Sept. 24, 1935. A. R. THOMPSON 2,015,164

METHOD AND APPARATUS FOR FILLING GRANULAR MATERIAL INTO MOVING CONTAINERS

Filed May 7, 1930 4 Sheets-Sheet 1

Fig. 1.

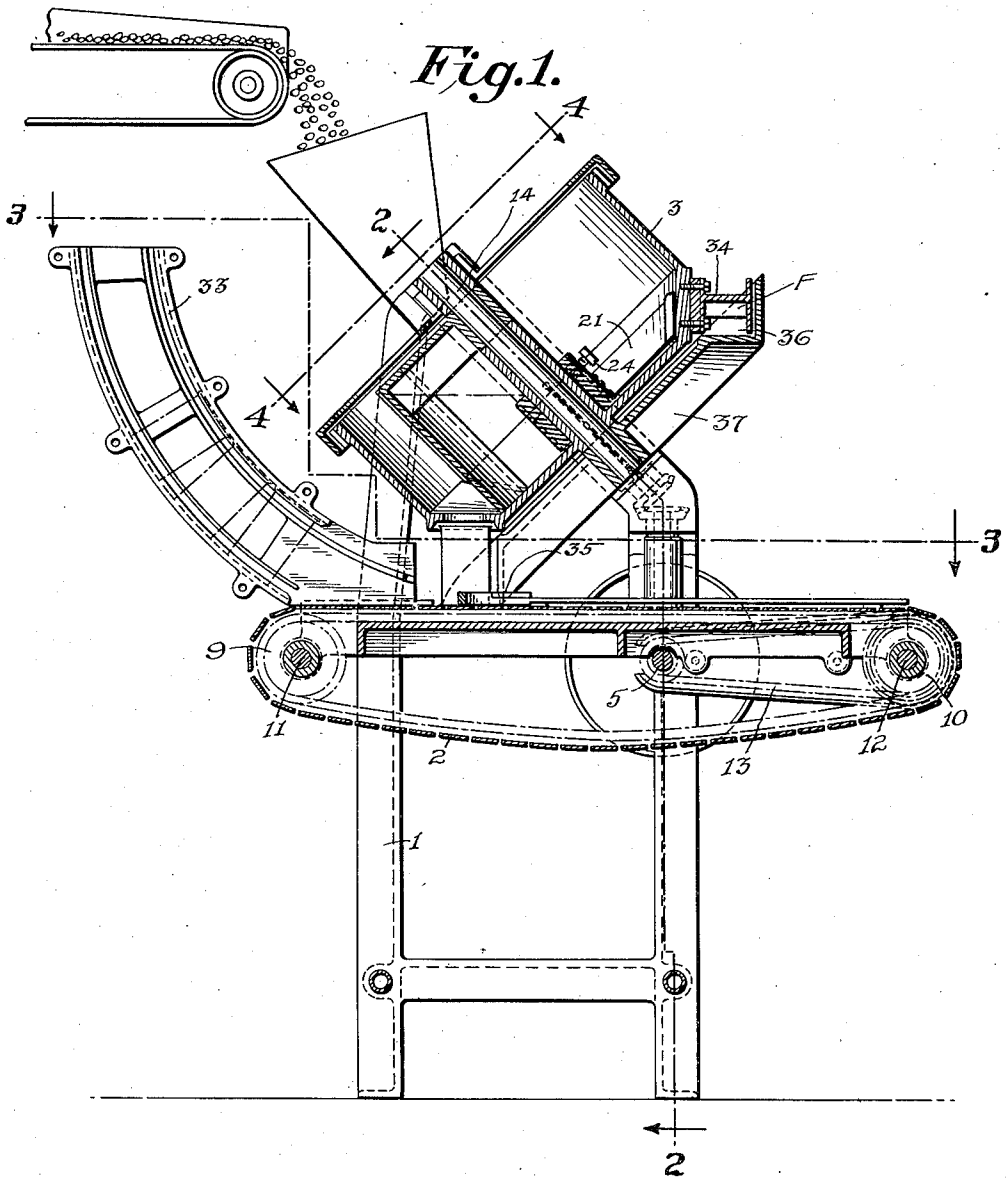

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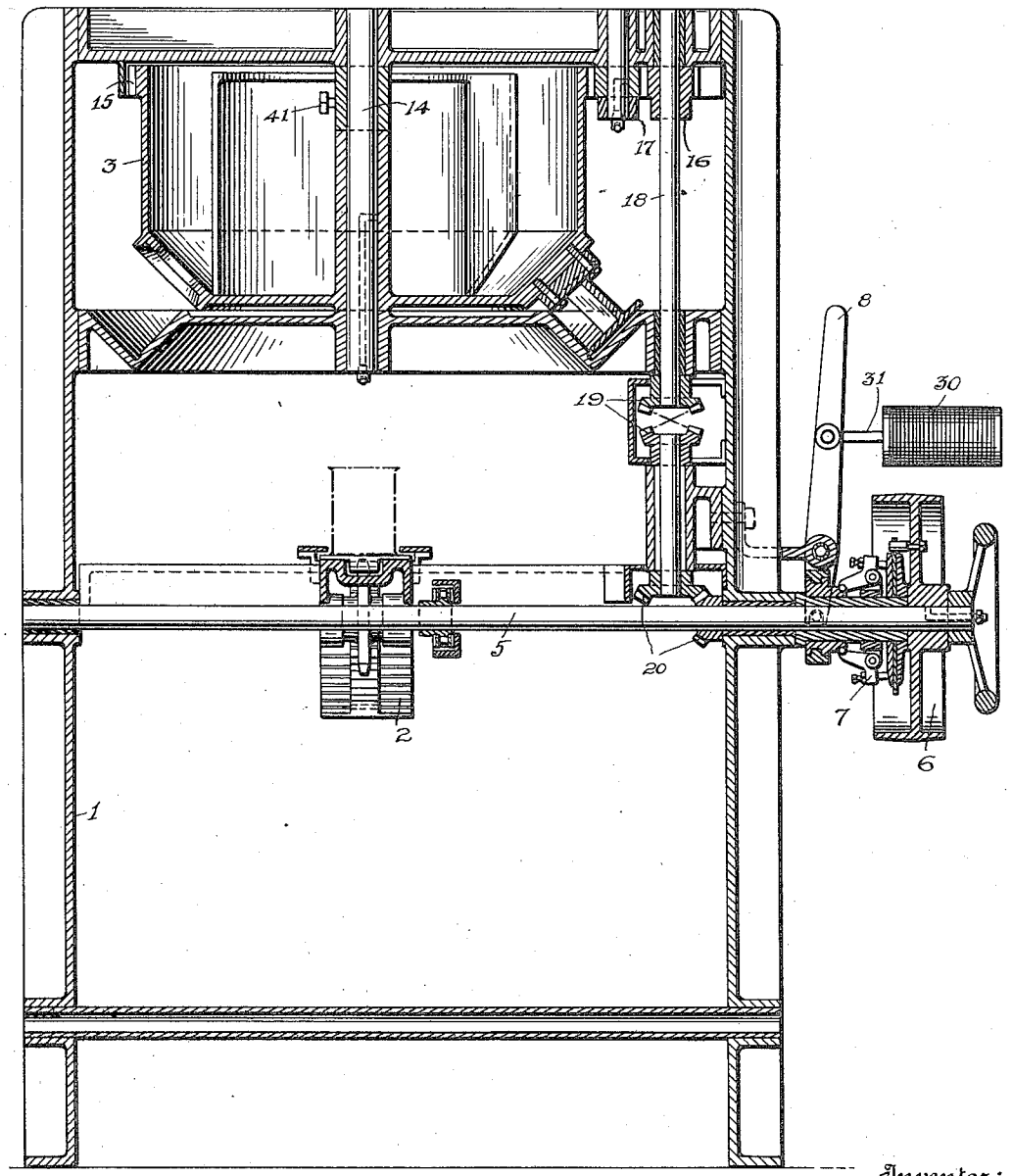
Fig. 2.



