Dec. 1, 1942. F. D. CHAPMAN 2,303,822

RECEPTACLE FILLER

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Fig. 1.

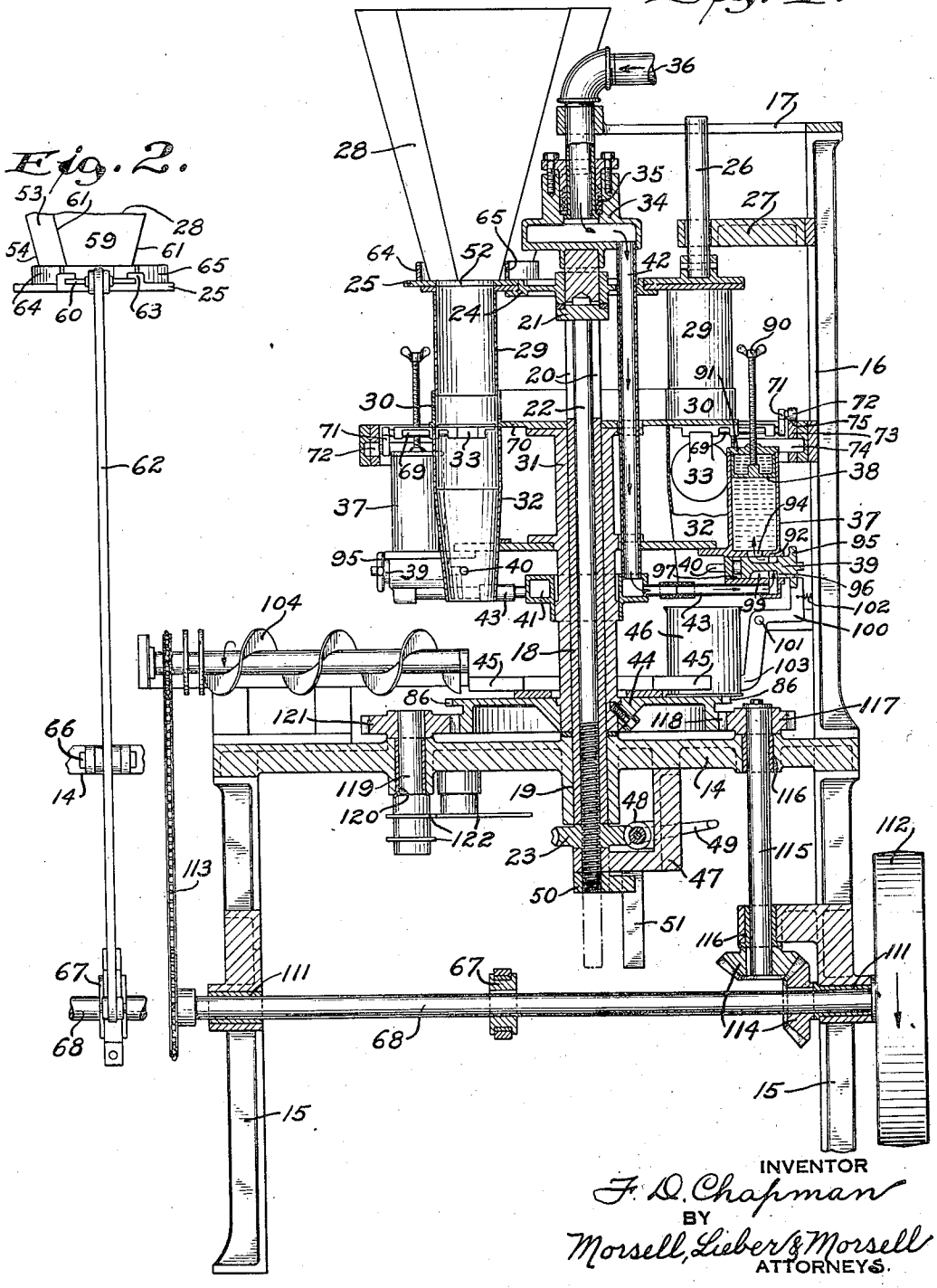


Fig. 2.

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Fig. 3.

