June 2, 1959 R. GUYER 2,888,963

CARTON FILLING APPARATUS

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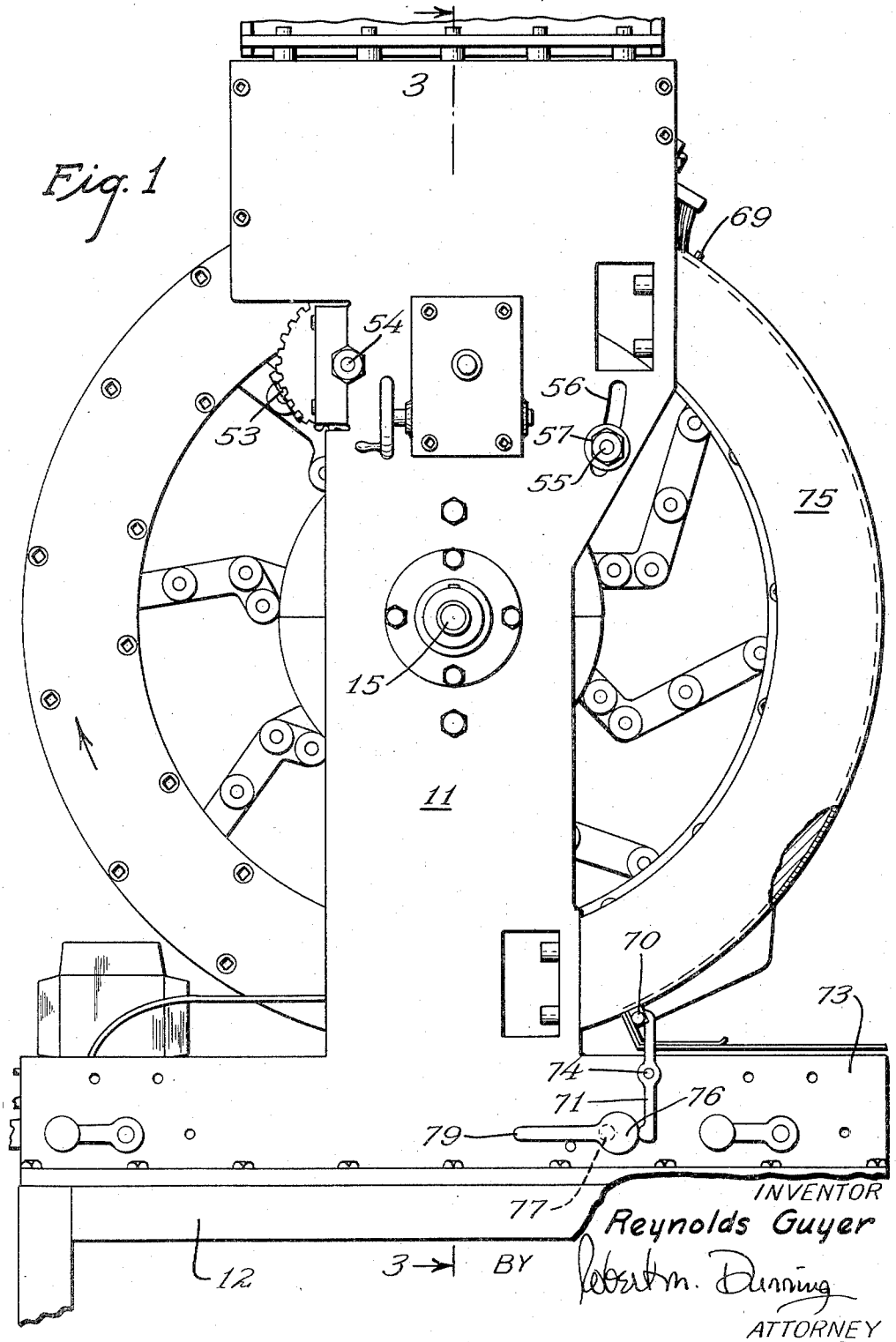
Fig. 1



