Jan. 7, 1964 R. M. MAGNUSON Re. 25,511

APPARATUS FOR SPRAYING AND/OR DISPENSING LIQUID

Original Filed Jan. 20, 1958 6 Sheets-Sheet 1

FIG. 1

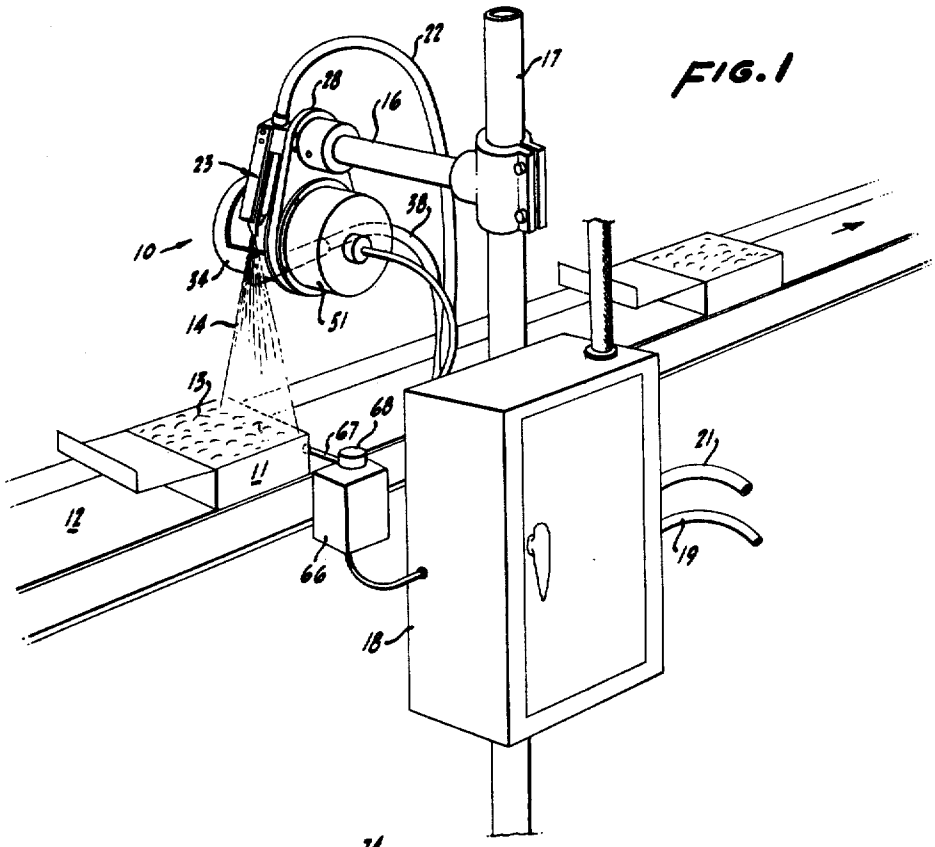
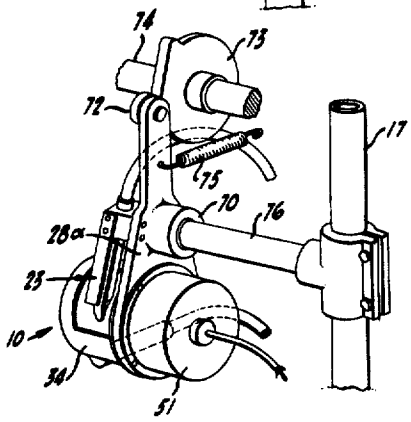


FIG. 6



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APPARATUS FOR SPRAYING AND/OR DISPENSING LIQUID

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FIG. 4

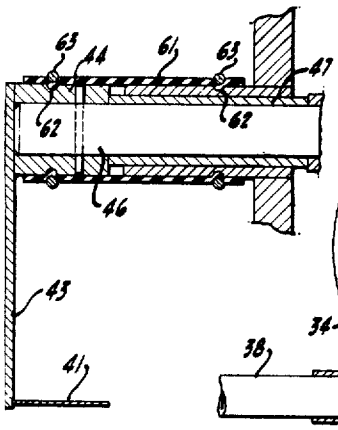
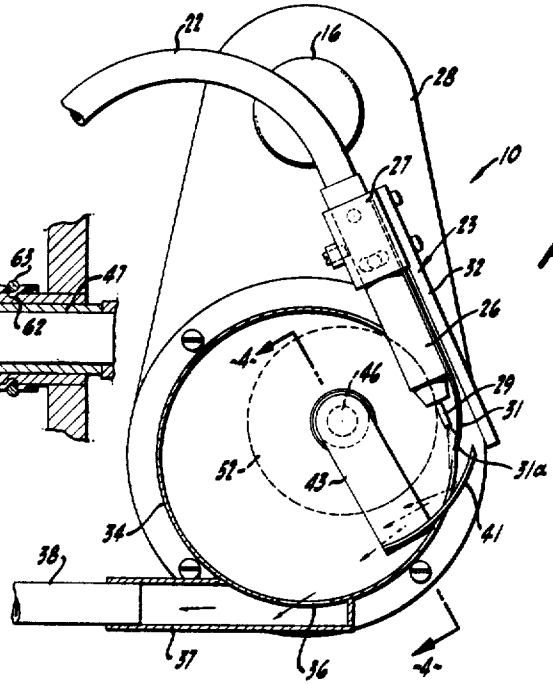


FIG. 3



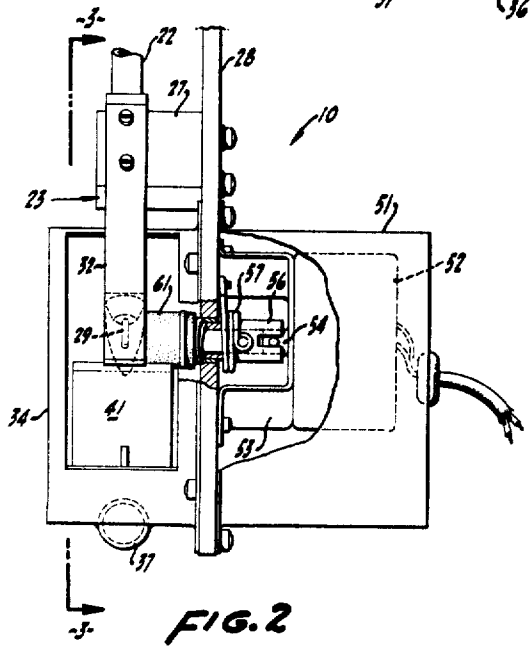
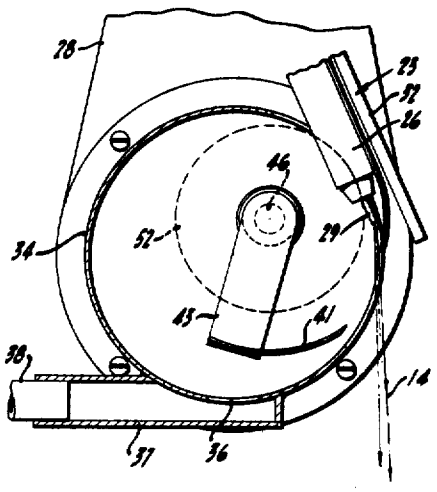


