

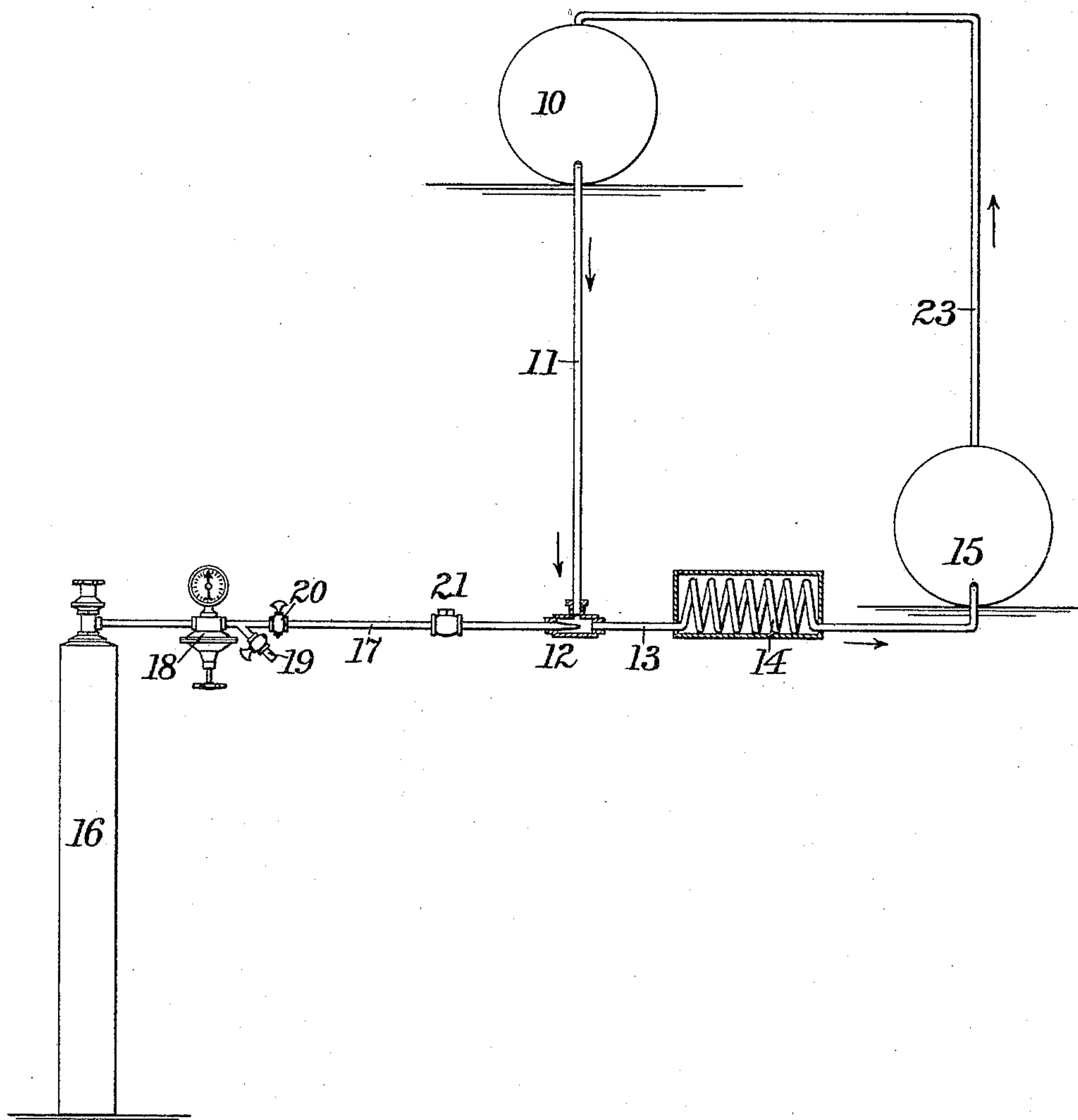
(No Model.)

J. & C. A. SCHNEIBLE.

ART OF AND APPARATUS FOR AERATING LIQUIDS.

No. 474,413.

Patented May 10, 1892.



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# UNITED STATES PATENT OFFICE.

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## ART OF AND APPARATUS FOR AERATING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 474,413, dated May 10, 1892.

