No. 673,146.

Patented Apr. 30, 1901.

C. B. VAN HORN.

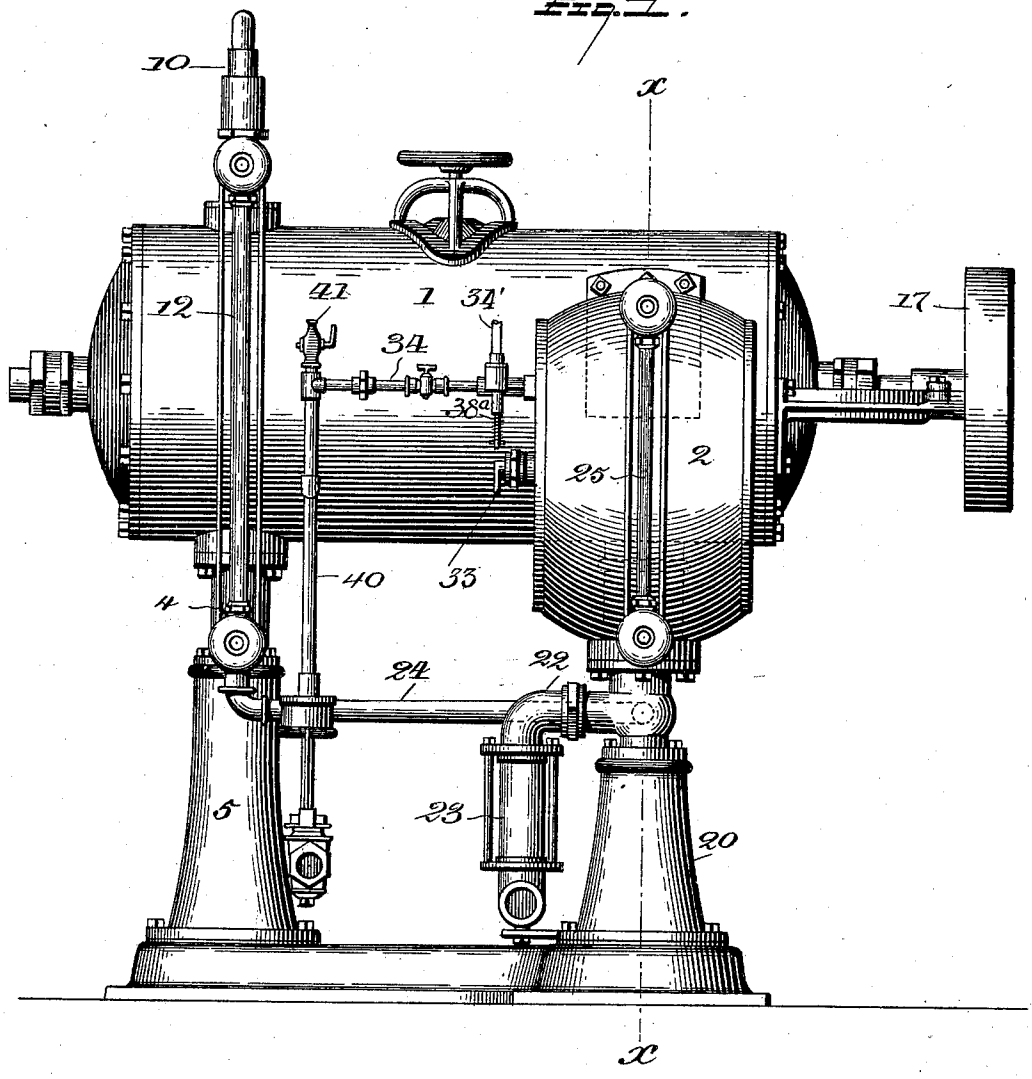
CARBONATOR.

(Application filed Dec. 12, 1898.)

(No Model.)

