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T. PARKER.

PROCESS OF MANUFACTURING CHLORATES BY ELECTROLYSIS.

(Application filed Dec. 22, 1897.)

(No Model.)

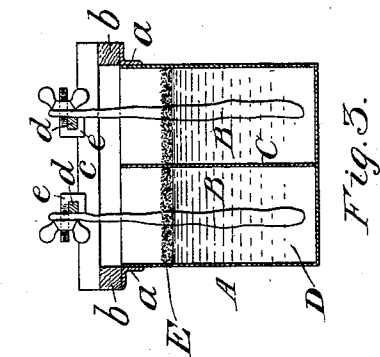


Fig. 3.

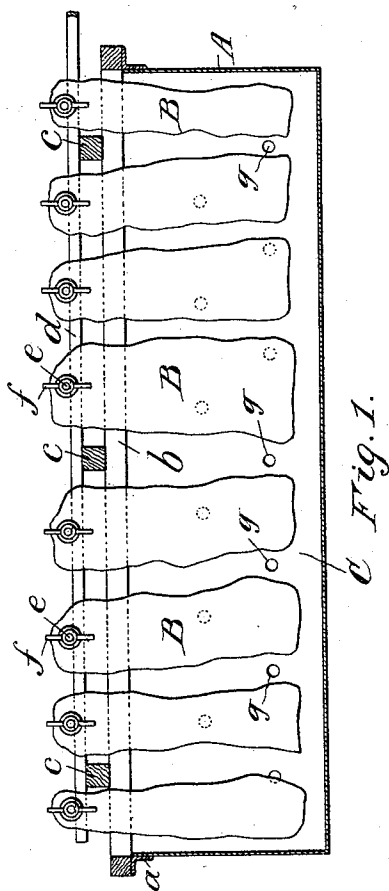


Fig. 1.

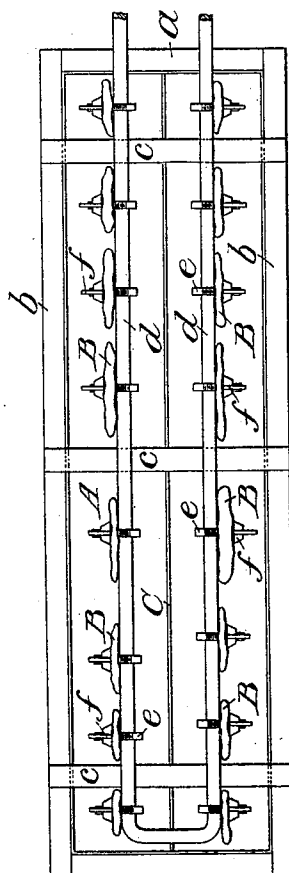


Fig. 2.

Witnesses:
J. H. Kliman
Peter A. Ross

Inventor:
Thomas Parker
by Henry Goussard
Atty.

UNITED STATES PATENT OFFICE.

THOMAS PARKER, OF TETTENHALL, ENGLAND.

PROCESS OF MANUFACTURING CHLORATES BY ELECTROLYSIS.

SPECIFICATION forming part of Letters Patent No. 633,272, dated September 19, 1899.

Application filed December 22, 1897. Serial No. 663,069. (No specimens.)

To all whom it may concern:

Be it known that I, THOMAS PARKER, a subject of the Queen of Great Britain, residing at Tettenhall, near Wolverhampton, in the county of Stafford, England, have invented certain new and useful Improvements in the Electrolytic Production of the Chlorates of Sodium and Potassium, of which the following is a specification.

This invention relates to electrolytic production of the chlorates of sodium and potassium; and it has for its object to insure a greatly-increased efficiency compared with the means ordinarily employed in the production of such chlorates.

The invention consists in the method of procedure employed in the electrolytic operation, and the construction of the cell employed is illustrated in the accompanying drawings, wherein—

Figure 1 is a longitudinal section, Fig. 2 a plan, and Fig. 3 a transverse section, of a double cell constructed and constituted according to this invention.

