April 22 , 1924. 1,490,923

O. H. HANSEN

CAN FILLING MACHINE

Filed May 31 , 1919 4 Sheets-Sheet 1

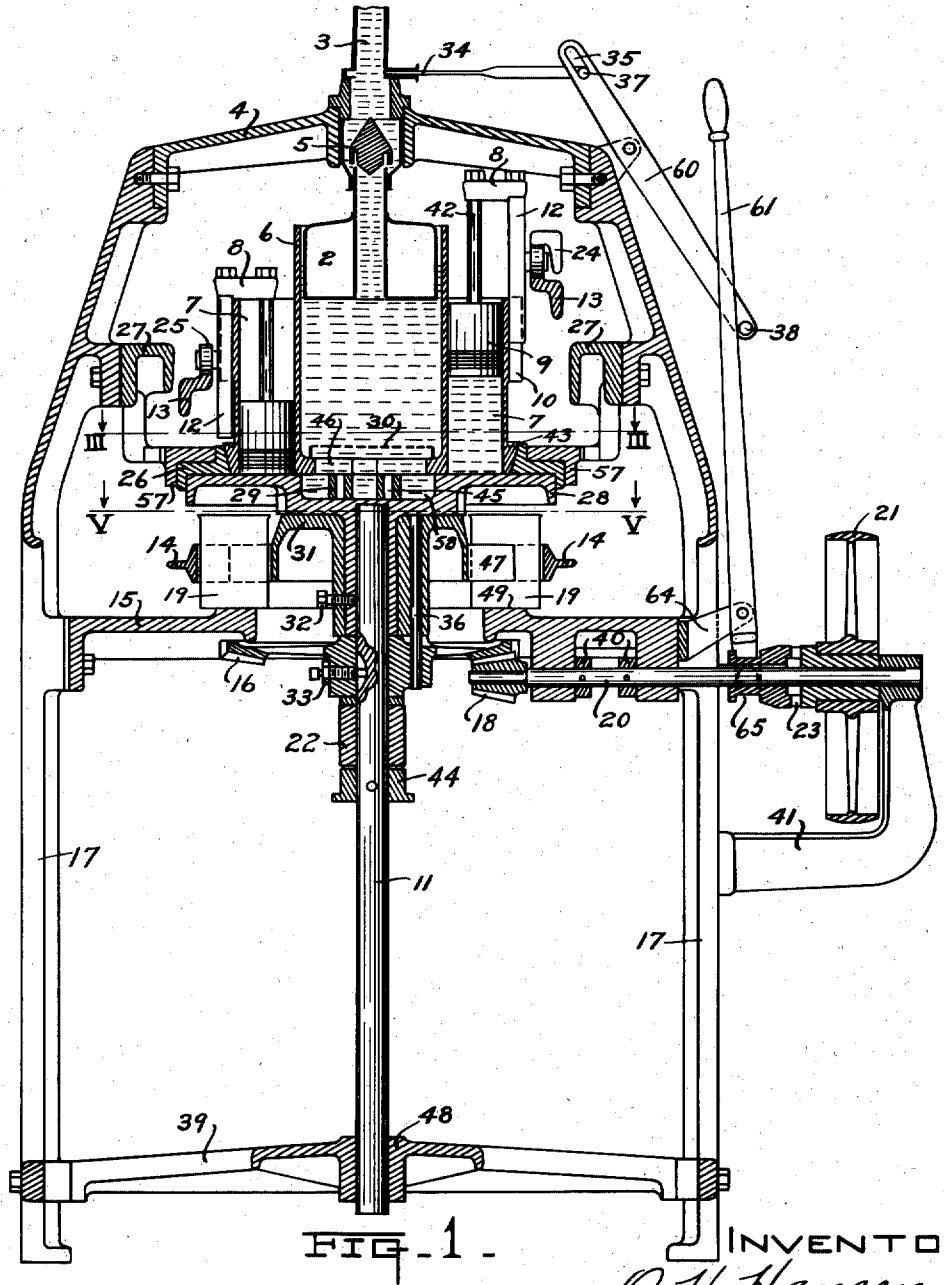


FIG-1-

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CAN