Oct. 31, 1967 R. L. SMITH 3,349,973

RECEPTACLE FILLING MACHINES

Original Filed Feb. 4, 1964 4 Sheets-Sheet 1

FIG. 1

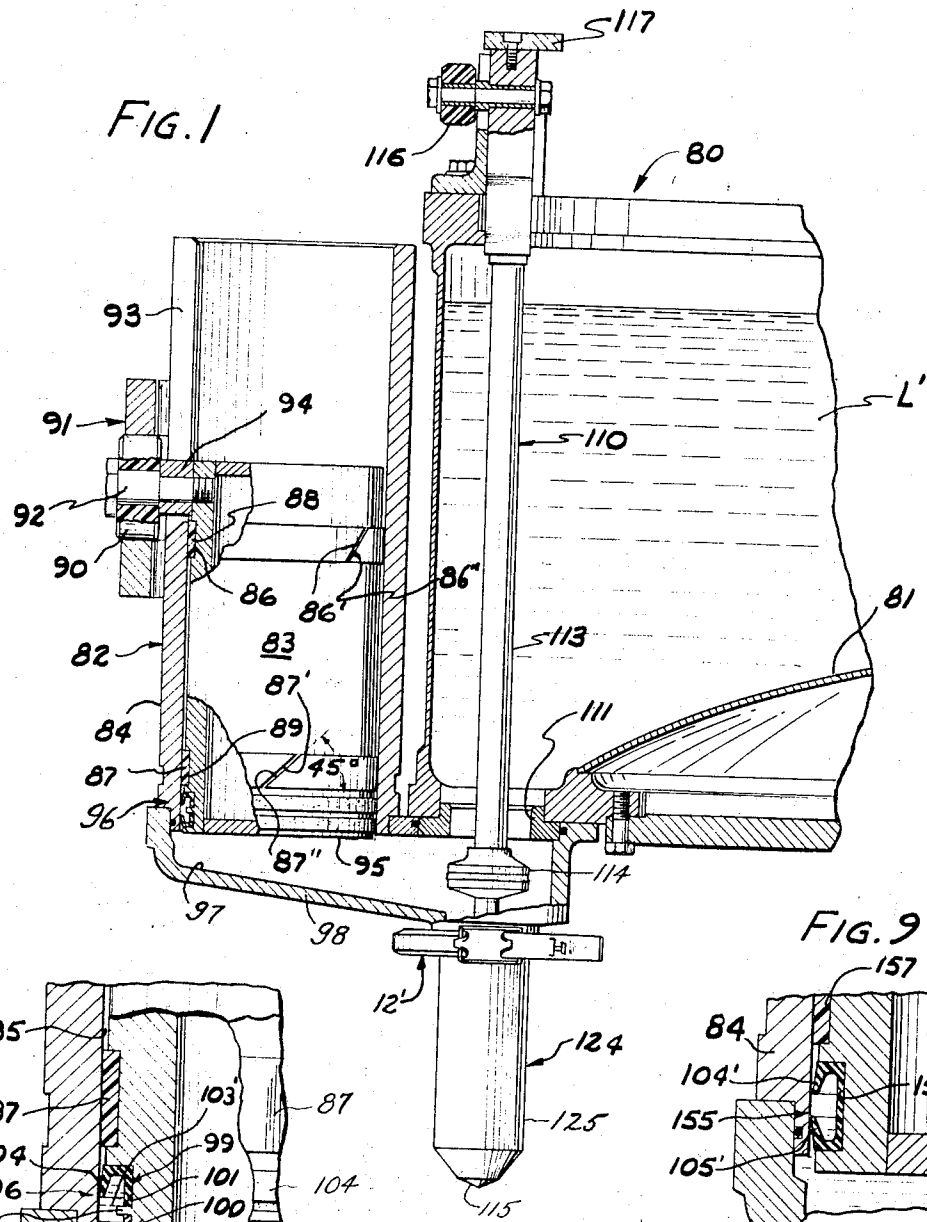


FIG. 2

FIG. 9

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Oct. 31, 1967 R. L. SMITH 3,349,973

