Jan. 21, 1947. P. H. PHILLIPS 2,414,607

AUTOMATIC CARBONATING APPARATUS

Filed Jan. 19, 1944

Fig. 2.

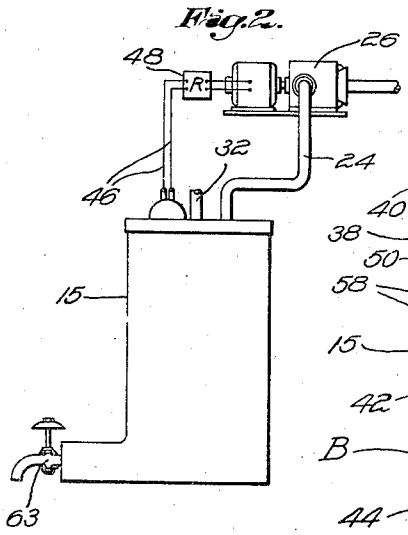


Fig. 1.

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AUTOMATIC CARBONATING APPARATUS

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Application January 19, 1944, Serial No. 518,801

1 Claim. (Cl. 261—27)

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The present invention relates to carbonating apparatus especially adapted for dispensing carbon dioxide effervescing liquid.

More specifically the invention relates to a carbonating device which is particularly intended for use where space limitations require a compact mixing and dispensing unit such as in soda fountains and coin vending machines.

An object of the invention is to provide a compact carbonating unit having a relatively small chamber in which is housed means of the instantaneous absorption type for mixing the liquid and the gas; means for automatically controlling the flow of liquid to the mixing means and the level of the carbonated liquid within the chamber, and means for effecting a reduction in the pressure of the carbonated liquid to substantially atmospheric pressure as the liquid is dispensed from the chamber.

Another aim of the invention is to provide a carbonating unit of the character described and wherein ebullition and disturbances within the carbonating chamber will not effect or disturb accurate and consistent performance of the automatic controlling means.

Another object is to provide a device of the aforementioned type without any moving parts and so constructed that it can be readily assembled or disassembled when servicing is required.

A further object is to provide a small, compact and effective carbonating unit which is of simple construction and which may be manufactured at low cost.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claim.

In the accompanying drawing, wherein I have shown one embodiment which the present invention may take:

Figure 1 is a vertical sectional view through an apparatus embodying the invention, and

Fig. 2 is a diagrammatic view illustrating the connections between the inlet flow and the automatic controlling means.

Referring to the drawing, the unit comprises a relatively small main casing 10 of cylindrical cross section having a top closure 12 and bottom closure 14, all defining a main chamber A. About the casing is a shell 15 and between the

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walls of the casing and shell is suitable insulation 17. The shell is shown only in part in Fig. 1.

Arranged in the top closure 12 is a threaded opening 16 for receiving a threaded plug 18. The plug 18 has a top threaded bore 20 and a bottom threaded bore 22 concentric with but of larger diameter than the top bore. Fitted within the top bore is the threaded end of a water inlet pipe 24, which pipe leads from a pump 26 (Fig. 2). The pump is adapted to draw water from any suitable pre-cooled source (not shown). Secured within the lower bore 22 is an instantaneous absorption type mixing means 28 of the kind disclosed in my co-pending application Serial No. 504,138, filed September 28, 1943. Also arranged within the top closure 12 and adjacent the means 28 is a second opening 30 for receiving the threaded end of a carbon dioxide gas inlet pipe 32, which pipe connects to a conventional supply cylinder or drum having suitable reducing means, the same not being shown as it is well known in the art.

The mixing means 28 is fully described in the above mentioned application, Serial No. 504,138, and for an understanding of the present invention it is sufficient to point out that upon water passing through the venturi section thereof, the carbon dioxide gas entering chamber A through inlet 32 will be drawn through inlet openings 36 in means 28 and entrained by the water, with the resulting effervescent mixture discharged through the lower end of means 28 into the main chamber A.

In order to automatically control the flow of liquid to the mixing means and the level of the carbonated liquid within the chamber A, a short metallic probe or electrode 42 and a long metallic probe or electrode 44 depend into the casing and are operatively connected to a pump or other means for establishing the flow of liquid through the inlet pipe 24. In the present instance, these electrodes are carried by and extend through a holder 40 which is screwed into a threaded opening 38 in the top closure 12, and the electrodes are connected by connectors 46 to a suitable relay 48 (Fig. 2) which, in turn, controls the operation of the pump 26. The operative form of relay circuit shown in the patent to Warrick, No. 1,979,127, dated October 30, 1934, may be employed.