INVENTOR
Reynolds Guyer
Robert M. Dunning
ATTORNEY

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CARTON FILLING APPARATUS

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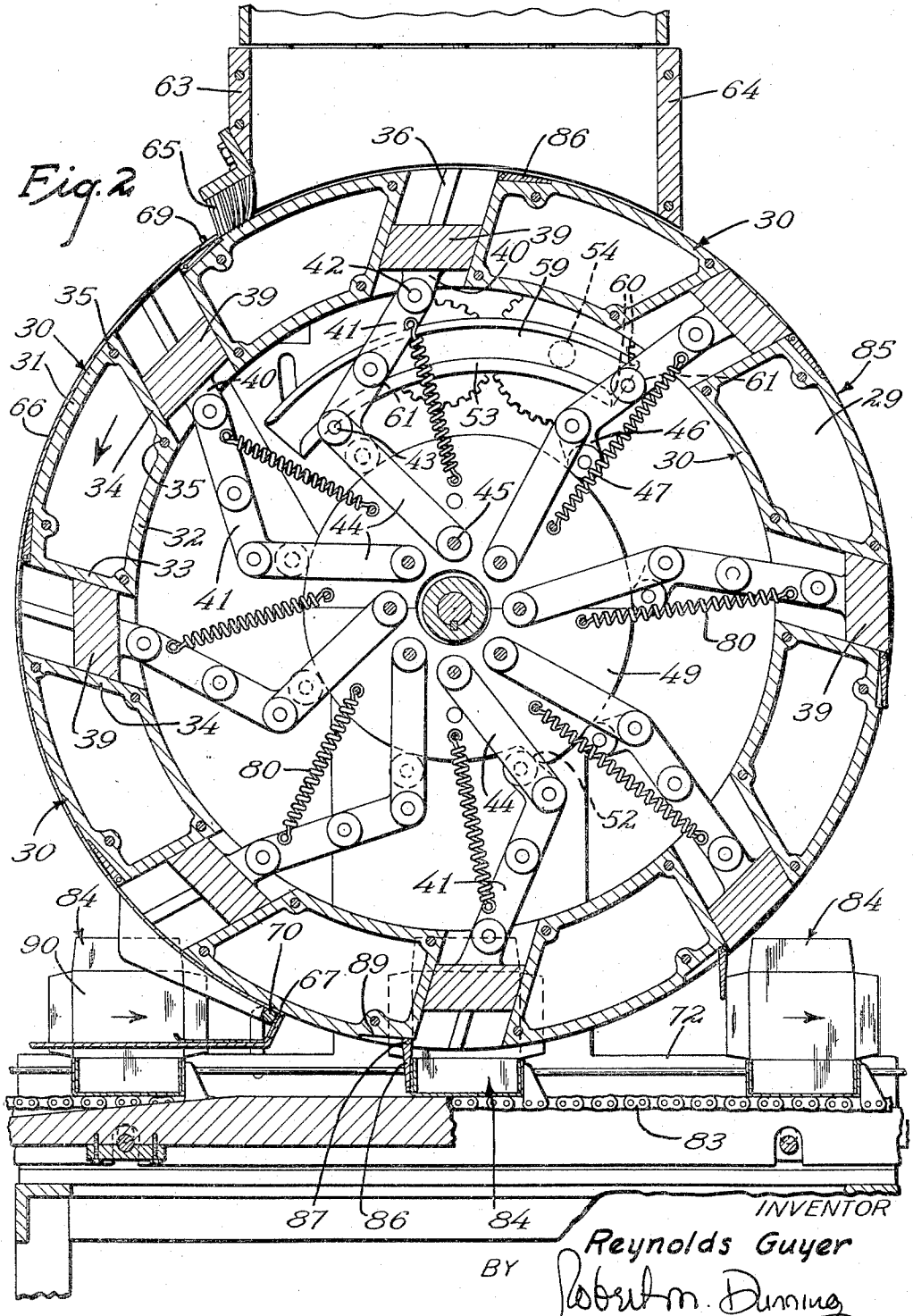
Fig. 2