RECEPTACLE FILLING MACHINES

Original Filed Feb. 4, 1964 4 Sheets-Sheet 2

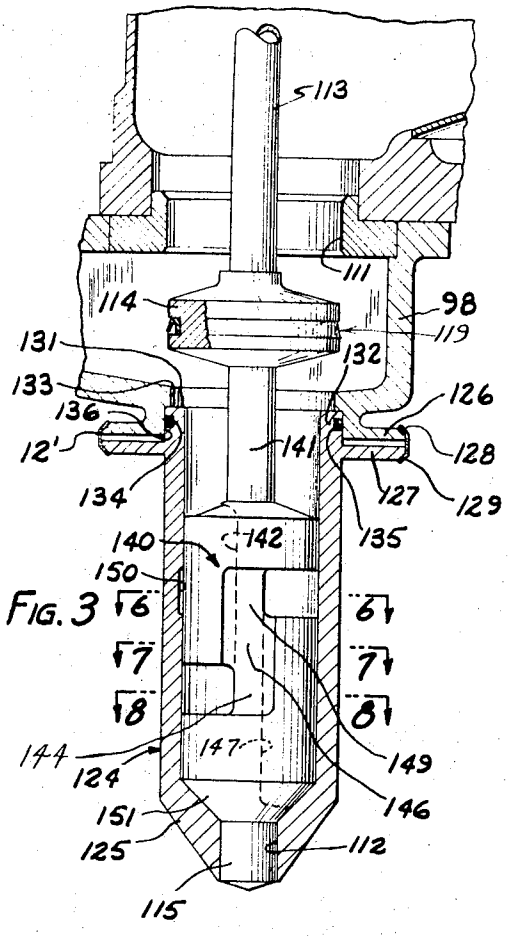


FIG. 3

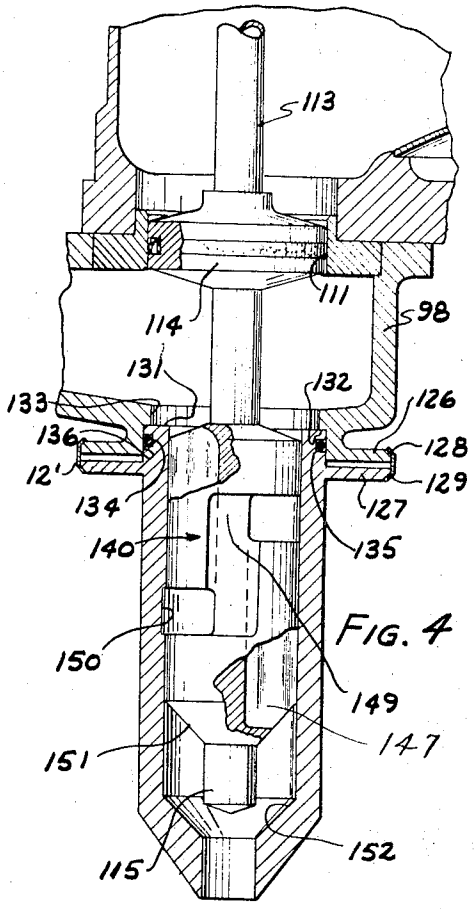


FIG. 4

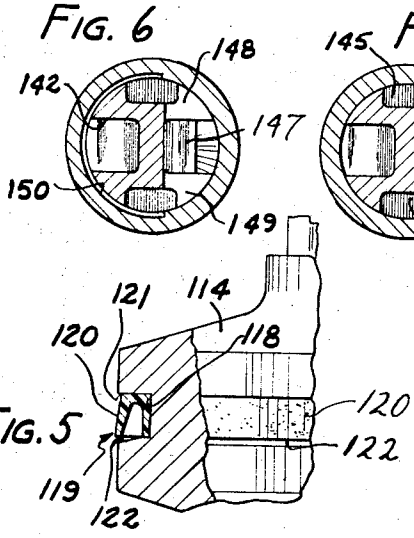


FIG. 5

FIG. 6

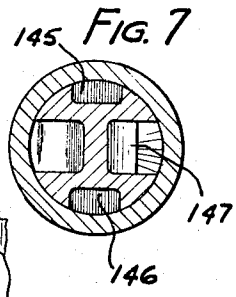


FIG. 7

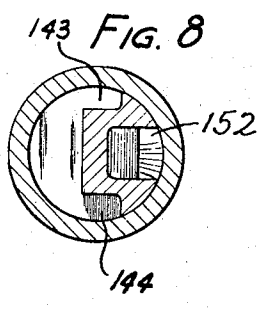


FIG. 8

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Oct. 31, 1967 R. L. SMITH 3,349,973

