Jan. 8, 1935. L. C. CARROLL ET AL 1,987,323

CARBONATOR AND COOLER

Filed Feb. 17, 1933

Fig. 1

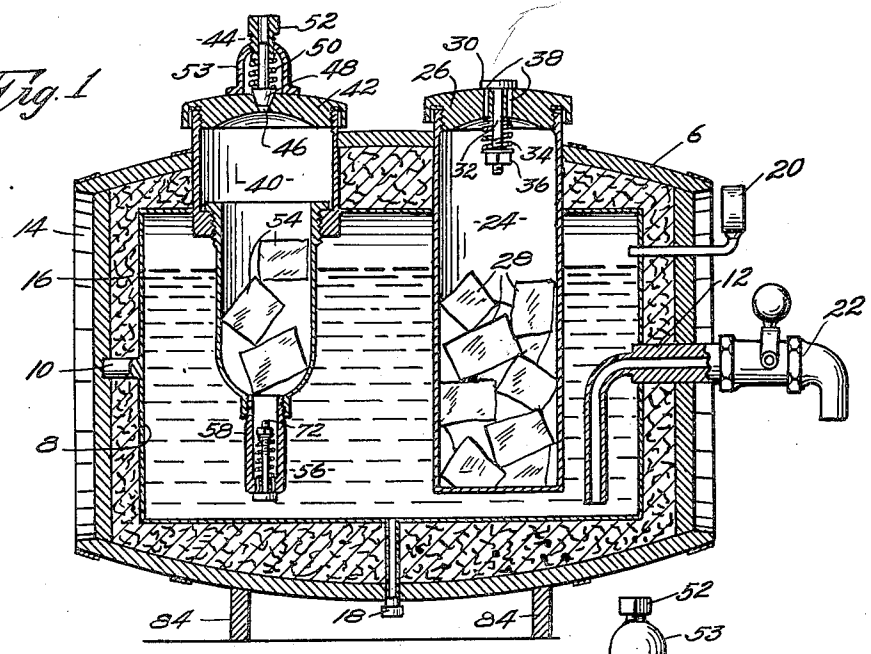
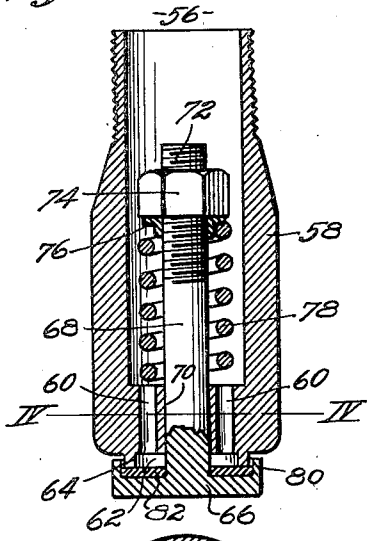


Fig. 3



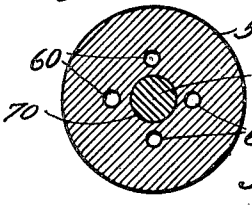


Fig. 4

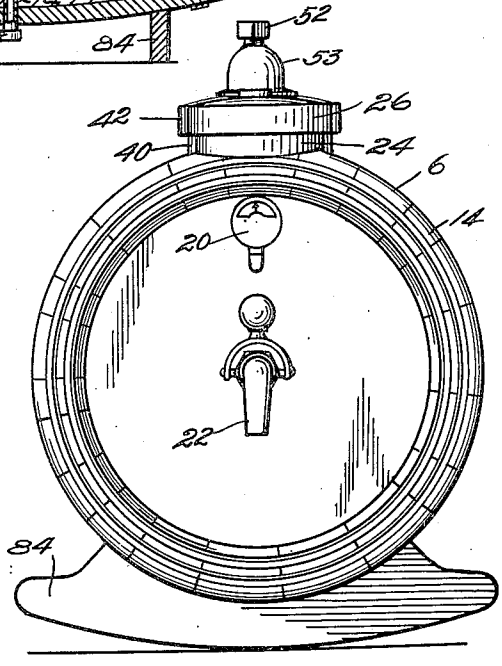


Fig. 2

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CARBONATOR AND COOLER

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9 Claims. (Cl. 62—91.5)