FIG. 2

FIG. 5



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APPARATUS FOR SPRAYING AND/OR DISPENSING LIQUID

Original Filed Jan. 20, 1958 6 Sheets-Sheet 3

FIG_7

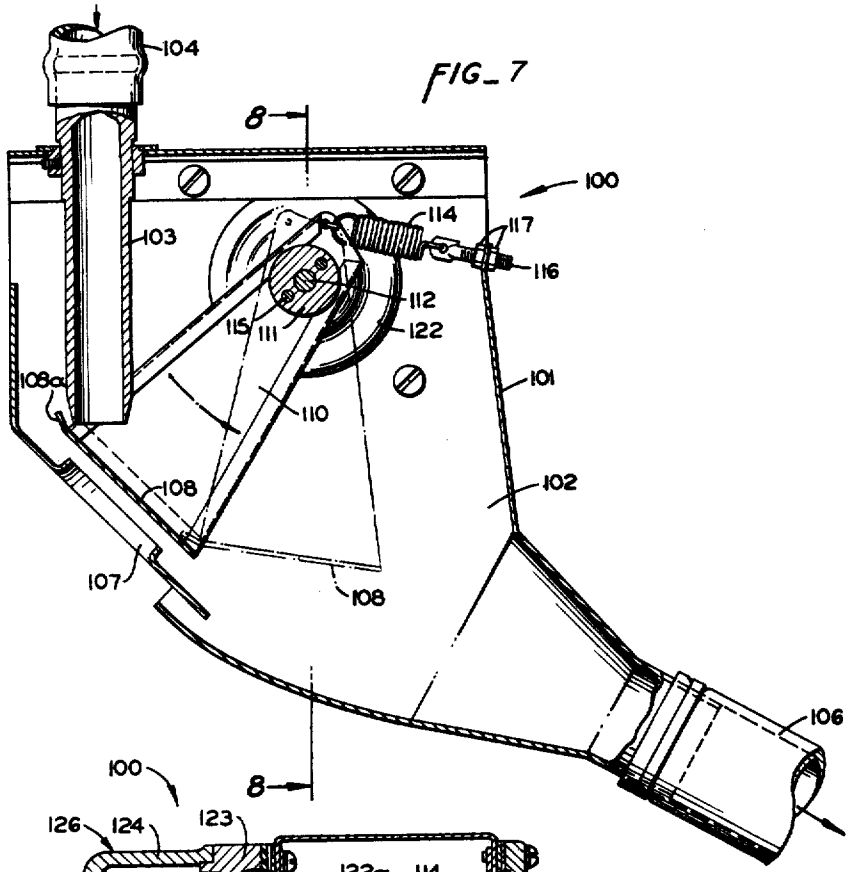
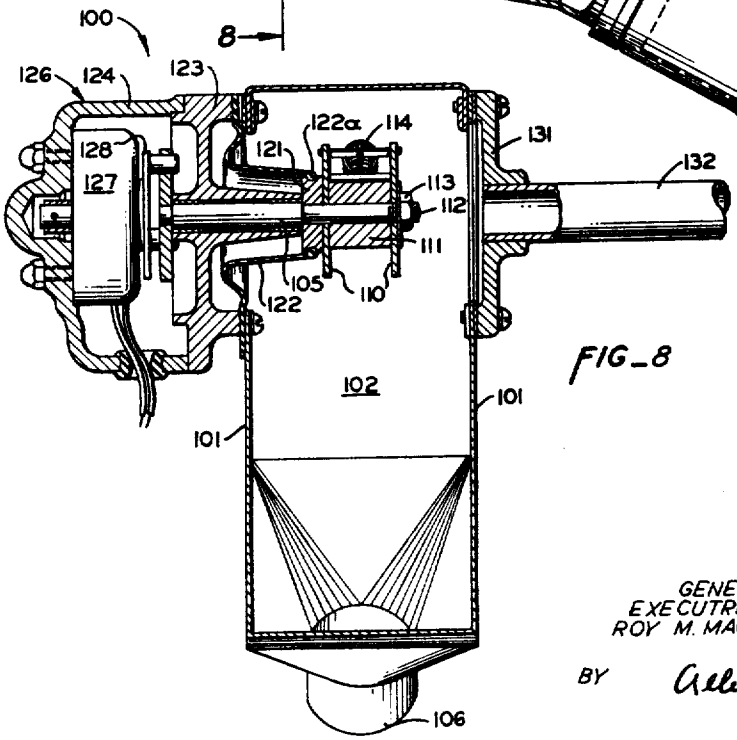


FIG_8



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Jan. 7, 1964 R. M. MAGNUSON Re. 25,511

APPARATUS FOR SPRAYING AND/OR DISPENSING LIQUID

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FIG_9

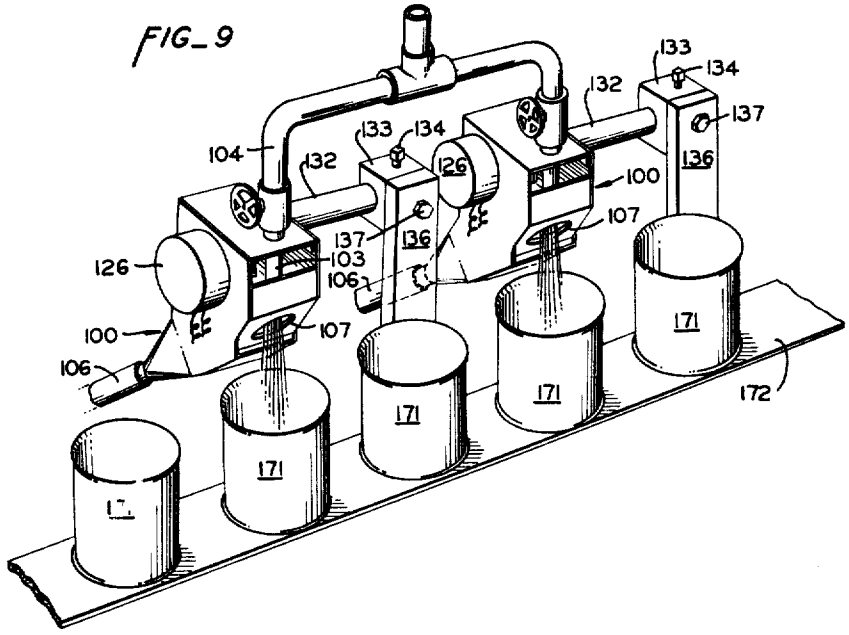
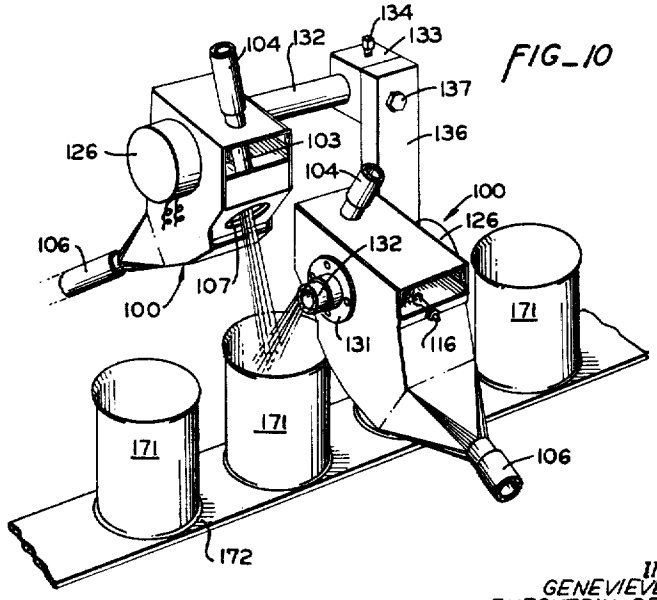


