

1,222,809.

Patented Apr. 17, 1917.
2 SHEETS—SHEET 1.

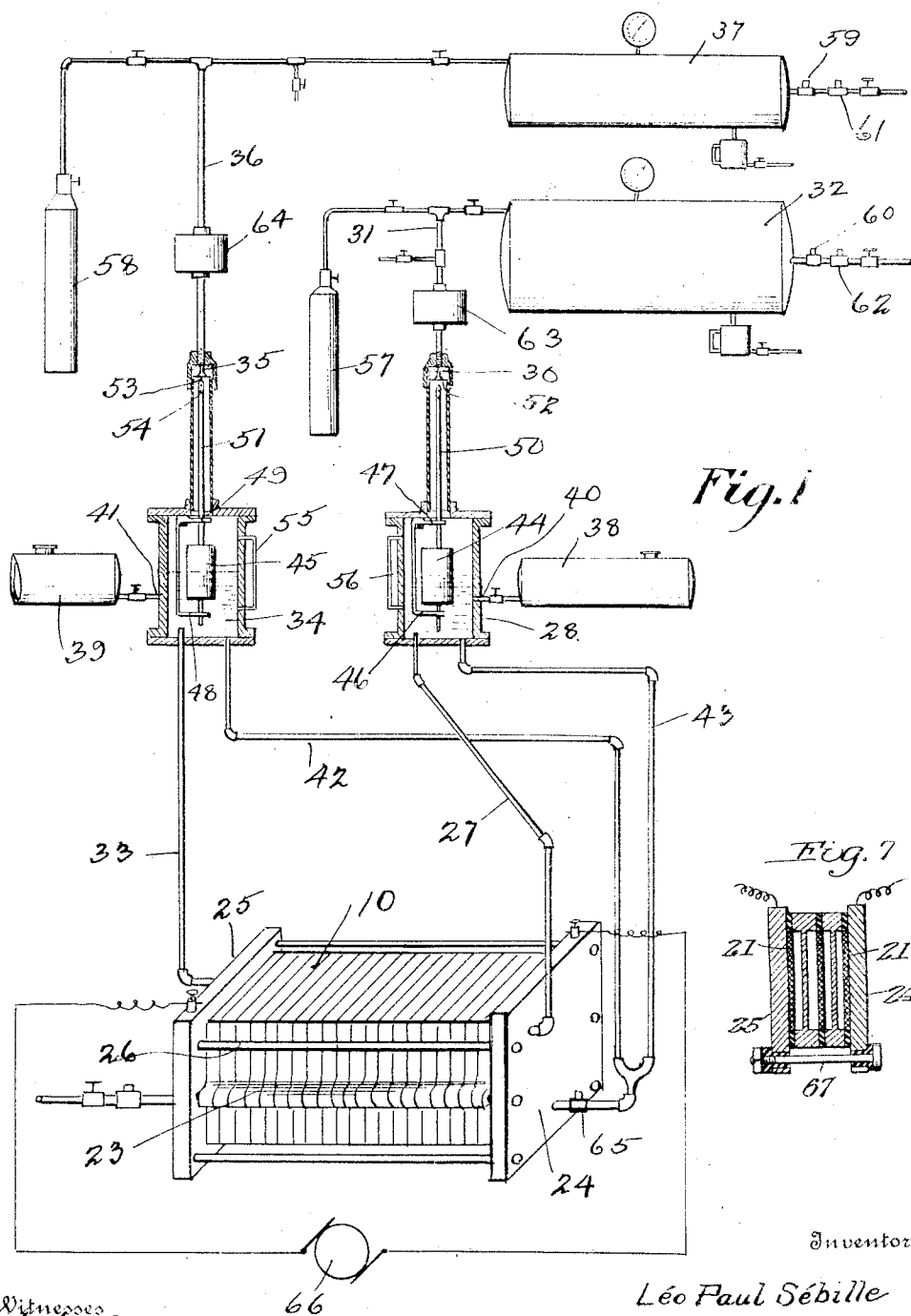
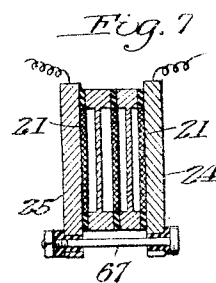


