March 24, 1936. J. D. LEAR 2,035,391

CARBONATED BEVERAGE DISPENSER

Filed April 27, 1933

Fig. 1.

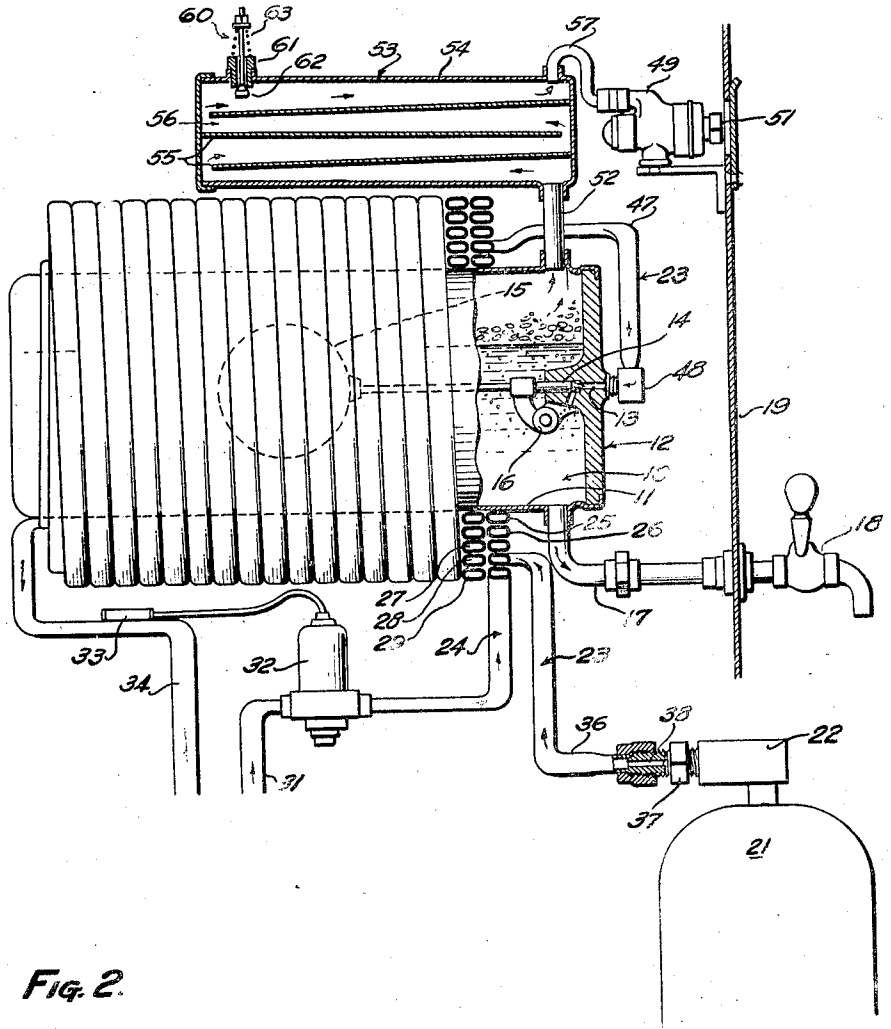
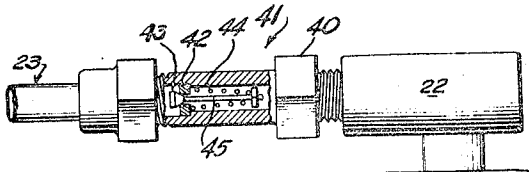


Fig. 2.



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CARBONATED BEVERAGE DISPENSER

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5 Claims. (Cl. 225—1)

This invention relates to beverage dispensing apparatus, and it has particular reference to the refrigerating and pressure control of carbonated beverages.

The invention is particularly adapted for use with carbonated beverages, such as root beer or ginger ale, which, due chiefly to their sugar content, have a bubbling or foaming characteristic during pressure reduction, and it is specifically devised to protect a pressure controlling device included therein from the entry and eventual escape of liquid bearing bubbles during certain operating conditions. The apparatus also includes a device for automatically restoring the entire system to normal operation subsequent to the forming of a vacuum block therein as occasioned by pressure leakage through a faulty valve or the like.

Other features and advantages of the present invention are more specifically described in the accompanying specification and drawing, wherein;

Fig. 1 is a side elevation of a dispensing apparatus with portions shown in section to illustrate a tank and coil arrangement.

Fig. 2 is a side elevation of a second embodiment of the flow control device, portions of which are shown in section.

In accordance with the present invention a settling tank or reservoir 10 forms a base for the device, and it is provided with a cylindrical body 11 and a head 12 for sealing the open end thereof. The reservoir is supplied with cooled beverage through an orifice 13 formed in the head 12, and liquid passage through the orifice is controlled by a float operated needle valve 14, the float 15 therefor being pivoted on the head 12 as indicated by the numeral 16 and being adapted to actuate the needle valve 14 to close the orifice 13, when the liquid in the reservoir has attained a predetermined level. Liquid beverage is withdrawn from the reservoir 10 from a draft arm or a pipe 17 terminating in a dispensing faucet 18, which may be mounted on a panel 19 forming part of a cabinet, bar, or other suitable dispensing device.