FIG_10



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APPARATUS FOR SPRAYING AND/OR DISPENSING LIQUID

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FIG_11

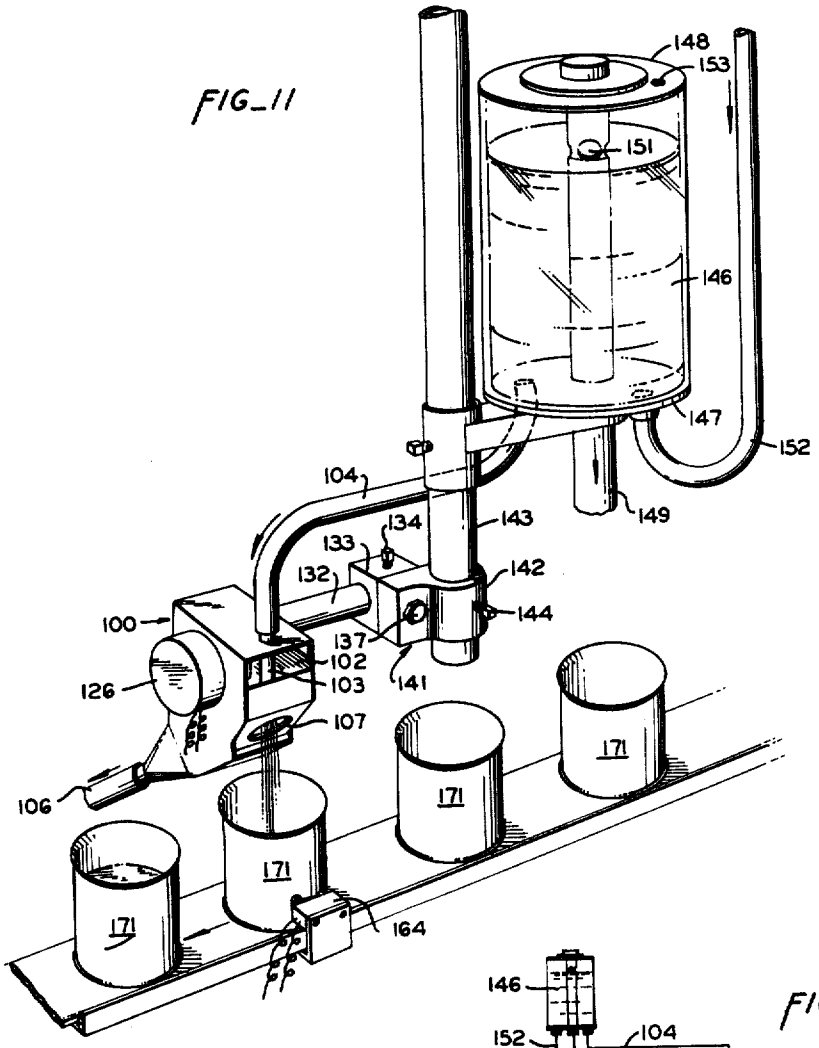
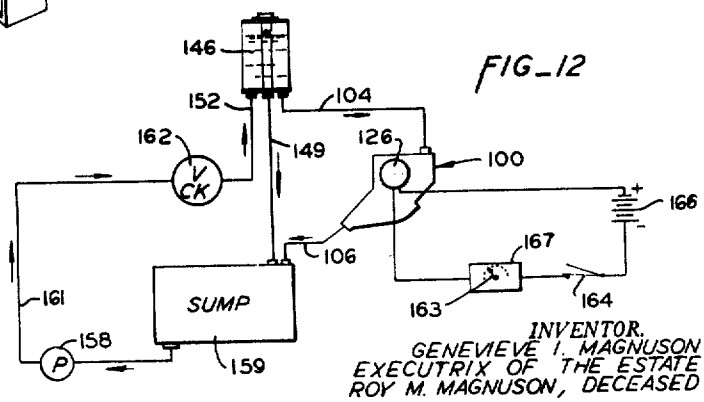


FIG_12



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Jan. 7, 1964 R. M. MAGNUSON Re. 25,511

APPARATUS FOR SPRAYING AND/OR DISPENSING LIQUID

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FIG_13

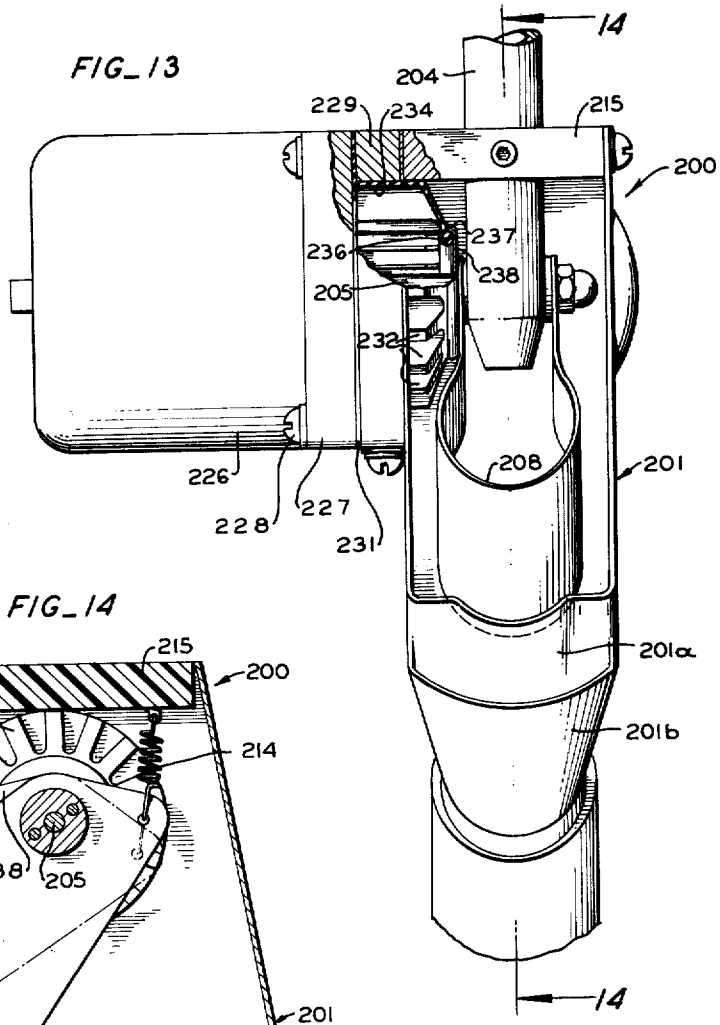
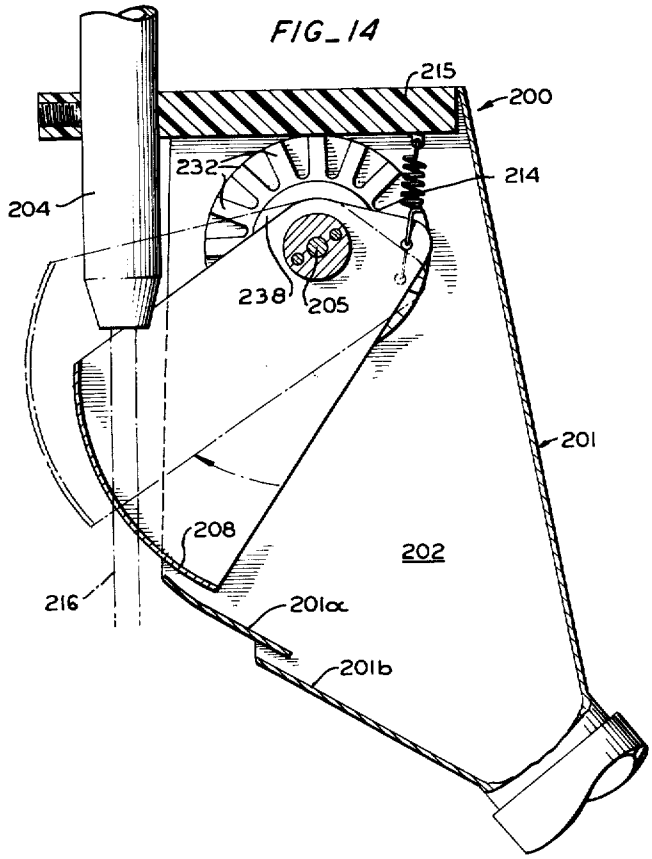