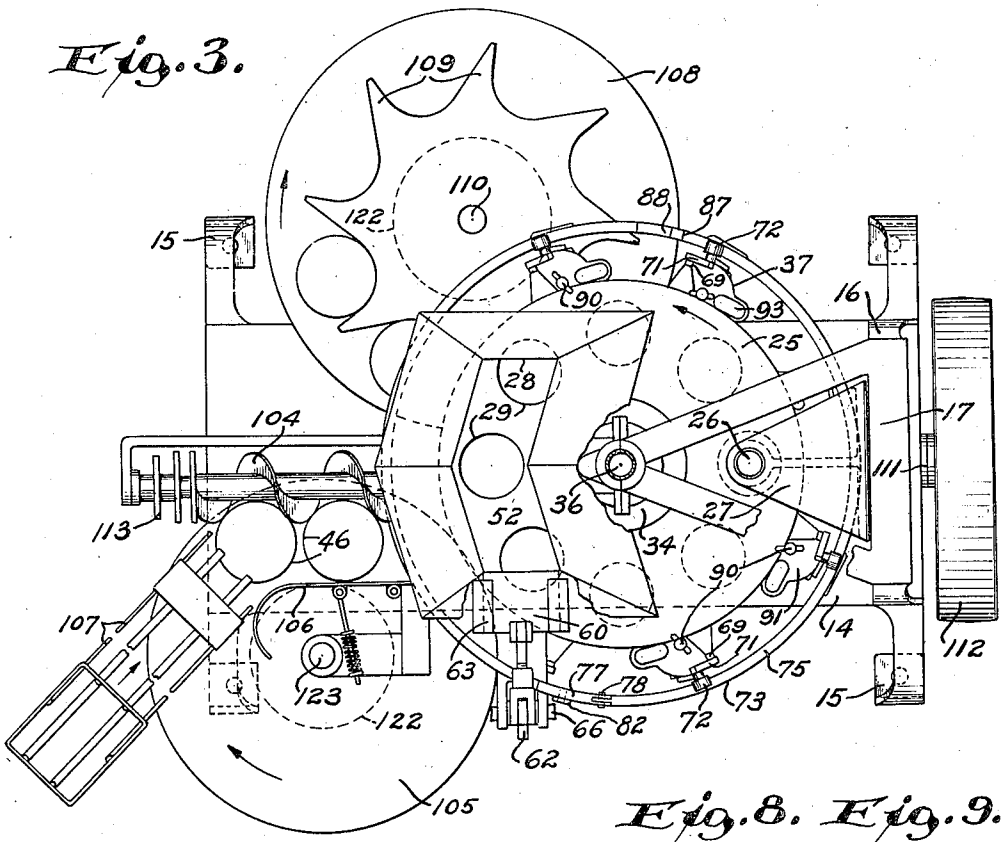


Fig. 8.

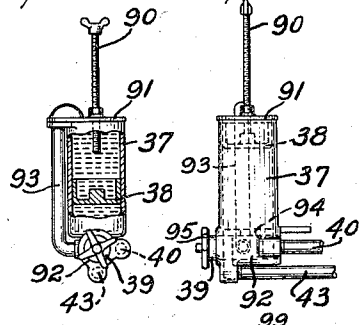
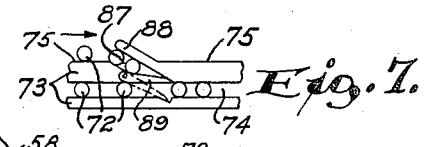


Fig. 9.

Fig. 7.



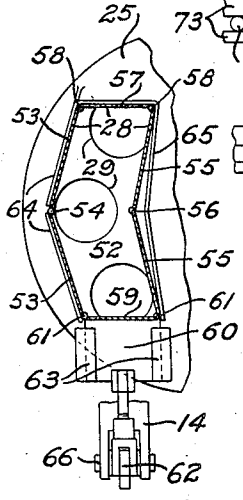


Fig. 4.

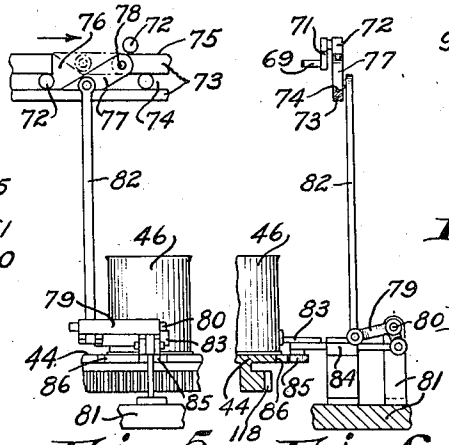


Fig. 5.

Fig. 6.

Fig. 10.

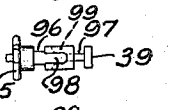
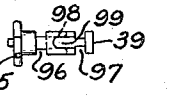


Fig. 11.



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Patented Dec. 1, 1942

2,303,822

UNITED STATES PATENT OFFICE

2,303,822

RECEPTACLE FILLER

Frank D. Chapman, Berlin, Wis.

