

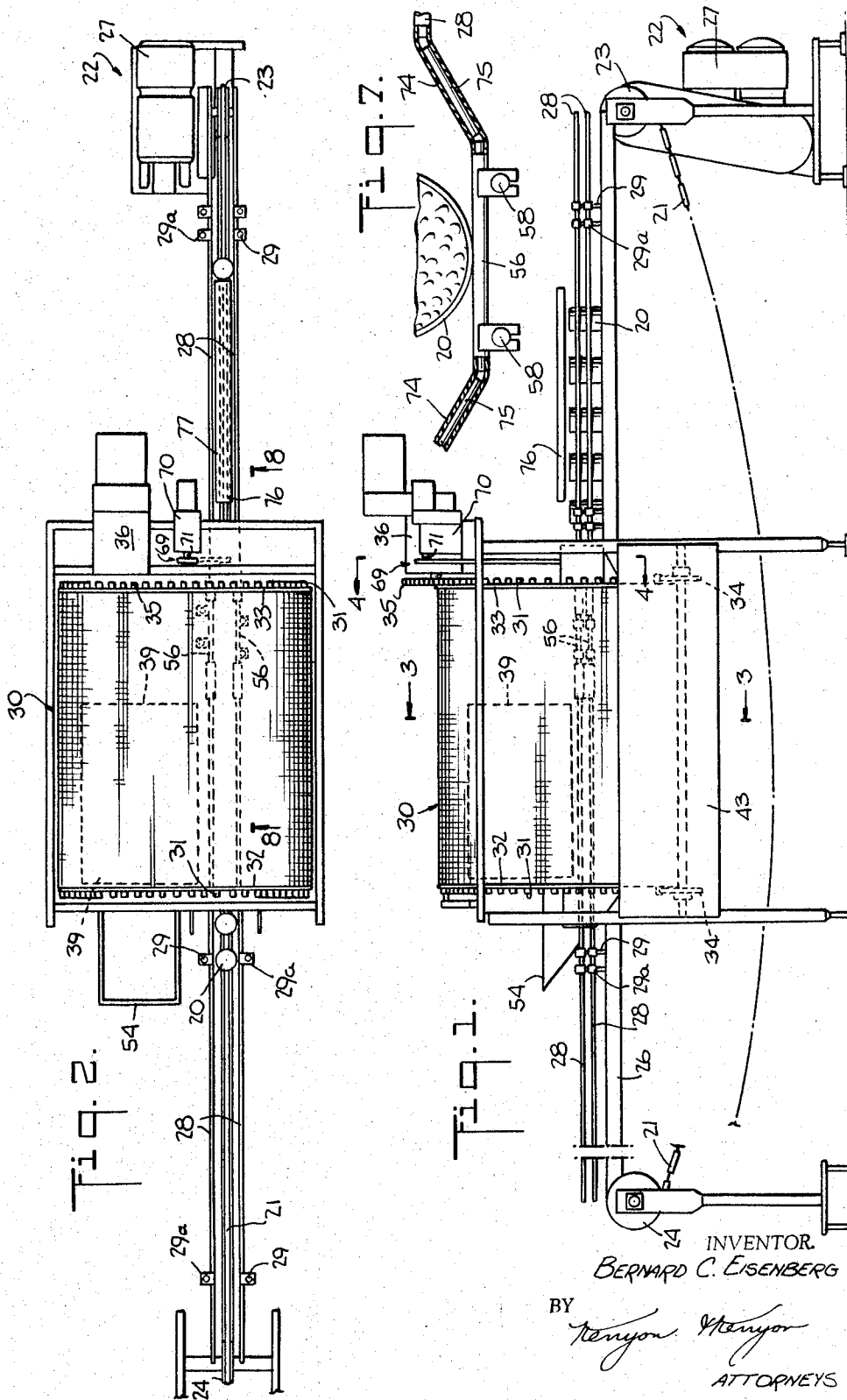
Jan. 17, 1967

B. C. EISENBERG
MACHINE AND METHOD FOR FILLING CONTAINERS
TO A PREDETERMINED LEVEL

3,298,404

Filed July 12, 1963

4 Sheets-Sheet 1



