A. R. GROSS.

APPARATUS FOR CARBONATING LIQUIDS.

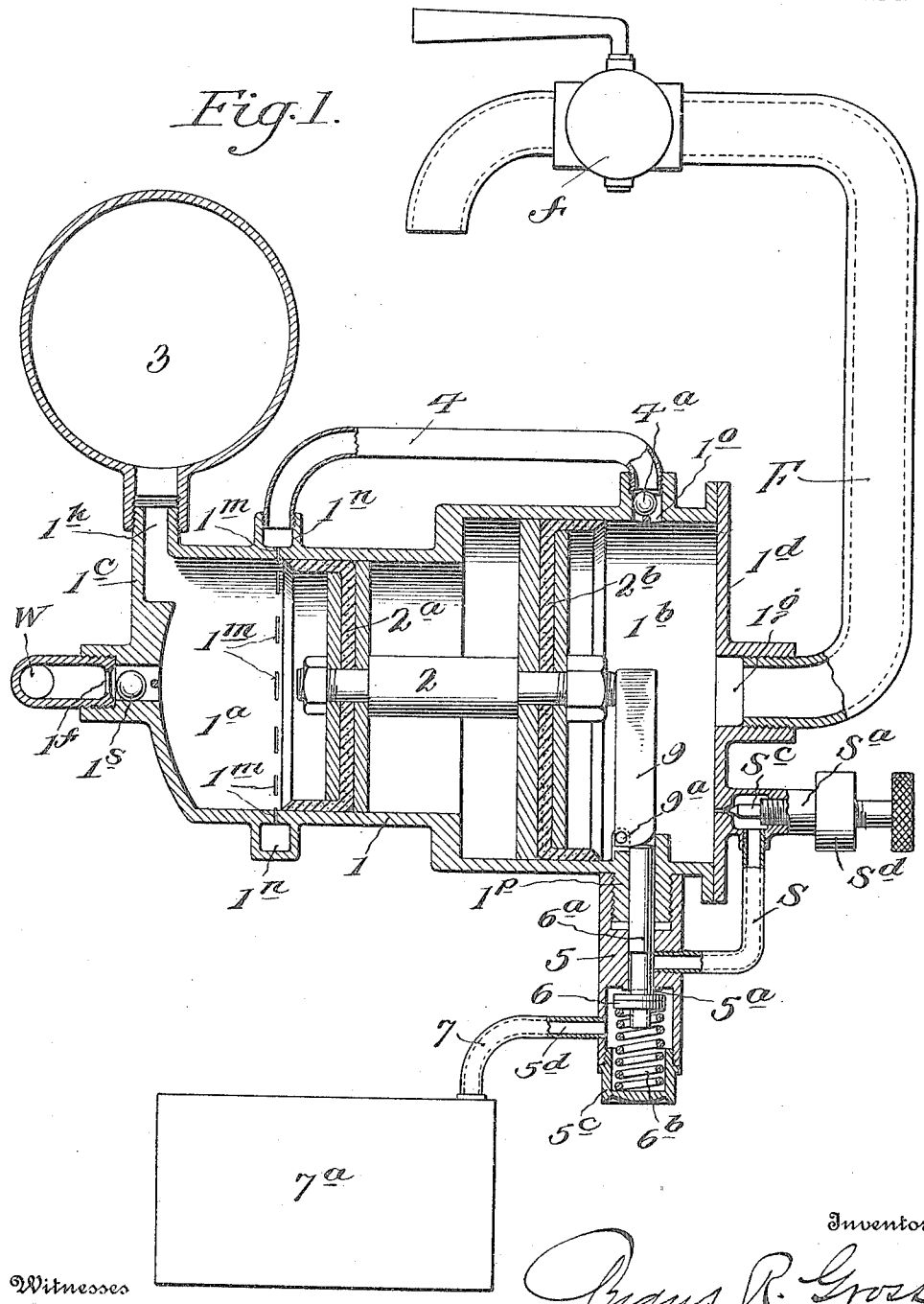
APPLICATION FILED FEB. 19, 1914.

1,136,004.