FILLING MACHINE

Filed May 31, 1919 4 Sheets-Sheet 2

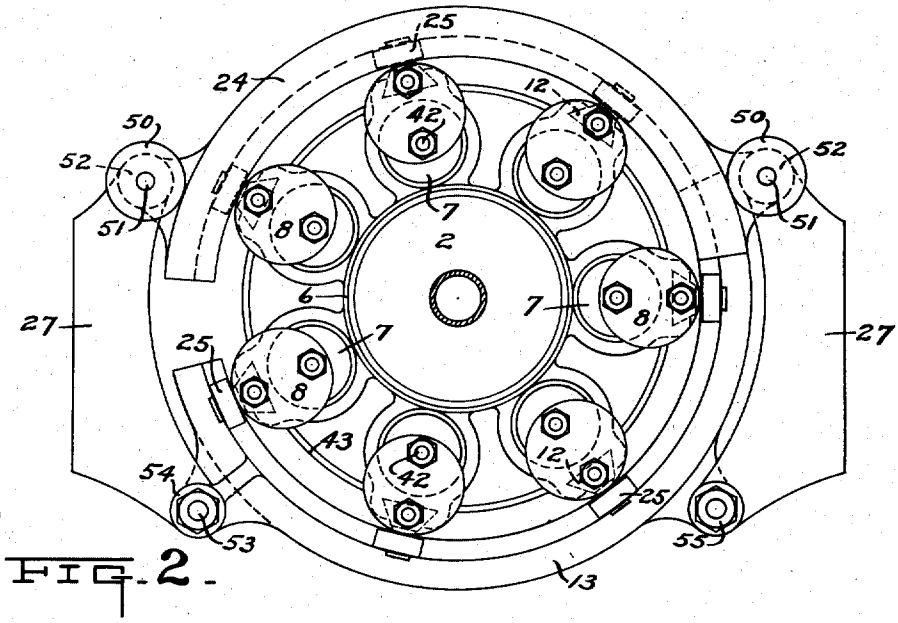


FIG. 2.

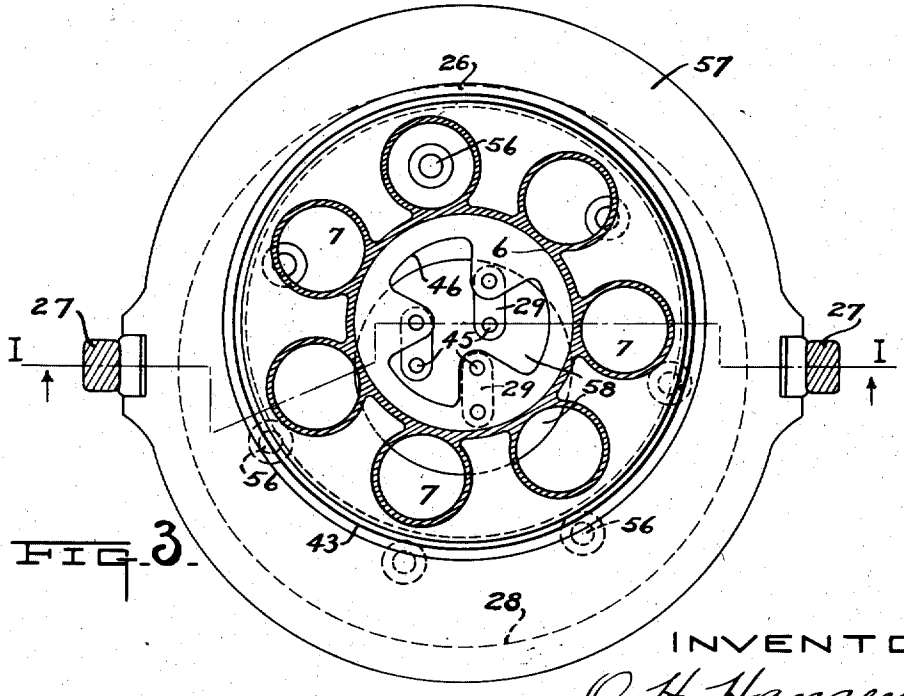


FIG. 3.