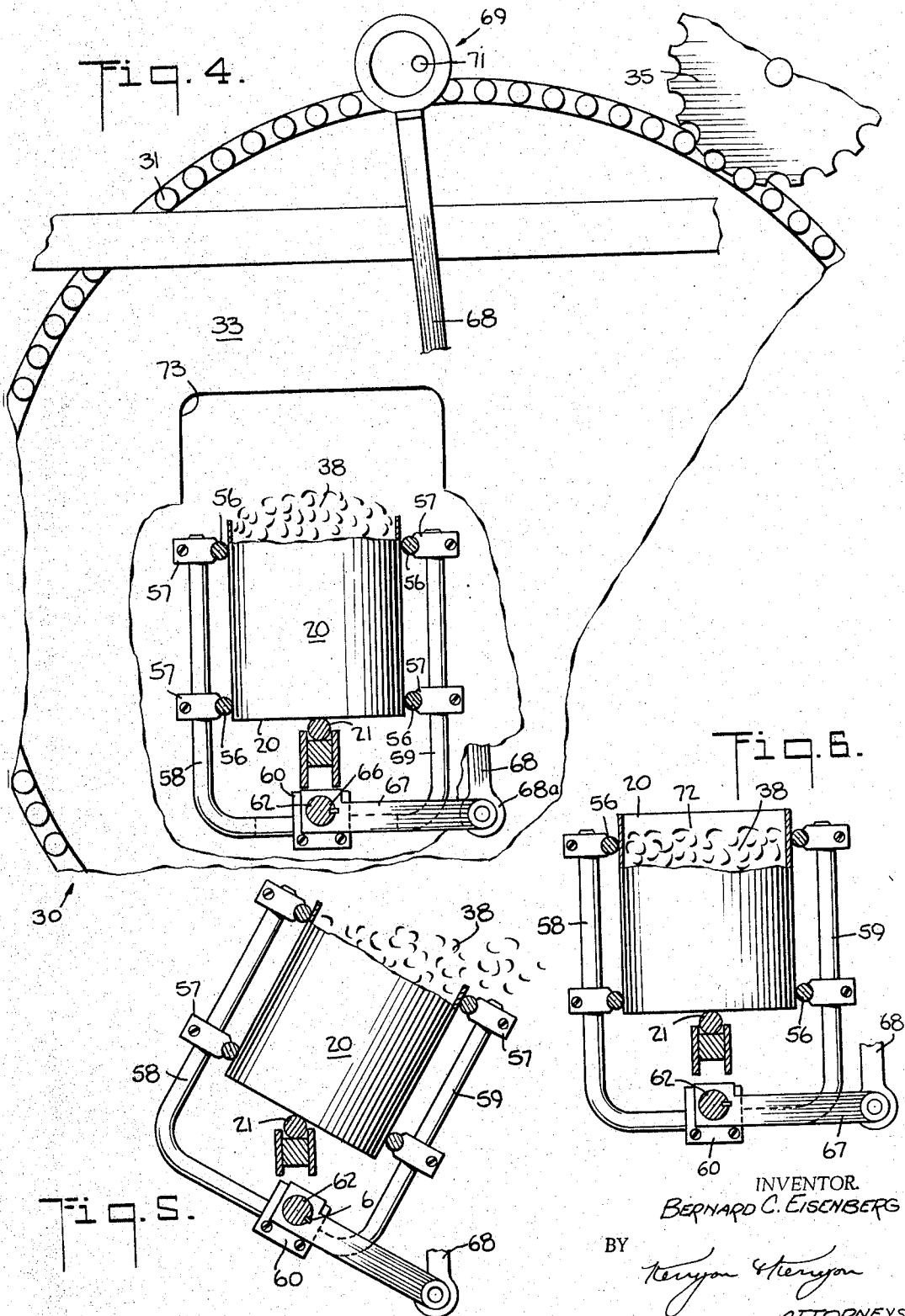
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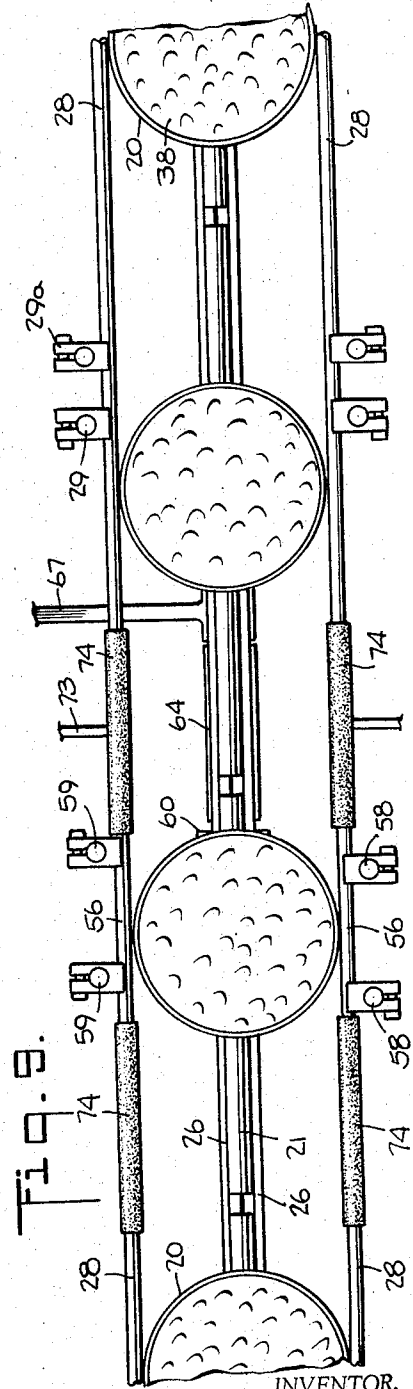
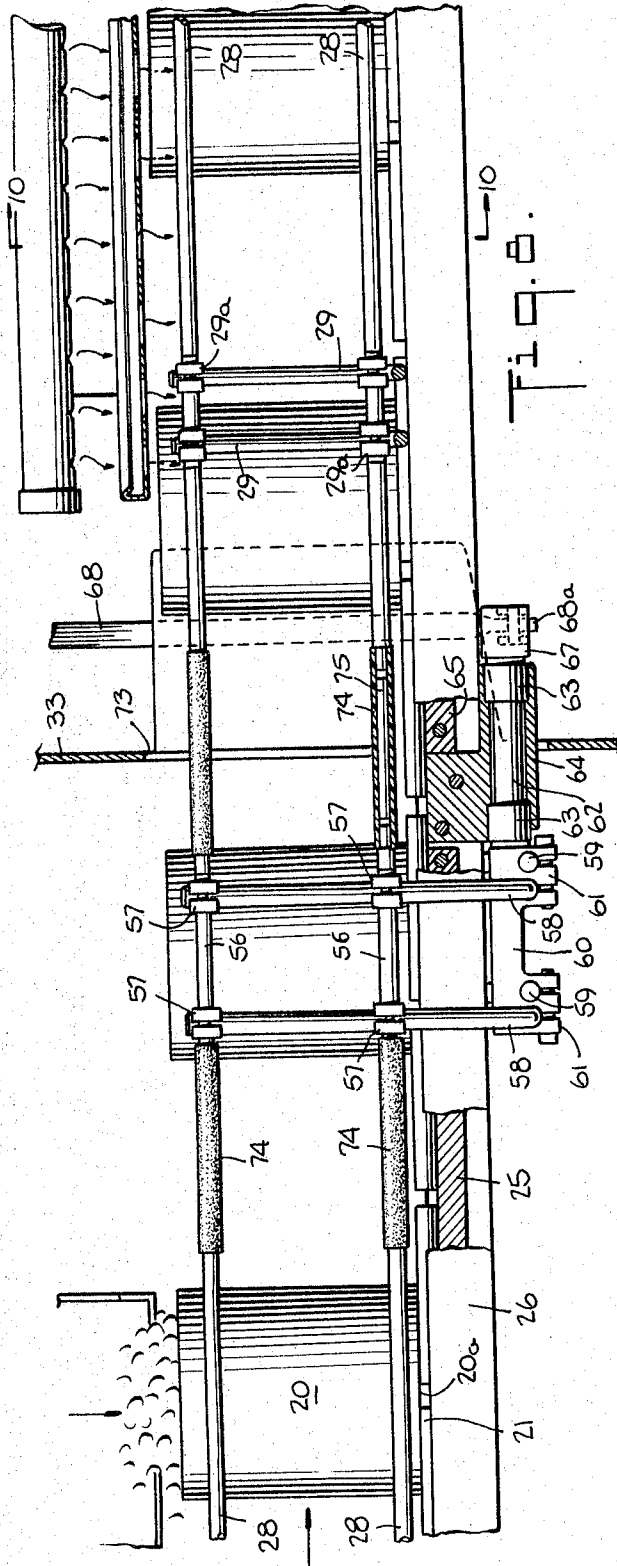