RECEPTACLE FILLING MACHINES

Original Filed Feb. 4, 1964 4 Sheets-Sheet 3

FIG. 10

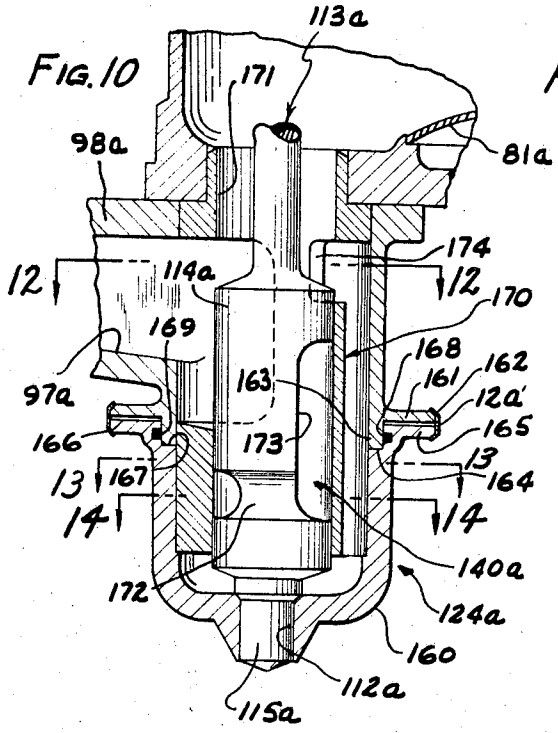


FIG. 11

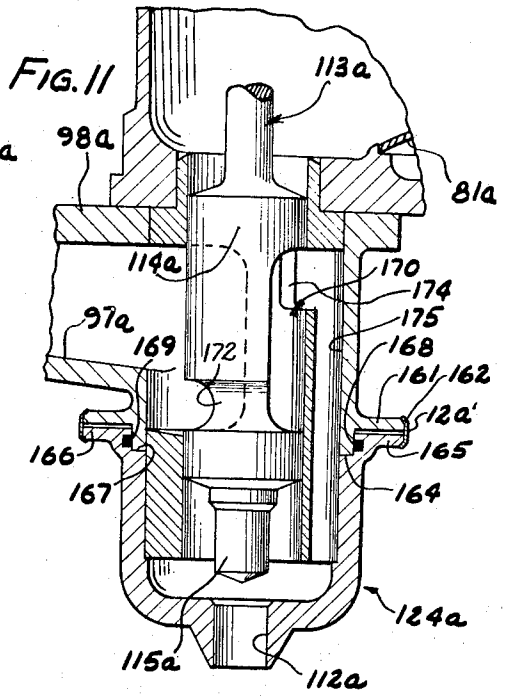


FIG. 12

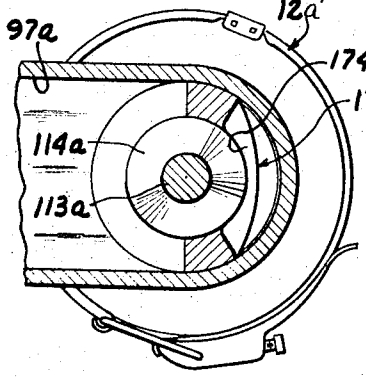


FIG. 13

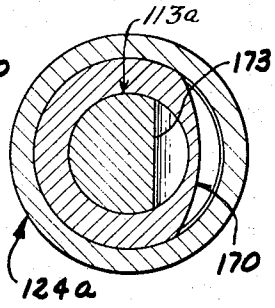
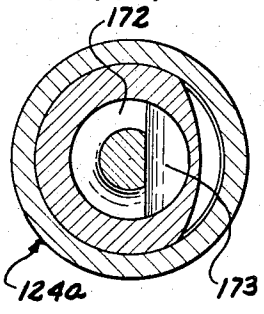


FIG. 14



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Oct. 31, 1967 R. L. SMITH 3,349,973

RECEPTACLE FILLING MACHINES

Original Filed Feb. 4, 1964 4 Sheets-Sheet 4

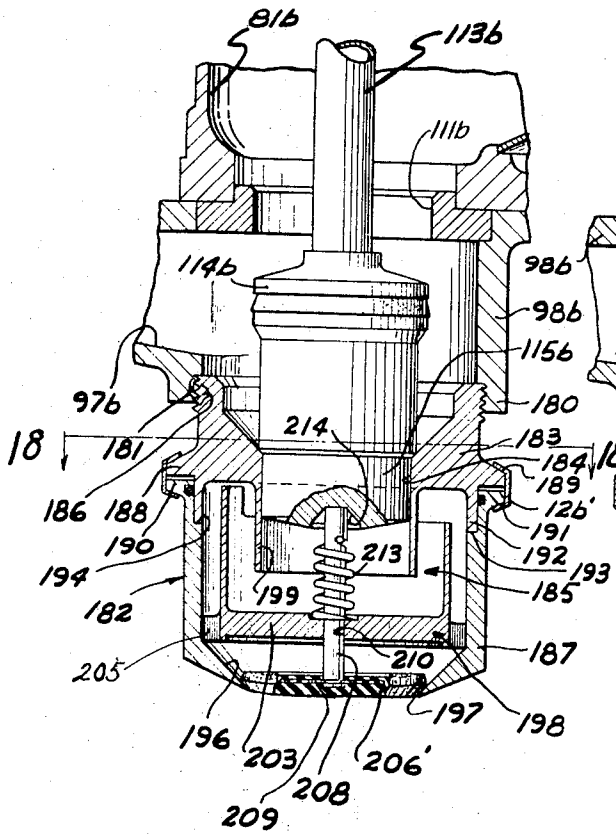


FIG. 15

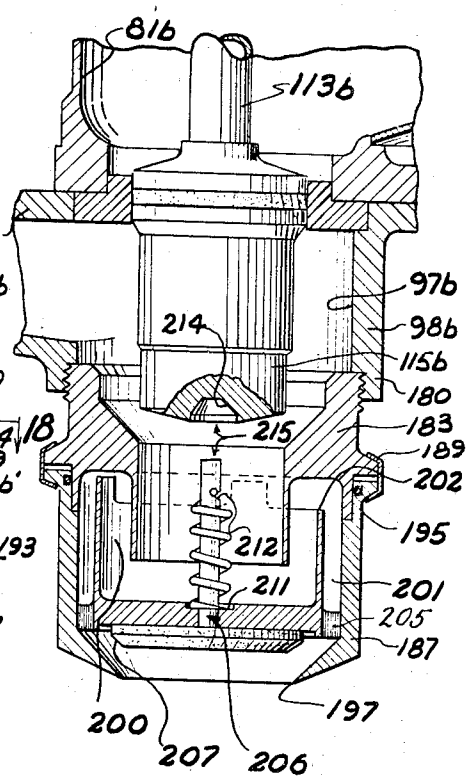


FIG. 16

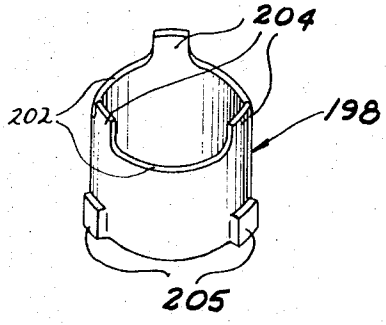


FIG. 17

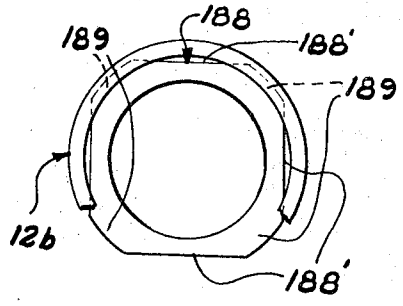


FIG. 18

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United States Patent Office

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Patented Oct. 31, 1967

3,349,973

RECEPTACLE FILLING MACHINES

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Original application Feb. 4, 1964, Ser. No. 342,427, now Patent No. 3,289,712. Divided and this application June 27, 1966, Ser. No. 560,583

