July 6, 1965 L. H. MERRILL ETAL 3,193,196

PILL-COUNTING AND CONTAINER-DEPOSITING MACHINE

Filed Oct. 29, 1963 5 Sheets-Sheet 1

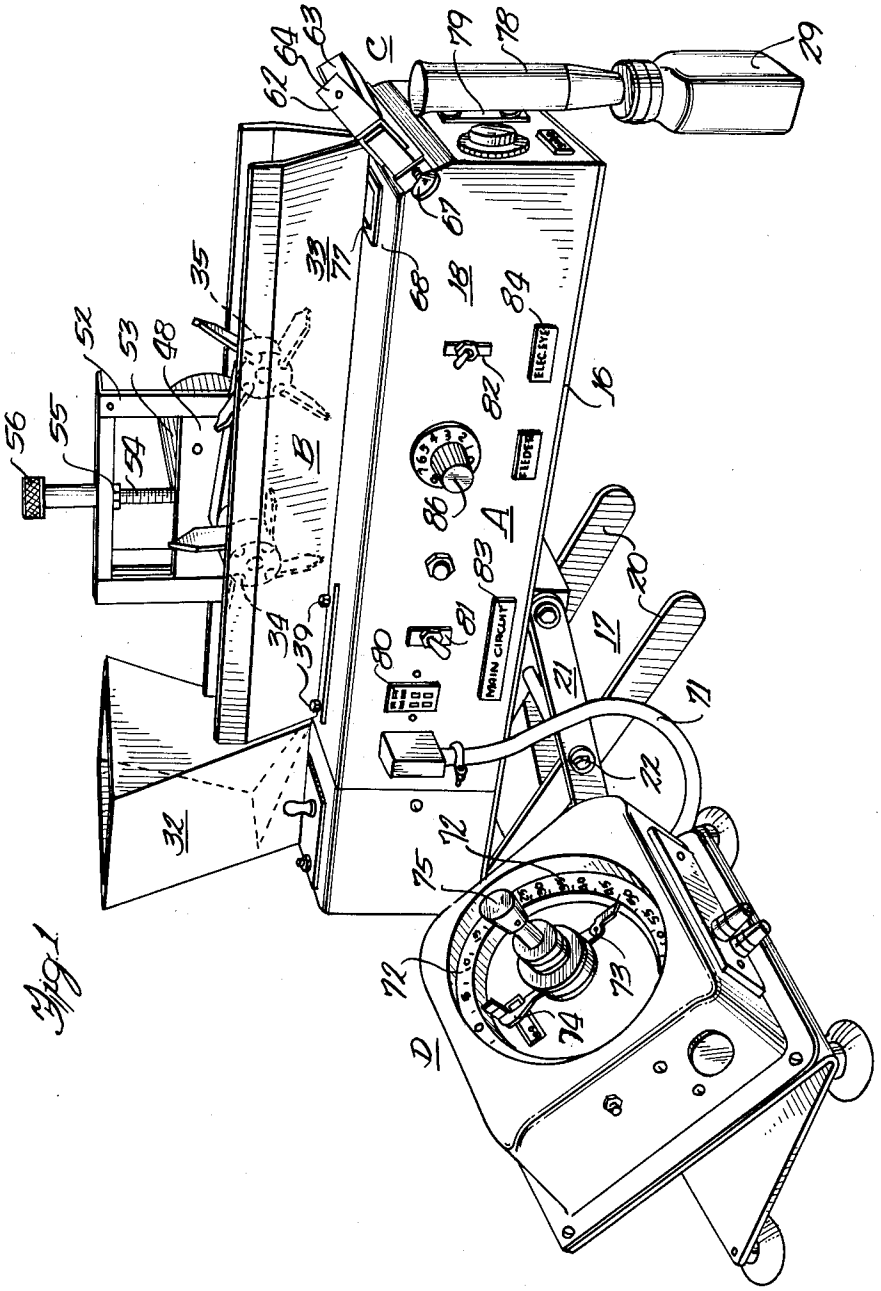

Fig. 1

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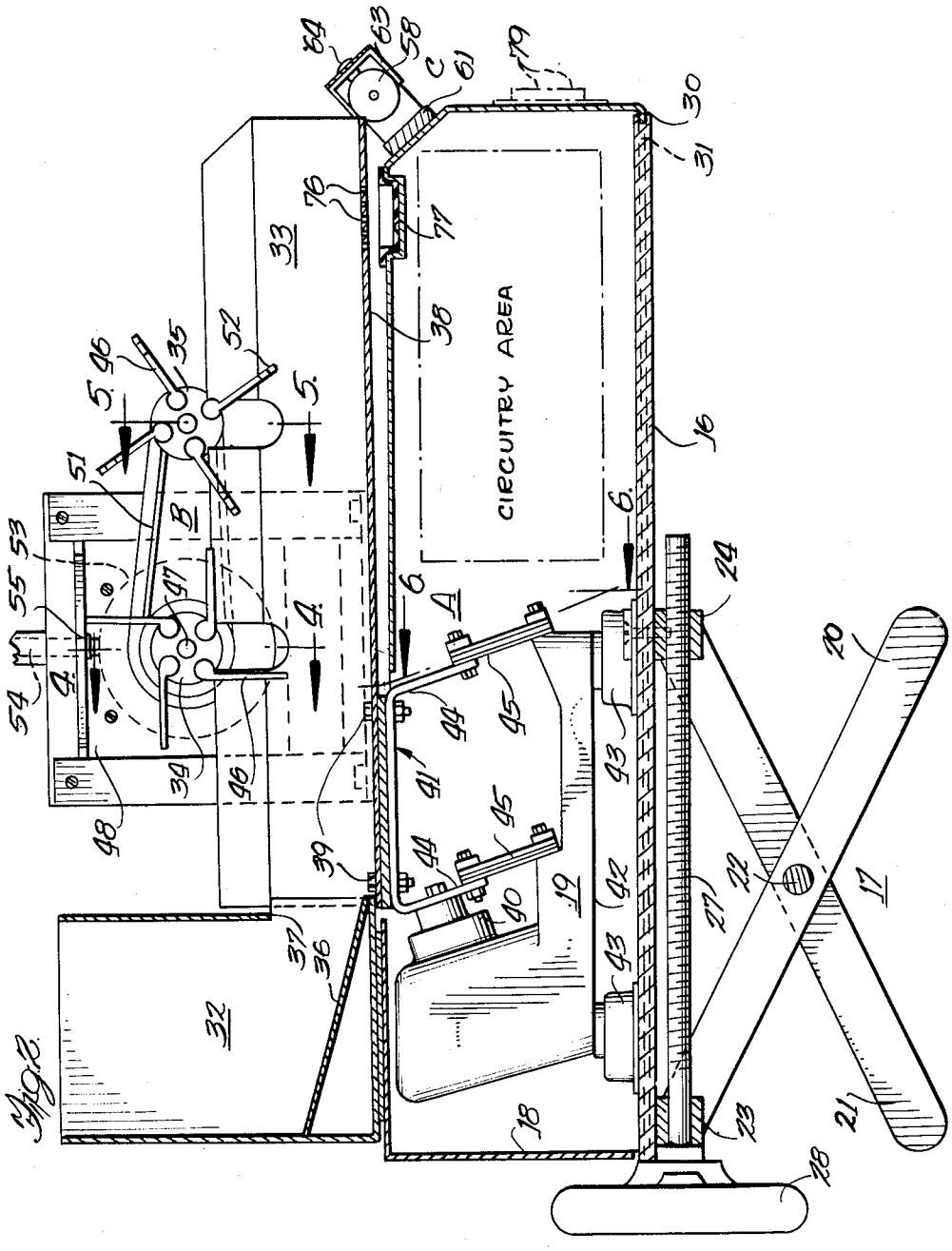

Fig. 2.

