of the brackets 56 and 58, suitably positioned for holding the solenoid in operable position. The solenoid has a coil 78 and an armature 80, therein, connected to the plates 42 of the terminal chutes. The armature 80 has two upwardly extending members 82, the free ends of which terminate at the outer sides of plates 42 and are provided with transverse slots 84 for reception of pins 86, secured to the respective plates 42.

When the solenoid is deenergized, the armature 80 thereof is in the lower position, shown in FIG. 3, and the free ends of the terminal chutes are in the position shown in said figure, whereat the discharge end of the primary chute 12 is in alignment or in register with the adjacent end of the counted pill chute 26, so that pills sliding down chute 12 will pass into the counted pill chute 26 and be discharged from the downturned forward end of chute 26 into a container which may be a receptacle or cup, such as shown at 90 in dotted lines. When the solenoid is energized, the armature 80 is moved upwardly to the position shown in FIG. 4 whereat the terminal chutes are swung pivotally on the pivot pin 50 to move the counted pill chute 26 out of register with the primary chute 12 and, simultaneously, bring the free end of the excess pill chute 28 into register with the discharge end of said primary chute, so that the excess pills will be discharged from said excess pill chute 28 into a container such as, for example, a receptacle or cup, shown in dotted lines at 92. Deenergizing of the solenoid results in the terminal chutes being returned to their original position, shown in FIG. 3, this being effected by gravity, although if desired a suitable spring may be used to assist in yieldingly returning the terminal chutes to the position shown in FIG. 3.

A counting mechanism is provided with a counter C which may be a conventional type, such as manufactured by the Veeder Root Company of Hartford, Connecticut. This counter is of the type which employs a photoelectric cell, indicated at 96, and a light source 98 which functions in response to interruption of a beam of light between the light source 98 and the photoelectric cell.

As shown, the side walls of the primary chute 12 have aligned openings 100, therein, adjacent the lower or discharge end of said primary chute 12. The light source, an electric light bulb of well known conventional type, is carried by a part 102 of the bracket 58, said part 102 being offset outwardly of said bracket 58. The light bulb is disposed in a housing 104 disposed in an opening in said part 102 and secured therein by means of a nut 106.

The photoelectric cell 96 is of well known type and has a housing 108 carried by a part 110 of bracket 56, the housing 108 is received in an opening provided in said part 110 and secured therein by means of a nut 112. Thus, the light source, when energized, directs a beam of light through the opening 100 in the adjacent wall of the primary chute 12 and through the opening 100 in the opposite wall of said primary chute and onto the photoelectric cell 96.

Counter C has a wheel 114 for setting the indicator dial 115 of the device for the number of pills to be counted and disposed in the counted pill receptacle or cup 90. Counter C is provided with the usual solenoid and ratchet mechanism 120 that causes the device to turn the indicator an increment for each number for which the indicator is set when there is an interruption of the light beam to the photoelectric cell.

Referring to FIG. 5, there is shown a photoelectric controller 122 supplied with electric current from a suitable source by means of wires 124. Current is supplied to the lamp 98 by means of wires 126. The photoelectric cell 96 has a connection with the sensitive relay 128 of the photoelectric controller 122 by means of wires 130, said relay 128 having a normally open switch 132. One side of the switch 132 is connected with a source of electric power by wire 134, while the other side of said switch 132 is connected by a wire 136 to one side of the solenoid ratchet mechanism 120 of the counter C, the other side of said solenoid ratchet mechanism is connected to the source of electric power by wire 138.

Counter C also has a single pole double-throw switch 140 which has a movable switch member 142 and a pair of fixed contact members 144 and 146. Fixed contact member 144 is connected by wire 148 to the solenoid ratchet mechanism 120, while fixed contact 146 is connected by wire 150 to the solenoid 70.

#### SUMMARY OF OPERATION

There is a master switch, not shown, which controls the supply of electric current to the apparatus. Now, starting with this switch in the off or open position, no power is supplied to the apparatus. The movable switch member of the relay switch 132 is in the open position, while the movable contact member 142 of the switch 140 is in contact with the fixed switch member 144.

The counter dial 115 is now set for the required number of pills and an excessive number of pills are put into the bowl 16. The chute mechanism is in the position shown in FIG. 3 so that counted pills will be deposited in the counted pill container or receptacle, since the relay 70 is deenergized.

The master switch is now turned to the closed position and the feeder 10 starts to operate to separate and feed pills in single file. At the same time, the lamp is energized and this energizes the photoelectric cell and counting begins.

As each pill slides down the chute, it passes through the light beam and blocks the passage of light to the photoelectric cell, causing the latter to be deenergized. As the photoelectric cell is deenergized, the switch 132 of the photoelectric cell controller 122 is closed to effect energization of the counter solenoid of the solenoid and ratchet mechanism 120, the ratchet being actuated to effect subtraction of one number from the counter, as shown by the dial 115. Each time a pill blocks the passage of light to the photoelectric cell, the counter subtracts one number from the initial setting until zero is reached. When this occurs, the counter switch 140 is actuated to the position whereat the movable switch member 142 contacts the fixed contact member 146 and the counter is deenergized and solenoid 70 is energized to cause the terminal chutes to be moved to the position shown in FIG. 4 whereat the excess number of pills, over the number for which the dial was set, fall into the excess pill container or receptacle 92, the feeder continuing to feed into the excess pill container until the bowl 16 is emptied. The operator then turns the master switch to the open or off position and the apparatus stops operating.

The operator removes the counted pill container and empties the contents into a box or vial for the customer. He then removes the excess pill container 92 and empties it into a bottle or other storage container which is returned to its shelf.

