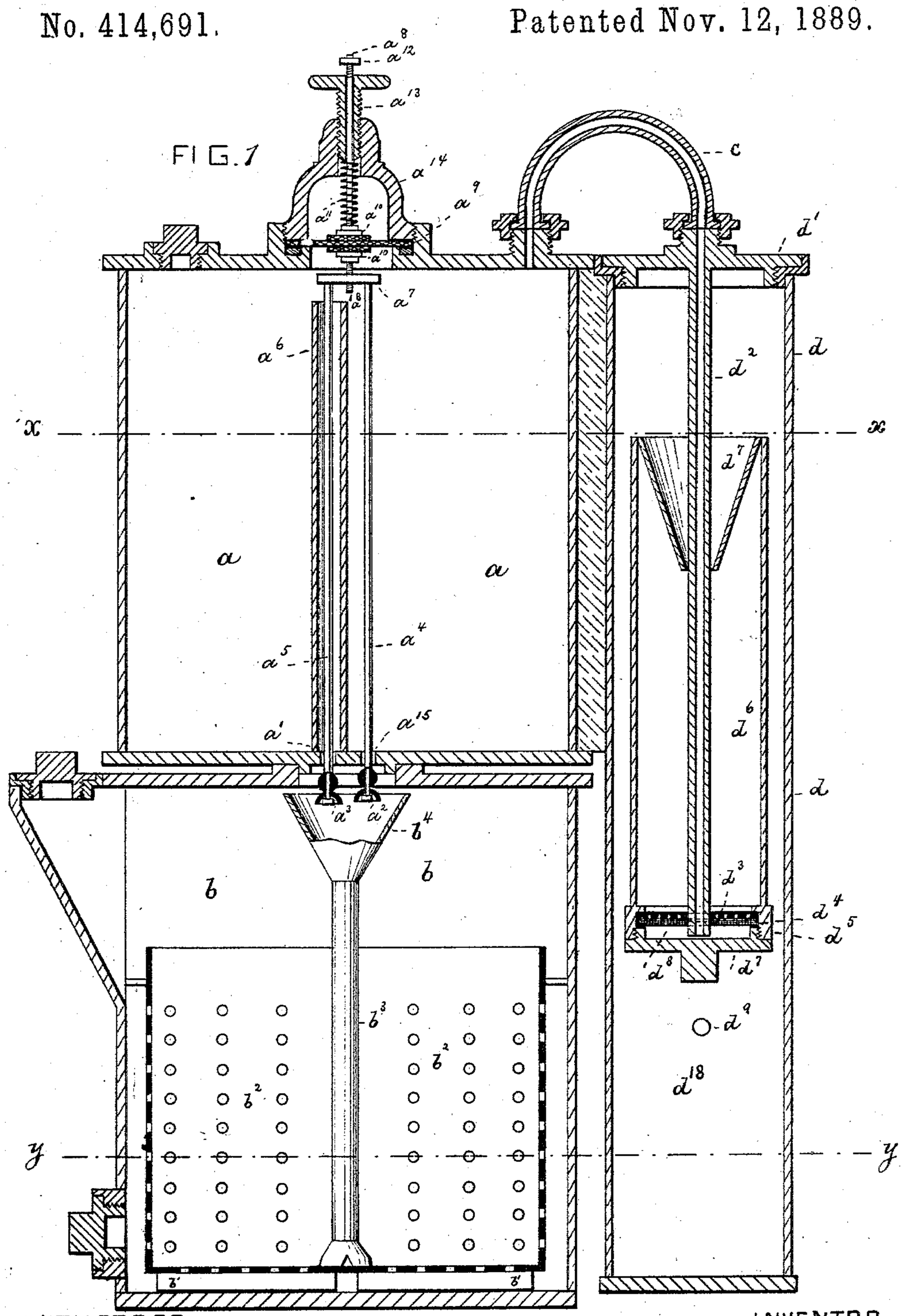
(No Model.) 3 Sheets—Sheet 1.