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PILL-COUNTING AND CONTAINER-DEPOSITING MACHINE

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Fig. 3

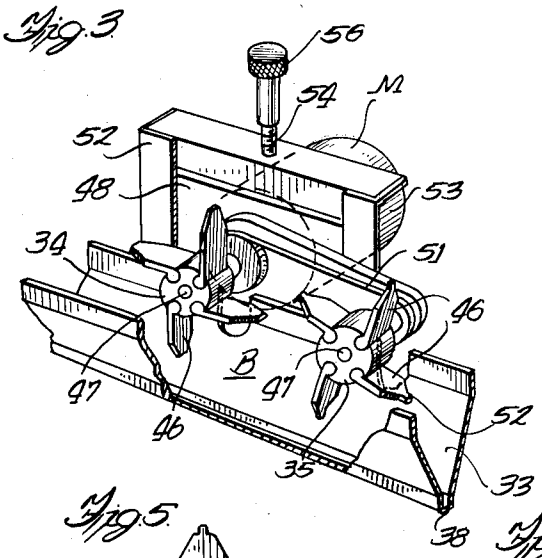


Fig. 4

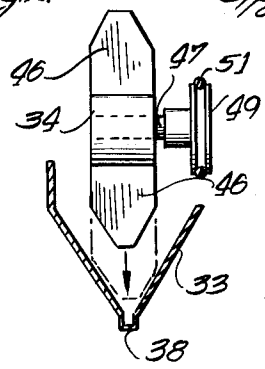


Fig. 5

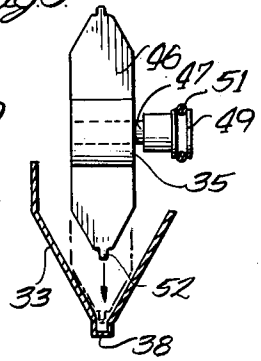


Fig. 6

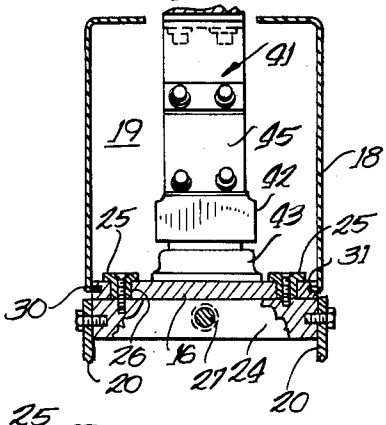
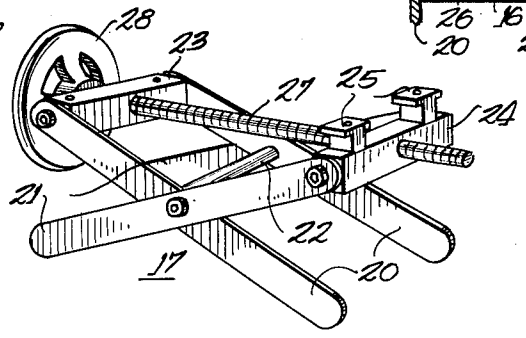


Fig. 7



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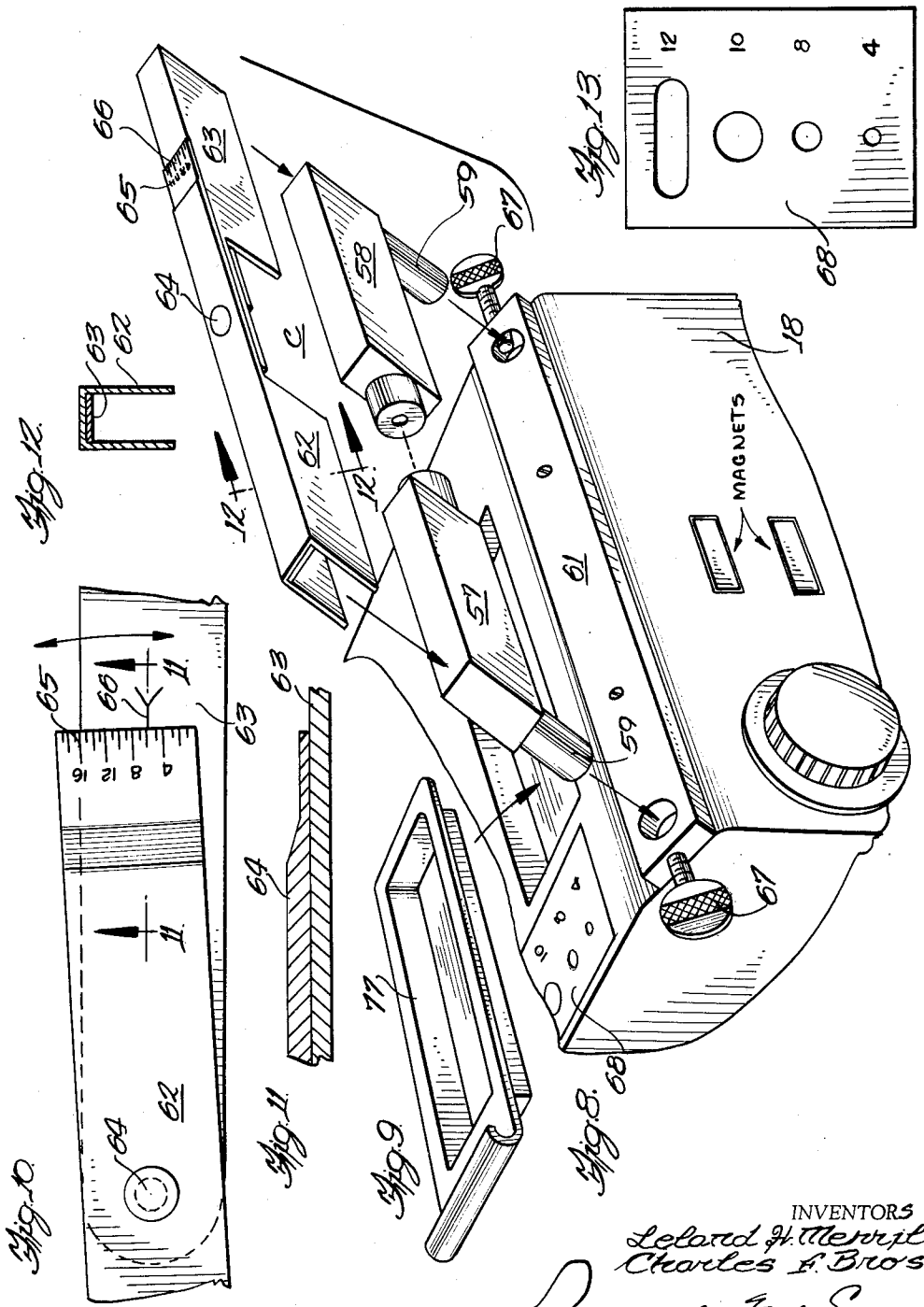

Fig. 8.

Fig. 9

Fig. 10

Fig. 11

Fig. 12.

Fig. 13

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PILL-COUNTING AND CONTAINER-DEPOSITING MACHINE

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Fig. 14.