Application August 21, 1939, Serial No. 291,159

8 Claims. (Cl. 226—97)

My present invention relates in general to improvements in the art of packing mixed fluent materials, and relates more particularly to improvements in the construction and operation of receptacle fillers of the type especially adapted to deliver pre-measured batches of several kinds of material to each of a succession of receptacles.

Generally defined, an object of this invention is to provide an improved receptacle filling machine for delivering mixed pre-measured batches of several kinds of material to successive receptacles, which is simple in construction and highly efficient in operation.

Some of the more specific objects of my present invention are as follows:

To provide an improved mechanism for automatically accurately measuring and for delivering successive batches of several kinds of material such as peas and brine, to a succession of receptacles such as cans, without wasting any of the material.

To provide an improved no-can-no-fill assemblage for receptacle fillers of the type adapted to deliver pre-measured batches of several kinds of material to the successive receptacles, which positively prevents delivery of charges of either kind of material when no receptacle is available to receive such charges.

To provide a can filling machine for delivering mixed batches of material to successive cans, wherein the successive batches of the several ingredients are accurately pre-measured, and in which the proportions of the mixture constituting each batch may be quickly and accurately varied at any time.

To provide an automatic can filler which is simple, compact and durable in construction, readily adjustable and manipulable, and wherein waste of material due to failure of the can supply is entirely obviated.

To provide improved mechanism for accurately pre-measuring independent batches of solids such as legumes or berries, and of liquid such as brine or syrup.

To provide an improved granular material supply mechanism for filling machines, which will positively prevent solids from bridging across the outlet of the supply hopper.

To provide an improved liquid supply system for receptacle fillers, which insures accurate measurement of the successive charges at high speed.

To provide a new and useful can filling assemblage which may be readily assembled and dismantled, and all parts of which are conveniently accessible for inspection and cleaning.

To provide a sanitary receptacle filling machine, which may be safely operated by a novice; and which may be manufactured, installed and operated at moderate cost.

To provide a high speed filling machine for sanitary cans or the like, which will not damage the cans and which is moreover extremely reliable in operation.

These and other specific objects and advantages will be apparent from the following detailed description.

A clear conception of the several features forming part of my present invention, and of the mode of constructing, adjusting and of operating can filling machines built in accordance with this improvement, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a somewhat diagrammatic vertical section through one of the improved can filling machines;

Fig. 2 is a fragment of the improved solid material agitating mechanism which is associated with the supply hopper;

Fig. 3 is a top view of the can filling machine of Fig. 1;

Fig. 4 is a fragmentary top view showing diagrammatically the mechanism for agitating the solid material within the supply hopper;

Fig. 5 is a fragmentary external view of the lower portion of the machine, showing the no-can-no-fill mechanism for preventing discharge of solid material when no can is in place;

Fig. 6 is a side view of the mechanism shown in Fig. 5;

Fig. 7 is a fragmentary external view of the cam track for restoring the solid material no-can-no-fill mechanism to normal operating condition;

Fig. 8 is a part sectional view of one of the liquid measuring pockets or chambers, showing the floating piston thereof in mid position;

Fig. 9 is another view of one of the liquid measuring pockets, showing the floating piston in uppermost position;

Fig. 10 is a top view of one of the liquid control valves; and

Fig. 11 is a side view of the liquid control valve of Fig. 10.

While the invention has been embodied in an automatic rotary can filler especially adapted to deliver independently premeasured batches of

peas and brine to a succession of sanitary cans, it is not desired to unnecessarily restrict the scope or utility by virtue of such specific embodiment.

