April 3, 1962 T. E. HOWELLS 3,027,698

COUNTING AND PACKAGING MACHINE

Filed March 23, 1960 4 Sheets-Sheet 1

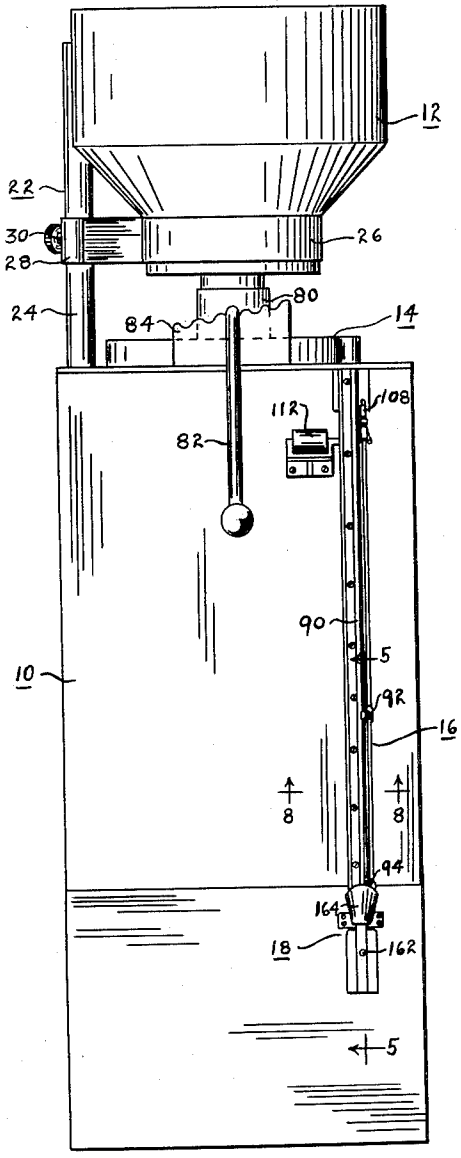


FIG. 1

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COUNTING AND PACKAGING MACHINE

Filed March 23, 1960 4 Sheets-Sheet 2

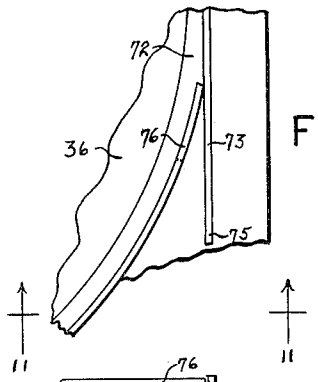


FIG. 10

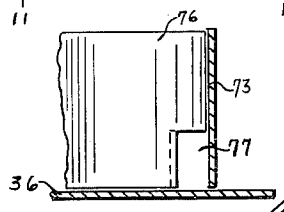


FIG. 11




FIG. 2

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COUNTING AND PACKAGING MACHINE

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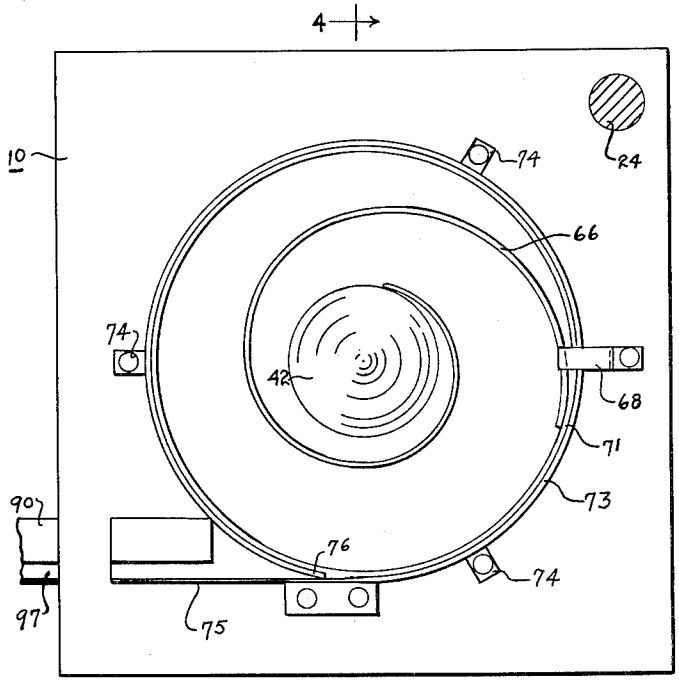