INVENTOR

Reynolds Guyer

BY Robert M. Dunning

ATTORNEY

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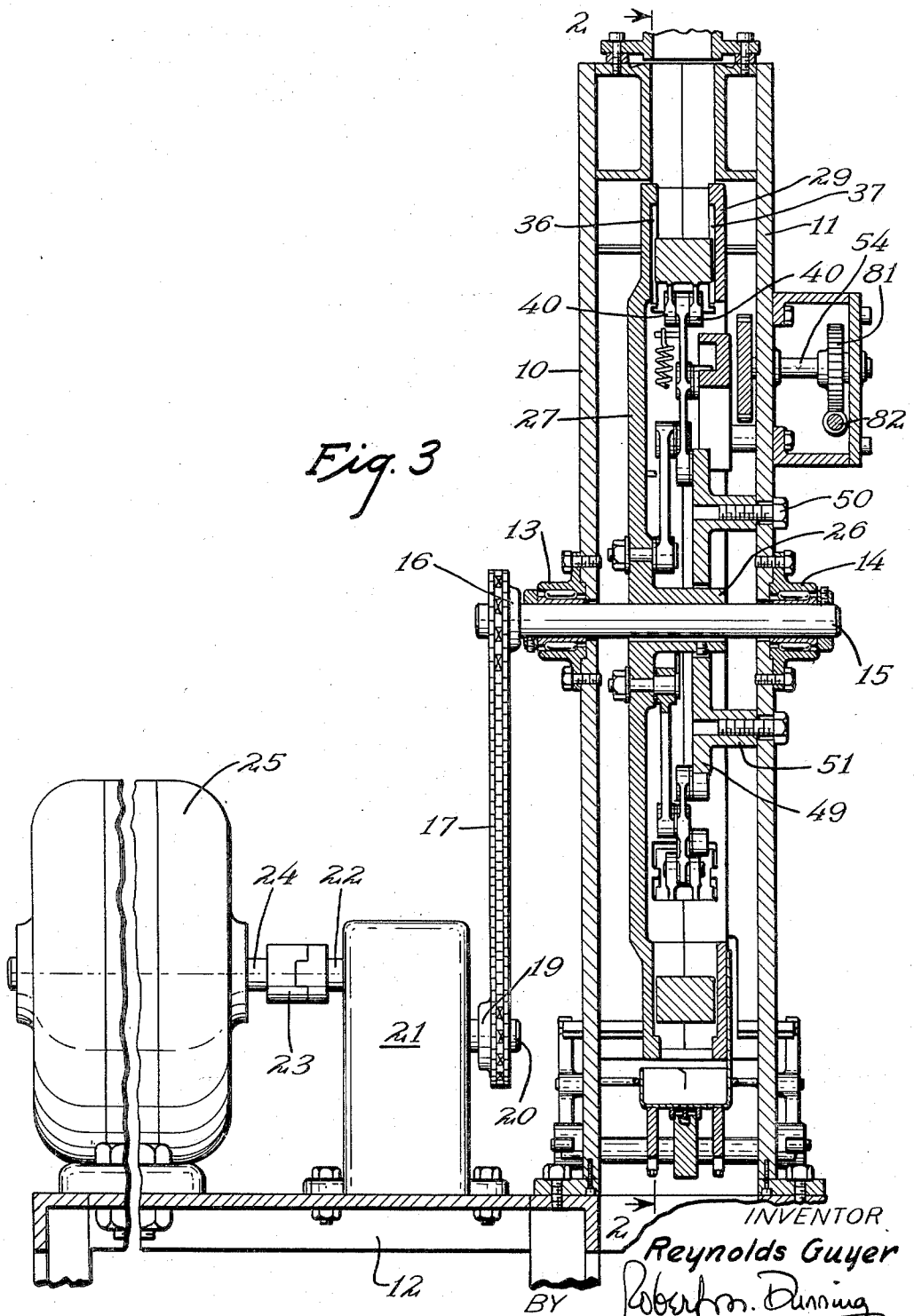
Fig. 3



INVENTOR
Reynolds Guyer
BY Robertson, Dunning
ATTORNEY

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2,888,963

CARTON FILLING APPARATUS

Reynolds Guyer, St. Paul, Minn., assignor to Waldorf Paper Products Company, Ramsey, Minn., a corporation of Minnesota

Application May 14, 1954, Serial No. 429,735

16 Claims. (Cl. 141—144)

This invention relates to an improvement in carton filling apparatus and deals particularly with a device capable of introducing a measured quantity of product from a hopper to a carton or other receptacle.

Various types of rotary filling devices have been produced. Many such devices comprise a rotatable wheel including a series of peripheral pockets. These pockets rotate beneath a supply hopper and the product drops by gravity or agitation into the pockets. Upon rotation of the wheel, the pockets move into position above a carton or other receptacle and deliver the material in the pockets to the receptacles.

Various types of devices have been employed for determining the quantity of material which may be delivered into the pockets. Adjusting means have been provided for varying the size of the pockets so as to vary the amount of material in the pockets. However, these means normally limit the maximum size of the pockets and do not permit expansion or enlargement of the pockets after they have been filled.

