Nov. 16, 1965 B. C. EISENBERG 3,217,760

MACHINE AND METHOD FOR FILLING CONTAINERS

Filed Jan. 4, 1963 7 Sheets-Sheet 1

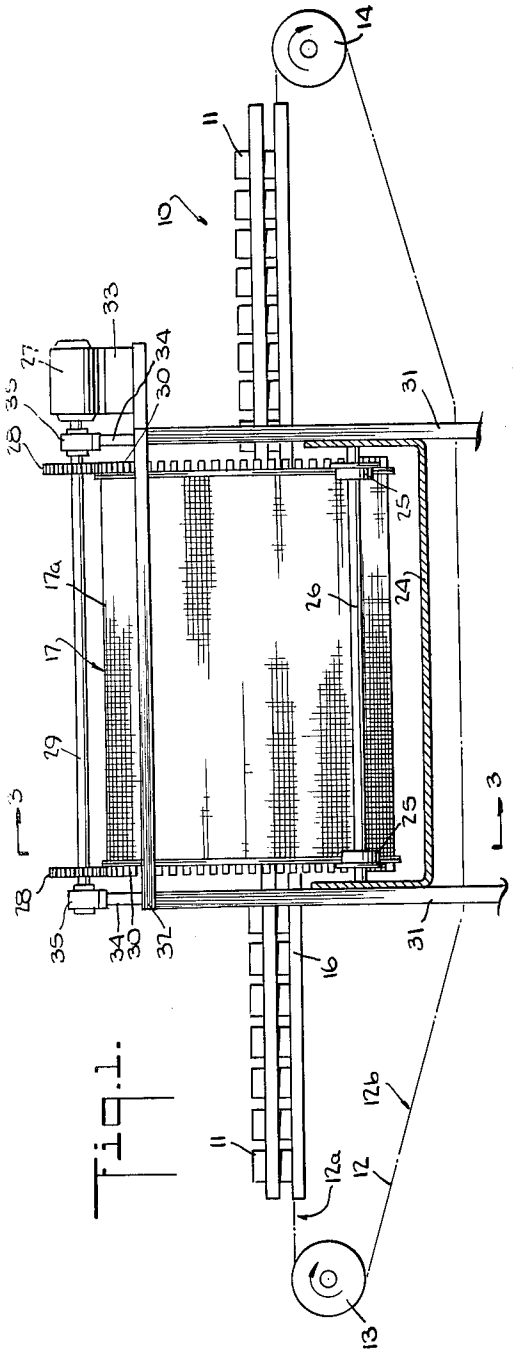

Fig. 1.

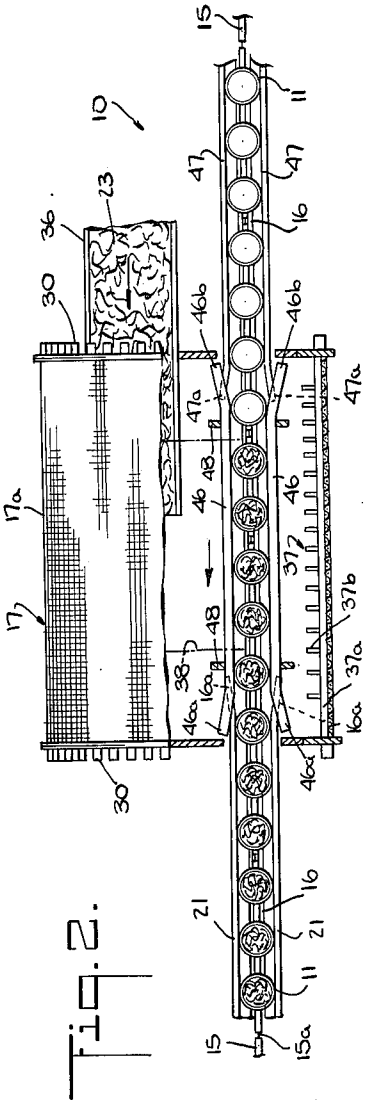

Fig. 2.

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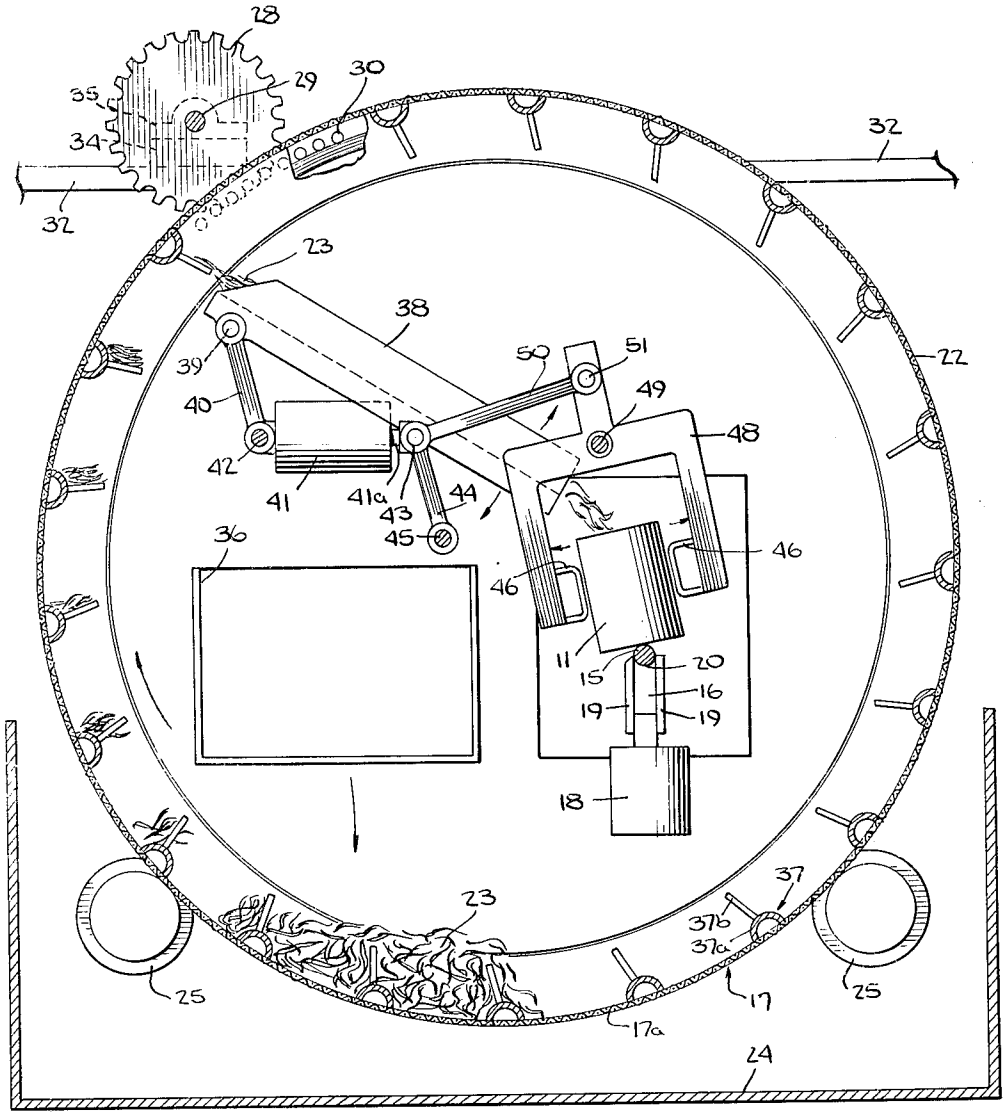

Fig. 3.