Fig. 9.

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3,298,404

MACHINE AND METHOD FOR FILLING CONTAINERS TO A PREDETERMINED LEVEL

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21 Claims. (Cl. 141-1)

This invention relates to a machine for filling containers and more particularly it is concerned with the filling of containers with relatively small pieces of material to a predetermined level within the container.

In many cases when packing material, such as food in the form of relatively small pieces, it is desirable to fill the container merely to a predetermined level corresponding to a major fraction of the volume of the container rather than to completely fill it. Thus with food material such as peas, mushrooms, and various other food products cut into relatively small bits or portions, the containers are partially filled to a level corresponding to a fraction of the capacity of the container such as approximately two-thirds full. The unfilled fraction of the container is thereby left available to provide space to receive syrup and the like and to accommodate expansion of the product during subsequent processing. Furthermore, in many instances to pack the standard weight in which a given product is sold into a standard container for the product, inevitably results in the container only being partially filled.

Consequently it is not only necessary to fill the container to a predetermined level but also to maintain accurately the level of material within the container in order to insure that the net weight of the material conforms to the value recited upon the label. It can be understood that when filling containers with a food product in the form of small pieces, the food product readily flows into the open upper portion of the container and tends to fill it completely and in many cases to an overflow condition in which the food product is heaped above the top portion. Attempts to remove the excess by tipping the container at a small angle from its upright position and then returning it to its upright position has been satisfactory only where it is sufficient to remove a relatively small quantity of material such as that heaped above the top portion of the container or that slightly below it. However, where it is desired to fill the container only to a predetermined level which can be substantially below the top, such as to fill the container to approximately two-thirds of its total capacity, the slight tipping of the container is insufficient to remove material to achieve the desired level.

In addition the predetermined level of material within a container which is sufficient to provide the net weight stated on the label can vary during packing whenever the size of the material varies or there are variations in the manner in which it has been prepared for packing. For example in the case of packing mushrooms, it is evident that as the size of the mushrooms increases, it happens that the level of mushrooms within the container necessary to provide a stated net weight will also change. Such variations can occur at frequent intervals during a normal day of operation in packing food products. Where the container is tipped slightly to remove the excess it is necessary, as variations in the product occur, to change the tipping angle and in order to make such an adjustment, the operation of the machine must normally be interrupted. Furthermore, since adjustment of the tipping angle is necessarily a cut-and-try process, it can cause extensive interruptions in the operation of the machine.

It is one of the objects of the invention to provide a machine for filling a container with material to a predetermined level therein.

It is another object of the invention to provide a machine for establishing a predetermined level of material in

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a container by ejecting material in excess of the predetermined level.

It is still another object of the invention to provide a machine for ejecting material from a container to establish a predetermined level therein which can be conveniently changed from one predetermined level to another.

It is an additional object of the invention to establish a predetermined level of material in a container by ejecting excess material adjacent to the location at which the material is initially delivered to the container.

