No. 641,684. Patented Jan. 23, 1900.

H. S. FERRY.

MEANS FOR CARBONATING LIQUIDS.

(Application filed Oct. 13, 1898.)

(No Model.) 2 Sheets—Sheet 1.

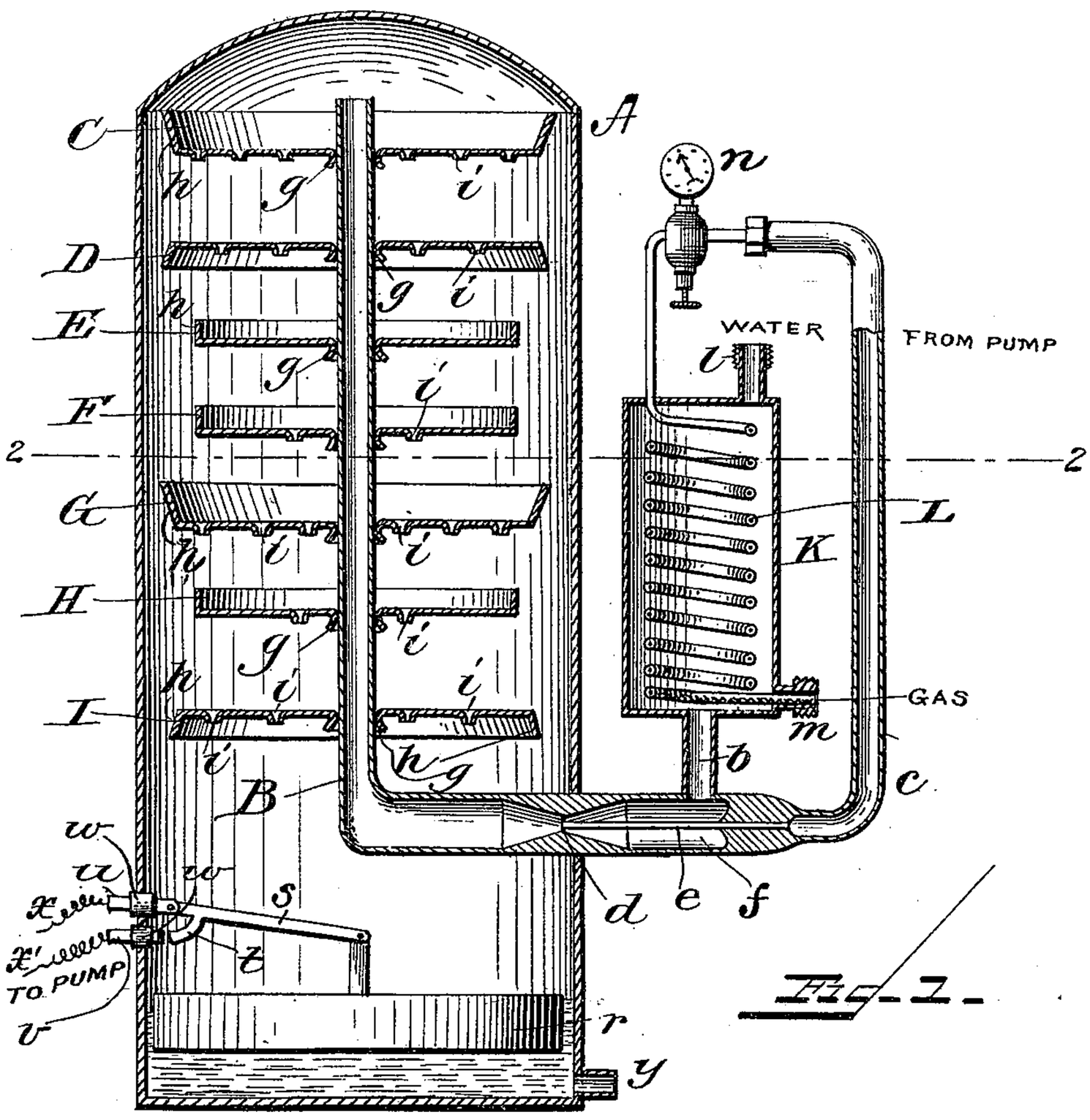

Fig. 1.