FIG_14



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United States Patent Office

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25,511

APPARATUS FOR SPRAYING AND/OR DISPENSING LIQUID

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Original No. 2,982,319, dated May 2, 1961, Ser. No. 710,083, Jan. 20, 1958. Application for reissue Mar. 29, 1963, Ser. No. 277,970

19 Claims. (Cl. 141—160)

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

This application is a continuation-in-part of the copending application of Roy M. Magnuson, Serial No. 374,173, filed August 14, 1953, and entitled "Method and Apparatus for Spraying Treating Liquid," now abandoned, and of the copending application of Roy M. Magnuson, Serial No. 594,651, filed June 28, 1956, and entitled "Method and Apparatus for Spraying and/or Dispensing Liquid," *now Patent No. 2,992,928, issued July 18, 1961.*

The present invention relates to the dispensing of measured amounts of liquid into a container wherein the liquid is either used for treating a product at a liquid dispensing station with a selected amount of liquid or is used to place a predetermined fill into a container such as a can. The invention is concerned more particularly with an improved apparatus of the above character which is automatic in operation and fast and reliable in use. It is an object of the invention to provide an improved apparatus for dispening measured quantities of liquid into a package or container.

It is another object of the invention to provide an improved apparatus for spraying a selected amount of treating liquid onto the product, by utilizing a constantly available spray of the liquid and by intermittently releasing the spray onto the product.

It is a further object of the invention to provide improved apparatus of the above character in which open packages of the products to be treated are carried by a spray station to receive the selected amount of treating liquid.

It is another object of the invention to provide apparatus of the character described in which the spray is desirably fan-shaped and the intermittent release is effected by substantially drip-proof cutoff mechanism.

Still another object of the invention is to provide apparatus of the above character by which a relatively minute amount of liquid can be dispensed with accuracy.

A further object of the invention is to provide an apparatus for carrying out a liquid filling operation in which the liquid is circulated as a stream having constant volume and velocity, this stream being passed through an air gap at one portion of its circulating path, and being released while in this air gap for discharge or spraying into a package or container for the desired amount of time to give an accurate fill.

The above and other objects and advantages of the invention will be apparent from the following description of certain preferred apparatus, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a schematic perspective view of one form of apparatus for carrying out the invention.

FIGURE 2 is an elevational view, partly in section, of the spray head of the apparatus.

FIGURE 3 is a transverse sectional view of the spray head of the apparatus taken in a plane indicated by the line **3—3** in FIGURE 2.

FIGURE 4 is a fragmentary sectional view through the cut-off plate and its mounting taken as indicated by the line **4—4** in FIGURE 3.

FIGURE 5 is a view similar to FIGURE 3, but showing the spray head in active spraying condition.

FIGURE 6 is a fragmentary perspective view of a modified form of the invention.

FIGURE 7 is a sectional view of a modified form of filling or dispensing head.

FIGURE 8 is a sectional view of the filling head shown in FIGURE 7, being taken in a plane indicated by the line **8—8** in FIGURE 7.

FIGURE 9 is a schematic perspective view illustrating one form of installation employing the filling or dispensing head disclosed herein.

FIGURE 10 is a schematic perspective view illustrating another type of installation.

FIGURE 11 illustrates a third method of installing the dispensing head.

FIGURE 12 is a schematic view illustrating one type of circulating system which can be employed in performing the invention.

FIGURE 13 is an elevational view of a further modified form of a dispensing or filling head.

FIGURE 14 is a sectional view partially in elevation and is taken in a plane indicated by the line **14—14** in FIGURE 13.

As previously stated, the present invention is concerned with a novel form of liquid measuring apparatus for dispensing purposes in which the liquid is circulated in a substantially closed path providing a stream of constant volume and constant velocity so that by discharging or diverting this stream for a selected period of time, a measurement of a desired amount of liquid can be made accurately. This type of dispensing operation is useful in filling measured amounts of liquids into containers as found, for example, in the canning industry, and is also equally useful in many fields of industry where it is desirable to treat a selected group of products with a liquid treating agent for various purposes. For example, in the food industry, it is desirable to treat certain food products with a flavor accentuating agent as monosodium glutamate, and it is highly desirable that exactly the right amount of liquid be delivered to a package of the product so as to treat the product uniformly without producing excess liquid in the package, and with a minimum loss of the liquid outside the package.

The present apparatus is concerned with this treatment of products; for example, in the food industry, and comprises generally a means for circulating liquid under pressure, incorporating a constantly operating spray which is normally by-passed back into the liquid supply. When a package is in position to receive the spray, the by-passing of the spray is interrupted, and a desired amount of liquid is sprayed into the package. The interruption of the by-passing of the liquid so that feeding of liquid occurs may be carried out in response to package control so that irregularly spaced packages may be carried past the spraying station, or it may be carried out in cyclic fashion with evenly spaced packages.