FIG. 3

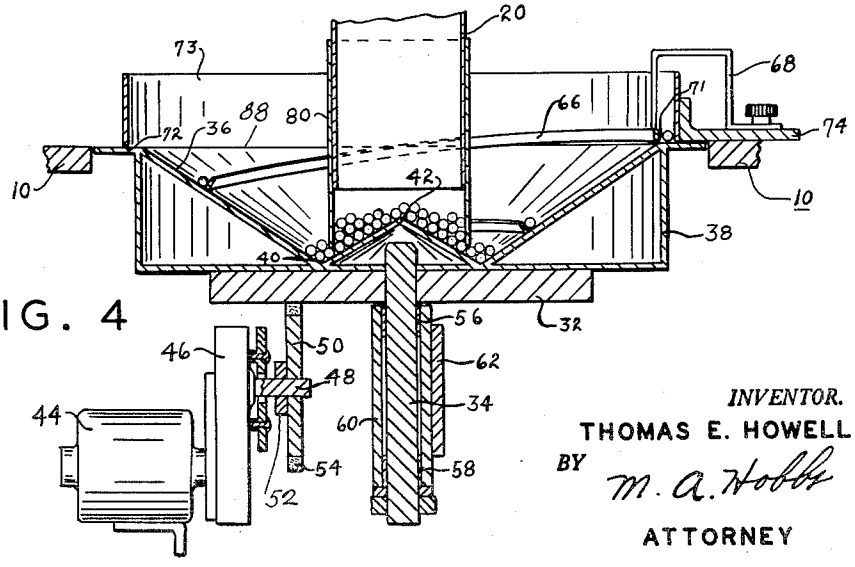


FIG. 4

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COUNTING AND PACKAGING MACHINE

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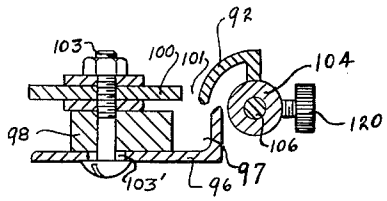


FIG. 6

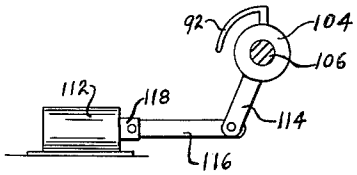


FIG. 8

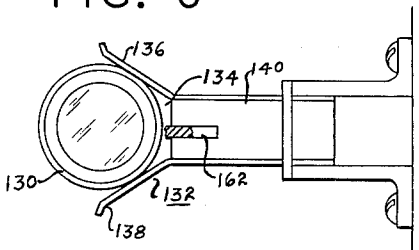


FIG. 7




FIG. 5

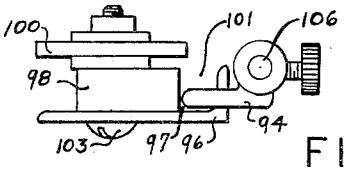


FIG. 9

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United States Patent Office

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3,027,698

# COUNTING AND PACKAGING MACHINE

Thomas E. Howells, Rte. 4, Box 76, Niles, Mich.; Frederick J. Marshall, administrator of said Thomas E. Howells, deceased, assignor to Joan W. Howells

Filed Mar. 23, 1960, Ser. No. 16,989
10 Claims. (Cl. 53—147)

The present invention relates to a counting and packaging machine, and more particularly to a machine for counting small uniform objects or articles such as pills, and for thereafter packaging them in bottles and similar containers.

In packaging relatively small orders of pills and medicinal capsules it has been necessary in the past to count the pills or capsules by hand or by manually operated devices, and manually bottling or otherwise packaging the counted objects using a funnel, and then often physically shaking or jarring the container to compact the container before the latter is closed and sealed. These manual operations are often tedious and time consuming and are often inccurate and unsanitary, and may result in damage to the pills or capsules. It is therefore one of the principal objects of the present invention to provide a machine which orients the pills or capsules to a desired position, counts the oriented objects, and thereafter packages the objects while simultaneously vibrating the container.