The above-described apparatus will very effectively handle pills that are flat or have a flat surface and, in fact, will handle such pills of widely varying sizes. For most effective handling of capsules, it has been found that best results are secured by

having means at least at one point positively restricting the passage of capsules up the track or ramp to a single capsule at a time.

One such means is shown in FIGS. 6 and 7 and comprises a resilient blade such as, for example, a steel spring 160 secured to the inner side of the bowl wall 22 and above the ramp or track 18 by any suitable means, such as a rivet 162 or the like. Normally, the blade has the same curvature as the inner side of said wall and rests against said wall, the free end of said blade being downstream relative to the direction of movement of the pills. When the blade is in the normal position, there is no restriction of the path of travel for the pills and they travel up said path or ramp in single file and spaced apart from each other.

When it is desired to count capsules, the free end of the blade is positioned away from the wall 22, as shown in dotted lines in FIG. 6, leaving a narrow path for the capsules between the inner end of said blade and the inner edge of the ramp so that only one capsule at a time can move past said blade. Capsules that double up at the inner side of the ramp simply fall back into the bowl and are again moved up the ramp.

Means for adjusting the position of the free end of the blade comprises a plunger 164 slidable longitudinally in a bore provided therefor in said wall 22. The plunger 164 is moved inwardly by a cam 166 secured to a shaft 168 rotatably mounted in the arms 170 of a bracket 172 secured to the wall 22 of the bowl by means of screws 174 screwed into tapped bores provided therefor in said wall 22. Cam 166 is disposed between said arms 170.

The shaft 168 extends upwardly through an opening 176 in the top wall 178 of the outer housing 180 of the apparatus. The outer end of the shaft 168 has an adjustment knob 182 secured thereto to facilitate rotation of the shaft 168 and cam 166, to thereby effect adjustment of the position of the blade 160. The plunger 164 and the blade is moved inwardly by cam 166 while the resiliency of the blade moves the plunger outwardly as the cam is rotated to allow the blade to move to its normal position.

The invention and its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the form, construction and arrangement of the parts of the invention without departing from the spirit and scope thereof or sacrificing its material advantages, the arrangement hereinbefore described being merely by way of example, and I do not wish to be restricted to the specific form shown or uses mentioned except as defined in the accompanying claims.

I claim:

- 1. An apparatus for counting and discharging a preselected number of articles into the first of two receptacles comprising:
  - A. a vibrating means for separating, spacing and feeding in single file articles to be counted;
  - B. downwardly inclined article receiving and conveying means for receiving articles from the vibratory feeding means and down which the articles are adapted to slide in single file, said article receiving and conveying means comprising an inclined primary chute having an outlet; a receiving end for receiving articles from said feeding means and a discharge end; a pair of similar terminal chutes being simultaneously movably mounted, comprising a counted article chute and an excess article chute extending generally side by side throughout the lengths thereof and having inlet end portions and having terminal outlet end portions curving in the same direction, said terminal chutes being integrally joined together and pivoted adjacent their outlet end portions, said terminal chutes

being respectively for receiving a preselected number of counted articles from the discharge end of the primary chute and selectively discharging said articles in a counted article receptacle and diverting all excess articles thereover into an excess article receptacle.

- C. Counting means including
  - a. a photoelectric cell at one side of the article receiving and conveying means and a light source positioned at the opposite side thereof for casting a beam of light across the path of articles moving in said article receiving and conveying means, said articles interrupting the light beam as they move through said article receiving and conveying means;
  - b. and a counter operably connected with said photoelectric cell and having number indicator means adapted to move an increment for each number upon interruption of the light beam by an article passing between the source of light and the photoelectric cell;
  - c. and means for setting the counter means for a preselected number of articles to be counted and discharged into the counted article receptacle;
  - d. and means operably connected with the counter for moving the inlet ends of said terminal chutes into alternate alignment with the outlet and of said primary chute to divert excess articles when the counter has counted the number of articles for which it has been set to count.

2. The invention defined by claim 1, wherein the side walls of the primary chute have aligned openings therein and the photoelectric cell is at one side of the primary chute and the light source is positioned at the opposite side thereof for casting a beam of light through said openings and across the path of articles moving in said primary chute.

3. The invention defined by claim 1, wherein the terminal chute means comprises a counted article chute and an excess article chute, said terminal chutes having inlet ends and outlet ends movable between a position whereat the inlet end of the counted article chute is in alignment with the outlet end of the primary chute and the inlet end of the excess article chute is out of alignment with the discharge end of the primary chute, and a position whereat the inlet end of the excess article chute is in alignment with the outlet end of the primary chute and the inlet of the counted article chute is out of said alignment, and the means for diverting excess articles includes said excess article chute, and the means operably connected with the counter for operating the excess article diverting means is connected with the terminal chutes for moving said terminal chutes from the position whereat the inlet end of the counted article chute is in alignment with the discharge end of the primary chute to the position whereat the inlet of the counted article chute is out of alignment with the discharge end of the primary chute and the inlet end of the excess article chute is in alignment with said discharge end of the primary chute, and vice versa.

4. The invention defined by claim 1, wherein the means operably connected with the counter for operating the terminal chute means comprises a solenoid.

5. The invention defined by claim 1, wherein the vibratory feeding means includes a track on which articles are separated and spaced forwardly in single file; and adjusting means for varying the effective width of said track.

6. The invention defined by claim 5, wherein said adjusting means includes a resilient blade normally in an out-of-the-way position relative to the track; and means for moving said blade to reduce the effective width of said track for single file passage of articles to be counted.

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