5 Sheets—Sheet 1.

Fig. 1.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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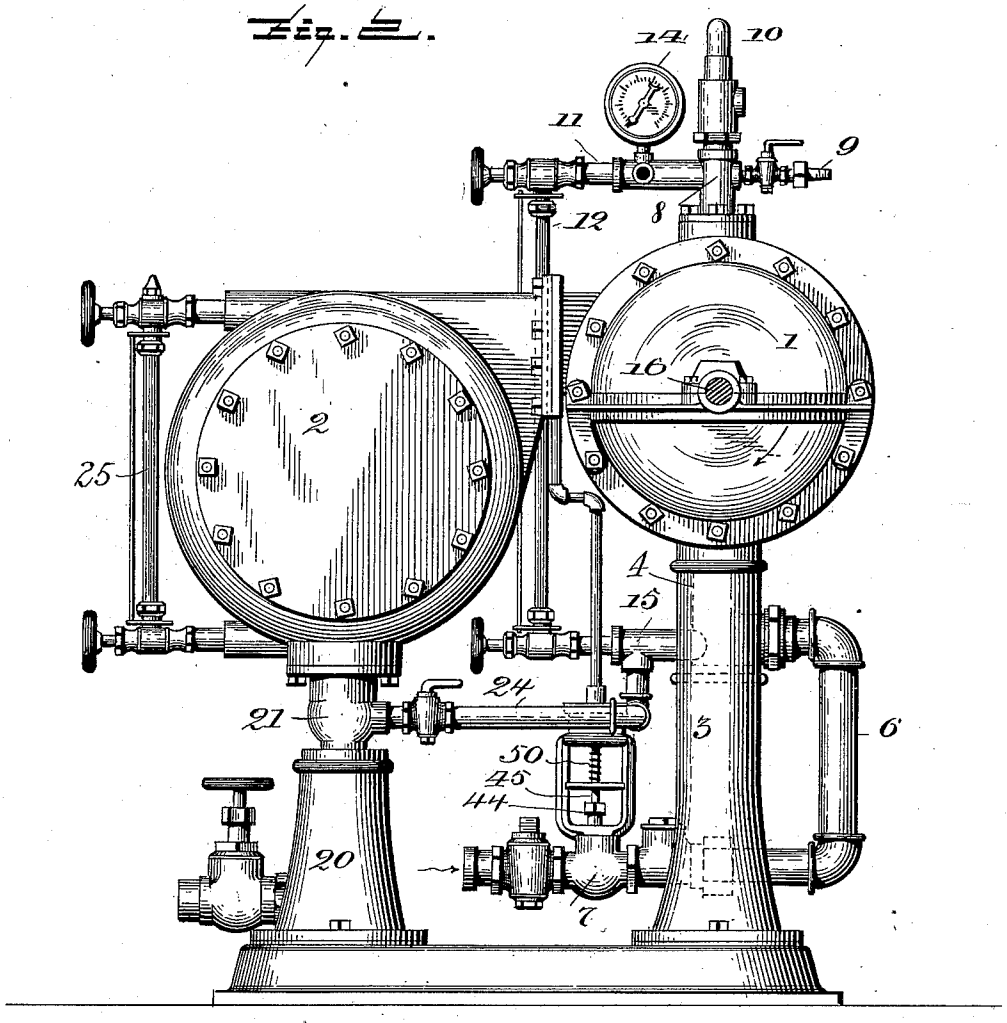
(No Model.) 5 Sheets—Sheet 2.

Fig. 2.



