UNITED STATES PATENT OFFICE.

HAMILTON YOUNG CASTNER, OF LONDON, ENGLAND.

ANODE FOR ELECTROLYTIC PROCESSES.

SPECIFICATION forming part of Letters Patent No. 572,472, dated December 1, 1896.

Application filed July 26, 1895. Serial No. 557,238. (No specimens.) Patented in England October 20, 1893, No. 19,089, and in France August 11, 1894, No. 240,684.

To all whom it may concern:

Be it known that I, HAMILTON YOUNG CASTNER, a citizen of the United States, residing at London, England, have invented certain new and useful Improvements in Anodes for Electrolytic Processes, (for which I have received Letters Patent in Great Britain, No. 19,089, dated October 20, 1893, and in France, No. 240,684, dated August 11, 1894;) and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

Carbon electrodes have long been used in electrolytic processes, and it is further common knowledge that they disintegrate more or less rapidly when they are employed as anodes in the decomposition of alkaline, chlorid, or other solutions from which chlorin and oxygen are separated at the anode.

The present invention relates to the preparation of a particular form of carbon for use as an anode which will better withstand the action of chlorin and oxygen than that now employed, and consequently be particularly well adapted for use in the process of producing caustic soda and chlorin from chlorid of sodium, as described in specifications of my Patents No. 528,322, dated October 30, 1894, and No. 518,135, dated April 10, 1894.

I have ascertained from experiments that the disintegration of carbon electrodes acting as anodes in such electrolytic processes is largely due to the oxidiation and solution of the carbon or hydrocarbon present in the carbon electrode (and which to a considerable extent act as binding agents) by the combined action of oxygen, chlorin, and water, and that such oxidation and solution is materially reduced as the carbon forming the anode more closely approaches the graphitic variety.

To this end the invention consists in forming the electrodes of a species of graphitic carbon produced by subjecting the ordinary gas-retort or other like carbon to the intense heating action that can only be attained by the passage of an electric current through the same.

As an example of how my invention may be practically carried out, let it be assumed that the ordinary ground gas-retort carbon is formed in the usual manner into an electrode eighteen inches long by one inch square. To each end of such an electrode I attach a dynamo-terminal, (direct contact being made through a carbon of much larger diameter,) so as to make the carbon a resistance in an unbroken circuit. I cover such carbon resistance with powdered charcoal or other medium which will exclude the air, and consequently prevent the carbon resistance from burning, and I then pass through the resistance a current of about five hundred amperes. The heat generated in the carbon forming the resistance is quite unmeasurable, and is such that the carbon will give off the more inflammable material it contains, and the remainder will in a few minutes be converted into a more fixed carbon, graphitic in its character, after which the current is switched off and the electrode allowed to cool. It is then ready for use and will be found to be of decreased density, to possess increased conductivity, and to be less susceptible to chemical action than those now usually employed.

I am aware that it has been heretofore proposed to use the electric current to carbonize paper and like materials, to deposit carbon from hydrocarbon gas on previously-carbonized materials, to subject the thickened ends of carbon filaments to an intense heat *in vacuo*, and I do not desire to claim such methods of manufacture, nor the manufacture of carbon filaments in any form; nor do I broadly claim heating carbon by the passage therethrough of an electric current, as such heating necessarily follows whenever the carbon offers greater resistance than the rest of the circuit; nor do I claim the heating of carbon *in vacuo*, as that is common in all incandescent lamps; but, having discovered and ascertained by experiment that if the usual carbons as now made for use as anodes in electrolytic processes are first heated to a degree only attainable by the employment of an electric current, they will be converted into a form of graphite and will then far better withstand the chemical and disintegrating action when used as a positive electrode in the electrolysis of alkaline salts.

What I therefore claim is—

1. The process of producing carbon elec-

trodes for electrolytic processes which consists in submitting a shaped electrode of gas-retort or like carbon while protected from contact with air to the intense heat produced by passing an electric current therethrough, substantially as and for the purpose described.

2. A carbon electrode for electrolytic processes composed of graphitized carbon of decreased density and increased conductivity as compared with a gas-retort or like carbon from which it has been produced and also more capable of withstanding the combined action of chlorin, oxygen and water, as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

HAMILTON YOUNG CASTNER.

Witnesses:
GEO. J. B. RANKLIN,
J. NORWOOD.