(No Model.)

T. DRAKE.

ELECTROLYTIC APPARATUS FOR THE MANUFACTURE OF CHLORIN AND CAUSTIC SODA.

No. 528,153. Patented Oct. 30, 1894.

FIG. 1.

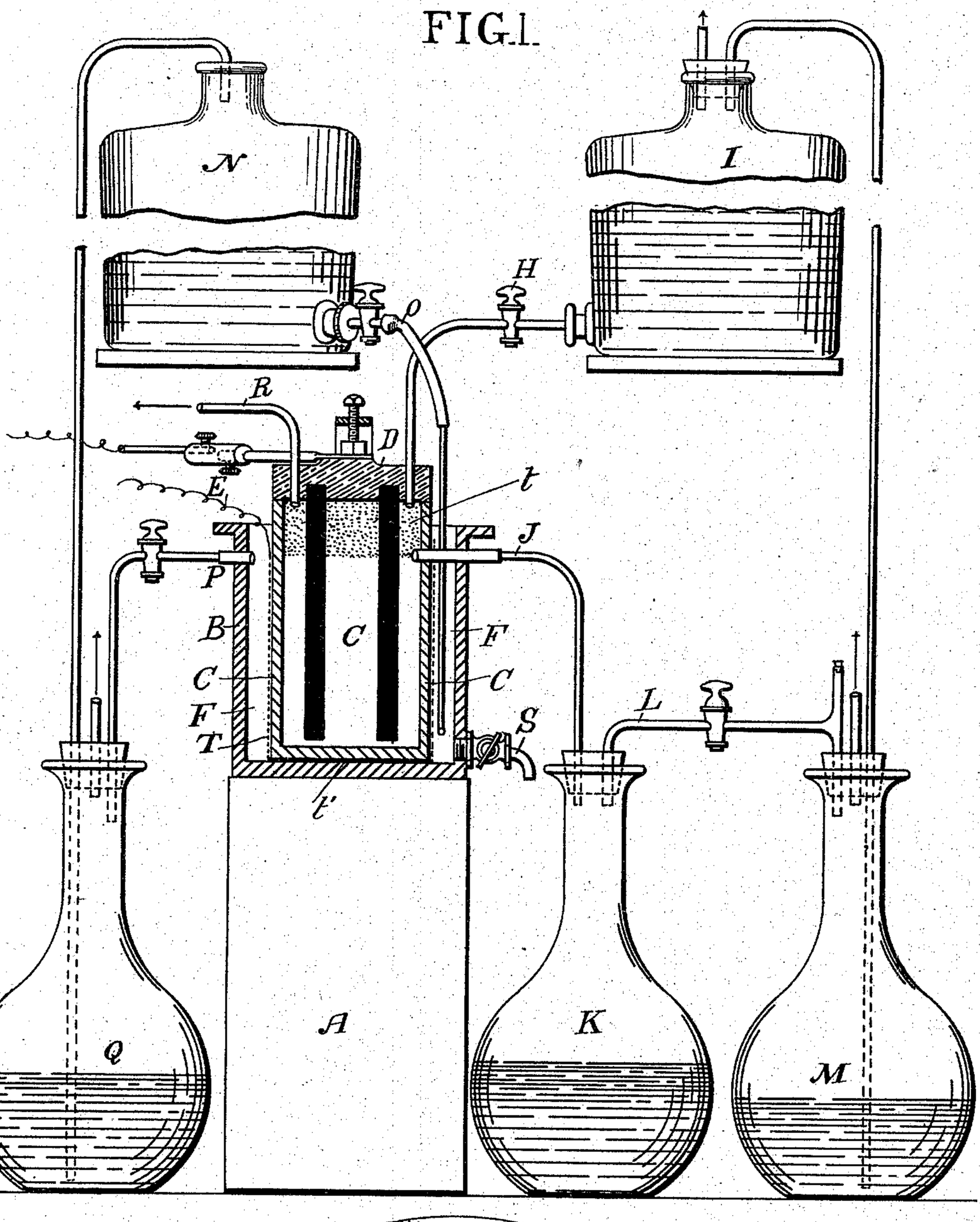
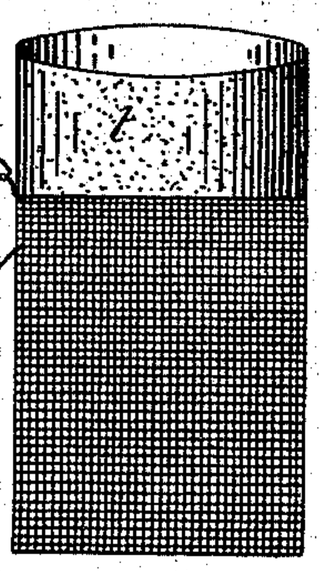


FIG. 2.



WITNESSES:

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ELECTROLYTIC APPARATUS FOR THE MANUFACTURE OF CHLORIN AND CAUSTIC SODA.

