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METHOD AND APPARATUS FOR FILLING CONTAINERS WITH BEVERAGES USING A PACKED LINE PRINCIPLE

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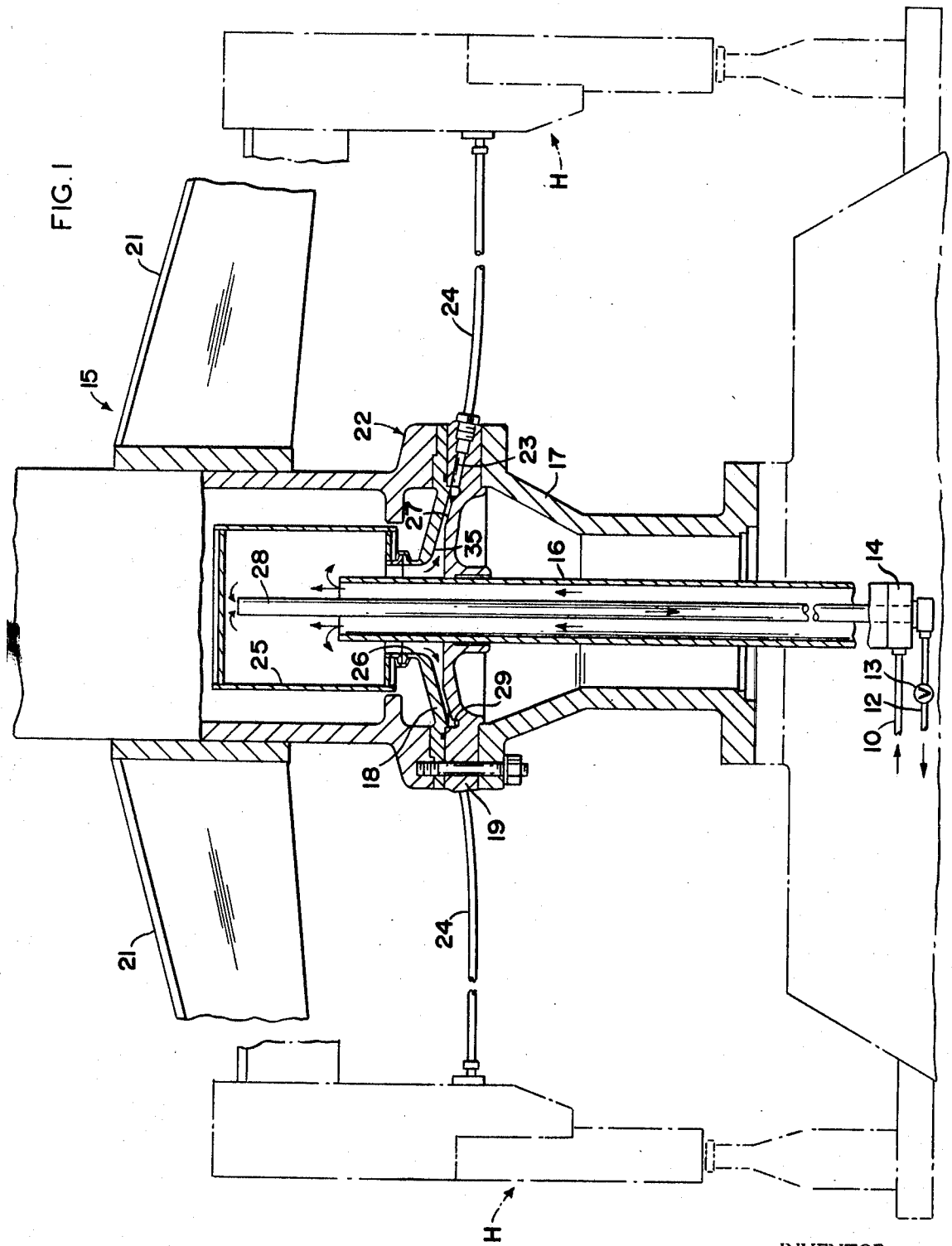
FIG. 1



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METHOD AND APPARATUS FOR FILLING CONTAINERS WITH BEVERAGES USING A PACKED LINE PRINCIPLE

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U.S. Cl. 141—6 9 Claims

ABSTRACT OF THE DISCLOSURE

The filling apparatus has a distributor head with a plurality of outlet members connected to individual filling heads and means supply a flow of beverage under pressure to the distributor head. A free gas disposal chamber is provided positioned above the distributor head and connected to the beverage supply means, and the distributor head preferably has the outlet members extending downwardly at an acute angle with relation to a vertical axis of the supply means. A return tube is positioned within the supply means and has an open inlet end adjacent the top of the free gas disposal chamber.