An object of the present invention resides in the provision of a rotary filling apparatus which includes a series of pockets having plungers therein by means of which the product may be expelled and by means of which the size of the pockets may be varied. These plungers are controlled in such a manner as to present a pocket of adjusted depth to receive the goods flowing into the pockets. At the completion of the pocket filling operation the plungers retract in a manner to enlarge the volume of the pocket. As a result the material within the pocket is loosely contained and the crowding of the material within the pockets against the peripheral pocket enclosing wall is avoided.

A further feature of the present invention resides in the provision of a filling apparatus which includes a series of peripheral pockets, the walls of which are arranged at an acute angle to a radial plane through the center of the pockets. In other words, the pockets do not extend radially within the rotating wheel but are angularly inclined so that during the major portion of the travel of the filled pockets the weight of the contents is upon a wall of the pocket rather than upon the encircling retaining wall. As a result the contents do not bear heavily against the encircling wall as the pockets rotate, thus preventing injury to the materials being packaged.

An added feature of the present invention lies in the provision of a filler useful in the filling of materials such as vegetables and the like either in fresh or frozen condition. Materials of this type when packed by a rotary wheel of usual construction fall against the encircling retaining wall as soon as the pockets rotate toward horizontal position and by the time the wheel rotates through substantially 180° virtually all of the weight of the material rests upon that portion of the product which is against the stationary encircling wall. As a result considerable friction is presented tending to abrade or press the material engaging the encircling wall, causing a deleterious effect upon the product. In the present device

the major portion of the weight of the product rests upon a pocket wall almost until the pocket is opened, thereby avoiding the difficulties previously encountered.

These and other objects and novel features of my invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of the specification:

Figure 1 is a side elevational view of the filling device in readiness for operation.

Figure 2 is a sectional view through the apparatus shown in Figure 1.

Figure 3 is a sectional view through the apparatus, the position of the section being indicated by the line 3—3 of Figure 1.

The filling apparatus includes a pair of generally parallel side plates 10 and 11 which are supported upon a suitable table or standard 12. These sides 10 and 11 support bearings 13 and 14 respectively which support a rotatable shaft 15. A sprocket 16 is mounted upon the shaft 15 and is connected by a chain 17 to a cooperable sprocket 19 upon the driven shaft 20 of a gear reducing unit 21. The drive shaft 22 of the reducing unit 21 is connected by a suitable couple 23 to the drive shaft 24 of a motor 25. Upon rotation of the motor 25 the shaft 15 is rotated at a properly reduced speed.

A hub 26 is mounted upon the shaft 15 and is keyed or otherwise secured for rotation therewith. A disc 27 is secured to the hub 26. A ring shaped member 29 is secured in spaced relation to the disc 27 and forms the second side of a rotatable wheel, the periphery of the disc 27 forming the first side.

With reference to Figure 2 of the drawings it will be noted that spacers 30 are provided between the disc 27 and the ring 29 to hold these parts in proper relation. Each of these spacers includes an outer arcuate wall 31 which conforms with the outer periphery of the disc and ring. The spacers 30 also includes an inner arcuate wall 32 which follows the inner curvature of the ring 29. One end of each spacer 30 comprises a pocket wall 33 which is at an acute angle to a radial plane through the axis of rotation. The other end of each spacer 30 also comprises an angular wall 34. The wall 34 of each spacer is at a greater angle from a plane through the axis of rotation than the wall 33. The angles of the walls 33 and 34 are so arranged that wall 33 of one pocket is parallel to the wall 34 of the next adjoining pocket. Bolts or other fastening means such as 35 connect the ring 29 and the disc 27 to clamp the spacers 30 therebetween.

By properly proportioning the spacers a wheel is thus provided which includes a series of angularly spaced pockets having parallel front and rear walls defined by the disc 27 and the ring 29 and parallel side walls 33 and 34 formed by the ends of the spacers 30. The angles of these walls is such that the walls 34 lead the walls 33 in the direction of rotation of the wheel and are so arranged that when the center of each pocket has travelled through 90° from its uppermost position the wall 34 inclines inwardly and downwardly from the periphery of the wheel. In other words the pockets are so angled that the weight of the major portion of the contents is upon the leading wall of each pocket substantially after the pockets rotate 90° from their top position.