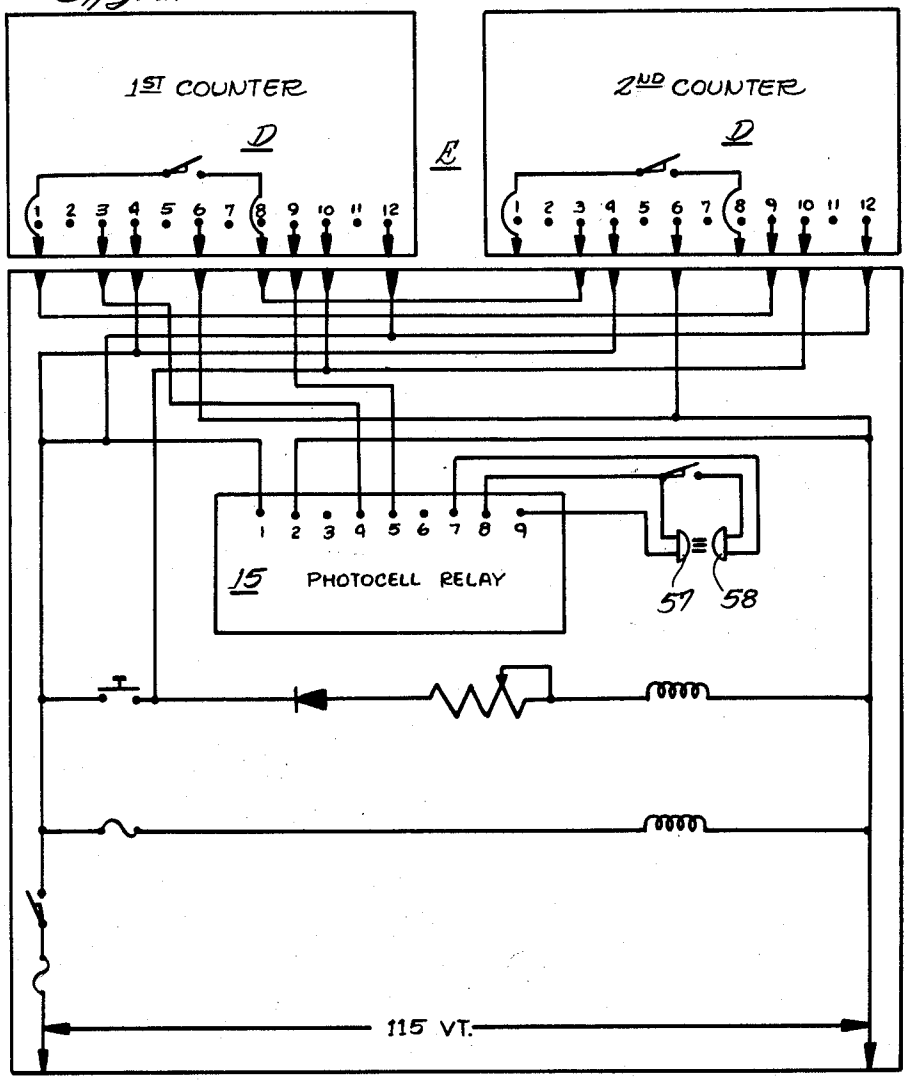
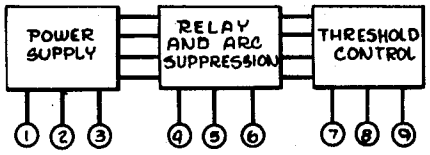


Fig. 15.



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3,193,196

PILL-COUNTING AND CONTAINER-DEPOSITING MACHINE

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Filed Oct. 29, 1963, Ser. No. 319,729
10 Claims. (Cl. 235—98)

This invention relates to a machine for the automatic counting and depositing in a container a predetermined number of preformed medicinal items, hereinafter generically referred to as "pills."

The current practice of filling containers with a predetermined number of pills—i.e. tablets, capsules, lozenges, and the like—taken from stock, is for the pharmacist or an assistant, to spread a quantity of the items onto a sheet of sterilized paper and, with a spatula or similar instrument, count the number of items required. These, then, are placed in the container.

The occasion for such "counting" of pills and putting them into a container may be in a pharmaceutical laboratory or at a drugstore prescription counter. In a pharmaceutical laboratory such counting may have to be repeated several times when filling samples for dispatch to doctors. At a drugstore prescription counter such counting usually is for the purpose of filling a prescription of a patron. On such occasions the pharmacist may be interrupted by attention requested by another patron, over the telephone or waiting at the counter. At times, this may mean having to start over again with the counting. Also, there may be occasions when the count is not accurate.

The main objects of this invention are: to provide an improved machine for use in effecting the automattic counting of a predetermined number of pills as they are deposited in a container; to provide an improved machine of this kind having a manually-settable automatically-acting device controlled by a sensing mechanism for "counting" the requisite number of pills as they are directed into a container; to provide improved means for accommodating the sensing mechanism to different sizes and forms of pills; to provide an improved support for adjusting the machine to different sizes of containers into which the pills are to be deposited; and to provide an improved machine of this kind which is very compact so as to occupy a very minimum of space whether in or out of use, and which makes for the most expeditious and accurate counting and depositing of a predetermined number of pills in a container.