Another object of the invention is to provide a counting and packaging machine for small objects such as pills and capsules which is accurate, easy to maintain in operating condition ready for use on small orders either by the manufacturer, supplier, distributor or retailer of the pills, capsules or other objects, and which can be easily operated by one man with little or no skill or experience being required.

Still another object of the invention is to provide a counting and packaging machine of the aforesaid type in which the elongated capsules are oriented into end-to-end position, counted and placed in a position where they can be readily inspected before being bottled or otherwise packaged.

A further object is to provide a counting and packaging machine which can be readily installed as a complete unit using only standard electrical installations, and which is economical to use, either on small orders requiring only a few minutes to complete or relatively large orders requiring the machine to remain in continuous operation over long periods of time.

Another object of the invention is to provide a machine for efficiently counting small round and elongated objects in a continuous, semi-automatic operation, which can easily be controlled and adjusted to meet the requirements for handling objects of different size and shape, and which can be operated continuously or intermittently as required.

Additional objects and advantages of the invention will become apparent from the following description and accompanying drawings, wherein:

FIGURE 1 is a front elevational view of the present counting and packaging machine;

FIGURE 2 is a side elevational view of the machine shown in FIGURE 1;

FIGURE 3 is a top plan view of a portion of the machine shown in the preceding figures;

FIGURE 4 is an enlarged fragmentary vertical cross sectional view of the present machine taken on line 4—4 of FIGURE 3;

FIGURE 5 is an enlarged fragmentary vertical cross sectional view of the machine shown in the preceding figures taken on line 5—5 of FIGURE 1;

FIGURE 6 is a cross sectional view of a portion of the



counting mechanism of the present machine, taken on line 6—6 of FIGURE 5;

FIGURE 7 is a top plan view of the mechanism of the present machine for packaging the counted objects;

FIGURE 8 is a partial cross sectional and elevational view of a portion of the counting mechanism of the machine, taken on line 8—8 of FIGURE 1;

FIGURE 9 is an elevational view of the lower end of the mechanism for counting objects;

FIGURE 10 is a fragmentary plan view of a portion of the rejecting means of the present mechanism; and

FIGURE 11 is a fragmentary cross sectional view of the parts shown in FIGURE 10, taken on line 11—11.

Referring more specifically to the drawings, numeral 10 designates the housing and frame for the counting and packaging machine, 12 a hopper mounted on the upper end of the housing for holding the objects to be counted and packaged, 14 a power driven object orienting and channeling mechanism receiving the objects directly from the hopper, 16 an object counting mechanism receiving oriented objects from mechanism 14, and 18 a bottling or packaging mechanism positioned for receiving the counted objects from the counting mechanism 16. The power drive, including the electric motors and controls therefor, is contained in or mounted on housing 10 and is for the most part made of conventional or standard components readily available on the market. The foregoing mechanism may be of various sizes to meet requirements; however, the unit shown in the drawings is designed to be placed on a table or frame having legs the length required to place packaging mechanism 18 two to three feet from the floor.

Hopper 12 is funnel shaped with a relatively small discharge pipe 20 for delivering objects from the hopper to the orienting mechanism 14, and is supported in position above the mechanism by a support means 22 consisting of a vertical post 24 secured at its base to the upper end of the housing and a bracket having an annular band 26 for receiving the lower portion of the hopper and a clamp 28 secured to post 24 by a bolt 30. The clamp can be adjusted vertically and laterally on the post to shift the hopper both vertically and laterally with respect to the orienting mechanism. The particular orienting mechanism 14 forms an important part of the present invention and consists of a rotatable table 32 mounted on and driven through a vertical shaft 34 and having an inwardly and downwardly conically shaped member 36 rotatably supported on table 32 by a cup-shaped member 38. The conically shaped member is of uniform slope throughout and terminates at the bottom in an annular groove 40 formed by the lower margin of member 36 and a centrally disposed, axially aligned cone 42 projecting upwardly into the lower end of discharge pipe 20.

