Aug. 23, 1949. L. A. BOYLAN 2,479,667

COUNTING MACHINE FOR TABLETS AND THE LIKE

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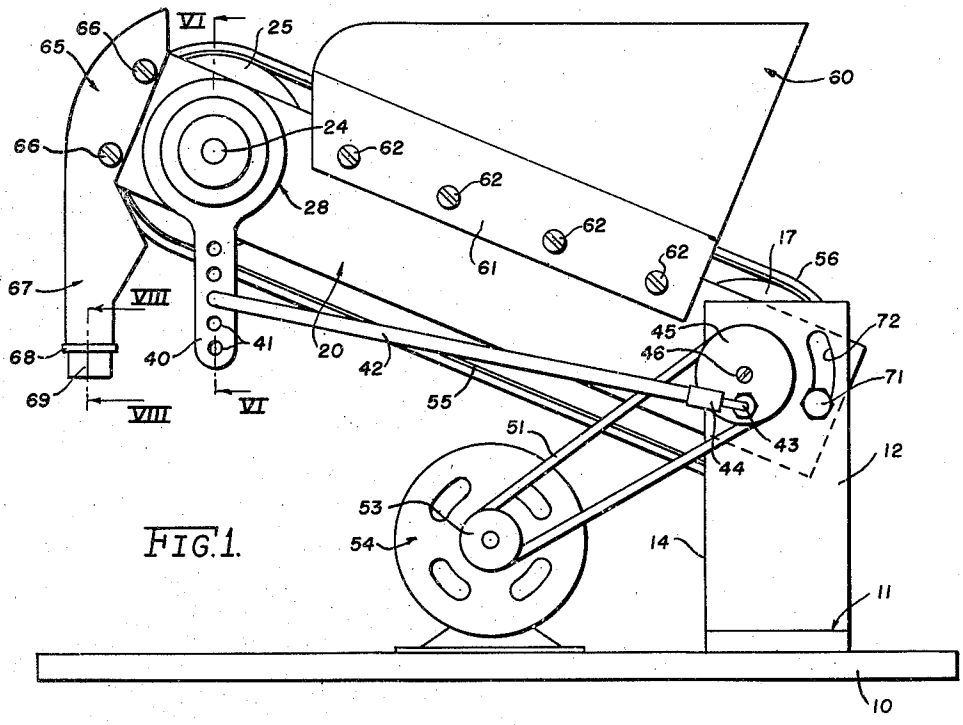


FIG. 1.

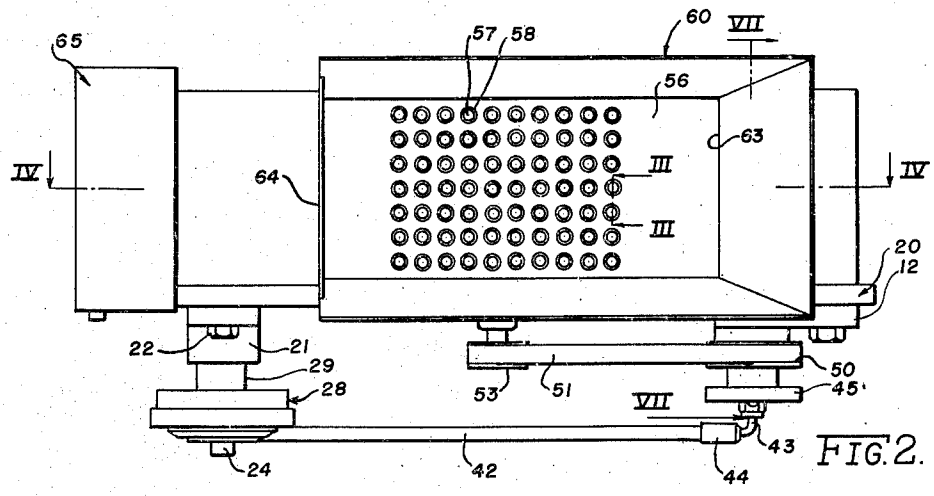


FIG. 2.

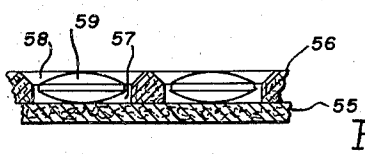


FIG. 3.