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CAN FILLING MACHINE

Filed May 31 , 1919 4 Sheets-Sheet 3

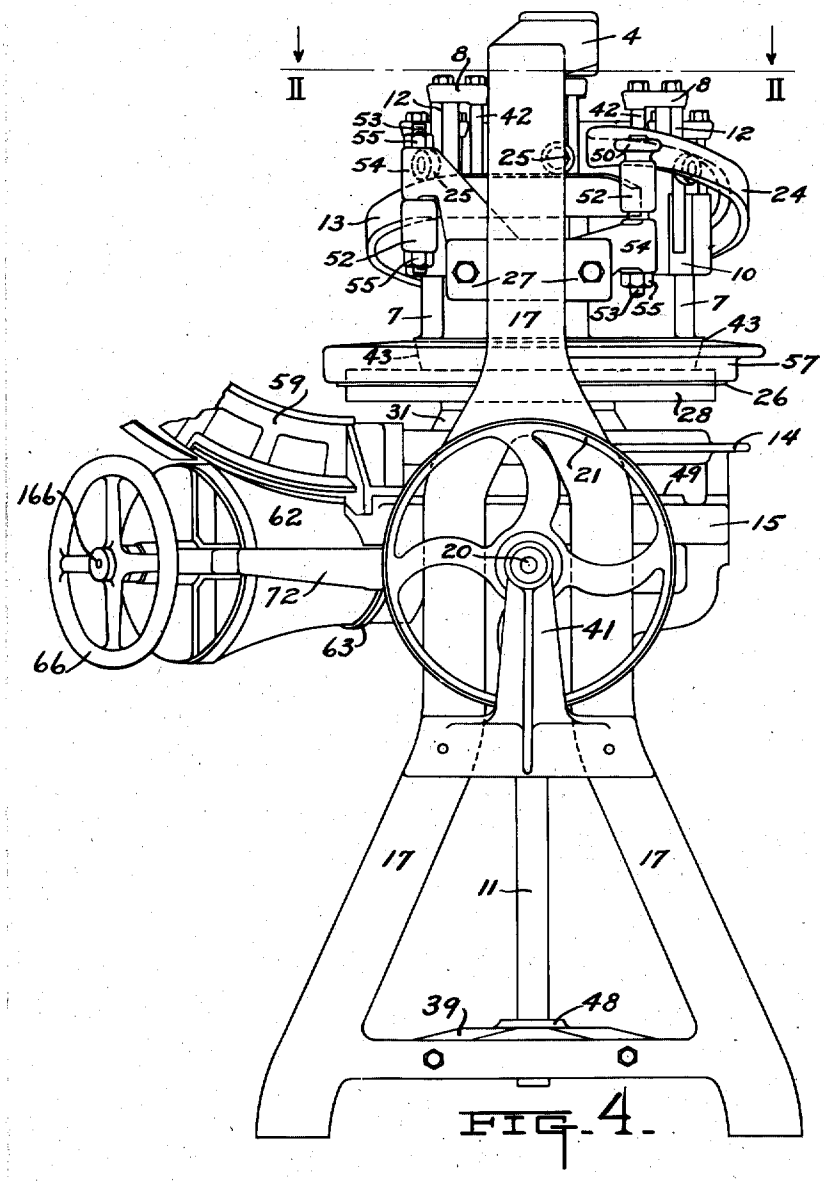


FIG. 4.

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CAN FILLING MACHINE

Filed May 31 , 1919 4 Sheets-Sheet 4

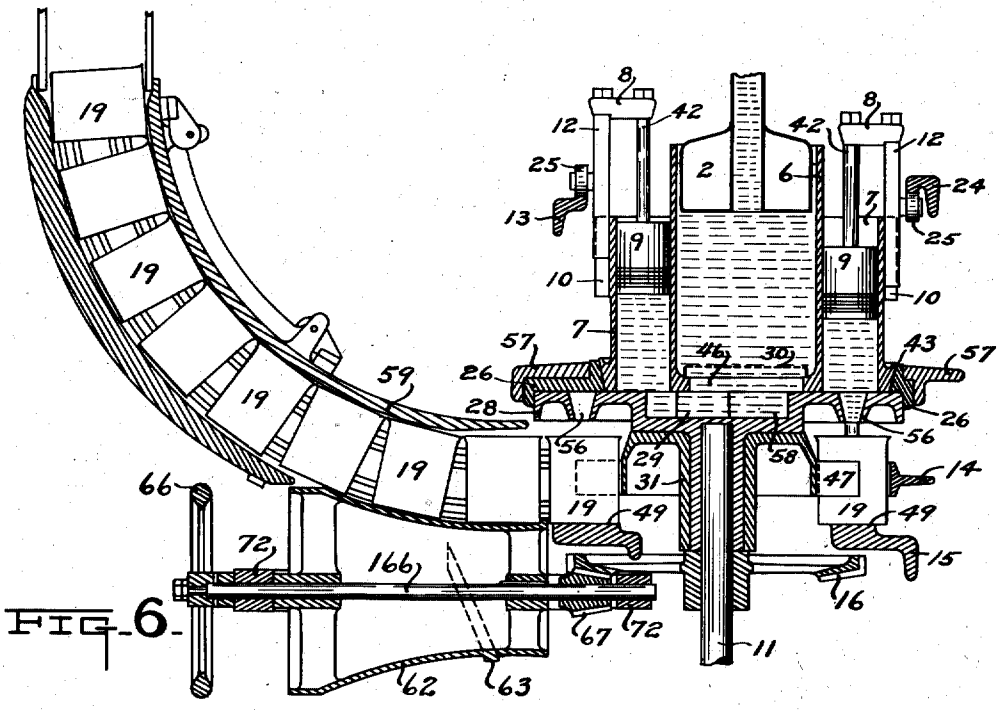


FIG. 6.