Rotatable table 32 is driven by a variable speed electric motor 44 through gear reduction mechanism 46, shaft 48, and friction roller 50 engaging the under side of table 32, and supported by a cross member 52 secured to the inner structure of housing 10, the motor being controlled by a rheostat (not shown). Roller 50 is provided with a band 54 of rubber or other suitable soft friction material to prevent slippage between the roller and table and to reduce noise which would otherwise be created by the coaction of the roller and table. Shaft 34 is journalled in bearings 56 and 58 disposed in the upper and lower ends of a sleeve 60, which in turn is rigidly supported by a cross member 62 secured to the inner structure of the housing. A spiral track 66 for picking up and orienting objects extends inwardly and downwardly adjacent the surface of conical member 36 to groove 40 and is secured in fixed position on or adjacent the upper surface of member 36 to a rigid bracket 68 which

in turn is mounted on the upper end of housing **10**. The track terminates at its upper end in a groove **71** formed by marginal flange **72** at the upper edge of conical member **36** and an upstanding ring **73** supported above the flange by a series of adjustable fixtures **74** secured thereto and to the upper end of the housing. The ends of the ring overlap, one end **75** extending tangentially therefrom, and the other end **76** extending along flange **72** and having a slot **77** therein for rejecting the unoriented objects before they pass from the orienting mechanism, to counting mechanism **16**.

The rate of delivery of the objects from the hopper to the orienting mechanism may be controlled by a vertically movable sleeve **80**, show in FIGURES 1 and 2, surrounding pipe **20** and movable up and down on the pipe by a lever **82** projecting forwardly within easy reach of the operator and supported by notched member **84** which determines the spacing between the lower end of the sleeve and the upper surface of cone **42**. The sleeve would normally be adjusted to a particular position for each size object being counted and packaged, and/or the desired rate of feed from the orienting mechanism to the counting mechanism.

The operation for orienting and rejecting the unoriented objects is performed by the frictional drag of the objects on the sloping upper surface of conically shaped member **36** as they travel upwardly from groove **40** along track **66** to groove **71**. Any unoriented objects passing through groove **71** are automatically rejected by the ledge **88** between ring **73** and the sloping portion of member **36**, the ledge being only wide enough to retain elongated objects in their end to end position. The width of ledge **88** and groove **71** is adjusted by moving ring **73** inwardly or outwardly circumferentially, the adjustment being made by adjustable fixtures **74**. If an unoriented object should fail to be rejected by ledge **88**, it is positively rejected before entering counting mechanism **16** by slot **77** which will not permit the elongated objects to pass therethrough except in their end to end position. Orienting of the objects is facilitated by having sleeve **80** properly adjusted with reference to groove **40** so that only a small quantity of objects is in groove **40** at any one time since the track tends to pick up only a single row of objects from the groove as member **36** is rotating. Tracks **66** may be replaced by different sized tracks to meet the requirements of various sized objects handled by the present machine.

Counting mechanism **16** consists of a chute **90** connected at its upper end to slot **77** and ledge **88** and discharging at its lower end into packaging mechanism **18**, and two fingers **92** and **94** automatically operated to retain therebetween a predetermined number of objects in the chute. The chute is supported at the upper end by the housing and at the lower end by a bracket **95** which in turn is secured to the housing, the chute being shiftable laterally to maintain alignment with slot **77** whenever ring **73** is adjusted for various sized objects. The embodiment of the chute shown in the drawings consists of an L-shaped bar **96** forming the bottom and one side of the chute groove **97**, a bar **98** secured to the upper side of bar **96** and forming the other side of the groove, and a strip **100** secured to the upper side of bar **98** and spaced from the opposite side of the groove to form a longitudinal opening **101** throughout the length of the chute so that the operator can observe the condition of the objects being counted and packaged and the operation of the counting mechanism. The transverse size of longitudinal groove **97** of the chute can be adjusted to handle different sized objects by sliding bar **98** laterally along with bolt **103** in slot **103'** in bar **96**.