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FIG. 4

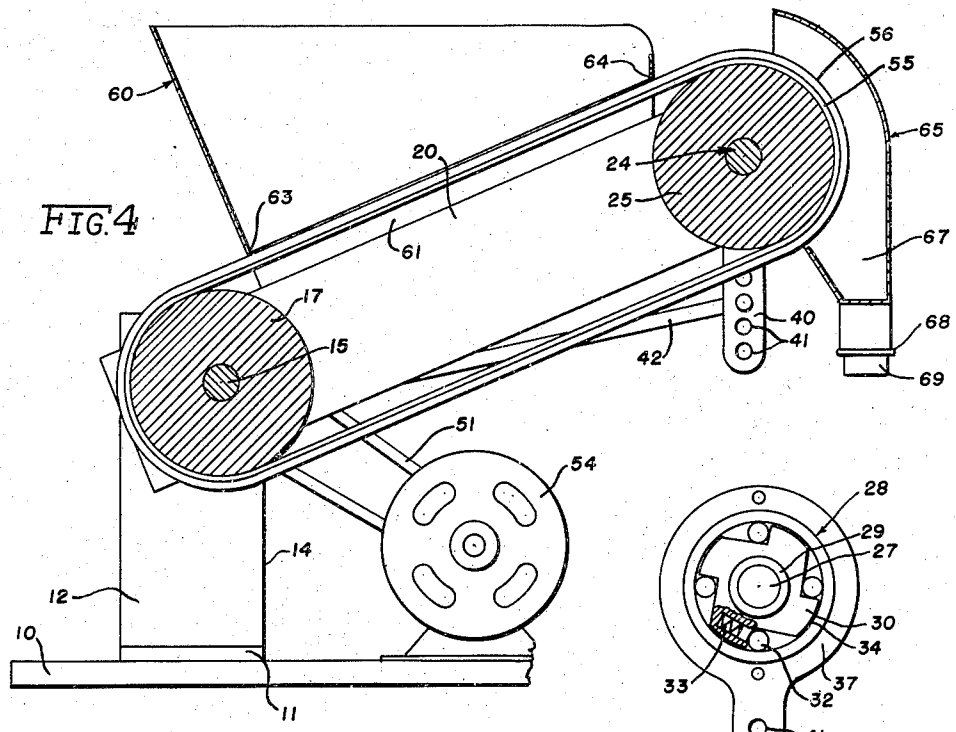


FIG. 5.

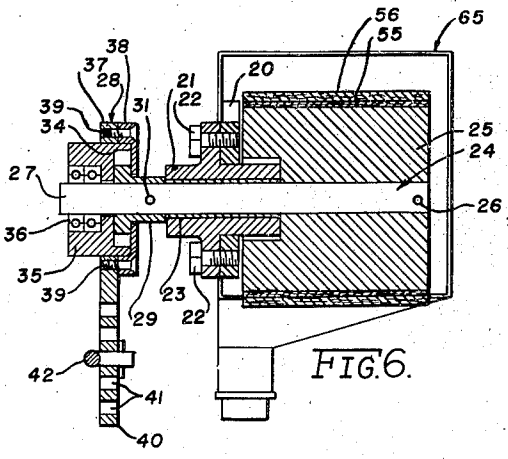


FIG. 6.

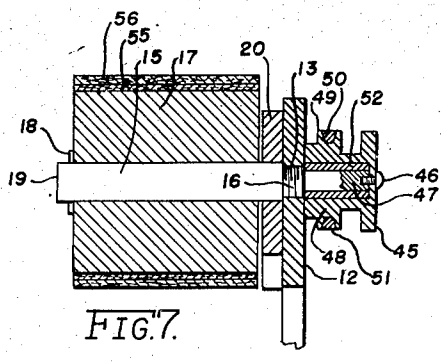


FIG. 7.

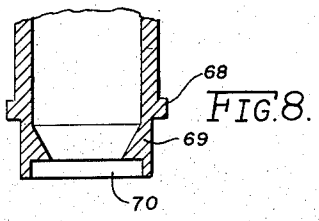


FIG. 8.