Patented Apr. 20, 1915.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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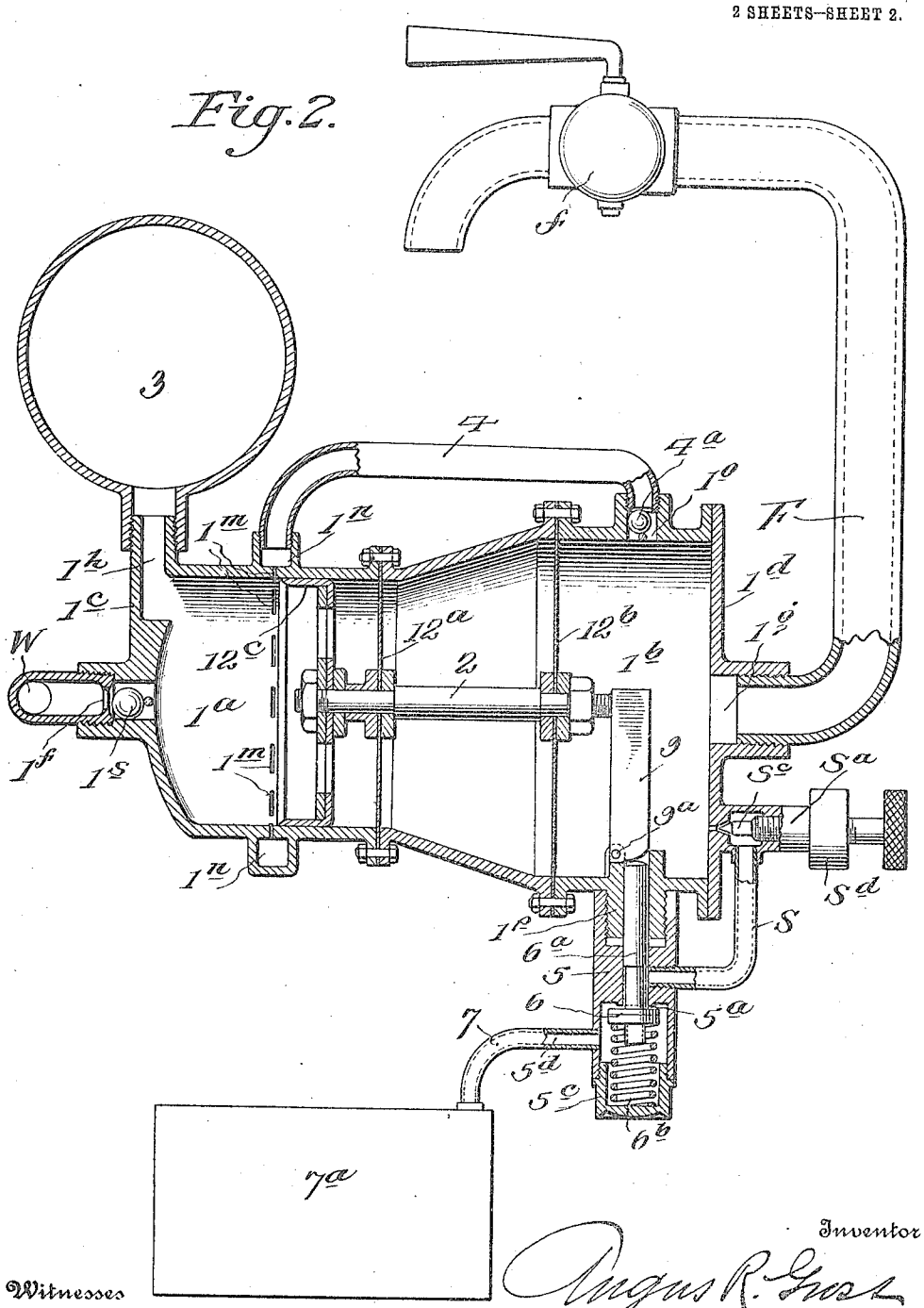
APPLICATION FILED FEB. 19, 1914.

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Patented Apr. 20, 1915.

2 SHEETS—SHEET 2.

Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR CARBONATING LIQUIDS.

1,136,004. Specification of Letters Patent. Patented Apr. 20, 1915.

Application filed February 19, 1914. Serial No. 819,807.