Suitable guides 36 and 37 are provided on the discs 27 and the ring 29 respectively, these guides being parallel to the pocket walls 33 and 34. Plungers 39 are slidably supported within the pockets, the plungers being grooved on opposite sides to accommodate the guides 36 and 37. Each plunger 39 is provided with a pair of inwardly projecting lugs 40 in spaced relation. Levers 41 are pivotally connected at 42 to the lugs 40. The levers 41 are of the bell-crank type and are pivotally connected intermediate their ends at 43 to arms 44. Each arm 44 is pivot-

ally connected at its inner extremity 45 to the disc 27. In Figure 2 the pivots connecting the arms 45 to the disc are in section as the sectional view is drawn between the disc and the arms.

The inner ends 46 of the levers 41 are equipped with cam rollers 47. A cam 49 is connected by suitable bolts 50 to the front plate 11. Spacing bosses 51 are provided on the cam 49 for holding the cam spaced from its support 11.

The cam 49 is suitably spaced to permit full retraction of the plungers 39 at the top point of their rotation and to hold the plungers fully retracted after they have been filled until the pockets approach the bottom point of their rotation. While the pockets are in inverted position the cam rollers 47 engage a shoulder 52 on the cam which acts to quickly swing the outer portion of each lever 41 into substantial alignment with the arm 44 pivoted thereto. The cam maintains the plungers in projected position until these plungers approach the uppermost point of their rotation, whereupon the plungers retract to assist in drawing material into the pockets.

A cam track 53 is pivotally connected at one end 54 to the front support 11. As illustrated in Figure 1 of the drawings the other end of the cam track 53 is provided with a bolt 55 which extends through an arcuate slot 56 having the axis of the bolt 54 as its center. As a result by loosening the nut 57 of the bolt 55 the angle of the cam track 53 may be varied. The cam track 53 is provided with a curved groove 59 having outwardly flared entrance ends 60.

Each of the levers 41 is provided on their outer arms with a cam roller 61 which is engageable into the groove 59. The cam track 53 is so arranged that its entrance end is always in the path of movement of the cam roller 61, the flaring end of the cam track compensating for any adjustment of the track and guiding the cam roller 61 into the groove 59. This cam track 53 acts to limit the retraction of the plungers 39 while they are in product receiving position. By swinging the cam track in a counterclockwise direction about its pivot 54 from the position shown in Figure 2 and lowering the left hand end of this track, the plungers may retract to a greater extent. By swinging the left hand end of the cam track upwardly, the retraction of the plungers is reduced.

The spaced plates 10 and 11 are connected above the wheel by parallel plates 63 and 64. These plates extend to a point closely adjacent the periphery of the wheel and form the ends of an inlet hopper directing produce to the pockets. A brush 65 forms a continuation of the wall 63, this brush having bristles directed against the periphery of the wheel and acting to limit the fill of the pockets. Excess material is brushed from the surface to maintain the material contained within the confines of the pockets. The brush bristles also sweep along the arcuate outer walls 33 of the spacers 30 to prevent produce from being forced between the periphery of the wheel and the arcuate encircling wall 66 which extends from the brush 65 to a point 67 near the lower extremity of the wheel. The wall 66 is detachably connected about the periphery of the wheel and is either flexible or shaped to fit the contour of the wheel. A pair of pins 69 extend radially from the plates 10 and 11 and extend through apertures in the wall 66 to hold the upper end of this wall in proper position. The wall 66 is provided with a transverse bar 70 secured thereto which is at a point spaced above the upper end of the wall 66. As is illustrated in Figure 1 of the drawings a pair of levers 71 are pivotally connected to transverse extensions 72 and 73 of the side plates 10 and 11. These levers 71 are pivotally mounted along aligned pivots 74 to their respective walls. The upper ends of these levers 71 are designed to engage the transverse bar 70 and to hold it against the arcuate walls 75 of the side plates 10 and 11. The arcuate walls 75 are of slightly greater radius than the wheel of the filler so that the wall 66 is supported closely adjacent to the outer periphery of the wheel when this wall is in position. A cam 76 is pivoted at 77 to each of the side plate extensions 72 and 73, the cams being provided with levers 79 by means of which they may be pivoted.

When it is desired to remove the enclosing wall 66 it is only necessary to pivot the cams 76 so that they release the levers 71. The levers 71 may then swing in a clockwise direction as viewed in Figure 1 to disengage the upper ends of these levers from the bar 70. The arcuate wall 66 may then be disengaged from the pins 69.