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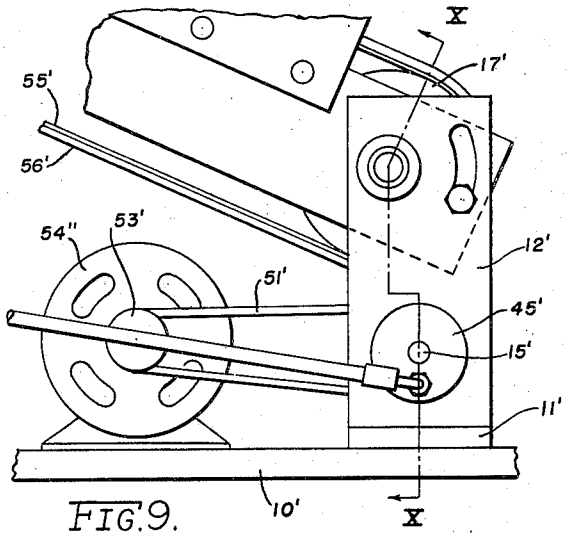
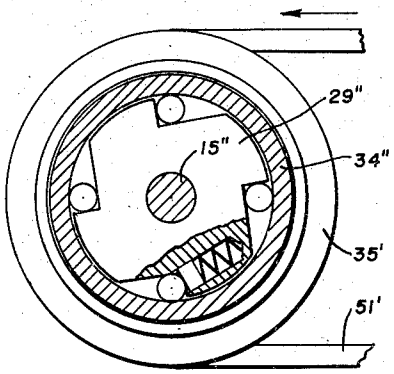


FIG. 9.

FIG. 11.



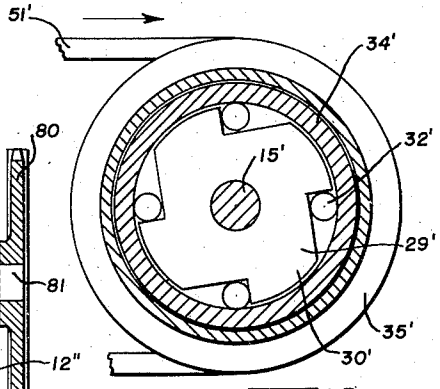


FIG. 12.

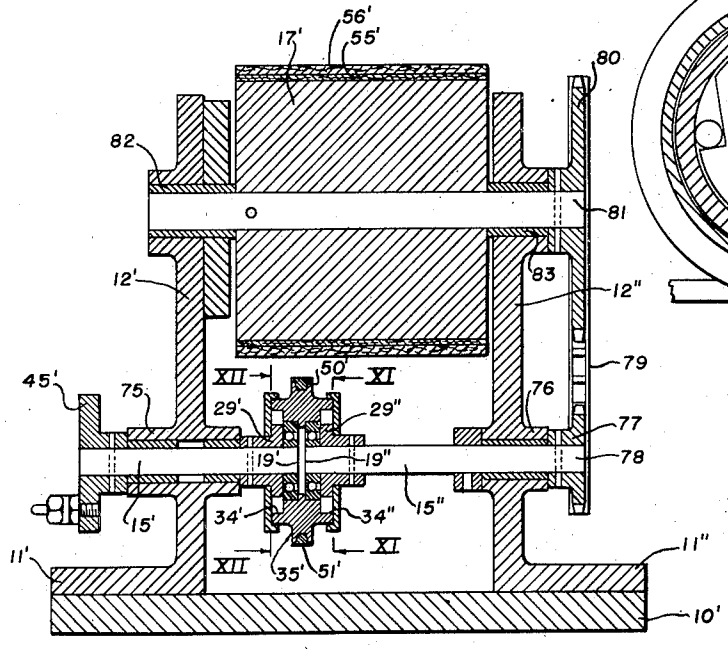


FIG. 10.

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COUNTING MACHINE FOR TABLETS AND THE LIKE

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Application December 18, 1944, Serial No. 568,658

6 Claims. (Cl. 198—30)

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This invention relates to counting machines and more particularly to tablet counters, although it may be employed with equal advantage for other purposes.

It contemplates more especially the provision of a simple and more effective counting machine construction which will segregate preformed units such as pharmaceutical tablets and place them into a container, so that a predetermined number thereof will be uniformly packed.

