A. KAYSER.

APPARATUS FOR GENERATING CARBONIC ACID GAS.

No. 181,268. Patented Aug. 22, 1876.

Fig. 1.

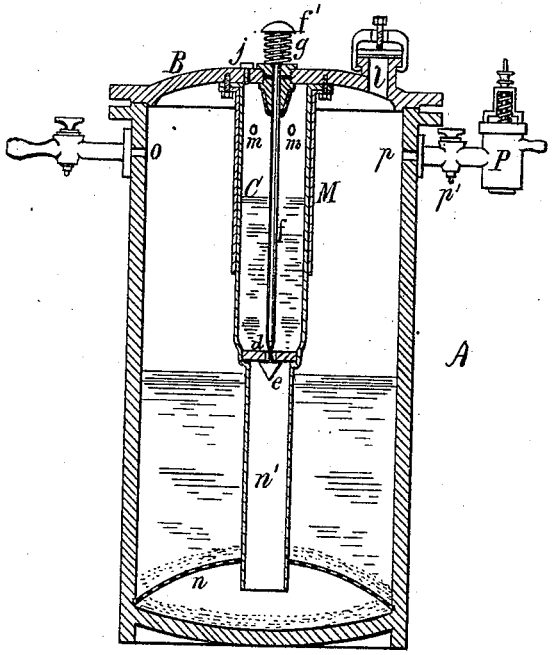


Fig. 2.

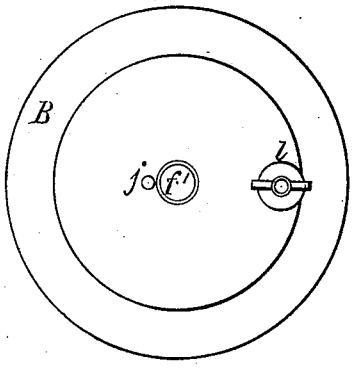
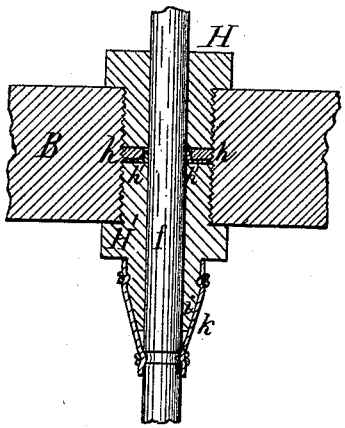


Fig. 3.



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UNITED STATES PATENT OFFICE.

ADOLPH KAYSER, OF BUFFALO, NEW YORK, ASSIGNOR TO PASCAL P. PRATT, OF SAME PLACE.

IMPROVEMENT IN APPARATUS FOR GENERATING CARBONIC-ACID GAS.

Specification forming part of Letters Patent No. **181,268**, dated August 22, 1876; application filed June 30, 1876.

To all whom it may concern:

Be it known that I, ADOLPH KAYSER, of the city of Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Apparatus for Generating Carbonic-Acid Gas, which improvements are fully set forth in the following specification, reference being had to the accompanying drawing.

My improvements relate to an apparatus composed of an outer tight shell or case, partly filled with an alkali solution, and an inner acid-reservoir arranged above the level of the alkali solution, and provided with a discharge-opening, which is opened and closed by a suitable valve actuated by a rod projecting through the top cover of the apparatus.

My invention consists of certain means for bringing the acid in contact with the alkali in the most direct manner, and for rendering the movements of the valve-rod easy, and at the same time gas-tight, as will be hereinafter fully explained.

In the accompanying drawing, Figure 1 is a vertical section of my improved apparatus. Fig. 2 is a top-plan view thereof. Fig. 3 is a detached sectional view, on an enlarged scale, of the valve-rod and cover of the apparatus.

Like letters of reference refer to like parts in each of the figures.

A represents the cylindrical body of the apparatus, constructed of wrought or cast iron, or any other suitable metal; and B, the cover or top plate closing the upper end of the cylinder A. C is the acid-receptacle, constructed, preferably, of lead, and secured to the under side of the cover B, so as to depend therefrom. *d* is the bottom of the acid-receptacle, composed of lead, glass, or other suitable material, and provided with a central opening, through which the acid is discharged. *e* represents the valve for regulating the discharge of the acid through this opening. It is secured to the lower end of the stem or rod *f*, so as to bear against the under side of the bottom *d* of the acid-reservoir, as clearly shown. The valve-stem *f* passes through an opening in the cover B, and is provided above the latter with a knob or disk, *f'*, for conveniently operating it. *g* is a spiral spring, interposed between the knob *f'* and the cover B of the apparatus, so as to hold the valve *e* tightly against its seat. The stem *f* is guided in the cover B by two glands or sleeves, H H', screwed into the cover B from opposite sides, and provided with an interposed packing-ring, *h*. The opening in the latter is made somewhat larger than the stem *f*, so that the packing does not bear against the latter. *h'* is a ring or collar, fitting loosely on the stem *f*, and arranged within the packing-ring *h*, so as to prevent the latter from pressing against the stem *f* when being compressed by the glands H H'. The lower sleeve H' is constructed with an extension, *i*, to which is secured the upper end of a short tube or sleeve, *k*, of rubber or other flexible material, while the lower end of the tube *k* is secured to the valve-stem *f*. As shown in the drawing, the extension *i* and stem *f* are each provided with an annular groove, over which the ends of the rubber tube *k* are secured by winding wires around them, as clearly represented in Fig. 3.