2 Claims. (Cl. 222—380)

ABSTRACT OF THE DISCLOSURE

A receptacle filling machine having a passageway for holding a supply of fluid with seals and a trap valve assembly to control flow of the fluid from, and entrance of atmospheric air into the passageway in the absence of a substantial pressure operating on the fluid supply.

This is a division of copending patent application Serial No. 342,427, filed February 4, 1964 now United States Patent No. 3,289,712.

This invention relates in general to the art of receptacle filling machines.

It is another object of the invention to provide, in a receptacle filling machine, a piston-cylinder metering mechanism including sealing means having flap or lip portions which face one another, constructed and arranged to prevent air leakage into a passageway during the intake stroke of the piston and to prevent liquid leakage out of the passageway during the discharge stroke of the piston, the sealing means being lubricated by the liquid.

It is another feature of the invention to provide valve means for a receptacle filling machine for selectively opening and closing inlet and outlet ports, with valve means having a closure portion mounted for travel into and out of the inlet port and having a resilient seal effective to prevent liquid leakage to or from the reservoir when the outlet port is open, the seal having a flap portion constructed and arranged to enter and leave the inlet port easily and to obviate damage to the seal.

It is another object of the invention to provide a discharge device, for a receptacle filling machine having a valve port housing, which cooperates with a movable valve, with a toggle clamp constructed and arranged to urge the discharge device upwardly against, and into locked position relative to, the valve port housing.

It is another object of the invention to provide, in a receptacle filling machine, valve means for selectively opening and closing inlet and outlet ports with the valve means having a closure portion movable into and out of the inlet port, with a discharge trap effective to prevent flow out of a passageway connecting the inlet and outlet ports in a condition when the outlet port is open and the operation of the machine is interrupted, the closure portion having a resilient seal for preventing liquid leakage from a liquid supply source, through the inlet port into the passageway, through the outlet port, and through the discharge trap during such condition.

It is another object of the invention to provide a discharge trap for a receptacle filling machine which cooperates with a movable valve so that liquid leakage from a passageway leading to the discharge trap is obviated when the outlet or discharge port is open and the operation of the machine is interrupted.

It is another object of the invention to provide, in a receptacle filling machine, a piston-cylinder metering mechanism in which a piston is spaced from and guided for travel in an elongated cylinder by non-metallic wear rings, with the wear rings constructed and arranged to

gradually progress around the piston during its intake and discharge strokes, with the piston additionally having sealing means for preventing liquid leakage from and air leakage into a passageway which is in liquid communication with the cylinder.

It is another object of the invention to provide a valve, in a receptacle filling machine, for selectively opening and closing inlet and outlet ports, with a passageway connecting the inlet and outlet ports and a metering mechanism, with a discharge trap formed at least partly in the valve and constructed and arranged so that when the outlet port is open and the metering mechanism ceases to discharge liquid, leakage from the passageway is obviated.

It is another object of the invention to provide, in a receptacle filling machine having a vertically movable valve, a resilient closure portion operable by the valve to open and close a discharge port so that dripping is obviated when the discharge port is closed.

These objects and other features and advantages will become more apparent from the following description and reference to the accompanying drawings, in which:

FIGURE 1 is an elevational view, mainly in section, showing a fragmentary portion of a rotary filling machine in accordance with the invention;

FIGURE 2 is an enlarged elevational view, mainly in section, showing in detail a fragmentary portion of a piston and a wear ring and air and liquid seals which it carries, in association with a cylinder;

FIGURE 3 is an elevational view, mainly in section, showing in detail a valve with a discharge trap, and showing the valve in its lowered position;

FIGURE 4 is an elevational view, mainly in section, similar to FIGURE 3, showing the valve in its raised position;

FIGURE 5 is an enlarged fragmentary view showing a seal in extended position as when the valve is in the lowered position;

FIGURE 6 is a sectional view taken along line 6—6 of FIGURE 3;

FIGURE 7 is a sectional view taken along line 7—7 of FIGURE 3;

FIGURE 8 is a sectional view taken along line 8—8 of FIGURE 3;

FIGURE 9 is a fragmentary sectional view showing a portion of a piston provided with an alternative form of air and liquid seal, in association with a cylinder;

FIGURE 10 is an elevational view, mainly in section, showing an alternative form of discharge trap from that shown in FIGURES 1 and 3 through 8 of the drawings, with the valve shown in its lowered position;

FIGURE 11 is a view similar to FIGURE 10, but showing the valve in its raised position;

FIGURE 12 is a sectional view taken along line 12—12 of FIGURE 10;

FIGURE 13 is a sectional view taken along line 13—13 of FIGURE 10;

FIGURE 14 is a sectional view taken along line 14—14 of FIGURE 10;

FIGURE 15 is an elevational view, mainly in section, of a fragmentary portion of a filling machine like that illustrated in FIGURE 1, showing an alternative form of discharge trap, and showing a valve and a closure in their lowered positions;

FIGURE 16 is a view similar to FIGURE 15, but showing the valve and the closure in their raised positions;

FIGURE 17 is a perspective view showing a cup-shaped member of the discharge trap shown in FIGURES 15 and 16; and

FIGURE 18 is a sectional view taken along line 18—18 of FIGURE 15.