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MACHINE AND METHOD FOR FILLING CONTAINERS

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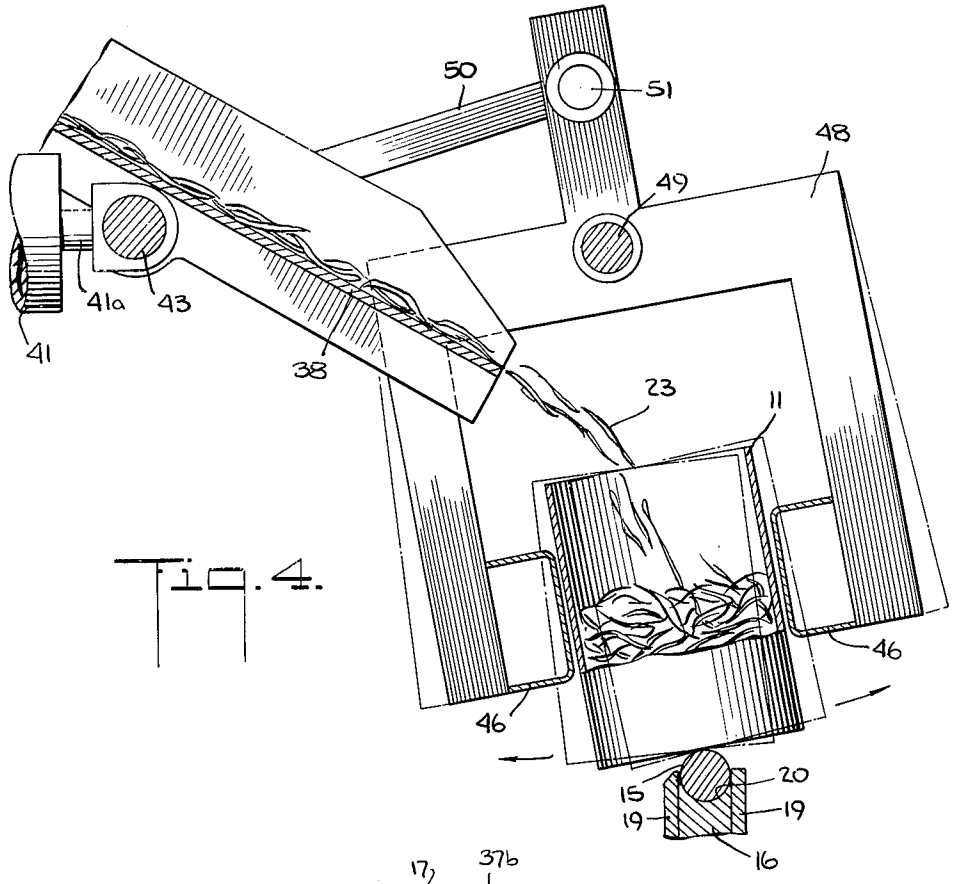

Fig. 4.

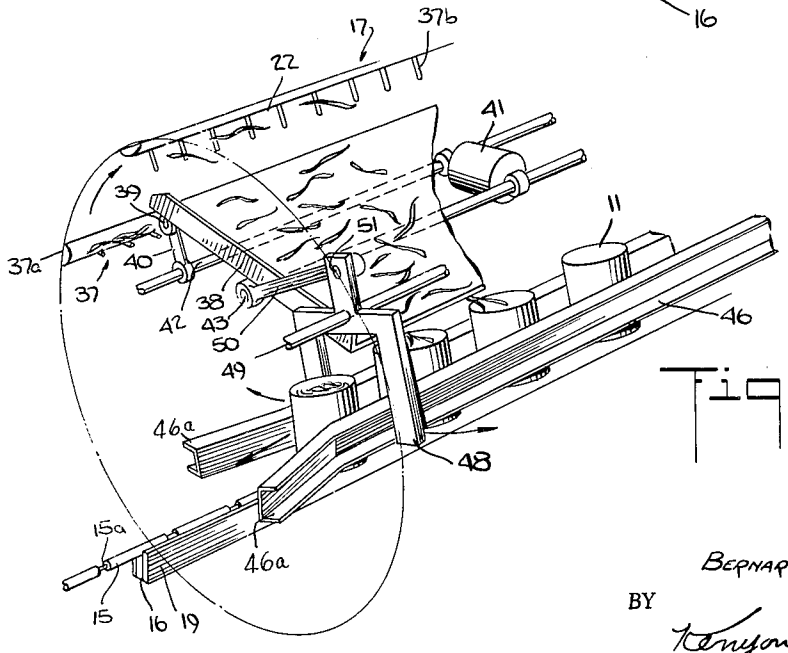

Fig. 5.

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MACHINE AND METHOD FOR FILLING CONTAINERS

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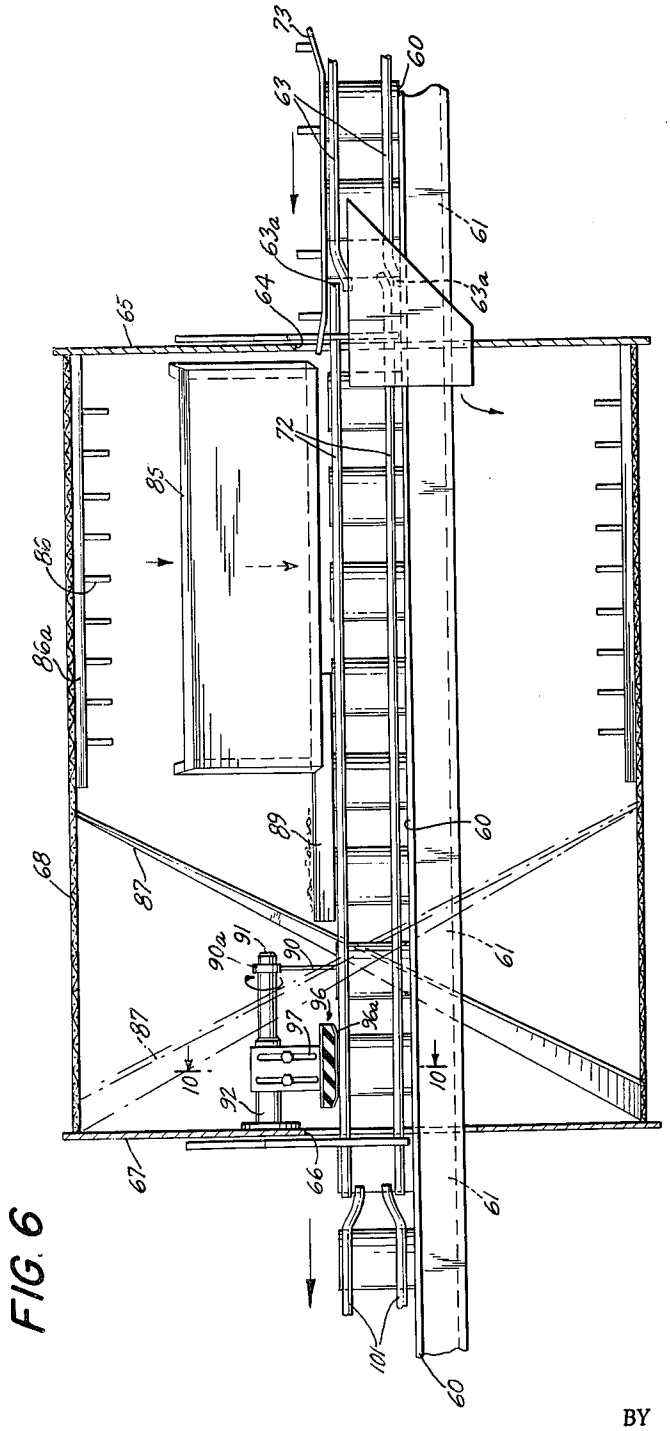