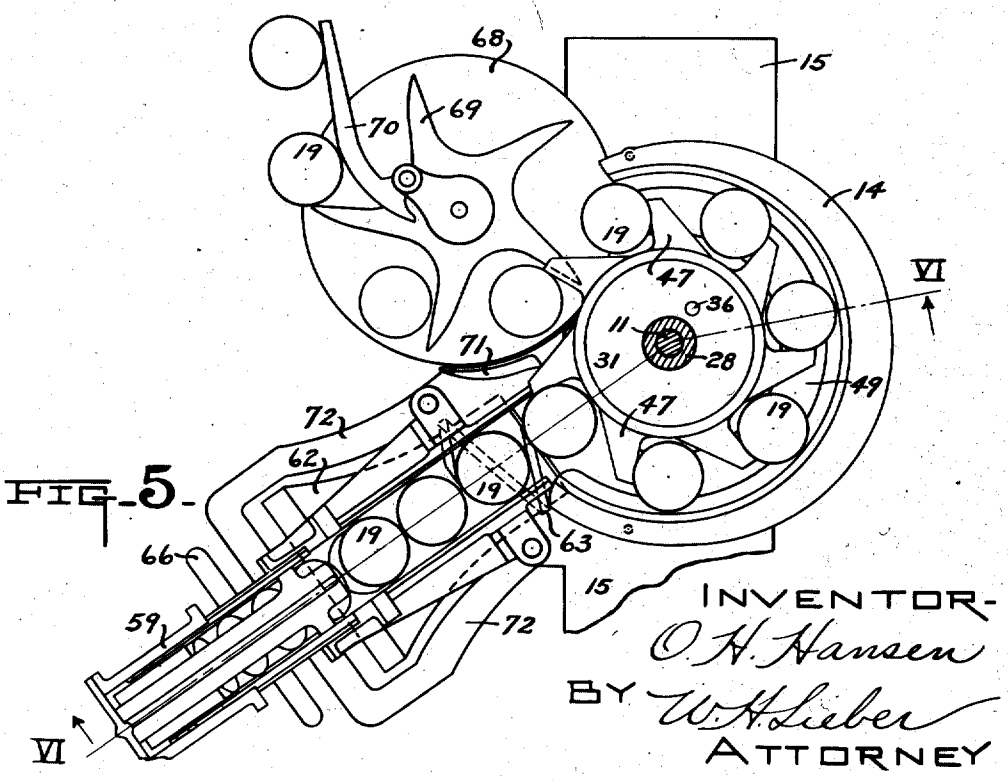


FIG. 5.

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Patented Apr. 22, 1924. 1,490,923

UNITED STATES PATENT OFFICE.

OSWALD H. HANSEN, OF PORT WASHINGTON, WISCONSIN, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO HANSEN CANNING MACHINERY CORPORATION, A CORPORATION OF WISCONSIN.

CAN-FILLING MACHINE.

Application filed May 31, 1919. Serial No. 300,992.

To all whom it may concern:

Be it known that OSWALD H. HANSEN, a citizen of the United States, residing at Port Washington, in the county of Ozaukee and State of Wisconsin, has invented a certain new and useful Improvement in Can-Filling Machines, of which the following is a specification.

This invention relates in general to improvements in the construction and operation of devices for delivering measured quantities of substance such as fluids, semi-fluids, pulverulent materials and the like, to receptacles, and has specific relation to improvements in machines for automatically delivering to cans, predetermined quantities of material such as syrup, jelly, jam, preserves, mince-meat, mustard, fruit butter, salad dressing, tomato paste, condensed milk, evaporated milk, whole milk, paint and the like.

An object of the invention is to provide a filling machine which is simple in construction and efficient in operation.

Some of the more specific objects of the present invention may be enumerated as follows:—

To produce a simple, compact and automatic filling machine which is operable at maximum speed and which will require minimum attention while in operation.

To provide a device which will deliver accurately pre-measured quantities of fluent substance to receptacles, without wasting any of the substance.

To provide a filling machine which may be readily assembled and dismantled, and in which all parts are readily accessible for cleaning, inspection and renewal of parts.

To provide a filler adapted to speedily transport and fill open topped sanitary cans, without in any manner injuring the cans.

To provide a mechanism in which the use of non-metallic packing or sealing elements is avoided, and in which the various bearing surfaces are automatically and effectively lubricated.

To provide means for accurately and rapidly adjusting or varying the quantities of substance measured.

To provide various details of construction and of operation of filling machines, which will reduce to a minimum the construction and operating costs, and which will produce maximum efficiency.

Several of the novel features of the machine herein disclosed, form no part of the present invention, such features being claimed broadly in co-pending applications. The frame structure for example forms the subject of application Serial No. 157,308, filed March 26, 1917. The feature of eliminating valves as well as some of the other details of filling machine construction, form the subject of application Serial No. 197,809, filed October 22, 1917. The power control and manipulating structure forms the subject of application Serial No. 214,205, filed January 28, 1918. The can feed mechanism forms the subject of application Serial No. 253,177, filed September 9, 1918. The discharge nozzle forms the subject of application Serial No. 300,993, filed May 31, 1919.

While numerous specific terms may be employed throughout this specification, it is not contemplated to thereby limit the scope of the invention. Although the machine herein disclosed is especially adapted to handle and fill open topped sanitary cans, the term "can" is intended to apply to any form of receptacle. The term "filling" refers to either a partial or complete filling of the receptacles. As the machine is especially applicable to the industry of filling cans with milk, the term "milk" is employed herein to designate any fluent substance. The principles of the invention are applicable generally to machines for automatically feeding measured quantities of substances to receptacles.

A clear conception of a specific embodiment of the invention and of the operation of a device constructed in accordance therewith, may be had by referring to the drawings accompanying and forming part of this specification, in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a vertical section through a machine adapted to automatically deliver pre-measured quantities of milk and like fluent substances to successive cans, the section being taken along the irregular line I—I of Fig. 3, looking in the direction of the arrows.

Fig. 2 is an enlarged transverse horizontal section through the machine, taken along the line II—II of Fig. 4, looking in the direction of the arrows.

Fig. 3 is an enlarged transverse horizontal section through the machine, taken along the line III—III of Fig. 1 looking in the direction of the arrows.