# J. A. FELD & J. SIEBRECHT.

## CARBONIC ACID GAS GENERATOR.

No. 414,691. Patented Nov. 12, 1889.

FIG. 1

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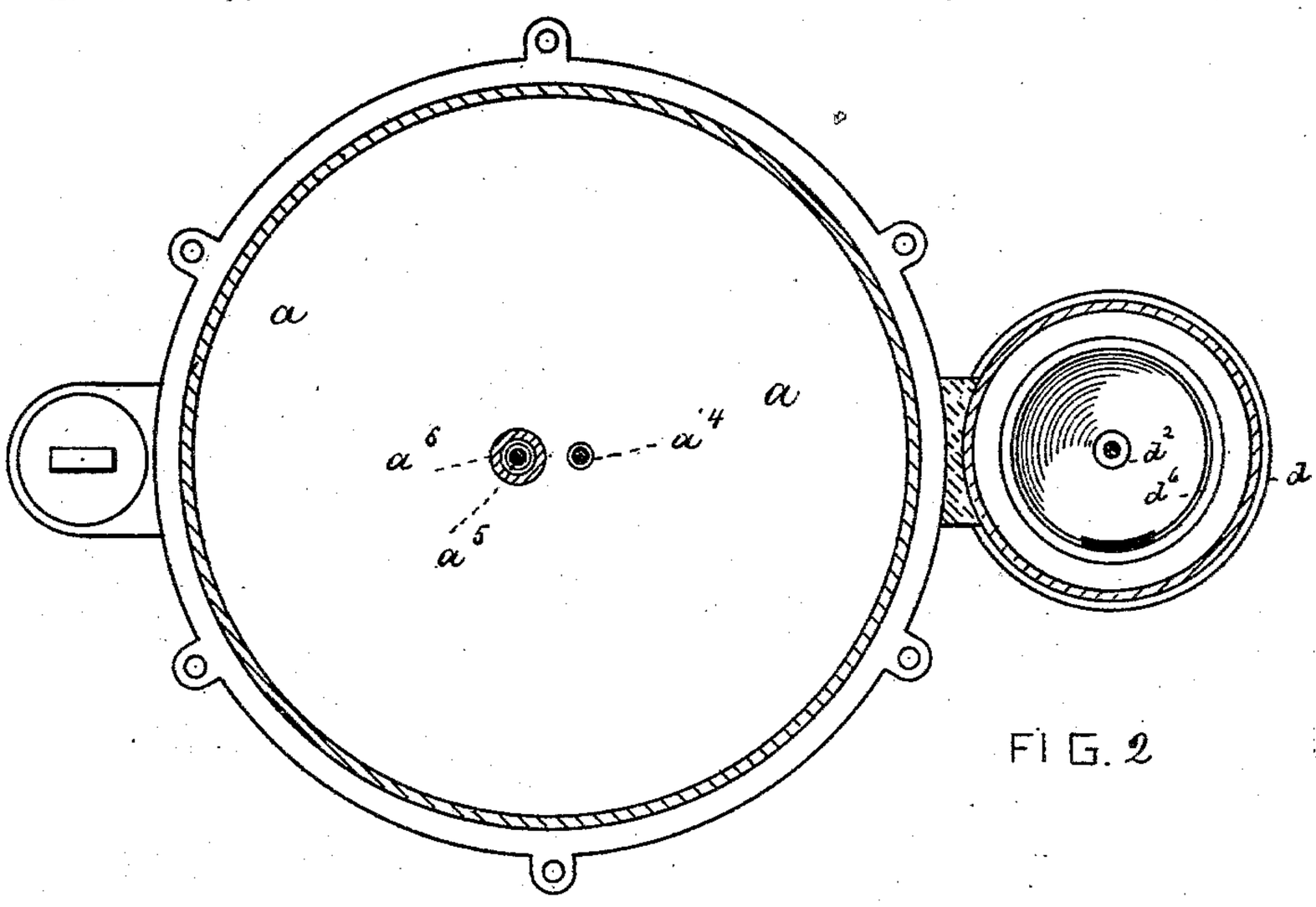