This invention relates to apparatus for treating liquids and has particular reference to means for both carbonating and cooling a liquid without the use of complicated machinery and parts and in such a manner that the simple unit contemplated might be used at home or in locations where there is no electricity or other means available for operating pumps or other equipment that is commonly used for performing the function of so treating liquids.

One of the most important aims of the instant invention is the contemplation of a unit of the above mentioned character that has as a part of its structure, a carbonating tank and a cooler container, both of which are formed to receive and utilize solidified carbon dioxide or dry ice, the said tank having means establishing communication between the lower portion thereof and the interior of the main receptacle, whereby carbon dioxide gas may be injected into the liquid contained within the receptacle after a predetermined pressure has been created within the carbonator tank.

A further object of this invention is to provide a carbonator tank for apparatus of the character mentioned that not only is equipped with the aforementioned injecting valve, but also has a relief valve forming a part thereof which permits the escape of gas after the pressure created both within the carbonator tank and main receptacle has reached a predetermined point established by the release member or spring forming a part of the injecting valve.

Another object of this invention is to provide a carbonating and cooling unit which is equipped with a cooler container that is separate from the carbonating tank, whereby refrigeration of the liquid within the main receptacle may take place even after the solidified carbon dioxide used in carbonating the liquid being treated has been used up. This combination between main receptacle, carbonator tank and cooler container is established because of the necessity for using different amounts of solidified carbon dioxide to efficiently accomplish the desired results.

An even further object of this invention is to provide a novel injecting valve which establishes connection between the interior of the carbonator tank and the receptacle holding the liquid being treated, said valve being formed in a particular manner to establish a non-leaking seal in a manner more fully described in the specifications.

The desirability of setting up agitation both within the carbonator tank and main receptacle is also recognized in this invention and there is provided simply formed agitators in the form of rockers that are affixed directly to the main receptacle so that regardless of how slight the pressure or force exerted when using the unit, it will be moved sufficiently to create an agitation where it will serve to the best advantage.

A large number of minor objects of the invention will appear during the course of the following specification, referring to the accompanying drawing, wherein:

Fig. 1 is a longitudinal, central, vertical section through a carbonating and cooling apparatus embodying this invention.

Fig. 2 is an end elevation of the same.

Fig. 3 is an enlarged, detailed, central, sectional view through the injecting valve forming a part of the carbonator tank, and,

Fig. 4 is a cross section through the said valve, taken on line IV—IV of Fig. 3.

The main receptacle wherein is stored the liquid being treated may be created to present a tank or the like 6, such as illustrated in Figs. 1 and 2. This main receptacle has a liner 8 which is cylindrical, and when forming the unit as illustrated, a trunnion 10 should be affixed at one end on the axis of jacket 8, whereby to co-operate with pipe 12 in a like opposed position, so that when the jacket 14 is moved to position, liner 8 is maintained in spaced relation so that insulating material 16 may be packed between liner 8 and jacket 14.

Obviously, any form of insulated receptacle may be used to contain or hold the liquid being treated so long as it has the property of withstanding an internal pressure and the ability to maintain the liquid at a low temperature, after such temperature has been reached through the medium of hereinafter described cooler container.

A drain and filling opening 18 is provided, whereby to fill or empty the receptacle when necessary, and a pressure gauge 20 forms a part of the equipment and is preferably positioned as illustrated near the top of the receptacle. A draw-off valve 22 is utilized to remove carbonated liquid from within receptacle 6 when the unit is in operation and pipe 12 terminates at a point in the lowest portion of receptacle 6 so that practically all of the liquid may be taken from within the receptacle through valve 22. A cooler container 24 projects into receptacle 6 from exteriorly thereof and is equipped with a cap 26 that is in screwthreaded engagement with container 24 so that solidified carbon dioxide

chunks 28 may be dropped into container 24. This cap is equipped with a relief valve comprising a head 30 and stem 32, the latter being circumscribed by spring 34 that is held under tension by nut 36, positioned within container 24.