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METHOD AND APPARATUS FOR FILLING GRANULAR MATERIAL INTO MOVING CONTAINERS

Filed May 7, 1930 4 Sheets-Sheet 3

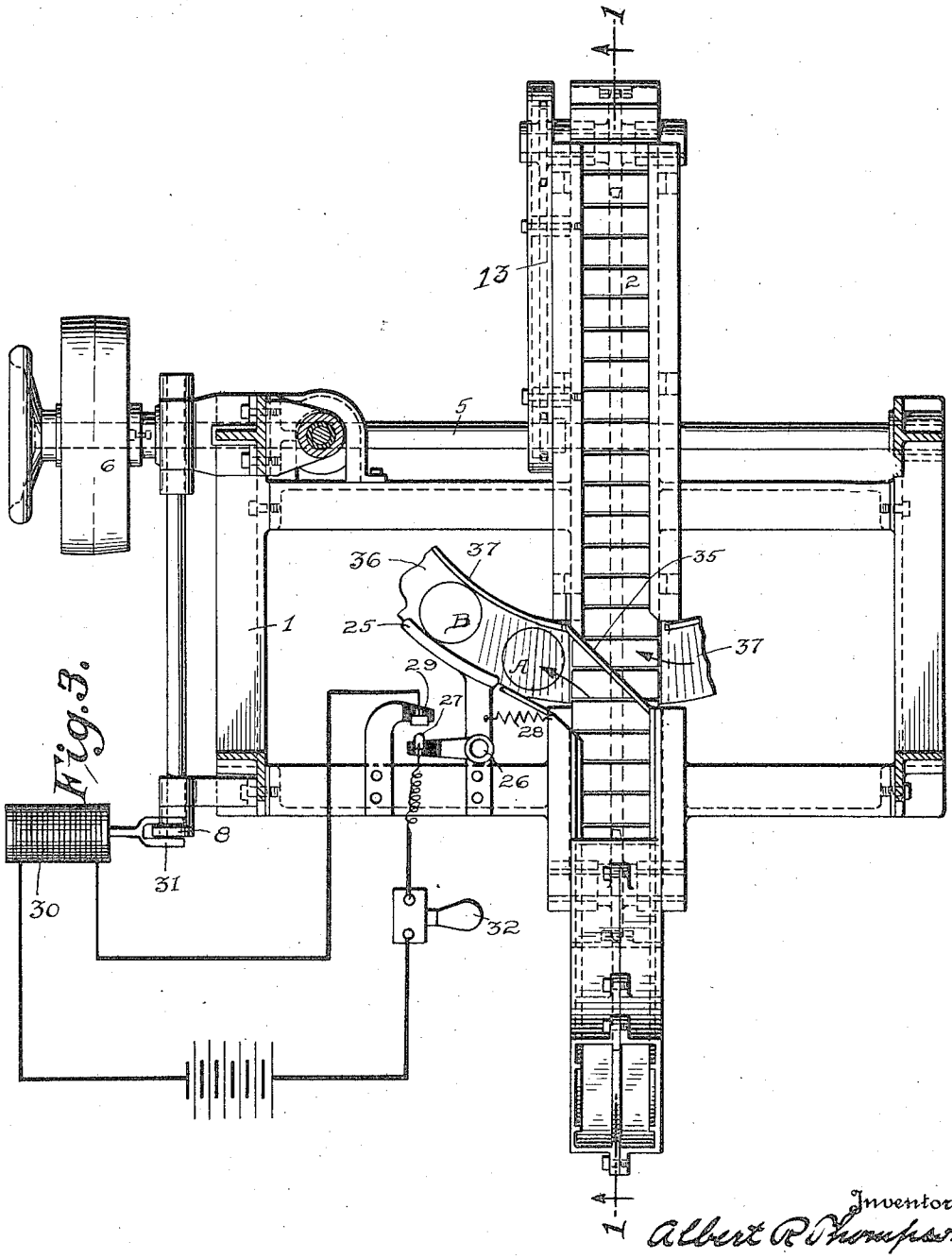

Fig. 3.

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METHOD AND APPARATUS FOR FILLING GRANULAR MATERIAL INTO MOVING CONTAINERS

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Fig. 4.

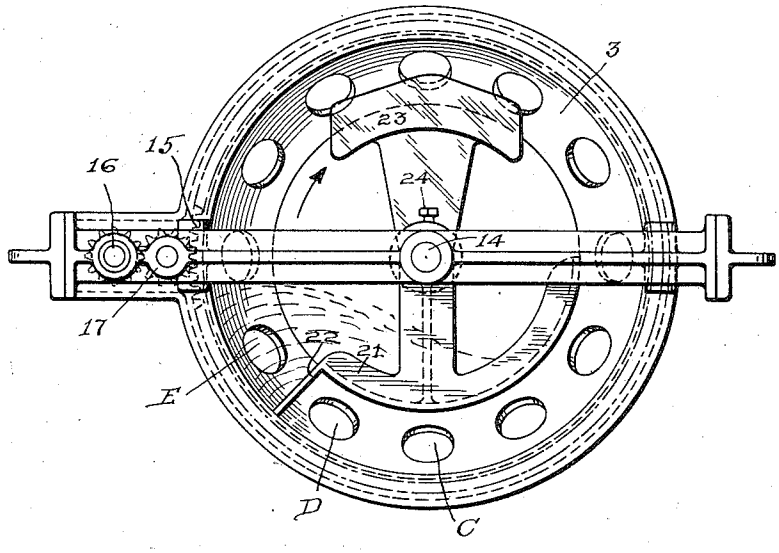
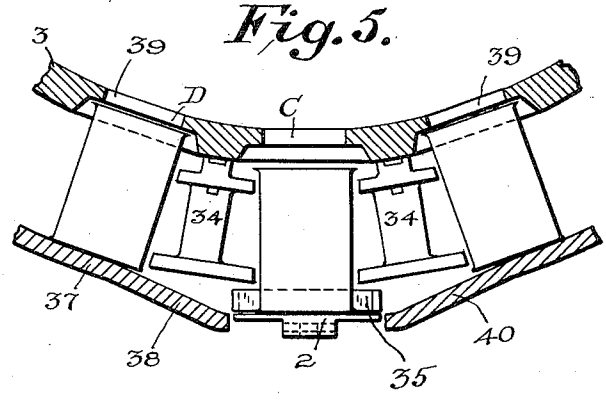