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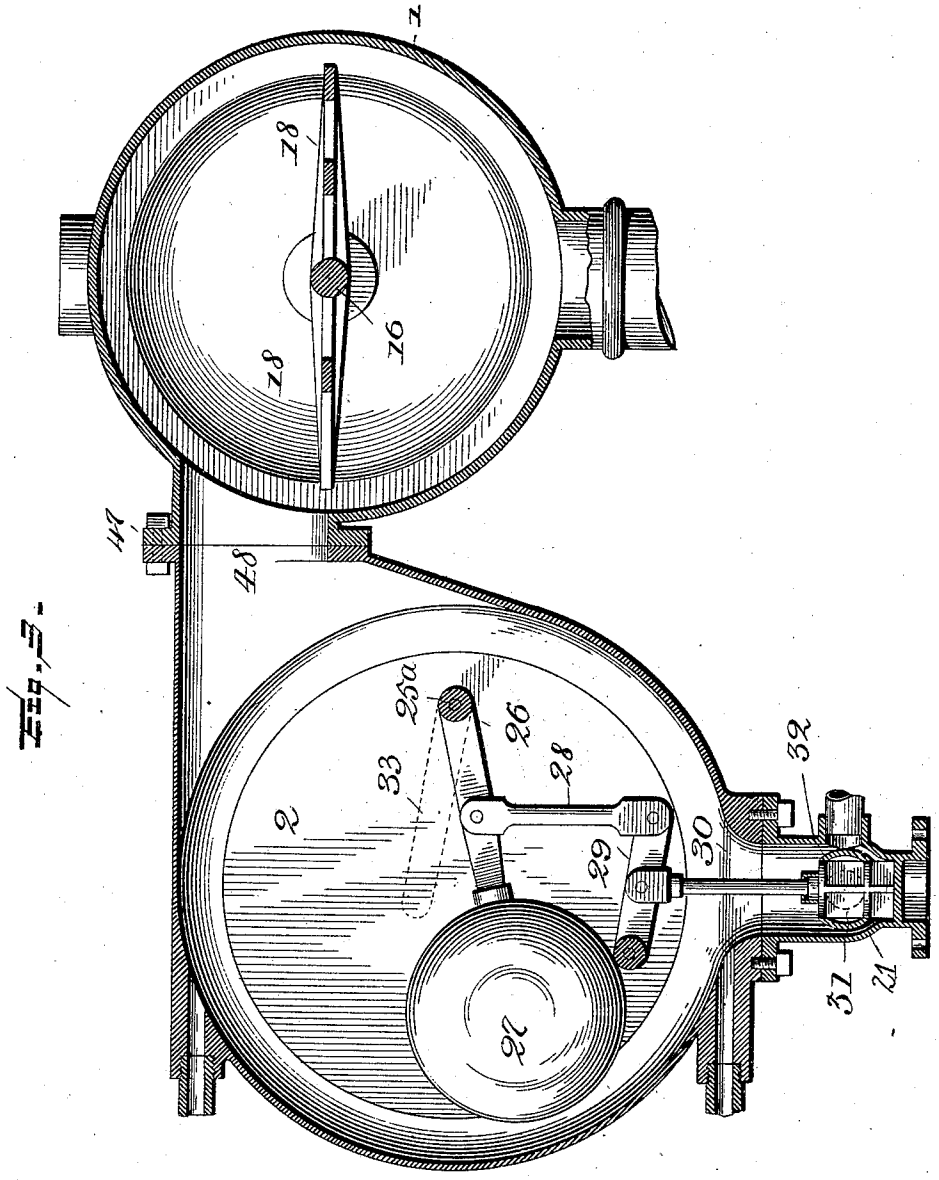