Liquid is supplied to the reservoir 10 from a supply device 21 which is herein shown as the usual commercial pressure tank having an outlet fitting 22 and in which liquid is maintained at a relatively high pressure. Communication is established between the supply means 21 and the reservoir 10 through an elongated conduit 23 which in effect forms a second reservoir which is brought into intimate contact with a cooling unit of a refrigeration system for practically its entire length. The cooling unit comprises a tube 24 wound upon the body 11 to form a coil layer 25. This forms a base upon which the beverage tube 23 is wound to form a second layer 26 which is then covered by a third layer 27 comprising a return winding of the refrigerant tube 24, and the assembly is completed by a subsequent beverage tube layer 28 and a covering refrigerant tube layer 29. It will be observed that both the beverage and refrigerant tubes are flattened in cross section and that the flattened portions thereof are wound in intimate thermal contact resulting in the sandwiching of the beverage tube layers between the several layers of refrigerant tubing.

The input end 31 of the refrigerant tube 24 is connected to a mechanical refrigeration apparatus (not shown) serving as a source of supply of liquid refrigerant, and a valve device 32, such as a thermostatic expansion valve, controls the entry of liquid refrigerant to the cooling device in the manner well-known in the art wherein a bulb 33, secured to the refrigerant output end 34 of the tube, contains a temperature responsive fluid which controls the operation of the valve 32 in response to the temperature of such portion of the cooling device.

The input end of the beverage tube 23 is connected to the fitting 22 of the supply tank 21 and a flow control device 37 is interposed therebetween, which is herein shown as a union formed with a restricted orifice 38 which controls the volume of fluid entering the tube 23. The flow control device shown in Fig. 1 may be substituted by a reducing valve device 41, (shown in Fig. 2), which may comprise a fitting 40 having a valve seat 42 and an inwardly opening valve 43 engaging thereon. A spring 44 is engaged between the valve seat and the stem 45 of the valve to retain it on its seat so that a predetermined pressure differential is required to open the valve.

The output extremity 47 of the beverage tube 23 communicates with the orifice 13, and it is secured to the head 12 by means of a fitting 48, and thus the beverage which is cooled in transit through the tube 23 by the refrigerant tube 24 is subsequently permitted to enter the reservoir 10. It will be noted that the first layer 25 of the refrigerant tubing is in intimate engagement with the outer surface of the cylindrical body 11 of the reservoir and thus retains the liquid within the reservoir at a predetermined temperature.

It is usually desired to dispense beverage such as ginger ale at pressures not exceeding six pounds per square inch, and, inasmuch as the pressure maintained in the supply tank 21 is usually over one hundred pounds per square inch, it is necessary to vent excess gas volumes from the reservoir to maintain the predetermined lower pressure therein. Accordingly, a pressure relief valve 49 of any known type may be provided, and it communicates with the reservoir 10 in a manner hereinafter described and is adjustable by means of a nut 51 so that variations in pressure adjustment are possible. The connections between the reservoir 10 and the valve 49 comprise a pipe 52 connecting the top of the body 11 to a baffle device 53, which comprises a tank 54 arranged in horizontal position over the cooling device and formed with a plurality of plates 55 arranged substantially horizontally therein and forming a labyrinth passage 56 leading to a pipe 57 which communicates with the valve 49.

In operation it is proposed to control the rate of delivery of the high pressure beverage into the refrigerant tube 23 by means of the restricted orifice 38 or the valve device 41 so that, if the system is entirely dry upon such occasion, the beverage entering the tube 23 will experience an immediate pressure reduction. This will be accompanied by a violent bubbling action, and, as a result of the provision of the restricted input device, the time interval required to fill the tube and to establish communication with the reservoir 10 permits a partial reducing action on the bubbles within the tube 23. Upon entering the reservoir 10 through the orifice 13, the bubble ladened liquid accumulates therein and eventually the pressure therein rises above the predetermined six pounds and the pressure relief valve 49 immediately responds to vent the excess gas volumes.

During the venting of gas volumes under the above described starting conditions, there is a general tendency for the bubbles or foam, which at this stage occupy the entire upper level of the reservoir 10, to escape with the gas in the direction of the valve 49. The baffle tank 53 which is interposed between the reservoir 10 and the valve 49, is provided to receive the excess bubbles or foam from the reservoir 10 for impingement on the various surfaces of the baffle plates 55 thereof, whereupon the bubbles are further exposed to reduction, and, upon proper proportioning of the tank 54, it will be found that with the usual line of beverages a complete condensation thereof will occur therein, and the valve 49 will be protected from liquid entry.

The above described condition is the most severe operating condition of the device, since to fill the reservoir 10 with a liquid to the level indicated, requires the venting of great volumes of gas with the accompanying bubbling formation described. Upon filling the tank to the point indicated, the float 15 is buoyed sufficiently to close the valve 14 and thus to cut off the supply means. The device is then ready for normal operation, and it has been found that the intermittent withdrawing operation of liquid through the dispensing faucet 18 does not cause the violent ebullient action as described for the starting operation, since comparatively small volumes are required to raise the float to its closing position, and the gas volumes escaping from the liquid under this condition cause a bubbling action which is usually localized within the reservoir 10.