FIG. 2

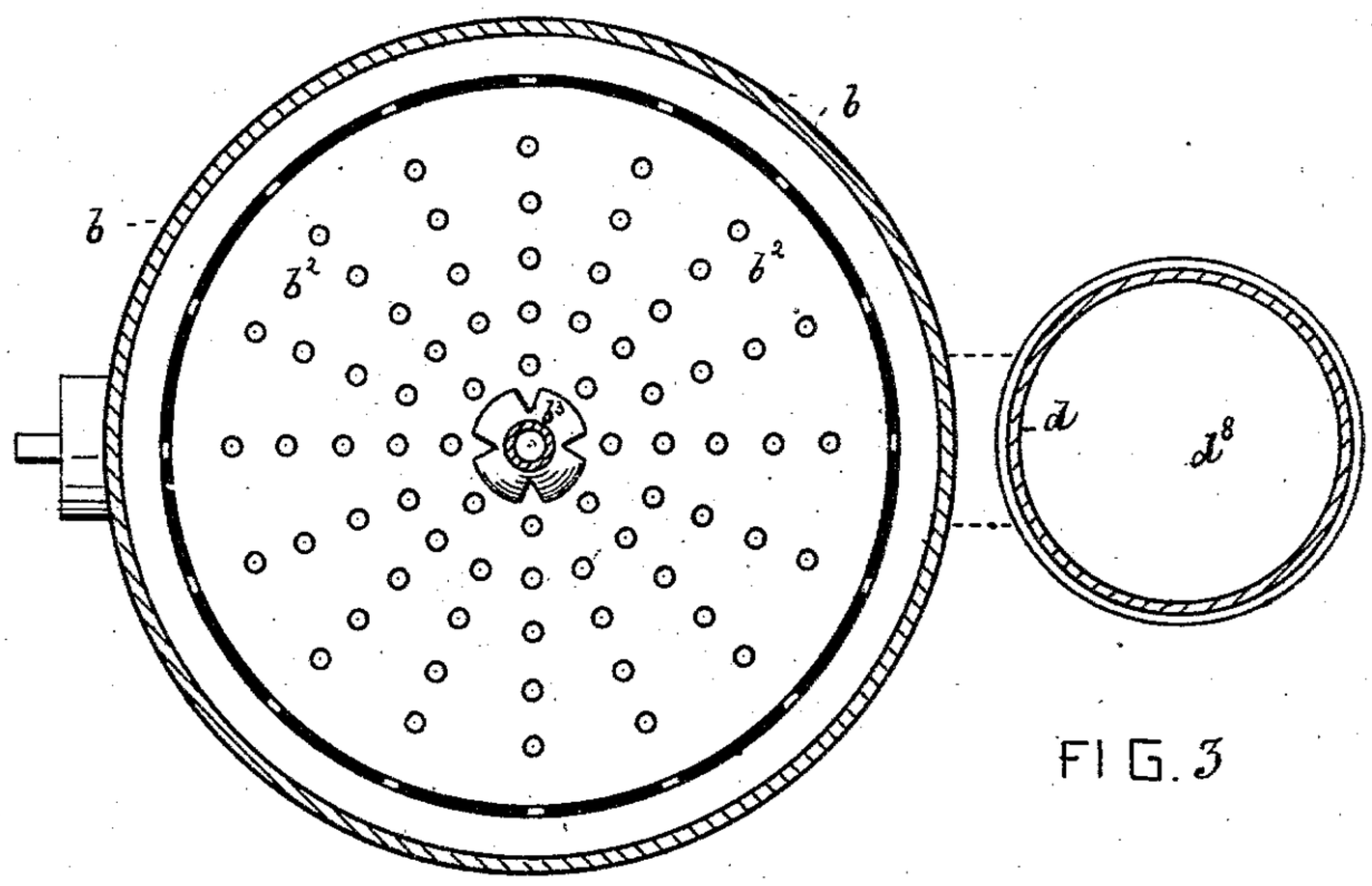


FIG. 3

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(No Model.) 3 Sheets—Sheet 3.