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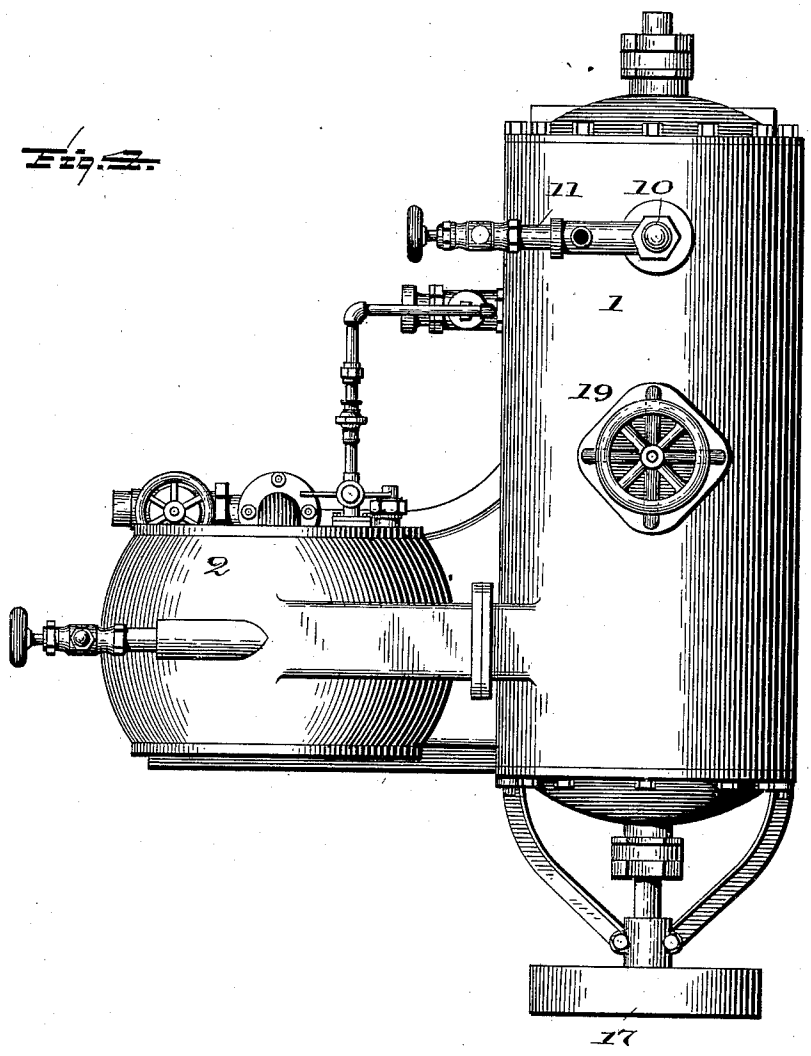
(Application filed Dec. 12, 1898.)

(No Model.) 5 Sheets—Sheet 4.

Fig. 3.



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(No Model.) 5 Sheets—Sheet 5.

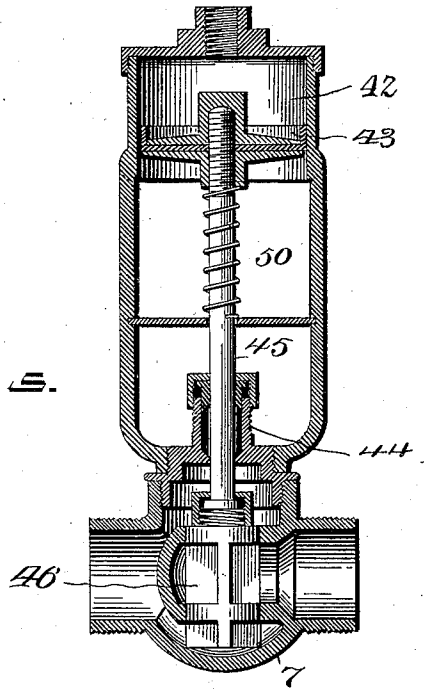

Fig. 5.

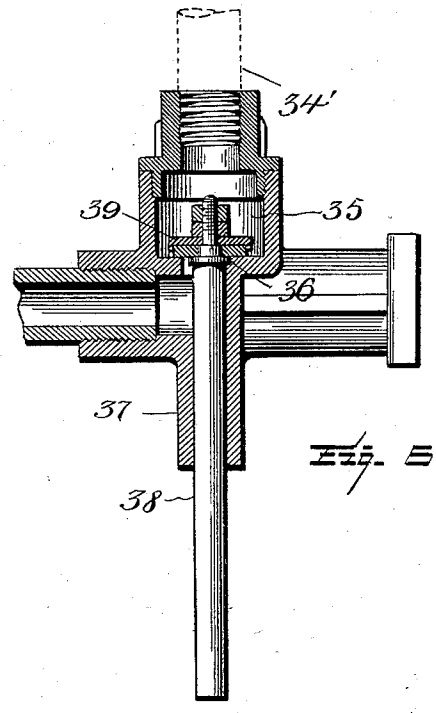

Fig. 5.

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UNITED STATES PATENT OFFICE.

CHARLES B. VAN HORN, OF DETROIT, MICHIGAN, ASSIGNOR TO E. G. MINER, JR., OF ROCHESTER, NEW YORK.

CARBONATOR.