Referring now to the embodiment of FIGURES 1 through 8 of the drawings, there is shown a fragmentary

portion of a rotary filling machine generally indicated at **80**. This type of machine is disclosed in U. S. Patent No. 2,896,676 in FIGURES 1 through 20 and in the description relating to those figures, and also in U. S. Patent No. 3,097,672.

The filling machine **80** is shown to have a bowl or reservoir **81** shown to contain a liquid L'. The filling machine **80** includes a plurality of piston-cylinder metering mechanisms generally indicated at **82**, only one of which is shown. Each piston-cylinder metering mechanism includes a piston **83** mounted for travel in an elongated cylinder **84**. A clearance space **85** is shown to be provided between the piston **83** and the inside wall of the cylinder **84**. Spaced wear rings **86** and **87** are shown to be received in grooves **88** and **89** in the piston **83**. The wear rings **86** and **87** are spaced apart on the piston **83** as far as is practical. The wear rings **86** and **87**, each have adjacent ends **86'** and **86''**, and **87'** and **87''**, respectively, so that each of the wear rings **86** and **87** is considered to be split. The ends **86'** and **86''** are split at an angle sufficient to cause the wear ring **86** to progress, that is, move, around the piston **83** as the piston **83** moves during its intake and discharge strokes. The angle of the split is preferably, but not necessarily, 45°. The wear ring 87 also progresses around the piston **83** as the piston **83** moves, since the ends **87'** and **87''** are constructed like the ends **86'** and **86''** of the wear ring **86**.

Secured to the upper end of the piston **83** is a roller **90** which rides in a cam track generally indicated at **91**. The roller **90** is rotatably mounted on a stud-like screw **92** which is threadably secured to the piston **83**. The cylinder **84** is provided with an elongated slot **93** which is shown to extend in a vertical direction. As the reservoir **81**, the piston cylinder mechanisms **82**, and their associated components rotate, the stationary cam track **91** will actuate each piston alternately upwardly to define an intake stroke and downwardly to define a discharge stroke. The piston **83** is prevented from rotating by a guide in the form of a guide block **94** which slides in the elongated slot **93**. Since the wear rings **86** and **87** are split, since there is a clearance space 85 between the piston **83** and the inner wall of the cylinder **84**, and since the wear ring **86** travels to above the lower end of elongated slot **93**, air is free to circulate into and out of the clearance space **85**. Closely adjacent a liquid-engageable end **95** of the piston **83** there is provided sealing means generally indicated at **96** which serves to prevent air from leaking into a passageway **97**, defined by a valve port housing **98**, on the intake stroke of the piston **83** and to prevent liquid leakage from the passageway **97** during the discharge stroke of the piston **83**. The sealing means **97** is illustrated as including a pair of resilient U-cup seals **99** and **100** which are shown to face each other. The seals **99** and **100** which are shown to be retained in grooves **101** and **102**, respectively, formed in the piston **83**. The grooves **101** and **102** are shown to be partly formed by a common ridge **103** which is of lesser radial extent than the piston **83** so that a passage **103'** exists to provide liquid communication between the seals **99** and **100**. The U-cup seals **99** and **100**, which extend completely around the piston **83**, are provided with continuous flap or lip portions **104** and **105**, respectively. Initially, before receptacles are to be filled with a new product, the machine is operated so that each piston **83** can complete at least one discharge stroke. Upon the first discharge stroke of a particular piston **83**, the lip portion **105** will enable liquid to pass from the passageway **97** into the passage **103'** because during the discharge stroke the lip portion **105** is not primarily relied upon to perform a sealing function. The existence of liquid in the passage **103'** will assure that the external surfaces of the lip portions **104** and **105** will be wetted by the liquid which is being handled. After the completion of the first discharge stroke, the piston will move upwardly on its intake stroke so that the lip portion **105** will seal the passageway **97** against air leakage from within the clearance space **85**. During the intake stroke the lip portion **104** is not relied primarily upon to perform a sealing function.

When the machine **80** is to be operated at relatively low speeds and/or the material to be filled is of relatively low viscosity, the downwardly facing U-cup seal **104** alone is sufficient to seal the passageway **97** against air and liquid leakage.

As each of the pistons **83** move on their intake and discharge strokes, the inclined ends **86'** and **86''** and **87'** and **87''** of the wear rings **86** and **87**, respectively, will cause the wear rings **86** and **87** to progress around the piston so that wear is evenly distributed. The wear rings **86** and **87** are preferably composed of a non-metallic material such as polytetrafluoroethylene, commercially known under the trademark Teflon.

Valve means generally indicated at **110** is provided to selectively open and close a tubular inlet port **111** and a tubular outlet port **112**. The valve means **110** includes a vertically movable valve **113** having a closure portion **114** which is movable into and out of the inlet port **111**, and further includes a closure portion **115** movable into and out of the port **112**. The uppermost portion of the valve means **110** is provided with a rotatably mounted roller **116** by means of which the valve **113** is raised into a raised position and is further provided with a magnetically-responsive element **117** by which the valve **113** is capable of being held in its raised position and of being lowered to its lowered position as more fully described in the above-mentioned Patent No. 3,097,672, it is to be understood that the valve **113** is capable of being held in its raised position and lowered by other and different means from that shown in that patent, as for example by a cam track as disclosed in above-mentioned Patent No. 2,896,676.