The preferred form of the invention, as illustrated in FIGURE 1 for example, is responsive to the presence of an open package into which a spray is dispensed and includes generally a spray head **10** past which a series of packages **11** are carried by a suitable conveyor **12**. The packages **11** are open to expose the product **13** to a divergent or fan-shaped spray **14**, which is of a desired width with respect to the width of the package, and the spray **14** is maintained for a period of time with relation to the speed of travel of the package to obtain substantially complete coverage of the product **13** within the package **11**. The spray head **10** for example, may be carried on an arm **16** secured on a suitable support post **17**. The support post **17** may also carry a suitable housing or cabinet **18** for certain conventional parts, including

a motor, a pump and various control elements of the system. A suitable suction line or conduit **19** may extend from the pump to a source of liquid not shown, and a suitable by-pass line **21** may extend from the pump to this source. Incorporated in the by-pass line **21** is a feed line **22** leading to a nozzle structure **23** from which the fan-shaped spray **14** is obtained.

The nozzle structure **23** (FIGURES 2 and 3) comprises a cylindrical body **26** which is secured by a mounting block **27** on a center support plate **28** of the spray head **10**, and a projecting tubular nozzle member **29** through which the liquid is ejected. A spray plate **31** is mounted on the block **27** in any convenient manner, with a backing member **32**, and has its lower end curved at **31a** to intercept the liquid stream from the nozzle **29** and to change its character to a fan-shaped spray which will extend transversely to the direction of travel of the package. The nozzle structure **23** is positioned in a cut-out portion or opening **33** of a cylindrical or cup-shaped housing **34** suitably secured to the side of the plate **28** and forming a liquid collecting chamber **35**. The chamber **35** has a bottom opening **36** through which liquid is drained through a tubular attachment **37** to a return line **38** communicating with the by-pass line or conduit **21** for return to the source of liquid.

Means are provided for normally directing the spray from the nozzle structure **23** into the chamber **35**, and this means takes the form of an interceptor or cut-off plate **41** having a knife edge **42** at its upper end. The interceptor plate **41** is of arcuate shape and is soldered or otherwise secured to the lower end of an actuating arm **43** having a hub **44** pinned to an actuating shaft **46**. The actuating shaft **46** is journaled in a bearing **47** secured in the support plate **28** and extends into a second cup-shaped housing member **51**, also secured on the plate **28** in opposed relation to the housing **34**. The housing **51** encloses an actuating solenoid **52** of a conventional rotary type carried by a mounting bracket **53**. The operating shaft **54** of the armature of the solenoid has a pin and slot connection with a collar **56** pinned to the actuating shaft **46**. A torsion spring **57** is connected between the collar **56** and the plate **28** to aid in fast return of the armature.

Within the housing member **34** a seal is provided about the actuating shaft **46** (FIGURE 4) and this seal is in the form of a rubber sleeve **61** engaging over the hub **44** and the bearing **47** for the shaft **46**. The hub **44** and the bearing **47** have respective annular grooves **62** into which the rubber sleeve **61** is compressed by suitable spring wire clips **63**. In this way the chamber within the housing **34** is sealed against leakage of fluid into the housing **51** containing the rotary solenoid **52**.

Operation of the rotary solenoid **52** is controlled by a suitable control switch mounted in a housing **66** attached to the frame of the conveyor **12**. A switch arm **67** is positioned to be moved by a package **11** and is pivotally mounted at **68** on the housing **66** so as to operate the switch therein and complete the circuit for the solenoid **52**.

Referring to FIGURE 6, a modified form of the invention is shown in which the spray head is mounted for oscillating movement so as to be able to follow the travel of a package therepast. In this modification, the structure is identical with that disclosed in connection with FIGURES 1 through 5 except where differences are described.

Referring to FIGURE 6, the spray head structure includes a center plate **28a** having a boss **70** journaled on the post **76**. The plate **28a** has upwardly projecting cam follower arm **71** carrying a roller **72** engaged with a cam **73** under the influence of a spring **75**. The cam **73** is carried by a shaft **74** which may be mounted in a suitable fashion and driven synchronously with the travel of packages along the conveyor **12** so as to oscillate the spray head to follow the package while the spray is being injected into the product, and then to allow immediate return of the spray head to the starting position for cooperation with the next succeeding package. The shaft **74** may be driven from a suitable clutch drive in time with the travel of the packages. If an irregular spacing of the packages will be obtained, the shaft **74** may be driven by a rotary solenoid similar to the solenoid **52** and operated simultaneously therewith by the switch arm **67**, as described in connection with the solenoid **52**.

In operation the packages of product, such as vegetables for example, are placed on the conveyor **12** and the pumping system for the nozzle structure is set in operation, so that the nozzle structure **23** is constantly delivering a spray which is interrupted by the deflector plate **41** and returned to the chamber **34** and through the conduits **37** and **38** to the source of supply. With the conveyor **12** in operation, a package **11** in spraying position operates the switch arm **67** (FIGURE 1) to close the circuit for the solenoid **52**. The solenoid **52** operates in a rapid fashion to move the deflector plate **41** from the position shown in FIGURE 3 to the open position shown in FIGURE 5 when the spray is delivered to the products **13**, as illustrated for example in FIGURE 1. When another shape of spray is desirable, the spray plate **31** is omitted. Also, the shape of nozzle **29** may be varied.

During the travel of the package past the spray, the desired amount of liquid for treatment of the product in the package is placed therein in a substantially uniform manner so that all of the product is treated, a suitable timing means being provided for controlling the rotary solenoid. The amount of liquid dispensed can be controlled accurately within relatively minute amounts of liquid, for example, from 0.5 milliliter to 5.0 milliliters. At the end of the spray interval, the deflector plate **41** is returned rapidly to its closed position, or deflecting position, as shown in FIGURE 3 and a sharp cut-off of the liquid spray is obtained.

It will be noted that any drip collecting on the outer surface of the deflector plate **41** will run down the outside surface of this deflector plate and into the housing **34**, and any liquid collecting on the inner surface of the deflector plate will run down the inner surface into the housing **34**, as shown in FIGURE 3, as the lower end of the deflector plate **41** is disposed inside of the housing **34**.

The operation of the form of the invention shown in FIGURE 6 is the same as that described in connection with FIGURES 1 through 5 except that the spray head is moved to travel with a package moving therepast.

As a specific example of the use of the above apparatus, an aqueous solution containing between about 5% and about 35% of dissolved monosodium glutamate, preferably containing about 15% of monosodium glutamate was used as the spraying liquid **14** in processing cut green beans in packages preparatory to quick freezing the product. The frozen product upon thawing and cooking in conventional manner possessed enhanced flavor characteristics as compared with the same product processed in the same way but which had not been treated with monosodium glutamate solution.

Other edible solutions, usually aqueous solutions, containing salt alone (15–35%), containing mixtures of salt (20%) and monosodium glutamate (15%) or containing any other or any further added dissolved substances conventionally added to foods such as fruits, seafood, meats, and vegetables may also be used as the liquid dispensed in the herein described novel apparatus. For example, the fluid dispensing device may be used for the addition of liquid sugar to those fruits to which sugar or sugar syrups are conventionally added preparatory to quick freezing the fruits.

Additionally, the novel dispensing device may be employed for adding these same types of liquids to vegetables and fruits which are being processed by canning techniques instead of by quick freezing techniques. In this instance, however, spray plate **31** having the lower end curved at **31a** is reshaped, or readjusted to avoid giving

a fan-shaped character to the spray. Instead the width of the ejected liquid stream is adjusted to give a stream no wider than the width or diameter of the container into which the stream is being ejected.