Referring especially to Figs. 1 and 3 of the drawings, the improved receptacle filler shown therein by way of illustration, comprises in general, a main support or frame having a base portion 14, lower supports 15, upwardly extending side members 16, and a top bracket 17; a central hollow column 18 fixedly mounted at its lower end in a bore 19 in the base 14 and having diametrically opposite slots 20 in its upper portion within which a cross-head 21 is slidably mounted; a non-rotatable adjusting rod 22 snugly confined within the column 18 and having its upper end rigidly attached to the cross-head 21 and its lower end threaded for cooperation with an adjusting worm wheel 23; an upper support or plate 24 resting upon a thrust ring carried by the outwardly projecting ends of the cross-head 21, and being freely rotatable relative to the column 18 and slidable vertically therealong; an upper disk 25 embracing an annular shoulder on the plate 24, and being adjustable vertically with this plate 24 but being fixed against rotation by a stub shaft 26 coacting with an arm 27 secured to the side members 16; a legume supply hopper 28 carried by the upper non-rotary disk 25; an annular series of eight upper measuring chamber sections 29 rotatably suspended from the periphery of the revolving plate 24 and slidably coacting with the lower face of the stationary disk 25; an annular series of eight lower measuring chamber sections 30 telescopically embracing the upper chamber sections 29 and being revolvable therewith; a central rotatable hollow shaft 31 revolvable about the fixed column 18 upon the base 14 and forming a direct support and drive for the measuring chamber sections 29, 30; an annular series of legume delivery chutes 32 suspended from the revolving shaft 31 beneath and in alinement with the chamber sections 30; a material delivery flap or valve 33 interposed between each chamber section 30 and the corresponding chute 32; a liquid supply header 34 rotatably mounted upon the upper extremity of the fixed column 18 and communicating through a stuffing box 35 with a fixed liquid supply pipe 36 which coacts with and is supported by the upper bracket 17; a series of eight liquid measuring pockets 37 suspended from the revolving shaft 31 near the chutes 32 and each having a floating piston 38 therein; an oscillatory valve 39 carried by each measuring pocket 37 and having a liquid discharge conduit 40 leading into the adjacent discharge chute 32; an auxiliary liquid distributing header 41 suspended from the medial portion of the rotary hollow shaft 31 and being connected to the main header 34 by a pipe 42 along which the plate 24 is slidable; radial pipes 43 extending outwardly from the lower header 41 to the several control valves 39; a revolving can support 44 secured to the lower end of the shaft 31 and having thereon a series of can hooks 45 for positioning the successive cans 46 beneath and in alinement with the lower open ends of the chutes 32; mechanism for feeding the cans 46 in succession to the support 44 in advance of the hooks 45; mechanism for delivering the successive loaded cans 46 from the filling zone; and other mechanism for driving the various movable parts of the assemblage.

The main frame may be of varied construction, and the central column 18 may be attached to the base 14 in any suitable manner so as to provide an effective journal or bearing for the plate 24, shaft 31, and header 34 all of which are simultaneously revolvable about the column axis. The cylindrical rod 22 which carries the cross-head 21 and is vertically slidable within the central bore of the fixed column 18, serves to effect telescopic adjustment of the legume measuring chamber sections 29 relative to the chamber sections 30, and the non-rotary legume supply hopper 28 moves vertically during such adjustment of the batch measuring chambers. The worm wheel 23 which coacts with the lower threaded portion of the rod 22 and which is rotatable to move this rod longitudinally within the column 18, is prevented from moving vertically by a bracket 47 secured to the frame base 14 and is revolvable by means of a worm 48 journalled in the bracket 47 and which may be operable by a crank handle 49 in an obvious manner. A guide block 50 which is rigidly attached to the lower extremity of the rod 22 and which coacts with fixed guides 51 depending from the bracket 47, cooperates with the cross-head 21 to positively prevent the rod 22 from rotating, and the worm gearing automatically locks the rod in various positions of adjustment.

All of the upper chamber sections 29 are integrally united and are firmly attached to the upper rotary support or plate 24, and the plate 24 is rotatable upon the cross-head 21 by the shaft 31 coacting with the chamber sections 29 through the other chamber sections 30. The normally fixed hopper supporting disk 25 which rests upon the upper ends of the measuring chamber sections 29 is prevented from rotating with these sections and with the plate 24, by the stub shaft 26, but the disk 25 and hopper 28 are vertically movable with the sections 29 and plate 24 during adjustment of the latter along the column 18 whereupon the shaft 26 slides vertically within the arm 27. During such vertical adjustment of the parts, the capacity of the legume measuring chambers formed by the sections 29, 30 will be simultaneously varied, and the elevation of the chutes 32, liquid measuring pockets 37, and liquid headers, 34, 41 will not be altered.

The lower end of the legume supply hopper 28 is communicable through a delivery opening 52 in the disk 25, with the upper ends of the successive measuring chamber sections 29, as these chambers are revolved about the column 18 by the shaft 31, and in order to maintain the material in the hopper 28 in a state of agitation and to prevent this material from bridging across the opening 52, I may provide a special hopper such as shown diagrammatically in Figs. 2 and 4. The special hopper 28 comprises a pair of outer side walls 53 interconnected at their adjacent ends by a hinge 54; a pair of inner side walls 55 likewise interconnected by a hinge 56; a fixed end wall 57 secured to the disk 25 and pivotally connected to the adjacent walls 53, 55 by hinges 58; a movable end wall 59 secured to a reciprocable slide 60 and pivotally attached to the adjacent side walls 53, 55 by hinges 61; an oscillatory lever 62 for reciprocating the slide 60 within guideways 63; and stops 64, 65 for limiting the oscillatory movement of the side walls 53, 55 respectively. The slide actuating lever 62 is swingably suspended from the frame base 14 by means of a pivot pin 66, and is constantly oscillatable during normal operation of the machine, by an eccentric 67 carried by the main drive shaft 68 and

