A. E. SHATTUCK.

CARBONATOR.

APPLICATION FILED JULY 26, 1911.

1,029,236. Patented June 11, 1912.

Fig. 1.

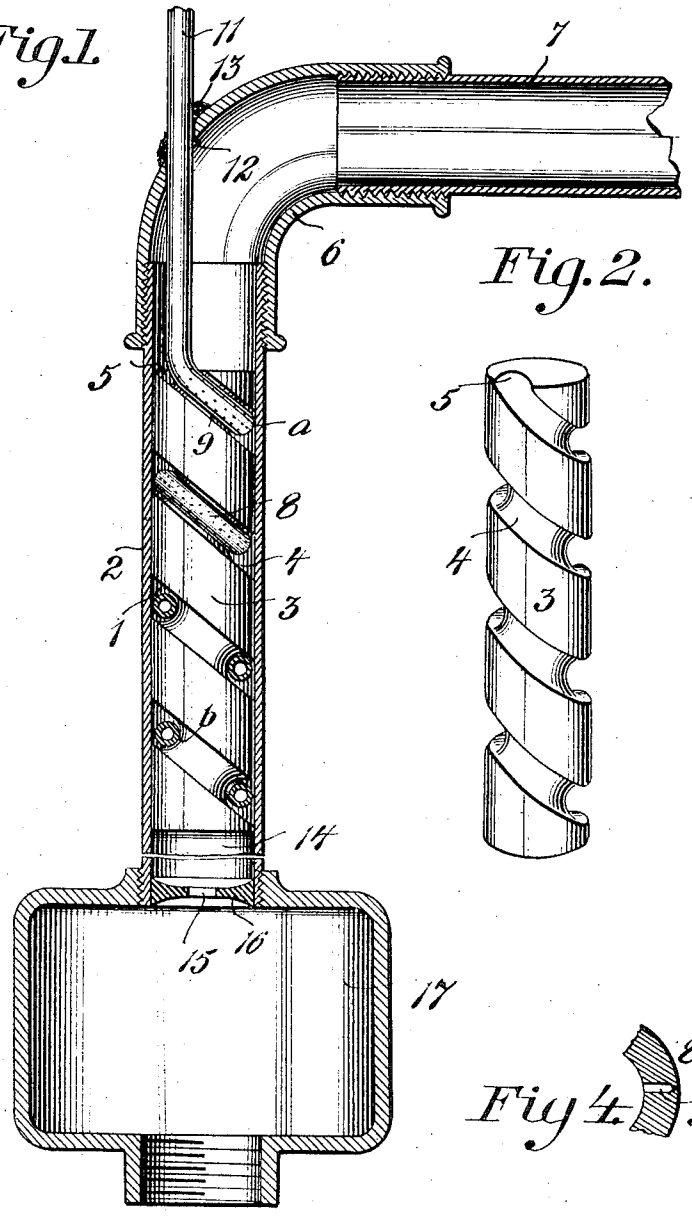

Fig. 2.

Fig. 3.

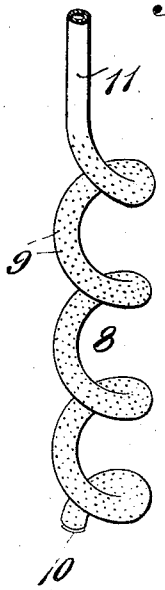

Fig. 4.

WITNESSES

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CARBONATOR.

1,029,236. Specification of Letters Patent. Patented June 11, 1912.

Application filed July 26, 1911. Serial No. 640,672.

To all whom it may concern:

Be it known that I, ARTHUR E. SHATTUCK, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Carbonators, of which the following is a specification.

This invention relates to a carbonating device of that type in which numerous minute jets of carbonic acid gas are injected into a relatively thin stream of water or other liquid to be carbonated so as to bring the maximum number of atoms of liquid into contact with the maximum number of atoms of gas on the principle that liquid, such as water, absorbs gas in the exact proportions to the area exposed to the action of gas.

