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W. H. & G. E. RUSSELL.

GAS GENERATING APPARATUS.

APPLICATION FILED APR. 9, 1904.

NO MODEL.

Fig. 2.

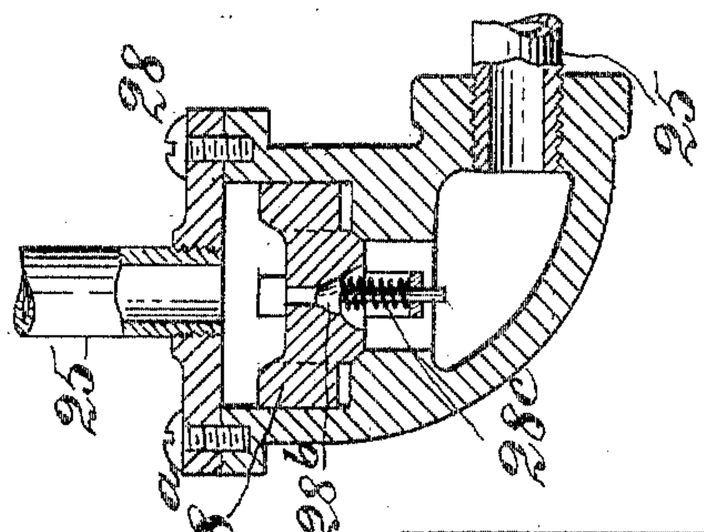


Fig. 3.

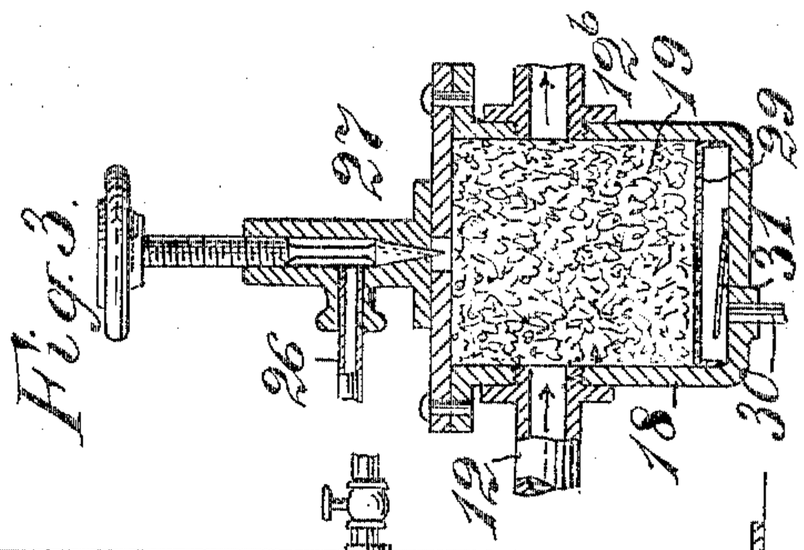
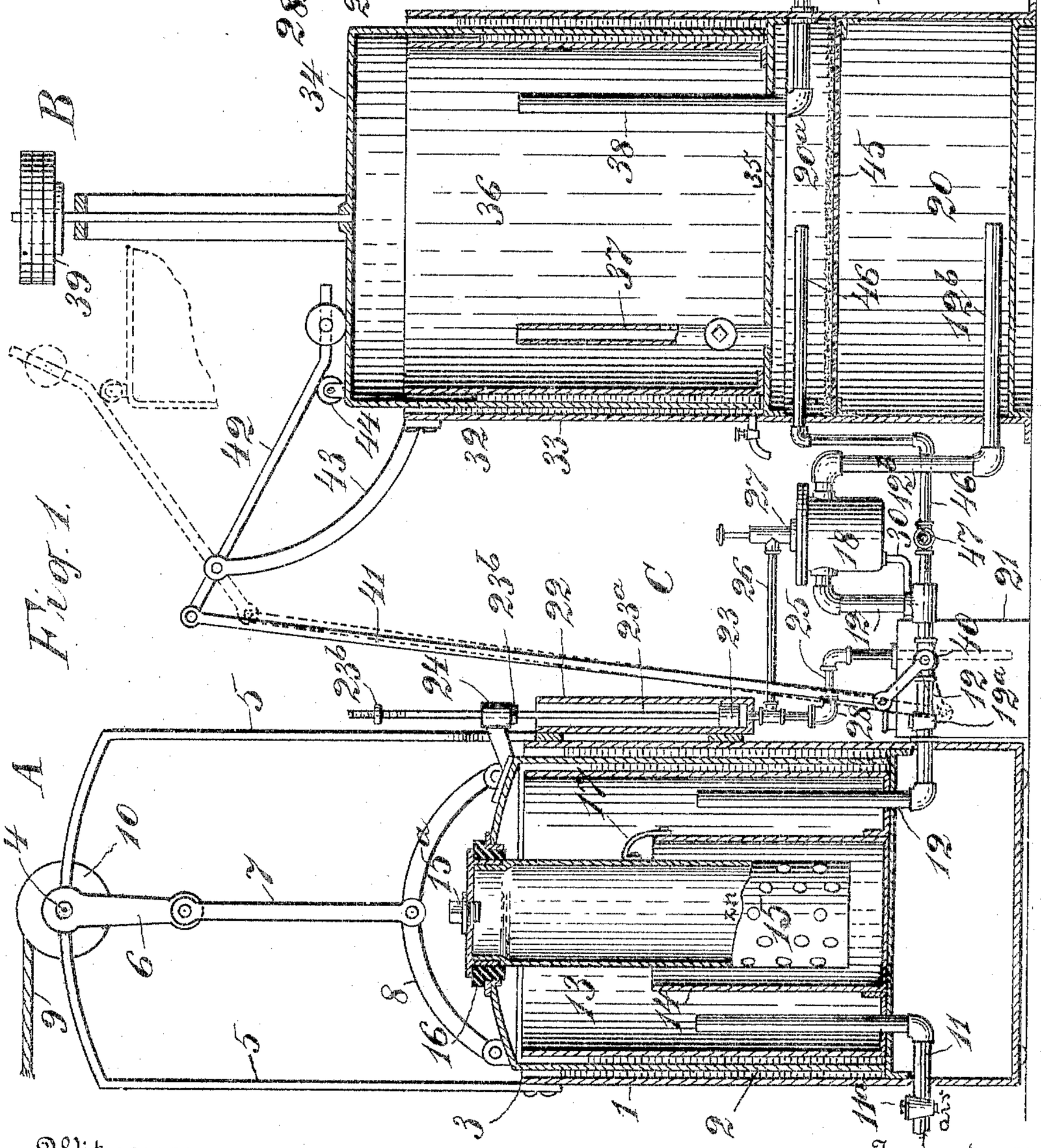