coacting with the lower extremity of the lever 62, see Figs. 1 and 2; and the upper end of the lever 62 which coacts with a bolt carried by the slide 60, may be vertically slotted to permit vertical adjustment of the hopper 28. The arrangement is obviously such that reciprocation of the slide 60 by the oscillating lever 62 will continuously alternately flex and straighten the toggles formed by the hinged sections or side walls 53, 55, and will thus shift the load within the hopper 28 back and forth over the discharge opening 52 thus positively preventing bridging of the material across this opening and insuring proper filling of the successive measuring chambers.

The flaps or valves 33 which are located between the legume measuring chambers and the adjacent chutes 32, are swingably suspended by means of radial shafts 69 mounted in bearings carried by the lower measuring section supporting plate 70, and each of the shafts 69 has an end crank 71 provided with a roller 72, see Figs. 1, 2, 5, 6 and 7. The rollers 72 are adapted to ride along a stationary valve actuating ring 73 which is fixedly secured to the frame member 16, and is provided with an annular continuous track groove 74 and with an upper rail surface 75, along which the successive rollers 72 are adapted to travel under certain conditions of operation of the machine. Near the can receiving portion of the machine, the ring 73 is provided with a gap 76 shown in Fig. 5, which is adapted to be spanned by a lever 77 swingably secured to the upper portion of the ring by a pivot pin 78. When the lever 77 is in the solid line position shown in Fig. 5, the successive advancing actuating rollers 72 of the valves 33 are adapted to ride from within the groove 74 up the upper surface of the inclined lever 77 and upon the upper track surface 75, thereby throwing the corresponding flap valves 33 from horizontal closed position as shown at the left of Fig. 1, to vertical open position as shown at the right of Fig. 1. This inclined setting of the lever 77 is maintained whenever cans 46 are in position beneath the successive chutes 32; but when no cans are thus positioned, the lever 77 will be automatically positioned as illustrated in dot-and-dash lines in Fig. 5 whereupon the roller or successive rollers 72 will follow the groove 74 and the corresponding valve or valves 33 will not open to deliver charges of legumes to the chutes 32.

The no-can-no-fill mechanism for thus positioning the valve actuating lever 77 is shown diagrammatically in Figs. 5 and 6, and comprises a bell-crank 79 swingably suspended from a pivot 80 carried by a bracket 81 secured to the frame base 14; a link 82 pivotally connecting one arm of the bell-crank 79 with the medial portion of the lever 77; and a can engaging rod 83 slidable in a guide 84 carried by the bracket 81 and pivotally attached to the other arm of the bell-crank 79. In order to prevent the can engaging end of the rod 83 from obstructing or denting the cans 46, this rod may also be provided with a roller 85 which rides along a cam surface 86, at the periphery of the can support 44, and this cam surface 86 comprises a recess adjacent each can hook 45 which will permit the rod 83 to slide inwardly sufficient to engage the advancing cans 46 but which also limits the inward travel of the rod 83, see Figs. 1, 5 and 6.

In order to restore the successive valve actuating rollers 72 to the groove 74 after each can 46 has been filled, the valve actuating ring 73 is provided beyond the filling zone with another gap 87 having a diverting projection 88 and a pivoted track section 89, see Figs. 3 and 7. The track section 89 is normally held by gravity in the dot-and-dash line position of Fig. 7, so that the rollers 72 advancing along the upper track surface 75 will strike the inclined projection 88 and will be directed downwardly along the section 89 and into the groove 74, thereby simultaneously closing the valves 33 which had been previously opened to deliver measured charges, preparatory to subsequent measurement of batches of legumes. If, however, no can 46 is in place to receive a charge, the corresponding valve actuating roller 72 will be advancing along the groove 74 and towards the lower side of the pivoted track section 89. As this roller 72 strikes the track section 89 it momentarily elevates the same and passes into the groove 74 beyond, whereupon the section 89 again descends by gravity to the dot-and-dash line position of Fig. 7. It will thus be noted, that the improved no-can-no-fill mechanism for the solid material or legumes, functions automatically to cause the flap valve actuating rollers 72 and cranks 71 to open and close the successive valves 33 whenever a can 46 is in proper position to receive a charge, and also functions automatically to keep the valves 33 sealed or closed when no cans 46 are present, thereby positively avoiding waste of solid material.