Fig. 5.



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Patented Sept. 24, 1935 2,015,164

UNITED STATES PATENT OFFICE

2,015,164

METHOD AND APPARATUS FOR FILLING GRANULAR MATERIAL INTO MOVING CONTAINERS

Albert R. Thompson, San Jose, Calif., assignor to Food Machinery Corporation, San Jose, Calif.

Application May 7, 1930, Serial No. 450,579

38 Claims. (Cl. 226—22)

This invention relates to an apparatus for measuring and filling granular material into positioned containers moving in successive processional arrangement past filling stations and is particularly adapted to the handling of such material as peas, beans, cereals of various kinds, or any material of a globular shape or that is of a pulverulent nature that will flow easily through orifices and which may be handled en masse and measured quantities successively removed therefrom by constantly operating mechanism.

While the invention is adapted to the handling of a varied assortment of materials, in order to make this description and the operation of the machine embodying the invention that is illustrated by the drawings accompanying this application, easily understood, the description will be substantially confined to the handling of such materials as green peas as handled in canning factories in the canning of food products, it being understood that the handling of any other granular product will be in substantially the same way and with substantially the same general results.

In all previous apparatus for handling and measuring such granular materials as green peas and delivering measured quantities to a succession of rapidly moving containers, such as the commercial open end tin can, the mechanism has included some kind of measuring chamber or device for segregating a given quantity of material from a mass and then depositing this measured charge of material into a container, always with a more or less consequent damage to the material through crushing and mutilation where the measured charge is separated from the mass. An attempt has been made to overcome this damaging of the material by the interpositioning of clearance spaces and various arrangements of the edges of the measuring chambers and attending surfaces so that the actual cut off of the measured charge is effected without the metal edges coming together to crush some of the material, and this has been done with a measure of success, but even so, the successive handling of the mass of material and the segregated charges in the manner necessary to isolate measured quantities to satisfy the demands of the packing methods in commercial canning plants has still resulted in some damage to the product from excessive manipulation and handling. Measuring chambers, plungers moving therein and the attendant mechanism for operating them adds additional cost to the apparatus and extra expense for operation and maintenance and the consequent agitation of the material when handled in this manner results in a more or less degrading of the product in spite of the efforts made to prevent just such conditions.

Applicant's device is designed to deliver measured quantities of granular material to a positioned container without the interpositioning of measuring chambers and their attending mechanism and to deliver a more accurately measured charge than has heretofore been possible or practicable in commercial practice.

Generally considered applicant's device comprises a rotating hopper set on an incline of substantially 45 degrees, although this angle is not a fixed necessity since other angles of inclination will operate efficiently, applicant has found that this angle of inclination will handle such material as green peas in a very efficient and satisfactory manner. This inclined hopper is the depository for a mass of granular material. It is given constant rotation by means of suitable mechanism and carries means for receiving open end cans in succession from a suitable source of supply and carry them through a circuitous path into and out of contact with a mass of granular material deposited in the hopper, from which mass each can receives a charge of material as it passes. At this time the measure of material is not necessarily extremely accurate as it passes into the can, but as the can advances through its path, moving with the hopper, it is brought into a position where its axis is substantially horizontal. Before it reaches this position, however, the open end of the can, substantially full of peas, passes behind an adjustable shield which prevents the peas from falling out of the can into the mass from which they were taken. This shield will, according to its adjustment, prevent the peas from rolling out of the can when in the horizontal position, except to just the extent desired to leave in the can the required measured quantity, and by thus spilling the excess from the cans after filling in the manner to be more fully described, applicant has succeeded in filling cans under commercial practice wherein the fill showed a variation of less than one tenth of an ounce in successive cans, which is a more accurate result than has heretofore been obtained as far as applicant is aware.

In the design of an apparatus to embody the invention, simplicity of construction and operation were of dominant importance. An endless conveyor for delivering open end empty cans to the filling mechanism also acts as the conveyor for carrying the filled cans from the machine.

There is really only two moving elements, that is operative elements in the machine. The rotating hopper and the endless conveyor, with the necessary connections in the way of gearing etc., to produce constant and synchronized operation. A curved chute delivers the open end cans by gravity to the conveyor. In the rotating hopper is positioned a division wall which extends substantially radially to one side of the hopper, this wall together with the hopper wall form the depository for the mass of peas which due to the inclination of the hopper, pyramid in the intersection of this fixed wall and the wall of the hopper adjacent thereto as will be more fully pointed out in the ensuing description.

Diagrammatic means are shown for stopping the operation of the machine in case a can is missed which will prevent loss and spilling of peas in case a filling opening is not covered by a can.

This stop mechanism as shown is electrical, but it is quite obvious that mechanical means can be applied very easily if preferred, the object being to show a means rather than a distinct device.

It is a principal object of the invention to provide an apparatus for handling and measuring granular or like material wherein a moving container is charged with a measured quantity of material and the container itself acts as the measuring medium.

It is also an object of the invention to provide an apparatus for the purpose specified wherein open end containers are delivered to a rotating element which conveys them in succession into contact with a mass of granular material from which mass each container receives a measured charge of material without the interposition of any measuring device.

It is a further object of the invention to provide an apparatus for the purpose wherein a mass of granular material is pyramided in a rotating hopper so that it follows the rotation in only a limited extent, and has direct connection with open end containers as they are moved past the mass whereby each container is filled with material from the mass.

It is also an object of the invention to provide an apparatus for filling open end containers with material wherein the containers are moved from a vertical position to substantially a horizontal position and back to a vertical position during their passage through the machine and during said passage to receive a fill of material and to have the excess spilled therefrom to leave an accurately measured charge in each container.