The cam 49 has been illustrated as having an external cam surface which engages the cam rollers 47. However, in actual practice the cam 49 may be of larger diameter and includes a cam track for controlling the position of the cam rollers. Alternatively the cam may be provided with an outer wall which is separate from but connected to the cam 49 for accomplishing a similar purpose.

Springs 80 may be provided for directing the pistons 39 toward their innermost positions, these springs extending between the levers 41 and a fixed portion of the wheel hub 27. The particular connection of these springs is not important as long as they tend to retract the pistons 39. If the cam track in which the rollers 47 are located is in the form of a groove, the springs 80 may be eliminated if desired.

It has been explained that the cam track 53 is pivoted about the center of the bolt or shaft 54. As is indicated in Figure 3 of the drawings, the bolt 54 may comprise a shaft upon which is mounted a worm wheel 81. A worm gear 82 is shown engaging the wheel 81. Rotation of the worm wheel 82 may serve to rotate the shaft 54 which in turn adjusts the position of the cam track 53. The nut 57 holds the cam track in an adjusted position but permits adjustment of the cam track when loosened.

A conveyor 83 is shown in Figure 2 for moving cartons such as 84 beneath the wheel which is indicated in general by the numeral 85. The conveyor 83 is in timed relation with the wheel 85 so that the open topped cartons 84 pass beneath the wheel pockets.

In order to prevent the spilling of any of the contents and to provide a baffle or shield adjoining the rear edge of the carton being filled, a baffle plate 86 is pivotally supported at 87 between the side plates 27 and 29 of the wheel. These baffles are recessed in notches such as 89 into the body of the wheel so as to be retained within the periphery of the wheel during rotation thereof. As indicated in Figure 2 these baffles are suspended vertically by gravity as the wheel swings upwardly and fold by gravity against the surface of the wheel as they extend above the axis of the wheel. During the downward pivotal movement on the other side of the wheel these baffles 86 are held in place by the encircling wall 66. When the baffles pass the lower edge of the wall 66, they drop by gravity downwardly and against the trailing edge of the cartons 84 so as to guide the contents of the wheel pockets into the cartons.

The wall 66 extends to a point rather close to the lower extremity of the wheel but a portion thereof is cut away between the side 27 of the wheel and the side plate 10 of the frame so that the carton covers 90 may extend upwardly from the cartons and pass between the wheel and the frame side 10. After the cartons have been filled they usually are directed to a carton closer which closes the top of the carton.

The operation of the apparatus is believed readily understood from the foregoing description. The product with which the cartons are to be filled is placed within the hopper formed at the top of the wheel between the side plates 10 and 11 and the end walls 63 and 64. Rotation of the wheel in a counter clockwise direction as viewed in Figure 2 brings each pocket beneath the hopper while the plunger or piston 39 is in outwardly projected position. As the pockets move beneath the hop-

per the plungers 39 retract, the extent of the retraction depending upon the position of the cam track 53. As a result the amount of product which enters the pockets is varied by the position of the cam track. As the pockets pass from beneath the hopper the brush 65 acts to remove excess product from the surface of the pockets so that the pockets are not overfilled. Furthermore, as the pockets move from beneath the hopper the cam rollers 61 leave the cam track 53 and the springs 80 or the shape of the cam retracts the plungers 29 to their innermost position.

In the event the cam 49 is provided with a cam track to control the position of the plungers 39, the cam track groove is widened at the top of the cam so as to permit the plungers to be maintained by the cam track 53 in a desired adjusted position. In other words, the position of the plungers during the upward swing of the wheel 85 is controlled by the cam 49 from this point to the point of disengagement between the cam control 61 and the cam track 63. The position of the plungers is controlled by the cam track 53 and the groove containing the cam rollers 47 is so arranged as to permit this control. However, after the cam rollers 61 are disengaged from the cam track 53 either the cam groove of the cam 47 or the springs 80 cause the plungers 39 to fully retract.

This full retraction of the plungers after the pockets are filled with the desired amount of product is of importance as it normally increases the volume of the pockets after they have been filled and prevents the crowding of the product within the pockets against the wall 66. As is also evident from an examination of the left hand side of Figure 2 the weight of the product is mainly against the leading wall 34 of each pocket until the pockets have rotated considerably past horizontal position. Thus the shape of the pockets tends to retain the product and to minimize the weight of the product upon the wall 66.