Fig. 1



Inventor

Léo Paul Sébille

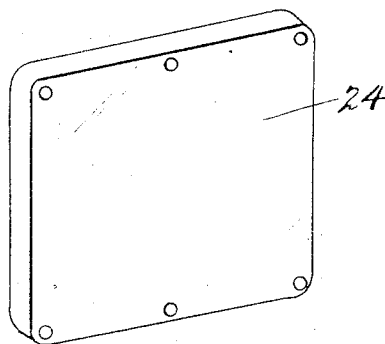
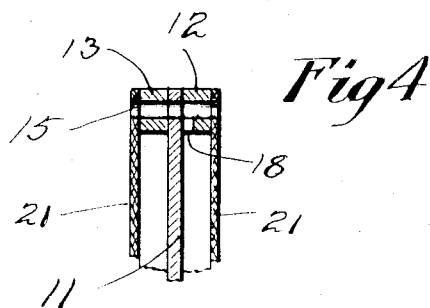
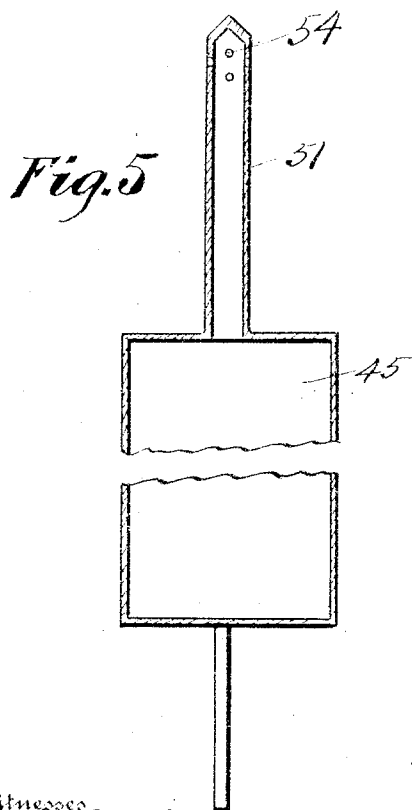
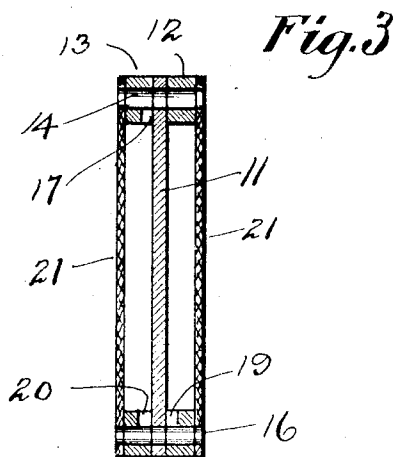
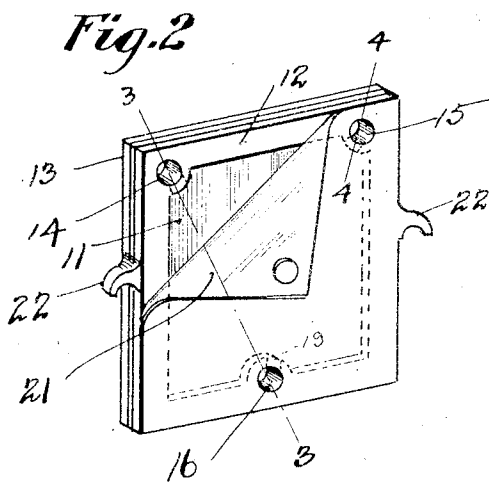
Witnesses
H. H. Bardeley
A. F. Macready.

By

Howard E. Barlow
Attorney

1,222,809.

Patented Apr. 17, 1917.
2 SHEETS—SHEET 2.



Witnesses
W. H. Burdette
A. F. Warrington

Fig. 6

Inventor
Léo Paul Sébille

By

Howard E. Barlow
Attorney

UNITED STATES PATENT OFFICE.

LÉO PAUL SÉBILLE, OF PROVIDENCE, RHODE ISLAND.

GAS-GENERATOR.

1,222,809.

Specification of Letters Patent.

Patented Apr. 17, 1917.

Application filed June 16, 1916. Serial No. 104,092.

To all whom it may concern:

Be it known that I, LÉO PAUL SÉBILLE, a citizen of the United States, and resident of the city of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Gas-Generators, of which the following is a specification.

This invention relates to machines for generating oxygen and hydrogen gas and refers more particularly to that type of machines which produces both gases simultaneously by the well known electrolysis process. The primary object of this invention is to provide means for conducting these gases as generated to, and storing them under their own natural accumulated pressure in separate receptacles, and that without the use of intervening gasometers and without mechanical means for compressing the gases.