To all whom it may concern:

Be it known that I, ANGUS R. GROSS, a citizen of the United States, residing at Catonsville, in the county of Baltimore and State of Maryland, have invented certain new and useful Improvements in Apparatus for Carbonating Liquids; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is a novel improvement in apparatus for carbonating liquids; and its object is to provide a simple, inexpensive and efficient device whereby the water in its passage to the dispensing faucet or bottling devices, can be charged with carbonic acid gas and the supply of gas be cut off when the outflow of the water is stopped, and be automatically reëstablished when the outflow of water is resumed; and back passage of gas into the water supply prevented.

I will explain the invention in detail with reference to the accompanying drawings in which—

Figure 1 is a sectional elevation of a complete apparatus for charging water embodying the invention; and Fig. 2 is a similar sectional view showing a slight modification of such apparatus.

Referring to the drawings, 1 designates the casing of the apparatus, which preferably has an inlet chamber 1^a and an outlet chamber 1^b slightly larger in diameter than the inlet chamber; direct communication between these chambers, in the example shown, is prevented by a piston 2. The outer end of chamber 1^a is closed by a head 1^c; and the outer end of chamber 1^b is closed by a head 1^d. The head 1^c is provided with an inlet port or opening 1^f connected by a pipe W with a water supply; such as the ordinary city service water pipe. The head 1^d has an outlet opening 1^g connected by a pipe F to a dispensing faucet or bottling device, not shown, and such pipe F can be controlled by a valve *f*, which may be the dispensing faucet valve, and by opening and closing valve *f* the carbonating apparatus is automatically started into or cut out of operation. The chamber 1^a is preferably also provided with an opening 1^h, connected with an air chamber 3 of any suitable construction, to maintain an air cushion in the chamber 1^a at the side of the piston 2 next the water inlet.

Within the chamber 1^b, as shown in Fig. 1, is a piston 2^b which may be rigidly connected with piston 2^a by means of a stem 2, as indicated in the drawings, so that the said pistons 2^a and 2^b move synchronously. Said pistons, as shown, may be provided with cup-leathers to maintain close joints with the walls of their respective chambers.

A passage is provided for conducting water from the chamber 1^a to the chamber 1^b; this passage is shown as a pipe 4 which connects with the chamber 1^b and with an annular chamber 1^n exterior to chamber 1^a and communicating therewith through an annular series of ports 1^m in the walls of said chamber, which ports 1^n are controlled by the piston 2^a, or cup-leather of such piston; the same serving as a valve to close said ports 1^n in one position of the piston, and to open the ports in another position thereof, said ports being shown open in Fig. 1. From the chamber 1^n the passage 4 conducts water to a port 1^o leading into chamber 1^b at the outer side of the piston 2^b. Said passage 4 may be provided with a check-valve 4^a of any suitable construction to prevent back flow of water or gas from the chamber 1^b into the chamber 1^a. I also prefer to provide the inlet port 1^f with a check-valve 1^s, of any suitable construction, to prevent back flow of water from the chamber 1^a into the pipe W.

Attached to the side of the casing of the chamber 1^b is a gas valve casing 5 having an outlet port 5^a closable by a valve 6 connected to the lower end of a rod 6^a that preferably projects into the chamber 1^b through a nipple 1^p on the side of said casing, to which nipple the gas valve casing 5 is screwed as shown. The valve 6 is adapted to close port 5^a, and it is held in normally closed position by means of a spring 6^b, interposed between the outer end of the stem 6 and a cap 5^c screwed into the outer end of the casing. Below the valve 6 the casing 5 is provided with an inlet port 5^d which is connected by a pipe 7 with a gas supply, or reservoir 7^a, which may be an ordinary liquid carbonic acid gas container. Above the valve 6 is an outlet port which communicates with a pipe

S leading to a regulating needle-valve casing S^a tapped into the head 1^d of the chamber 1^b, or other suitable part of said chamber, and provided with a needle-valve S^c whose stem projects through a stuffing box S^d on the outer end of the needle-valve casing as shown.

Within the chamber 1^b is a valve actuating lever 9, which is pivoted at 9^a adjacent the inner end of the stem 6^a of the gas valve 6, and the pivoted end of this lever is adapted to engage the stem 6^a and open valve 6 when the lever is rocked outwardly, as indicated in Fig. 1. The free end of lever 9 contacts with the end of the rod 2, projecting through the piston 2^b into chamber 1^b, when the faucet is open as shown in Fig. 1.