It is a further object of the invention to provide a machine of the class described wherein a material container element also acts as a container moving element for moving single containers past a mass of material in said container element whereby said containers will receive a charge of material therefrom.

It is also an object of the invention to provide an apparatus for filling measured quantities of a granular material into open end containers wherein the containers are over filled and by a continued movement through the same path and by the same mechanism a portion of said material is controllably spilled therefrom to leave an accurately measured quantity in each container.

It is a further object of the invention to provide an apparatus for the purpose wherein a rotating hopper in conjunction with a fixed member will act to pyramid a mass of granular material within a restricted zone in the hopper space whereby the said hopper may convey single containers past said mass and have deposited therein a charge of material.

It is also an object of the invention to provide an apparatus for the purpose wherein a rotating hopper in conjunction with a fixed member and an adjustable member both within the hopper space will segregate a mass of material within a restricted zone within said hopper whereby a container moved past said fixed and adjustable members will receive an accurately measured charge of material.

It is also an object of the invention to provide an apparatus for the purpose wherein a rotating hopper adapted to hold a mass of material is positioned at an inclination and has a series of filling ports for admitting material to open end containers in contact therewith and is adapted to engage and move containers through an inclined circuitous path whereby each container will receive a charge of material from the mass within said hopper.

It is also an object of the invention to provide an apparatus for the purpose wherein a rotating circular hopper is set on an inclined axis with a circular inclined pathway adjacent and under said hopper to form a bottom support for containers, with means on said hopper for engaging and moving containers through said inclined pathway and with means in said hopper for segregating a mass of material at one side thereof whereby as containers are moved through said pathway they successively receive a charge of material therefrom.

It is also an object of the invention to provide means for stopping the machine in case the feed of cans or containers is interrupted to thereby prevent the spilling and loss of material if a filling opening passed the mass of material without being covered by a container.

It is also an object of the invention to provide an apparatus for filling containers with a loose material wherein the containers are moved through an inclined circuitous path and are at the same time axially rotated to cause a rolling of the material charged therein, the containers moving from a vertical to a horizontal and back to a vertical position during said transit.

With such objects in view as well as other advantages inherent in the invention, the novel structural peculiarities, novel organization of elements, and the separate and collective operations involved in carrying out the recited objects of the invention, which will be made the subject matter of claims hereto appended, I wish it understood that the several necessary elements and combinations constituting the same may be varied in their proportions, general arrangement and operative relation without departing from the scope and nature of the invention. In carrying out the invention in a concrete form or machine, further objects, advantages and improvements have been evolved than have been recited, and in order to make the invention more clearly understood there are shown in the accompanying drawings means and mechanism embodying the preferred structural arrangement and disposition of the different parts and combinations in which I have only illustrated one way of embodying the invention. The described devices are simply embodiments of the invention which other structures might also employ and some of the parts or combinations may be used

without the others in different types of such machines without departure from the purview of my invention and I therefore regard myself as entitled to such variations from the shown and described devices as fall within the scope and meaning of the claims.

Referring now to the accompanying drawings which are more or less diagrammatic in character; are not necessarily drawn to scale and in which some parts may be more or less exaggerated in size and proportion to better show the structure and operation, a better and clearer understanding of the structure and operation will be understood.

Fig. 1 is a vertical sectional elevation of an apparatus embodying the invention and has been taken on substantially the line 1—1 of Fig. 3. This view shows clearly the manner of inclining the rotating hopper; its positioning directly over the endless conveyor which serves to move the containers to and from the hopper element and the manner of feeding the empty containers to the endless conveyor.

Fig. 2 is a sectional elevation taken on the line 2—2 of Fig. 1 but with the inclined hopper set up into a vertical plane to avoid the confusion of a part perspective view. It was thought this manner of showing the device in this view would be preferable since the sections are all looked at from the same plane.

Fig. 3 is a sectional plan of the machine taken on approximately the line 3—3 of Fig. 1. This view clearly shows the endless conveyor; the deflector member that diverts the containers into the circular trackway and back onto the conveyor as well as the stopping mechanism which operates when a can is missed.

Fig. 4 is a plan of the hopper looking in direction of the arrows 4 of Fig. 1. This view clearly shows the division wall in the hopper that acts to segregate the mass of material at one side of the hopper and also shows the spill gauge that controls the spill of the excess material to give an accurate fill to each container.

Fig. 5 is more or less of a diagrammatic view showing a portion of the rotary hopper; the inclined surfaces at the entry and exit of the circular path for the containers; the deflector for controlling the direction of movement of the containers and the conveyor.

The numeral 1 represents generally the frame work of the machine. 2 represents the endless conveyor, and 3 the inclined hopper and 4 the curved chute for directing the cans to the upper surface of the conveyor 2. At one side of the frame 1 will be seen the main drive shaft 5 on which is mounted the drive pulley 6 controlled by the clutch 7, the clutch members being operated by the combined manually and electrically controlled lever 8. The endless conveyor 2 is mounted on suitable sprockets 9 and 10 in turn carried by the shafts 11 and 12 and is driven by the chain 13.

The hopper 3 is mounted to rotate on the inclined shaft 14 and carries around its upper periphery the ring gear 15 which is driven by the gears 16 and 17 through the shaft 18, bevel gears 19 and mitre gears 20 from the main shaft 5.

Fig. 4 shows a plan arrangement of the division wall in the hopper as at 21 where it will be seen that this wall has a radial section 22 which contacts with the inner wall of the rotating hopper. It is at the intersection of this division wall and the inner wall of the hopper that the granular material will tend to pyramid as the hopper revolves and I have indicated by dotted circular lines the manner in which the material will tend to climb up the inner wall of the hopper and then fall back on the mass. There can be no crushing or multilation of material here because the hopper wall is always moving away from the wall 22.

This Fig. 4 also very clearly shows the spill gauge located within the hopper space and lying along the upper wall of the hopper as it rotates, the portion 23 acting to partially cover the filling openings in the hopper as it revolves and by its adjustment circumferentially controls the amount of material spilled from each container as it passes. The desired adjustment is held by the set screw 24, this will be further explained under operation.

A stop mechanism is shown in somewhat of a diagrammatic manner on Fig. 3. Arranged to contact with the passing cans as they start up their incline is a detector lever 25 pivoted at 26 and carrying an electrical contact member 27 and held in the position shown by contact with the passing cans against the tension of the spring 28. A fixed contact 29 is located in operative relation with the contact 27 so that if a can is missing from a filling opening the spring 28 will tend to close the electrical circuit by bringing the contacts 27 and 29 together when the solenoid magnet 30 will be energized, the plunger 31 be pulled laterally and through its connection with the clutch lever 8 release the clutch and stop the machine and at the same time flash a signal through a colored light 32, or in place of a light an ordinary buzzer may be placed in the circuit, when an operator will place a can in the empty space to replace the lever 25 in its inoperative position and the machine started. Other features of structure will be referred to in the operative description to follow.

