P. A. EMANUEL.

BATTERY AND GENERATOR.

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1,182,759.

Patented May 9, 1916.

2 SHEETS—SHEET 1.

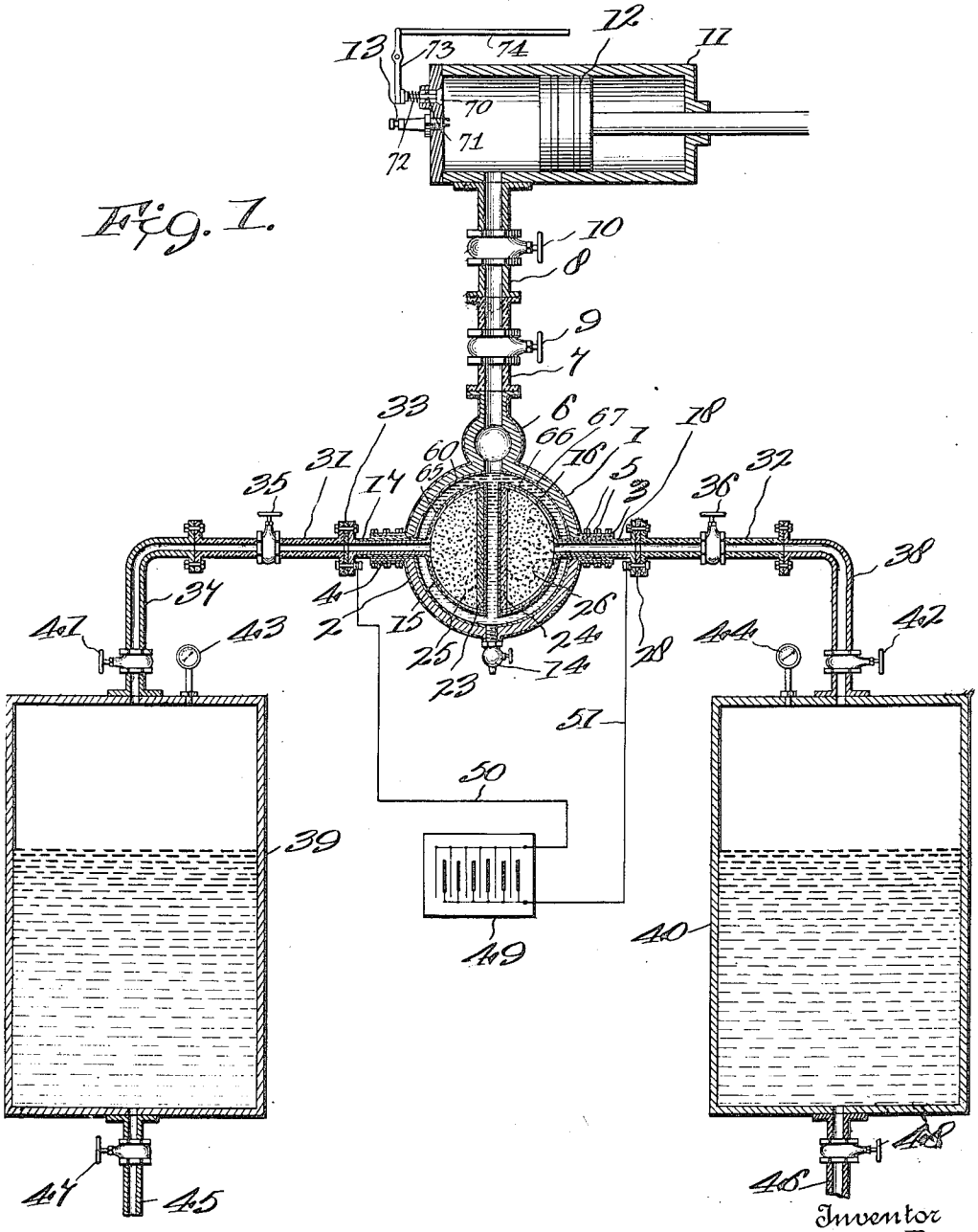


Fig. 1.