The operation of this device is as follows: The chamber 1^a is suitably connected to the water supply pipe, and the chamber 1^b to the outlet pipe, or draft pipe; and the gas valve 6 to the gas supply; the normal position of the parts, when the valve *f* is closed, will be with the piston valve 2^a closing the ports 1^m, the chamber 1^a being filled with water and the chamber 1^b with water mingled with gas; and when the valve 2^a closes ports 1^m the rod 2 is drawn backward with piston 2^b, and permits spring 6^b to close the gas valve 6. Now, if the valve *f* be opened so as to allow water to escape from chamber 1^b the reduction of pressure in chamber 1^b will allow the water to enter chamber 1^a and force pistons 2^a and 2^b to the right, uncovering the ports 1^m and permitting water to flow through the passage 4 from chamber 1^a into chamber 1^b; at the same time the outward movement of the piston 2^b would have rocked lever 9 and caused it to engage stem 6^a and open valve 6, so that gas is admitted from the gas valve to pipe S and through the needle-valve S^a into the chamber 1^b and commingles with the water therein and the charged water escapes from said chamber through the pipe F. This operation will continue as long as valve *f* is open; but when valve *f* is closed the pressure of the water and gas trapped in the chamber 1^b causes piston 2^b to move to the left and simultaneously move piston 2^a with it, closing ports 1^m; such movement being effected because of the larger area of the piston 2^b as compared with piston 2^a; such movement of the pistons causes lever 9 to release stem 6^a and permit spring 6^b to close the gas valve 6, thus automatically closing the gas supply when the water is cut off. A small amount of carbonated water will always remain in chamber 1^b and the pipe F (depending upon the size of said chamber and the length of the pipe between said chamber and valve *f*) and, when used on soda fountains, this would ordinarily be sufficient to provide several glasses of soda water.

In Fig. 2 the construction and operation of the parts is substantially the same as that above described, but in lieu of the pistons 2^a, 2^b, I have shown diaphragms 12^a, 12^b to which the rod 2 is connected; and an ordinary cup-valve 12^c is attached to the inner end of the stem 2 to close ports 1^m; the stem 2 is moved longitudinally in this instance, so as to cause valve 12^c to cover or uncover the ports 1^m in the same manner that the pistons 2^a, 2^b, control said ports in the construction illustrated in Fig. 1. Similar parts are similarly lettered in both figures.

It will be observed that each time the valve *f* is opened and charged water withdrawn, water is admitted into the apparatus and the gas valve is opened and such water is charged, and a predetermined supply of charged water is always maintained. The exact amount of gas admitted into the water may be nicely regulated by means of the needle-valve S^c, but this valve S^c is not indispensable but it is useful as a nice adjustment of the valve 6 is not necessary when the regulating valve S^c is used. Of course there will be no flow of water through the chambers 1^a, 1^b when the valve *f* is closed, and if the ports 1^m were not closed instantly after the valve *f* closes, they will be closed very quickly thereafter owing to the fact that the water in chamber 1^b is charged with gas and the gas tends to expand, while the water in chamber 1^a is inert, and the air chamber 3 permits back movement of piston 2^a even when the check-valve 1^s is closed. The check-valve 4^a will also prevent escape of charged water back into chamber 1^a and in some cases this check-valve 4^a may be sufficient to control the supply of water from the chamber 1^a to the chamber 1^b.

What I claim is:

1. An apparatus for carbonating liquids having an inlet and an outlet chamber, a passage for admitting liquid from the inlet chamber into the outlet chamber, a valve for closing said passage, a gas supply communicating with the outlet chamber, and means to automatically admit gas into said outlet chamber when water is withdrawn therefrom, and means for automatically closing the gas supply when the escape of liquid from said outlet chamber is cut off.

2. An apparatus for carbonating liquids having an inlet and an outlet chamber, a passage for admitting liquid from the inlet chamber into the outlet chamber, a valve for closing said passage, a movable member separating said chambers, a gas supply communicating with the outlet chamber, and means controlled by said member to admit gas into the outlet chamber when water is withdrawn therefrom, and means for closing the gas supply when the escape of liquid from said outlet chamber is cut off.

3. An apparatus for charging liquids having an inlet and an outlet chamber and a communication therebetween, a movable member separating said chambers, means for admitting liquid to the inlet chamber, means for withdrawing liquid from the outlet chamber, a gas supply connected with the outlet chamber, and means controlled by said movable member whereby gas is admitted to the outlet chamber when the liquid is withdrawn therefrom, and means whereby when the escape of liquid from the outlet chamber is cut off the pressure in the outlet chamber causes the closing of the gas supply.