This invention relates to beverage filling apparatus, particularly to apparatus for filling a large number of containers rapidly and substantially automatically with a uniform content of a beverage, which usually contains carbon dioxide or is of a carbonated nature.

Hitherto, on machines for filling containers with beverage, particularly where same contains carbon dioxide or are of a carbonated nature, a head tank or product receiver has been mounted. Each filling valve is supplied with its beverage from such a tank. Frequently, the space above the liquid in the tank, which is normally maintained at a constant level, is filled with air, or even when filled with carbon dioxide gas, the returning displaced air from the containers, which are being filled with product, is passed into this space. It will, therefore, be seen that this system renders it possible under suitable pressure conditions for air to be absorbed by the product. This is detrimental, particularly when handling such beverages as beer or where some fermentable matter remains, or where there is any matter which can oxidize and may have a spoiling effect upon the product.

The purpose of this invention, which should be read in conjunction with a co-pending companionship application entitled "Apparatus for Filling Containers With Beverages," filed Oct. 22, 1965 under application Ser. No. 500,863, is to enable a container filling machine to be operated without this head tank or receiver. Each filling valve is supplied directly from the feeding conduit or pipe, which will at all times be full and packed with beverage under suitable pressure. This eliminates any possibility of the product contacting air, and thus avoiding any possibility of any absorption of air during the passage through the filling machine.

In practice, some difficulties were first experienced, due to the fast opening and closing of the filling valves etc., by hydraulic shocks, and liquid hammer, which seriously affected the smooth filling of the product concerned. By means now about to be described, these difficulties have been overcome.

The general object of the present invention is to avoid any instability of, or fluctuations in pressure in, the processed beverage in container filling apparatus wherein such pressure fluctuations may be caused by pump action, liquid hammer actions from rapidly opening or closing

valves in the apparatus, and/or by pressure variation due to change in rate of flow of the beverage, as well as for other pressure variations that may arise in the system.

Another object of the invention is to avoid any accumulation of gas pockets in carbonated liquids as they are being processed rapidly for container filling action.

Another object of the invention is to provide beverage container filling apparatus, particularly adapted for use with carbonated beverages, wherein the apparatus provides for continuously circulating a portion of the product to be fed into bottles from its source to and through the filling machine right up to the point of distribution to the individual filling systems and to return an appreciable controlled amount of the beverage continuously back to its source for recirculation in the system.

Attention now is directed to the accompanying drawings wherein a fragmentary, enlarged vertical section of a portion of a beverage distributing apparatus embodying the principles of the present invention is shown.

When referring to corresponding members shown in the drawings and referred to in the specification, corresponding numerals are used to facilitate comparison therebetween.

With reference to the details of the structures shown in the drawings, FIG. 1 represents a beverage dispensing and/or filling machine that can be used with any typical or conventional carbonated beverage processing apparatus. Thus a beverage is provided to an inlet line **10** from suitable means prepared for container filling action. Some beverage is to be returned for reprocessing by a return line **12**. The return line or tube **12** preferably has a control valve or means **13** provided therein whereby the rate of flow of beverage through the line **12** can be varied within desired limits. A beverage distributor and filling machine **15** is provided with beverage from the inlet line **11**. Any suitable rotary joints or couplings **14** connect the lines **11** and **12** to operative parts of the machine **15**.

The beverage supply means includes a vertically positioned, upwardly extending tube **16** which is received within the bore or hollow center of a suitable support **17** which positions and journals the filling machine **15** for container filling action. Only a portion of this distributor and filling apparatus **15** is shown as the remainder thereof is shown and described in detail in my previously identified co-pending patent application. In general, the filling apparatus includes a plurality of individual filling heads H that normally are secured to radially extending arms or circumferentially spaced parts of a support means **21** carried by the upper end of the support **17**. Any desired means (not shown) engage the support **17** and position it for controlled rotary movement. Thus, the individual filling section or heads of the filling apparatus are adapted to be associated with individual containers for filling them with beverage during a controlled arcuate movement of the upper portion of the filling apparatus or machine **15**. This also includes a distributor head or means indicated as a whole by the numeral **22** and which is made from an upper plate **18** and a lower plate **19**. The plate **19** has a plurality of individual outlet means, members, or bores **23** of which only one is shown, but which are provided at circumferentially spaced portions of the distributor head for connection to the individual filling heads provided in the filling apparatus of the invention, as by tubes or lines **24**. The distributor plates **18** and **19** are so designed and constructed that the upper plate **18** has a downwardly inclined inner surface **35** which is at an acute angle to the horizontal and it has an upwardly extending neck or tube **26**. The lower plate **19** is in suitable sealed engagement adjacent its periphery with the plate **18** and it has a section **27** substantially parallel to the surface **35** for restricting