Fingers **92** and **94** and their respective adjustable fixtures **104** and **105** are mounted on rotatable rod **106** disposed longitudinally beside the chute and journalled at the upper and lower ends in bearings **108** and **110**. The two fingers are rotated with the rod to form an escapement mechanism which is operated by a solenoid **112** through a linkage consisting of a lever **114** attached rigidly to rod **106** and a lever **116** connected to the end of lever **114** and to plunger **118** of solenoid **112**. The solenoid contains a spring (not shown) for returning the rod and fingers to their original position after a counted number of objects in the chute has been released to the packaging mechanism by operation of the solenoid. The counting mechanism is normally in the filling position with finger **94** across the lower end of groove **97** and finger **92** raised from the groove. With the fingers in this position, objects from groove **71** of the orienting mechanism fill the groove **97** completely above finger **94**, in end-to-end position if the objects are elongated. When the solenoid is operated, finger **92** is moved into groove **97** to prevent the escape of the objects in the groove above the finger and finger **94** moves downwardly from the lower end of the groove to permit the predetermined number of objects between the fingers to pass down the chute to the packaging mechanism **18**. The number of objects in each package can be selected by shifting finger **92** to preselected locations along rod **106** to provide the correct distance between the two fingers for the desired number of objects in each package. The position of finger **92** is changed by loosening the set screws **120** in fixture **104** and sliding the fixture along the rod to the desired position.

The particular packaging mechanism **18** shown in the drawings is designed to fill small bottles **130**, and in the filling operation the bottles are held against a vibrator **132** consisting of a slot **134** formed by two side members **136** and **138** mounted on a body member **140**. Member **140** is pivoted on a pin **142** supported by a bracket **144** on the front of the housing and is oscillated rapidly while the pills or capsules are entering the bottle through a linkage **146** by an eccentric **148** driven by an electric motor **150**, the linkage consisting of a rod **152** connected to the eccentric and a spring **153** interposed between the lower end of the rod and a stem **154** secured to body member **140**. The operation of solenoid **112** is controlled by a microswitch **160** mounted on body member **140** behind slot **134** and actuated by a stem **162** projecting into the slot for contact with the bottle, the solenoid being operated once each time a bottle is placed in slot **134**. The lower end of chute **90** discharges directly into a funnel shaped chute **164** below which the bottle is placed. The funnel **164** is mounted rigidly on body member **140** by a bolt **166** and vibrates therewith to assist in moving the objects therethrough into the bottle as the counting mechanism discharges the objects into the funnel.

In the operation of the present counter and packaging machine, starting with a supply of capsules, for example, in hopper **12** and with sleeve **80** properly adjusted to provide the desired rate of feed from the hopper into groove **40**, the motor **44** for rotating conical member **36** and motor **150** for vibrating the packaging mechanism are started and are kept in operation throughout the period the machine is in use. Rotation of conical member **36** causes the objects in groove **40** to travel therefrom upwardly along the upper or outer side of spiral track **66** into annular groove **71** and thence into chute **90**. The oval or otherwise elongated capsules are oriented in end-to-end relationship as they are moved along track **66** and are confined sufficiently in groove **71** and chute **90** to maintain this end-to-end relationship until they are discharged from the counting mechanism into funnel member **164** of the packaging unit. The capsules are moved by the rotation of member **36** along the track and through groove **71** and discharged into chute **90** continuously until the chute above finger **94**, groove **71** and the length of track **66** are filled with a single row of capsules in end-to-end position. Thereafter, until the counting machine releases the capsules in chute **90**, the capsules in groove **40** and at the bottom of conical mem-

ber 36 merely rotate with member 36, but being constantly urged toward the lower end of track 66 ready to replace those discharged by the counting mechanism. Only a small quantity of capsules are maintained in groove 40, the bulk of the capsules remaining in the hopper and feeding into the groove as required to replenish the supply.

When chute 90 has been fully filled above finger 94, which normally is positioned in groove 97 to hold the column of objects in the chute, a bottle is placed beneath funnel 164 in slot 134 and pressed against stem 162 closing micro-switch 160. The closing of the switch energizes solenoid 112, rotating rod 106 in the clockwise direction, as seen in FIGURE 8, thereby placing finger 92 in groove 97 to hold the capsules in the groove above the latter finger, and depressing finger 94 to the point where it does not obstruct the chute. The column of capsules in chute 90 below finger 92 is now free to slide from the chute through funnel 164 into bottle 130 which is being vigorously vibrated to cause the capsules to settle compactly in the bottle, wherein they will not interfere with the final packing and sealing of the bottle. The filled unsealed bottle is then removed from the machine and another bottle inserted in slot 134 for filling in the manner described. The procedure is repeated from one bottle to the next until the counting and packaging operation has been completed.