Operation

In this operative description I will, for the purpose of simplicity refer to the material being handled as the ordinary green peas of commerce. I prefer to deal with this material because the highest grade of product is very delicate and very easily crushed and mutilated in the ordinary automatic machinery for filling the product into the commercial cans, and when so crushed and mutilated is quickly reduced to a lower grade material resulting in a financial loss to the packer and offering to the consuming public an inferior grade of food.

In the canning of green peas they require more or less of handling in several different kinds of apparatus before they reach the filling machine. They must first be separated from the pods in a pea threshing machine which beats them about more or less and has a tendency to cause some mutilation. They must then be washed, graded for size, separated from refuse materials and finally blanched or at least subjected to the action of steam or hot water to give them a preliminary cook before being placed in the cans for final disposition. When the peas reach the ordinary filling machine they are more or less soft and tender and much more easily bruised than at any other time in the process before going into the cans, and this is the time that the most careful handling and efficient apparatus will produce the highest grade product that will bring the most money to the packer. My improved filling machine will now take the tender peas and fill them into cans with prac-

tically no bruising or mutilation and will give to the packer the highest grade product he has ever had as far as filling practices go.

In Fig. 1, I have shown a simple source of supply in the shape of a conveyor belt which brings the previously treated peas to a chute which deposits them into the hopper **3** as shown. When the machine is operating continuously there is a uniform decrease of the quantity of material in the hopper and the supply should provide sufficient additional material to maintain a substantially uniform mass in the hopper so that the filling operation will be carried on under uniform conditions. The supply of open end cans will come down the gravity chute **33** in uniform succession and will pass onto the conveyor belt **2** to be in turn presented to the feeding elements or spacing members **34** carried by the hopper **3** and by means of the deflecting member **35** resting directly over the conveyor **2** at the point of passing into the zone of the members **34** will be deflected away from the conveyor **2** and will begin their passage through the circuitous path **36** which is provided by the member **37** located adjacent the bottom of the hopper **3**. The fixed path provided by the member **37** is substantially circular and in the same inclined plane throughout its extent except at the point where the cans enter.

By referring now to Fig. 5 it will be seen that the entrance and exit of the member **37** is somewhat tapered where it adjoins the conveyor **2** so that as the cans are swept off the conveyor **2** by means of the can feeders and spacers **34** they will slide up the incline **38** which will gradually raise them up into the tapered mouth of the orifice **39** which will roughly center them with the orifice. The cans are now held in this position by sliding on the bottom of the trackway **36** and the spacers and feeders **34**. Likewise as the cans return to the conveyor **2** to be carried away from the filling hopper **3** they slide down the incline **40** out of alignment with the orifice **39** and by means of the deflector are swept onto the conveyor **2** to be carried away.

In operating machines of this type it is supposed that the cans will always feed in uniform succession without miss and that a can will always be present to cover a filling orifice, but sometimes something happens to restrict the flow of cans and a filling orifice will pass the conveyor **2** without getting a can, in which case, if the machine is permitted to continue its operation this open orifice, when it reached the mass of peas in the hopper would permit them to run out, and if no means were provided to catch them they would go on the floor and be lost.

In order to obviate such a condition I have shown diagrammatically in Fig. 3 one way of preventing such a condition to develop. Along the trackway **36**, just as the cans enter from the conveyor **2** there is a pivoted lever **25** which is normally held in the position shown by the presence of cans in proper spaced succession. This lever, or the portion in contact with the cans is of such a length that a can must be in the position "A", to contact with the lever **25** before the can at position "B" passes out of contact, in which case the lever will be continuously held in the position shown, if, however, a can is missing from the position "A" and the can "B" passes out of contact with the lever the spring **28** will immediately pull the lever into the space that should be occupied by a can and close the circuit by the contacts **27** and **29**, energizing the solenoid magnet **30** thus pulling the clutch lever **8** and stopping the machine, which cannot be again started until the lever **25** is pulled out to its normal position by inserting a can in the empty space. The signal **32** indicating that the machine has stopped may be a colored light or a buzzer, anything that will attract the attention of an operator to come and right conditions.

Refer to Fig. 4 now and we will see how the cans are filled direct from the hopper with uniform charges of material without the interposition of any kind of measuring device other than the can itself.

The orifice at position "C" is where the orifice and empty can come into alignment as shown in elevation in Fig. 5. In the space of the hopper defined by the circular wall of the member **21**, the radial wall **22** and the outer wall of the hopper **3** is always empty so that there are no peas to fall through the orifices while changing cans. The peas are fed into the space indicated by the circular dotted lines above the radial wall **22**. This wall being fixed and the wall of the hopper always moving upward in the direction of the arrow tends to roll the mass of peas in contact with the hopper wall upward away from the wall **22**, but the quantity assembled at one time is sufficient to form a pyramid at this point and since the movement of the hopper wall is sharply inclined the peas will fall back onto the mass as they are carried up from the bottom of the mass. This slight easy agitation is sufficient to prevent bridging of the mass and thus effecting a uniform fill. As the cans begin their travel along the inclined path **36** and the orifice "D" with a can underneath just passes under the division wall **22** the edge of the orifice will pass under and in direct contact with the mass of peas resting against the wall **22** and they will immediately roll into the can and will so continue as the can and orifice move upward under the mass until the can is completely filled. As the can and orifice continue their movement through the upwardly inclined pathway they will gradually pass from under the mass and the charge in the can will be separated from the mass without any other cut off than the simple moving of the filled can from the mass. There can be no crushing here because there is nothing present but the peas themselves.