A further object of the invention is to provide simple and practical means for effectually preventing excess pressure on either side of the generating system so as to positively eliminate the possibility of the blowing out of the liquid electrolyte, which blowing out would permit the mixing of the two gases and render the system dangerous.

The usual oxygen and hydrogen generating apparatus is provided with a gasometer for receiving the gas as generated from the electrodes, and compressors are employed for receiving the gas from these gasometers and placing the same under the desired pressure in suitable storage tanks.

By my improved apparatus I avoid the use of both the gasometers and also that of the gas compressors as by my system I am enabled to conduct the gases as formed directly into two separate pressure chambers and here these gases are placed under their own natural accumulated pressures, which pressures may be raised to any degree, even to that of liquefying both of said gases if desired, and this without the employment of pumps or other compressing apparatus.

It is found in practice in the operation of the ordinary type of oxygen and hydrogen generator that the pressure in one side due to various causes often becomes much higher than that in the other side of the generator, thereby blowing out the sealing liquid electrolyte and permitting the two gases to mix which as is well known is extremely dangerous.

By the use of my improved apparatus this danger of blowing out of the liquid, and mixing of the gases is effectually prevented for the reason that as soon as the pressure on one side of the system rises a predetermined amount above that on the other side, the valves will automatically operate to control the ports and again equalize these pressures and so effectually prevent the displacement of the liquid.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings:

Figure 1— is a diagrammatic view illustrating one general arrangement of the apparatus.

Fig. 2— is a detail showing one view of one of the electrodes with one corner of the separating diaphragm turned back.

Fig. 3— is a section on line 3—3 of Fig. 2 showing the electrode and the gas opening on the side of the plate through which one of the gases pass also showing the liquid passageway and the openings on both sides of the plate through which the electrolyte passes.

Fig. 4— is a section on line 4—4 of Fig. 2 showing a portion of the electrode and the gas opening on the side of the plate opposite to that shown in Fig. 3 through which the other gas passes.

Fig. 5— is a sectional view of the float and the closure for the valve opening also showing the holes through the neck of the valve stem for the entrance of gas to the interior of the float.

Fig. 6— is a perspective view of one of the plates for retaining the series of electrodes.

Fig. 7— is a transverse sectional view showing the electric connection whereby the current passes through the cells from one end of the generator to the other.

In my improved gas generating system it is understood that I preferably employ the usual electrolysis process which is that of generating oxygen on one side of the electrode and hydrogen on the opposite side of the same by the passage of an electric current through the electrolyte in which the electrodes are submerged.

Referring to the drawings 10 designates the gas generator which may be formed in

any suitable or convenient way. I have shown the same as constructed of a plurality of sheet-metal plates 11, each having two metal frames 12 and 13, see Figs. 2, 3 and 4 formed around its upper edge on opposite sides thereof. These frames and plates are each provided with holes 14, 15 and 16. The frame 13 is provided with an opening 17 on one side of the plate communicating with the hole 14, see Fig. 3, and the frame 12 is provided with an opening 18 on the opposite side of the plate communicating with the hole 15, see Fig. 4, whereby the gas generated on one side of the plate 11 will be conducted to a receptacle separate and independent from that generated on the opposite side of the plate, but as will be noted the hole 16 for the liquid electrolyte communicates by openings 19 and 20 with both sides of the plate 11, whereby the electrolyte has a free passage all through the system including the separate chambers on both sides of all of these plates. Each of these plates is so constructed that it constitutes a unit, and these units are separated by a diaphragm or thin sheet 21 of specially prepared asbestos. Any desired number of these plates are assembled side by side by which they are supported on the rod 23 passing between the end plates 24 and 25.

In order to bind these plates or electrodes together to resist the high pressure which they are called upon to withstand I have provided two end plates 24 and 25 and have secured the whole together by means of a number of bolts or tie-rods 26. These electrodes are shown as being made in a square or rectangular form, but in some cases, where the pressure is high I make the plates in a circular or disk form whereby they are capable of carrying a greater pressure, but these plates may be made in any desired form to obtain the results required.

As the gases form in the generator the hydrogen passes out through the holes 14 into the pipe 27 thence to the float chamber 28 and up through the valve opening 30 and pipe 31 into the larger tank or high pressure resisting container 32.