As best shown in FIGURES 3 through 5, the closure portion **114** is provided with a continuous peripheral groove **118** in which there is a resilient U-cup seal generally indicated at **119**. The U-cup seal **119** is provided with a continuous flap or lip portion **120** which is at least slightly recessed at its upper end in the groove **118** as indicated at **121**. The lip portion **120** is shown to extend in a direction generally toward the outlet port **112**, and more specifically in a generally downward direction. When the closure portion **14** is positioned in the passageway **97** between the inlet port **111** and the outlet port **112** as seen in FIGURES 3 and 5, the lip portion **120** is shown to extend radially slightly beyond the periphery of the closure portion **114**. As the closure portion moves from the position shown in FIGURE 3 to the position shown in FIGURE 4, the lip portion **120** is flexed inwardly upon contact with the inner surface of the inlet port **111**. Due to the fact that the upper end of the lip portion **120** is recessed in the groove **118** as indicated in **121**, damage to the seal **119** is obviated. A lower surface of the groove **118** is shown to taper downwardly so that liquid trapped in the seal **119** is forced into the passageway **97**. The seal **119** is particularly advantageous when the reservoir **81** holds a liquid of low viscosity; if leakage were to occur between the inlet port **111** and the closure **114** when the outlet port **112** is open and when the piston **83** ceases to complete its discharge stroke, not only could liquid drain completely out of the passageway **97**, but the low viscosity liquid could also leak from the reservoir **81** through the passageway **97** and through the outlet port **112**.

A discharge device generally indicated at **124** is shown to take the form of a discharge nozzle **125** depending from the valve port housing **98**. The lower end of the valve port housing **98** is shown to be provided as an external flange **126**, while the upper end of the discharge nozzle **125** is shown to be provided with an external flange **127** which is shown to be in face-to-face relationship and spaced from the external flange **126**. The periphery of the external flange **126** has an outwardly and down-

wardly inclined cam surface **128**, while the external flange **127** has an outwardly and upwardly inclined cam surface **129**. A toggle clamp **12'**, identical to the toggle clamp **12** in patent application Ser. No. 342,427, filed February 4, 1964, now United States Patent No. 3,289,712, is shown to urge the upper terminal end **131** of the discharge nozzle **125** into abutment with an internal downwardly facing seat **132** of the valve port housing **98**. The internal seat **132** defines an opening **133** through which the valve **113** is capable of moving. A resilient O-ring seal **134** is shown to be received in a groove **135** in the upper end of the discharge nozzle **125** at a place closely adjacent to its terminal end **131**. The upper end of the discharge nozzle **125** is shown to be received in a vertical extending annular bore **136** which terminates at the seat **132**.

A part of the valve **113** is constructed and arranged to provide a discharge trap generally indicated at **140**. The discharge trap **140** is slideably received in the nozzle **125** and is movable from the lowered position shown in FIGURE 3 to the raised position shown in FIGURE 4. The closure portion **114** and the discharge trap **140** are connected by a stem **141** of relatively small diameter. The discharge trap **140** terminates at its lower end at the closure portion **115**. The discharge trap **140** is formed by various cut-outs in the valve **113** the component parts of which are considered to be: a vertical passage **142** which is in liquid communication with the liquid in the passageway **97**; the vertical passage **142** leads into a pair of horizontal passages **143** and **144** which in turn lead into a pair of vertically extending passages **145** and **146**, respectively; the passages **145** and **146** communicate with a vertically extending discharge passage **147**, defined in part by the nozzle **125**, by means of a pair of passages **148** and **149**, respectively. There is, of course, no discharge of liquid through the port **112** when the valve **113** is in the position shown in FIGURE 3. When the valve **113** is in the position shown in FIGURE 4 and assuming the piston **83** is in motion on its discharge stroke, liquid is discharged from the cylinder **84** by the piston **83** into the passageway **97**, through the discharge trap **140**, and through the outlet port **112**. The path of the liquid through the discharge trap is as follows: downwardly through the vertically extending passage **142** and across the passages **143** and **144** into the vertically extending passages **145** and **146**, and across the passages **148** and **149** into and through the discharge passage **147**.

Assuming that the valve **113** is in the position of FIGURE 4 of the drawings and that the piston **83** ceases its motion during its discharge stroke, the discharge trap **140** will prevent liquid from draining from the passageway **97**. Depending upon the viscosity of the liquid being handled, drainage of some or all of the liquid in the discharge passage **147** and the passages **148** and **149** may occur. Once that liquid has drained from passages **147**, **148** and **149**, further drainage is impossible since no air can enter the passages **145** and **146** to replace the liquid. The seal **119** prevents leakage from the reservoir **81** into the passageway **97** and through the discharge trap **140**, and through the outlet port **112**.