# J. A. FELD & J. SIEBRECHT.

## CARBONIC ACID GAS GENERATOR.

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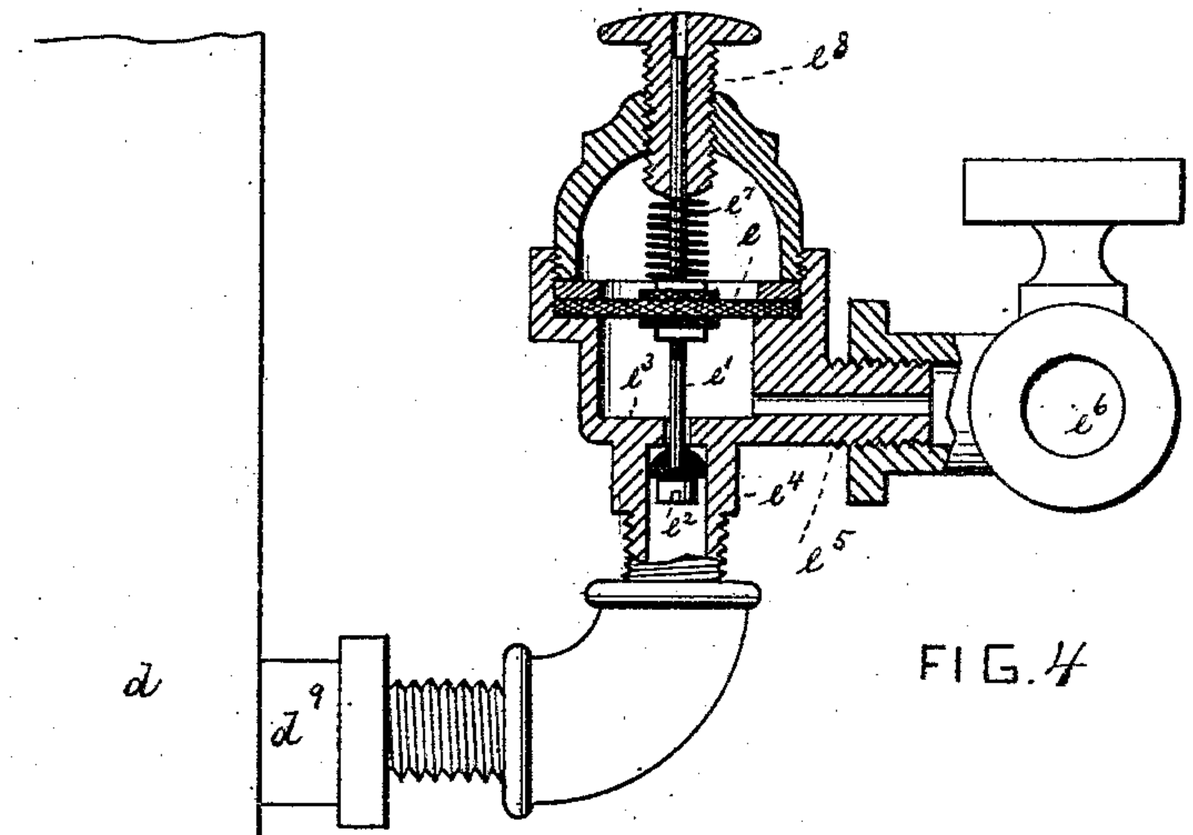