In the adaptation shown in the accompanying drawings:

FIGURE 1 is a perspective view of a pill-counting and container-depositing machine and associated counting device constructed in accordance with this invention;

FIG. 2 is a longitudinal, sectional, elevation of the supporting housing and the several coordinated operating parts;

FIG. 3 is a fragmentary, perspective, partly broken away, of the pill-advancing means;

FIGS. 4 and 5 are fragmentary, vertical, sectional views of the pill advancing means taken, respectively, on the planes of the lines 4—4 and 5—5 of FIG. 2;

FIG. 6 is a transverse, sectional, elevation taken on the plane of the line 6—6 of FIG. 2;

FIG. 7 is a perspective view of the adjustable pedestal whereon the supporting housing is mounted for vertical disposition to accommodate varying sizes of containers wherein the counted pills are to be deposited;

FIG. 8 is an enlarged, exploded, perspective of the pill-sensing mechanism which activates the associated pill-counting device;

FIG. 9 is a perspective view of the tray whereon is collected particles that may be eroded or cast off from the pills as they approach their discharge from the pill-advancing means;

FIG. 10 is an enlarged, fragmentary, plan view of the adjusting component of the pill-sensing mechanism whereby the photocell units are relatively adjusted to accommodate the dispensing of pills of various sizes and shapes;

FIG. 11 is a sectional detail taken on the plane of the line 11—11 of FIG. 10;

FIG. 12 is a transverse, sectional detail taken on the plane of the line 12—12 of FIG. 8;

FIG. 13 is a plan view of a templet, arranged on the machine, for use in indicating the requisite setting of the adjusting component of the pill-sensing mechanism;

FIG. 14 is a diagram of the electrical circuitry required for the manually-initiated automatic functioning of the machine shown in these other figures; and

FIG. 15 is a diagrammatic amplification of the "Photocell Relay" of FIG. 14.

The essential concept of this invention involves a means for advancing pills from a magazine along a path for deposit in a container and in the path of which advancing pills is interposed a pill-sensing device connected to activate a manually-settable, automatically-operating counting device, all arranged in a circuitry to predetermine the number of pills to be deposited in a selected container.

A pill-counting and container-depositing machine embodying the foregoing concept comprises a supporting housing A, a pill-advancing and container-depositing means B, a pill-sensing mechanism C, and a digit-counting device D, all operatively interconnected in a circuitry E.

The supporting housisng A, as shown herein, requires a rectangular-shaped platform 16, attached to a pedestal 17, and on which is arranged a sheet-metal casing 18 enclosing a vibrator 19 for the pill-advancing and container-depositing means B exteriorly arranged on the casing 18.

The pedestal 17 comprises pairs of horizontally-spaced arms 20 and 21 pivotally connected, substantially medially thereof, by a rod 22. The upper ends of the arms 20 and 21 are hinged, respectively, to blocks 23 and 24. The block 23 is detachably connected to the underside of the platform 16 at the one end thereof. The block 24 is formed with T-shaped lugs 25 that are slidably seated in longitudinally-disposed tracks 26 (FIG. 6), recessed on the under face of the platform 16. A threaded shaft 27 is swivelled at its outer end in the block 23, between the arms 20 and 21, and threaded through the block 24. A hand-wheel 28, keyed to the end of the shaft 27, provides for rotating the shaft 27 to alter the longitudinal spacing of the blocks 23 and 24 so as to alter the vertical spacing of the platform 16 above a counter, table or other ledge when the machine is in use. Such vertical adjustment permits accommodating the height of the machine to the requirements of a container-depositing means B.

The casing 18 is formed of appropriately-shaped, opposed sections the perimeters of which are turned inwardly to provide for flanges 30 seating in perimetrical grooves 31 in the platform 16 (FIGS. 2 and 6). The casing 18 is disposed above the platform 16 to provide an enclosure for the vibrator 19 and the circuitry E, as will be explained presently.

The pill-advancing and container-depositing means B comprises a magazine 32, a V-shaped trough 33 secured to the vibrator 19, and a pair of motor-driven pill-restraining paddle wheels 34 and 35.

The magazine 32 here is shown as of inverted pyramidal form with a V-shaped bottom 36, inclined inwardly downward toward the adjacent end of the trough

33, and a V-shaped port 37, conforming with the opposed end of the V-shaped trough 33.

The V-shaped trough 33 terminates in a channel-shaped base-extension 38 (FIGS. 4 and 5) and is of a length to span the casing from the magazine 32 to adjacent the opposite end of the casing 18. At the end, adjacent the magazine 32, the trough 33 is secured by fasteners 39 to an inverted U-shaped bracket 41 forming a part of the vibrator 19.