As previously indicated, each of the successive cans 46 is supplied with a pre-measured batch of liquid such as brine, as well as with a pre-measured batch of solid material such as legumes. The liquid batches are measured in the cylindrical measuring pockets 37, and the volume of each batch of liquid is pre-determined by the stroke of the corresponding plunger or piston 38. The stroke of each piston 38 may be varied by means of a stop screw 90 having screw thread coaction with a threaded opening in the upper head 91 of the pocket, and when the screw 90 is in the position shown in Fig. 9 the stroke is greatest, whereas adjustment of the screw 90 to the position shown in Fig. 8 will shorten the stroke. The measuring pockets 37 alternately measure batches of the liquid on opposite sides of the pistons 38 therein, and the chamber at the top of each piston 38 is connected with the central portion of the side of the corresponding valve casing 92 by an open conduit 93, while the bottom chamber is connected to this casing by a port 94, see Figs. 1 and 8. The brine control valves 39 are rotatable within the casings 92 by means of star wheels 95 at the ends of these valves, and the valves 39 are formed as shown in Figs. 10 and 11 with annular recesses 96, 97, near the opposite ends thereof, and with two sets of diametrically opposite passages 98, 99 extending longitudinally of the valves and away from the recesses 96, 97 respectively. The recess 96 of each valve 39 is in constant open communication with the corresponding liquid supply pipe 43 as shown in Fig. 1, and the annular recess 97 is likewise in constant open communication with the corresponding discharge conduit 40 as shown in Fig. 9. When a valve 39 is positioned as shown in section in Fig. 1, the liquid supply headers 34, 41 are in open communication with the lower displacement chamber of the corresponding pocket 37 through the pipe 43, valve recess 96, upper passage 99, and port 94; the upper displacement chamber is in open communication with

the corresponding liquid discharge conduit 40 through the conduit 93, valve recess 97, and passage 98. When a valve 39 has been displaced through an angle of ninety degrees from the position shown in Fig. 1, the lower displacement chamber of the pocket 39 will be brought into open communication with the liquid discharge conduit 40 through the port 94 which then communicates with the recess 97 through one of the passages 99; and the upper displacement chamber will be placed in communication with the corresponding liquid supply pipe 43 through the conduit 93 which then communicates with the recess 96 through one of the passages 98. The hydrostatic head of liquid in the supply headers 34, 41 acting upon the face of the pistons 38 which are exposed to this pressure, will always cause the pistons to move either up or down and will expel the pre-measured charges on the other side of these pistons 38.

The valves 39, as previously indicated, are rotatable by means of the star wheels 95, and the arms of these wheels are cooperable with the upper end of a no-can-no-fill lever 100 in the manner shown in Fig. 1. The lever 100 may be suspended from the main frame by means of a pivot pin 101 at any desired location, so that the measured liquid batches will be delivered to the successive cans 46 either before, simultaneously with, or after the measured batches of peas have been introduced into the cans. The lever 100 is constantly urged to swing about its pivot pin 101, by means of a spring 102, so that the lower extremity 103 will be projected into the path of the advancing cans 46. If no can 46 is in place, the upper end of the lever 100 will be pulled outwardly by the spring 102 so that the corresponding valve actuating star wheel 95 will not engage the lever 100, thus preventing delivery of any liquid as the star wheel passes the lever. If a can 46 is in position, the can will engage the lower lever extremity 103 and will swing the upper end into the path of the star wheel 95 which will then cause the corresponding valve 39 to shift through an angle of ninety degrees and will thereby deliver a measured batch of liquid to the can. In this manner, measured charges of liquid will be delivered only when a can 46 is in position to receive the same, and waste of liquid is positively avoided; and each of the liquid measuring pockets 37 will alternately deliver a pre-measured batch of liquid from its lower and upper displacement chambers. It is also noteworthy that regardless of the position of adjustment of the screw 90, the liquid batches measured on the opposite sides of the same piston 38 will always be equal to each other, since the piston stroke in both directions will remain equal.

The mechanism for delivering the successive empty cans 46 to the machine, may be of the improved form shown and described in my copending application Serial No. 189,490, filed February 9, 1938, and comprises a can feed screw 104 cooperating with a rotary can feed disk 105 and with a resiliently mounted fixed can guide 106 to deliver the successive cans 46 upon the revolving support 44 in front of the can hooks 45; and a can supply chute 107 for directing the cans towards the screw 104 and upon the disk 105 in upright condition. The mechanism for discharging the food laden cans 46 in succession from the machine, is of well known construction and comprises a stationary discharge plate 108 and a series of can hooks 109, simultaneously revolvable about a common vertical axis by means of an upright shaft 110. The mechanism for driving the machine during normal operation thereof, comprises a main shaft 68 journalled in bearings 111 carried by the frame supports 15 and having a driving pulley 112 at one end thereof; chain gearing 113 connecting the opposite end of the shaft 68 with the feed screw 104; bevel gearing 114 connecting a medial portion of the shaft 68 with the lower end of an upright counter shaft 115 which is journalled in other bearings 116 carried by the main frame; a pinion 117 secured to the upper end of the counter shaft 115 and meshing with a spur gear 118 formed integral with the can support 44 to drive this support and the hollow shaft 31; another counter shaft 119 journalled in a bearing 120 carried by the base 14 and having thereon a pinion 121 which meshes with the gear 118; and chain gearing 122 driven by the counter shaft 119 and cooperating with the disk supporting shafts 110, 123 to drive the latter, see Figs. 1 and 3.