Fig. 4 is a side elevation of the machine looking toward the driving pulley, the control lever having been omitted.

Fig. 5 is a transverse horizontal section through the machine, taken along the line V—V of Fig. 1, looking in the direction of the arrows.

Fig. 6 is a fragmentary vertical section through the machine, taken along the irregular line VI—VI of Fig. 5, looking in the direction of the arrows.

The frame structure of the can filling machine is adapted for cooperation with filler mechanisms of various types as set forth in application Serial No. 157,308, filed March 26, 1917, and comprises a pair of spaced vertical side frames 17 which are interconnected at their lower portions by a horizontal cross-frame 39 supporting a central bearing 48, at their medial portions by means of a horizontal frame element 15, and at their upper extremities by means of a horizontal cross-frame 4 carrying the fluid inlet pipe 3 and an automatic control valve seat 5, see Fig. 1.

The driving mechanism which is also adapted for cooperation with fillers of various types as set forth in the application herein before referred to, comprises a horizontal power shaft 20 supported in bearings formed integral with the frame element 15 and in an outer bearing formed in the bracket 41 secured to one of the side frames 17, see Figs. 1 and 4. A driving pulley 21 is mounted upon the power shaft 20 adjacent to the bracket 41 and is adapted to be drivingly connected to the shaft 20 by means of a jaw clutch 23. The movable clutch element 65 is splined to the shaft 20 and is shiftable by means of an operating lever 61 pivotally mounted upon a supporting bracket 64. The shaft 20 is fixed against longitudinal displacement by means of thrust collars 40 and has a bevel pinion 18 secured to its inner extremity. The pinion 18 meshes with the main bevel gear 16 which is secured by means of a set screw 33 to the medial portion of the vertical main shaft 11. The main shaft 11 is mounted in the bearing 48 in the lower cross frame 39 and in a bearing 22 secured to the frame element 15, and is restrained from moving upwardly by means of a thrust collar 44. Secured to the upper extremity of the main shaft 11 is a rotatable cut-off plate 28 and a can conveyor 31, both of these elements being attached directly to the main shaft 11 by means of a common set screw 32, and the conveyor 31 being additionally secured to the gear 16 by means of a vertical rod 36.

The can feed, transporting and discharging mechanisms are also of novel structure as set forth in applications Serial No. 157,308 filed March 26, 1917, Serial No. 214,205 filed January 28, 1918, and Serial No. 253,177 filed September 9, 1918. The can feed mechanism comprises a guide chute 59 adapted to deliver the cans 19 in succession upon the rotating feed drum 62. The feed drum 62 has a peripheral helical flange 63 adapted to engage the lower rear portions of the successive cans 19 and to deliver the cans upon the horizontal plane surface 49 of the frame element 15. The drum 62 is secured to a counter shaft 166 which is supported in bearings in the frame 72 which in turn is associated with the frame element 15, the counter shaft being rotatable by means of a bevel pinion 67 meshing with the main gear 16. A hand wheel 66 attached to the counter shaft 166 is provided for manual operation of the machine when the power clutch 23 is disconnected, see Figs. 5 and 6. The can transporting mechanism comprises the rotary conveyor 31 having a series of seven equally spaced can hooks 47 for sliding the successive cans 19 over the surface 49, and a stationary guide 14 for confining the movement of the cans 19 to a circular path concentric with the axis of the shaft 11. The can discharging mechanism comprises a rotary disc 68, a revolving can conveyor 69 and adjustable stationary ejectors 70, 71. The disc 68 and conveyor 69 are rotatable by means of gearing associated with the main gear 16, as shown in Fig. 1 of application Serial No. 347,110, filed December 24, 1919. The guide 14 extends from the feed drum 62 to the disc 68. These can handling mechanisms are adapted to gently feed, transport and deliver the successive cans 19, to, through and from the filler without injuring the cans or wasting any of the substance by splashing.

The material measuring and delivering mechanism has several novel features forming the subject of copending application Serial No. 197,809 filed October 22, 1917, and application Serial Number 300,993, filed concurrently herewith. This mechanism comprises the rotatable feed and cut-off plate 28 rotatable by and coaxially with the shaft 11, a bearing plate 26 secured to the stationary element 57 and having therein a tapered bore 43 formed eccentrically of the shaft 11, and an annular series of seven measuring cylinders 7 secured to the periphery of a supply tank 6 and arranged in an annulus eccentrically of the axis of the shaft 11 and plate 28. The tank 6 and cylinders 7 are formed integral and coact with the upper surface of the plate 28. Three parallel links

29 located in the central recess 58 of the plate 28 are pivoted at corresponding ends to the plate 28 and at their opposite corresponding ends to the bottom of the tank 6, by means of pivot pins 45, see Figs. 1, 3 and 6. The eccentricity of the opening 46 in the bottom of the tank 6 relatively to the recess 58 in the plate 26, is such that during simultaneous rotation of the tank 6, cylinders 7 and plate 28 by virtue of the links 29, the cylinders 7 are successively placed into communication with the tank 6 through the opening 46 and recess 58, as indicated in Fig. 3. The plate 28 is also provided with an annular series of seven discharge nozzles 56 which are spaced equidistant apart and from the axis of the shaft 11. When the cylinders 7 are in communication with the tank 6, they are cut off from communication with the nozzles 56, each cylinder 7 being brought successively into communication with the tank 6 and with a nozzle 56 as the cylinders 7 and plate 28 are relatively gyrated. The nozzles 56 are located above and directly in line with the cans 19 which are being transported through the machine by the can hooks 47.