At the time the forward edge of each pocket passes the lower extremity of the wall 66, a carton 84 is immediately beneath the pocket and the contents of the pocket are directed downwardly and rearwardly into the carton. As the wheel continues its rotation the contents continue to drop from pocket into the carton and when the pockets are fully opened the shields or baffles 86 tend to prevent spilling of the contents over the rear edge of the cartons.

The ejection of the material within the pockets is aided by the projection of the plungers 39 after the pockets are open. As soon as each pocket is open the cam roller 47 which controls the projection and retraction of the piston engages the shoulder 52 of the cam 49 and as the wheel rotates the lever 41 and its corresponding arm 44 swing toward aligned position, thus urging the plungers 39 outwardly. Thus any product which tends to cling to the walls of the pockets is ejected and falls into the carton 84 while it is still beneath the pocket and while the baffle 86 is against the trailing edge of the carton.

For the purpose of simplifying the description, it may be said that the side walls of each pocket are parallel and extend on planes which are usually normal to the axis of rotation of the wheel. The front and rear walls of the pocket are arranged on parallel planes which are tangent to circles or cylinders encircling the axis of rotation. By extending the plane of the rear wall 33 of each pocket it will be noted that this wall is tangent to a cylinder of relatively small radius encircling the axis of rotation. The forward wall 34 of each pocket is arranged on a plane tangent to a circle or cylinder of relatively larger diameter encircling the wheel axis. Stated otherwise, all of the walls of each pocket are vertical in two rotative positions of the wheel, which positions are one hundred eighty degrees apart in the direction of rotation of the wheel. Each of these positions is reached shortly after the pocket has passed through a vertical plane including the axis of rotation of the wheel.

This definition may be used in the claims to define the manner in which the pockets incline.

In accordance with the patent statutes, I have described the principles of construction and operation of my carton filling apparatus, and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that obvious changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A filling device for use in filling cartons, the device including a rotatable wheel, means supporting said wheel for rotation about a substantially horizontal axis, said wheel having a series of peripheral pockets therein, said pockets having slidable plungers therein forming the inner surface thereof, lever means pivotally connected to said plungers for regulating the position thereof, said lever means including a pair of pivotally connected toggle members one of which is pivoted to the plunger and the other of which is pivoted to said wheel inwardly of the plunger, a hopper above said wheel for guiding material into said pockets, a conveying device beneath said wheel for conveying cartons beneath the pockets, a wall encircling the portion of the wheel between said hopper and a point near the lower extremity of the wheel for confining material within said pockets, means engageable with one of said toggle members for successively retracting said plungers as they pass beneath said hopper, means engageable with said one toggle member for projecting said plungers as they pass over said cartons near the lower position of the plungers, said last named engageable means comprising cam means.

2. The construction described in claim 1 and including means for limiting the retraction of said plungers as they pass beneath said hopper.

3. The construction described in claim 1 and including means for limiting the retraction of said plungers as they pass beneath said hopper and means for fully retracting said plungers after they pass from beneath said hopper.

4. A receptacle filling apparatus including a wheel, means rotatably supporting said wheel for rotation about a substantially horizontal axis, a series of pockets in the periphery of said wheel, a hopper above said wheel for guiding material into said pockets upon rotation of said wheel, conveying means designed to support receptacles, means moving said conveying means in timed relation with said wheel to move the receptacles beneath said pockets upon rotation of said wheel, a peripheral wall encircling said wheel between said hopper and a point adjacent to the lower extremity of the wheel, and a baffle movably supported adjoining the trailing edge of each pocket and confined substantially within the periphery of the wheel as the wheel rotates within said peripheral wall, and each said baffle moving outwardly beyond the periphery of said wheel as said wheel pivots beyond the lower end of said peripheral wall, each said baffle acting to guide material from its adjoining pocket into a corresponding receptacle.

5. The construction described in claim 4 and in which said baffles are pivotally supported.

6. The construction described in claim 4 and in which said baffles are pivotally supported on axes substantially parallel to the axis of rotation of said wheel.

7. A filling apparatus including a wheel, means rotatably supporting said wheel for pivotal movement about a substantially horizontal axis, a series of peripheral pockets in said wheel, said pockets having parallel side walls arranged on planes substantially normal to the axis of rotation, said pockets also having parallel forward and rear walls, plungers slidably supported in said pockets and movable in a non-radial direction from a projected position to a retracted position, the direction of movement of said plungers being tangent to a circle having the wheel axis as its center, a hopper above said wheel

for guding material into said pockets and conveying means beneath said wheel for conveying receptacles beneath said pockets and a confining wall encircling a portion of the wheel between said hopper and a point near the lower extremity of the wheel.

