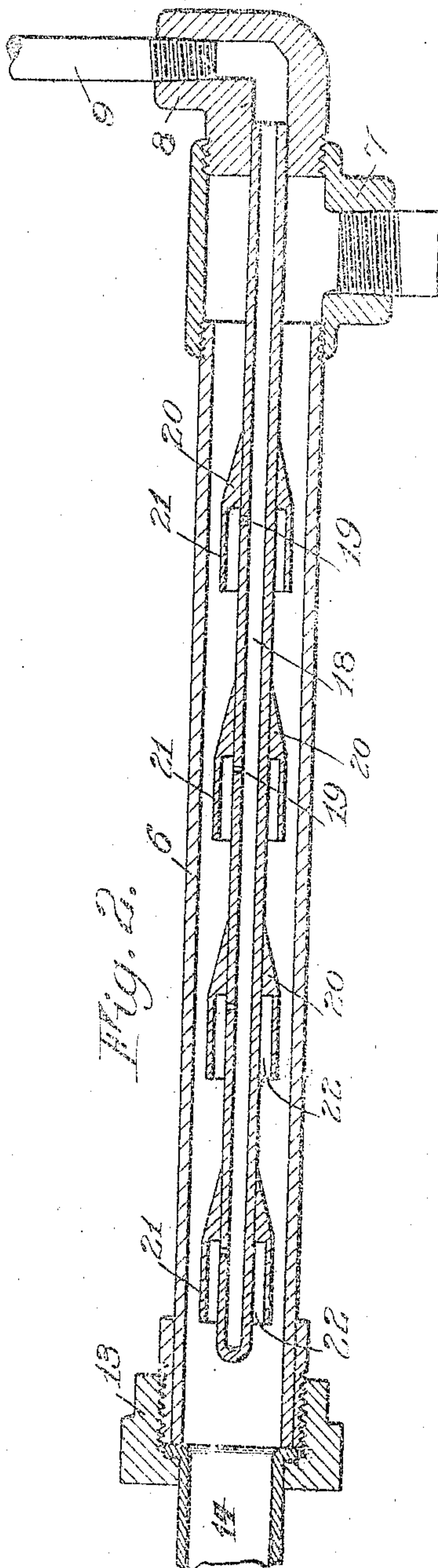
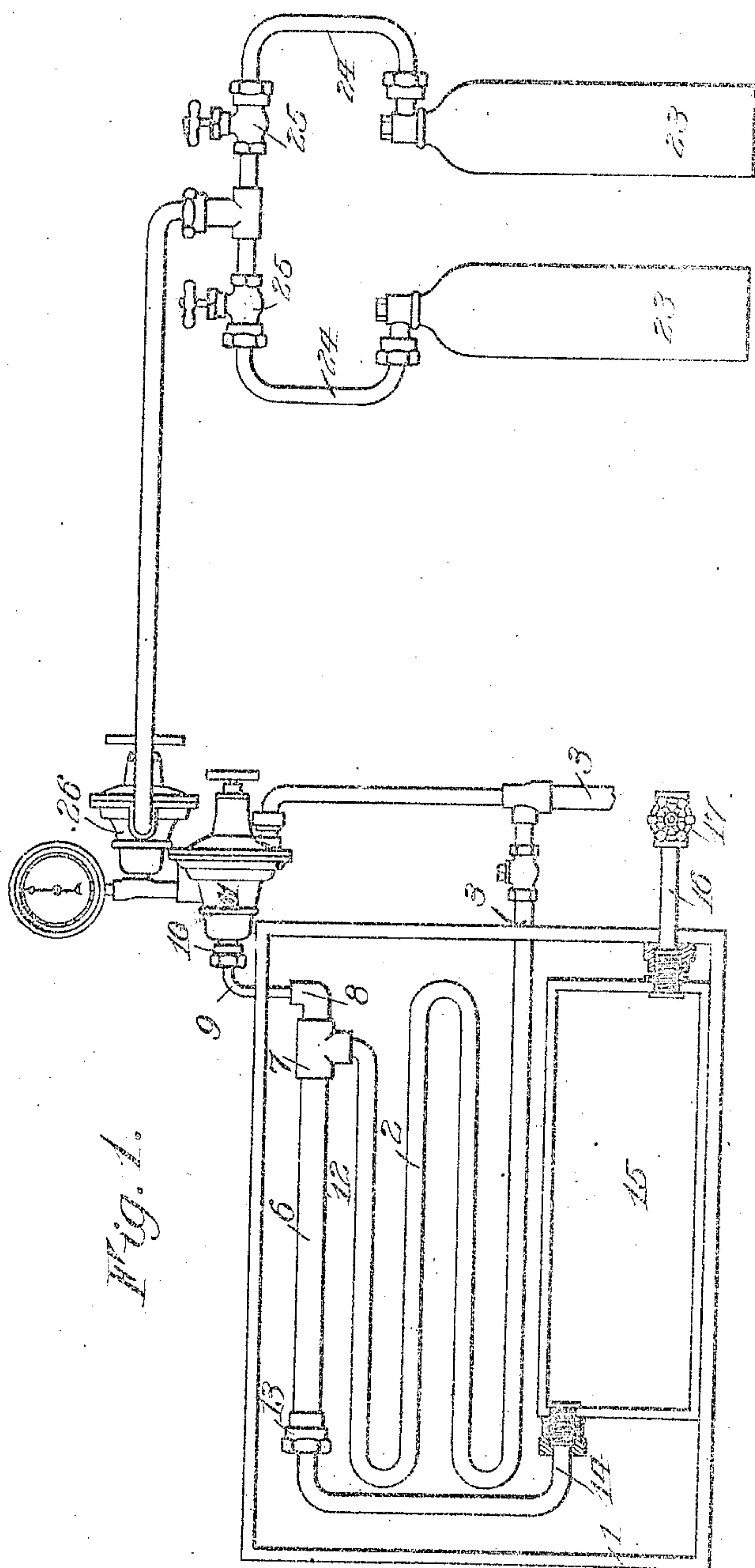