FIG. 6

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FIG. 7

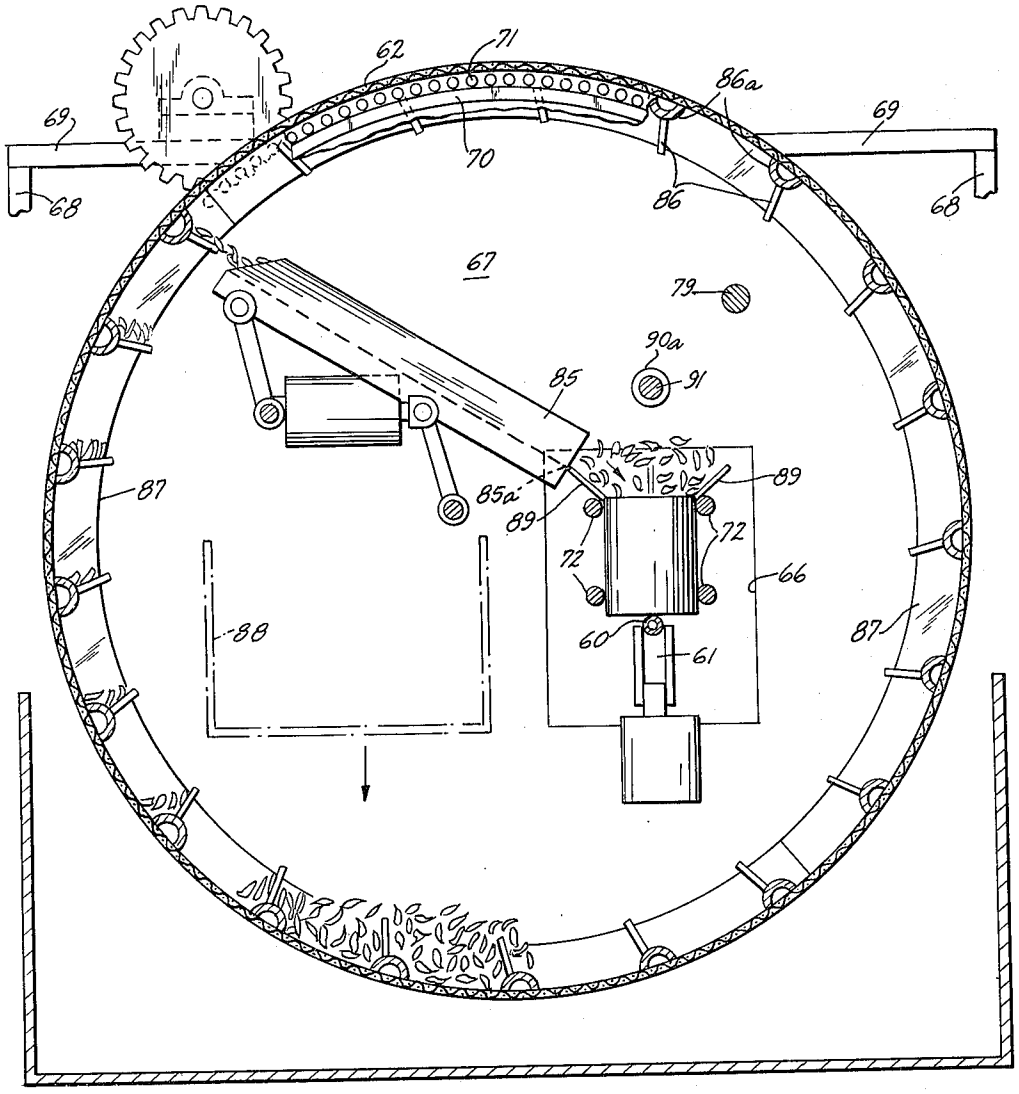

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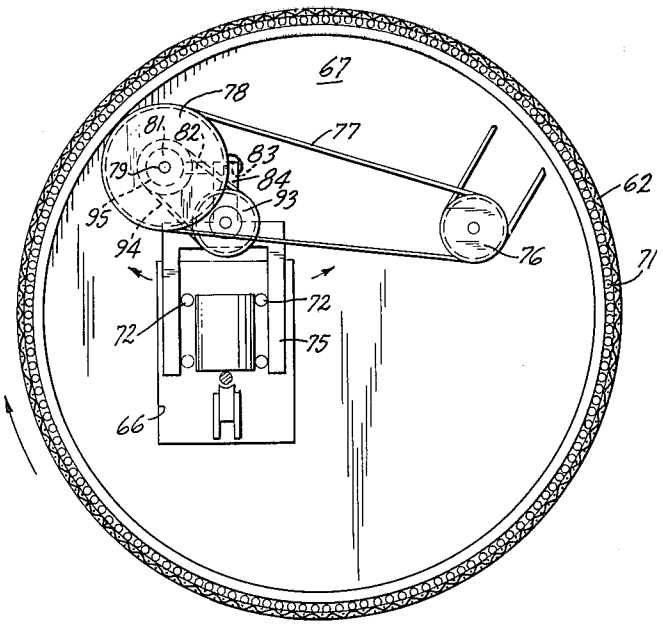
FIG. 8