The machine can be used with or without the packaging mechanism and used by a series of operations to count any number of objects. While only one embodiment of the present object counting and packaging machine has been described in detail herein, various changes and modifications may be made to suit requirements without departing from the scope of the invention.

I claim:

1. A counting and packaging machine, comprising a housing, an inwardly and downwardly extending conical member mounted on said housing, an upwardly extending cone disposed in the center of said member and forming a groove with said member, a shaft concentric with said member for rotatably supporting said member, an electric motor for rotating said shaft, an upwardly and outwardly extending spiral track extending from said groove to the margin of said member, an annular wall above said first mentioned member forming a groove with said track for receiving oriented objects, a hopper for supplying objects to said first mentioned member having restricted cylindrical discharge conduit above the center of said member for discharging objects into said first mentioned groove, a sleeve in telescopic relation with said conduit for varying the opening at the bottom of the hopper, means for adjusting the position of said sleeve, an inclined chute connected at its upper end to said second mentioned groove, a rotatable rod positioned along said chute, a pair of spaced fingers on said rod operable with said rod to release a predetermined number of objects from said chute, means for varying the spacing of said fingers on said rod, a solenoid for rotating said rod to operate said fingers, a body member adjacent the lower end of said chute having a slot means for receiving a package to be filled, a means for vibrating said body member including an eccentric, an electric motor for driving said eccentric and a linkage having a spring therein connecting said eccentric with said body member, a funnel means at the bottom of said chute for directing objects from the chute into the package when the latter is in receiving position, and a switch actuated by the packages when in receiving position for energizing said solenoid.

2. A counting and packaging machine, comprising an inwardly and downwardly extending conical member, an upwardly extending cone disposed in the center of said member and forming a groove with said member, a shaft concentric with said member for rotatably supporting said member, an electric motor for rotating said shaft, a spiral track adjacent the upper surface of said member, an annular wall above said first mentioned member forming a groove with said track for receiving oriented objects, a hopper for supplying objects to said first mentioned member having restricted discharge conduit above the center of said member for discharging objects into said first mentioned groove, an inclined chute connected at its upper end to said second mentioned groove, a rotatable rod positioned along said chute, a pair of spaced fingers on said rod operable with said rod to release a predetermined number of objects from said chute, means for varying the spacing of said fingers on said rod, a solenoid for rotating said rod to operate said fingers, a body member adjacent the lower end of said chute having a slot means for receiving a package to be filled, a means for vibrating said body member including an eccentric, an electric motor for driving said eccentric and a linkage having a spring therein connecting said eccentric with said body member, a funnel means at the bottom of said chute for directing objects from the chute into the package when the latter is in receiving position, and a switch actuated by the packages when in receiving position for energizing said solenoid.

3. A counting and packaging machine, comprising an inwardly and downwardly extending conical member, an upwardly and inwardly extending member disposed in the center of said first mentioned member and forming a groove with said member, a means for rotatably supporting said member, a spiral track adjacent the upper surface of said member, an annular wall above said first mentioned member forming a groove with said track for receiving oriented objects, an inclined chute connected at its upper end to said second mentioned groove, a rotatable rod positioned along said chute, a pair of spaced fingers on said rod operable with said rod to release a predetermined number of objects from said chute, means for varying the spacing of said fingers on said rod, a solenoid for rotating said rod to operate said fingers, a body member adjacent the lower end of said chute having a slot means for receiving a package to be filled, a means for vibrating said body member including an eccentric, an electric motor for driving said eccentric and a linkage having a spring therein connecting said eccentric with said body member, a funnel means at the bottom of said chute for directing objects from the chute into the package when the latter is in receiving position, and a switch actuated by the packages when in receiving position for energizing said solenoid.

