L. NEUMAYER.

METHOD OF AERATING LIQUIDS.

APPLICATION FILED JUNE 1, 1910.

1,045,066.

Patented Nov. 19, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

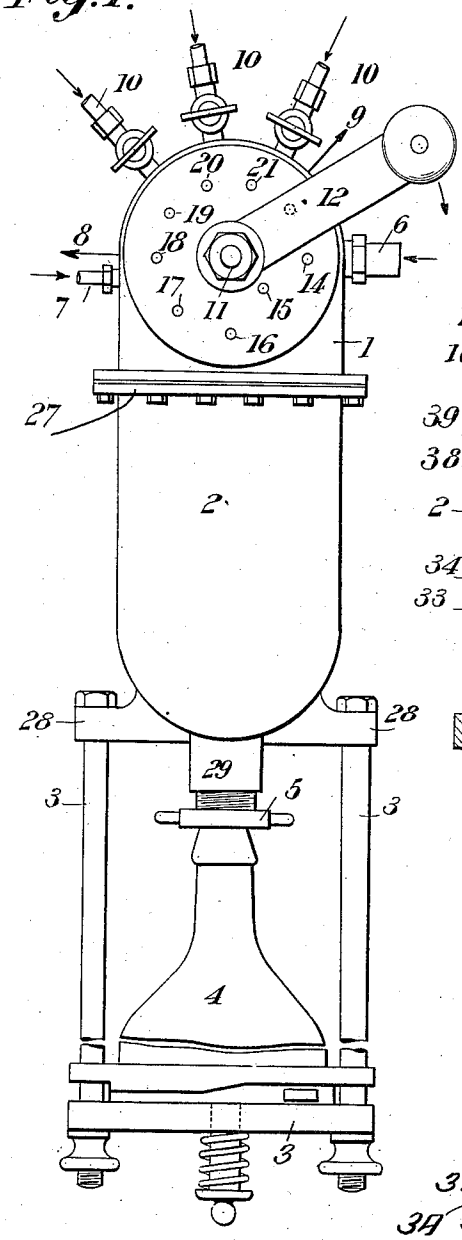

Fig. 2.

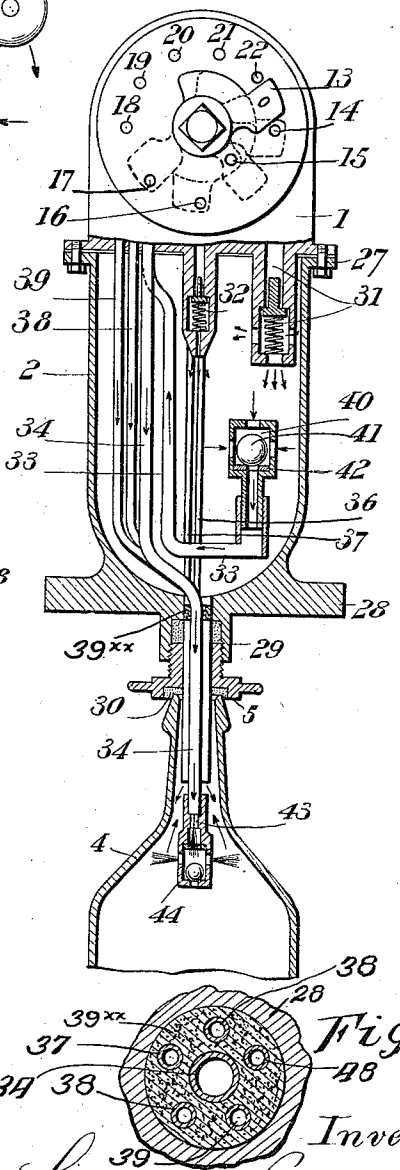

Fig. 8.

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2 SHEETS—SHEET 2.

Fig. 3.