Numerous types of counting machines for coins and the like have heretofore been proposed, but these are not adaptable for efficacious use in connection with readily destructible units such as preformed pharmaceutical pills or tablets which are easily injured by abrasion, impact or friction thereon.

This is highly important in the handling of pharmaceutical tablets owing to the fact that they are internally consumed and must present a perfect appearance to the consumer. Then, too, counting machines for the purpose mentioned must be sufficiently flexible so that the number of pills or tablets that are successively segregated and packed into a container may be varied within a wide range depending upon the dictates of commercial practice and the size of containers which confine different quantities.

One object of the present invention is to simplify the construction and improve the operation of devices of the character mentioned.

Another object is to provide an improved counting mechanism which can be readily adjusted to adapt itself to units of different size and shape as well as count the different numbers thereof for packing into containers.

Still another object is to provide an endless carrier construction which is capable of continuous or intermittent movement for counting units of different characteristics most responsive thereto.

A further object is to provide a movable carrier having a predetermined number of perforations of a size corresponding to the units to be counted for movement relative to a supporting surface to effectively count and discharge the desired number into containers.

A still further object is to provide a perforated carrier for transferring a predetermined number of preformed units to a container and to successively repeat the operations for counting purposes.

Still a further object is to provide a perforated carrier for movement below a hopper to successively count predetermined batches of preformed

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units therefrom and effect the transference thereof to containers for packaging.

Other objects and advantages will appear from the following description of an illustrative embodiment of the present invention.

In the drawings:

Figure 1 is a side view in elevation of a device embodying features of the present invention.

Figure 2 is a plan view of the device shown in Figure 1.

Figure 3 is a fragmentary section view in elevation taken substantially along line III—III of Figure 2.

Figure 4 is a section view in elevation taken substantially along line IV—IV of Figure 2.

Figure 5 is a side view in elevation of the clutch and arm with the plate removed and a part shown in section to clarify the showing.

Figure 6 is a sectional view in elevation taken substantially along line VI—VI of Figure 1.

Figure 7 is a fragmentary sectional view in elevation taken substantially along line VII—VII of Figure 2.

Figure 8 is a fragmentary sectional view in elevation taken substantially along line VIII—VIII of Figure 1.

Figure 9 is a fragmentary side view in elevation of a modified device similar to Figure 1, but providing mechanism for continuously or intermittently moving the carrier.

Figure 10 is a sectional view taken substantially along broken line X—X of Figure 9.

Figure 11 is a sectional view taken substantially along line XI—XI of Figure 10.

Figure 12 is a sectional view taken substantially along line XII—XII of Figure 10.

The structure selected for illustration is not intended to serve as a limitation upon the scope or teachings of the invention, but is merely illustrative thereof. There may be considerable variations and adaptations of all or part of the teachings depending upon the dictates of commercial practice. The present embodiment comprises a base 10 having a bracket 11 attached thereto to present an upstanding plate or standard 12 serving as a mount for instrumentalities to be hereinafter described.

The plate 12 has a threaded aperture 13 extending transversely through the upper region thereof to support a stub shaft 15. The stub shaft 15 has a reduced threaded shoulder 16 to engage the correspondingly threaded aperture 13 to horizontally support the stub shaft 15 normal to the plate or standard 12. The shaft 15 carries a roller 17 (Figure 7) that idles thereover for

retention thereon by means of a pin 18 projecting through the stub shaft 15 proximate to the free extremity 19 thereof. A conveyor supporting plate 20 of elongated rectangular configuration is press fitted on to the stub shaft 15 between the upstanding plate or standard 12 and the roller 17 to normally extend in an upwardly inclined direction for supporting a bearing hub 21 that is attached thereto by means of a plurality of threaded fasteners 22.

A bearing sleeve 23 is press fitted into the hub 21 to carry a stub shaft 24 that is journalled therein (Figure 6). The stub shaft 24 carries a roller 25 corresponding in shape and size with the roller 17, the roller 25 being fixed to the shaft 24 by means of a pin 26 which projects diametrically therethrough. The stub shaft 24 projects outwardly from the bearing hub 21 to present an extension 27 to which a standard rotary ratcheting clutch 28 is attached through the medium of a tubular hub 29 constituting a part of the internal clutch element 30. A pin 31 extends diametrically through the tubular hub 29 and the shaft extension 27 so that the clutch element 30 will rotate therewith. Spherical detents 32 impelled by tangential springs 33, are normally urged against the internal annular ring 34 of the clutch element 35. The clutch element 35 is rotatively supported on the shaft extension 27 through the medium of ball bearing raceways 36.