Assuming that at least some of the liquid has drained from the passages **147**, **148** and **149**, and assuming further that the piston again moves to complete its discharge stroke, any air will first be purged from the passages **147**, **148** and **149**, and depending upon the amount of unfinished discharge movement of the piston, liquid may be dispensed through the discharge port **112**. As the closure portion **115** enters the outlet port **112** to prevent any further flow of liquid through the trap **140**, an internal recess **150** begins to establish communication between the vertical passage **142** and the passages **148** and **149** so that any air which may be present in the discharge passages **147**, **148** and **149**, will be bypassed directly into the vertical passage **142**. Downwardly and inwardly inclined portion **151** which is immediately above

the closure portion **115** cooperates with internal surface **152** of the nozzle **125** to pump any air back into the passageway **97**. When the valve **113** is in its lowered position as shown in FIGURE 3, at least some of the air in the passageway **97** can find its way into the reservoir and to the surface of the liquid L'.

Referring now to FIGURE 9 of the drawings, there is shown sealing means generally indicated at **155**. The sealing means **155** differs from the sealing means **96**, in that, instead of employing a pair of U-cup seals, a resilient C-cup seal is provided. The sealing means **155** is shown to have a pair of continuous lip or flap portions **104'** and **105'** which face each other. The lip portion **104'** provides a liquid seal during the discharge stroke of a piston **83'**, while the lip portion **105'** provides an air seal on the intake stroke of the piston **83'**. The piston **83'** has only one groove **156** for receiving the sealing means **155**. In all respects the piston **83'** is identical in construction to the piston **83** and has spaced wear rings identical in construction to the wear rings **86** and **87**. A fragmentary portion of a wear ring **157**, which corresponds with wear ring **87**, is shown.

Referring now to the embodiment of FIGURES 10 through 14, components having the same general construction, function and relative location are indicated by the same reference characters as in the embodiment of FIGURES 1 through 8, with the addition of letter *a*. A discharge device **124***a* is shown to include a discharge nozzle **160** releasably locked to a valve port housing **97***a* by what is shown to be a toggle clamp **12***a'*. A valve port housing **98***a* is shown to have an outwardly extending continuous annular flange **161** terminating at an outwardly and downwardly extending cam surface **162**. The valve port housing **98***a* has a tubular portion **163** terminating at a downwardly facing abutment face **164** disposed below the flange **161**. The discharge nozzle **160** has an external annular flange **165** at its upper end, and the flange **165** terminates at its periphery at an outwardly and upwardly inclined cam surface **166**. The nozzle **160** also has an internal upwardly facing shoulder **167** which is brought into abutment with the abutment face **164** as the clamp **12***a'* is brought into locking position. A resilient seal **168** is shown to be positioned in an annular groove **169** in the discharge nozzle **160** at a place between the upper surface of the flange **165** and the shoulder **167**. The seal **168** could as well be provided in an annular groove (not shown) in the tubular portion **163** of the valve port housing **98***a*, if desired. A tubular member generally indicated at **170** is shown to define both an inlet port **171** and a portion of a discharge trap generally indicated at **140***a*. A valve generally indicated at **113***a* has a closure portion **114***a* for closing off the inlet port **171** and a closure portion **115***a* for closing off the outlet port **112***a*. The valve **113***a* is provided with a passage **172** which extends across the valve **113***a* and communicates with a vertically extending passage **173**. The tubular member **170** is provided with an opening **174** at its upper end, which provides communication between the passage **173** and a passage **175** when the valve **113***a* is in its raised position as shown in FIGURE 11; in that position the discharge passage **175** is in liquid communication with the port **112***a*. The passage **175** is defined partly by a portion of the valve port housing **98***a* and a portion of the discharge nozzle **160** and is further defined partly by a portion of the outer surface of the tubular member **170**. When the closure portion **115***a* begins closing off the outlet port **112***a*, communication is established, via the passage **174**, from the passage **175** and the passageway **97***a*. As the closure portion **114***a* has moved downwardly sufficiently to open the inlet port **171**, liquid and any air that may be in the passage **175** can pass through the passage **174**, through the inlet port **171** and into the reservoir **81***a*. Depending upon the viscosity of the liquid some of the air from the passage **175** may be drawn into the passageway **97***a* on the intake stroke of the piston.

Referring now to the embodiment of FIGURES 15

through 18, the same reference characters are employed to indicate components having the same general construction, function, and relative location as in the embodiment of FIGURES 1 through 8, with the addition of letter *b*.

The valve port housing **97***b* differs from the valve port housing **97** in that a depending flange portion **180** has internal threads **181**. A two-part discharge device generally indicated at **182** includes a depending tubular member **183** which defines both an outlet port **184** and a portion of a discharge trap generally indicated at **185**. The tubular member **183** has external threads **186** at its upper end. The discharge device **182** also includes a discharge nozzle **187** which is releasably locked by a toggle clamp **12***b*′ to the tubular member **183**. The lower end of the tubular member **183** is provided with an annular external flange **188** having a downwardly and outwardly extending cam surfaces **189**, while the upper end of the discharge nozzle **187** has an external flange **190** having an outwardly and upwardly inclined cam surface **191**. Flat surfaces **188**′ of the flange **188** are engageable by a wrench to permit the member **183** to be easily tightened or removed from the valve port housing **98***b*. A depending tubular portion **192** of the member **183** has an abutment surface **193** which is shown to be in abutment with an upwardly facing internal shoulder **194** of the nozzle **187**. A resilient seal **195** prevents liquid leakage between the member **183** and the nozzle **187**.