SPECIFICATION forming part of Letters Patent No. 673,146, dated April 30, 1901.

Application filed December 12, 1898. Serial No. 698,998. (No model.)

To all whom it may concern:

Be it known that I, CHARLES B. VAN HORN, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Carbonators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain new and useful improvements in apparatus for carbonating liquids.

The primary object of the invention is to regulate the supply of liquid to the apparatus by the amount drawn off.

A further object of my invention is to carbonate liquids under a constant gas-pressure, with the inlet and outlet controlled by the liquid in the apparatus, the liquid being forced into the apparatus either by pump or air pressure and forced therefrom by the constant gas-pressure in the apparatus, which serves both to thoroughly impregnate the liquid with gas and to force the liquid from the apparatus into any suitable receptacle under any desired counter-pressure.

A still further object of my invention is to construct an apparatus for carbonating liquids of all kinds that will be purely automatic in every particular.

In describing the invention in detail reference is had to the accompanying drawings, forming a part of this specification, wherein like figures of reference indicate similar parts throughout the several views.

In the drawings, Figure 1 is a side elevation of my improved carbonator. Fig. 2 is an end elevation of the same. Fig. 3 is a vertical sectional view on the line X X of Fig. 1. Fig. 4 is a top plan view. Fig. 5 is a sectional view of an air-operated valve located in the inlet-pipe. Fig. 6 is a sectional view of the valve controlling the admission of the air to the air-operated valve.

Referring to the drawings by reference-numerals, 1 designates a horizontal cylinder forming an infusion-chamber, and 2 a vertical cylinder forming a carbonated-liquid receptacle. The infusion-chamber 1 is mounted upon a suitable support 3, near one end thereof, and secured to the opposite end and on the underneath side thereof is a hollow casting 4, which is mounted on a suitable support 5, said hollow casting communicating with the infusion-chamber 1.

Secured to the hollow casting 4 and communicating therewith is a liquid-inlet pipe 6, in which is arranged an air-operated valve 7. Secured to the top of the infusion-chamber and communicating therewith is a hollow casting 8, which receives the gas from a supply-pipe 9. Arranged in the top of the casting 8 is a relief-valve 10 of any suitable construction. Secured to the casting 8, on the opposite side thereof from the gas supply pipe 9, is a pipe 11, which leads to the top of a sight-glass 12. A pipe 15 connects the lower end of the sight-glass 12 with the hollow casting 4. Secured to the pipe 11 is a pressure-gage 14 of any suitable construction.

Journaled in the ends of the infusion-chamber 1 is a shaft 16, having connected to one end thereof a driving-wheel 17. Mounted on this shaft within the infusion-chamber 1 are paddles or blades 18, which are adapted to agitate the liquid, so that the same will become thoroughly impregnated with gas. The infusion-chamber is provided with a hand-hole 19.

Mounted on a support 20 is the carbonated-liquid receptacle 2, between which and the support 20 is a hollow casting 21, communicating with said receptacle. From this casting 21 leads a liquid-discharge pipe 22, in which is arranged a sight-glass 23. Connecting the liquid-discharge pipe 22 and the pipe 15 is a pipe 24, which is adapted to drain the liquid from the infusion-chamber 1. Arranged on one side of the carbonated-liquid receptacle 2 and connected therewith is a sight-glass 25.

25ª denotes a short shaft journaled in the receptacle 2. Fixed to this shaft within the receptacle is a lever 26, on which is a float 27. Secured to this lever 26 is a connecting-rod 28, the lower end of which is pivotally attached to a rock-lever 29, and pivotally secured to the lever 29, about midway of its ends, is a valve-stem 30, on the lower end of which is attached a balanced valve 31, movable to and from a valve-seat 32, the valve

and valve-seat being located within the hollow casting 21.

One end of the shaft 25ª projects through and beyond one of the heads of the receptacle 2, and on said projecting end is fixed an arm 33, the object of which will be hereinafter more fully described.