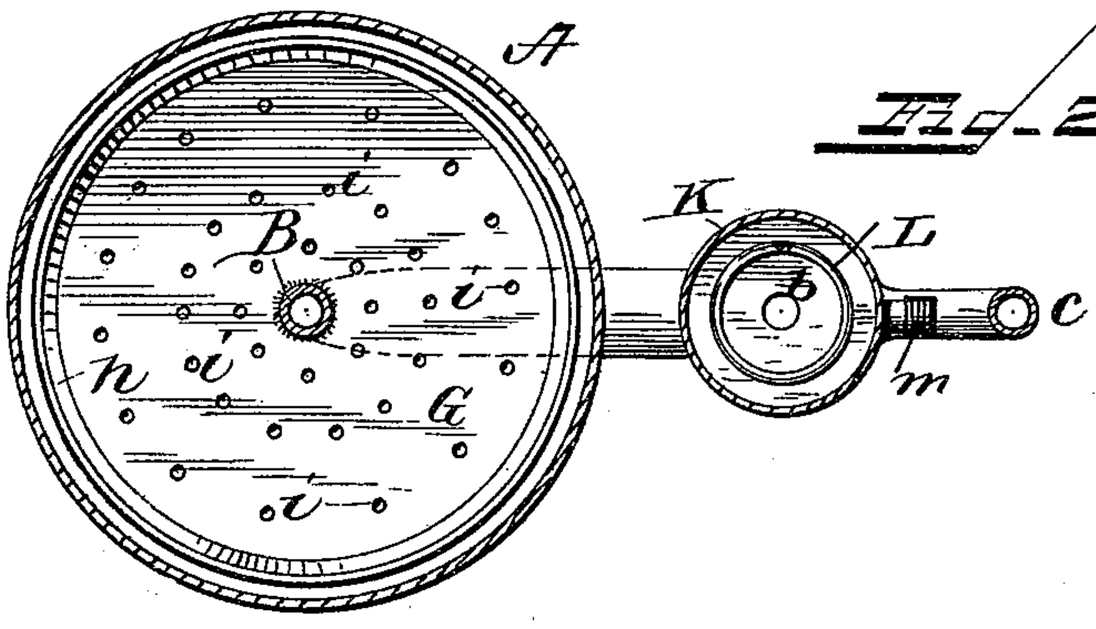

Fig. 2.

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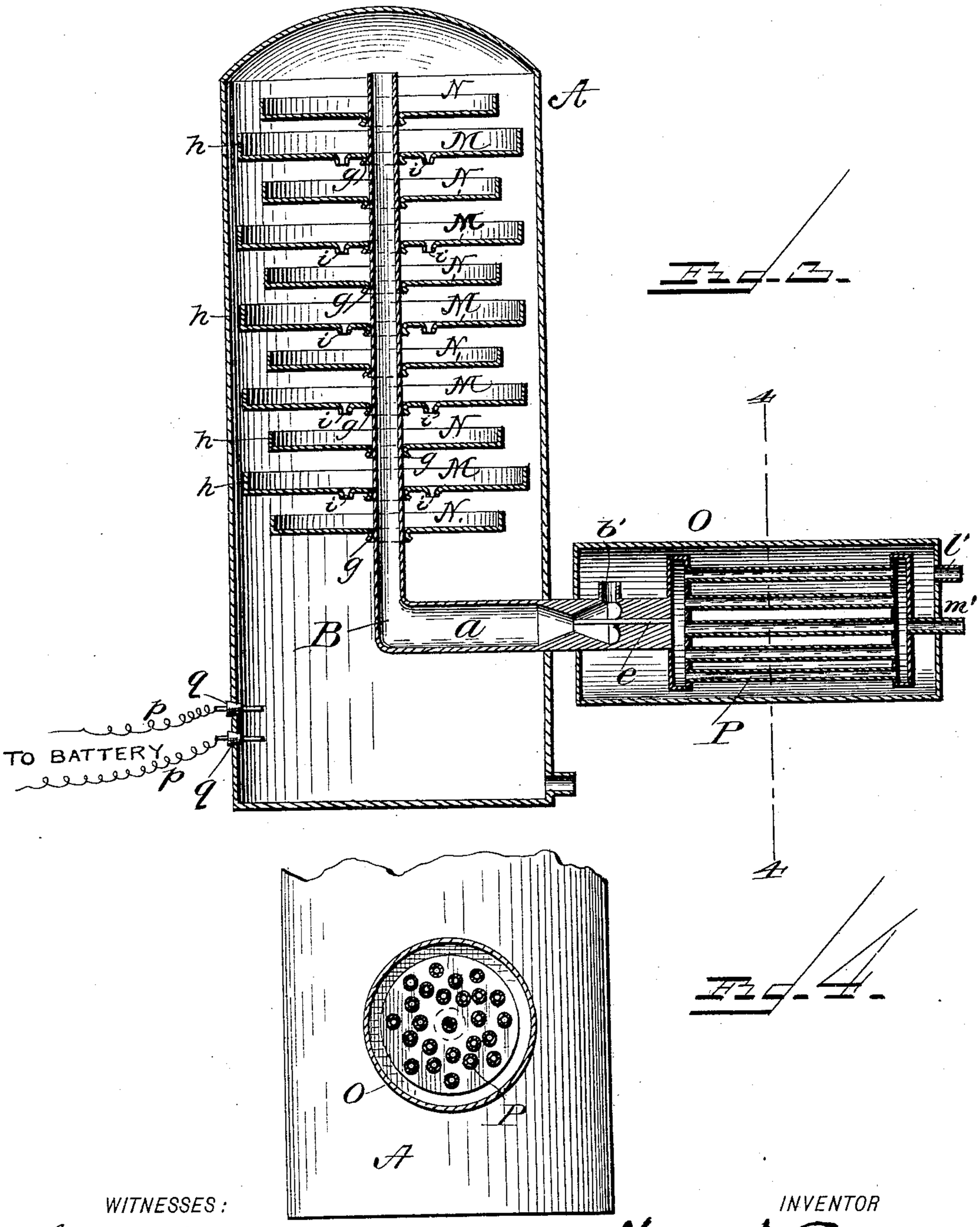