Referring to FIGURES 7, 8, 9 and 10, the modifications of the invention therein shown are adapted to the volumetric filling of containers, or the placing of a measured amount of liquid into containers as referred to above. Referring particularly to FIGURES 7 and 8, a dispensing head **100** is shown including a sheet metal housing **101** forming a chamber **102** into which liquid is introduced through a pipe or nozzle **103** from a conduit **104**, the liquid being discharged freely through the air at the mouth of the pipe **103** to impinge upon and be directed by an interceptor or cut-off plate **108** which directs the liquid to a return conduit **106** for the liquid, in the manner previously described. The housing **101** has an outlet opening **107** which is normally closed by the interceptor or cut-off plate **108**, which is similar to the plate **41** previously described.

The interceptor plate **108** is constructed as a part of a U-shaped sheet metal part including side portions **110** and which at their upper ends are secured at either side of a spacing sleeve **111** which, together with a washer **121**, are secured to the reduced end **112** of a shaft **105** by a nut **113**. Suitable pins **115** (FIGURE 7) connect sleeve **111** and the side portions **110** for rotation together. At its upper end the interceptor plate **108** has an inclined lip **108a** which leads in the direction of interception of the stream of liquid. A spring **114** tensioned between one of the side portions **110** and a threaded stud **116** adjustably secured in a wall of the housing **101** by lock nuts **117**. Also clamped in place with the sleeve **111** as described above is the spacer washer **121** which has a peripheral groove to receive the inner ring-like end **122a** of a rubber boot or seal **122** which has its outer peripheral edge clamped between the housing **101**, and a mounting casting **123** for a housing **124** for a conventional rotary solenoid **126** suitably mounted in the housing **124**. The solenoid **126** has its armature **127** connected to a disc **128** on the oscillating drive shaft **105**.

For mounting the dispensing head **100** and enabling angular adjustment thereof for directing the dispensed or sprayed liquid in a desired manner, the housing **101** has secured thereto a coupling flange **131** (FIGURE 8) in which an end of a pipe **132** may be secured by press fitting. As seen in FIGURES 9 and 10 the pipe **132** is received in an apertured block **133** in which it may be positively located in a desired angular adjustment by a set screw **134**, the block **133** being secured on a suitable mounting post **136** by a cap screw **137**.

Referring to FIGURE 11, the mounting for the dispensing head **100** and its associated pipe **132** and mounting block **133** is by means of a bracket **141** having a sleeve portion **142** adjustably secured on upright pipe **143** by means of a set screw **144**. The pipe **143** may be mounted in fixed position in any desired manner.

The liquid supplied through the conduit **104**, which in this instance is flexible, is provided by either a constant pressure pump or by a gravity head from a gravity source of supply. In FIGURE 11 the form of the gravity source of supply is of the type described in the co-pending application of J. B. Aldecoa, Serial No. 617,194, filed October 19, 1956, for "Filling Apparatus and Method." This gravity source of supply is in the form of a transparent container **146** having respective bottom and top plates **147** and **148**, to which are suitably secured a by-pass discharge pipe **149** having a series of apertures **151** at the desired level of the liquid. The inlet to the container **146** is through a flexible conduit **152** entering the bottom plate **147** through a suitable coupling. The top plate **148** is provided with a breather aperture **153**.

The operation of the apparatus in one form is illustrated schematically in FIGURE 12. The system includes a pump **158** having its inlet connected to a sump **159**. The outlet from the pump **158** is connected through a conduit **161** and a check valve **162** to the inlet conduit **152** for the gravity container **146**. A constant head gravity flow from the container **146** is provided as described through the conduit **104** to the dispensing head **100**. The by-pass discharge pipe **149** is suitably connected to the sump **159**, as is also the by-pass return pipe **106** from the head **100**.

To control the length of time the discharge gate or interceptor plate **108** is open, the rotary solenoid **126** is electrically connected to a source of potential **166** through a conventional electric timer **167** having an adjusting control **163** for setting the desired time value. A combination starting and no-can no-fill switch **164** (FIGURES 11 and 12) is incorporated in the circuit so that no fill will be made when there is no can present to receive the fill.

One or more of the dispensing heads **100** are provided to place the desired amount of liquid into containers **171** as they pass continually by the dispensing head **100**, for example, in FIGURE 9, two dispensing heads **100** are provided, for dispensing measured amounts into the cans **171** carried on a suitable conveyor **172**, the timing of the dispensing or filling action being such that separate charges are placed in each container from each of the dispensing heads.

Referring to FIGURE 10, an arrangement is shown where two dispensing heads **100** are placed on opposite sides of the conveyor **172** and discharged simultaneously into a can **171**. It will be noted that in FIGURE 10 the angularity of mounting of the heads **100** is different from the angularity necessary in FIGURE 9.

Referring to FIGURES 13 and 14, another form of the invention is shown for placing of a measured amount of liquid into a container as described in connection with FIGURES 7 and 8, for example. A dispensing head **200** (FIGURES 13 and 14) is shown including a sheet metal housing **201** providing a chamber **202** into which liquid is diverted or introduced by an interceptor gate or cut-off plate **208** from a pipe **204**. The housing **201** has an offset wall or plate **201a** which overlies an adjacent bottom portion **201b** for the direction of liquid in the circulating path. The interceptor or gate **208** is generally U-shaped as described in connection with the interceptor **108** and is actuated by a shaft **205** from a rotary solenoid **226**, being returned to the position shown in FIGURE 14 by a spring **214** tensioned between the interceptor **214** and an upper mounting plate **215** which also carries the housing **201** and the pipe **204**. The solenoid **226** is of the type disclosed in the co-pending application of Traver J. Smith and Ralph K. Daugherty, Serial No. 669,794, filed July 3, 1957.

The solenoid **226** has a base portion **227** secured by screws **228** to partition means **229** suitably secured to the side wall of the housing **201**. The partition means **228** and the adjacent wall of the housing **201** are apertured to receive a resilient shaft seal member of rubber or the like and having an outer flange **231** secured between the base **227** and the plate **229**. From this outer flange or sheet portion **231** there projects a circular array of radially directed hollow ribs **232** which extends outwardly from a circular portion or wall **234** provided with an annular rib **236** which is circular in cross section. This rib **236** seats within and is adhesively bonded to an annular rim **237** of a plate **238** secured to the interceptor gate **208** and to the shaft **205**. It will be seen that the spaced apart radial ribs **232** provide for a twisting flexing action of the rubber seal member with a minimum resistance to movement of the shaft **205** and a minimum distortion of the seal member itself.

The home position of the interceptor **208** is determined by a stop built into the rotary solenoid structure **226**, and is the full line position thereof shown in FIGURE 14. When the solenoid is energized the interceptor **208** is moved rapidly from its full line position to the dotted line position where the stream **216** from the pipe **204** is

free to descend into a container, the amount depending upon the length of time the interceptor **208** is in its open position. It will be noted that the action of the gate in moving from its open to its closed position tends to deflect any liquid spray caused by entering the stream **216** toward and into the housing **202** so as to reduce loss of liquid from the system.

While I have shown and described certain preferred apparatus embodying the invention, it will be apparent that the apparatus is capable of modification and variation from the form shown.