flow of beverage between these plates, as described hereinafter in more detail.

The drawing shows that the supply means section or tube **16** extends upwardly of the machine to discharge the beverage supplied under pressure by the line **10** to a relatively small free gas disposal chamber **25** that is positioned adjacent but slightly above the distributor head **22**. It should also be noted that the individual outlet members or bores **23** preferably extend at a slight acute angle downwardly with relation to a horizontal plane normal to the tube **16**. Hence, beverage pumped into the distributor tube **16** flows up into the chamber **25** with some of such beverage continuously flowing down into and through the neck **26** and through the distributor and out the outlet members **23** for filling individual containers associated with the individual filling heads in the apparatus. By having these outlet members inclined slightly downwardly and by being below the chamber **25** as beverage flows into the distributor from the tube **16**, any gas bubbles present in the beverage being pumped through the tube **16** will tend to rise up in the free gas receiving chamber **25** rather than being carried along with the beverage into the individual outlet members provided.

In all events as a further feature of the invention, a portion of the beverage supplied to the chamber **25** is continuously withdrawn therefrom for recirculation in the cooling or other processing apparatus with which the machine **15** is used. This recirculation, from the top of the beverage flow path, of a controlled amount of the beverage being processed, such as up to about 10 percent of the beverage, is an important feature of the present invention and it is obtained by use of a return or exhaust tube **28** that is received within the bore of the tube **16** and normally is on the central axis thereof. Such return tube **28** preferably extends to a point adjacent the top of the chamber **25** and has an inlet end provided thereat. Hence, a controlled but appreciable portion of the beverage flowing upwardly through the tube **16** and normally the lighter component thereof including any undissolved gas bubbles in the beverage will tend to flow up into this free gas disposal chamber **25** and be exhausted or returned therefrom through the return tube **28**. This tube **28**, in turn, connects to the return line **12** and such beverage can be returned for chilling in the carbonator portion of the apparatus associated with the filling apparatus **15** of the invention. At the same time, any free air or gas carried by the returning beverage can be removed by suitable apparatus.

The distributor head **22** is made from the plates **18** and **19** that are suitably secured together in the assembled apparatus. The lower plate **19** has a distributing recess or groove **29** formed therein at the radially inner ends of the outlets or bores **23**. Such recess or groove **29** connects to the distributor neck **26** through the flow restrictor, or regulator formed between the parallel surfaces **35** and **27**. Any vertical section through the restrictor means area in the distributor head or means **22** equals, or substantially equals, the total cross-sectional area of the outlets **23** for a smooth flow of beverage through the distributor to the individual filling heads in the machine.

By the vertical upward input of the beverage being processed into the free gas disposal chamber **25** near the lower portion thereof, any entrapped air or gas bubbles flow upwardly in this small chamber. As another factor in the improved flow pattern of beverage being processed, the beverage received in the chamber **25** then flows downwardly therefrom through the relatively large diameter neck **26** formed in association with the distributor head or means **22**. Also, this downward flow path continues as the beverage moves into and through the regulator or flow restrictor means formed between the surfaces **35** and **27** to the distributor channel or groove **29**. The beverage then continues to flow in a downward direction through the individual outlets **23** and the conventional fittings and other members attached thereto to distribute the beverage to the individual filling heads H. By this distribution of the beverage by a downwardly directed flow pattern, the free gas receiving chamber **25** collects any gas bubbles or free air therein and such gases will be withdrawn from the chamber **25** through the outlet tube **28** with beverage flow therethrough.

As indicated before, it is possible to control the temperature of the recirculated beverage so that all beverage is at a desired temperature for container filling action before being supplied to the filling apparatus for container filling action. Such action, of course, is obtained by rechilling, or cooling, the beverage in any suitable heat exchanger that may be associated with the machine **15**.