A plurality of openings 38 are formed through cap 26 and are closed by head 30 when the valve is in the closed position. Obviously, manipulation of nut 36 will vary the tension of spring 34 so that the pressure required to operate the same may be varied. Under normal conditions it is desirable to require that the relief valve be opened when generated gas within cooler container reaches a pressure of from between twenty to twenty-five pounds. The exceptionally large area of container 24 that is contacted by the liquid being treated within receptacle 6 insures a quick refrigeration and since the material from which container 24 is made is a good conductor, it is obvious that the solidified carbon dioxide 28 within container 24 will efficiently serve the function of cooling the liquid.

In carbonating liquids through the use of solidified CO_2, it has been found advantageous to combine with the aforementioned cooler container a carbonator tank 40, such as illustrated in Fig. 1. The specific construction shown need not be followed, but it is essential that tank 40 have a removable cap 42 which may be used in introducing the proper amount of dry ice to the interior thereof. In the instance shown and preferred, a relief valve 44 should be provided to form a part of cap 42. Port 46 forms the seat for valve head 48 and spring 50 serves to urge head 48 to the seated position against the pressure of generated gases that are formed within tank 40. A set sleeve 52 is provided to vary the tension of spring 50, and under normal conditions the spring is set to allow the valve to open when a pressure of from seventeen to nineteen pounds is established. Sleeve 52 is in screw-threaded engagement with dome 53 mounted on top of cap 42, and this dome serves as a housing for spring 50. Dry ice chunks 54 are positioned within carbonator tank 40 where they release carbon dioxide gas and it is this gas that is used to charge liquid being treated.

An injecting valve 56 is located in tank 40 at a place where it is entirely within container 6 and this valve is uniquely constructed so that leakage does not occur. The detailed views, Figs. 3 and 4, clearly illustrate the construction of this injecting valve 56. The body 58 thereof is hollow and in direct connection with the interior of tank 40 and the lowermost portion of body 58 has a number of holes 60 formed therethrough which terminate in communication with a chamber 62 formed between the parts of the valve 56, as shown in Fig. 3. An annular flange 64 circumscribes the holes 60 and depends from the bottom of body 58. Valve head 66 is integral with valve stem 68 which passes into body 58 through an opening 70 and a machine fit is set up between said stem and walls of the opening. Chamber 62 is always filled with gas under pressure and when the pressure overcomes spring 78, it is obvious that an even opening of the valve takes place without danger of tipping or a holding open at one side.

The inner end of stem 68 is screwthreaded as at 72 to receive nut 74 which bears upon spring washer 76 bearing against spring 78, which draws head 66 toward the bottom of body 58. Head 66 has an upstanding annular wall 80 which circumscribes annular flange 64 when the valve is closed, and a resilient gasket 82 within the confines of annular wall 80 bears against the lower annular edge of flange 62 to set up a seal. Thus chamber 62 is formed, which always has gas under pressure therein when the unit is in operation and through such construction it is obvious that leakage is entirely precluded and no liquid will pass into tank 40 by reason of a faulty seal at injecting valve 56. Annular flange 64 and annular wall 80 do not touch, but are normally spaced apart as shown in Fig. 3.

A pressure of from twelve to fourteen pounds within tank 40 will operate injecting valve 56, and so long as it is possible to charge the liquid being treated with carbon dioxide at this pressure the released gases will pass through injecting valve and into receptacle 6. When the pressure within receptacle 6 and tank 40 exceeds fourteen pounds, and climbs to seventeen or nineteen pounds, further charging will be stopped because relief valve 44 will then be brought into play to allow the escape of excess gases being formed.