The pliability of the tube *k* permits the valve-stem, which fits loosely in the glands H H', to be raised and lowered with great ease, while it forms a gas-tight connection between the two parts.

j represents an opening formed in the cover B for introducing the acid into the receptacle C. The opening *j* is closed by a screw-plug, as shown in Fig. 1, or in any other suitable manner. M represents a cylinder, of cast or wrought iron or similar material, in closing the lead cylinder C, so as to prevent the same from being bent or otherwise displaced or injured in shipping the apparatus. *m* represents openings formed in the upper part of the acid-reservoir C and inclosing-cylinder M, so as to admit the gas into the reservoir C, thereby equalizing the pressure within and without the same, and permitting the free escape of the acid when the valve is opened. *n* represents a perforated plate or diaphragm, arranged above the bottom of the cylinder A, so as to form a shallow chamber between them. *n'* is a pipe secured to the under side of the bottom *d* of the acid receptacle. It penetrates the perforated plate *n*, and terminates at a short distance above the bottom of the cylin-

der A, as clearly shown in Fig. 1. *l* is an opening formed in the cover B for introducing the alkali into the cylinder A. It is closed by a suitable plate, held in place by a bail and set-screw, in a common manner. O represents the gas-escape aperture, through which the gas is taken from the apparatus under the full pressure. It is provided with a suitable faucet or valve for opening and closing it. *p* represents the second gas-escape aperture, also provided with a stop cock or valve, *p'*, and leading to an automatic pressure-valve, P, by which the gas-pressure is reduced to a point at which it can be safely admitted to casks containing malt liquors and similar liquids without danger of causing them to leak, or interfering with the drawing off of the liquid.

In charging the apparatus the cylinder A is filled with water to within a short distance from the bottom of the acid-vessel, as represented in Fig. 1. A quantity of alkali—preferably bicarbonate of soda—suitable to the size of the apparatus is then introduced through the opening *l*. A small portion of alkali is dissolved by the water, while the remainder descends and settles upon the perforated plate *n*, or, passing through the openings thereof, lodges on the bottom of the cylinder A. A proportionate quantity of sulphuric acid is then introduced into the receptacle C through the opening *j*, when both openings are securely closed.

By pressing upon the knob *f'* the valve *e* is opened, and the acid permitted to escape into the tube *n'*, by which it is conducted directly to the space between the perforated plate *n* and the bottom of the vessel A, where it comes in contact with the undissolved alkali, and generates carbonic-acid gas. The gas so generated on the bottom of the apparatus rises through the superincumbent body of alkali solution, whereby it is thoroughly purified, and accumulates in the upper portion of the vessel A.

The layer of alkali on the perforated plate assists in preventing any of the sulphuric acid from being carried up by the gas into the alkali solution, and insures the production of perfectly pure carbonic-acid gas. When the desired quantity of sulphuric acid has been admitted to the vessel A, the knob *f'* is released, when the valve *e* is closed by the spring, and the generation of gas arrested. The gas generated directly underneath the tube *n'* accumulates in the upper portion thereof, and displaces the alkali solution contained therein, so that the tube *n'* is filled for the greater part of its height with gas only. By this means the acid discharged from the vessel C is enabled to reach the undissolved alkali on the bottom of the apparatus quicker and in a less diluted state than when it is allowed to descend through the entire body of alkali solution, thereby making the generation of the gas instantaneously, or immediately following the opening of the valve *e*. The gas contained within the tube *n'* is subjected to a slight pressure, corresponding with the difference in the heights of the liquid levels within and around the tube *n'*, whereby the gas is caused to press against the under side of the bottom of the acid-vessel C, and any leakage of the acid through the opening in the bottom thereby prevented. By admitting a greater or less quantity of sulphuric acid to the vessel A, any desired quantity and pressure of gas can be produced in my apparatus. The gas required for the manufacture of soda-water is drawn off by the aperture *o*, while the other aperture, *p*, provided with the automatic valve P, is connected with the cask containing the malt liquor. The vessel A is, preferably, provided with a pressure-gage, for determining when the desired quantity of gas has been generated, and with a safety-valve to prevent an excessive pressure being produced. The sulphuric acid discharged from the vessel C is brought in direct contact with the layer of alkali on the bottom of the vessel by the pipe *n'*, whereby it is completely absorbed or neutralized, and any injury to the metallic surfaces prevented. The valve-rod *e* and stem *f* are, preferably, constructed of steel, and covered with lead, to prevent their corrosion by the sulphuric acid.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the generating-vessel A B and acid-receptacle C, of the perforated diaphragm *n* and the tube *n'*, opening into the space between the diaphragm *n* and the bottom of the vessel A, substantially as and for the purpose hereinbefore set forth.

2. The combination, with the movable rod *f* and stationary guide *i*, of the flexible tube *k*, secured to the same, as described, for forming a gas-tight joint between the parts, while permitting the rod to be easily moved, substantially as hereinbefore set forth.

3. The combination, with the movable rod *f* and glands H H', of the flexible tube *k*, packing-ring *h*, and collar *h'*, substantially as and for the purpose hereinbefore set forth.

4. A carbonic-acid-gas generator, composed of the vessel A B, acid-receptacle C, perforated diaphragm *n*, tube *n'*, valve and stem *e f*, and spring *g*, substantially as shown and described.

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