Witnesses

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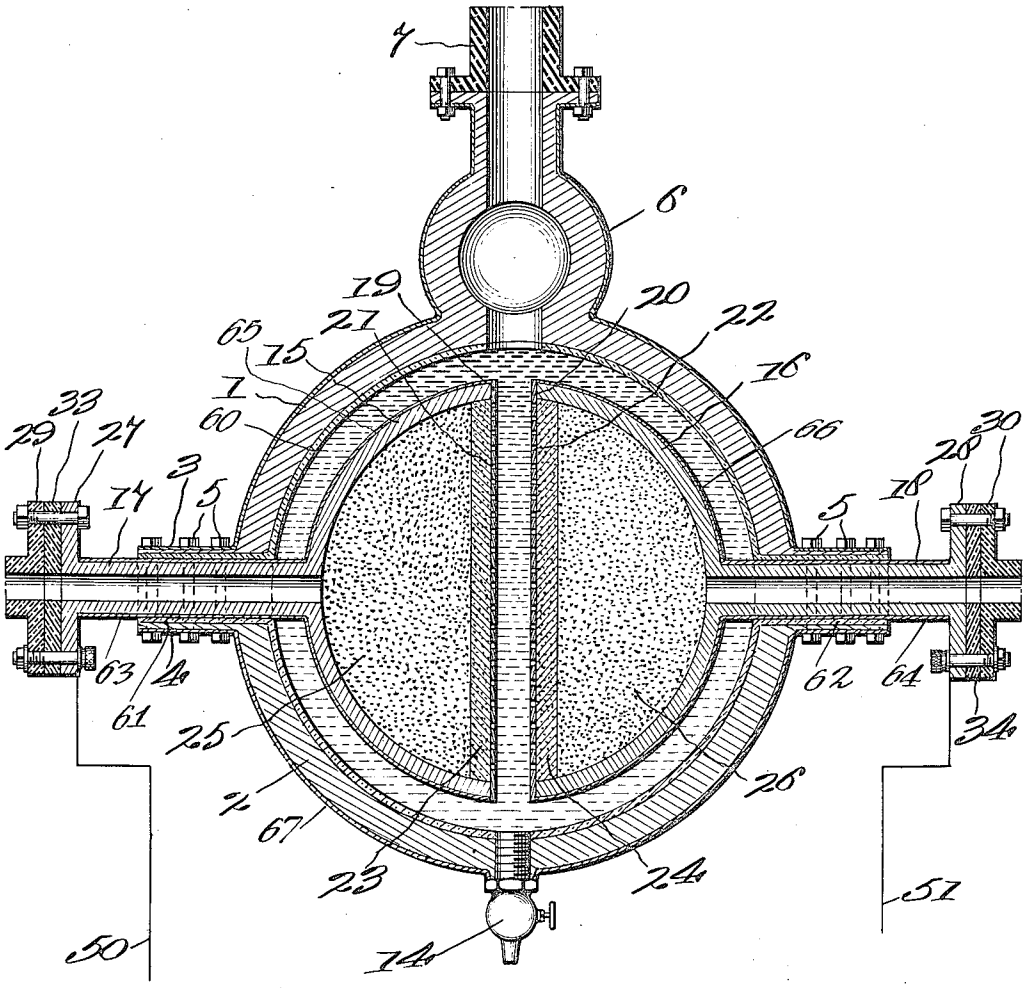
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2 SHEETS—SHEET 2.

Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

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BATTERY AND GENERATOR.

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To all whom it may concern:

Be it known that I, PHILIP A. EMANUEL, a citizen of the United States, residing at Aiken, in the county of Aiken and State of South Carolina, have invented certain new and useful Improvements in Batteries and Generators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to improvements in batteries and generators, and consists more particularly in an improved battery constructed on the principle of the Grove gas cell, in which the gases are introduced into the battery under pressure; it being discovered that the electromotive force is thereby increased.

It is an object of the present invention to produce, in addition to the above improved Grove gas cell, a boiler for generating steam, which may be used to drive a reciprocating engine, or may be taken off for any well known purposes and applied to do work.

The invention will be more particularly understood by reference to the accompanying drawings, in which similar reference numerals indicate similar parts throughout the several views, and in which:—

Figure 1 is a cross sectional view of an apparatus constructed in accordance with the present invention; and Fig. 2 is an enlarged vertical sectional view of the improved cell.

Referring more particularly to the drawings, 1 and 2 designate a pair of semi-spherical sections provided with flanges 3 and 4, whereby said sections are connected together through bolts or other means 5; the same, in their assembled position, constituting an outer shell for the battery and generator: such sections being constructed substantially after the manner of the Magdeburg spheres.

The upper section 1 of the battery shell is formed with a steam dome 6, and above the dome is any suitable number of pipe sections 7, 8 including valves 9 and 10, and the uppermost of these pipe sections communicates with the interior of an engine cylinder 11 in which reciprocates the usual piston 12; although the engine employed in conjunction with my invention need not necessarily be of the reciprocating, but may be of any other type.

The engine 11 is equipped with an exhaust valve 70 supported on a stem 71, and normally kept seated by a coil spring 72. The stem 71 is engaged by a tappet 73 actuated from a rod 74, connected to be operated from the movable parts of the engine in a well known manner.