The structure for agitating the liquid being treated is here illustrated to be a pair of rockers 84 mounted on receptacle 6. When the unit is being used, the slightest handling will cause the same to move and "shake" the contents thereof.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A carbonating and cooling apparatus of the character described comprising, in combination a receptacle for the liquid being treated; and a carbonator tank projecting into said receptacle from exteriorly thereof, said tank having a valve assembly forming a part thereof, positioned in that portion of said tank within the receptacle and discharging gas from the former at a point adjacent the bottom of the latter, and a relief valve in the exterior portion thereof whereby gas generated within said tank may pass therefrom both into the receptacle and to the atmosphere exteriorly thereof.

2. A carbonating and cooling apparatus of the character described comprising, in combination a receptacle for the liquid being treated; a carbonator tank adapted to contain solidified carbon dioxide projecting into said receptacle from exteriorly thereof; an injecting valve establishing communication between the receptacle and said carbonator tank; a relief valve permitting escape of gas to the atmosphere from within said tank; and a container for solidified carbon dioxide extending into said receptacle having a relief valve for liberating gases to the atmosphere from within the container.

3. A carbonating and cooling apparatus of the character described comprising in combination, a receptacle for the liquid being treated; a carbonator tank adapted to contain solidified carbon dioxide projecting into said receptacle from exteriorly thereof; an injecting valve establishing communication between the receptacle and said carbonator tank; a relief valve permitting escape of gas to the atmosphere from within said tank; and means mounted on said receptacle for agitating the contents of both receptacle and carbonator tank whereby to cause uniform carbonation.

4. A carbonating and cooling apparatus of the character described comprising in combination, a receptacle for the liquid being treated; a carbonator tank adapted to contain solidified carbon dioxide projecting into said receptacle from exteriorly thereof; an injecting valve establishing

communication between the receptacle and said carbonator tank; a relief valve permitting escape of gas to the atmosphere from within said tank; and means associated with said receptacle for agitating the contents of both receptacle and carbonator tank whereby to cause uniform carbonation, said means comprising a plurality of rockers carried exteriorly of said receptacle.

5. In an apparatus for cooling and carbonating liquids, a vessel for the liquid to be treated, a plurality of containers projecting into said vessel, solidified carbon dioxide positioned in said containers, means for placing the interior of one of said containers in communication with said vessel and pressure relief means for each of said containers.

6. In an apparatus for cooling and carbonating liquids, a vessel for the liquid to be treated, a container projecting into said vessel in heat exchange relation with liquid therein, solidified carbon dioxide positioned in said container, a receptacle projecting into said vessel, solidified carbon dioxide in said receptacle, means for discharging carbon dioxide, formed by sublimation, from said receptacle into said vessel and a pressure relief valve for said container and said receptacle.

7. An apparatus for cooling and carbonating liquids including in combination a vessel for the liquid to be treated, a pair of solidified carbon dioxide receiving containers projecting into said vessel, solidified carbon dioxide positioned in said containers, one of said containers being adapted to discharge gas, liberated by heat exchange with the liquid, to the atmosphere and the other of said containers adapted to discharge carbon dioxide into the liquid in said vessel and a pressure relief valve for said last mentioned container.

8. In an apparatus for cooling a liquid and charging it with carbon dioxide gas, a vessel for receiving the liquid to be cooled and carbonated, a pair of containers in heat exchange relation with the liquid to be treated, means for introducing solidified carbon dioxide into said containers, and means for discharging carbon dioxide gas, liberated in one of said containers, into the vessel to charge the liquid therewith and pressure relief valves for said containers.

9. In an apparatus for cooling a liquid and charging it with carbon dioxide, a vessel for receiving the liquid to be cooled and carbonated, a pair of solidified carbon dioxide receiving containers, means for positioning the containers to remove heat from the liquid to be cooled and means for discharging the sublimated carbon dioxide gas from one of said containers to charge the liquid therewith and pressure relief valves for said solidified carbon dioxide receiving containers.

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