No. 827,567

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F. ROBBIN.
CARBONATING APPARATUS.
APPLICATION FILED NOV. 25, 1904.



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CARBONATING APPARATUS.

No. 827,567.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, FREDERICK ROBBIN, of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Carbonating Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference-numerals marked thereon.

My present invention relates to improvements in the art of carbonating liquids; and it is the purpose of my invention to provide an apparatus of this character which is capable of producing the carbonated or aerated liquid directly from the gas and water or other liquid which may be employed through the medium of a commingling-chamber which is of such a construction that a thorough impregnation is secured without the necessity of employing mechanically-agitated devices such as are often found necessary in other apparatuses.

To these and other ends the invention consists in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings, Figure 1 is a diagrammatic view showing the method of connecting up an apparatus embodying my invention; and Fig. 2 is a sectional view through the commingling-chamber, showing the interior construction and arrangement of its parts.

Similar reference-numerals in both figures indicate similar parts.

Heretofore in the process of carbonating liquids it has been customary to lead the water and gas separately to a mixing-chamber which usually contains some suitable agitator through the operation of which the water is impregnated with the gas, some systems employing a supplemental device, such as a series of plates over which the partially-mixed liquid is passed in thin films to enable it to absorb sufficient gas; but these devices are not only very expensive and complicated, but they do not thoroughly impregnate the liquid with the gas; and it is the purpose of my present invention to simplify the construction and operation of the apparatus and to secure a more perfect carbonization of the liquid.

The present embodiment of my invention comprises generally the refrigerating-chamber 1, within which is preferably located the coil 2, through which water from the supply-pipe 3 passes in order that its temperature may be reduced before it reaches the gas, this supply-pipe 3 connecting, preferably, with an ordinary service-pipe which is usually supplied under pressure. This coil 2 connects at its opposite end with the commingling-chamber 6 at the connection 7, and adjacent to this connection 7 is provided a similar connection 8, with which is connected the gas-supply pipe 9, which leads to the connection 10 of a pressure-regulator 11. This chamber 6 embodies generally a hollow cylindrical casing 12, to one end of which are connected the fittings 7 and 8 and at the opposite end is connected the fitting 13, which connects by the pipe 14 with a settling receptacle or reservoir 15, to the opposite end of which is connected pipe 16, which leads to the draft-arm 17 of the soda-fountain or other dispensing apparatus.