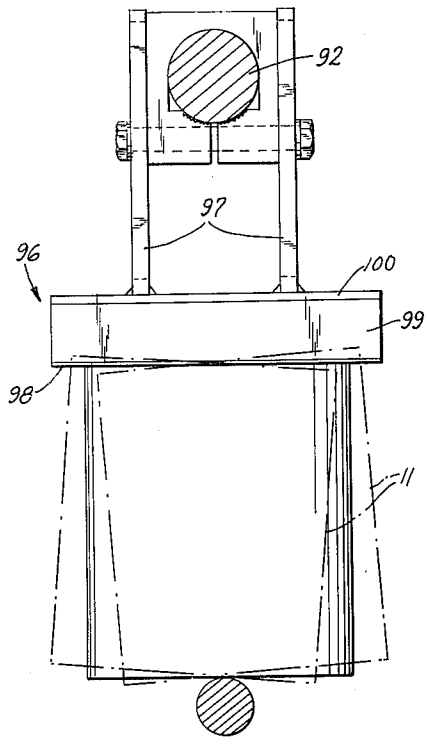


FIG. 10

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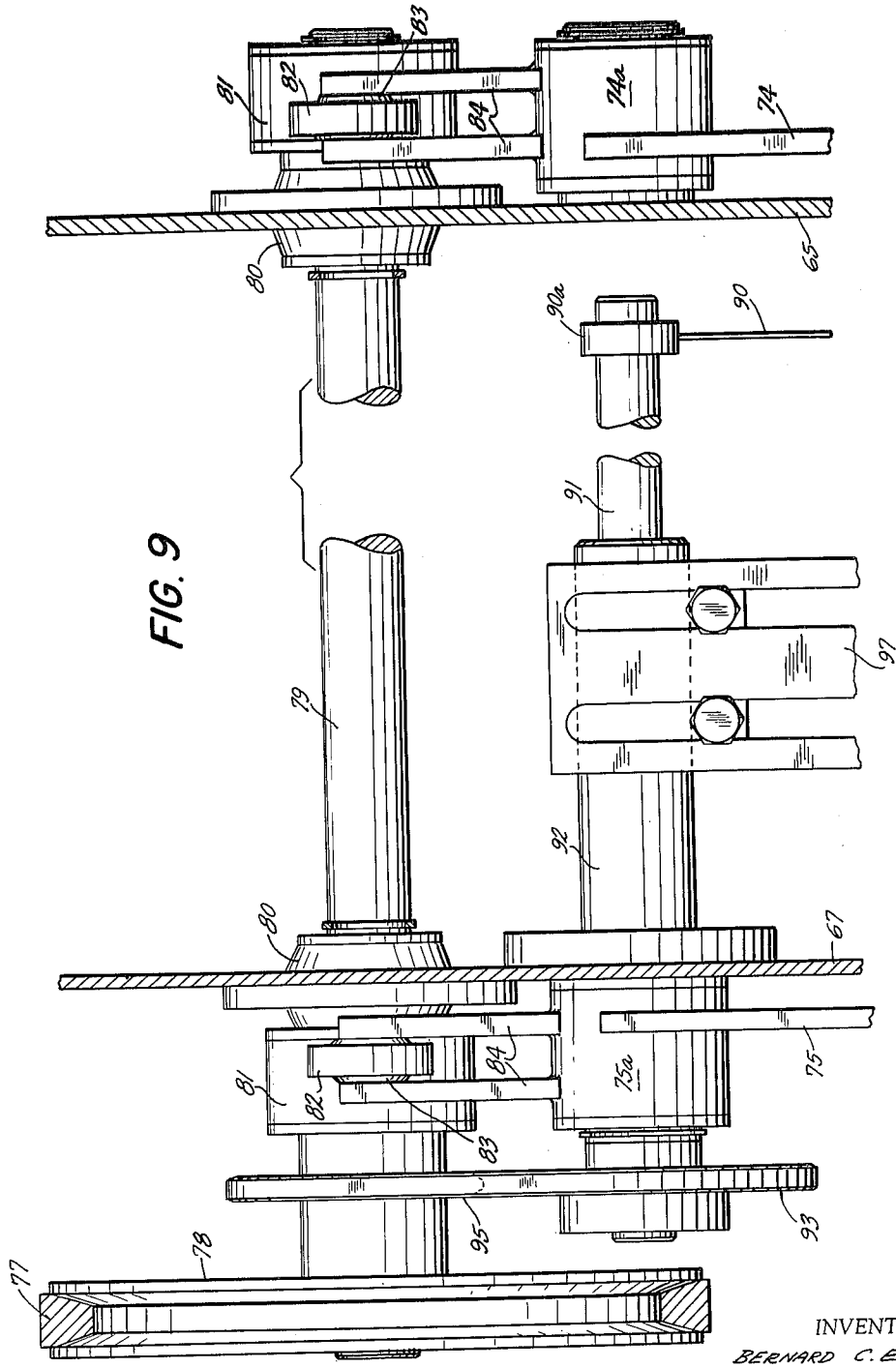
FIG. 9



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United States Patent Office 3,217,760 Patented Nov. 16, 1965

3,217,760

MACHINE AND METHOD FOR FILLING CONTAINERS

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Filed Jan. 4, 1963, Ser. No. 249,522
23 Claims. (Cl. 141—12)

This application is a continuation-in-part of application Serial No. 165,147, filed January 9, 1962, now abandoned.

This invention relates to a machine for filling containers and more particularly it is concerned with the filling of containers with substantially elongated material.

When packing material such as food care must be taken to avoid breaking and crushing the food while at the same time it is necessary to fill the container with the proper amount since food products normally are sold by the net weight of the container. When the food material is in a finely divided state, in liquid form, or in relatively small pieces the container may be accurately filled by merely flowing the material into its interior. Filling the container with such material to a controlled level insures that the weight of material is satisfactorily controlled. On the other hand if the material is irregularly shaped, elongated, or shredded, it cannot be simply flowed into the container since it would tend to pile up and obstruct the opening to the container. Consequently there would be no certainty that each container would be filled with the proper amount.

Certain types of food products having an elongated form such as pickles have been successfully packed into containers by machines since at the time of packing, the pickles are substantially rigid and have a sufficiently hard surface to resist damage. However machines which are adapted to package pickles and the like are completely unsatisfactory for types of food products which have a narrow elongated form or which are shredded. An example of such material is string beans which are in the so-called french-cut form, that is the beans are sliced along their longitudinal axes. French-cut string beans prior to packing are customarily blanched but the beans are still delicate and brittle and therefore difficult to handle without breaking and damaging them. French-cut string beans therefore cannot be simply flowed into a container since their finely elongated form would result in the beans tangling into a mass which would tend to pile up and bridge across the opening of the container. Furthermore the delicate and brittle nature of the beans makes it impossible to employ any apparatus to positively force the french-cut beans into the container.

Because of these difficulties in packing french-cut beans and food material of a like nature, it has been customary to employ manual filling of the containers or manual filling wtih some limited mechanization. In the case of the french-cut beans the machine operators place a quantity of the beans into a cavity which is subsequently formed into a cylindrical body so that the contents may be urged into a container. Obviously such an arrangement is limited in production by the skill and dexterity of the operator in estimating the proper weight of beans to be inserted into the cavity and in correctly positioning the beans therein. This type of manual operation is inherently of low production and costly from the standpoint of the amount of labor required. In addition hand packing makes it difficult to control the weight of the contents accurately.

Another problem related to packing elongated material is the tendency for such material to extend out of the opening of the container. If the container cover or top is applied when the material is extending out of the container, the material can be forced into the cover seal region upon closing the container and thereby cause leakage.

The present invention overcomes these disadvantages by providing a machine for filling containers with material which may have an irregular or elongated shape. The machine employs a raking motion to separate a portion of the material from a quantity within the machine in order that the material may be oriented in a manner suitable to enable it to pass into the containers. The raking action untangles the particles of the material so that they are free to fall into and fill the containers. In this way the containers can be reliably filled without damaging the food product.

The present invention further overcomes these disadvantages by applying a swinging motion to the containers during the filling operation in order that the accompanying normal acceleration be directed constantly toward the bottom portion of the containers. With this arrangement centrifugal force in response to the normal acceleration urges the material to pass downwardly into the containers toward their bottom portion. Thus the swinging motion tends to force the articles of food material to pass through the container opening and to be tightly distributed within the container.

The primary object of the present invention is to provide a machine for filling containers with material in a substantially narrowly elongated or shredded form.

Another object of the present invention is to provide a raking apparatus which is adapted to separate a portion of material having an elongated form from a quantity of the material.

An additional object of the present invention is to provide a raking apparatus to orient the elongated material separated from a quantity of the material.

Another additional object of the present invention is to provide a swinging motion to containers to be filled so that the material is subjected to a centrifugal force directed toward the bottom portion of the containers.

A further object of the present invention is to facilitate the entry of the articles into the containers by vibrating the containers as they are subjected to the swinging motion.

Another further object of the present invention is to vibrate the material released from the raking apparatus to insure that it remains untangled as the material is directed toward the containers.

Still a further object of the invention is to insure that the material does not extend out of the upper portion of the container after filling.