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*To all whom it may concern:*

Be it known that we, JOSEPH SCHNEIBLE, of Brooklyn, in the county of Kings, and CARL A. SCHNEIBLE, of New York, in the county of New York, and State of New York, have invented certain new and useful Improvements in the Art of and Apparatus for Aerating Liquids; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing, and to the letters of reference marked thereon, making a part of this specification.

Heretofore the charging or aerating of liquids with carbonic or other gas has been effected by a more or less violent mixing of the gas with the liquid, as by agitation of the liquid in a closed vessel with the gas, or by discharging the gas under high pressure into the liquid, or by using the gas under high pressure in an atomizing apparatus, or by forcing the mingled gas and liquid under high pressure through a series of fine apertures or through a mechanical stirrer or agitator, or by forcing the liquid in the form of a fine spray into a receptacle filled with the gas and subsequently fixing the mixture by agitation. Other processes more or less analogous to some of the foregoing have also been used and in all of them a greater or less degree of violence in the mixing has been considered an essential. Furthermore, in all methods hitherto practiced the mixing of the gas with the liquid has been followed almost immediately by a reduction of the pressure upon the charged liquids. In one instance it has been attempted to provide for the carbonating of liquid as it is drawn from a dispensing-cock by causing the gas to pass under a high pressure through an ejector-nozzle into a water-pipe which is connected directly with the dispensing-cock. In this case neither the gas nor the water will flow while the dispensing-cock is closed, and consequently the operation is not continuous. Moreover, when the dispensing-cock is open the water is propelled rapidly by the gas through the pipe and the dispensing-cock, and as no pressure is then maintained upon the water and gas there is no fixing of the gas in the water, but gas and water in varying relative proportions issue

from the cock, and such gas as may be carried along by the water into the receiving-vessel is immediately given off and the water becomes still. After many experiments and by most careful and oft-repeated tests we have discovered that vastly superior results may be secured by altogether avoiding violence throughout the process of charging and by mixing the gas with the liquid as quietly as possible. We have also found that it is necessary to maintain pressure upon the liquid throughout the process of charging—that is, after the introduction of the gas, as well as before. Actual measurements show that by the use of our process, as compared with the processes heretofore followed, a given quantity of liquid will be more heavily charged and the gas will be retained by the liquid for a longer time and given off with less freedom when the liquid is exposed to atmospheric air, apparently indicating a more intimate union of the gas with the liquid. The further results are that there is much less waste of gas both during the process of charging and subsequently thereto, and that the foaming and frothing of liquids which are subject to such action, as beer, is almost entirely prevented.

The process which we have invented and which is designed to accomplish the results mentioned and to provide for the continuous charging of any quantity of liquid which may thereafter be withdrawn from the apparatus for storage or transportation or any other purpose consists, essentially, in allowing or causing the liquid to be charged to flow continuously and quietly in a smooth and steady stream at a suitable point in the stream or current, introducing a steady and quiet flow of gas, making the pressure on the gas and that on the liquid as nearly equal as possible at the point of mingling and in maintaining a constant and uniform pressure upon the liquid after the introduction of the gas.

In the accompanying drawing we have illustrated an apparatus which may be used to carry our improved process into effect; but we do not intend to limit our invention by anything that is shown in said drawing, and many different arrangements of apparatus might be used to practice our process.

In the apparatus shown for illustration of



the process the liquid to be charged flows through a pipe 11 under the influence of gravity or of a pump from a supply tank or vessel 10. At a convenient point in the pipe is placed a suitable connection 12 for the gas-supply, and thence a pipe 13 conducts the liquid through a cooler 14 into the bottom of a receiver 15. The gas-supply, which is shown as an ordinary liquid-carbonate container 16, is connected with the liquid-supply pipe at 12 by a pipe 17, which is provided with a pressure-regulating valve 18, a supplemental regulating-valve 19, a stop-valve 20, and a check-valve 21. The supply-tank 10 is placed at such a height or the pump is so regulated as to give to the liquid in the pipe a suitable pressure. The pressure-regulating valve 18 of the gas-supply is set to maintain the pressure upon the gas as it enters the moving column of liquid at 12 as nearly equal as possible to the pressure on the liquid at that point.