Within the casing 12 is mounted a tube 18, which is preferably arranged concentrically within the casing and connects at one end with the fitting 8, which connects with the gas-supply pipe 9, such construction forming an annular chamber which surrounds this tube and forms a communication between the water-supply pipe 2 and the pipe 14. The tube 18 is provided at suitable intervals with orifices 19, and over the tube adjacent to each orifice is fitted a sleeve 20, each having a portion adapted to snugly fit the tube to retain it in operative position and provided with a hollow annular extension 21, which is comparatively thin, and it forms an annular space 22 between it and the tube 18, the sleeve 20 being so adjusted on the tube that the annular chamber 22 will communicate with the corresponding orifice 19 of the tube, those portions of the sleeve 20 in which are formed the annular chambers 22 being so arranged that the openings in these chambers are directed away from the fittings 7 and 8 and toward the fitting 13 at the opposite end of the chamber for a purpose that will presently appear.

Any suitable source of gas-supply may be employed; but I prefer to use the ordinary receptacles or tanks 23, which are charged with higher initial pressure than that of the liquid to be carbonated, and to these tanks are connected the pipes 24, which are provided with

the stop-cocks 25, which are utilized for the purpose of enabling either of the tanks to be shut off independently of the other, and to these pipes 24 is connected a pressure-regulator 26, any form being employed which is capable of reducing the pressure from the receptacles approximately to that of the liquid to be carbonated.

A carbonating apparatus constructed in accordance with my invention may be connected, as stated, to any source of water or other liquid supply which is under pressure, such as that of the service-pipes which are connected to the ordinary street water-mains, and the water thus obtained passes through the coil of pipe 2, which extends through the refrigerator 1, which will cause the temperature of the water to be materially reduced before meeting the gas, and from the pipe 2 it enters the commingling-chamber 12 by the connection 7 thereof, passing from one end thereof in an annular film which surrounds the tube 18 toward the opposite end, finally passing out through the fitting 13 and the pipe 14 into the settling-tank 15, from which it is drawn from the pipe 16 and draft-arm 17. The liquid in passing longitudinally along the tube 18 will be thoroughly impregnated with the gas which issues from the apertures 19 in the tube and expands into the gas-expansion and temperature-equalizing chamber 22, which surrounds the tube 18 and is separated from the passing liquid by the thin wall 21 of the sleeve 20, thereby keeping the liquid out of contact with the gas until the latter reaches the discharge end of the space 22, at which time the gas will be sufficiently expanded and spread into an annular film of a large surface, so as to enable it to be immediately absorbed by the passing water, the temperature of the water and the gas being reduced to such a degree that they will be approximately equal, thereby increasing the affinity of the liquid and gas to the maximum degree, and as the liquid and gas within the chamber are under pressure during the entire operation of carbonization the absorption of the gas by the liquid will be materially facilitated. Moreover, the serious difficulty usually experienced in devices of this kind, caused by the freezing of the gas-orifices, will be obviated, for notwithstanding the fact that the temperature of the gas is materially lowered the moment it leaves the orifices 19 still it is kept out of contact with the liquid by the thin wall 21, which serves as a shield which is maintained at a moderate temperature by the passing of the water along its outer walls, and therefore instead of projecting the gas from minute apertures which are liable to become clogged or frozen, the gas is introduced to the water in an annular film of comparatively large area, which will increase the rapidity of the absorption by enlarging the area of contact between the water and gas. The

carbonated water thus produced within the chamber 12 passes through the pipe 14 into the settling-tank 15 and from thence to the pipe 16 to the draft-arm 17 of a soda-fountain or other dispensing apparatus.