As the filled can passes from under the mass its axis is being gradually converted from a vertical position at the point "C" to a horizontal position at the top of the inclined path as at "F" Fig. 1. If some means were not provided at these upper positions to keep the peas in the cans the most of them would roll out and fall back onto the mass below. To prevent this and to regulate the amount of peas retained in each can there is provided a spill gauge in the member **23**. With the cans completely full when they rise up the incline from the filling position the peas will begin to roll out as soon as the tilting of the cans are sufficient to begin the spill. In no instance is it desirable to have the cans completely full of peas so that a certain amount must be spilled. The beginning of the spill may be unrestricted but as soon as a certain amount have rolled out the spill gauge **23** should be adjusted circumferentially to begin to partially cover the orifice and restrict further spilling. If the gauge member **23** is placed in a position to the left of that shown in Fig. 4 so the orifices are covered sooner the cans will retain a larger quantity of peas, while if a less quantity is desired in each can the

normal spill occasioned by the increased inclination toward the horizontal position of the cans is permitted to continue for a longer period before the spill gauge acts to restrict the spill. The adjustment to produce this effect is setting the spill gauge to the right of the position of Fig. 4. It is to be understood that this description of the adjustment of the spill gauge is only illustrative and is not intended to represent accurate adjustments, neither is the position of this gauge in Fig. 4 necessarily correct for any condition of operation. It may be necessary to have the gauge portion shorter or longer than shown and it may be adjusted on either side of that shown for normal operation. After the cans pass the top horizontal position they gradually begin to tilt back until they reach the position of the can at the right of Fig. 5 when they have almost reached the vertical position, and do reach this position as they again rest on the conveyor 2 to be carried away from the machine.

By reference to Fig. 3 it will be seen that the cans leave and return to the conveyor 2 at substantially the same point, the two arrows here show the direction the cans take. The movement of the conveyor 2 should be slightly faster than the movement of the hopper so that the line of cans approaching the trackway 36 will push one another against the outer edges of the spacing members 34 so that no time will be lost in getting each can into the space between two members 34 as the cans move from the conveyor into the pathway 36 and start their inclined travel. The frictional effect of the conveyor on the bottoms of the cans when they first contact with the edges of the spacing members 34 will help to quickly push them into the spaces as soon as they are permitted to enter by the rotation of the hopper and the spacing elements.

The member 21 is shown as positioned and held in adjustment by a set screw 41 Fig. 2. Fig. 4 shows that this member is mounted on the shaft 14 so that it may swing circumferentially to any adjustment desired, by which means the division wall 22 may be placed lower or higher than that shown.

It is believed that a new method has been evolved in the art of filling granular material into moving containers by the development of this invention and that this method comprises the steps of passing empty cans under a mass of granular material whereby the material will flow directly into the cans which act as their own measuring devices, cutting off the filled charges in the cans from the mass by simply moving them out of contact with the mass then standardizing the fill by spilling a controlled amount from each can as the cans pass through a continuously changing axial position.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. An apparatus for measuring and filling granular material into positioned containers comprising means for moving containers to and away from filling means, filling means comprising an inclined rotating hopper for carrying a supply of granular material, means in said hopper for isolating said material, means associated with said hopper for engaging and moving containers, a fixed inclined pathway adjacent said hopper over which said containers are moved, a wall of said hopper having a series of ports for connecting the containers in succession with the supply of granular material in said hopper whereby as said hopper revolves and moves said containers over said pathway material will flow into each container as it passes.

2. An apparatus for filling granular material into positioned containers comprising means for moving containers to and away from filling means, filling means comprising a hopper rotating on an inclined plane for carrying a supply of granular material, means in said hopper for isolating said material, means associated with said hopper for moving containers, a fixed inclined pathway adjacent said hopper over which said containers are moved, a wall of said hopper having a series of ports for connecting said containers in succession with the material supply carried by said hopper whereby as said hopper revolves and moves containers over said pathway material will flow through the said ports into said containers while moving up said inclined plane.

3. An apparatus for filling granular material into positioned containers comprising means for moving containers over a horizontal pathway to and from filling means, filling means comprising an inclined rotating element for carrying a supply of granular material, means associated with said filling means for confining said granular material to an isolated zone, means associated therewith for moving containers, an inclined pathway over which said containers are moved, a wall of said hopper having a series of ports for connecting said containers successively with the material carried by said rotating element whereby as said element rotates material flows therefrom into said containers while moving up said inclined pathway.

4. An apparatus for filling granular material into positioned containers comprising means for moving containers over a horizontal pathway to and from filling means, filling means comprising a rotating element moving over an inclined plane and carrying a supply of granular material fixed means positioned in said filling means for holding said granular material to an isolated zone, means associated therewith for moving containers, an inclined pathway adjacent said rotating element over which said containers move, a wall having free passageways connecting said containers with the supply of material carried by said rotating element whereby as said element rotates material will flow into the positioned containers while moving up said inclined plane.

5. An apparatus for filling granular material into positioned containers comprising means for moving containers over a horizontal pathway, a rotary element having a fixed inclined axis for receiving said containers and moving them over a fixed inclined pathway and returning them to said horizontal pathway, an inclined pathway over which said containers move, a movable inclined hopper and a fixed element for holding a supply of granular material adjacent one side said inclined pathway, a wall of said hopper having a series of ports for connecting said containers with said material supply whereby as said containers move over said pathway material will flow thereinto while moving up said inclined pathway.

6. An apparatus for filling granular material into positioned containers comprising a horizontal pathway over which containers are moved, means for moving said containers, an inclined pathway leading from said horizontal pathway, means for moving cans from one of said pathways to the other, rotating and fixed elements asso-

ciated therewith for carrying and isolating, a supply of granular material, a wall in said rotary element having constantly open ports forming free passageways from said material supply to containers moving over said inclined pathway whereby as containers are moved up said incline material will flow thereinto.

7. An apparatus for filling a flowing material into positioned containers comprising a permanently inclined rotating element for carrying a supply of material and filling into containers, a partition within said element for segregating said material into one side thereof and thereby preventing movement of material past said partition, permanently inclined means associated with said element for receiving containers, an inclined pathway adjacent said element over which said containers move, a wall of said rotating element having ports forming free passageways connecting said containers with said material supply whereby material will flow from said supply into said containers as they are moved over said pathway by said rotating element.

8. An apparatus for filling a flowing material into positioned containers comprising a permanently inclined moving element for carrying a supply of material, a partition associated therewith for segregating said material at one side thereof, other means associated with said element for moving containers through a constantly changing axial inclination, an inclined pathway adjacent thereto over which said containers supported, a wall of said material supply element having ports for passageways connecting said containers with said material supply whereby material will flow into said containers as they are moved over said pathway.

9. An apparatus for filling a flowing material into positioned containers comprising a moving element for carrying a supply of material, and rotating through an inclined plane, an inclined fixed member adjacent said path of rotation for contacting with said material and causing it to segregate at one side of said pathway, means for moving containers through a path substantially parallel to the pathway of said moving element, a wall of said material supply element having ports forming passageways connecting said containers with said material as they are moved along whereby material will flow thereinto.

10. An apparatus for filling flowing material into positioned containers comprising moving means for carrying a supply of material, inclined fixed means associated therewith for causing said material to remain in a substantially isolated location therein, inclined means for moving containers in filling relation with said material supply, a wall of said material supply means having ports for connecting said containers with said material supply as they are moved in relation thereto whereby as they are carried into contact with said supply material will flow from said supply into said moving containers.