FIG. 4

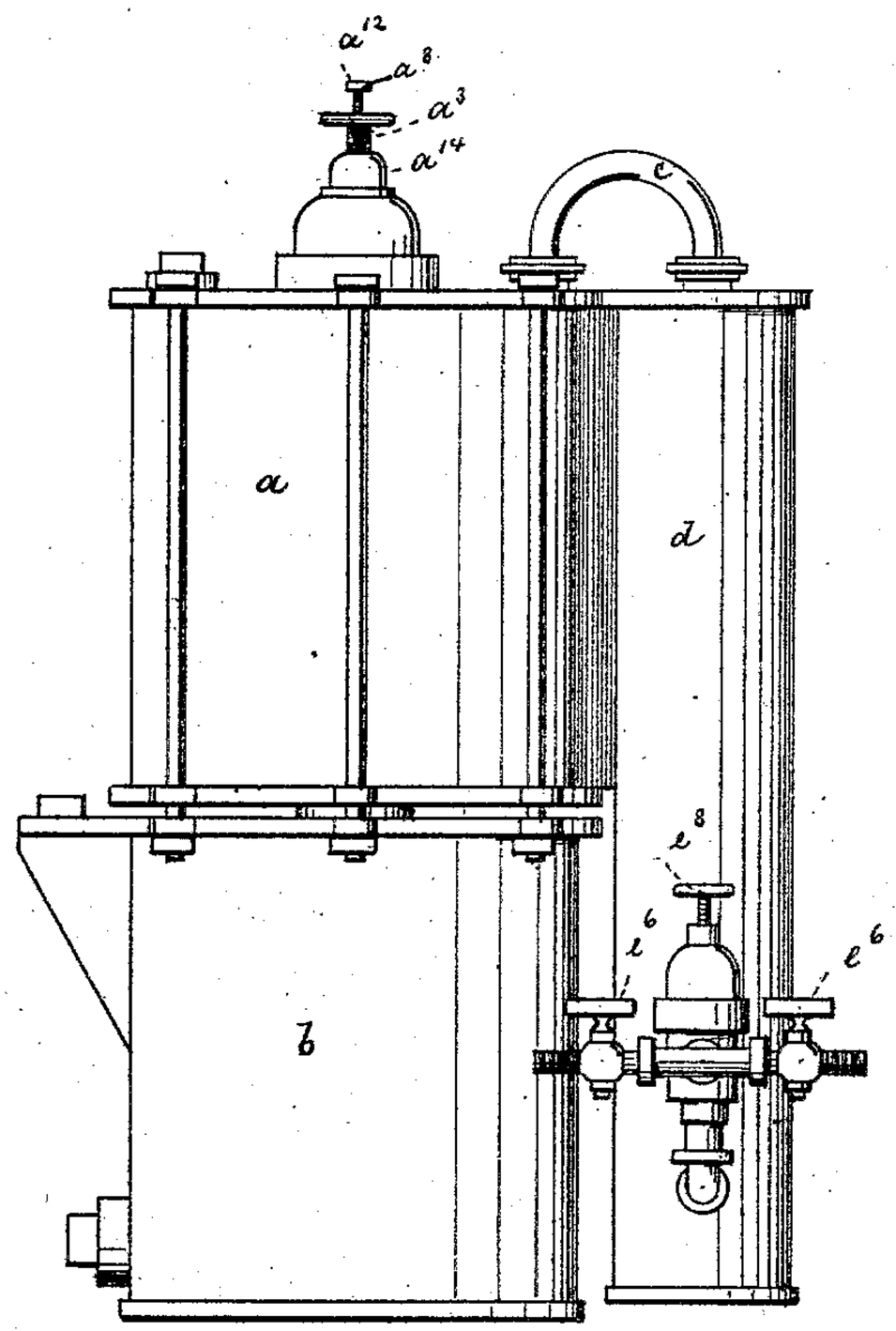


FIG. 5

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# UNITED STATES PATENT OFFICE

JOHN AUGUST FELD, OF NEW YORK, AND JOHN SIEBRECHT, OF BROOKLYN, ASSIGNORS TO SAID JOHN AUGUST FELD, JACOB MAYER, AND HENRY DEXHEIMER, ALL OF NEW YORK, N. Y.

## CARBONIC-ACID-GAS GENERATOR.

SPECIFICATION forming part of Letters Patent No. 414,691, dated November 12, 1889.

Application filed July 18, 1889. Serial No. 317,853. (No model.)

*To all whom it may concern:*

Be it known that we JOHN AUGUST FELD, of New York city, New York, and JOHN SIEBRECHT, of Brooklyn, New York, have invented an Improved Carbonic-Acid-Gas Generator, of which the following is a specification.