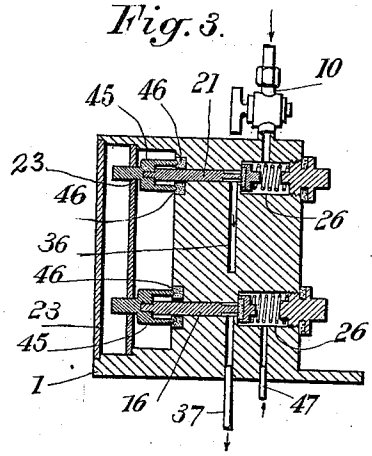


Fig. 6.

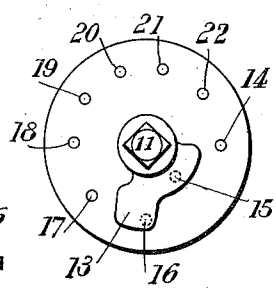


Fig. 7.

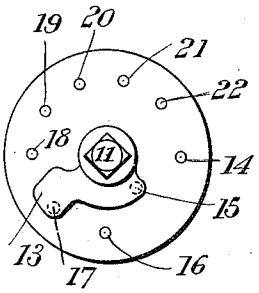


Fig. 9.

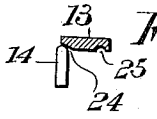


Fig. 4.

Fig. 10.

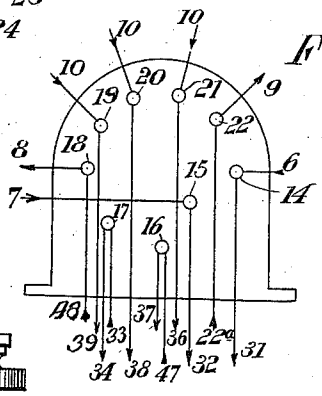


Fig. 5.

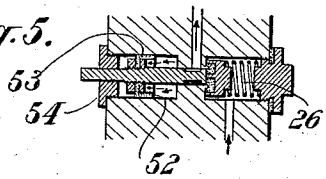
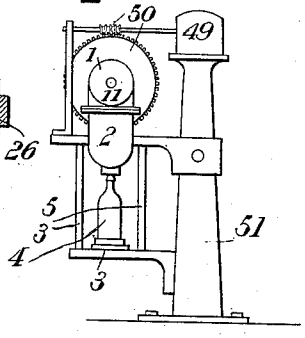


Fig. 11.



Witnesses:

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UNITED STATES PATENT OFFICE.

LUDWIG NEUMAYER, OF STRASSBURG, GERMANY.

METHOD OF AERATING LIQUIDS.

1,045,066. Specification of Letters Patent. Patented Nov. 19, 1912.

Application filed June 1, 1910. Serial No. 564,463.

To all whom it may concern:

Be it known that I, LUDWIG NEUMAYER, a subject of the German Emperor, and resident of Strassburg, Germany, have invented certain new and useful Improvements in Methods of Aerating Liquids, of which the following is a specification.

This invention relates to improvements in a method of aerating liquids during the bottling operation.

The object of my improved method is to inject gas under pressure to a confined column of liquid and permit a portion of the gas to escape and subsequently confine same, and finally subject the liquid to a further charge of gas and force the aerated liquid in sprays to the gas previously expelled from the column of liquid.

By the employment of this method the gas thoroughly impregnates the liquid.

In carrying out my improved method I have illustrated an apparatus such as shown and described in my patent, dated April 9, 1912, No. 1,022,968.

In the accompanying drawings:—Figure 1 is a front elevation of my improved apparatus, Fig. 2 is a longitudinal section of the same, the parts being illustrated in elevation, and parts being broken away, Fig. 3 is a vertical section of the valve box, Fig 4 is a horizontal section of the same, Fig. 5 is a detail sectional view of a modified form of valve, Fig. 6 is a detail front view of the valve box, the valve stem and their operating element, Fig. 7 is a similar view, but showing the operating element in a different position, Fig. 8 is a horizontal section showing the arrangement of the pipes, in the neck of the mixing tank, Fig. 9 is a detail of a valve stem and the operating element, Fig. 10 is a diagrammatic view, illustrating the ports and the points to which the ducts or pipes lead, Fig. 11 is a view illustrating on a somewhat reduced scale the apparatus driven by a motor.