On the other side of the system the oxygen passes out through the hole 15 through the pipe 33, float chamber 34, valve opening 35 and pipe 36 into a similar but smaller container 37. The size of the oxygen container is less than that of the hydrogen container for the reason that the oxygen is generated one-half as fast as the other. The electrolyte may be supplied to the system through the supply tanks 38 and 39 which are connected to their respective float chambers at the points 40 and 41 whereby they will automatically replenish the system with fresh electrolyte replacing the small amount which is being carried over with the out-flowing gases, gage glasses 55 and 56 are

connected to the chambers so that the height of the liquid may be readily determined. Both of these float chambers are connected by pipes 42 and 43 to the generator, whereby the electrolyte which is free to flow through the entire system stands at the same height in both chambers when the pressures in both are equal.

In practice the pressure in these receptacles may become unequal from many causes for instance, more of the gas from one receptacle may be withdrawn for use than from the other receptacle, then again it is calculated that the oxygen will not generate as fast as the hydrogen but the relative generating quantities may vary and in such cases it will be seen that the pressure in one of the receptacles will be greater than that in the other, and that this pressure will act upon the liquid columns in the different float chambers to drive them to different levels and if there were nothing to prevent all of the liquid might be driven from one chamber up through the valve opening to the other chamber into the receptacle connected thereto, in which case the two gases would become mixed with disastrous results.

To effectually obviate the possibility of such a happening, I have mounted floats 44 and 45 in separate float chambers 28 and 34 to be moved vertically in their bearings 46, 47, 48 and 49 respectively. The floats are provided with long tubular necks 50 and 51 respectively, the upper end of the tube is closed and adapted to fit into its valve seats 52 and 53 so that when either rises a predetermined amount it will close this small gas outlet and prevent further flow of gas to its receptacle until after the pressure is again reduced in this side of the system as presently explained.

In the upper end of each of these tubular stems, I have formed a number of small holes 54 as best illustrated in Fig. 5, whereby the gas pressure in the float chamber may enter the body of the float through the upper end of its tubular neck so that the pressure inside of the float will equalize that outside of the same, and so prevent damage to the float by collapse or expansion.

In the drawing I have indicated safety valves 59 and 60 connected to the receptacles, also reducing valves 61 and 62 for reducing the pressure of the gases as drawn from the tanks.

In the operation of my improved gas generating system the oxygen is generated on one side of the plates and is conducted through the pipe 33, float chamber 34, valve opening 35, pipe 36 directly into the pressure tank 37 where the accumulated pressure is raised to the desired degree. The hydrogen which is generated on the opposite side of the plates passes up through the pipe

27, chamber 25, valve opening 30, pipe 31 into the pressure tank 32. If the pressure in one of the tanks, say for instance, in the hydrogen tank, exceeds that in the oxygen tank a predetermined amount, this pressure will act upon the electrolyte in float chamber 28 and drive the same downward in that chamber and correspondingly upward in chamber 34, thereby raising the float 45 and closing the valve opening 35. The oxygen now generated is confined to the small space above the liquid in the float chamber 34 thereby opening valve 35 and permitting the oxygen gas in this chamber to enter its receptacle, and in this way the valves are caused to oscillate to intermittently open and close the outlet port and so maintain the pressures practically balanced in both sides of the system. Owing to the long valve stem arrangement on the float it is impossible for the liquid to ever rise sufficiently in the float chamber to pass out through the valve opening, as the first rising action of the float due to the rising liquid at once closes the opening.

It is found in practice of great advantage to remove the moisture from the gas before it enters the storing receptacle. In order to accomplish this result in a simple and effective way, I have provided collecting chambers 63 and 64 which contain lime, or other suitable moisture absorbing material and have interposed one chamber in each of the pipe lines between the generator and the receptacles. In this way the gas enters the receptacle practically dry in which condition it is much more efficient than when loaded with moisture.

A safety valve 65 is placed in the pipe carrying the electrolyte, whereby if for any reason enough liquid should be accidentally admitted to the system to raise and close both of the float valves, the gas which continues to be generated will be trapped in the system and a dangerous excess pressure would result.

If such a condition should arise the safety valve 65 would open automatically and permit enough of the electrolyte to be discharged, to restore the system to normal conditions.

In some cases a pump or other suitable means may be employed for feeding electrolyte to the system instead of employing the supply tanks 38 and 39 shown in Fig. 1.

I have shown and described float operated valves for controlling the pressure in the different sides of the system, but I do not wish to be restricted to valves of this type as any suitable means may be provided for regulating the pressures in the opposite sides of the system to effectually prevent the blowing out of the liquid.

A number of storage or receiving tanks may be connected to either side of the sys-

tem. In addition to tanks 32 and 37 I have also shown commercially portable tanks 57 and 58, any desired number of which may be connected to and filled from the system. 66 designates the electrical generator, for providing the operating current to the plates.