Although it is believed that the normal operation of my improved receptacle filler should be apparent from the foregoing detailed description of the parts thereof, this operation will again be briefly described. During such normal operation, the can supply and discharge mechanisms, and the upright hollow shaft 31 with its associated parts, will be revolving continuously by virtue of the application of power to the drive shaft 68 by the pulley 112. The stationary hopper 28 should be supplied with an abundance of solid material such as peas, and liquid such as brine should be abundantly supplied to the main header 34 through the fixed supply pipe 36. The upper pea measuring chamber sections 29 should be adjusted relative to the lower sections 30, with the aid of the adjusting rod 22, worm gearing 23, 48, and crank 49 so as to accurately predetermine the volume of the measured batches of solid material; and the stroke of each piston 38 should also be fixed with the aid of the corresponding adjusting screw 90 so as to likewise accurately pre-determine the volume of the measured batches of liquid, which when mixed with the batches of solid material will properly fill the successive cans 46. The continued rotation of the upright hollow shaft 31 and can support 44, causes the solid material measuring chamber sections 29, 30, the liquid measuring pockets 37, the liquid supply headers 34, 41, the batch delivery chutes 32, and the can conveying hooks 45 to simultaneously revolve about the axis of the fixed upright column 18, and the successive cans 46 are thus advanced about the column axis beneath and in vertical alinement with the lower delivery openings of the chutes 32.

As each of the measuring chambers passes beneath the delivery opening 52 of the fixed hopper 28, it receives a measured charge of peas and advances beyond the opening 52 beneath the fixed top plate 25; and one of the displacement chambers of each pocket 37 is always provided with a measured batch of liquid which is ready for delivery to a can 46. When an advancing can 46 resting upon the support 44 reaches a position wherein it engages the rod 83, the lever 77 will be swung downwardly to the position shown in solid lines in Fig. 5, and the corresponding flap valve 33 will be opened to deliver the measured batch of peas through the chute 32 to the can 46. Either before, simultaneously with, or after such

delivery of legumes to the can 46, the same can will also trip the lever 100 which actuates the corresponding liquid delivery valve 39 through its star wheel 95, thus also delivering a measured batch of liquid to the advancing can and completing the filling operation. When the can 46 has passed the rod 83, the roller 85 riding along the cam 86, restores the lever 77 to dot-and-dash line position of Fig. 5, preparatory to subsequent actuation by another can, but the liquid control valves 39 require no special pre-setting as they are always in condition for discharge of measured liquid batches whenever a can is in position. After the flap valve 33 which has just been opened to deliver a charge, has been advanced to a position near the can discharge portion of the machine, it will be automatically closed by coaction of its roller 72 and actuating crank 69, with the projection 88, gap 87 and rail section 89, to restore the corresponding pea measuring chamber to closed condition preparatory to reception of a fresh batch. In this manner the successive cans 46 are automatically delivered to and from the machine, and each can is supplied with an accurately pre-measured charge of mixture of peas and brine.

When no can 46 is in position beneath any of the chutes 32, the lever 77 will not be lowered from the dot-and-dash line position of Fig. 5 as the corresponding chute 32 passes the rod 83, and the corresponding valve actuating roller 72 will therefore continue to advance along the groove 74, and the valve 33 will not be opened. As the chute 32 passes the corresponding liquid control valve 39, the lever 100 will not engage the star wheel 95 of this valve, and no charge of liquid will be delivered to the chute 32. It will thus be apparent that with my improved no-can-no-fill mechanism, neither solid material nor liquid will be discharged from a chute 32, unless a can 46 is in position to receive the material from this chute. This mechanism positively prevents delivery of any material and therefore likewise positively eliminates waste of material.