The element 57 is prevented from rotating by means of the brackets 27 secured to the side frames 17 as shown in Fig. 3, the element 57 being freely vertically removable from the machine. Vertically adjustably secured to the brackets 27 are lower and upper cam tracks 13, 24 which extend in proximity to the measuring cylinders 7. These cam tracks 13, 24 have hubs 52 which are in line with hubs 54 of the brackets 27. The alined hubs 52, 54 are relatively adjustably secured to each other by means of stud bolts 53, nuts 55 and adjusting hand wheels 50. Each measuring cylinder 7 has therein a reciprocable piston 9 provided with a piston rod 42. The upper end of each piston rod 42 is secured to a plate 8 to which a guide 12 is also secured. The guides 12 are parallel to the piston rods 42 and coact with guide ways 10 formed integral with the walls of the cylinders 7. Each guide 12 has a roller 25 mounted thereon, which coacts with the adjacent cam tracks 13, 24. As the cylinders 7 revolve, the rollers 25 coact with the adjacent stationary cam tracks, and positively raise and lower the pistons 9 within the cylinders 7.

Within the tank 6 is located a float 2 which rests upon the liquid within the tank and which has a central inlet pipe the upper extremity of which forms a cut-off valve adapted to enter an annular recess in the valve seat 5 to automatically cut off the supply of fluid when a predetermined high level of fluid is established in the tank 6. This automatic cut-off valve is entirely balanced being sensitive and positive in action. The bottom of the tank 6 is provided with a filter or screen 30 for separating impurities from the fluid delivered to the cylinders 7. The fluid is supplied to the cut-off valve from a removable supply pipe 3 past a slide valve 34. This slide valve 34 is automatically closed when the power control lever 61 is swung to the right as viewed in Fig. 1, to thereby stop the machine, but is not affected in starting the machine. Such automatic closing of the valve 34 is effected by the lever 60 pivoted at its medial portion to the frame 17, and having at one end a slot 35 engaging the pin 37 on the stem of the valve 34 and at its opposite end a pin 38 engageable with the lever 60.

During the normal operation of the machine, power is applied to the pulley 21 and the clutch 23 is thrown in by means of the control lever 61 as shown in Fig. 1, causing the shaft 20 to rotate. Rotation of the shaft 20 is transmitted to the gears 18, 16 to the main shaft 11, can conveyor 31 and plate 28. The rotating gear 16 causes the feed drum 62 and can discharge plate 68 and ejector 69 to rotate, thereby gently feeding the cans 19 in succession into the path of the moving can hooks 47, around the shaft 11 and from the machine.

The milk or other liquid is supplied to the tank 6 through the pipe 3 upon opening of the slide valve 34, the float 2 resting upon the liquid in the tank 6. As the level of the liquid in the tank 6 rises, the float 2 rises and eventually automatically closes the cut-off valve, upon attainment of a predetermined high level of liquid in the tank 6. As the liquid level in the tank 6 drops, the cut-off valve automatically opens and replenishes the supply in the tank 6 through the interior of the float 2. The control of milk admitted to the tank 6 is thus effected automatically and an approximately constant head of fluid is maintained in the tank.

As the plate 28 is rotated, its motion is transmitted through the parallel links 29 and pins 45 to the tank 6 and cylinders 7, causing the tank and cylinders to revolve about the axis of the bore 43 and to gyrate relatively to the plate 28. The revolving cylinders 7 advance their corresponding rollers 25 along the inclined cam tracks 13, 24 causing the pistons 9 within the cylinders 7 to rise when the cylinders are in communication with the recess 58, and to move downwardly when the cylinders are in communication with the cans 19 through the nozzles 56. As communication is established between the tank 6 and cylinders 7, the corresponding pistons are lifted and fluid is drawn by the suction produced and by virtue of the head of fluid established in the tank 6, from within the tank 6 into the cylinders 7, filling the cylinders and measuring definite amounts of the fluid. As communication is established between

the cylinders 7 and the corresponding discharge nozzles 56, the fluid is forced from within the cylinders by the descending pistons and is delivered through the nozzles 56 into the cans 19 below, in the form of solid jets. The formation of the nozzles and the fact that they are interially unobstructed eliminates excessive agitation of the liquid forced therethrough and consequently eliminates frothing and splashing of the liquid deposited into the cans 19. The successive cans 19 are thus automatically filled or supplied with definite equal quantities of the liquid.

The quantities of liquid delivered to successive cans may be readily varied by vertical adjustment of the cam tracks 13, 24 such adjustment being effected by means of the hand wheels 50. The adjustment may be made without removing any part of the machine and while the machine is in operation. Such adjustment may be desirable in order to increase the clearance in the cans or when filling cans of different sizes.