With this arrangement, when the carbonated liquid in chamber A reaches a level where both probes are partially immersed, the relay 48 will act to cut out the pump 26 and carbonation will stop, and when the liquid is drawn off, so that the

level thereof drops, carbonation will be resumed.

It will be noted at this point that top closure **12** provides a common support for the mixing means **28**, the gas inlet pipe **32**, the electrode holder **40** and also the hereinafter described tube **52** and form therewith a complete sub-assembly permitting ready assembly of the parts on the closure and subsequent location of the closure **12** on the casing **10** with proper positioning of all parts.

In view of the fact that considerable agitation and ebullition will occur in the chamber A due to the force with which the carbonated water issues into the chamber from the mixing device, and such agitation and ebullition would, unless prevented, result in faulty operation of the automatic controlling means, there is arranged within the chamber A an auxiliary chamber B within which the flow control probes are located. This auxiliary chamber is formed by a tube **52** and a sleeve **54**. The tube is here shown as depending from the top closure **12** for substantially the length of the long probe **44**. The upper end of the tube may be secured to the closure **12** in any suitable manner as by means of welding, as indicated at **50**. The sleeve **54**, in the present instance, is concentric with, but of larger diameter than, the tube **52**. The lower end of the sleeve is provided with a flange **55** which is secured between the bottom closure **14** and a header **57** secured to the under side of the bottom closure by bolts **59**. The upper end of the sleeve overlaps the lower end of the tube **52** and is flared inwardly so as to define a restricted annular opening **56** which forms a vent between the auxiliary chamber and the main chamber. Openings **58** are provided adjacent the top of the tube **52** for venting the interior thereof to the chamber A. The sleeve **54** is provided with openings **61** located slightly above the bottom of the chamber A and through which the carbonated liquid flows from that chamber to the bottom of the chamber B.

By providing the auxiliary chamber B, it will be seen that the liquid within this chamber will remain relatively quiet and undisturbed by agitation within chamber A. In this way accurate fluid control will be maintained as the control means will be responsive to the true level of the liquid within the device.

The carbonated liquid is withdrawn from the apparatus as desired through an outlet passage **62** in the header **57** to which is connected quick opening valve **63** of any conventional design. As the carbonated liquid within the apparatus will be above atmospheric pressure and it is desirable to dispense the same at atmospheric pressure, there is provided within the bottom of the chamber B an outlet flow control means comprising a pressure restrictor **60** which may be of the type disclosed in my co-pending application Serial No. 509,883, filed November 11, 1943. The lower end of the restrictor is threaded, as at **64**, so as to be screwed into the header **57**. As described in my said co-pending application Serial No. 509,883, the restrictor has, extending therethrough, a large number of individual, like channels parallel to one another, and each having a small mean hydraulic radius. These channels, at their upper ends, communicate with the chamber B and, at their lower ends, with the outlet passage **62**. Obviously, any suitable design of restrictor, capable of meeting the specific pressure drop requirements, can be employed.

As previously indicated, casing **10** is relatively small and a particular advantage of the structure is that the compact arrangement, elimination of moving parts, and location of the control means within a quiet zone permit the making of a very small device. In fact, the structure shown may have a diameter of four and one-half inches and a height of eight inches. As a result, the apparatus particularly lends itself for installation in soda fountains, coin vending machines, or in other devices where very little space is available.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claim is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim as my invention:

In a device of the character described, a main chamber, means for supplying gas to the main chamber, carbonating means of the instantaneous absorption type located in the main chamber and suspended from the top wall thereof, means for supplying a liquid under pressure to said carbonating means, a vertical and generally tubular auxiliary chamber located in said main chamber and communicating therewith, a pair of probes depending into said auxiliary chamber and operatively associated with said liquid supply means and responsive to the level of liquid within the auxiliary chamber for controlling the flow of liquid to said carbonating means, a valved outlet leading from the bottom of said auxiliary chamber, and a pressure restrictor located in the bottom of said auxiliary chamber and associated with said valved outlet.

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