It is a further object of the invention to provide a machine for filling a container with material to a predetermined level therein as the container is conveyed through the machine.

In one embodiment of the invention the machine for filling a container with material to a predetermined level therein comprises means for conveying the container through the machine. Means are included for delivering the material through the open upper portion of the container to establish a level of material therein which is at least equal to the predetermined level to which the container is to be filled. The machine further includes means for swinging the container transversely to the path of the conveying of the container through the machine and about an axis extending below at least the upper portion of the container. The swinging means moves the container through a plurality of cycles of reciprocating motion. At least a portion of the centrifugal acceleration applied to the container in response to the movement thereof by the swinging means is directed toward the upper portion of the container in order that centrifugal force may urge material in excess of the predetermined level therein to be ejected from the container.

An advantage of this arrangement is that the material can be conveniently delivered into the open upper portion of the containers to completely fill them and perhaps even to heap the material above the top portion of the container. Subsequently the swinging means, by moving the container through a plurality of cycles of reciprocating motion about an axis extending below at least the upper portion of the container, results in centrifugal force which can urge material adjacent the upper portion of the container to be ejected therefrom and thereby establish the predetermined level of the material in the container.

In another embodiment of the invention the machine includes means for selectively determining the swinging motion of the swinging means in order to thereby control the centrifugal acceleration applied to the container which in turn determines the amount of material that is ejected from the container in order to establish the predetermined level therein. This arrangement enables the machine to be quickly and conveniently adjusted during operation so that the predetermined level may be maintained within the containers even though the density, size, or other characteristic of the material being delivered into the containers varies during operation.

In an additional embodiment of the invention the means for swinging the container is disposed adjacent to the means for delivering material through the open upper portion of the container. In this way the material ejected from the container by the swinging motion is directly returned to the delivering means so that the excess material is delivered to the subsequent containers. In this way the possibility of waste or accumulation of the ejected material is prevented.

In a further embodiment of the invention, the means for swinging the containers is conditioned to swing the containers as they continue to be advanced by the conveying means. This construction enables the machine to operate without interruption and eliminates any decelerating and accelerating of the containers which could otherwise possibly damage them.

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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 invention;

FIG. 2 is a plan view of the machine;

FIG. 3 is a fragmentary vertical section view taken along the line 3—3 in FIG. 1 and showing the means for delivering the material into the container;

FIG. 4 is a fragmentary vertical section view taken along the line 4—4 in FIG. 1 and showing the means for swinging the container transversely to the path of the conveying means;

FIG. 5 is a fragmentary vertical section view showing the container swinging means operating from a normally inclined position;

FIG. 6 is a fragmentary vertical section view showing the means for swinging the container and the contents of the container after excess material has been ejected therefrom;

FIG. 7 is a fragmentary plan view showing a moving guide member of the swinging means and the means for connecting the moving guide member to the stationary guide members of the conveying means;

FIG. 8 is a fragmentary vertical section view taken along the line 8—8 in FIG. 2 and showing various elements of the container swinging means;

FIG. 9 is a fragmentary plan view showing the containers advancing through the swinging means;

FIG. 10 is a fragmentary vertical section view taken along the line 10—10 in FIG. 8 and showing the means for applying liquid to the interior of the container.

The means for conveying container or containers 20 through the machine includes conveyor 21 operated by conveyor drive 22 through pulley 23 (FIGS. 1 and 2). Conveyor 21 can comprise a plurality of articulated links or a cable member with an external covering such as rubber. Conveyor 21 passes over idler pulley 24 and extends in engagement with the bottom portion 20a of the containers while resting upon support 25 and disposed between side plates 26 (FIG. 3). The means for determining the rate of conveying includes variable speed motor 27 of conveyor drive 22. This arrangement enables the speed of the conveying of the containers to be maintained at the optimum point which insures that the containers are properly filled and at the same time enables the machine to be selectively operated at a rate sufficient to provide the required rate of production. The means for conveying the containers through the machine further includes stationary guide members or guide rails 28 between which the containers pass due to the urging of conveyor 21. Arms 29 and clamps 29a which support the guide rails are adjustable so that both the horizontal and vertical spacing of the guide rails can be set to fit a variety of container sizes.

The means for delivering the material through the open upper portion of the container to establish a level of material therein includes drum 30 having a plurality of spaced rollers 31 extending in an axial manner from the end portions of the drum. Stationary end plates 32 and 33 close the end portions of the drum. Drum 30 is supported for rotation by idler sprockets 34 which are in turn pivotally mounted with respect to the frame of the machine (FIG. 1). Drum 30 is driven in rotation by drive sprocket 35 which engages rollers 31. Variable speed motor 36 which actuates the drive sprocket can be selectively controlled to rotate the drum at a predetermined rate which is best suited for each type of material to be packed.

The means for delivering material through the open upper portion of the containers to establish a level of material therein can be similar to the arrangements shown in my U.S. Patent No. 2,937,670, issued May 24, 1960, and entitled, "Container Filling Machine." Thus drum 30 contains a plurality of bucket devices 37 which

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are adapted to receive a quantity of material 38 and carry it upwardly to chute 39 (FIG. 3). Each of bucket devices 37 includes wall 40 which extends in the direction of the length of the drum and pivoted side wall 41 which serves to segregate and hold a quantity of material 38 adjacent to porous shell 42 of the drum and wall 40. The bucket device enables material in the form of relatively small pieces such as peas, mushrooms, and the like, to be carried from the lower portion of drum 40 to a point adjacent to chute 39 where pivoted side wall 41 is moved inwardly, thereby releasing the material onto the chute. A portion of drum 30 can rotate in tank 43 which is adapted to contain water or the like for rinsing and conditioning material 38 as it is being packed (FIG. 1).