In the cylinder is the usual spark plug 13 for exploding such gases as may not have chemically united in the generator, all as hereinafter more fully explained.

The boiler shell, constituted of the sections 1 and 2, is arranged to receive water from any suitable source, and the lower section 2 is provided with a blow-off cock 14. Water may be injected through this blow-off cock 14 at any stage of the operation, or prior to the commencement of the operation; but the same is also supplied to the generator by the union of the gases, as hereinafter described.

In the generator, and spaced from the walls of the shell sections 1 and 2, are the electrodes 15 and 16, the same being of substantially the hemi-spherical form shown in the drawings, and being supported in spaced relation by tubular pole-pieces 17 and 18, respectively, passing through bearings in the flanges 3 and 4 of the sections 1 and 2. The interior walls of the shell sections 1 and 2 are provided with an insulating lining 60 which is extended, as indicated at 61 and 62, through the flanges 3 and 4, between which are clamped the hollow pole-pieces 17 and 18, which may be similarly provided with an insulating coating 63 and 64; the latter coating extending within the container and being applied to the exterior walls of the electrodes 15 and 16, as indicated at 65 and 66. These coatings or linings may be of porcelain, glass, enamel, or other suitable insulating material. The container, made up of the sections 1 and 2, is also preferably coated exteriorly with glass, enamel, or other like material, as indicated at 67. The inner ends of the hemi-spherical electrodes 15 and 16 are inclosed by platinum or other disks 19 and 20, which are preferably perforated as indicated at 21 and 22. Next adjacent the platinum disks 19 and 20 are preferably carbon disks 23 and 24, and the remainder of the space within the electrodes is filled with platinum black

25 and 26, or other substance having the property of absorbing great quantities of gas.

The pole-pieces 17 and 18 are provided with flanges 27 and 28 for coöperating with similar flanges 29 and 30 on insulated pipe sections 31 and 32; there being advantageously insulating gaskets 33 and 34 interposed therebetween.

The insulating sections 31 and 32 include valves 35 and 36 and are flanged to connect with metallic or other pipe sections 37 and 38 which are preferably curved, as shown in Fig. 1, and are connected to tanks or receptacles 39 and 40.

41 and 42 are valves in the sections 37 and 38, and 43 and 44 are gages for indicating the pressure within the receptacles 39 and 40. At their lower ends the receptacles 39 and 40 are connected to a supply source through pipes 45 and 46, under the control of valves 47 and 48.

Oxygen and hydrogen under pressure are contained in the tanks 39 and 40, under liquid seal, as indicated, and said gases are led through the various pipes to the battery in a manner presently explained.

A storage battery 49 is shown connected to the battery by means of conductors 50 and 51 for storing up the energy generated thereby.

The operation of the improved device is substantially as follows:—Oxygen under pressure, for example, having been stored up within the receptacle 39 and the tank 40 having been previously charged with hydrogen under pressure, the several valves 41, 35 and 42, 36 are opened to the required degree to admit the gaseous oxygen and hydrogen into the space within the respective electrodes 15 and 16, where the platinum black or other material 25 and 26 will absorb the same in great quantities. The carbon disks 23 and 24 also have an enormous absorptive power, and the same cooperate with the platinum black to maintain large quantities of the respective gases in the electrodes.

The water within the shell sections 1 and 2, which is acidulated, for instance with dilute sulfuric acid, to perform the functions of an electrolyte, is in intimate contact with the gases through the perforations 21 and 22 in the platinum disks 19 and 20; and it will be readily seen that all the elements of a Grove gas battery are here present, although in a different structure and relation. The action will consequently be appreciated to be substantially that in the Grove cell, and the electro-motive force produced therefrom is taken off through the conducting wires 50 and 51 for the purpose of charging and re-charging the storage battery 49, or the same may be applied for other purposes. The action in the present cell will be found, however, to be greatly improved over that of the Grove cell by reason of the fact that the gases, oxygen and hydrogen, are under pressure.

In addition to the above action, the oxygen and hydrogen under pressure issue through the perforations 21 and 22 in the platinum disks 19 and 20 in fine jets, and under the influence of the pressure and electrolytic action combine to form water and thus uniting generate heat which converts the water within the shell sections 1 and 2 into steam. This steam is collected in the dome 6, and passes out through the pipe sections 7 and 8, as permitted by the valves 9 and 10.

The expansive force of the steam so generated may be utilized in the engine, such as shown in Fig. 1, to reciprocate the piston 12, and the spark plug 13 is provided to ignite those gases which have escaped chemical combination in the generator, thus superadding internal combustion force to that of the expansive action of the steam.

It will be understood that the current generated in the battery may be taken off for any suitable purpose, and likewise the steam collected in the dome 6 may be utilized for any other purpose than that stated and shown.