The vibrator 19, as here shown in FIG. 2, is a conventional structure comprising a motor (not shown) enclosed in a member 42 supported on rubber pads 43 fixed on the platform 16. An eccentric 40, driven by the enclosed motor, is secured to the U-shaped bracket 41 which has the ends of the parallel arms 44 attached to sets of leaf springs 45 fixed on the member 42.

The paddle wheels 34 and 35 are conventional-type structures. As here shown, each comprises for uniformly-spaced, flexible-material vanes 46 keyed to the respective shafts 47 journaled in radially-spaced relationship on a plate 48 and mounting pulleys 49 connected by a belt 51. The plate 48 is slidably supported in a frame 52 attached to the casing 18, and mounting a motor 53 directly connected to the paddle wheel 34.

The plate 48 is vertically adjustable in the frame 52 by virtue of a threaded rod 54 swivelled at its lower end to the plate 47 and rotatably supported by a nut 55 fixed on the frame 52. A knurled knob 56, on the exposed upper end of the rod 54, provides for turning the rod 55 to operatively adjust the vertical disposition of the vanes 46, on the paddle wheels 34 and 35, with respect to the trough 33 depending upon the character of the pills wherewith the machine is to be used, with a view to securing a single-line approach of the pills to the sensing mechanism C.

The vanes 46, on these paddle wheels 34 and 35, have their free ends tapered for spaced parallel disposition to the respective sides of the trough 33. From FIG. 2 it will be noted that the vanes 46, on the paddle wheel 34, extend more nearly tangentially to the hub in which the vanes are seated, whereas, the vanes 46 on the paddle wheel 35 extend more nearly radially outward from the respective hub. Such differential arrangement of these vanes 46, in the two wheels, tends to facilitate a reverse activation of the pills along the trough 33 to ensure their taking a single-line relationship as they approach the pill-sensing mechanism C.

The pill-sensing mechanism C, the detail nature of which is best shown in FIG. 8, comprises a pair of conventional electrically-activated photo cell units 57 and 58 fixed on stud shafts 59 rotatively setting in a bar 61. These cell units 57 and 58 comprise the conventional photo-cells (not specifically shown) within the enclosure units 57 and 58 whereby the ray of light between the cells is directed outward through the opening across the path of the passing pills. The passing of each pill interrupts the beam of light and activates the circuit wherein these cells are interposed (see FIG. 14) so as to effect the operation of "photo cell relay" 15 leading to the counter D. These units 57 and 58 are embraced, respectively, by similar channel-shaped members 62 and 63 hinged together at 64. The inner end of the member 62 has scored thereon a scale 65 disposed for registering with a medial score line 66 on an opposed portion of the member 63.

These photo-electric cell units 57 and 58 are adapted to be rotated on the bar 61 to alter their relative angularity and thus vary the size of the gap between their opposed functioning ends. Also, these cell units 57 and 58 may be adjusted vertically to vary their spacing above the bar 61. The cell units 57 and 58 may be temporarily fixed in either of these adjusted positions by the set screws 67. Such adjustment of the cell units 57 and 58 is to form the gap between the cells and above the plate to accommodate pills of differing physical characteristics, as indicated by a template 68 (FIG. 13) hereinafter to be described. Such adjustments of the photo-electric cell units 57 and 58, with respect to the plate 61, may be effected by altering the axial position of the shafts 59 on the plate 61 as permitted by action of the set screws 67. The vertical adjustment may be made independently of the relative angular adjustment of the cell units 57 and 58 or coordinated therewith, as circumstances may require.

The templet 68, as here shown, has openings formed therein of varying sizes and contours. The ones here shown are suggestive of the wide range of characteristics of pills which may be subject to sorting by this machine, preparatory to their being deposited in containers 29. Indicia, in the form of numerals, are inscribed on the templet 68 suggestive of the varying characteristics of such pills. Such a templet 68 is fixed on the casing 18 directly adjacent the pill-sensing mechanism C. These same numerals are so arranged on the scale 64, on the member 62, that a relative shifting of the members 62 and 63—as permitted by action of the set screws 67—will ensure such an altered angulation of the opposed ends of the cell units 57 and 58 as will allow for the passage of a pill having the physical characteristics of what is indicated by the templet 68, obviously, with circuit pills that would be any diameter. With other than circular pills, such as capsules, that would be the transverse width.

The digit counting device D is a conventionally-marketed, electro-magnetic-type of equipment connected by cable 71 into the circuitry E. Such a device D is adapted for manual setting for subsequent operation by a conventional pulse-switch in the circuitry E successively-activated by the passage of pills through the gap between the photo-electric cell units 57–58. As here shown, the device D embodies a numerated dial 72 with respect to which is arranged a pair of pointers 73 and 74. These pointers are manually-settable by a knob 75 to predetermine the functioning of the interinal mechanism by pulsations caused by the passing of pills through the gap between the photo-electric cell units 57–58. One or more such devices D may be used with this machine, more than one being needed where it is desirable to deposit in a single container 29 more pills than one device D can be set to count.