Chute 39 is pivotally supported about shaft 44 and is vibrated by pneumatic actuator 45 which is connected to the chute by link 46 (FIG. 3). The vibrating of chute 39 insures that the material is separated from adjacent particles and moves in a steady flow down the chute toward containers 20 advancing adjacent to the lower portion of the chute. Air valve 47 having input link 47a is the means for controlling the vibration of the chute since air valve 47 delivers a pulsating flow of air to pneumatic actuator 45. Input link 47a of air valve 47 which meters the flow of air from air supply 48 to actuator 45 is connected to link 49. Link 49 is connected to link 50 which is pivotally supported by bracket 51. Spring 52 biases link 50 so that roller follower 53 is subjected to a rocking motion by the passage of rollers 31 in engagement therewith. In this way a pulsating flow of air is delivered to actuator 45 whenever drum 30 is rotated.

The material to be delivered to the containers is placed in drum 30 by means of hopper 54 mounted about opening 55 in end plate 32. During operation, material is periodically added by means of the hopper in order to maintain a sufficient accumulation of material in the lower portion of drum 30 (FIG. 3) which insures steady delivery to the containers.

As the containers are advanced through the drum while engaged with conveyor 21 and disposed between guide rails 28, material 38 flows down chute 39 and fills the container to a full and even to an overflowing condition (FIGS. 3 and 8). After advancing beyond the end of chute 39, the containers approach the means for swinging the container transversely to the path of the conveying of the container. The containers are conveyed between moving guide members or guide rails 56 which are secured to adjustable clamps 57. Clamps 57 are attached to arms 58 and 59 extending through openings in support 60 which is disposed beneath conveyor 21 (FIGS. 4 and 8). Support 60 is provided with a plurality of clamps 61 which enable the arms to be locked in place when they have been laterally adjusted to fit the size of the container which is to be passed through the machine. Support 60 is attached to shaft 62 which is mounted by needle bearings 63 in housing 64. The housing extends through opening 73 in end plate 33 and is attached to frame member 65 of the machine.

The end of shaft 62 opposite to that connected to support 60 is connected by means of key 66 to crank arm 67 which in turn is pivotally connected to end 68a of connecting rod 68. The pivotally supported guide members or guide rails 56 receive a swinging motion, that is, are reciprocated about the axis of rotation defined by shaft 62, by means of eccentric 69 which is coupled by connecting arm 68 to crank arm 67 and thence to the guide rails. Eccentric 69 is driven by variable speed motor 70 through shaft 71 (FIGS. 1 and 2).

The means for selectively determining the swinging motion includes variable speed motor 70 since the output speed of motor 70, as applied by shaft 71 to eccentric 69, determines the characteristic of the motion imparted to the pivotally supported guide rails 56. Thus, for ex-

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ample, as the speed of shaft 71 is increased, the rate at which the guide members are reciprocated increases and consequently the centrifugal acceleration which is applied to container 20 and the corresponding centrifugal force applied to material 38 increases. Since the axis of rotation of the pivotal axis, namely shaft 62, is disposed beneath the bottom portion 20a of the containers, the radial or centrifugal acceleration is always in an upward direction and consequently centrifugal force tends to eject the material from the container. By controlling the magnitude of centrifugal force applied to the material, the material can be ejected until the predetermined level, shown as line 72 in FIG. 6, is reached.

As operation of the machine proceeds and a variation in the size, density, etc. of the material takes place, it is possible that the quantity of material ejected from container 20 can also vary and cause the level in the container to vary from the predetermined level. In such a case, whether the new level is above or below the predetermined level, it is merely necessary to change the output speed of variable speed motor 70 and thereby vary the swinging motion applied by the swinging means to the containers until the required level of material in the containers is again restored. Such an adjustment can be conveniently made as the machine continues to operate since the human operator can readily see the changes which he has caused by viewing the containers passing from the exit portion of the drum at opening 73.

As shown in FIG. 5, in certain instances as determined by factors such as the size of the container, the amount of material to be ejected from the container, the nature of the material itself, etc., the means for swinging the container may be disposed in an inclined position. The inclined or tilted position of the guide members serves to direct the containers to a tilted position which causes the spilling out of a portion of the excessive material to be removed from the containers. The swinging motion imparted to the guide members, similarly as discussed above, is sufficient to remove the remainder of the material that is necessary in order to establish the predetermined level of material within the container.

The means for connecting the stationary guide members to the moving guide members, that is for connecting guide rails 28 to guide rails 56, includes tubes 74 of resilient material such as plastic material, which contain core members or stiffening rods 75 within the interior thereof (FIGS. 7 and 8). The end portions of the guide rails can be necked down in order to fit tubes 74. Thus as is shown in FIG. 7 the tubes flex during the swinging of guide rails 56 in order to maintain continuous lengths of guide rails for directing the containers during their continuous movement through the machine. Universal joints having slip joints for permitting variations in the axial length during movement of the universal joints can be used to couple the moving guide members to the stationary ones in place of the tube and rod assembly.