My improved apparatus comprises essentially a valve box 1, a mixing tank 2, and the device 3 for fitting a bottle 4, in place to be filled.

The valve box 1, is provided with a number of inlet ports and inlet pipes—6, designates a water inlet pipe; 7 the inlet pipe for carbonic gas; 8 the port for venting the bottle; 9 the port for venting the mixing tank 2; and 10 designates syrup inlet pipes.

Mounted in the valve box 1, is a driving shaft 11, having a crank 12, and a valve operating blade 13. Also mounted in the valve box 1, are valves 14, 16, 17, 18, 19, 20, 21, and 22, and in said valve box between the before mentioned valves and the shaft 11, is a valve 15, all the valves except valve 15, being arranged concentrically with reference to the shaft 11, the stems of said valves being arranged in the path of movement of the valve operating blade 13. The stems of the valves operate in guide openings in a plate 23, the valve operating blade fitting closely to said plate. The valve operating blade 13 is preferably provided with an incline surface 24 to engage the ends of the valve stems, and it is also provided with a depression 25, which offers a point of rest for the valve stems during the operation of the apparatus. Each valve is held in operative position by means of a spring 26.

The mixing tank 2 is preferably made of metal and is connected to the valve box 1, at the flanged end 27, its bottom being preferably curved. At the bottom of the tank 2, are ears 28, which support the bottle clamping device 3. The bottom of the mixing tank is formed with a tubular extension 29, through which certain of the pipes pass. The tubular extension 29, is threaded and receives a packing head 5, having a gasket 30, against which the upper edge of the bottle is pressed during the operation of filling.

A pipe 31, extends from the valve 14, into the mixing tank 2, to introduce water to the latter, and a pipe 32, communicates with the valve 15, and the tank 2, to supply carbonic acid gas to the latter. The inner ends of the pipes 31 and 32 are provided with check valves to prevent back pressure against the valves 14 and 15.

From the gas distributing valve 16, leads a pipe 37, the end of which passes through the extension 29 and into the neck of the bottle. With the valve 17, communicates a pipe 34, which also passes through the extension 29, and into the bottle, and at its lower end is attached a spraying device 44, for spraying the water to cause a thorough intermixing of the same while being introduced in the bottle. Also communicating

with the valve 17, is a pipe 33, which extends down within the tank 2. The end of the pipe 33, turns upwardly, and receives a cage 41, formed with a series of openings. In the cage is a float valve 40, designed to close the exit of the pipe 33, as shown in Fig. 2. The cage is formed with a stem 42, which fits in the end of the pipe 33, and may be adjusted therein. A pipe 48 communicates with the valve 18, and from the latter leads the vent pipe 8. From the valves 19, 20 and 21, lead pipes 39, 38, and 36, all of which extend through the tank 2, and into the neck of the bottle. The pipes 10, communicate with the valves 19 to 21, so that syrups may be introduced to the bottle if desired. A duct 22^a communicates with the tank 2, and the valve 22, to vent the tank after a bottle has been filled.

The pipes are assembled in compact form to pass through the head 5, and into the bottle 4, and are preferably soldered together as at 39 to fill the interstices between said pipes to close the outlet from the tank 1, to prevent the gas and liquid escaping therefrom.

Owing to the necessary high pressure in an apparatus of this type the ordinary stuffing boxes cannot be employed, and to meet the requirements I provide the valve stems with metallic heads 45, which engage rubber buffers 46, to form elastic seats. This construction effectually prevents the escape of gas or liquid.

In lieu of the valves previously described I may employ the modified structure shown by Fig. 5. In this construction the chamber 52, surrounding the valve stem is enlarged and a leather cap 53, is secured on the stem. When the valve is opened the gas accumulates in the hollow part of the cap 53 and presses the latter tightly against the walls of the casing thus producing an automatic and absolutely tight joint. The screw plugs 54, serve to guide the valve stems in their movement.