In carrying out the invention, the water to be carbonated is delivered through a conduit which is preferably spiral so that the size of the device can be reduced to a minimum, and passing through this conduit is a spiral gas supply tube of such size with respect to the cross-sectional area of the conduit that the water will flow in a more or less tubular film-like stream into which numerous minute jets of carbonic acid gas are delivered, with the result that the water absorbs gas and becomes carbonated. The water conduit may be in the form of a spiral pipe or tube with the perforated gas-conducting tube extending therethrough, or the spiral water-conducting conduit may be formed by a straight section of pipe having fitted therein a plug formed with a spiral groove in its circumferential surface and extending from one end to the other to permit the water to flow spirally around the plug through the groove, in which latter is arranged the perforated gas pipe.

For a more detailed understanding of the invention, reference is to be had to the following description, taken in connection with the accompanying drawing, which illustrates one embodiment of the invention.

In the drawing, Figure 1 is a vertical section of the carbonating device. Fig. 2 is a perspective view of the spirally grooved plug. Fig. 3 is a perspective view of the perforated gas supply conduit. Fig. 4 is a greatly enlarged sectional view showing one of the perforations of the gas supply conduit.

Similar reference characters are employed to designate corresponding parts throughout the views.

Referring to the drawing, 1 designates a helical conduit of any desired length and diameter. In the present instance, this conduit is formed by a straight section of pipe 2 and a plug 3 fitted therein and provided with a superficial helical groove 4 which extends from one end of the plug to the other. The end 5 of this conduit 1 communicates with a source of water or other liquid under pressure, as for instance, the service pipe of a city water supply system. On one end of the section is a couple 6 which connects with the water supply pipe 7. The water in passing through the conduit 1 is carbonated by the introduction of numerous fine jets of carbonic acid gas, but in passing through the conduit, the water is caused to take a more or less film-like form so that the gas will have a better chance to impregnate the water and bring the maximum atoms of water into contact with the atoms of gas. For this purpose, the means for introducing the gas into the water also serves to cause the water to take a film-like form. A simple and effective means for accomplishing these two functions is the employment of a helical tube or pipe 8 which has the same pitch and the same number of convolutions as the helical groove 4 in the plug 3, so that the helical portion of the gas-conducting conduit or tube 8 can extend longitudinally of such groove. The external diameter of the tube 8 is slightly smaller than the depth of the groove 4 so that the water can pass through the conduit 1 in the form of a tubular film around the tube 8. To better illustrate the proportions, let it be assumed that the conduit 8 is one-quarter of an inch in external diameter while the groove in the plug 4 is three-eighths of an inch in diameter, leaving a space of one-sixteenth of an inch around the tube 8 in case the latter is concentric with the groove 4. Thus, the water in passing through the conduit 1 is drawn out into a thin tubular film of about one-sixteenth of an inch so as to be in the best condition for receiving the carbonic acid gas.

The helical portion of the tube 8 is provided with closely-arranged and extremely small perforations 9 through which the gas discharges into the water traversing the con-

duit 1. These apertures are formed by drilling holes through the tube with the smallest size drill obtainable, and then by means of a punch, the metal is hammered down until the apertures are practically invisible to the naked eye. In other words, the apertures are made as small and numerous as possible. The forming of the apertures or perforations in the tube 8 takes place when the latter is straight, and after being perforated, the tube is shaped on a suitable form into the helix of the required pitch. One end of the tube 8 is closed by a plug 10 while the other end 11 may be straight so as to pass out through an opening 12 in the elbow 6, the opening 12 being sealed by solder 13.