In constructing the carbonating-tube the annular walls 21 are formed very thin and arranged very close to the outside of the tube 18, so that the intervening space 22, which forms the expansion-chamber, is very thin and drawn out lengthwise of the tube to varying distances proportionate to the capacity and the requirements of each apparatus, the walls 21 in each case being sufficiently thin and extended as to serve as a temperature-equalizing medium between the expanding gas in chamber 22 and the liquid in contact with its outer walls, and the annular space 22 is sufficiently narrow in proportion to the relative pressures of the liquid and gas as to insure its complete filling by the latter, the gas discharging from it in an annular film of comparatively large surface for absorption; but in the drawings the essential parts of the carbonator are exaggerated in size and proportion for the sake of illustration.

As the quality of the carbonated water is essentially dependent upon the relative pressures of the liquid and gas within the commingling-chamber during carbonization, I prefer to employ the double regulation, whereby the gas under heavy pressure from the containing-tanks is led directly to the pressure-regulator 26, which is so adjusted that the pressure will be reduced until it slightly exceeds that of the water-supply, and from the regulator 26 it passes to the regulator 11, where it is controlled by the pressure of the liquid-supply, fluctuations of the pressure of the water-supply acting upon the regulator 11 to decrease the volume of gas admitted to the mixing-chamber and corresponding increases in the pressure of the liquid-supply causing a corresponding increase in the volume of gas admitted thereto, and this arrangement insures an equalization of the pressures of the gas and liquid supply to the apparatus irrespective of the fluctuations in the pressure of the liquid-supply and a reduction in the pressure of the gas-supply from the gas-receptacles, thereby rendering it possible to obtain carbonated liquid which will contain the same percentage of gas at all times even though the relative pressures at the sources of supply of the liquid and gas may vary.

A carbonating apparatus embodying my invention obviates the necessity of employing mechanical agitators and other expensive apparatus for thoroughly mixing the gas and the liquid, and its construction is such that it may be inexpensively manufactured and in operation will be reliable, as the possibility of freezing or clogging is reduced to a minimum and there are no mechanically-operated parts to get out of order.

I claim as my invention—

1. The combination with sources of liquid and gas supply under pressure, and regulating means for maintaining a predetermined ratio between the pressures of the liquid and gas, of a carbonator for mixing the liquid and gas embodying a hollow casing having communication at one end with the source of liquid-supply and provided with a discharge at its opposite end, said casing forming a passage for the liquid during carbonization, and a nozzle inclosed by and spaced from the walls of said casing and communicating with the source of gas-supply, said nozzle having a contracted gas-discharge orifice, and a sleeve on the nozzle having an enlarged interior expansion-chamber for receiving gas from the discharge-orifice and permitting it to expand, the said chamber of the sleeve having an enlarged discharge-orifice for spreading the gas and introducing it in the form of a film of enlarged surface and reduced pressure to the liquid contained in the casing.

2. A carbonator embodying a hollow casing communicating at one end with a source of liquid-supply and having a discharge at its opposite end, forming a passage for the liquid to be carbonated, a tube inclosed therein and spaced from the walls of the casing to form a mixing-chamber, said tube being in communication with a source of gas-supply under pressure and having a discharge-orifice therein, and a gas-expansion and temperature-equalizing chamber embodying a sleeve arranged between the nozzle and the outer casing having a hollow extension with thin walls

spaced from the nozzle and projecting over the discharge-orifice to form an enlarged expansion-chamber, the thin walls of which are in contact with the liquid, whereby gas under pressure issuing from the orifice into the expansion-chamber will expand into an annular film of enlarged surface the temperature of which will be equalized with that of the liquid before mixture through the thin walls of the expansion-chamber.

3. In a carbonator, the combination with a hollow casing communicating at one end with a source of liquid-supply and having a discharge at its opposite end, of a tube inclosed within the casing and spaced from the walls thereof to form a mixing-chamber, said tube being connected to a source of gas-supply under pressure, and having a series of discharge-orifices spaced lengthwise thereof, and a series of gas-expansion and temperature-equalizing chambers spaced lengthwise of the gas-tube for the discharge-orifices, each embodying a sleeve having thin walls spaced from the tube forming an enlarged expansion-chamber for receiving the gas under high pressure from the orifice, expanding it into a film of low pressure and enlarged surface and introducing it to the liquid in such form, the outer surface of the thin walls of the sleeves being in contact with the liquid and acting to equalize the temperatures of the latter and the gas before mixing.

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