The entire machine may be readily dismantled by swinging the inlet pipe 3 out of the way after disconnection thereof, and removing the upper cross frame 4. The pistons 9 and their cooperating plates 8, guides 12 and rollers 25, may be freely vertically removed when positioned at the medial portion of the cam track 13, without disturbing the position of the upper frame 4 or any other part of the machine. After the upper frame 4 has been removed, the float 2, cylinders 7 and tank 6 are freely vertically removable. The cam tracks 13, 24 may be removed by releasing the nuts 55 and hand wheels 50. The frame element 57, bearing plate 26, cut-off plate 28 and conveyor 31 may also be vertically removed in succession, by releasing the set screw 32. The screen 30 and links 29 are held in place by gravity and are also readily removed, thus making all parts of the machine readily accessible for cleaning, inspection and renewal of parts.

When operating on milk, the fat contained in the milk is forced into the space between coacting relatively movable surfaces, thus automatically lubricating such surfaces and providing a packing which prevents leakage and waste of substances. All movable parts of the machine are rotatable continuously in the same direction, thereby eliminating excessive agitation and splashing of the liquid such as would occur in reversing the movement of rapidly moving parts. The machine is operable to fill and deliver an average of 150 cans per minute without wasting substance or injuring the cans, and requires no attention after proper adjustment of working parts has been made. The elimination of complicated valves and other parts which are liable to become inoperative further eliminates necessity of attention. As most of the elements may be entirely finished by turning or boring, the cost of construction is reduced to a minimum.

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

It is claimed and desired to secure by Letters Patent:—

1. In a filling machine, material supply means, a measuring device, an element constituting a wall for said device and having a discharge orifice, and means for simultaneously continuously gyrating said device and said element about different axes to alternately establish communication between said supply means and said device and between said device and said discharge orifice.

2. In a filling machine, material supply means, a measuring device, a displacement member associated with said device, an element constituting a wall for said device, and having a discharge orifice, means for simultaneously gyrating said device and said element about different axes to alternately establish communication between said supply means and said device and between said device and said discharge orifice, and means for relatively reciprocating said device and said member during said gyration.

3. In a filling machine, material supply means, a measuring device, an element constituting a wall for said device, and means for simultaneously continuously gyrating said device and said element about different axes to establish communication between said supply means and said device.

4. In a filling machine, material supply means, a measuring device, a displacement member associated with said device, an element constituting a wall for said device, means for simultaneously continuously gyrating said device and said element about different axes to establish communication between said supply means and said device, and means for relatively reciprocating said device and said member during said gyration.

5. In a filling machine, a measuring device, an element constituting a wall for said device and having a discharge orifice, and means for simultaneously continuously gyrating said device and said element about different axes to establish communication between said device and said discharge orifice.

6. In a filling machine, a measuring device, a displacement member associated with said device, an element constituting a wall for said device and having a discharge orifice, means for simultaneously gyrating said

device and said element about different axes to establish communication between said device and said discharge orifice, and means for relatively reciprocating said device and said member during said gyration.

7. In a filling machine, material supply means, a measuring device, an element forming a bottom closure for said device and having a discharge orifice, and means for simultaneously continuously gyrating said device and said element about different axes to alternately establish communication between said supply means and said device and between said device and said discharge orifice.

8. In a filling machine, material supply means, a measuring device, a displacement member forming a closure for one end of said device, an element forming a closure for the opposite end of said device and having a discharge orifice, means for simultaneously gyrating said device and said element about different axes to alternately establish communication between said supply means and said device and between said device and said discharge orifice, and means for relatively reciprocating said device and said member during said gyration.

9. In a filling machine, material supply means, a measuring device movable about an axis, an element movable about a different parallel axis to provide a bottom closure for said device, said element having a discharge orifice, and means for simultaneously continuously revolving said device and said element about said axes to alternately establish communication between said supply means and the bottom of said device and between the bottom of said device and said discharge orifice.

10. In a filling machine, material supply means, a measuring device movable about an axis, an element movable about a different parallel axis and providing a closure for said device, and means for simultaneously continuously revolving said device and said element about said axes whereby communication is established between said supply means and said device.

11. In a filling machine, a measuring device movable about an axis, an element movable about a different parallel axis to provide a closure for said device, said element having a discharge orifice, and means for simultaneously continuously revolving said device and said element about said axes to establish communication between said device and said discharge orifice.

12. In a filling machine, material supply means, a series of measuring devices, an element constituting a wall for all of said devices and having discharge orifices, and means for simultaneously moving all of said devices and said element relatively to each other to alternately establish communication between said supply means and successive devices and between successive devices and said discharge orifices.

13. In a filling machine, material supply means, a series of measuring devices, an element constituting a wall for all of said devices and having discharge orifices, and means for simultaneously gyrating all of said devices and said element about different axes to alternately establish communication between said supply means and successive devices and between successive devices and said discharge orifices.