It will be obvious that various modifications might be made in the herein described construction and in the combination and arrangement of parts which could be used without departing from the spirit of my invention.

I claim:

1. An apparatus as described including a container, a pair of hollow electrodes supported within said container and having their inner open ends disposed substantially vertically in opposed and spaced relation, perforated metallic disks inclosing the inner open ends of said electrodes, an electrolyte within said container, a source of oxygen under pressure in communication with the interior of one of said electrodes, means for regulating the delivery of oxygen from said source to the electrode, a source of hydrogen under pressure in communication with the interior of the other electrode, and means for regulating the supply of hydrogen to its electrode, substantially as described.

2. In an apparatus as described, the combination of a container, a pair of hollow hemispherical electrodes supported within said container and having their inner open ends disposed vertically in spaced and opposed relation, perforated platinum disks inclosing the open ends of said hollow electrodes, an electrolyte within said container and within the space between said platinum disks, oxygen under pressure in communication with one of said electrodes, means for regulating the passage of the oxygen to said

electrode, hydrogen under pressure in communication with the interior of the other electrode, and means for controlling the passage of the hydrogen to its electrode, substantially as described.

3. In an apparatus of the character described, the combination of a container, an electrolyte in said container, a pair of bell-shaped electrodes supported substantially vertically within said container and having their inner open ends disposed in opposed relation, metallic plates inclosing the inner ends of said electrodes and having perforations therein, absorptive material within said electrodes, tanks in communication with the interiors of said electrodes, means for controlling passage from said tanks to the electrodes, oxygen confined under pressure in one of said tanks and adapted to enter the interior of one of said electrodes and issue through the perforations in the respective plate, and hydrogen under pressure in the other of said tanks for entering the opposite electrode and issuing through the perforations in the associated plate, substantially as described.

4. In an apparatus of the character described, the combination of a container, a pair of bell-shaped electrodes supported vertically in spaced relation within said container, perforated platinum disks inclosing the inner ends of said electrodes, carbon disks fitted next said platinum disks within the electrodes, an absorptive material within said electrodes and confined in place by said carbon disks, separate tanks in communication independently with said electrodes, means for controlling passage therebetween, oxygen under pressure in one of said tanks for delivery to the interior of one electrode, and hydrogen under pressure in the other of said tanks for delivery to the opposite electrode, substantially as described.

5. In an apparatus of the character described, the combination of a container including a pair of hemispherical sections assembled together, an electrolyte in said container, a pair of bell-shaped electrodes within said container, hollow pole-pieces connected to support said electrodes and extending within said container, a source of oxygen under pressure in communication with the interior of one electrode through its hollow pole-piece, and a source of hydrogen under pressure in communication with the opposite electrode through the respective hollow pole-piece, substantially as described.

6. In an apparatus of the character described, the combination of a container embodying a pair of hemispherical sections having horizontally disposed meeting flanges, means for securing said flanges together, a pair of bell-shaped electrodes fitted vertically and in spaced relation within said container, a pair of hollow pole-pieces connected to said electrodes and supported through the flanges on said container sections, oppositely and vertically disposed perforated plates inclosing the inner ends of said bell-shaped electrodes, an electrolyte in said container, a source of oxygen supply under pressure in communication through one hollow pole-piece with the respective electrode, and a source of hydrogen under pressure in communication through the other hollow pole-piece with the interior of its respective electrode, substantially as described.

7. In an apparatus of the character described, the combination of a container including a pair of hemispherical sections having horizontally disposed meeting flanges, means for connecting said flanges together, a pair of bell-shaped electrodes supported vertically within said container, hollow pole-piece extending from said electrodes and supported through said flanges, perforated platinum disks secured to the inner ends of said electrodes, carbon disks disposed next said platinum disks within the electrodes, platinum black within said electrodes confined by said carbon disks, tanks, a source of oxygen under pressure in one of said tanks, connections between said tank and one of said hollow pole-pieces, means included in said connections for regulating the delivery of oxygen through the hollow pole-piece to the interior of its electrode, hydrogen under pressure in the other of said tanks, connections between said tank and the other hollow pole-piece, and means included in said connections for regulating the supply of hydrogen to the opposite electrode through its pole-piece, substantially as described.

8. In an apparatus of the character described, the combination of a container including upper and lower sections, means for securing said sections together, a dome formed on the upper section, a pair of hollow electrodes supported within said container, an electrolyte in said container, a source of oxygen supply in communication with the interior of one electrode, means for regulating the supply of oxygen thereto, a source of hydrogen under pressure in communication with the other electrode, and means for regulating the supply of hydrogen thereto, substantially as described.

In testimony whereof, I affix my signature.

PHILIP A. EMANUEL.