The distributor outlets **23** are inclined downwardly at, for example, about a 10° angle and conventional fittings connect the tubes thereto.

From the foregoing, it is believed that the objects of the present invention have been achieved and that novel and worthwhile improvements have been provided in beverage container filling apparatus and methods.

What is claimed is:

1. An apparatus for filling containers with carbonated beverages and including a distributor chamber with a plurality of outlet means individually connected thereto for individual filling heads,

a free gas disposal chamber positioned above and in flow communication with the distributor chamber,

means supplying a flow of beverage under pressure to said gas disposal chamber, the supply means being on a vertical axis and having an upward flow of beverage therein to such free gas disposal chamber,

means connecting said free gas disposal chamber to said distributor chamber for vertical downward flow of beverage thereto and for the upward passage of any free gas,

means communicating with the upper portion of said gas disposal chamber to bleed off any excess free gas therein, and

downwardly converging conical flow restriction means in said distributor chamber to communicate said free gas disposal chamber with said outlet means.

2. Apparatus as in claim **1** where said flow restriction means are in said distributor means in the flow path of beverage therethrough and are of substantially the same cross-sectional area as the total area of said outlet means.

3. Apparatus as in claim **1** where

said individual outlet means extend outwardly and downwardly at an acute angle to a horizontal plane and connect in straight line relation to said flow restriction means.

4. In an apparatus for filling containers with carbonated beverages and including a distributor means with a plurality of outlet means adapted to be individually connected to individual filling heads, the improvement comprising

first supply means on a vertical axis and having an upward flow of beverage therein connected to a first chamber,

said first chamber being positioned above the distributor head to receive said flow of beverage,

second means for supplying a flow of beverage vertically downwardly under pressure from said first chamber to said distributor means and allowing for the upward flow of free gas from said distributor means to said first chamber,

means communicating with the upper portion of said first chamber to bleed off any excess free gas therein, and

said distributor means forming a second chamber therein having an upper surface extending downwardly and outwardly to provide gas bubble flow back up to said first chamber.

5. Apparatus as in claim **4** wherein said free gas bleed

off means comprising a return tube is positioned within said first supply means and has an inlet end positioned adjacent the top of said first chamber,

a portion of the beverage flowing through said first supply means is continuously withdrawn by said return tube, and

a control means is present in said return tube to regulate flow of the beverage therethrough.

6. In an apparatus for filling containers with beverages and including a distributor means with a plurality of circumferentially spaced outlet means adapted to be individually connected to individual filling heads, and beverage supply means on a vertical axis and having an upward flow of beverage therein, the improvement comprising

a first chamber positioned above the distributor means and connected to the supply means,

said distributor means comprising upper and lower members secured together at peripheral portions thereof and having inner walls opposed and defining a second chamber, said upper member having an upwardly extending neck connecting to the bottom of said first chamber for downward flow of the beverage from said first chamber to said distributor means and for upward flow of any free gas contained in said beverage from said distributor means to said first chamber,

means communicating with the upper portion of said first chamber to bleed off any excess free gas therein,

said upper member having an inner wall surface downwardly inclined at an acute angle, and

said outlet means extending in a radical direction in relation to said neck and being formed in said lower member.

7. Apparatus as in claim **6** where said distributor means including an enlarged annular distribution section positioned adjacent the radially inner ends of said outlet means.

8. A beverage container filling method for carbonated beverage which has been processed and is supplied under controlled temperature and pressure conditions, the improvement comprising the steps of

flowing all of the beverage vertically upwardly in a flow path to a storage area,

collecting a volume of the beverage at the upper portion in its flow path at the storage area while leaving a free gas disposal zone above said collected volume of beverage,

withdrawing a portion of the beverage from the volume thereof at the storage area for downward flow of all of such withdrawn beverage to a second area for distribution to individual container filling means whereby any free gas will travel upwardly to said gas disposal zone, and

continuously withdrawing a second quantity of fluid comprising beverage and free gas from adjacent the top of said volume of beverage at said first storage area for further processing.

9. A method as in claim **8** including

flowing the first beverage portion withdrawn vertically downwardly in relation to said volume of said beverage at said first storage area, and providing a downwardly inclined beverage discharge flow path in relation to a horizontal plane in said second area.

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