14. In a filling machine, material supply means, a series of measuring devices, a displacement member associated with each of said devices, an element constituting a wall for all of said devices and having discharge orifices, means for simultaneously moving all of said devices and said element relatively to each other to alternately establish communication between said supply means and successive devices and between successive devices and said discharge orifices, and means for relatively reciprocating said devices and the adjacent displacement members during said movement.

15. In a filling machine, material supply means, a series of measuring devices, a displacement member associated with each of said devices, an element constituting a wall for all of said devices and having discharge orifices, mean for simultaneously gyrating all of said devices and said element about different axes to alternately establish communication between said supply means and successive devices and between successive devices and said discharge orifices, and means for relatively reciprocating said devices and the adjacent members during said gyration.

16. In a filling machine, material supply means, a plurality of measuring devices, an element constituting a wall for said devices and means for continuously relatively gyrating all of said devices and said element about different axes to successively establish communication between said supply means and said devices.

17. In a filling machine, a plurality of measuring devices, an element constituting a wall for said devices and having discharge orifices, and means for continuously relatively gyrating all of said devices and said element about different axes to successively establish communication between said discharge orifices and said devices.

18. In a filling machine, material supply means, a plurality of measuring devices, a displacement member associated with each of said devices, an element constituting a wall for said devices, means for simultaneously relatively gyrating all of said devices and said element about different axes to successively establish communication between

said supply means and said devices, and means for relatively reciprocating said devices and said members during said gyration.

19. In a filling machine, a plurality of measuring devices, a displacement member associated with each of said devices, an element constituting a wall for said devices and having discharge orifices, means for simultaneously relatively gyrating all of said devices and said element about different axes to successively establish communication between said discharge orifices and said devices, and means for relatively reciprocating said devices and said members during said gyration.

20. In a filling machine, a plurality of measuring devices movable about an axis, a displacement member within each of said devices, an element movable about a different axis and providing a closure for said devices, said element having discharge orifices, means for rotating said devices and said element about said axes to successively establish communication between said discharge orifices and said devices, and means for relatively reciprocating said devices and said members during said rotation.

21. In a filling machine, material supply means, a plurality of measuring devices movable about an axis, a displacement member within each of said devices, an element movable about a different axis to provide a closure for said devices, means for rotating said devices and said element about said axes to successively establish communication between said supply means and said devices, and means for relatively reciprocating said devices and said members during said rotation.

22. In a filling machine, material supply means, a measuring device movable about an axis, a cut-off element movable in proximity to said device about a different parallel axis, said element having a discharge orifice, driving means connecting said element and said device, and means for positively rotating said element to simultaneously revolve said device and said element about said axes whereby communication is alternately established between said supply means and said device and between said device and said discharge orifice.

23. In a filling machine, material supply means, a measuring device movable about an axis, a cut-off element movable in proximity to said device about a different axis, driving means connecting said element and said device, and means for positively rotating said element to simultaneously revolve said device and said element about said axes whereby communication is established between said supply means and said device.

24. In a filling machine, a measuring device movable about an axis, a cut-off element movable in proximity to said device about a different parallel axis, said element having a discharge orifice, driving means connecting said element and said device, and means for positively rotating said element to simultaneously revolve said device and said element about said axes whereby communication is established between said device and said discharge orifice.

25. In a filling machine, a measuring device, an element in proximity to said device, means for continuously rotating one of said members, and a movable link associated with both of and located within said members for transmitting the continuous rotary movement of the one to the other.

26. In a filling machine, a measuring device, an element in proximity to said device, means for continuously rotating one of said members, and a plurality of parallel movable links associated with both of and located within said members for producing relative continuous gyration between said members.

27. In a filling machine, a measuring device, an element in proximity to said device, means for continuously rotating said element, and a plurality of parallel movable links associated with both said device and said element for communicating continuous rotary motion from said element to said device, said links being located within said element.

28. In a filling machine, a measuring device, a cut-off element in proximity to said device, means for rotating said element, and a movable link associated with both of said members for transmitting rotary motion from said element to said device.

29. In a filling machine, a measuring device having an axis, an element constituting a wall for said device having a parallel axis, means for continuously rotating one of said members, and a link associated with both of said members for transmitting continuous rotary motion from one of said members to the other about said axes.

30. In a filling machine, a measuring device having an axis, an element constituting a wall for said device having a parallel axis, means for continuously rotating said element about its axis, and a plurality of parallel links associated with both said device and said element for communicating rotary motion from said element to produce continuous rotation of said device about its axis.

31 In a filling machine, a measuring device having an axis, an element constituting a wall for said device and movable about a parallel axis, means for continuously rotating one of said members, and a link associated with both of said members, said link being movable in a plane perpendicular to said axes to transmit continuous rotary motion from one of said members to the other.

32. In a filling machine, a measuring device having an axis, an element constituting a wall for said device and movable about a parallel axis, means for continuously rotating said element about its axis, and a plurality of parallel links associated with both said device and said element, said links being movable in a plane perpendicular to said axes to communicate rotary motion from said element whereby said device is continuously rotated about its axis.

In testimony whereof, the signature of the inventor is affixed hereto.

OSWALD H. HANSEN.