Fig. 1.



Witnesses
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No. 777,545. Patented December 13, 1904.

UNITED STATES PATENT OFFICE.

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GAS-GENERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 777,545, dated December 13, 1904.

Application filed April 9, 1904. Serial No. 202,405. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. RUSSELL and GEORGE E. RUSSELL, citizens of the United States, and residents of Jersey City, Hudson county, New Jersey, have jointly invented certain new and useful Improvements in Gas Apparatus, of which the following is a specification.

This invention relates to the manufacture of gas for illumination and other purposes; and the object of the invention is to provide a convenient means for producing hydrogen by electrolysis, mixing the same with air, carbureting the mixture, and storing the gas, all as will be hereinafter described with reference to the accompanying drawings, wherein—

Figure 1 is a sectional elevation of the apparatus. Fig. 2 is an enlarged sectional view of the check-valve device below the pump. Fig. 3 is an enlarged sectional view of the carbureter.

As herein shown, the apparatus includes two major parts—namely, the generator (designated as a whole by A) and the gas-holder, (designated as a whole by B.) Between them is the carbureting means C.

The generator A comprises a double-walled tank 1, open at the top and provided with an annular water seal 2. In the seal 2 is suspended a bell 3, adapted to be raised and lowered by suitable mechanism. Any mechanism may be employed for this purpose; but that shown includes a shaft 4, rotatively mounted in a frame 5 and having on it a crank 6, coupled by a rod 7 and bail 8 to said bell. The shaft 4 may be rotated by a rope 9, wound upon a drum 10 on the shaft. Any form of power may be applied to the rope, as a weight, for example. A pipe 11, having in it a check-valve 11^a, admits air to the chamber 13 under the bell when the latter rises, and a pipe 12, provided with a check-valve 12^a, is the discharge-pipe for the gas, which is forced out when the bell descends.