A circular flange 37 confronts the clutch casing plate 38 which rotatively rides on the hub 29, the adjacent circular flange 37 and casing plate 38 being attached together by means of a plurality of circumferentially spaced fasteners 39. The circular flange 37 has an extended arm 40 formed integral therewith to present a series of linearly aligned apertures 41, in this instance five, which present an adjustable attachment for a pitman 42 that is engageable with anyone of the apertures 41.

The pitman 42 has an arm 43 that telescopes therein for adjustable connection therewith through the threaded union sleeve 44 so that the length of the pitman 42 can be varied. The arm 43 is eccentrically connected to a circular crank wheel 45 having a threaded fastener 46 extending axially therethrough to effect connection with a reduced axial shaft extension 47 projecting from the stub shaft 15 on the end opposite to the somewhat reduced threaded shoulder 16 that is comparatively larger in diameter than the shaft extension 47 (Figure 7).

The crank wheel 45 has an inwardly extending hub 48 to present a peripheral shoulder 49 which has an annular groove 50 therein to receive a driving belt 51. The crank wheel 45 with its inwardly extending hub 48 is journalled on the bearing sleeve 52 carried by the shaft extension 47 so that the crank wheel 45 with its hub 48 will rotate relative to the shaft 15 and its extension 47, the fastener 46 merely retains the crank wheel 45 on the shaft extension 47 so that the crank wheel 45 may continuously rotate responsive to the driving belt 51 that engages a pulley 53 fixed to the armature shaft of an electric motor 54 that is attached to the base 10 (Figure 1).

The rotation of the crank wheel 45 will oscillate the clutch arm 40 which imparts intermittent rotation to the conveyor roller 25 that has an endless conveyor belt 55 extending thereover to engage the correspondingly sized conveyor roller 17, thereby transmitting intermittent rotation to the latter through the endless conveyor belt 55 which has its upper stretch linearly displaced upwardly toward the discharge station (Figure 1) responsive to the intermittent counter-clockwise rotation of the rollers 17—25 (viewed from Figure 1).

Another endless conveyor belt 56 is disposed over the conveyor belt 55 in frictional contact for intermittent frictional displacement therewith. The outer endless conveyor belt 56 is provided with a plurality of tablet receiving apertures 57 therein which, preferably though not essentially, are intransverse straight rows to provide the desired count for each container to be filled therewith.

In the present embodiment there are one hundred apertures 57 extending through the outside endless conveyor belt 56 and these apertures are countersunk to provide enlarged tapered entrant orifices 58 (Figure 3) so that preformed units such as aspirin tablets 59 or the like will be dropped and received therein from a hopper 60 which is placed over the conveyor belts 55—56 for attachment to the inclined conveyor supporting plate 20.

The hopper 60 has depending sides 61 through which fasteners 62 extend for attachment to the conveyor supporting plate 20. The hopper 60 is supported so that its ends are barely above the outside conveyor belt 56 to avoid friction therewith and still prevent the units, such as the pills or tablets 59, from passing below the lower end 63 of the hopper 60.

The upper end 64 is similarly supported (Figure 4) so that only the tablets 59 that are received within the countersunk apertures 57—58 in the outside conveyor belt 56 will be disposed in line with or beneath the surface of the conveyor belt 56 to transfer the predetermined number of tablets in the countersunk apertures 57—58 to an end housing 65. The end housing 65 envelopes the outside end region of the conveyor roller 25 for attachment through fasteners 66 to the upper end of the conveyor supporting plate 20.