This invention relates to a carbonic-acid-gas generator of the kind which is intended to be applied directly to beer-holding vessels or kegs, so as to keep the beer at all times fresh and under pressure.

The object of the invention is to secure the proper formation of gas, to relieve the gas from impurities, and to regulate the pressure in the gas-generator independently from the pressure in the keg.

It consists in the various features of improvement more fully pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical central section of our improved carbonic-acid-gas generator. Fig. 2 is a horizontal section on line $x$ $x$, Fig. 1; Fig. 3, a similar section on line $y$ $y$, Fig. 1; Fig. 4, a vertical central section through the pressure-regulator. Fig. 5 is an elevation of the entire apparatus on a reduced scale.

The letters $a$ $b$ represent a pair of superposed vessels, the upper being designed for the reception of diluted sulphuric acid and the lower for the reception of bicarbonate of soda. The vessels communicate by the openings $a^{15}$ $a'$, closed by soft-rubber valves $a^2$ $a^3$, secured, respectively, to the valve-stems $a^1$ $a^5$. Of these valve-stems, one is a trifle longer than the other. The longer valve-stem $a^5$ passes through a tube $a^6$, projecting upwardly from the bottom of vessel $a$. Both valve-stems $a^1$ $a^5$ are at their upper ends fastened to a cross-bar $a^7$, which is by screw $a^8$ connected to elastic diaphragm $a^9$. This diaphragm is by nuts $a^{10}$ prevented from slipping and is subjected to the action of a spring $a^{11}$. The upper end of screw $a^8$ carries a nut $a^{12}$, beneath which a threaded tube $a^{13}$, encircling the screw, engages a socket $a^{14}$ and bears upon spring $a^{11}$.

The entire device thus far described has for its object to regulate the flow of acid into the vessel $b$. The acid will flow into such vessel through opening $a^{15}$ to mix with the bicarbonate of soda. The carbonic-acid gas thus formed rises in the tube $a^6$ through the vessel $a$ and above the surface of the acid contained in said vessel. From the mouth of tube $a^6$ the gas enters the washer through tube $c$. The gas in forming will naturally press upon the valves $a^3$ $a^2$ and have a tendency to close such valves. These valves being connected to the elastic diaphragm, it is evident that by adjusting the tension of the latter the pressure of the gas in the generator may be automatically regulated. This is, moreover, the case, as the gas acts also directly against the diaphragm.

The tension of the diapragm is regulated by screw $a^{13}$, which increases or diminishes the tension of the spring $a^{11}$. When the gas in forming exceeds the desired pressure, it will close the acid-valve $a^2$, and thus shut off the supply of acid; but as the gas-valve $a^3$ is upon a longer stem the latter will not quite close, but permit the escape of the gas into the washer. Thus an explosion of the apparatus, caused by the introduction of an unduly great body of acid into vessel $b$, is prevented. When the valve $a^3$ is seated, the soft-rubber valve $a^2$ is pressed against its seat to permit the additional motion of the valve $a^3$. If the vessel $a$ is to be filled, the valve $a^2$ should be entirely closed. This is effected by screwing the screw $a^{13}$ upward until it bears against nut $a^{12}$, and thus draws screw $a^8$ up. The screw in turn draws up valve-stem $a^4$.

In the vessel $b$ there is placed upon suitable projections or ribs $b'$ a vessel $b^2$, having perforated bottom and sides. This vessel contains an upright tube $b^3$. The upper end of tube $b^3$ is provided with a funnel $b^4$ directly beneath the valves $a^2$ $a^3$. The lower part of tube $b^3$ discharges upon the bottom of vessel $b^2$ by lateral openings. The bicarbonate of soda is placed in the vessel $b^2$, and the acid will from opening $a^{15}$ flow through tube $b^3$, to gradually rise from the bottom upwards. Thus the bicarbonate of soda will be assailed by the acid from the bottom