With a view to having the exterior of the pills as free as possible of powder or other dust, at the time they pass through the gap between the photo-electric cell units 57–58, the trough 33 has a series of small apertures 76 (FIG. 2) formed in the base of the narrow channel-shaped extension 38, adjacently inward from the discharge end of the trough 33. Below this apertured portion 76 is located a removable tray 77 (FIGS. 1, 2 and 9).

Where needed a chute 78 (FIG. 1) may be arranged, adjacent the pill traversing gap of the sensing-mechanism C, to direct the counted pills into the container 29. A form of such chute 78 is shown held in place by a conventional magnet-block 79 fixed on the end of the casing 18.

The circuitry E (FIG. 14) is quite conventional for such a machine as herein described. As shown in FIG. 14. Provision is made for a pair of counting devices D, the casing 18 mounting receptacles 80 (FIG. 1) for a plug-in of the cable or cables 71. A circuit-control switch 81 and a photo-electric cell control switch 82 are mounted on the casing 18. Below these two switches are shown identifying plates 83 and 84, respectively. Intermediate these switches 83 and 84 is a control knob-and-dial 86 for a circuitry rheostat arranged to control the speed of the vibrator 19.

The general nature of the "photo-cell-relay," designated by the circled "15" in the circuitry E of FIG. 14, is diagrammatically illustrated in FIG. 15.

Such a pill-counting and container-depositing machine is operated in the following manner:

One of the pills to be counted, and deposited in a container 29 is compared with the pill-forms on the templet 68. Having noted the indicia thereon, the members 62

and 63 are adjusted by shifting the scale 65 (FIGS. 8 and 10) to align the same indicia thereon with the score line 66. This is effected by a temporary retraction of the set screws 67, following which they are set to lock the photo-electric cell units 57 and 58 in their adjusted rerelationship.

Following the adjustment of these photo-electric cells, the hand-wheel 28 is turned to dispose the discharge end of the trough 33 the desired distance above the deck, on which the machine is placed, to best locate the discharge end of the trough 33 for depositing the pills in a container 29.

A quantity of the pills, thus to be counted, then are deposited in the magazine 32. The required disposition of the paddle wheels 34 and 35, relative to the trough 33, is effected by the turning of the knurled knob 56.

In accordance with the instructions provided with the conventional counting device D, the knob 75 is turned clockwise to set the pointer 74 at "Zero" on the dial 72 and the pointer 73 at the number on the dial 72 indicative of the number of pills that are to be counted and deposited in the container 29.

If required, or desired, a chute 78 may be positioned on the magnet-block 79 to direct the pills into the container 29.

With all of these preliminary adjustments made, the machine is ready to function upon the shifting of the switches 81 and 82. These switches close the circuit, respectively, to the motor for the vibrator 19 and the motor 53 for the paddle wheels 34 and 35, and to the sensing mechanism C. Thereupon, the control-knob-and-dial 86 may be relatively adjusted to determine the speed of the vibrator 19.

The agitation of the trough 33 and the action of the paddle wheels 34 and 35 will cause the pills to move from the magazine 32 into a single-line approach to the sensing mechanism C. As each pill passes through the gap between the photo-electric cell units 57 and 58 a pulse switch in the circuitry E will be activated and successively reverse the pointer 73 on the dial 72, until the pointer reaches "Zero." Thereupon, the current will be broken to the circuitry E and further functioning of the machine will be arrested.

Although but one specific embodiment of this invention is herein shown and described it will be understood that details of the construction shown may be altered or omitted without departing from the spirit of the invention as defined by the following claims.

We claim:

1. A machine for counting and depositing in a container a predetermined number of pills comprising, a supporting housing, a pill magazine arranged on the housing, an elongated V-shaped trough positioned on the housing forwardly of the magazine, means for vibrating the trough for advancing pills from the magazine for deposit in a container, a manually-settable automatically-operating counting device, pill-sensing mechanism interposed in the path of the pill-advancing trough and connected to activate the counting device, circuitry operatively connecting the pill-advancing trough-vibrating means, the pill-sensing mechanism and the counting device and a pair of paddle wheels rotatively positioned within the trough for contact with the pills to effect a reverse activation of the pills and ensure a single-line approach thereof to the pill-sensing mechanism.

2. A machine as set forth in claim 1 wherein an adjustable pedestal is fixed on the housing for altering the vertical disposition of said housing and said pill-advancing trough with respect to a container wherein the pills are to be deposited and thereby accommodate containers of different heights.

3. A machine as set forth in claim 1 wherein the pill-sensing mechanism is in the form of a pair of opposed photoelectric cell units relatively adjustable axially of each other to accommodate the functioning of the pill-sensing mechanism to the varying sizes and forms of pills.

4. A machine as set forth in claim 1 wherein a chute is detachably and adjustably mounted on said housing for directing pills into a container, wherein said housing has thereon a magnet element and wherein said chute carries a mounting block attracted by said magnet.