Briefly described the invention comprises a rotating drum adapted to receive the material to be placed into the containers. A conveyor moves the containers through the rotating drum substantially parallel to its axis of rotation. Raking apparatus disposed within the drum is adapted to rake a portion of the material from the quantity of it disposed within the drum and thereby separate it from the rest of the material. As the raking apparatus moves a portion of the material from the remainder it untangles the material and orients it substantially along the raking apparatus. Movement of the drum advances the raking apparatus to a position at which the raked material is released from the raking apparatus and moves toward the containers on the conveyor. The particles of the material having been separated and untangled from one another by the raking action fall toward and enter into the openings of the containers. To facilitate the entry of the material into the containers and to insure that the containers are completely filled, they are subjected to a swinging motion having a normal acceleration constantly toward their bottom portion with the result that centrifugal force in response to the normal acceler-

ation urges the material into the container. In this way the containers are filled as they are conveyed through the drum.

In another embodiment of the invention a chute is disposed between the position at which the material is released from the raking apparatus and the location of the cans being conveyed through the drum in order to direct the material released from the raking apparatus toward the containers.

In still another embodiment of the invention, the chute arrangement is vibrated in order to insure that the material released from the raking apparatus remains untangled as it moves toward the containers.

In an additional embodiment of the invention a vibrating device engaged with the conveyor assists the swinging motion of the containers in insuring that the material completely fills them.

A further additional embodiment of the invention comprises a vibrating device adapted to be commonly connected to both the chute arrangement and the conveyor.

In still a further embodiment of the invention means are provided for preventing the material from extending beyond the upper portion of the container.

Other objects and advantages will become apparent from the following description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a front elevational view of the machine of the present invention;

FIG. 2 is a plan view of the machine for filling containers;

FIG. 3 is an enlarged vertical cross sectional view taken along line 3—3 in FIG. 1;

FIG. 4 is an enlarged vertical sectional view of the chute and the yoke for swinging the containers with respect to the conveyor;

FIG. 5 is a perspective view of the rotating drum and the apparatus within for filling the containers;

FIG. 6 is a front elevational view of another embodiment of the machine of the invention showing various elements for removing material extending from the top portion of the containers;

FIG. 7 is a side elevational view of the entrance portion of the embodiment of FIG. 6;

FIG. 8 is a side elevational view of the exit portion of the embodiment of FIG. 8;

FIG. 9 is an enlarged front elevational view of the drives for the means for swinging the containers and the means for removing material adjacent the top portion of the containers;

FIG. 10 is a vertical sectional view taken along the line 10—10 in FIG. 6 and showing the means for cutting material adjacent the top portion of the containers.

FIGS. 1 and 2 illustrate a typical arrangement for machine 10. Containers such as cans 11 enter the machine along the upper reach 12*a* of conveyor 12. Conveyor 12 travels about pulleys 13 and 14 and has its lower reach 12*b* adjacent the bottom portion of machine 10. Conveyor 12 can be formed of a plurality of substantially cylindrical links 15 which are connected to one another by flexible joints 15*a* disposed between the links. Links 15 are supported throguh the machine by track 16 (FIGS. 1 and 5). The portion of conveyor 12 extending through rotating drum 17 is provided with vibrator 18. Actuation of the vibrator causes track 16 to vibrate substantially in a vertical manner since it is freely disposed between side plates 19. The upper portion of track 16 is provided with concave groove 20 which is adapted to receive the cylindrical form of conveyor 12 (FIG. 3).

Cans 11 advancing toward drum 17 are aligned with respect to conveyor 12 by side rails 21. Shell 22 of rotating drum 17 may be perforated so that excess moisture in the material being packed such as french-cut string beans 23 may fall into tank 24 disposed beneath machine 10. Rotating drum 17 is supported by rollers 25 which are attached to shaft 26 (FIGS. 1 and 3). Motor 27 drives

the drum in rotation by the engagement of sprockets 28 on shaft 29 with rollers 30 disposed about the circumference of the drum at each of its ends. The frame of the machine includes uprights 31 which support rails 32. Mount 33 of motor 27 is supported by rails 32 as also are spacers 34 for bearing blocks 35 of shaft 29.

French-cut beans 23 which are to be packed into cans 11 are delivered into drum 17 by means of passage 36 which extends into the interior of the drum. The beans move into the drum in the direction of the arrow shown adjacent passage 36 in FIG. 3 and drop into the bottom portion of the drum. Within the drum extending from one end to the other substantially parallel to its longitudinal axis are a plurality of rakes 37. Each of the rakes comprises base member 37*a* from which extends a plurality of elongated members or tines 37*b*. As the drum revolves the rakes engage a portion of the mass of beans in the bottom portion of the drum and rake away the engaged portion in the direction of rotation of the drum. As the rakes advance upwardly in the direction of the arrow indicating the rotation of drum 17 in FIG. 3, the excessive portion of the beans adjacent the rake falls away with the result that the remaining portion consists of beans which are substantially untangled from one another and disposed along tines 37*b*. The tumbling action of the beans adjacent the bottom portion of the drum plus the raking action serves to prevent the beans within the drum from being tangled into a mass.

Tines 37*b* preferably are inclined in a forward direction with respect to the direction of rotation of the drum so that at a predetermined position adjacent to the upper portion of chute 38, the beans engaged with the rake can fall from it onto the chute. Chute 38 which is pivotally attached at pivot 39 to supporting link 40 extends downwardly to a location adjacent to cans 11 being conveyed through the machine. The opposite end of link 40 is mounted on supporting shaft 42. To assist the downward movement of beans 23 along chute 40 and to assist the beans in untangling from one another, chute 38 is vibrated by actuator 41 which may be of the well-known pneumatic type comprising a cylinder containing a piston attached to an actuator rod. Such an actuator is provided with a control valve device to deliver compressed air to the cylinder in a manner to cause the actuator to reciprocate at a predetermined frequency. Actuator 41 is pivotally attached at shaft 42 at one end and on its other end to shaft 43 engaged with chute 38. The reciprocating motion of actuator rod 41*a* oscillates chute 38 about pivot 39. Supporting link 44 extends from pivot 45 secured to the frame of the machine to shaft 43.

Adjacent the entrance into the rotating drum, side rails 16 terminate with diverging portion 16*a*. At this location the cans pass in between guide members 46 which engage the outer side walls of the cans. To facilitate the entrance and exit of the cans with respect to guide members 46, the guide members are provided with divergent portions 46*a* and 46*b* at their entrance and exit ends, respectively. After passing beyond divergent end portions 46*b*, cans 11 enter between side rails 47 which continue to the end of the machine.

In order to insure that beans 23 moving down chute 38 enter into and completely fill cans 11, the cans are provided with a swinging motion in a plane transverse to their line of motion along conveyor 12. As shown in FIGS. 3 and 5 guide members 46 are attached to yokes 48 which are pivotally supported about fixed shaft 49. The drive for the oscillating or swinging motion of the cans originates at the connection of reciprocating arm 41*a* to shaft 43. Connecting rod 50 which is pivotally connected at pivots 51 to yokes 48 transmits the motion of shaft 43 to the yokes. Thus a single actuator can provide oscillating motion to chute 38 as well as yokes 48. Since the point of rotation of yokes 48 is fixed shaft 49 which is disposed above the bottom portion of the cans, it may be seen that the cans are rotated about fixed shaft

49 and have a normal acceleration constantly in a direction toward the bottom portions of the cans. The normal acceleration results in centrifugal force being applied in a direction toward the bottoms of the cans to not only the cans but to beans which are in contact with the cans. The centrifugal force component serves to force the beans tightly into the cans so that the complete filling of the can is insured. The cylindrical section of conveyor links 15 enables cans 11 to move in the swinging manner transversely to the links. The actuator control valve setting may be adjusted to set the frequency of its reciprocation and therefore the frequency of oscillation of chute 38 and yokes 48.