Beyond opening 73 in end plate 33, the containers are advanced by conveyor 21 beneath the means for applying liquid to the interior of the container or containers, that is trough 72 extending along the length of a portion of conveyor 21 and having openings 77 which are elongated in the direction of the movement of the containers (FIGS. 1 and 10). The liquid which is to be applied to the containers is delivered to the trough by pipe 78 mounted on brackets 79. Pipe 78 contains a plurality of openings 78a which deliver the flow of liquid such as brine, syrup, etc. to trough 76 from whence it flows onto the containers and the material therein. The passing of the liquid through openings 78a and openings 77 serves to reduce the downward velocity of the liquid so that it cannot cause the material to be driven out of the container as the liquid is being applied. Thus the trough drips the liquid into the containers rather than directing it in the form of a jet of liquid.

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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.

What is claimed:

1. A machine for filling a container with material to a predetermined level therein, the container having an open upper portion, comprising means for conveying the container through the machine, means for delivering material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level, and means for swinging the container being conveyed and having material delivered therein transversely to the path of the conveying of the container through said machine and about an axis extending below at least the open upper portion of the container, said swinging means moving the container through a plurality of cycles of reciprocating motion with the open upper portion of the container facing upwardly throughout each of the cycles of reciprocating motion, at least a portion of the centrifugal acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the upper portion of the container, whereby centrifugal force urges material delivered to the container in excess of said predetermined level to be ejected from the container.

2. A machine for filling a container with material to a predetermined level therein, the container having an open upper portion, comprising means for conveying the container through the machine, said conveying means being adapted to engage the bottom portion of the container, means for delivering material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level, and means for swinging the container having material delivered therein and while in engagement with said conveying means transversely to the path of the conveying of the container through said machine and about an axis extending below at least the open upper portion of the container, said swinging means moving the container through a plurality of cycles of reciprocating motion with the open upper portion of the container facing upwardly throughout each of the cycles of reciprocating motion, at least a portion of the centrifugal acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the upper portion of the container, whereby centrifugal force urges material delivered to the container in excess of said predetermined level to be ejected from the container.

3. A machine for filling a container with material to a predetermined level therein, the container having an open upper portion, comprising means for conveying the container through the machine, said conveying means including an elongated member extending in the direction of the path of the conveying of the container, the upper portion of said elongated member having a substantially rounded transverse cross-section and being adapted to engage the bottom portion of the container, means for delivering material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level, and means for swinging the container having the material delivered therein and while in engagement with said upper portion of said conveying means transversely to the path of the conveying of the container through said machine and about an axis extending below at least the open upper portion of the container, said swinging means moving the container through a plurality of cycles of reciprocating motion with the open upper portion of the container facing upwardly throughout each of the cycles of reciprocating motion, at least a portion of the centrifugal

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acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the upper portion of the container, whereby centrifugal force urges material delivered to the container in excess of said predetermined level to be ejected from the container.

4. A machine for filling a container with material to a predetermined level therein, the container having an open upper portion, comprising means for conveying the container through the machine, means for delivering material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level, and means for swinging the container transversely to the path of the conveying of the container through said machine and about an axis extending below at least the upper portion of the container, said swinging means including spaced apart guide members extending substantially parallel to the path of the conveying of the container and adapted to engage the side portions of the container adjacent thereto, said swinging means moving said container through a plurality of cycles of reciprocating motion, at least a portion of the centrifugal acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the upper portion of the container, whereby centrifugal force urges material delivered to the container in excess of said predetermined level to be ejected from the container.

5. A machine for filling a container with material to a predetermined level therein, the container having an open upper portion, comprising means for conveying the container through the machine, said conveying means including spaced apart stationary guide members extending substantially along the path of the conveying of the container and being substantially parallel thereto, said guide members being adapted to engage the side portions of the container adjacent thereto, means for delivering material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level, and means for swinging the container transversely to the path of the conveying of the container through said machine and about an axis extending below at least the upper portion of the container as the container is being conveyed, said swinging means including spaced apart moving guide members extending substantially parallel to the path of the conveying of the container and adapted to engage the side portions of the container adjacent thereto, said swinging means moving said container through a plurality of cycles of reciprocating motion, at least a portion of the centrifugal acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the upper portion of the container, whereby centrifugal force urges material delivered to the container in excess of said predetermined level to be ejected from the container.

6. A machine for filling a container with material to a predetermined level therein, the container having an open upper portion, comprising means for conveying the container through the machine, said conveying means including spaced apart stationary guide members extending substantially along the path of the conveying of the container and being substantially parallel thereto, said guide members being adapted to engage the side portions of the container adjacent thereto, means for delivering material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level, means for swinging the container transversely to the path of the conveying of the container through said machine and about an axis extending below at least the upper portion of the container as the container is being conveyed, said swinging means including spaced apart moving guide members extending substantially parallel to the path of the conveying of the container and adapted to engage the side portions of the

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container adjacent thereto, said swinging means moving the container through a plurality of cycles of reciprocating motion, at least a portion of the centrifugal acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the upper portion of the container, and means for flexibly connecting each of said stationary guide members to each moving guide member adjacent thereto, whereby centrifugal force urges material delivered to the container in excess of said predetermined level to be ejected from the container.