In order to pass the electric current through the different cells of the generator from one pole to the other these cells are separated by a diaphragm of asbestos whose edges serve as an insulation between the cells, but whose middle portion when saturated with the electrolyte becomes a conductor of electricity, for the reason that that portion of the asbestos held between the plates is so tightly squeezed that it prevents the entrance of the electrical conducting electrolyte thereinto, therefore the current entering the wire at one end passes through all of the cells and out through the wire at the other end, the bolts 67 which do the binding of the plates 24 and 25 are fully insulated from all of the parts.

I have shown and described one illustrative embodiment of my invention but I desire it to be understood that although specific terms are employed they are used in a descriptive sense and not for the purpose of limitation, the scope of the invention being defined and limited only by the appended claims.

I claim:

1. In a gas generator, means for generating oxygen and hydrogen gases separately and simultaneously, separate pressure resisting storage containers connected to receive the gases under pressure as generated, and means for positively preventing the flow of gas from one container to the other regardless of the extent of difference in pressures said system being closed and without automatically controlled openings to the air.

2. In a gas generator, means for generating oxygen and hydrogen gases simultaneously, means for conducting each of said gases to a separate pressure storage receptacle, and an automatically actuated valve for controlling the gas pressures as generated.

3. In a gas generator, means for generating oxygen and hydrogen gases simultaneously, means for conducting said gases to separate pressure receptacles and positively actuated means controlled by the difference of pressures between the gases for controlling the flow of gases from the generator to said receptacles.

4. In a machine of the character described, means including an electric current for generating oxygen and hydrogen gases, two separate gas receiving chambers, means for conducting the different gases to said different chambers, and a valve controlled by the pressure in one of the chambers for auto-

matically regulating the flow of gas to the other.

5 5. In a machine of the character described, means for generating oxygen and hydrogen gases, a separate chamber for receiving each of said gases under pressure and float actuated means for automatically shutting off the supply to one chamber when the pressure in the other exceeds that in the first a
10 predetermined amount.

6. In a machine of the character described, means for generating oxygen and hydrogen gases, separate chambers for receiving each of the gases, and a float actuated valve for
15 interrupting and controlling the flow to one chamber when an excess pressure has accumulated in the other chamber.

7. In a machine of the class described, a multiplicity of electrodes for generating
20 oxygen and hydrogen gases, means for conducting each gas to a separate receptacle, valves in said conducting means, and means controlled by the difference in said pressures for operating said valves to substantially
25 equalize the pressures on both sides of the generator without loss of gas.

8. In a machine of the character described, means for generating oxygen and hydrogen gases, means for conducting each gas to a
30 separate pressure receptacle, and float operated valves controlled by the difference of pressures of said gases for controlling the openings to said receptacles to equalize said pressures in the generator.

35 9. In a machine of the character described, means for generating oxygen and hydrogen gases simultaneously, means for conducting said gases each to a separate receptacle, a float chamber interposed in each gas conductor, a valve for shutting off the supply
40 to each receptacle, a hollow float in each chamber for operating each valve, and means whereby a difference of pressure in said conductors moves said floats to operate

one of said valves until the pressure is again
45 equalized.

10. In a machine of the character described, means for generating oxygen and hydrogen gases simultaneously, means for conducting said gases each to a separate receptacle, a float chamber interposed in each gas conductor, a valve for shutting off the supply to each receptacle, a hollow float in each chamber for operating each valve, and means for admitting the outside gas pressure into said float.
55

11. A gas generator comprising a closed system, means for generating oxygen and hydrogen simultaneously, means for conducting said gases each to a separate receptacle, a float chamber in each gas conductor each carrying liquid at a predetermined level, a valve for shutting off the supply to each receptacle located above the normal liquid level, a float in each chamber connected to its valve by a long tubular neck, said neck being provided with openings at its upper end through which the gases may enter from the chamber and equalize the pressure on the inside and outside of the float.
60 65 70

12. In a gas generator, means for generating oxygen and hydrogen gases simultaneously, means for conducting said gases each to a separate pressure receptacle, a float chamber interposed in each conductor, each chamber carrying liquid at a predetermined level, a valve for shutting off the supply to each receptacle located a substantial distance above the normal liquid level, and a float in each chamber for operating each valve.
75 80

In testimony whereof I affix my signature in presence of a witness.

LÉO PAUL SÉBILLE.

Witness:

HOWARD E. BARLOW.