Within the generator-chamber under the bell (which is a dry chamber not connected with the water seal) is a removable open vessel 14, and suspended from the crown of the bell is a perforated holder 15. It may be explained here that the apparatus is designed, as herein shown, for producing hydrogen by electrolytic action, and to effect this the vessel 14 is of copper and contains water acidulated with sulfuric acid, and the perforated holder 15, also of copper, contains scraps of zinc. This holder is removably mounted at its upper end in the crown of the bell and insulated from the latter by a ring 16, of insulating material. It is furnished with a screw cap or plug for closing it, and this cap has in it an opening closed by a plug or stopper 15^a. A contact-spring 17 connects the copper and zinc elements. This completes the circuit.

The bell in rising draws in air at the inlet 11, and this air mixes with the hydrogen. In its descent the bell forces the gases out through the outlet-pipe 12 to the carbureting means now to be described.

The carbureter proper, 18, (seen in section in Fig. 3,) consists of a vessel with a removable cover, to which the pipe 12 is connected on one side. This vessel is filled with fibrous absorbent material 19 to receive the liquid hydrocarbon for carbureting, and a pipe 12^b leads the carbureted gas to a chamber 20 in the base of the gas-holder B. The liquid hydrocarbon is supplied from a suitable vessel 21, from which it is lifted by a pump and forced to the carbureter 18. This pump consists of a cylinder 22, secured to the generator-tank, and a piston 23, the rod 23^a of which is coupled to an arm 24 on the bell of the generator. A pipe 25 connects the vessel 21 with the pump, and another pipe, 26, connects the pump with the carbureter 18, being controlled at the latter by a needle-valve 27. The stroke of the pump is or may be limited by allowing its piston-rod 23^a to play through the arm 24, and providing it with limiting-stops 23^b, one of which may be a nut. Below the pump in the pipe 25 is a check-valve device 28. (Seen detached in Fig. 2.) This device has a main check-valve 28^a, which will prevent the liquid under normal conditions from flowing back to the vessel 21 and compel it to flow to the carbureter; but in case the needle-valve is very

nearly closed or for any other reason there is undue resistance to the flow of liquid to the carbureter a small valve 28^b in the bottom of the valve 28^a and backed by a spring 28^c will open and allow the surplus liquid to flow back to the vessel 21. In the lower part of carbureter 18, Fig. 3, is a perforated diaphragm 29, and in the bottom below said diaphragm is an outlet from which a small pipe 30 leads any liquid hydrocarbon which may collect in the bottom of the carbureter to the tank or vessel 21. This outlet is controlled by a light spring-valve 31, which closes the outlet when there is any unbalanced pressure at said outlet from any cause.

The holder B comprises a tank 32, provided with a water seal 33 and a bell 34. There is a bottom 35 to the gas-chamber 36, and the gas from the chamber below flows up into the chamber 36 through a pipe 37. When the bell descends, the gas is forced out to the service-pipe by way of a pipe 38. There is a support for weights 39 on the bell 34 to regulate the pressure of the gas in the service-pipe. In order to limit the upward movement of the bell 34 and arrest the flow of gas to the holder when the latter is full, there is a cock 40 in the pipe 12, and an arm on the plug of this cock is coupled by a link 41 with the shorter arm of a lever 42, fulcrumed in a bracket 43 on the tank of the holder. The longer weighted arm of the lever 42 rests on a roller 44 on the bell of the holder. When the bell rises to the position seen in dotted lines in Fig. 1, the cock 40 is closed and cuts off the flow of mixed air and hydrogen to the carbureter.

In order to regulate the richness of the gas in carbon, the chamber 20 has in it a diaphragm or filter-partition 45, through which the gas entering through 12^b may rise and filter through to an upper chamber 20^a, removing thus any liquid hydrocarbon from the gas and thoroughly mixing the vapor and gases. A pipe 46, connecting with the pipe 12 before the latter reaches the carbureter 18 and entering the chamber 20^a, supplies a mixture of non-carbureted air and hydrogen to the gas supplied by the pipe 12^b. There is a stop cock or valve 47 in this pipe 46, whereby the amount of the mixed gases flowing therethrough to the holder may be suitably regulated.