and not from the top. The advantage of this construction is that the upper part of the soda will remain dry and no deposit of Epsom salts will be formed on the soda. The salt that is formed will settle around and in perforations of vessel $b^2$, and will not interfere with the formation of the gas. The gas being formed in the manner described and escaping at the mouth of tube $a^6$, enters a tube $c$, that carries it to the gas-washer. The gas-washer proper is inclosed by a long vessel $d$, closed by a perforated screw-cap $d'$, from which depends a tube $d^2$, the lower end of which carries a perforated metal diaphragm $d^3$ and a felt percolator $d^4$. The diaphragm $d^3$ and percolator $d^4$ are received by a socket $d^5$ at the lower end of the gas-washer $d^6$ proper, having a funnel $d^7$ at the top. The socket $d^5$ is closed by a screw-plug $d^7$, so as to leave a chamber $d^8$ between the screw-socket and the percolator. In the lower part of vessel $d$, beneath washer $d^6$, there is left a large space or chamber $d^{18}$, the upper part of which by tube $d^9$ communicates with the regulator which adjusts the pressure within the cask. Water is poured into funnel $d^7$ to fill vessel $d^6$. The gas passes from tube $c$ through the perforated plug $d'$ and tube $d^2$ into the space $d^8$. From thence the gas rises up and filters first through the percolator $d^4$, thence through the perforated disk $d^3$, and finally through the water in vessel $d^6$. After reaching the upper part of vessel $d^6$ the gas decends between the walls of vessels $d$ $d^6$ until it reaches the discharge-tube $d^9$.

Any sediment that may have remained in the gas will deposit in the chamber $d^{18}$, which may from time to time be cleaned out. Thus perfectly pure gas alone will be delivered by the apparatus.

We have found that the pressure under which the gas is generated must usually be considerably stronger than that at which the gas is to be delivered. For this reason a second regulator is secured to the tube $d^9$. This regulator is more clearly shown in Fig. 4. It consists of the diaphragm $e$, to which a valve-stem $e'$ is secured. This valve-stem carries its valve $e^2$ beneath a perforated partition $e^3$ and within a tube $e^4$. Above such tube and partition there is the exit-pipe $e^5$, communicating with the cock $e^6$, which by a rubber hose may be connected to the barrel. The diaphragm $e$ is acted upon by the spring $e^7$, which may be adjusted by the screw $e^8$. By turning the screw the pressure is regulated.

Briefly repeated, the action of the apparatus is as follows: The spring $a^{11}$ being set, the acid in vessel $a$ flows gradually through tube $b^3$ into vessel $b$. Here it rises to act upon the soda from the bottom up. The gas generated passes through the washer $d^6$ and is delivered to the second regulator. This regulator is set to the pressure desired in the barrel. Thus the barrel will receive clean gas under a constant pressure.

What we claim is—

1. The combination, in a gas-generator, of an acid-holding vessel, with a soda-holding vessel communicating therewith, and with a pair of soft-rubber valves $a^2$ $a^3$ for controlling the admission of acid and the discharge of gas, both valves being connected to an elastic diaphragm, and the valve-stem $a^4$ of the acid-valve being shorter than the valve-stem $a^5$ of the gas-valve, substantially as specified.

2. The combination of communicating vessels $a$ $b$ with the soft-rubber valves $a^2$ $a^3$, connected to an elastic diaphragm by their valve-stems and screw $a^8$, and with a spring $a^{11}$, screw $a^{13}$, socket $a^{14}$, and a nut $a^{12}$ upon the screw $a^8$, against which the screw $a^{13}$ is adapted to bear, so as to raise the valves, substantially as specified.

3. The combination of communicating vessels $a$ $b$ with the soft-rubber valves $a^2$ $a^3$, having valve-stems $a^4$ $a^5$, of unequal length, and with tube $a^6$, through which the longer valve-stem passes, substantially as specified.

4. The combination of an acid-vessel $a$ and a communicating soda-vessel $b$, with a gas-washer connected to vessel $a$, and with a tube passing through said washer, and with a vessel $d$, encircling the gas-washer, the vessel $d$ extending below the washer to form the deposit-chamber $d^{18}$, and with the discharge-tube $d^9$, opening into said chamber, substantially as specified.

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WM. WAGNER.