The mean position of yokes 48 and guide members 46 can be inclined to the vertical so that the means position of the swinging motion of cans 11 is also inclined to the vertical (FIG. 4). This arrangement tilts the cans toward the end portion of chute 38 so that beans 23 can more conveniently enter into the openings of the cans. The filling of the cans progresses as the cans travel through the drum. The speed of rotation of drum 17 as determined by motor 27 is set to insure that the drum operates at a speed great enough to bring a sufficient quantity of beans onto chutes 38 in order to insure that cans leaving the machine are completely filled. By observation of this condition the operator can set the optimum speed of the drum. A speed in excess of the optimum results in a surplus of beans falling to the bottom of the drum where they are again engaged by rakes 37. Too slow a speed causes an insufficient number of beans to be released onto chute 38 with the result that cans 11 leave the machine without being completely filled.

In another embodiment of the invention the means for conveying the cans through the machine is conveyor 60 which includes an endless rubber-covered steel cable (FIGS. 6 and 7). The upper reach of the conveyor throughout the machine is supported by track 61. As cans 11 approach rotating drum 62 they are maintained in a row disposed above conveyor 60 by means of parallel spaced guide rails 63. At the entrance end of the machine conveyor 60 passes through opening 64 in end plate 65. At the exit end of the machine conveyor 60 extends through opening 66 in end plate 67. At each end of the machine uprights 68 mount beams 69 to which are attached arcuate tracks 70 for supporting rollers 71 extending from each end of rotating drum 62. The weight of the rotating drum is distributed over a plurality of rollers 71 by providing that each arcuate track extends over an arc of at least about 90°.

Adjacent the entrance end of the drum, guide rails 63 are provided with divergent portions 63*a* which extend away from one another and in a generally downward direction (FIG. 6). Divergent portions 63*a* enables cans 11 to move in the lateral direction as they come under the influence of swinging bars 72. Adjacent the entrance end of the drum, cans 11 are urged downwardly towards conveyor 60 by the force of flat spring 73 which insures that the cans remain engaged with the conveyor even though the portion of the conveyor extending through the drums is vibrated in a vertical plane by a vibrator such as that shown in FIG. 3. Thus the flat spring facilitates the transfer of each can from between divergent portions 63*a* of the guide rails to between swinging bars 72.

Swinging bars 72 are attached to yokes 74 and 75 which are pivotally mounted with respect to end plates 65 and 67, respectively (FIG. 9). Sleeves 74*a* and 75*a* of the yokes contain the bearings supporting the yokes about their axis of rotation. The drive for reciprocating the yokes in an arcuate manner for swinging the cans begins with a motor (not shown) which drives pulley 76. By means of V-belt 77, pulley 76 drives pulley 78 attached to shaft 79 which extends through the end plates and is retained therein by bearings 80. At each end of shaft 79 adjacent the end plates there is provided eccentrics 81 disposed about shaft 79 and connected by link 82 and pivot 83 to arms 84 extending from yoke sleeves 74*a* and 75*a*. Since the axis of rotation of the yokes is above that of the path of travel of the cans it can be seen that the swinging motion imparted to the cans is accompanied by a radial or normal acceleration which is directed toward the bottom portion of the cans whenever they are being swung by the yoke and swinging bar assembly.

As shown in FIG. 7 the rotating drum contains chute 85 which is adapted to be vibrated similarly as that shown for chute 38 in FIG. 3. As shown in FIG. 6 chute 85 extends from adjacent end plate 65 through a portion of the length of the rotating drum. Similarly as in the arrangement of FIG. 3 tines 86 extending from base members 86*a* form a plurality of rakes disposed about the inner circumference of the rotating drum. Each of the rakes is adapted to separate and untangle a portion of the material to be packed into the containers from the mass of material in the lower portion of the drum. The rakes extend along the portion of the drum adjacent to chute 85 (FIG. 6). Baffles 87 which are in the form of a portion of a helix are secured to the inner surface of the drum adjacent end plate 67 and are inclined with respect to the axis of rotation of the drum in order that the baffles direct the material in the direction of the entrance portion of the drum as it rotates in a clockwise direction as viewed at the entrance end. In this way the material which is delivered into the drum through feeding opening 88 in end plate 65 (FIG. 7) is constantly urged in the direction of end plate 65 so that the rakes formed by tines 86 can deliver the material to chute 85 as the drum rotates.

The material, sliding down chute 85 as the chute which is vibrated as an aid in separating the material and facilitating its downward travel, drops into the cans which are swinging beneath lower edge 85*a* (FIG. 7) of the chute. To aid in the delivery of the material into the cans from the chute, the uppermost swinging bars 72 are provided with baffles 89 extending therefrom in a diverging manner adjacent the portion of the chute toward the exit portion of the rotating drum (FIGS. 6 and 7). A further advantage of baffles 89 is that they serve to hold a mass of material above the cans as they move away from the chute. The mass of material disposed between baffles 89 has sufficient weight which when augmented by the normal acceleration resulting from the swinging motion of the cans causes the material to be compacted into the cans. In this way it is insured that each of the cans is fully packed.

As the cans pass beyond the end portion of baffles 89 in the direction of the exit end of the machine, the mass of material above the cans previously engaging the baffles falls downwardly into the drum and is subsequently deflected toward the entrance end of the drum by engagement with baffles 87. Following the falling away of the surplus of material above the cans, certain portions of the material can remain either extending outwardly from the top opening of the can or draped or bent over its top edge. To aid in the removal of this surplus portion of material the machine is provided with means for removing material adjacent the upper portion of the cans, that is brush 90 mounted upon shaft 91 which is supported by sleeve 92 connected to end plate 67 (FIGS. 6 and 9). Shaft 91 is driven in rotation by pulley 93 engaged thereto, belt 94 and pulley 95 which in turn is driven by pulley 78. Brush 90 can include a wire-like member or finger which is mounted by bracket 90*a* on shaft 91. The free end portion of the brush is adjusted so that the lower portion of its circular path of rotation travels adjacent to the top portion of the cans beneath with the result that it can sweep away from the top portion of the cans, any surplus material which is bunched or piled up in that location. Consequently after the cans have passed beneath brush 90 they are substantially free from material extending outwardly from their top openings.

If the cans after filling are permitted to leave the machine with portions of the material hanging over the edge of the top openings to which the cover is to be sealed, the attaining of a lasting vacuum tight seal may

be interfered with or rendered impossible. Thus even though rotating brush 90 is capable of removing practically all of the material extending from the top opening of the can it is possible that at least one fragment can remain extending over the edge of the can to which the cover is to be sealed.

To remove such a portion of material the machine is provided with means for confining the material within the can, such as shoe member 96 which is adjustably supported in height above the conveyor by bracket 97 with respect to sleeve 92 (FIG. 6). As shown in FIG. 10 the shoe member includes lower surface 98 of thin metal or the like which is attached to resilient member 99. The resilient member can comprise a pad of sponge rubber or plastic material which in turn is attached to plate 100. Leading edge 96*a* of the shoe can be contoured upwardly in order that the cans approaching the shoe can gently and progressively enter beneath bottom surface 98 (FIG. 6). As the can passes beneath the shoe and with the shoe adjusted to have an interference fit with respect to the top edge portion of the can, any portions of material extending outwardly from the interior of the can will be sheared off. As shown in FIG. 10 by virtue of the resiliency of block 99 and the flexibility of bottom surface 98, the container is free to continue its swinging motion as it advances beneath the shoe. Another embodiment of a means for confining the material within the can is a roller mounted to engage the top edge of the can in a tangential manner. Thus by rolling across the edge of the can top edge, the portions of material can be severed over the edge or urged back into the can.