I claim:

1. In an apparatus for treating a product with a given amount of a liquid, a product support, a spray head adjacent said support including a nozzle structure having a liquid flow conducting duct providing wall means to completely enclose and conduct liquid under substantially constant super atmospheric pressure and speed to give a substantially constant rate of pressurized liquid flow within said duct, said nozzle structure having means at one end thereof for connecting said duct to a substantially constant super atmospheric pressure source of liquid and an outlet at the other end thereof directed toward said support for forming a free unconfined spray, a chamber for receiving said flow, means beyond said outlet for directing spray from the nozzle structure to the chamber, and means for shifting said directing means out of said spray whereby a spray is delivered from the spray head to products on said support.

2. In an apparatus for treating a product with a given amount of liquid, a product support, a spray head adjacent said support including a center support plate carrying a pair of housing members on opposite sides thereof, said spray head also including a nozzle structure carried by said plate and having an outlet directed toward said support to form a free unconfined spray beyond said outlet, one of said housings providing a chamber adjacent said nozzle structure and having an opening adjacent said nozzle structure, deflector means movably mounted in said one housing and normally disposed beyond said outlet in the path of the spray from said nozzle structure to deliver the spray into the chamber, and means for moving said deflector means out of the path of the spray comprising a rotary solenoid mounted in the other said housings and connected to said deflector means.

3. In an apparatus for treating a product with a given amount of liquid, a product support, a spray head adjacent said support including a center support plate carrying a pair of housing members on opposite sides thereof, said spray head also including a nozzle structure carried by said plate and directed toward said support, one of said housings providing a chamber adjacent said nozzle structure and having an opening adjacent said nozzle structure, deflector means in said one housing and normally disposed in the path of the spray from said nozzle structure to deliver the spray into the chamber, a shaft connected to said deflector means and extending through said plate into the other of said housings, a bearing in said plate for said shaft, means for moving said deflector means out of the path of the spray comprising a rotary solenoid mounted in the other said housings and connected to said shaft, and a flexible seal disposed about said shaft within said one housing.

4. In an apparatus for treating a product with a given amount of liquid, a product support, a spray head adjacent said support including a nozzle structure for forming a free unconfined spray directed toward said support, a chamber, means beyond the outlet of said nozzle structure for intercepting spray from the nozzle structure and delivering it to the chamber, comprising an arcuate spray intercepting plate pivotably mounted in said chamber and disposed to deliver the intercepted spray into said chamber, and means for moving said plate out of the path of the spray.

5. In an apparatus for treating a product with a given amount of liquid as recited in claim 4 in which the intercepting plate is provided with a knife-edge cut-off.

6. In an apparatus for dispensing a given amount of liquid into a container, means for providing a circulating liquid flow of substantially constant volume and traveling at a substantially constant speed at one portion of its path, including a dispensing head having a liquid flow conducting duct providing wall means to completely enclose and conduct liquid under substantially constant superatmospheric pressure and speed to give a substantially constant rate of pressurized liquid flow within said duct, said duct having means at one end thereof for connecting said duct to a substantially constant superatmospheric pressure source of liquid and a nozzle outlet at the other end thereof for forming a free unconfined stream of the liquid at said one path portion, interceptor means disposed beyond said nozzle outlet to intercept said stream and divert it to remain in its circulating path, and means for effecting relative movement between said interceptor means and said nozzle outlet to enable escape of the stream from the path for a selected time interval.

7. In an apparatus for dispensing selected amounts of liquid, a spray head including a housing and a nozzle structure for forming a free unconfined stream of liquid, said housing having an opening to permit escape of the liquid stream from said housing, deflector means movably mounted in said housing and normally disposed beyond the outlet of said nozzle structure in the path of the liquid stream from said nozzle structure to retain the liquid in the housing, and means for moving said deflector means out of the path of the liquid stream comprising a rotary solenoid carried by said spray head and connected to said deflector means.

8. In an apparatus for dispensing a given amount of liquid, a dispensing head including a nozzle structure having a liquid flow conducting duct providing wall means to completely enclose and conduct liquid under substantially constant superatmospheric pressure and speed to give a substantially constant rate of pressurized liquid flow within said duct, said nozzle structure having means at one end thereof for connecting said duct to a substantially constant superatmospheric pressure source of liquid and an outlet at the other end thereof for forming a free unconfined stream of liquid and also providing a chamber for receiving said flow and having an opening adjacent said nozzle structure, deflector means normally disposed beyond the outlet of said nozzle structure in the path of the liquid from said nozzle structure to deliver the liquid into the chamber, means for moving said deflector means out of the path of the liquid and away from said chamber, and means for subsequently returning said deflector means toward said chamber and into the path of the liquid to cause any stray drops caused by said return movement to be directed into said chamber.

9. In an apparatus for dispensing selected amounts of liquid, a dispensing head including a housing and a nozzle structure for forming a liquid stream, said housing having an opening to permit escape of the liquid stream from said housing, deflector means movably mounted on said head and normally disposed in the path of the liquid from said nozzle structure to retain the liquid in the housing, and means for moving said deflector means out of the path of the liquid stream comprising a rotary solenoid carried by said spray head and connected to said deflector means, partition means separating said rotary solenoid from said liquid in said housing and a resilient seal member connected to said partition means and to said deflector means, said seal member having a circular array of radially disposed ribs to provide for distortion of said seal member during operation of said solenoid.

10. In an apparatus for dispensing selected amounts of liquid, a dispensing head including a housing and a nozzle structure for forming a liquid stream, said housing

having an opening to permit escape of the liquid stream from said housing, deflector means movably mounted on said head and normally disposed in the path of the liquid from said nozzle structure to retain the liquid in the housing, and means for moving said deflector means out of the path of the liquid stream comprising a rotary solenoid carried by said spray head and connected to said deflector means, partition means separating said rotary solenoid from said liquid in said housing and a resilient seal member connected to said partition means at one side thereof and to said deflector means at the other side thereof, said seal member having a circular array of radially disposed hollow ribs between said sides to provide for distortion of said seal member during operation of said solenoid.

11. In an apparatus for dispensing selected amounts of liquid, a dispensing head including a housing and a nozzle structure, said housing having an opening to permit escape of the liquid stream from said housing, deflector means movably mounted on said head and normally disposed in the path of the liquid from said nozzle structure to retain the liquid in the housing, and means for moving said deflector means out of the path of the liquid stream comprising electrical operating means carried by said head and connected to said deflector means, partition means separating said operating means from said liquid in said housing and, a resilient seal member connected to said partition means and to said deflector means, said seal member having a circular array of radially disposed ribs to provide for distortion of said seal member without causing damaging flexing thereof.

12. In an apparatus for dispensing selected amounts of liquid, a pair of dispensing heads each including a housing and a nozzle structure, each housing having an opening in alignment with the discharge end of its associated nozzle structure and also having a liquid return outlet, deflector means movably mounted on each housing beyond the discharge end of its associated nozzle structure for movement between a first position to direct the liquid from said nozzle structure through said outlet and a second position permitting liquid flow from said nozzle structure through said opening, means providing a liquid flow in a circulating path including two portions, each portion including one of said nozzle structures and providing at said nozzle structure a free unconfined stream of substantially constant volume and traveling at a substantially constant speed, said nozzle structures being mounted in opposed direction to direct the respective streams therefrom to a point of impingement, and means for operating the deflector means of both said dispensing heads simultaneously.