11. An apparatus for filling positioned containers with a mobile material comprising a continuously rotating hopper for carrying a supply of material, a fixed pathway concentric with the rotation of said hopper, means associated with said hopper for moving cans or containers over said concentric pathway and in filling relation with said hopper while moving over said pathway, an inclined member associated with said hopper for causing said material to remain in a substantially isolated location therein and to prevent movement therepast, so that containers may move into and out of contact therewith and receive a charge of material therefrom.

12. An apparatus for filling flowing material into positioned moving containers comprising an inclined rotating hopper for holding a supply of material, fixed inclined means within said hopper for restraining said material so it will not follow the rotation of said hopper but will remain in a substantially fixed location relative thereto, means for moving containers in synchronism with said hopper through an inclined pathway so they will contact with said material and receive a charge segregated therefrom as they are moved relative thereto.

13. An apparatus for filling a flowing material into positioned containers comprising an inclined rotating hopper, an inclined support for said hopper causing it to rotate over an inclined plane whereby material in said hopper will tend to roll to the lowest point of rotation, means within the hopper for holding said material on the side of said incline, means for moving cans over a path substantially parallel to the path traveled by said hopper whereby said cans will contact with the material in said hopper and receive a charge therefrom while they and the hopper are moving in unison.

14. An apparatus for filling a flowing material into positioned containers comprising a rotating hopper, an inclined support for said hopper causing it to rotate in an inclined plane, means for holding an isolated supply of material in said hopper substantially midway between the highest and lowest points of inclination, means for moving containers over an inclined circular path parallel with the plane of movement of said hopper and in synchronism therewith, a wall of said hopper having ports directly connecting with the open ends of the containers positioned thereto so that as said ports pass said isolated material supply a charge will enter each container and fill the same.

15. An apparatus for filling a flowing material into positioned containers comprising an inclined hopper, means for rotating said hopper through an inclined pathway, means for moving containers through an inclined fixed path parallel thereto, a wall of said hopper having ports forming free passageways connecting said positioned cans with the interior of said hopper while moving through said path whereby material in excess of natural fill may flow from said hopper directly into said cans as they are moved in synchronism therewith, with means along said path to permit excess fill to spill therefrom.

16. An apparatus for filling a flowing material into positioned containers comprising an inclined hopper, means for rotating said hopper through an inclined pathway, means for moving containers through an inclined pathway parallel thereto, a wall of said hopper having ports forming free passageways for a free flow of material from said hopper to said containers while they are moved in synchronism therewith, with means for holding material in said hopper in a substantially isolated position so the containers will pass by said material and receive a charge therefrom.

17. An apparatus for filling a flowing material into positioned containers comprising an inclined hopper, means for rotating said hopper through an inclined pathway, means for moving cans through a path parallel therewith, a wall of said hopper having ports for a free flow of material

from said hopper to said cans while they are moving in synchronism, means for holding material in said hopper in a substantially isolated location so that the moving cans pass said material and receive a charge therefrom, with means passing beneath said hopper for moving cans to and away therefrom.

18. An apparatus for filling a flowing material into positioned containers comprising an inclined support for a mass of material, means for moving said support, means for moving containers in synchronism with said support and in filling relation thereto, said containers being moved through a pathway giving them a constantly changing inclination from the vertical to the horizontal and back to the vertical, a wall of said inclined support having ports connecting said containers with material in said support while moving up their inclined pathway for permitting material to flow therein and means for controlling the spill of material therefrom when they are passing through their horizontal position.

19. An apparatus for filling a flowing material into positioned containers comprising an inclined support for a mass of material, means for moving said support over an inclined pathway, means for moving containers in synchronism therewith and in filling relation therewith, a wall having ports moving along said pathway for connecting said containers with material in said support whereby material flows unrestricted into said containers and fully charges them, the movement of said containers away from said material effecting a separation of the charge therefrom with means along the pathway of said containers for permitting a portion of the material to spill therefrom.

20. An apparatus for filling peas into open end cans wherein the can forms its own measuring device comprising an inclined hopper for a supply of peas, means for rotating said hopper over an inclined pathway, means for holding a supply of peas upon one side of said inclined pathway, means for moving cans in unison with said hopper and over substantially the same inclined pathway, a wall member having ports connecting said cans with the supply of peas in said hopper whereby they receive a charge from said supply as they are moved over their pathway, means for supplying a uniform supply of cans with means for stopping the operation of said filling apparatus if the supply of cans is broken or interrupted.

21. An apparatus for filling material into moving containers comprising a combined hopper and feeding device positioned to rotate through an inclined plane, a fixed trackway located in the same inclined plane, means for moving a succession of containers through said trackway, a single means for delivering to and removing containers from said trackway, fixed means positioned in said hopper to segregate and prevent the material therein from following said hopper in its rotation whereby said material accumulates in a substantially fixed location, one wall of said hopper having ports connecting with positioned containers so that material will flow therein as the hopper and containers move past the segregated supply of material.

22. An apparatus for filling material into moving containers comprising a combined hopper and feeding device positioned to rotate through an inclined plane, a fixed trackway located in the same inclined plane, means secured to said hopper for moving a succession of cans through said trackway, a single means moving under said hopper for delivering to and removing containers from said trackway, fixed means positioned in said hopper to prevent the supply of material from following said hopper in its rotation whereby said material is held in a substantially fixed location, one wall of said hopper having means of entry into positioned containers so that material will flow thereinto as the hopper and containers move past the source of material supply.

23. An apparatus for filling material into moving containers comprising a combined hopper and feeding device positioned to rotate through an inclined plane, a fixed trackway located in the same inclined plane directly under said hopper, means secured to said hopper for receiving and moving a succession of cans through said trackway, a single means moving under said hopper for delivering to and receiving from said hopper a succession of containers, fixed means positioned in said hopper to restrain the supply of material from following the rotation thereof and to segregate said material at one side of the inclined path through which said hopper rotates whereby the rotation of said hopper causes said supply of material to mass and remain in a substantially fixed location, one wall of said hopper having means of entry into said positioned containers so that material will flow thereinto as the hopper and containers move past said mass of material.

24. An apparatus for filling material into containers and grading the fill by spilling a portion from the overfilled containers comprising a rotating material supply hopper set on an inclined axis and moving through an inclined plane, a pathway for containers positioned in the same inclined plane, means for moving a succession of containers along said pathway in unison with said hopper and in position to receive material therefrom, means for accumulating the supply of material in said hopper into an isolated position occupying one side of the said hopper, a perforated wall of said hopper connecting the isolated material with the said containers whereby they each receive an excess charge of material therefrom with means along the path of said containers for controlling a spill therefrom whereby each container retains a uniform charge of material.