The tank A, which is the cathode, is made of sheet or thin plate metal, conveniently iron. The top edge of the tank is surrounded by an angle-metal stiffener *a*, which serves also to support longitudinal bearers *b*, of wood. These bearers *b* support cross-bearers *c*, upon which rest longitudinal copper rods *d*, to which the pieces of carbon B forming the anode are connected by means of hook-bolts *e*. The hinder ends of these bolts are hooked over the bars *d* and their forward ends are passed through the respective pieces of carbon and have wing-nuts *f* screwed thereon to tighten the carbons against the bars *d*. Any carbon B may thus be readily removed and replaced without interfering with the working of the cell. The tank itself forms, as above stated, the cathode, and the surface area of the cathode may be increased by the introduction of one or more metal plates C between two adjacent rows of the carbons indicated in the drawings. As shown in the drawings, the cell becomes a double one. If two or more metal plates, such as C, be placed within the tank, each by itself between two adjacent rows of carbons, the cell becomes triple, quadruple, &c., according to the number of plates used. The plate or plates C are provided with holes

g therethrough, or they are otherwise of such character as to allow free communication between the solution or liquid on opposite sides thereof, and the plate or plates are of course electrically connected with the metal tank in a manner which constitutes it part of the cathode. If no plate C is inserted within the tank, one row only of carbons is used and the cell is then a simple or single cell. In practice any desired number of single, double, treble, &c., cells may of course be worked together in series.

The solution D, Fig. 3, in the cell is sodium or potassium chlorid or a solution of these chlorids mixed and is free from alkaline carbonates by preference. A diaphragm is omitted altogether and the solution is covered with a thick layer of some buoyant non-conducting substance E, Fig. 3, as pumice-stone, cork, or the like, preferably pumice-stone in bits of about the size of a hazelnut, the layer being about one inch deep. The purpose of this pumice or floating material is to scrub the escaping gases, and thereby prevent them from carrying off any portion of the solution forming the electrolyte.

The surface areas of the anode (at the surface of which the chlorine is liberated) and of the cathode will be of course arranged to insure a current density suitable for economical working—that is to say, about twenty amperes per square foot of the superficial area of the cathode.

The carbons B shown in the drawings are bits of gas-carbon; but molded or prepared carbons may be used as well, or platinum may be used in lieu of carbon for the anodes.

An important feature of the invention consists in the maintenance of the temperature of the cell at about 30° to 40° centigrade during the working, and this is most conveniently effected by regulating the current density, as above stated, at about twenty amperes per square foot of cathode area. The advantage gained by maintaining such low temperature in the cell is this: In ordinary working with the usual apparatus there is a small anode and cathode area, and consequently a relatively high current density at their surfaces, with the result that the electrolyte is heated, and thus current is wasted in raising the temperature of the electrolyte. The present

invention provides a large anode and cathode area, and thus permits a lower current density to be used, and this insures a low temperature in working, no current being wasted in heating the electrolyte. Obviously the advantage lies in avoiding against loss of current, and the construction of the apparatus employed permits of effecting this saving. It will be observed also that in carrying out this invention the anode-surfaces are separated from the cathode-surfaces by the electrolyte only, no porous protecting material being interposed, as in ordinary cases. Where such material is employed, the apparatus cannot be worked at as low a voltage as where it is not required, and consequently the use of such an intermediate to some extent impairs the efficiency of the apparatus. This apparatus requires no protective lining for the cell, as the metal liberated at the cathode-surface is in itself a sufficient protection.

Any suitable generator of electricity may be employed in the operation, the anodes and cathodes forming, of course, parts of the circuit.

Having thus described my invention, I claim—

1. The herein-described method of carrying on the production by electrolysis of chlorates,

directly from an electrolyte consisting of an aqueous solution of an alkali-metal chlorid, which consists in passing a current of electricity through said solution while the latter is covered with a layer of some buoyant non-conducting material, whereby the gases disengaged are scrubbed, and maintaining the current density during the operation, at about twenty amperes per square foot, substantially as set forth.

2. The herein-described method of carrying on the production by electrolysis of chlorates, directly from an electrolyte consisting of a solution of an alkali-metal chlorid, which consists in passing a current of electricity through said electrolyte from the anode to the cathode, separated only by the electrolyte, said solution being covered with a layer of some buoyant non-conducting material whereby the gases disengaged are scrubbed, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

THOMAS PARKER.

Witnesses:

STEPHEN WATKINS,
ROBERT M. LESTER.