The housing 65 terminates downwardly in a funnel spout 67 having a peripheral flange 68 thereon to serve as an abutment for a container such as a bottle (not shown) to be received on the reduced discharge extremity 69. The discharge extremity 69 has a countersunk internal orifice 70 against which a small neck container can be held for filling. Containers, such as bottles, are held by the attendant over the reduced discharge funnel extremity 69 or within the orifice 70 for filling from a series of pre-numbered countersunk apertures 57—58 that discharge the contents 59 over the upper end of the conveyors 55—56 as such come up over and down around the conveyor roller 25. The housing 65 receives the discharged tablets 59 through the spout 67 so that the angularity of the conveyor belts 55—56 and their supporting plate 20 may be varied to provide the most effective filling of the countersunk apertures 57—58. A threaded bolt 71 projects through an arcuate groove 72 in the upstanding plate or standard 12 for engagement with the lower end of the conveyor supporting plate 20 so that angular supporting adjustment may be effected through the bolt 71 and its position in the arcuate groove 72.

Any number of separated series of a predetermined number of countersunk apertures 57—58 may be provided in the outside conveyor belt 56 so that only partial displacement of the conveyor belts 55—56 will fill a container to increase the capacity of packaging. Only enough spacing between each series is required to allow the attend-

ant enough time to change containers. The lower conveyor belt 55 supports the tablet 59 in the aperture 57—58. In the case of non-coated tablets 59, such as aspirin, intermittent movement of the conveyor belts 55—56 has been found most effective to insure the deposit of tablets 59 in each of the countersunk apertures 57—58; however, in the case of coated tablets which have a much more smooth exterior, continuous displacement of the conveyor belts 55—56 has been found most desirable.

So that the conveyor belts 55—56 may be either intermittently or continuously displaced, a modified embodiment of the invention is illustrated in Figures 9 to 12 inclusive. The primary elements are precisely the same except that the crank wheel 45' is fixed to a shaft 15' which is journalled in bearings 75—76 provided on confronting upstanding plates or standards 12'—12''. The shaft 15'—15'' (Figure 10) is, in this instance, split so that confronting ends 19'—19'' are fixed to cooperating clutch elements 29'—29'' which cooperate with annular flanges 34'—34'' constituting a part of the revolvable member 35'.

Spring impelled detents 32' (Figure 12) cooperate with the ratchet teeth 30' that confront the annular flanges 34' for controlling the rotation of both sections of the split shaft 15'—15'' so that one may ratchet with or relative to the other depending upon the direction of rotation of the electric motor 54'' mounted on the base 10'. The belt 51' extends from the motor pulley 53' to the peripheral groove 50' provided on the revolvable clutch element 35' (Figure 10).

As shown, the crank wheel 45' is fixed to the shaft section 15' which leads to the clutch element 29' while the axially aligned shaft section 15'' projects from the clutch element 29'' through the bearing 76 to terminate in a sprocket 77 fixed to the external shaft extremity 78 thereof. A chain 79 meshes with the sprocket 77 to extend over and in meshing engagement with the comparatively larger sprocket 80 fixed to a stub shaft 81 journalled in bearings 82—83 provided in the upstanding plates or standards 12'—12'' proximate to the top end thereof to carry the conveyor roller 17'.

The conveyor roller 17' has the double layer of interfitting endless belts 55'—56' which extend over to an upper conveyor roller similar to and positioned exactly as the conveyor roller 25 in the preceding embodiment.

It will be apparent from the showing of the confronting clutch elements 29'—29'' in Figures 11 and 12 that rotation thereof in a counter-clockwise direction (viewed from Figure 11) will effect the continuous rotation of the shafts 15'—15'' and impart correspondingly continuous linear displacement of the conveyor belts 55'—56' while the opposite rotation of the shaft section 15' will cause intermittent rotation of the shaft section 15''. This controls the character of the operation of the endless conveyor belts 55'—56' so that it can be adapted to any particular units that are most responsive to either type of movement. To this end, the electric motor 54'' is reversible so that glazed or unglazed units or tablets 59 may be counted in the most effective manner without requiring any adjustment. Substitute top belts 56 having different multiples of counting apertures 57—58 may be substituted for the specifically described belt 56.