It will be apparent that the device above described would be rendered inoperaive if a slow gas leak occurred, since the liquid level and the float would not be affected thereby, and, therefore, a replenishing of the gas envelope would not be possible. The most usual occurrences of this nature are caused by faulty solder connections or an improper closing of the dispensing valve 18 in a position wherein gas escape is permitted without a substantial equivalent liquid escape. It will be obvious that after a long shutdown under these conditions, the gas envelope above the liquid body in the reservoir 10 would be reduced to atmospheric pressure, and upon the first subsequent dispensing operation, such gas envelope would be reduced to less than atmospheric pressure to cause a vacuum condition to be set up in the entire reservoir system resulting in a pressure block on the dispensing valve 18, and the prevention of liquid escape therethrough. It is, therefore, necessary to provide means for permitting gas entry into the system to relieve this condition, and a valve device 60 is provided for this purpose.

The valve device 60 comprises a seat member 61 secured to the top of the baffle tank 54 and having an inwardly opening valve 62 backed by a light spring 63. The valve 62, in the presence of normal pressures in the tank 53, will be retained in seated position; however, in the presence of subatmospheric pressures, the valve will open and permit air entry into the system, whereupon liquid withdrawal through the dispensing valve 18 will immediately become possible. This will be accompanied by the dropping of the float 15, the opening of the needle valve 14, and a resumption of high pressure beverage supply to the reservoir 10 to reestablish the predetermined pressure therein for normal operation.

In summarizing, it will be noted that the bubble or foam reduction is provided for prior to the entry of the beverage into the reservoir 10 by means of the flow control device 37, wherein a reduction of pressure occurs in the tube 23, and it is accompanied by the release of gas volumes and the subsequent formation and breakage of bubble and foam formations. It will also be appreciated that this arrangement is only partially effective in such reduction function and that a supplementary reducing means, the baffle tank 54, is provided in anticipation of a starting condition where a steady flow is directed to the reservoir 10 accompanied by a secondary bubble formation in the presence of the reduced pressures therein. It will thus be apparent that the precise structure herein may be varied to a considerable degree and yet maintain the functions above described, and therefore it is intended that various modifications may be made therein within the purview of the accompanying claims.

I claim:

1. A carbonated beverage dispensing apparatus comprising a source of beverage under pressure, a reservoir having a draft arm, a second reservoir comprising a length of tubing connecting the first reservoir to said pressure source, a cooling unit comprising a refrigerant tube, said reservoir tube and said refrigerant tube being wound in alternate layers upon said first reservoir, a float controlled valve in the first reservoir for controlling the liquid level therein, a pressure relief valve communicating with the first reservoir above the liquid level therein, and a tank interposed between the first reservoir and the pressure relief valve, said tank having a plurality of baffles therein providing a bubble reducing means and being located above said first

reservoir for gravitational drainage therebetween.

2. A carbonated beverage dispensing apparatus comprising a source of beverage under pressure, a reservoir communicating therewith and having a draft arm, means connecting said reservoir and said pressure source, a float controlled valve in the reservoir for controlling the liquid level therein, a pressure relief valve communicating with the reservoir above the liquid level therein, and a tank interposed between the reservoir and the relief valve and having a plurality of baffles providing a bubble reducing means, said tank being located above said reservoir for gravitational drainage therebetween.

3. A carbonated beverage dispensing apparatus comprising a source of beverage under pressure, a reservoir communicating therewith and having a draft arm, means connecting said reservoir and said pressure source, a float controlled valve in the reservoir for controlling the liquid level therein, a pressure relief valve, means connecting the relief valve to the reservoir above the liquid level therein, and an inwardly opening valve in said last connection whereby air may be admitted into the reservoir when the pressure therein falls below atmospheric.

4. A carbonated beverage dispensing apparatus comprising a reservoir having a draft arm, a pressure relief valve communicating with the reservoir, a secondary reservoir, a supply tank containing beverage under pressure, a connection between the secondary reservoir and the tank including a restricted orifice, a connection between the reservoirs including an orifice of greater area than the first orifice, and a float controlled valve in the first reservoir for controlling the orifice area therein, whereby during open position of the valve a preliminary expansion of beverage gases is permitted in the secondary reservoir.

5. A carbonated beverage dispensing apparatus comprising a cylindrical reservoir having a draft arm, a pressure relief valve communicating with the reservoir, a secondary reservoir comprising a length of tubing, a supply tank containing beverage under pressure, a connection between one end of the tubing and the tank including a restricted orifice, a connection between the remaining end of the tubing and the first reservoir including an orifice of greater area than the first orifice, a float controlled valve in the first reservoir for controlling the orifice area therein, whereby during open position of the valve a preliminary expansion of beverage gases is permitted in the secondary reservoir, and a refrigerant coil thermally associated with the tubing to cool the liquid therein during transit to the first reservoir.

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