The lower end of the nozzle **187** has an inwardly and downwardly inclined annular internal surface **196** which terminates at a sharp annular discharge port **197**. A cup-shaped member **198** is shown to be spaced from and between the bottom at inner surface of the nozzle **187** and a depending tubular portion **199** of the member **183** to define a vertically extending passage **200** communicating with a vertically extending discharge passage **201** via passages **202** formed in the tubular member **198**. The cup-shaped member **198** has a horizontally extending lower wall **203** so that liquid must pass through the discharge port **184**, through the passage **200**, through the passages **202**, through the passage **201**, and through the discharge port **197**. The passages **202** exist between upwardly extending projections **204** which preferably terminate slightly short of the member **183**. The cup-shaped member **198** has a plurality of, and in particular three, radially outwardly extending projections **205** which center the cup-shaped member **198** within the nozzle and which enable the cup-shaped member **198** to be supported by the upper end of the inclined surface **196**. A closure gennerally indicated at **206**, including a flexible resilient closure portion **206**′, is provided for opening and closing off the discharge port **197**. The closure portion **206**′ has an upwardly and outwardly inclined surface **207** which is inclined at substantially the same angle as the inclined surface **196** and is adapted to form a seal upon contact with the inclined surface **196**. The closure portion **206**′ is preferably constructed of a flexible resilient material, such as rubber, compatible with the liquid to be dispensed, so that it will conform to minor irregularities of the surface **196** and will provide an effective seal against liquid drippage. A vertically extending stem **208** is joined to the closure portion **206**′, for example by securing perforate plate **209** to the lower end of the stem **208** and by molding the closure portion **206**′ to the lower end of the stem **208** and the plate **209**. The stem **208** is shown to be slideably received and guided by a central aperture **210** in the bottom wall **203** of the cup-shaped member **198**. The clearance between the stem **208** and the aperture **210** is only sufficient to permit the slid-movement of the stem **208**. The bottom wall **203** of the cup-shaped member **198** is provided with a recess **211** at the place of the aperture **210**. A hook-shaped recess **212** is provided near the upper end of the stem **208**. One end of a compression spring **213** is hooked into the hook-shaped recess **212** and the other end of the spring **213** nests in the recess **211**. The valve **213** has a central, downwardly opening cone-shaped recess **214** into which the upper end of the stem **208** is adapted to move. The valve **113***b* is capable of moving the closure **206** in a downward direction against the upward urging of the spring **213**. The valve **113***b* is connected to the closure **206** through a lost-motion connection indicated generally at **215**. When the valve **113***b* moves upwardly so that the stem **208** loses contact with the valve **113***b*, the spring **213** is able to urge the seal upwardly against the bottom wall **203** of the cup-shaped member **198**, thus completely opening the discharge port **197**. When the valve **113***b* is in the position shown in FIGURE 16, liquid is capable of passing through the passageway **97***b*, through the discharge trap **185**, and through the discharge port **197** assuming, of course, that the piston-cylinder metering mechanism (not shown in FIGURE 16) is moving on its discharge stroke; in this position, the closure portion **206**′ also provides an auxiliary seal against liquid leakage between the stem **208** and the aperture **210**. As closure portion **115***a* of the valve **113***a* begins to close off the outlet port **184**, the stem **208** begins to contact the valve **113***b* in the recess **214**. As the valve **113***b* continues to move in a downward direction, the valve **113***b* and the closure **206** will move together as a unit. When the valve **113***b* has moved downwardly to its lowermost position as indicated in FIGURE 15, the closure portion **206**′ has closed the discharge port **197**.

Other embodiments and modifications of this invention will suggest themselves to those skilled in the art, and all such of these as come within the spirit of this invention are included within its scope as best defined by the appended claims.

What is claimed is:

1. In a receptacle filling machine: an inlet port and an outlet port disposed below said inlet port, a passageway connecting said inlet and outlet ports, movable valve means for selectively opening and closing said inlet and outlet ports, means for metering liquid from said passageway when said inlet port is open and for discharging the metered liquid into said passageway and through said outlet port when said outlet port is open, and means provided in said valve means for preventing flow out of said passageway when said outlet port is open and said metering means ceases discharging liquid, said flow preventing means including at least one passage arranged for direct communication with said passageway at least one second passage connected to the one passage opposite the communication with the passageway, a third passage in liquid communication with the second passage, said third passage extending toward said passageway, a fourth passage connected to said third passage and extending from said third passage and a discharge passage in liquid communication with said fourth passage and extending in a direction away from said passageway.

2. In a receptacle filling machine: an inlet port and an outlet port, said inlet port leading from a source of liquid supply, a passageway connecting said inlet and outlet ports, valve means for selectively opening and closing said inlet and outlet ports, means for metering liquid from said passageway when said inlet port is open and for discharging the metered liquid into said passageway and through said outlet port when said outlet port is open, said valve means having a closure portion alternately movable from said passageway into said inlet port and from said inlet port into said passageway, a resilient seal carried by said closure portion for providing a liquid-tight seal across said inlet port, and a discharge trap leading from said passageway, said discharge trap including a first vertical passage in direct communication with said passageway, a lower horizontal passage connected to the first vertical passage at an end opposite the communication with the passageway, a second vertical passage in liquid communication with the lower horizontal passage and being extended toward the passageway, an upper horizontal passage connected to the end of the second vertical passage

opposite its connection to the lower horizontal passage and a discharge passage in liquid communication with the upper horizonatl passage and extending away from said passageway for the discharge of the liquid, said resilient seal preventing leakage of liquid from said source, through said inlet port, through said passageway and through said discharge trap even when the liquid is of low viscosity.

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