While I have illustrated and described a preferred embodiment of this invention, it must be understood that the invention is capable of considerable variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

I claim:

1. In a counting machine, the combination with a frame, of a flexible continuous solid carrier mounted for movement on said frame, a standard connected to said frame to serve as a support thereof, means associated with said frame and standard to angularly and adjustably support said frame proximate to one end of the latter to provide for the desired inclination of said carrier, a tablet receiving hopper on said frame to confine preformed units on said flexible continuous solid carrier, there being a predetermined number of apertures in said flexible continuous solid carrier, each of said apertures having an enlarged counter-sunk entrant orifice for reception of preformed units therein from said hopper, discharge means disposed in the path of said carrier where its upper reach changes its direction of travel for guiding the delivery of said preformed units from said carrier apertures to containers as said carrier apertures pass said discharge means, and means for moving said carrier either intermittently or continuously along a predetermined path to repeat the aforesaid cycle of counting operations.

2. In a counting machine, the combination with a frame, of an endless flexible continuous solid carrier mounted for movement on said frame, a standard connected to said frame to serve as a support thereof, means associated with said frame and standard to angularly and adjustably support said frame proximate to one end of the latter to provide for the desired inclination of said carrier, a tablet receiving hopper on said frame to confine preformed units on said flexible continuous solid carrier, there being a predetermined number of apertures in said flexible continuous solid carrier, each of said apertures having an enlarged counter-sunk entrant orifice for reception of preformed units therein from said hopper, discharge means disposed in the path of said carrier where its upper reach changes its direction of travel for guiding the delivery of said preformed units from said carrier apertures to containers as said carrier apertures pass said discharge means, and means for moving said carrier either intermittently or continuously along a predetermined path to repeat the aforesaid cycle of counting operations.

3. In a counting machine, the combination with a frame of a hopper supported by said frame, a standard connected to said frame to serve as a support thereof, means associated with said frame and standard to angularly and adjustably support said frame proximate to one end of the latter to provide for the desired inclination of said carrier, an endless conveyor mounted on said frame to incline upwardly for movement on and relative to said frame beneath said hopper, there being counter-sunk recesses in said endless conveyor to receive articles to be counted from said hopper, discharge means disposed in the path of the upper reach of said conveyor where it changes its direction of travel for guiding the delivery of the articles from said counter-sunk recesses over the upper end of said conveyor, and power means for moving said endless conveyor to displace the articles from said counter-sunk recesses to said discharge guiding means.

4. In a counting machine, the combination with a frame, of a hopper supported by said frame, an endless flexible continuous conveyor mounted for movement on said frame beneath said hopper, there being countersunk recesses in said endless conveyor to receive articles to be counted from said hopper, another endless conveyor supporting the first named endless conveyor with the articles in said counter-sunk recesses, means disposed in the path of said first named conveyor where its upper reach changes its direction of travel for guiding the discharge of the articles from said counter-sunk recesses, and power means for moving said endless conveyor to displace the articles from said counter-sunk recesses to said discharge guiding means.

5. In a counting machine, the combination with a frame, of a hopper supported by said frame, an endless flexible continuous conveyor mounted for movement on said frame beneath said hopper, there being counter-sunk recesses in said endless conveyor to receive articles to be counted from said hopper, another endless conveyor supporting the first named endless conveyor with the articles in said counter-sunk recesses, means disposed in the path of said first named conveyor where its upper reach changes its direction of travel for guiding the discharge of the articles from said counter-sunk recesses, power means for moving said endless conveyor to displace the articles from said counter-sunk recesses to said discharge guiding means, and means operating responsive to said power means for moving said endless carriers either intermittently or continuously beneath said hopper.

6. In a counting machine, the combination with a frame, of a hopper supported by said frame, an endless flexible continuous conveyor mounted for

movement on said frame beneath said hopper, there being counter-sunk recesses in said endless conveyor to receive articles to be counted from said hopper, another endless conveyor supporting the first named endless conveyor with the articles in said counter-sunk recesses, a standard connected to said frame to serve as a support thereof, means associated with said frame and standard to angularly and adjustably support said frame proximate to one end of the latter to provide for the desired inclination of said conveyors, means disposed in the path of said first named conveyor where its upper reach changes its direction of travel for guiding the discharge of the articles from said counter-sunk recesses, reversible power means for moving said endless conveyor to displace the articles from said counter-sunk recesses to said discharge guiding means, and clutch means operating responsive to the rotational direction of said power means for moving said endless carriers either intermittently or continuously beneath said hopper.

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