13. In an apparatus for dispensing volumetrically a given amount of liquid into a container, means for providing a circulating liquid flow of substantially constant volume and traveling at substantially constant speed in one portion of its path, said flow providing means including a source providing liquid at a constant pressure, a conduit leading from said source, and a dispensing head to receive liquid from said conduit having a liquid flow conducting duct providing wall means to completely enclose and conduct liquid under substantially constant superatmospheric pressure and speed to give a substantially constant rate of pressurized liquid flow within said duct, the filling of said conduit with liquid from said source providing said flow of substantially constant volume traveling at a substantially constant speed, said dispensing head including a nozzle outlet at one end of said duct for forming a free unconfined stream of liquid at said one path portion and means at the other end of said duct for connecting said duct to said conduit, interceptor means disposed beyond said nozzle outlet to intercept said stream and divert it as a whole to remain in its circulating path, and means for effecting rapid relative movement between said interceptor means and said nozzle outlet to enable escape of the whole of said stream from the path to deliver volumetrically a measured amount to a container.

14. In an apparatus for dispensing a given amount of liquid into a container, means for providing a circulating liquid flow of substantially constant volume and traveling at a substantially constant speed at one portion of its path, including a dispensing head having a nozzle outlet for forming a free unconfined stream of the liquid at said one path portion, intercepting means normally disposed beyond said nozzle outlet to be active with respect to said stream to divert it to remain in its circulating path, means for rendering said intercepting means inactive, and thereby providing for escape of the stream from the path for a selected time interval, and container responsive electrical means for controlling the time interval during which said intercepting means is rendered inactive.

15. In an apparatus for dispensing a given amount of liquid into containers moving successively to and from a dispensing station, means for providing a circulating liquid flow of substantially constant volume and traveling at a substantially constant speed at one portion of its path, including a dispensing head positioned adjacent said dispensing station having a liquid flow conducting duct providing wall means to completely enclose and conduct liquid under substantially constant super-atmospheric pressure and speed to give a substantially constant rate of pressurized liquid flow within said duct, said duct having means at one end thereof for connecting said duct to a substantially constant super-atmospheric pressure source of liquid and a nozzle outlet at the other end thereof for forming a free unconfined stream of the liquid at said one path portion which may be directed toward a container at said dispensing station, interceptor means disposed beyond said nozzle outlet to intercept said stream and divert it to remain in its circulating path, and means for effecting relative movement between said interceptor means and said nozzle outlet to enable escape of the stream from the path for a selected time interval directly into a container at said dispensing station.

16. In an apparatus for dispensing a given amount of liquid into containers moving successively to and from a dispensing station, means for providing a circulating liquid flow of substantially constant volume and traveling at a substantially constant speed at one portion of its path, including a dispensing head positioned adjacent said dispensing station having a liquid flow conducting duct providing wall means to completely enclose and conduct liquid under substantially constant super-atmospheric pressure and speed to give a substantially constant rate of pressurized liquid flow within said duct, said duct having means at one end thereof for connecting said duct to a substantially constant super-atmospheric pressure source of liquid and a nozzle outlet at the other end thereof for forming a free unconfined stream of the liquid at said one path portion which may be directed toward a container at said dispensing station, interceptor means disposed beyond said nozzle outlet to intercept said stream and divert it to remain in its circulating path, means including a rotary solenoid responsive to the positioning of a container at said dispensing station for effecting rapid relative movement between said interceptor means and said nozzle outlet to enable escape of the stream from the path for a selected time interval directly into a container at said dispensing station.

17. In an apparatus for dispensing a given amount of liquid into containers moving successively to and from a dispensing station, means for providing a circulating liquid flow of substantially constant volume and traveling at a substantially constant speed at one portion of its path including a source providing liquid at a constant pressure, a conduit leading from said source, and a dispensing head positioned adjacent said dispensing station having a liquid flow conducting duct providing wall means to completely enclose and conduct liquid under substantially constant super-atmospheric pressure and speed to give a substan-

tially constant rate of pressurized liquid flow within said duct, said duct having means at one end of connection to said conduit and a nozzle outlet at the other end thereof for forming a free unconfined stream of the liquid at said one path portion which may be directed toward a container at said dispensing station, interceptor means disposed beyond said nozzle outlet to intercept said stream and divert it to remain in its circulating path, and means responsive to the positioning of a container at said dispensing station for effecting rapid relative movement between said interceptor means and said nozzle outlet to enable escape of the stream from the path for a selected time interval to deliver volumetrically a measured amount of liquid from said nozzle directly into a container positioned at said dispensing station.

18. In an apparatus for dispensing a given amount of liquid into containers moving successively to and from a dispensing station, means for providing a circulating liquid flow of substantially constant volume and traveling at a substantially constant speed at one portion of its path including a source providing liquid at a constant pressure, a conduit leading from said source, and a dispensing head positioned adjacent said dispensing station having a liquid flow conducting duct providing wall means to completely enclose and conduct liquid under substantially constant super-atmospheric pressure and speed to give a substantially constant rate of pressurized liquid flow within said duct, said duct having means at one end for connection to said conduit and a nozzle outlet at the other end thereof for forming a free unconfined stream of the liquid at said one path portion, interceptor means disposed beyond said nozzle outlet, said nozzle outlet and said interceptor means being relatively movable from one relative position in which said interceptor means intercepts said stream and diverts it to remain in its closed path to another relative position in which said interceptor means is ineffective to divert said stream and said free unconfined stream passes directly into a container positioned at said dispensing station, means tending to maintain said nozzle outlet and interceptor means in intercepting position, means for effecting rapid relative movement between said nozzle outlet and said interceptor means from intercepting to dispensing position and means for controlling the time interval during which said interceptor means is rendered ineffective.

19. In an apparatus for dispensing a given amount of liquid into containers moving successively to and from a dispensing station, means for providing a circulating liquid flow substantially constant volume and traveling at a substantially constant speed at one portion of its path including a source providing liquid at a constant pressure, a conduit leading from said source, and a dispensing head positioned adjacent said dispensing station having a liquid flow conducting duct providing wall means to completely enclose and conduct liquid under substantially constant super-atmospheric pressure and speed to give a substantially constant rate of pressurized liquid flow within said duct, said duct having means at one end for connection to said conduit and a nozzle outlet at the other end thereof for forming a free unconfined stream of the liquid at said one path portion, interceptor means disposed beyond said nozzle outlet, said nozzle outlet and said interceptor means being relatively movable from one relative position in which said interceptor means intercepts said stream and diverts it to remain in its closed path to another relative position in which said interceptor means is ineffectve to divert said stream and said free unconfined stream passes directly into a container positioned at said dispensing station, means tending to maintain said nozzle outlet and interceptor means in intercepting position and container responsive electrically actuated means for effecting rapid relative movement between said nozzle outlet and said interceptor means from intercepting to dispensing position and controlling the time interval during which said interceptor means is rendered ineffective.

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