SPECIFICATION forming part of Letters Patent No. 528,153, dated October 30, 1894.

Application filed June 30, 1894. Serial No. 516,141. (No model.)

To all whom it may concern:

Be it known that I, THOMAS DRAKE, a subject of the Queen of Great Britain, residing at Huddersfield, in the county of York, England, have invented certain new and useful improvements in apparatus for producing caustic soda and chlorin gas or caustic potash and chlorin gas by the electrolysis of common salt in solution or chloride of potassium in solution; 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.

My invention consists in means for producing caustic soda and chlorine gas or caustic potash and chlorine gas by the action of electricity on common salt in solution or chloride of potassium in solution.

For the purpose of carrying out my invention I use an electrolytic cell containing two chambers. I also employ a porous pot, surrounded with wire, wire-gauze or perforated sheet metal of the nature and in the manner hereinafter described together with electric currents.

In order that the nature and object of my invention may be more fully understood and put into practical operation I will make reference to the annexed sheet of drawings, wherein—

Figure 1 illustrates an arrangement of vessels and an electrolytic cell the latter resting upon a pedestal A. Fig. 2 is a detail view of the porous pot T.

The cell is composed of an outer vessel B made of cast iron. A porous pot C is placed within the cast iron vessel, leaving a space between the inner walls of the outer vessel B and the porous pot C. This porous pot contains two or more carbons secured to a disk of lead D which forms the lid of the said porous pot, which lid is the anode of the cell C. The outer side of the porous pot must be closely and firmly wrapped with a very fine wire, wire-gauze or finely perforated sheet of gold, silver, copper, brass, zinc, iron, or platinum, or other metal of suitable electrical conductivity as shown at letter T. After the porous pot has been thus covered with the metal described, the said pot is immersed in a salt of mercury say—nitrate of mercury—for the purpose of coating the wire, wire-gauze or perforated sheet of metal above described. In thus providing the pot with a metallic covering it is necessary that the covering should be reticular, that is to say it must have numerous small openings or interstices through which the liquid can pass to the pot. Coils of wire wound at a little distance apart around the pot are therefore the equivalent of wire gauze in which the wires cross one another, and of perforated metal.

E is the cathode and it is connected to the wire, wire-gauze or perforated sheet of metal surrounding the porous pot as above described as shown by the letter E and also in detail in Fig. 2.

The space F formed between the outer vessel B and the inner vessel C is filled with water to the height of the overflow pipe P. After the introduction of water into the space F the top H of vessel I (which is filled with a strong solution of common salt or strong solution of chloride of potassium) is opened allowing the liquor therein to flow into the anode side of the cell until it rises to the overflow J when the liquor falls into the depositing tank or vessel K.

In the process of manufacture, the supernatant liquor in vessel K flows over through pipe L into vessel M which when full is forced or pumped back into the upper vessel I and thus the circulation of the liquor is continued. The vessel N is charged with water and flows through pipe O into the space F until the water rises to the level of the overflow pipe P when it passes into the vessel Q which when full is forced or pumped back into the vessel N and so the circulation of the liquor continues. The electric current produced by a dynamo being now connected to the two poles of the cell, the electrolysis commences and the brine or the solution of chloride of potassium in the inner cell C decomposes and chlorine gas passes off by pipe R while sodium or potassium is deposited on the wire, wire-gauze or perforated sheet of metal surrounding the porous pot C. The action of the flow of water through pipe O is to oxidize the sodium to soda with liberation of hydrogen, or potassium to potash the said water being discharged through pipe P. This process may be continued until the solution of

caustic soda or caustic potash attains any desired gravity or strength.

I would here observe that for covering the porous pot C I give preference to fine copper gauze treated with a salt of mercury. The mercury sustains no chemical waste by the action or process herein described. At the same time it is not absolutely necessary to employ mercury inasmuch as an inferior result can be obtained without its use. I would also observe that the chamber of the porous pot above the overflow pipe J should be coated or charged inside and outside with paraffine or other like substance to destroy its porosity, as also should the bottom of the pot on the outside bringing the paraffine in contact with the wire, wire-gauze or perforated sheet of metal.

The paraffine coating is shown on the pot at *t* in Fig. 2, and under the pot at *t'* in Fig. 1.

What I claim is—

In apparatus for the manufacture of chlorine gas and caustic soda or potash, the combination, with a porous pot C for holding a solution of chloride of sodium or potassium, and provided with the insulating material *t* at its upper part to prevent short circuiting; of the metallic cover resting on the insulated top edge of the said pot and provided with the depending pole pieces forming the anode of the cell; the reticular metallic covering T closely encircling the said pot and forming the cathode of the cell; an outer vessel for containing water, surrounding the said pot and its covering; and insulating material interposed between the bottoms of the said pot and vessel, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS DRAKE.

Witnesses:

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