4. An apparatus for charging liquids, having an inlet and outlet chamber and a communication therebetween, a movable member separating said chambers, means for admitting liquid to the inlet chamber, means for withdrawing liquid from the outlet chamber, a gas supply connected with the outlet chamber, and means controlled by said movable member whereby gas is admitted to the outlet chamber when liquid is withdrawn therefrom, and means whereby when the escape of liquid from the outlet chamber is cut off the pressure in the outlet chamber causes the closing of the communication between the inlet and outlet chambers, and also the closing of the gas supply.

5. An apparatus for charging liquids comprising inlet and outlet chambers, a liquid supply to the inlet chamber, and means for withdrawing liquid from the outlet chamber; a movable member intermediate said inlet and outlet chambers, and a passage for conducting the liquid around said member from one chamber to the other; with means for supplying gas to the outlet chamber, and means controlled by said movable member whereby when the liquid outlet means is opened the said passage and said gas passage are opened; and when the outlet means is closed the passage and the gas supply are closed.

6. An apparatus for charging liquids comprising two chambers, a movable member interposed between said chambers and closing communication therebetween, a passage for conducting liquid from one chamber to the other around said member, a liquid inlet to one chamber, a liquid outlet from the other chamber, a gas supply communicating with the latter chamber; means operated by the said member when liquid is withdrawn from the latter chamber to open the gas supply, and means whereby when the liquid outlet is closed the gas supply is closed, and means for closing the passage when the liquid outlet is closed.

7. An apparatus for charging liquids, comprising two chambers of different diameters, a movable member interposed between said chambers and closing communication therebetween, a passage for conducting liquid from one chamber to the other around said member, a liquid inlet to one chamber, a liquid outlet from the other chamber, a gas supply valve communicating with the latter chamber, means in the latter chamber adapted to be engaged by the said member and open the gas valve when the liquid outlet is opened, and means whereby when the liquid outlet is closed and the said member is retracted the gas valve is closed, and means operated by said movable member for closing the passage when the gas valve is closed.

8. The herein described apparatus for carbonating liquid comprising a casing having large and small chambers, an outlet port in the small chamber, means for conducting liquid from the outlet port to the large chamber, a valve in the small chamber for closing said outlet, a movable member between said chambers, a gas valve communicating with the larger chamber, a device in the latter chamber adapted to be actuated by said member and open the gas valve when the liquid is withdrawn from said chamber, and a spring for closing said gas valve when the outlet from said larger chamber is closed.

9. The herein described apparatus for carbonating liquid comprising a casing having large and small chambers, a passage for conducting liquid from one chamber to the other, a valve for closing said passage, a movable member between said chambers, a gas supply valve communicating with the larger chamber, means in said larger chamber adapted to be engaged by the member therein to open the gas valve when the liquid is withdrawn from said chamber, a spring for closing the gas valve when the outlet from said larger chamber is closed, and an air cushion chamber communicating with the small chamber.

10. The herein described apparatus for carbonating liquid comprising a casing having large and small chambers, a passage for conducting liquid from one chamber into the other, a valve in the small chamber for closing said passage, movable members in said chambers, means connecting said members, a gas supply valve communicating with the larger chamber, means in said larger chamber adapted to be engaged by the member therein to open the gas valve when the liquid is withdrawn from said chamber, a spring for closing the gas valve when the outlet from said larger chamber is closed, and a regulating gas valve between the gas supply valve and the said larger chamber.

11. The herein described apparatus for carbonating liquid comprising a casing having large and small chambers, an outlet port from one chamber, a passage for conducting liquid from said outlet port into the other chamber, a valve in the small chamber for closing said outlet, an air cushion chamber

communicating with the smaller chamber, movable pistons in said chambers, means connecting said pistons, a gas supply valve communicating with the larger chamber, means in said chamber adapted to be engaged by the piston to open the gas valve when the liquid is withdrawn from said larger chamber, a spring for closing said gas valve when the outlet from said larger chamber is closed, and a regulating gas valve between the gas supply valve and the said chamber.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

ANGUS R. GROSS.

Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."