FIG. 2.

FIG. 4.

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UNITED STATES PATENT OFFICE.

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MEANS FOR CARBONATING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 641,684, dated January 23, 1900.

Application filed October 13, 1898. Serial No. 693,467. (No model.)

To all whom it may concern:

Be it known that I, HARVEY S. FERRY, a citizen of the United States, residing at Mount Vernon, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Means for Carbonating Liquids; 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.

My invention relates to means for preparing carbonated beverages, and has for its object a thorough commingling of the liquid and carbonic-acid gas and the utilization of the gas for cooling the liquid before the gas is commingled therewith, as will be fully disclosed in the following specification and claims.

In the accompanying drawings, which form part of this specification, Figure 1 represents a vertical transverse section of my improved carbonator; Fig. 2, a horizontal section on line 2 2, Fig. 1; Fig. 3, a vertical transverse section showing a modification of the carbonator; and Fig. 4, a section on line 4 4, Fig. 3.

Reference being had to the drawings and the letters thereon, A indicates a carbonating vessel; B, the fluid-supply pipe, which enters the vessel A at the lower end, crosses the vessel to the center thereof, and extends near the upper end of the vessel. In the pipe B is formed a commingling-chamber *a*, in which water from a pump (not shown) or other source of supply is admitted through connection *b*, and carbonic-acid gas under pressure from a cylinder (not shown) or other source of supply is admitted through connection *c*, the latter being extended beyond the water connection into the *vena contracta d* by a tube *e*. In front of the commingling-chamber is a water-receiving chamber *f*, through which the tube *e* passes.

Upon the vertical extension of the pipe A are supported a plurality of diaphragms or pans C, D, E, F, G, H, and I, the number of which may be varied in different carbonators and all of which are preferably provided with an annular outwardly-flaring flange *g* around the pipe A to prevent liquid from the diaphragms running down the surface of said pipe and causing it to fall from one diaphragm into another in drops or sheets through the free gas in the vessel, and each diaphragm is provided at its perimeter with a flange *h*, which may be turned up or down from the body of the diaphragm to direct the overflowing water in a thin sheet or film.

The diaphragms for carbonators have heretofore been perforated by punching out the metal to form the perforations, and in the practical operation of such diaphragms the liquid which passes through the perforations adheres to the bottom of the diaphragm to a very great extent, and when it falls it does so in a sheet rather than in fine small drops or streams, as it should do. To overcome this defect, perforations are made in the diaphragms by a punch, which forces the metal downward and forms tubular passages *i*, which extend below the lower surface of the diaphragms and cause the liquid to pass through the diaphragms in distinct drops or fine streams, which are thus exposed to the gas in their comminuted condition and absorb the maximum quantity of gas.

The number of the tubular passages in the diaphragms may be varied to cause the liquid to pass through the passages in different degrees of time and also to cause the liquid to take up some of the gas by surface absorption, the object being to detain the liquid in its descent from the exit end of the liquid-supply pipe to the carbonated-water chamber *k* as long as possible to cause it to become thoroughly impregnated or incorporated with the free gas in the carbonator.

The diaphragm E is imperforate, thus forming a shallow pan, in which the entire surface of the liquid is constantly exposed to and takes up gas by absorption.