5. A machine as set forth in claim 1 wherein the pill-sensing mechanism is in the form of a pair of photoelectric cell units positioned on the housing in opposed relationship for the passage there-between of pills one at a time, and a pair of members support the respective units and are relatively adjustable to each other to accommodate the functioning of the photoelectric cell units to varying sizes and shapes of pills.

6. A machine for counting and depositing in a container a predetermined number of pills comprising,

(a) supporting housing

(b) a pill magazine having a discharge opening therein positioned adjacent one end of the housing,

(c) a V-shaped trough disposed longitudinally along and on the housing to receive pills from the magazine for discharge at the opposite end of the housing into a selected container,

(d) a motor-driven vibrator connected to the trough to effect an action thereof for advancing the pills therealong to the discharge end,

(e) a digit-counting device manually settable for a predetermined number of successive reverse movements for arresting the operation of the vibrator upon deposit in the container of the last of the predetermined number of pills for which the digit-counting device was preset,

(f) a pair of opposed photoelectric cell units positioned on the housing adjacent the discharge end of the trough for exposure to the passage of pills into the container,

(g) circuitry operatively connecting the vibrator motor, the digit-counting device, and the photoelectric cell units, and energizable for the coordinated functioning of the vibrator motor, the photoelectric cell units and the counting device, to cause the deposit in a container of the number of pills for which the counting device has been preset, and

(h) manually-settable means for controlling the speed of the vibrator.

7. A machine for counting and depositing in a container a predetermined number of pills comprising,

(a) a supporting housing

(b) a vertically-adjustable pedestal fixed on the supporting housing for varying the height of the housing above a pill-receiving container,

(c) a pill magazine having a discharge opening therein positioned adjacent one end of the housing,

(d) a V-shaped trough disposed longitudinally along and on the housing to receive pills from the magazine for discharge at the opposite end of the housing into a selected container,

(e) a motor-driven vibrator connected to the trough to effect an action thereof for advancing the pills therealong to the discharge end,

(f) a frame fixed on the housing

(g) motor driven paddle wheels journaled on the frame and extending into the trough and

(h) means vertically adjustable on the frame for positioning the paddle wheels relative to the trough to ensure a single-line approach of the pills to the container, said paddle wheels positioned on said frame one adjacent said magazine and the other adjacent the discharge end of said trough.

(i) a digit-counting device manually settable for a predetermined number of successive reverse movements for arresting the operation of the vibrator upon deposit in the container of the last pill for which the digit-counting device was preset,

(j) a pair of opposed photoelectric cell units positioned

on the housing adjacent the discharge end of the trough for exposure to the passage of pills into the container, and

(k) circuitry operatively connecting the vibrator motor, the digit-counting device, and the photoelectric cell units and energizable for the coordinated functioning of the vibrator motor, the paddle-wheel motor, the photoelectric cell units and the counting device, to cause the deposit in a container of the number of pills for which the counting device has been preset.

8. A machine for counting and depositing in a container a predetermined number of pills as set forth in claim 7 wherein the

trough has the bottom thereof terminating in a narrow shallow channel with parallel sides, and

the paddles have their perimeters contoured substantially parallel with the sides of the trough, and

the paddles on the paddle wheel positioned adjacent the end of the trough have terminal protuberances extending into the channel-shaped bottom of the trough.

9. A machine for counting and depositing in a container a predetermined number of pills comprising,

(a) supporting housing

(b) a vertically-adjustable pedestal for varying the height of the housing above a pill-receiving container,

(c) a pill magazine having a discharge opening therein positioned adjacent one end of the housing,

(d) a V-shaped trough disposed longitudinally along and on the housing to receive pills from the magazine for discharge at the opposite end of the housing into a selected container,

(e) a motor-driven vibrator connected to the trough to effect an action thereof for advancing the pills therealong to the discharge end,

(f) a digit-counting device manually settable for a predetermined number of successive reverse movements for arresting the operation of the vibrator upon deposit in the container of the last of the predetermined number of pills for which the digit-counting device was preset,

(g) a pair of photoelectric cell units,

(h) a pair of stud shafts mounted on the respective units and swivelled at respectively opposite edges of

the supporting housing for disposing the cell units in opposed horizontally-spaced relationship adjacent the end of the trough for activation by pills discharged from the trough into a container,

(i) a pair of set screws fixed on the housing for engagement with the respective stud shafts to secure the cell units in vertically and horizontally-adjusted positions relative to the housing and to each other,

(j) a pair of members attached to the respective cell units and to each other and relatively adjustable to vary the opposed relationship of the cell units to accommodate the sensing of pills of varying sizes and shapes,

(k) circuitry operatively connecting the vibrator motor, the digit-counting device, and the photoelectric cell units, and energizable for the coordinated functioning of the vibrator motor, the paddle-wheel motor, the photoelectric cell units and the counting device, to cause the deposit in a container of the number of pills for which the counting device has been preset.

10. A machine for counting and depositing in a container a predetermined number of pills as set forth in claim 9 which includes:

manually-settable means for controlling the speed of the vibrator.

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LEO SMILOW, *Primary Examiner.*