Beyond end plate 67 of the machine the cans pass beyond the exit end portions of swinging bars 72 and enter between spaced guides 101 while the cans continue to be moved by conveyor 60. From this location of the machine the filled cans are ready for the next step in the canning operation.

Operation

Machine 10 requires a supply of material to be filled into the cans such as french-cut string beans 23. The beans are delivered into machine 10 along passage 36 which enters into rotating drum 17*a*. The containers which are to be filled with the french-cut beans are delivered to the machine along the upper reach 12*a* of conveyor 12. Drum 17 supported on rollers 25 is driven in rotation by the engagement of sprockets 28 with rollers 30 disposed about the circumference of drum 17 at each of its end portions. The driving force for sprockets 28 is provided by motor 27.

During rotation of the drum rakes 37 disposed along its interior in a direction substantially parallel to the longitudinal axis of the drum rake portions of the beans from the quantity of beans at the bottom of the drum. The action of rakes 37 separates portions of the beans from those at the bottom of the drum and orient the bean strips substantially along tines 37*b*. In this way portions of the beans are engaged with the rakes and at the same time substantially untangled from one another.

The rotation of the drum carries the beans engaged with the rakes to a position adjacent to the top portion of chute 38. Here the beans fall from the rakes onto chute 38 which directs them toward cans 11 being conveyed through the machine. Actuator 41 reciprocates chute 38 in a vibratory manner so that the beans are continually moving downwardly toward the cans. The vibratory motion also prevents the beans from again tangling with one another and piling up on the chute.

As the cans enter into the entrance portion of drum 17 they pass from beyond end portions 16*a* of the side rails and enter in between divergent portions 46*a* of guide members 46. While engaged between the guide members, the cans continue to rest upon links 15 of conveyor 12 which engage the bottom portions of the cans. Yokes 48 attached to guide members 46 are oscillated by means of connecting rod 50 connected to actuator 41. The motion of yokes 48 about shafts 49 disposed above the bottom portions of the cans causes the cans to swing transversely to their line of travel to the drum. This oscillating motion results in normal acceleration being constantly directed toward the bottoms of the cans. In response to the normal acceleration centrifugal force urges the beans in contact with the cans to be moved downwardly. In this way the beans are caused to completely fill the cans.

The filling of the cans continues as they pass through the drum which is driven at a speed sufficient to bring up a quantity of beans large enough to fill each of the cans as they travel through the drum. By the time each can reaches the exit portion of drum 17, it is filled. The can then passes beyond divergent end portions 46*b* of guide members 46 and enters end portions 47*a* of side rails 47.

In preparing the machine shown in FIGS. 6–10 for operation the material which is to be packed in the cans is delivered into the rotating drum by means of feeding opening 88. The drum is rotated in a clockwise direction as viewed when facing the entrance end of the drum by means of a sprocket drive similar to that shown in FIG. 3 which engages roller 71. The rollers also serve to support the drum by means of arcuate track 70.

The cans which are to be filled are delivered to the rotating drum through opening 64 in end plate 65. With the reciprocating drive to yokes 74 and 75 energized, the swinging motion is imparted to bars 72 so that the cans are subjected to the swinging motion as they advance beyond guide rails 63. Conveyor 60 within the drum can be vibrated by a vibrator arrangement similar to that shown in FIG. 3.

As the drum rotates the rakes formed by tines 86 gather a portion of the material from the bottom portion of the drum and deliver it onto chute 85. By vibrating the chute the untangling and separation of the particles of the material to be packed is facilitated. As the drum rotates baffles 87 function in the manner of an Archimedes' screw to return the material toward the entrance end portion of the drum in order that it may be picked up by tines 86.

The material sliding down the chute drops into the swinging cans. Baffles 89 extending from rails 72 direct the material into the cans and enable the material to accumulate above the containers to achieve better packing of it therein. With the material accumulated above the containers, the containers are advanced beyond the chute and proceed for a distance between the remaining portion of baffles 89.

The cans then advance beyond the end portion of baffles 89 where the excessive amount of material above their top portion drops into the drum. Next the cans advance beneath rotating brush 90 which sweeps the material away from the opening at the top of the can. Beyond the brush the cans pass beneath shoe 96, the bottom surface of which presses and wipes along the top rim of the can thereby cutting and shearing away any remaining material extending beyond the top opening of the can. As the can moves beyond the shoe the top rim and adjacent portions of the can are completely cleared of any material so that the can is ready for the remaining steps in the canning operation.

The can then passes from between bars 72 and enters into the space between exit guide bars 101. As determined by variables such as the type of materials to be packed, the size of cans, the desired rate of production, etc., the machine includes a plurality of adjustments. Thus conveyor 60 can be varied in speed and thereby determine the number of cans which can pass through the machine in a given period of time. The rate of rotation of the drum can be adjusted in order to deliver in an effective manner a sufficient quantity of material to chute 85 in order to insure that the cans passing adjacent to it are completely filled. The rate of swinging of the bars

through the cans' travel during the passage through the machine originates with a drive which is also coupled to brush **90** with the result that the swinging rate and the brush rate are related. However, by changes in the drive the optimum rate of swinging and rate of rotation of the brush can be selected. Similarly the rate of vibration for chute **85** and for conveyor **60** within the rotating drum can be controlled by adjustment of the vibrator related to each of these elements.

It can be seen from the above description that the present invention provides a machine and method for filling containers. Although various embodiments of the invention have been shown and described herein, it is understood that certain changes and additions within the scope of the appended claims may be made by those skilled in the art without departing from the scope and spirit of this invention.

It is further understood that the machine and method of the present invention is adapted for the filling of containers with other articles which include food products with a narrow elongated form such as, chinese noodles, "shoe-string" style potatoes, sauerkraut and the like.

This application is a continuation-in-part of application Serial No. 165,147, filed January 9, 1962.

What is claimed:

1. A machine for filling a container with material, the container having an open upper portion, comprising means for conveying the container through said machine, means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container, the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container, and means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

2. A machine for filling a container with material, the container having an open upper portion, comprising means for conveying the container through said machine, said conveying means being adapted to engage the bottom portion of the container, means for swinging the container engaged to and being conveyed by said conveying means, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container, the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container, and means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

3. A machine for filling a container with material, the container having an open upper portion, comprising means for conveying the container through said machine, said conveying means including a substantially cylindrical portion extending in the direction of travel of the container and adapted to engage the bottom portion of the container, means for swinging the container engaged to and being conveyed by said cylindrical portion, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container, the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container and means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

4. A machine for filling a container with material, the container having an open upper portion, comprising means for conveying the container through said machine; means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container, the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container, said swinging means including spaced apart guide members extending substantially parallel to the path of conveying of the container and adapted to engage the side portions of the container adjacent thereto; and means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

5. A machine for filling a container with material, the container having an open upper portion, comprising means for conveying the container through said machine; means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container, the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container, said swinging means including spaced apart guide members extending substantially parallel to the path of conveying of the container and adapted to engage the side portions of the container adjacent thereto, the end portion of said guide members toward which the container is conveyed being substantially divergent; and means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