34 denotes a pipe by which air under compression is applied to operate the liquid-inlet-controlling valve 7. Arranged in the pipe 34 is a chamber 35, provided with a valve-seat 36. Projecting through an extension 37 of the pipe 34 is a valve-stem 38, on the upper end of which is secured a valve 39, adapted to engage the valve-seat 36. The valve is held normally against its seat by the air-pressure and also by a spring 38ª. Secured to the valve-chamber is a pipe 34', leading to the air-supply. (Not shown.)

Secured to the pipe 34 is a vertical pipe 40, in the upper end of which is an escape-valve 41. The function of this valve 41 is to relieve the pressure behind the valve 7. The lower end of said pipe 40 is connected to the upper end of a cylinder 42, which is an extension of the casing of the valve 7. In the cylinder 42 a piston-head 43 operates. Secured to said piston-head 43 and passing through a stuffing-box 44, of any suitable construction, is a valve-stem 45, carrying a balanced valve 46, similar in form and construction to the valve 31. The valve 46 is held normally open by a coiled spring 50. The infusion-chamber and carbonated-liquid receptacle are secured together, as shown at 47, and intercommunicate through a passage-way 48. This passage 48 is located near one end of the infusion-chamber, which end is opposite from that in which the liquid enters. The object in locating the passage as shown is to retain the liquid in the infusion-chamber a sufficient length of time to become thoroughly impregnated with gas before it passes into the carbonated-liquid receptacle. The carbonated-liquid receptacle is arranged below the level of the infusion-chamber, whereby sufficient space is given for free operation of the float and also to establish a level of the liquid in the receptacle below that established in the infusion-chamber. Were the carbonated-liquid receptacle placed on the same level with the infusion-chamber the carbonated liquid in the liquid-receptacle would overflow into the infusion-chamber and destroy the perfect operation of the carbonator.

The operation is as follows: The supply-pipe 22 is connected to a storage-tank containing the desired counter-pressure. Gas is admitted to the infusion-chamber 1 through the gas-supply pipe 9 until a predetermined pressure is obtained, which pressure is maintained during the process of carbonating by means of a reducing-valve of any of the well-known constructions. The liquid is then admitted to the infusion-chamber 1 through the pipe 6 and the liquid continues to rise in the chamber 1 until it reaches the point of overflow or passage 48, when it flows into the carbonated-liquid receptacle 2. As the liquid accumulates in the receptacle 2 the float 27 is raised and through the intermediate mechanism the balanced valve 31 is opened, allowing the carbonated liquid to discharge through the pipe 22 as fast as it enters the infusion-chamber. Should the influx of liquid be greater than the quantity drawn off, the surplus accumulates in the receptacle, raising the float 27 until the arm 33, which moves with the float, comes in contact with the valve-stem 38, when the valve 39 is raised from its seat 36, thereby allowing the air to pass through the pipes 34', 34, and 40 and act upon the piston-head 43, forcing the piston-rod 45 and balanced valve 46 downward and automatically shutting off the flow of liquid to the infusion-chamber 1. When the accumulated liquid in the carbonated-liquid receptacle has been reduced, the float 27 descends, carrying the arm 33 out of engagement with the rod 38 of the valve 39. The pressure of the air against the top of the valve, together with the spring 38ª, closes the valve 39, thereby cutting off the supply of air to the air-operated valve 46 and allowing the tension of the spring 50 to open said valve when the latter has been relieved of the pressure behind it by opening the valve 41.

The supply of liquid to the infusion-chamber is automatically regulated by the discharge of the liquid from the carbonated-liquid receptacle. When the liquid is admitted to the apparatus, no further attention is required.

It will be noted that any liquid may be carbonated in the apparatus above described, the only change required being the regulating of the gas-pressure in the infusion-chamber in inverse proportion to the specific gravity of the liquid to be carbonated.

I claim as my invention—

1. In an apparatus for carbonating liquids, a horizontal cylinder forming an infusion-chamber, and having a liquid-supply pipe connected to the bottom thereof, toward one end, said chamber being provided with an opening in one side thereof, and at the end opposite the liquid-inlet, the lowest point of said opening being located at a height sufficient to retain the liquid in the infusion-chamber until it becomes thoroughly impregnated with carbonic-acid gas, a carbonated-liquid receptacle provided with an opening in one side thereof, said opening registering with the opening in the infusion-chamber and forming the inlet for the liquid to the liquid-receptacle, and an automatically-operated valve controlling the discharge of the liquid from the liquid-receptacle.