In assembling the parts, the plug 3 is inserted in the spiral conduit 8 by engaging the plugged end 10 in the inlet end of the groove 4 in the plug 3, and then by a screw action the plug is assembled within the helical conduit. The two parts thus assembled are inserted longitudinally of the pipe 2, the straight portion 11 of the conduit 8 passing through the opening 12 in the coupling 6. The plug 4 snugly fits in the pipe 2 so that water can only pass through the pipe 2 by way of the conduit 4, and by means of the solder joint 13 water is prevented from escaping around the gas pipe or conduit. In arranging the parts as described it is practically impossible to arrange the helical conduit 8 so that it will be concentric with the groove 4 at all points and at certain places the conduit 8 may be in contact with the surrounding pipe 2, as at *a*, Fig. 1, while the helical gas conduit 8 may be in contact with the plug 3, as at *b*. This relative disposition of the parts is an advantage in that the stream of water is broken up at such points, resulting in an effective commingling or agitation of the water particles and gas, bringing the atoms more closely together. The spirally flowing twisting stream of commingled water and gas discharges from the lower end of the conduit 4 into a chamber 14 formed in the lower extremity of the pipe 2, which chamber may be of any desired size, and in this chamber the water circulates and finally issues through a port 15 formed centrally in a concavo-concave partition or wall 16. The wall 16, by reason of its shape, changes the course of the water and gas passing through the chamber 14 so that in passing through the port 15, the water and gas particles will be sprayed outwardly in all directions at the under side of the wall 16, this spraying taking place in an enlarged chamber 17 attached to the lower end of the pipe 2. The spraying action causes the gas and water particles to be intimately commingled so that whatever free gas remains unabsorbed up to the time the port 15 is reached may become finally absorbed. From the chamber 17 carbonated liquid is conducted to a dispensing apparatus through a pipe connected with the chamber.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims appended hereto.

Having thus described the invention, what I claim as new, is:—

1. A carbonator comprising a helical conduit, means for supplying liquid under pressure to one end of the conduit, and a spiral pipe extending through the conduit for reducing the cross-sectional area thereof for the passage of liquid and having a plurality of orifices for discharging gas into the liquid passing through the conduit.

2. A carbonator comprising a pipe section, a plug therein having a spiral groove in its circumferential surface coöperating with the pipe section to form a liquid conduit, and means extending longitudinally of the conduit for reducing the cross-sectional area thereof for the passage of liquid and for injecting gas into the liquid in its passage through the conduit.

3. A carbonator comprising a section of pipe, a plug fitted in and extending longitudinally thereof and having a helical groove extending from one end of the plug to the other, a helical pipe extending in the groove of the plug and having gas-discharging orifices, said pipe being open at one end to receive gas and closed at the other, means for supplying water to one end of the groove, and means for receiving carbonated liquid from the other end of the groove.

4. A carbonator comprising a section of pipe, an elbow connected therewith having an opening in its wall, a water supply pipe connected with the elbow, a helically grooved plug fitted in the said section of pipe whereby water will pass only through said groove, and a perforated helical tube extending longitudinally of the groove and having a gas inlet portion extending through the opening of the coupling.

5. A carbonator comprising a structure having a helical conduit for the passage of liquid, a tube of helical form extending longitudinally of the conduit and of less cross-sectional area than the latter to cause the liquid to flow in an approximately film-like tubular stream, said tube being in contact with the walls of the conduit at differ-

ent points to break up the stream, said tube having minute gas discharging orifices in the portion located in the conduit.

6. A carbonator comprising a conduit in the form of a coiled tube having closely arranged minute orifices, and a conduit corresponding in shape to and of slightly greater diameter than the tube and through which the latter extends longitudinally, one conduit being open at one end to receive liquid and open at the other end to discharge carbonated liquid, and the other conduit being closed at one end and open at the other end to receive gas for injection through the said orifices into the liquid for carbonating the same.

7. A carbonator comprising a conduit in the form of a coiled tube having closely arranged minute orifices, a conduit corresponding in shape to and of slightly greater diameter than the tube and through which the latter extends longitudinally, one conduit being open at one end to receive liquid and open at the other end to discharge carbonated liquid, and the other conduit being closed at one end and open at the other end to receive gas for injection through the said orifices into the liquid for carbonating the same, a chamber around which the carbonated liquid spirally flows, said chamber having a concavo-concave ported wall through which the carbonated liquid discharges, and a comparatively large chamber into which the liquid sprays through the port in the said wall.

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

ARTHUR E. SHATTUCK.

Witnesses:
G. L. KENNEDY,
E. A. THOMPSON.