25. An apparatus for filling material into containers and grading the fill by spilling a portion from the overfilled containers comprising a rotating material supply hopper set on an inclined axis and moving through an inclined plane, a pathway for containers positioned in the same inclined plane and directly under said hopper, means for moving a succession of containers along said pathway in unison with said hopper and in position to receive material therefrom, means for accumulating the supply of material in said hopper into an isolated position occupying one side of said hopper space, a perforated wall of said hopper connecting the material therein with the said containers whereby they each receive an excess charge of material therefrom as they move under said material with means along the path of the overfilled containers for partially closing their open ends but leaving sufficient exposed for a portion of the charge to flow from the containers and thus grade the fill.

26. An apparatus for filling material into moving containers comprising a hopper for a supply of material, said hopper also acting as a material

feeding and as a container moving element, means associated with said hopper for segregating the supply of material at one side thereof where it remains as said hopper rotates, means for positioning and moving said hopper through an inclined plane, means for guiding a succession of empty containers into filling relation with said hopper so that they receive charges of material therefrom as they move in unison therewith, means for controlling a discharge of material from said containers after filling to grade the fill thereof and means for delivering to and removing containers from said hopper.

27. An apparatus for filling material into moving containers comprising a hopper for a supply of material, said hopper also acting as a material feeding and as a container moving element, fixed means inside of said hopper for segregating the supply of material at one side thereof where it remains as said hopper rotates, means for positioning and moving said hopper through an inclined plane, means for guiding a succession of empty containers into filling relation and underneath said hopper so that they will receive a charge of material therefrom as they move in unison therewith, the same means removing the filled containers from said hopper, means for controlling the discharge of a portion of the filled containers while moving through the said inclined plane to thereby grade the fill of said containers.

28. An apparatus for filling and grading the fill of containers comprising means for moving a succession of containers through a path effecting a constantly changing axial position of said containers from vertical to horizontal and back to vertical, means for holding a source of material supply to intercept said containers while moving from the vertical to the horizontal positions and to establish filling connection with said containers to fill the same in excess of the desired amount, means adjacent said containers while passing through the said horizontal position to control a spill of material therefrom and to thereby effect a uniform fill.

29. An apparatus for filling and grading the fill of containers comprising means for moving a succession of containers through a horizontal path with their axes in vertical position, means for receiving said containers and moving them through an inclined path from vertical to horizontal and back to vertical and delivering them to said first mentioned means, means for holding a material supply to intercept said containers while moving through their inclined path from vertical to horizontal and to establish filling relation with said containers to fill the same in excess of the desired amount, means adjacent said containers while passing through the horizontal positions to control a spill of material therefrom and to thereby effect a uniform fill.

30. An apparatus for filling and grading the fill of moving containers comprising means for moving a succession of containers through a horizontal path with their axes in vertical position, means positioned above said moving means for receiving said vertically disposed containers and move them through an inclined path from vertical to horizontal and back to vertical and place them on said first moving means, means for holding a material supply to intercept said containers while moving through their inclined path from vertical to horizontal and to establish filling relation with said containers to fill the same in excess of the desired amount, adjustable means adjacent the said containers while passing through the horizontal position to partially cover the open ends thereof and thereby control a spill of material therefrom which flows to said main supply and thereby effect a uniform fill of material in said containers.

31. An apparatus for filling and grading the fill of moving containers comprising a plurality of container moving means for continuously moving a succession of containers through changing paths from horizontal linear to inclined rotary and back to horizontal linear, means along said plurality of paths for intercepting said containers and delivering a charge of material to each in excess of the desired amount, means along said inclined rotary path for controlling a spill of material from said excess filled containers by partially covering the open ends of said filled containers while passing through their inclined rotary path thereby effecting a grading of the fill of said containers.

32. A method of charging empty containers with a charge of material wherein the container acts as its own measuring device and thereafter grading the fill thereof, consisting in continuously moving containers through a path over an inclined plane and gradually tipping the containers to substantially a horizontal axial inclination over a portion of their travel and then returning them to normal, holding a mass of material above a portion of said inclined path so that containers will contact therewith while passing and be completely filled therefrom, the gradual tipping of the containers during their continued travel tending to spill therefrom a graduated amount of material and thus leave in each container a uniform measured charge of said material.

33. A method of charging empty containers with a charge of material wherein the container acts as its own measuring device and thereafter grading the fill thereof, consisting in holding a mass of non-fluid material in a substantially isolated fixed location, moving a container over an inclined path a part of which crosses underneath said mass of material and contacts directly therewith so that material flows freely from said mass and completely fills the container, continued movement of the container cutting off the charge therein from the mass, the tipping of the container after it leaves the mass spilling a graduated amount of material therefrom and thus leaving in each container a uniform measured charge, the axis of the container intersecting a point and remaining constant therewith during travel over said path.

34. A method of filling containers with uniform graded charges of material consisting in moving containers over a predetermined path with open ends exposed and during their travel contacting with a supply of isolated material to become completely filled therefrom, partially covering the open ends of the filled containers in succession while tipping them to spill a predetermined amount of material therefrom to leave a uniform graded charge in each container.

35. An apparatus for filling empty containers comprising means for positioning containers with their axes vertical, other means for receiving the containers and moving them through an inclined pathway which gradually changes the axis of the containers to horizontal and brings them back to vertical, means for controlling and positioning a mass of material above the inclined pathway traversed by the containers, walls having free

passageways for connecting passing containers with the said mass of material whereby each container is completely filled with material, the container acting as its own measuring device, a guard located along a part of the path of said containers near their horizontal positions that partially covers their open ends and permits a portion of the contents to spill therefrom to leave a uniform measured charge in each container.

36. An apparatus for filling empty containers with a flowing material, comprising means for isolating a mass of material, means for moving unsealed open end containers underneath and in direct contact with said material whereby they are completely filled, the container acting as its own measuring device, means for then partially covering the open end of the container for a portion of its travel and spilling therefrom a portion of the contents to thereby leave in each container a uniform measured charge.

37. A method of filling containers with uniform charges of material consisting in moving containers over an inclined circular pathway that inclines them and while so moving said containers contacting each in succession with an isolated supply of material from which it is completely filled, then partially covering each filled container in succession during its further travel which tips them to spill a predetermined amount therefrom.

38. A method of filling containers with uniform charges of material consisting in moving containers over an inclined circular pathway and while so moving them contacting each in turn with an isolated supply of material from which it is completely filled, then covering the open end of each container in turn while tipping it to spill a predetermined amount therefrom and holding the axes of the containers focussed on a common intersection during their travel over said pathway.

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