It is well known that the colder the water the more readily it mingles and becomes thoroughly impregnated with the gas, and to effect the cooling of the water the carbonators are surrounded with ice. It is my purpose to utilize the gas for this purpose by cooling the water on its way to the carbonator by conducting it through a reservoir containing a tubular receptacle, through which the gas passes and in which it is expanded in transit from the gas-cylinder to the carbonator, thus taking advantage of the cooling property of the gas heretofore allowed to go to waste.

To the liquid-supply pipe A is attached a

reservoir K, having an inlet *l* for water, and within the reservoir is a helically-coiled pipe or receptacle L, having an inlet *m*, which is connected to a gas-cylinder. (Not shown.) Gas flowing from the cylinder is expanded in the receptacle L and cools the water in the reservoir K on its way to the liquid-supply pipe A, and the pressure of the gas is indicated by gage *n*.

In Figs. 3 and 4 I have shown modifications of the arrangements of the diaphragms, which to avoid confusion are designated by letter M applied to the perforated and N to the imperforate diaphragms. This construction is designed to secure more surface absorption than that shown in Fig. 1.

The water-reservoir O is shown horizontal and contains a tubular receptacle P, through which the gas passes. Water from the pump is admitted to the reservoir through connection *l'* and discharged into pipe B through *b'*, and gas is admitted to the receptacle from the gas-cylinder through connection *m'* and is discharged through tube *e'* into the commingling-chamber *a*.

In the practical operation of carbonators as heretofore constructed it is well known that gas cannot enter the carbonator when the pressure of the liquid from the pump exceeds the pressure of the gas being drawn from the cylinder, and as a result the carbonator frequently becomes charged with water containing a very small percentage of gas, and consequently of a very low degree of effervescence. By introducing the gas into the liquid-supply pipe B, as shown, each stroke of the pump draws gas into the commingling-chamber *a*, and the liquid is kept under a uniform charge of gas at all times. It is also my purpose to automatically control the quantity of carbonated liquid in the carbonator, and for this purpose I may employ negative and positive wires *o p*, which are provided with insulators *q q* and connect with a battery. (Not shown.) As the liquid rises in the vessel A and covers the upper wire an electrical circuit is formed by the liquid and the pump stopped, and when the water falls below said wire the electrical circuit is interrupted and the pump started. This construction is shown in Fig. 3. I may also use a float *r*, which is pivotally connected to a lever *s*, which is provided with an arm *t* and is pivotally connected to a terminal *u*, so that the arm *t* makes and breaks contact with the terminal *v* as the float rises and falls, and thereby starts and stops the pump. The terminals are provided with insulators *w* and wires *x* and *x'*, and the vessel A is provided with a suitable discharge-outlet *y* for carbonated water.

Having thus fully described my invention, what I claim is—

1. A carbonator provided with a supply-pipe, diaphragms having tubular passages and imperforate diaphragms supported on said pipe and provided with flanges at their perimeter and outwardly-distended flanges surrounding said pipe.

2. A carbonator provided with a supply-pipe, diaphragms provided with an outwardly-distended annular flange in the center thereof and a flange at the perimeter, and supported by said pipe.

3. A carbonator provided with a supply-pipe, a plurality of graduated diaphragms having tubular passages extending below the body of the diaphragm, an outwardly-distended annular flange surrounding said pipe and a flange at the perimeter, and supported by said pipe.

4. A carbonator provided with a reservoir for water, a receptacle for carbonic-acid gas in said reservoir, a connection between the reservoir and the carbonator, and a connection between said receptacle and the water and gas supply pipe to the carbonator; in combination with a plurality of distributing-diaphragms provided with outwardly-distended flanges in the center thereof and surrounding the supply-pipe within the carbonator.

5. A carbonator provided with a supply-pipe, a reservoir for water supported by and communicating with the supply-pipe and having a receptacle for carbonic-acid gas within said reservoir, and a connection between the reservoir and the supply-pipe; in combination with a plurality of distributing-diaphragms provided with outwardly-distended flanges in the center thereof and surrounding the supply-pipe within the carbonator.

6. A carbonator provided with a plurality of diaphragms having outwardly-distended flanges in the center thereof, a supply-pipe supporting said diaphragms and having a *vena contracta*, a reservoir for water, a receptacle for carbonic-acid gas in said reservoir, and a connection between the reservoir and the carbonator terminating in the *vena contracta;* in combination with a connection between said receptacle and the supply-pipe.

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

HARVEY S. FERRY.

Witnesses:
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