4. A counting and packaging machine, comprising an inwardly and downwardly extending conical member, an upwardly and inwardly extending member disposed in the center of said first mentioned member and forming a groove with said member, a means for rotating said member, a spiral track adjacent the upper surface of said member, an annular wall above said first mentioned member forming a groove with said track for receiving objects, an inclined chute connected at its upper end to said second mentioned groove, a rotatable rod positioned along said chute, a pair of spaced fingers on said rod operable with said rod to release a predetermined number of objects from said chute, means for varying the spacing of said fingers on said rod, a solenoid for rotating said rod to operate said fingers, a body member adjacent the lower end of said chute having a slot means for receiving a package to be filled, a means for vibrating said body member, and a funnel means at the bottom of said chute for directing objects from the chute into the package when the latter is in receiving position.

5. A counting and packaging machine, comprising an inwardly and downwardly extending conical member, a means for rotatably supporting said member, a motor for rotating said member, a spiral track adjacent the upper surface of said member, an annular wall above said first

mentioned member forming a groove with said track for receiving objects, an inclined chute connected at its upper end to said groove, a rotatable rod positioned along said chute, a pair of spaced fingers on said rod operable with said rod to release a predetermined number of objects from said chute, means for varying the spacing of said fingers on said rod, a solenoid for rotating said rod to operate said fingers, and means at the lower end of said chute for positioning a package for receiving counted objects.

6. An object counting machine, comprising a housing, a downwardly extending conical member, an upwardly extending cone disposed in the center of said member and forming a groove with said member, a shaft concentric with said member for rotatably supporting said member, an electric motor for rotating said shaft, an upwardly and outwardly extending spiral track extending from said groove to the margin of said member, an annular wall above said first mentioned member forming a groove with said track for receiving oriented objects, a hopper for supplying objects to said first mentioned member having restricted cylindrical discharge conduit above the center of said member for discharging objects into said first mentioned groove, a sleeve in telescopic relation with said conduit for varying the opening at the bottom of the hopper, means for adjusting the position of said sleeve, an inclined chute connected at its upper end to said second mentioned groove, a rotatable rod positioned along said chute, a pair of spaced fingers on said rod operable with said rod to release a predetermined number of objects from said chute, means for varying the spacing of said fingers on said rod, and a means for rotating said rod to operate said fingers.

7. An object counting machine, comprising an inwardly and downwardly extending conical member, an upwardly and inwardly extending member disposed in the center of said first mentioned member and forming a groove with said member, a shaft concentric with said member for rotatably supporting said member, an electric motor for rotating said shaft, an upwardly and outwardly extending spiral track extending from said groove adjacent the upper surface of said member, an annular wall above said first mentioned member forming a groove with said track for receiving oriented objects, a hopper for supplying objects to said first mentioned member having restricted discharge conduit above the center of said member for discharging objects into said first mentioned



groove, an inclined chute connected at its upper end to said second mentioned groove, and means associated with said chute for separating a predetermined number of objects.

8. An object counting machine, comprising an inwardly and downwardly extending conical member, a means for rotating said member, a spiral track extending to the margin of said member and being positioned adjacent the upper surface thereof, an annular wall above said first mentioned member forming a groove with said track for receiving objects, an inclined chute connected at its upper end to said groove, and means associated with said chute for separating a predetermined number of objects.

9. In an object counting machine, an inwardly and downwardly extending conical member, an upwardly and inwardly extending member disposed in the center of said first mentioned member and forming a groove with said member, a shaft concentric with said member for rotatably supporting said conical member, an electric motor for rotating said shaft, an upwardly and outwardly extending spiral track extending from said groove to the margin of said first mentioned member, an annular wall above said first mentioned member forming a groove with said track for receiving oriented objects, and a hopper for supplying objects to said first mentioned member having restricted cylindrical discharge conduit above the center of said member for discharging objects into said first mentioned groove.

10. In an object counting machine, an inwardly and downwardly extending conical member having an annular groove in the lower portion thereof, a means for rotatably supporting said member, a means for feeding objects to said groove, a spiral track extending upwardly from said groove adjacent the upper surface of said member, and an annular wall above said first mentioned member forming a groove with said track for receiving objects.

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