7. A machine for filling a container with material to a predetermined level therein, the container having an open upper portion, comprising means for conveying the container through the machine, said conveying means including spaced apart stationary guide members extending substantially along the path of the conveying of the container and being substantially parallel thereto, said guide members being adapted to engage the side portions of the container adjacent thereto, means for delivering material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level, means for swinging the container transversely to the path of the conveying of the container through said machine and about an axis extending below at least the upper portion of the container as the container is being conveyed, said swinging means including moving spaced apart moving guide members extending substantially parallel to the path of the conveying of the container and adapted to engage the side portions of the container adjacent thereto, said swinging means moving the container through a plurality of cycles of reciprocating motion, at least a portion of the centrifugal acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the upper portion of the container, tubular members of flexible material connecting each of said stationary guide members to each moving guide member adjacent thereto, and core members disposed within the interior of each of said tubular members for stiffening a portion of said tubular members, whereby centrifugal forces urges material delivered to the container in excess of said predetermined level to be ejected from the container.

8. A machine for filling a container with material to a predetermined level therein, the container having an open upper portion, comprising means for conveying the container through the machine; means for delivering material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level; and means for swinging the container transversely to the path of the conveying of the container through said machine and about an axis extending below at least the upper portion of said container, said swinging means moving the container through a plurality of cycles of reciprocating motion, 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 members about said axis, and means for reciprocating said pivotal supporting means about said axis, at least a portion of the centrifugal acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the upper portion of the container, whereby centrifugal force urges material delivered to the container in excess of said predetermined level to be ejected from the container.

9. A machine for filling a container with material to a predetermined level therein, the container having an open upper portion, comprising means for conveying the container through the machine; means for delivering material through the open upper portion of the container to establish a level of material therein at least equal to

said predetermined level; and means for swinging the container transversely to the path of the conveying of the container through said machine and about an axis extending below at least the upper portion of said container, said swinging means moving the container through a plurality of cycles of reciprocating motion, 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 members about said axis, means for reciprocating said pivotal supporting means about said axis, and means for selectively controlling the rate of operation of said reciprocating means, at least a portion of the centrifugal acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the upper portion of the container, whereby centrifugal force urges material delivered to the container in excess of said predetermined level to be ejected from the container.

10. A machine for filling a container with material to a predetermined level therein, the container having an open upper portion, comprising means for conveying the container through the machine; means for delivering the material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level, 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, a chute disposed within said drum for directing the material toward the open upper portion of the container, means disposed in said drum for moving the material to said chute; and means for swinging the container transversely to the path of the conveying of the container through said machine and about an axis extending below at least the open upper portion of the container as the container is being conveyed, said swinging means moving the container through a plurality of cycles of reciprocating motion with the open upper portion of the container moving along an arcuate path having its center of curvature beneath the open upper portion of the container throughout each of the cycles of reciprocating motion, at least a portion of the centrifugal acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the upper portion of the container, whereby centrifugal force urges material delivered to the container in excess of said predetermined level to be ejected from the container.

11. A machine for filling a container with material to a predetermined level therein, the container having an open upper portion, comprising means for conveying the container through the machine; means for delivering the material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level, 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, a chute disposed within said drum for directing the material toward the open upper portion of the container, means disposed in said drum for moving the material to said chute; and means disposed in said drum for swinging the container transversely to the path of the conveying of the container through said machine and about an axis extending below at least the open upper portion of the container as the container is being conveyed, said swinging means moving the container through a plurality of cycles of reciprocating motion with the open upper portion of the container moving along an arcuate path having its center of curvature beneath the open upper portion of the container throughout each of the cycles of reciprocating

ing motion, at least a portion of the centrifugal acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the upper portion of the container, whereby centrifugal force urges material delivered to the container in excess of said predetermined level to be ejected from the container and returned to said drum.

12. A machine for establishing a predetermined level of material in a container having a level of material therein at least equal to said predetermined level, the container having an open upper portion, comprising means for conveying the container through the machine with the open upper portion of the container facing upwardly and means for swinging the container transversely to the path of the conveying of the container through said machine and about an axis extending below at least the open upper portion of the container, said swinging means moving the container through a plurality of cycles of reciprocating motion, the open upper portion of the container facing substantially above a horizontal plane through said axis throughout each cycle of the reciprocating motion, at least a portion of the centrifugal acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the open upper portion of the container, whereby centrifugal force urges material within the container in excess of said predetermined level to be ejected from the container.

13. A machine for establishing a predetermined level of material in a container having a level of material therein at least equal to said predetermined level, the container having an open upper portion, comprising means for conveying the container through the machine with the open upper portion of the container facing upwardly and means for swinging the container transversely to the path of the conveying of the container through said machine and about an axis extending below the bottom portion of the container, said swinging means moving the container through a plurality of cycles of reciprocating motion, the open upper portion of the container facing substantially above a horizontal plane through said axis throughout each cycle of the reciprocating motion, the centrifugal acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the open upper portion of the container, whereby centrifugal force urges material within the container in excess of said predetermined level to be ejected from the container.

14. A machine for establishing a predetermined level of material in a container having a level of material therein at least equal to said predetermined level, the container having an open upper portion, comprising means for supporting the container in an upwardly extending position with the open upper portion of the container facing upwardly, means for swinging the container being supported about an axis extending below at least the upper portion of the container, said swinging means moving the container through a plurality of cycles of reciprocating motion, the open upper portion of the container facing substantially above a horizontal plane through said axis throughout each cycle of the reciprocating motion, the centrifugal acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the open upper portion of the container, whereby centrifugal force urges material within the container in excess of said predetermined level to be ejected from the container.