8. A carton filling apparatus including a rotatable wheel, means supporting said wheel upon a horizontal axis, pockets in the periphery of said wheel, a filling hopper above said wheel directing material toward said pockets upon rotation of said wheel, means for moving cartons beneath said wheel in timed relation therewith to receive material from said pockets, plungers forming the bases of said pockets, said plungers being movable between fully projected and fully retracted position, adjustable means retracting said plungers to a selected extent between said positions as the pockets pass beneath said hopper, and independent means for fully retracting said plungers after the pockets pass filling position and also for fully projecting said plungers in said pockets as said pockets extend over said cartons.

9. The structure described in claim 8 and in which said adjustable retracting means acts to hold said plungers at a position intermediate said extreme positions while said plungers are beneath said hopper.

10. A filling apparatus including a wheel, means supporting said wheel for rotation about a horizontal axis, pockets arranged peripherally in said wheel, plungers closing the inner ends of said pockets, said plungers being movable between a fully projected position and a fully retracted position, a hopper above said wheel, means directing material from said hopper into said pockets, movable means moving in timed relation to said wheel and arranged to support receptacles to move beneath said pockets upon rotation of said wheel, a peripheral wall encircling said wheel from said hopper to a point near the lower extremity of the wheel to confine material in said pockets, means projecting said plungers as said pockets move over said movable means supporting said receptacles and also for fully retracting said plungers as they pass from beneath said hopper, and independent means for retracting said plungers as they move beneath said hopper limiting the retraction of said plungers to a position between said first mentioned positions while they are beneath said hopper.

11. The construction of claim 10 and in which the means for limiting the retraction of the plungers is adjustable.

12. The structure of claim 11 and in which the independent means for limiting the retraction of the plungers comprises a cam track.

13. A filling device for use in filling cartons, the device including a rotatable wheel, means supporting said wheel for rotation about a substantially horizontal axis, said wheel having a series of peripheral pockets therein, said pockets having slidable plungers therein forming the inner surface thereof, lever means pivotally connected to said plungers for regulating the position thereof, a hopper above said wheel for guiding material into said pockets, a conveying device beneath said wheel for conveying cartons beneath the pockets, a wall encircling the

portion of the wheel between said hopper and a point near the lower extremity of the wheel for confining material within said pockets, means retracting said plungers as they pass beneath said hopper, means projecting said plungers as they pass over said cartons near the lower position of the plungers, cam means and means on said lever means engageable with said cam means forming said plunger projecting and retracting means, a second cam, means adjustably supporting said second cam, and means on said lever means engageable with said second cam for limiting retraction of said plungers as they pass beneath said hopper.

14. A filling device for use in filling cartons, the device including a rotatable wheel, means supporting said wheel for rotation about a substantially horizontal axis, said wheel having a series of peripheral pockets therein, said pockets having slidable plungers therein forming the inner surface thereof, lever means pivotally connected to said plungers for regulating the position thereof, a hopper above said wheel for guiding material into said pockets, a conveying device beneath said wheel for conveying cartons beneath the pockets, a wall encircling the portion of the wheel between said hopper and a point near the lower extremity of the wheel for confining material within said pockets, means retracting said plungers as they pass beneath said hopper, means projecting said plungers as they pass over said cartons near the lower position of the plungers, cam means and means on said lever means engageable with said cam means forming said plunger projecting and retracting means, and baffle means movably supported adjacent each pocket and projectable from said wheel against said cartons as said pockets move into lowermost position.

15. A filling apparatus for filling receptacles including a wheel, means pivotally supporting said wheel, means connected to said wheel for rotating the same in one direction, a series of angularly spaced pockets in the periphery of said wheel, the walls of each said pockets being vertical in two rotative positions of the wheel, each of said positions being substantially after the pocket has passed a vertical plane including the axis of rotation of the wheel in said one direction of rotation, the axes of said pockets being tangent to a circle having the wheel axis as its center, and the two positions being one hundred eighty degrees apart.

16. The structure of claim 15 and in which said pockets are rectangular, with two sides of said pockets arranged on planes normal to the axis of said wheel.

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