6. A machine for filling a container with material, the container having an open upper portion, comprising means for conveying the container through said machine; means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container, the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container, said swinging means including spaced apart guide members extending substantially parallel to the direction of the conveying of the container and adapted to engage the side portions of the container adjacent thereto, means for pivotally supporting said guide member about said axis, and means for reciprocating said pivotal supporting means about said axis; and means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

7. A machine for filling a container with material, the container having an open upper portion, comprising means for conveying the container through said machine, means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis dis-

posed at least as high as the upper portion of the container, the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container, means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, and means for vibrating the container being conveyed, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

8. A machine for filling a container with material, said container having an open upper portion, comprising means for conveying the container through said machine, means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container, the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container, and means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, said delivering means including a drum adapted for rotation about its longitudinal axis and having an interior portion adapted to receive the material, said conveying means extending through said interior portion substantially parallel to the longitudinal axis thereof, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

9. A machine for filling a container with material, the container having an open upper portion comprising means for conveying the container through said machine; means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container; the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container, and means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, said delivering means including a drum adapted for rotation about its longitudinal axis and having an interior portion adapted to receive the material, said conveying means extending through said interior portion substantially parallel to the longitudinal axis thereof, and means disposed in said interior portion of the drum for raking material from the material therein to a position at which the material being raked is released therefrom toward the open upper portion of the container, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

10. A machine for filling a container with material, the container having an open upper portion comprising means for conveying the container through said machine; means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container, the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container; and means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, said delivering means including a drum adapted for rotation about its longitudinal axis and having an interior portion adapted to receive the material, said conveying means extending through said interior portion substantially parallel to the longitudinal axis thereof, and means disposed in said interior portion of the drum for raking material from the material therein to a position at which the material being raked is released toward the container, said raking means including a plurality of rod-shaped members spaced apart and extending from the inner surface of said drum into said interior portion thereof, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

11. A machine for filling a container with material, the container having an open upper portion comprising means for conveying the container through said machine; means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container, the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container; and means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, said delivering means including a drum adapted for rotation about its longitudinal axis and having an interior portion adapted to receive the material, said conveying means extending through said interior portion substantially parallel to the longitudinal axis thereof, and means disposed in said interior portion of the drum for raking material from the material therein to a position at which the material being raked is released toward the container, said raking means including a plurality of rod-shaped members spaced apart and extending from the inner surface of said drum into said interior portion thereof, said rod-shaped members being disposed in a plurality of rows extending substantially parallel to the longitudinal axis of said drum, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

12. A machine for filling a container with material, the container having an open upper portion, comprising means for conveying the container through said machine, means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container; the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container; and means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, said delivering means including a drum adapted for rotation about its longitudinal axis and having an interior portion adapted to receive the material, said conveying means extending through said interior portion substantially parallel to the longitudinal axis thereof, means disposed in said interior portion of the drum for raking material from the material therein to a position at which the material is released toward the open upper portion of the container, and means for directing the material being released toward the open upper portion of the container, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

13. A machine for filling a container with material, the container having an open upper portion, comprising means for conveying the container through said machine, means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container; the centrifugal acceleration applied to the con-

tainer whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container; and means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, said delivering means including a drum adapted for rotation about its longitudinal axis and having an interior portion adapted to receive the material, said conveying means extending through said interior portion substantially parallel to the longitudinal axis thereof, means disposed in said interior portion of the drum for raking material from the material therein to a position at which the material is released toward the open upper portion of the container, and means for directing the material being released toward the open upper portion of the container, said directing means including a chute extending from said position at which the material is released to adjacent the open upper portion of the container, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

14. A machine for filling a container with material, the container having an open upper portion comprising means for conveying the container through said machine, means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container, the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container, said swinging means including spaced apart guide members extending substantially parallel to the path of conveying of the container and adapted to engage the side portions of the container adjacent thereto, means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, and means extending upwardly from said spaced apart guide members for maintaining an excess of the material being delivered above the open upper portion of the container in order to urge the material beneath said quantity of material to fill the container, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

15. A machine for filling a container with material, the container having an open upper portion comprising means for conveying the container through said machine, means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container, the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed to the lower portion of the container, said swinging means including spaced apart guide members extending substantially parallel to the path of conveying of the container and adapted to engage the side portions of the container adjacent thereto, means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, and a baffle extending upwardly from each of the uppermost of said guide members for maintaining a quantity of the material being delivered above the open portion of the container in order to urge the material beneath said quantity of material to fill the container, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

16. A machine for filling a container with material, the container having an open upper portion comprising means for conveying the container through said machine, means for moving the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine, said moving means including spaced apart guide members extending substantially parallel to the path of conveying of the container and adapted to engage the side portions of the container adjacent thereto, means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, and means extending upwardly from said spaced apart guide members for maintaining an excess of the material being delivered above the open upper portion of the container in order to urge the material beneath said quantity of material to fill the container.

17. A machine for filling a container with material, the container having an open upper portion comprising means for conveying the container through said machine, means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container, the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container, means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, and means adjacent said delivering means for removing material extending beyond the top portion of the container after the delivering of the material, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

18. A machine for filling a container with material, the container having an open upper portion comprising means for conveying the container through said machine, means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container, the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container, means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, and means adjacent said delivering means for removing material extending beyond the top portion of the container after the delivering of the material, said removing means including a brushing member rotating in a substantially vertical plane, said brushing member being disposed with the lower portion of said plane being adjacent the path of travel of the upper open portion of the container, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

19. A machine for filling a container with material, the container having an open upper portion comprising means for conveying the container through said machine, means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container, means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, and means for confining the delivered material into the interior portion of the container, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

20. A machine for filling a container with material, the container having an open upper portion comprising means for conveying the container through said machine, means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of

the container through said machine and about an axis disposed at least as high as the upper portion of the container, means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, and means for cutting delivered material extending out of the open upper portion of the container, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

21. A machine for filling a container with material, the container having an open upper portion comprising means for conveying the container through said machine, means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of the container through said machine and about an axis disposed at least as high as the upper portion of the container, means for delivering the material to the open upper portion of the container during the conveying and swinging thereof, and means for confining the delivered material into the interior portion of the container, said confining means including a shoe member and means for resiliently supporting said shoe member in a position overlying and substantially parallel to the path of travel of the open upper portion of the container and at a level substantially equal to the level of the open upper portion of the container, whereby said shoe member engages the open upper portion of the container and confines the material to the interior portion thereof.

22. A machine for filling a container with material delivered thereto, the container having an open upper portion to receive the material, comprising means for conveying the container through said machine and means for swinging the container while being conveyed, the swinging being transverse to the path of conveying of

the container through said machine and about an axis disposed at least as high as the upper portion of the container, the centrifugal acceleration applied to the container whenever the container is moved by said swinging means about said axis being directed toward the lower portion of the container, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the container through the open upper portion thereof toward the lower portion of the container.

23. A method of filling a container with material, the container having an open upper portion, comprising the steps of conveying the container along a predetermined path, swinging the container while being conveyed, the swinging being about an axis disposed at least as high as the upper portion of the container and extending substantially in the direction of the conveying of the container, and delivering the material to the open upper portion of the container during the conveying and swinging thereof, whereby centrifugal force in response to the swinging of the container urges at least a portion of the material delivered to the open upper portion thereof toward the lower portion of the container.

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