15. A machine for filling a container with material to a predetermined level therein, the container having an open upper portion, comprising means for conveying the container through the machine, means for delivering material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level, and means for swinging the container transversely to the path of the conveying of the container

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through said machine and about an axis extending below at least the upper portion of the container, said swinging means moving the container through a plurality of cycles of reciprocating motion, at least a portion of the centrifugal acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the upper portion of the container, means for selectively determining the motion of said swinging means to thereby determine the magnitude of centrifugal acceleration applied to the container, whereby centrifugal force urges material delivered to the container in excess of said predetermined level to be ejected from the container.

16. A machine for filling a container with material to a predetermined level therein, the container having an open upper portion, comprising means for conveying the container through the machine, means for delivering material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level, and means for swinging the container in an inclined position transversely to the path of the conveying of the container through said machine and about an axis extending below at least the open upper portion of the container as said container is being conveyed with material delivered thereto, the inclined position being a position tilted from the vertical in a plane extending vertically and at substantially right angles to the path of conveying, said swing means moving the container through a plurality of cycles of reciprocating motion with the open upper portion of the container facing upwardly throughout each of the cycles of reciprocating motion, at least a portion of the centrifugal acceleration applied to the container in response to the movement of the container by said swinging means about said axis being directed toward the open upper portion of the container, whereby centrifugal force urges material delivered to the container in excess of said predetermined level to be ejected from the container.

17. A method of filling a container with material to a predetermined level therein, the container having an open upper portion, comprising the steps of conveying the container along a predetermined path, delivering material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level, and swinging the container transversely to the path of the conveying of the container and about an axis extending below at least the upper portion of the container as said container is being conveyed with material therein, said swinging moving the container through a plurality of cycles of reciprocating motion with the open upper portion of the container facing upwardly throughout each of the cycles of reciprocating motion, at least a portion of the centrifugal acceleration applied to the container in response to the swinging of the container about said axis being directed toward the open upper portion of the container, whereby centrifugal force urges the material delivered to the container in excess of said predetermined level to be ejected from the container.

18. A method of filling a container with material to a predetermined level therein, the container having an open upper portion, comprising the steps of conveying the container along a predetermined path in a substantially upright position, delivering the material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level, tilting the container transversely to the path of the conveying of the container to a predetermined angle, and swinging the container from the inclined position thereof transversely to the path of the conveying of the container and about an axis extending below at least the open upper portion of the container as said container is being conveyed with material therein, said swinging moving the container through a plurality of cycles of reciprocating motion with the open upper portion of the container facing upwardly throughout each of the cycles reciprocating motion, at

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least a portion of the centrifugal acceleration applied to the container in response to the swinging of the container about said axis being directed toward the open upper portion of the container, whereby centrifugal force urges the material delivered to the container in excess of said predetermined level to be ejected from the container.

19. A method of filling a container with material to a predetermined level therein, the container having an open upper portion, comprising the steps of conveying the container along a predetermined path, delivering material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level, swinging the container transversely to the path of the conveying of the container and about an axis extending below at least the upper portion of the container, said swinging moving the container through a plurality of cycles of reciprocating motion, at least a portion of the centrifugal acceleration applied to the container in response to the swinging of the container about said axis being directed toward the upper portion of the container, and selectively determining the swinging motion to determine the centrifugal acceleration applied to the container, whereby centrifugal force urges the material delivered to the container in excess of said predetermined level to be ejected from the container.

20. A method of filling a container with material to a predetermined level therein, the container having an open upper portion, comprising the steps of conveying the container along a predetermined path, delivering material through the open upper portion of the container to establish a level of material therein at least equal to said predetermined level, swinging the container transversely to the path of the conveying of the container and about an axis extending below at least the upper portion of the container, said swinging moving the container through a plurality of cycles of reciprocating motion, at least a portion of the centrifugal acceleration applied to the container in response to the swinging of the container about said axis being directed toward the upper portion of the container, and selectively determining the frequency of the cycles of reciprocating motion to determine the centrifugal acceleration applied to the container, whereby centrifugal force urges the material delivered to the container in excess of said predetermined level to be ejected from the container.

21. A method of establishing a predetermined level of material in a container having a level of material at least equal to said predetermined level, the container having an open upper portion, comprising the steps of conveying the container along a predetermined path, swinging the container transversely to the path of the conveying of the container and about an axis extending below at least the open upper portion of the container as said container is being conveyed with material therein, said swinging moving the container through a plurality of cycles of reciprocating motion with the open upper portion of the container facing upwardly throughout each of the cycles reciprocating motion, at least a portion of the centrifugal acceleration applied to the container in response to the swinging of the container about said axis being directed toward the open upper portion of the container, whereby centrifugal force urges the material delivered to the container in excess of said predetermined level to be ejected from the container.

References Cited by the Examiner

UNITED STATES PATENTS

837,559	12/1906	Graham	141—79 X
2,010,220	8/1935	Cocks	141—78
2,212,325	8/1940	Meyer.	
2,789,795	4/1957	De Back et al.	
2,978,231	4/1961	Eisenberg	141—78 X

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