The operation of the apparatus is substantially as follows: A bottle 4, to be filled, is held by the bottle holding device 3, the upper edge of the neck bearing against the head 5, to seal the joint. Upon revolving the shaft 11, the valve operating blade 13, first engages the end of the valve 14, and forces the same inwardly and admits water under pressure to the mixing tank 2, until the air contained in said tank is compressed to a degree that it may counterbalance the pressure of the liquid. As the water rises in the tank, the spherical float valve 41, in the cage 40, will rise and open the pipe 33, and permit the water to flow into pipe 33. Upon further rotation of the blade 13, it leaves the valve 14 and its spring automatically closes it. The blade 13 next contacts with and opens the valve 15, which admits a supply of carbonic acid gas to pass through the pipe 32 to the tank 2. The carbonic acid gas is forced into the tank under high pressure through the nozzle on the pipe 32, which agitates the water and causes the gas to become intimately mixed therewith. This operation produces what I term the first aeration of the liquid.

Upon further rotation of the shaft 11, the blade 13 is operated on the stem of valve 16, and opens the latter, the valve 15 being held open at this time by an extension on the blade 13, as shown in Fig. 6. From the valve 16 leads a duct 47, which communicates with the tank 2, while a pipe 37 also leads from the valve 16, and extends into the bottle, so that when valve 16 is opened the gas passes from the tank 2 through duct and pipe 37 to the bottle.

During the time the valves 15 and 16 are open, the pressure in the tank and bottle is the same. When the blade 13 is again moved it permits valve 16 to close, and encounters and opens the valve 17. Communicating with the valve 17, is the pipe 33, and the escape pipe 34, the latter leading to the bottle.

When the valve 17 is opened the following action occurs. The liquid which has already been aerated in the mixing tank, is forced with great pressure through the small openings of the nozzle 43, into the bottle 4, in separated streams until the bottle is filled. This operation obviously aerates the liquid a second time and thereby insures a thorough intermixing of the gas and liquid. When the bottle is filled the valve 44 rises and closes the pipe 34. The position of the ball valve 44 may be changed by screwing its supporting cage more or less on the end of the pipe, whereby the volume of liquid introduced into the bottle may be altered. When the liquid falls below the cage 40, the spherical float valve 41, closes the pipe 33, and prevents the gases from entering the bottle. As will be readily seen, the more the cage 40 is elevated from the mouth of the pipe 33, the smaller will be the volume of liquid forced through the valve 17, and into the bottle 4.

The bottle containing the liquid, which has now been mixed twice with gas, could be removed, but this would set up a shock and detonation produced by the gases accumulated above the liquid in the bottle. In order to avoid this occurrence, the valve 18 is provided. When the blade 13 is moved from the valve 17, it opens valve 18, and as the pipe 48, communicates with said valve, and when the latter is opened the excess of gas in the bottle escapes to the atmosphere through pipe 8. When it is desired to add extracts to the aerated liquid in the bottle, the blade 13 is moved again to open the pipes 10, and the respective syrups pass

through the valves 19, 20 and 21, respectively. The syrup flows under pressure into the bottle through the respective pipes 39, 38 and 36.

After the bottling operation is completed, the blade 13, is moved to open valve 22, to vent the gas in tank 2, through opening 9, to the atmosphere, thereby relieving said tank of pressure.

The diagram shown in Fig. 10, illustrates the position of the pipes with respect to the valves, the arrows indicating the course followed by the liquids and the gases.

The actuating shaft 11, instead of being actuated by means of the crank as shown in Fig. 1 may be caused to rotate by a worm 50, operated by a motor 49. In this case, the device is preferably mounted on a framework 51, as shown in Fig. 11.

Having now fully described my invention, what I claim and desire to secure by Letters Patent, is:—

The herein described method of aerating liquid, consisting in supplying gas under pressure to a column of confined liquid, permitting a portion of the gas to escape from the column of liquid and subsequently confining the escaping gas, and finally subjecting the column of liquid to an additional charge of gas and forcing the aerated liquid in sprays to the confined gas previously expelled from the column of liquid.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

LUDWIG NEUMAYER.

Witnesses:

CARL W. SCHMITT,

AUGUST OOSTERMAN.