It will be seen that the gas-producing device described has important advantages in this class of apparatus. It enables the liquid hydrocarbon to be used in such a way as to preserve a nearly-uniform density and to avoid the lighter being taken first and the heavier at the last. The hydrocarbon will be practically the same in density at all times. It also enables the amount of the liquid supplied to be carefully regulated and permits, through the pipe 46 and cock 47, the richness of the gas in carbon to be nicely regulated by the user.

The exact construction herein shown is not essential to the invention, and it may obviously be varied to some extent without departing materially from or affecting the operation of the invention. For example, the pipes may be arranged in any convenient way. In Fig. 1 the parts have been disposed and arranged for convenience of illustration; but so long as they perform their functions their arrangement is not material. Obviously the cock 40 may be so constructed that it will cut off the gas when the bell of the holder shall have risen to the desired height, whatever that may be. So long as the tank 1 and bell 3 form an alternately expanding and contracting generating-chamber it is not important what means are employed for moving the bell up and down.

By "liquid hydrocarbon" as herein used is meant any of the readily-vaporizable hydrocarbons—such as gasolene, naphtha, &c.—and other similar liquids, such as alcohol, may be used as well.

Having thus described our invention, we claim—

1. A gas apparatus, having a hydrogen-generator, comprising an open, double-walled tank provided with a water seal in the annular chamber between its walls, a bell suspended in said annular chamber, an open-topped copper vessel in the chamber in the tank, under the bell, a perforated copper holder carried by and insulated from the bell and suspended in said open-topped vessel, the spring-contact, mechanism exterior to the tank for alternately raising and lowering said bell, an inlet-pipe for air to the chamber under the bell, and an outlet-pipe for the mixed air and gas, said apparatus also having a carbureter connected with said outlet.

2. A gas apparatus, having a hydrogen-generating chamber capable of expansion and contraction, and having an inlet for air and a gas-outlet for the mixed air and hydrogen, mechanism exterior to said chamber which alternately and regularly expands and contracts it for drawing in the air and expelling the mixed air and gas, a carbureter connected with said gas-outlet, a filter for the gas, and a receiver and holder for the carbureted gas.

3. A gas apparatus, having an alternately expanding and contracting hydrogen-generating chamber, having an inlet for air and an outlet for gas, a carbureter connected with said outlet, a chamber 20 which receives the carbureted gas, a chamber 20^a, a filter-partition separating said chambers 20 and 20^a, and a cock-controlled pipe connecting the chamber 20^a with the outlet from the hydrogen-generating chamber.

4. In a gas apparatus, the combination with the tank 1, having an annular chamber for a liquid seal, an inlet for air and an outlet for gas, an open copper vessel 14 in the chamber in said tank, and the bell 3 pendent in said

annular chamber, of the perforated copper holder 15 carried by and insulated from the bell and open at its upper end through the crown of the bell, the spring-contact 17, exterior means for reciprocating the bell, a carbureter connected with the gas-outlet of the generator, and a receiver for the carbureted gas.

5. A gas apparatus, having a generator for producing hydrogen and mixing it with air, said generator having a reciprocating bell, an inlet for air and an outlet for gas, a carbureter connected with said outlet, a holder for a liquid hydrocarbon, a pump operated by said reciprocating bell and connected on the receiving side with the said hydrocarbon-holder and on the other side with the carbureter, and a holder for the carbureted gas connected with said carbureter.

6. A gas apparatus, having a generator for producing hydrogen gas and mixing it with air, said generator having a reciprocating bell, an inlet for air and an outlet for gas, a carbureter connected with said outlet, a holder for liquid hydrocarbon, a pump operated by said bell, said pump being connected on its receiving side with the said holder for hydrocarbon and on the other side with the carbureter, a holder for the gas connected with and receiving gas from the carbureter, and a check device between the pump and holder of liquid hydrocarbon, said check device having means for permitting the surplus liquid to pass back to the holder when the pressure exceeds a predetermined point.

In witness whereof we have hereunto signed our names, this 6th day of April, 1904, in the presence of two subscribing witnesses.

WILLIAM H. RUSSELL.
GEORGE E. RUSSELL.

Witnesses:
HENRY CONNETT,
BENJAMAN H. HOLT.