Instead of allowing the pressure to be reduced after the mixing of the gas we maintain the pressure upon the liquid after the introduction of the gas as well as before, and this we accomplish in the apparatus shown by making both the supply-tank and the receiver as closed vessels and by connecting them by a pipe 23. Whatever pressure is then put upon the liquid in the pipe 11 the same pressure will therefore be maintained upon the liquid after it is mingled with the gas, and the absorption and fixing of the gas in the liquid will be facilitated accordingly.

Before the process of charging is commenced an initial pressure is established throughout the system of pipes and tanks. As this initial pressure is intended not to introduce gas into the liquid, but to operate merely as a cushion to fix the gas already in the liquid, it may be established in any convenient manner, as by admitting either gas or compressed air. The degree of this initial pressure varies according to the degree to which the liquid is to be charged; but some degree of pressure is essential, as without it the gas would not become fixed in the newly-charged liquid. The connection of the return-pipe 23 enables the pressure to be maintained uniformly without the use of relief-valves and without requiring any further attention from the operator, as the gas or air displaced in the receiving-tank by the inflowing liquid will take the place in the supply-tank of the liquid drawn therefrom. Furthermore, as the system of pipes is nowhere open to the atmosphere there can be no waste of gas.

We prefer to assist in fixing the gas in the charged liquid by cooling the same as it passes from the mixing-point, as indicated in the drawing.

The practice of our improvement in the art of aerating or charging liquids, whether carried on by the apparatus described above or by any other suitable apparatus, has always in view as the immediate result to be attained

the avoidance of all violent agitation during the entire process and the effecting of the first mixing of the gas with the liquid as quietly as possible. To this end, therefore, we put both the liquid and the gas under suitable and substantially equal pressure, causing both to flow continuously in steady and quiet streams, and mingle the gas and liquid quietly and with the least possible agitation, maintaining the mingled gas and liquid under pressure to effect the combination of the two. It is important to preserve a substantial balance between the pressure on the gas and liquid, as any material excess of pressure on the gas would produce corresponding agitation at the point of the mingling of the gas and liquid. We also maintain the pressure upon the liquid substantially equal before and after the mingling of the gas therewith, or, in other words, maintain about the same pressure in the supply-tank and in the receiving-tank. This balance of pressure on the liquid before and after the mingling with the gas is most conveniently effected by establishing free communication without access to the external air from the surface of the charged liquid to the supply of liquids to be charged.

It is of course essential, in order that the liquid may flow into the receiver, that the pressure on the liquid before it reaches the receiver shall be greater than that on the surface of the liquid in the receiver. The latter is of course the initial pressure, which is established before the process of charging is commenced, while the excess of the former is secured by elevating the supply-tank or by using a pump. Accordingly the pressure on the liquid at the point where the gas is introduced is equal to the initial pressure plus the weight of the column of water at that point, and this total gives the figure at which the regulating-valve in the gas-supply pipe must be set.

We claim as our invention—

1. The improvement in the art of aerating or charging liquids with gas, which consists in producing a smooth and steady flow of the liquid under a uniform pressure, producing a smooth and steady flow of the gas under a uniform pressure, mingling the gas and liquid quietly and without agitation, and maintaining a uniform pressure upon the mingled gas and liquid, substantially as shown and described.

2. The improvement in the art of aerating or charging liquids with gas, which consists in producing a smooth and steady flow of the liquid under a uniform pressure, producing a smooth and steady flow of the gas under a uniform pressure, mingling the gas and liquid quietly and without agitation, and maintaining a substantially equal pressure upon the liquid before and after the mingling of the gas therewith, substantially as shown and described.

3. The improvement in the art of charging liquids with gas, which consists in producing



a smooth and steady flow of the liquid under pressure, producing a smooth and steady flow of the gas under a substantially equal pressure, mingling the gas and liquid quietly  
5 and without agitation, and establishing free communication, without access to the external air, between the surface of the charged liquid and the supply of liquid to be charged, substantially as shown and described.

10 4. An apparatus for charging liquids with gas, comprising a liquid-supply tank, a receiving-tank, a pipe for communicating the liquid from the supply-tank to the receiving-tank, means for introducing gas into the  
15 moving column of liquid in said pipe, means

for maintaining the pressure of the gas substantially equal to the pressure on the liquid, and an independent pipe for establishing free communication below the surface of the liquid in the receiving-tank and the liquid in  
20 the supply-tank, substantially as shown and described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOSEPH SCHNEIBLE.  
CARL A. SCHNEIBLE.

Witnesses:

A. N. JESBERA,  
A. WIDDER.