From the foregoing detailed description it will be apparent that my present invention provides an improved receptacle filler for delivering batches of mixed material to successive receptacles, which is simple, compact and durable in construction and which is moreover highly efficient in operation. The improved mechanism may obviously be accurately adjusted to insure accurate pre-measurement of the successive charges of material, and by utilizing an improved supply hopper 28 for the solid material, such as shown in detail in Fig. 4, complete filling of the successive measuring chambers will be assured and bridging of the material across the hopper outlet opening 52 will be positively prevented. When the side walls of this hopper 28 are moved laterally, they not only shift the entire charge of material within the hopper back and forth over the plate 25 but the volumetric capacity of the hopper is also constantly changing. These combined actions most effectively retain the legume charge in a state of constant agitation and cause the particles to gravitate freely towards the measuring pockets. The improved no-can-no-fill mechanisms are obviously extremely simple in construction and positive in action. While the solid materials are delivered from the hopper to the cans by gravity, the liquid charges are positively delivered to the cans by the hydrostatic head in the liquid supply, and the delivery of the liquid charges through the same chutes 32 through which the solids are delivered, will serve to lubricate the interiors of these chutes and to prevent accumulation of solids therein. The assemblage is of such construction that it may be operated at relatively high speed, and may be utilized to fill cans or receptacles of various sizes, and all parts of the assemblages are obviously readily accessible for inspection and cleaning. The improved receptacle filling machine may be conveniently installed and operated by a novice, and can be manufactured and sold at moderate cost.

It should be understood that it is not desired to limit this invention to the exact details of construction or to the precise mode of use, herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

I claim:

1. In a filler, an annular series of measuring chambers rapidly revolvable about an axis, and a hopper for delivering material by gravity into said chambers as they move beneath the hopper in rapid succession, said hopper having opposite downwardly converging side walls each formed of several hingedly connected rigid sections movable relative to the corresponding sections of the other wall and a reciprocable end wall for relatively moving said side walls.

2. In a filler, an annular series of measuring chambers rapidly revolvable about an axis, a hopper for delivering material by gravity into said chambers as they move beneath the hopper in rapid succession, said hopper having opposite downwardly converging side walls each formed of several hingedly connected rigid sections movable relative to the corresponding sections of the other wall and a reciprocable end wall for relatively articulating said side walls, and common means for revolving said chambers and for reciprocating said end wall.

3. In a filler, an annular series of upwardly open measuring chambers rapidly revolvable about an upright axis, and a hopper for delivering material by gravity into said chambers as they pass in rapid succession beneath said hopper, said hopper having opposite downwardly converging side walls each formed of a pair of hingedly connected rigid sections movable toward and away from the corresponding sections of the other wall to insure filling of said chambers as the latter move rapidly past the lower hopper discharge opening.

4. In a filler, an annular series of upwardly open measuring chambers rapidly revolvable about an upright axis, and a hopper for delivering material by gravity into said chambers as they pass in rapid succession beneath said hopper, said hopper having opposite downwardly converging side walls each formed of a pair of hingedly connected rigid sections movable toward and away from the corresponding sections of the other wall to insure filling of said chambers as the latter move rapidly past the lower hopper discharge opening, and also having a reciprocable end wall for moving said side walls.

5. In a filler, an annular series of upwardly open measuring chambers rapidly revolvable about an upright axis, a hopper for delivering material by gravity into said chambers as they pass in rapid succession beneath said hopper, said hopper having opposite downwardly converging side walls each formed of a pair of hingedly connected rigid sections movable toward and away from the corresponding sections of the other wall to insure filling of said chambers as

the latter move rapidly past the lower hopper discharge opening, and also having a reciprocable end wall for moving said side walls, and common means for revolving said chambers and for reciprocating said end wall.

6. In a filler, a series of measuring chambers movable along a definite path, a hopper for delivering material into the successive chambers as they advance past the hopper outlet, said hopper having opposite side walls formed of several rigid sections articulably interconnected by hinges extending in the direction of travel of the material passing through the hopper, and means for articulating said hopper wall sections during advancement of said chambers past said outlet.

7. In a filler, an annular series of measuring chambers revolvable about an axis, a hopper for delivering material into the successive chambers as they move past the hopper outlet, said hopper having opposite side walls formed of several rigid sections articulably interconnected by hinges extending in the direction of travel of the material passing through the hopper, and an end member connecting said hopper side walls and being reciprocable to articulate said side wall sections during revolution of said chamber series.

8. In a filler, a series of measuring chambers revolvable about an upright axis, a hopper for delivering material by gravity into the successive chambers as they move past the hopper outlet, said hopper having opposite side walls each formed of several rigid sections articulably interconnected by hinges extending downwardly and inwardly toward said outlet and also having an end wall reciprocable to articulate said side wall sections, and means for simultaneously revolving said chamber series and for reciprocating said end wall.

FRANK D. CHAPMAN.