2. In an apparatus for carbonating liquids, a horizontal cylinder forming an infusion-chamber, and having a liquid-supply pipe connected to the bottom thereof toward one end, said chamber being provided with an opening in one side thereof and in the end opposite

the liquid-inlet, a carbonated-liquid receptacle provided with an opening in one side thereof, said opening registering with the opening in the infusion-chamber and forming the inlet for the liquid to the liquid-receptacle, an automatically-operated valve controlling the discharge of liquid from the liquid-receptacle, a valve in the liquid-supply pipe, a piston connected with said valve, an air-pipe leading to the piston, and means operated by the liquid in the liquid-receptacle to admit air to the piston and thereby close the liquid-supply-pipe valve.

3. In an apparatus for carbonating liquids, an infusion-chamber having a gas-supplier and a liquid-supplier connected therewith, a carbonated-liquid receptacle, agitating means in said chamber, a passage between the carbonated-liquid receptacle and the infusion-chamber, a liquid-discharge pipe connected with said receptacle, a float in the receptacle, a valve connected with the float and automatically regulating the discharge of liquid therefrom, a valve in the liquid-supply pipe, a piston connected with said valve, an air-supply pipe leading to the piston, a valve in the air-supply pipe, and a connection between the air-supply-pipe valve and float.

4. In an apparatus for carbonating liquids, an infusion-chamber, a carbonated-liquid receptacle communicating with said chamber, a liquid-supply pipe leading to the chamber, an air-operated valve in the liquid-supply pipe, and means controlled by the liquid in the liquid-receptacle to close said air-operated valve and regulate the supply of liquid to the infusion-chamber.

5. In an apparatus for carbonating liquids, an infusion-chamber, a carbonated-liquid receptacle, a liquid-supply pipe leading to the chamber, an air-operated valve in the liquid-supply pipe, an air-supply pipe leading to the valve, and means controlled by the liquid in the liquid-receptacle operating to admit air to said air-operated valve to regulate the flow of liquid to the infusion-chamber.

6. In an apparatus for carbonating liquids, an infusion-chamber, a carbonated-liquid receptacle, a liquid-supply pipe leading to the chamber, a liquid-discharge pipe leading from the receptacle, and fluid-pressure means controlled by the discharge of the liquid from the receptacle operating to automatically regulate the influx of liquid to the chamber.

7. In an apparatus for carbonating liquids, an infusion-chamber, a carbonated-liquid receptacle, a liquid-supply pipe leading to the chamber, an air-operated valve in the supply-pipe, an air-supply pipe leading to the valve, a valve in the air-supply pipe, and means controlled by the liquid in the liquid-receptacle operating to admit air to the air-operated valve to close the same.

8. In a carbonator, an infusion-chamber, a carbonated-liquid receptacle, a float arranged in said receptacle, a liquid-supply pipe leading to the chamber, a liquid-discharge pipe leading from the receptacle, a valve in the discharge-pipe, a connection between said valve and float, and fluid-pressure means whereby the valve is controlled by the liquid in the receptacle to regulate the influx of liquid in the chamber.

9. In an apparatus for carbonating liquids, an infusion-chamber having a gas-supply pipe and a liquid-supply pipe connected thereto, a carbonated-liquid receptacle communicating with the chamber, paddles rotatably mounted in the chamber, a liquid-discharge pipe leading from the receptacle, a float in said receptacle, a valve regulating the discharge of liquid, connections between the said valve and the float whereby the valve is controlled, an air-operated valve in the said liquid-supply pipe, a valved air-supply pipe leading to the air-operated valve, and an arm on the air-pipe valve operated by the float to open the latter valve to admit air to the air-operated valve to close the same and stop the influx of liquid to the chamber.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES B. VAN HORN.

Witnesses:

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WILLIS KESSLER.