UNITED STATES PATENT OFFICE.

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PROCESS OF PRODUCING ZINC OXID AND NITRITES.

SPECIFICATION forming part of Letters Patent No. 670,201, dated March 19, 1901.

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To all whom it may concern:

Be it known that I, EDWARD D. KENDALL, a citizen of the United States, residing in the city of New York, borough of Brooklyn, in the State of New York, have invented certain new and useful Improvements in Processes of Producing Zinc Oxid and Nitrites, of which the following is a specification.

The object of my invention is to produce zinc oxid as a solid deposit or precipitate and a nitrite or nitrites in solution from a suitable nitrate, preferably the nitrate known as "Chili" saltpeter, the zinc oxid being used as a paint and for chemical preparations, while the nitrites may be used in the manufacture of azo colors, for which they are especially adapted, owing to the pure state in which they are obtained.

The invention consists of a process of producing zinc oxid and nitrites by electrolysis, which consists in subjecting an electrolyte consisting of an aqueous solution or bath of a nitrate or nitrates to the action of an electric current passing between an anode formed of zinc and a cathode formed of suitable material, substantially as hereinafter set forth.

In carrying out my invention the electrolyte is prepared by dissolving in water the nitrate, from which the zinc oxid and nitrite or nitrites are to be obtained. The nitrate to be used is preferably crude sodium nitrate, known as "Chili" saltpeter, as this can be bought at a comparatively low price in the market. A saturated or nearly-saturated solution of the nitrate may be used or a solution containing any considerable proportion of nitrate. The solution or bath is subjected in a tank or tanks to the action of the electric current of sufficient quantity and electromotive force. Zinc plates are used as anodes, while the cathodes are formed of carbon or a suitable metal, a suitable metal for this purpose being one which, while not too costly, sufficiently resists the destructive action of the electrolyte, such as copper, iron, (with or without a coating of tin,) or lead. The zinc anode or anodes may be made in any required form, either by casting or by rolling in sheets, or they may be a mass or masses of fragments or granules of zinc; but whatever the form of the anode it is to be in electric contact with the conductor of the electric current properly connected with the dynamo or other source of electricity. The tank or tanks employed may be of wood, iron, or other suitable material and may be connected in series. When the tank is made of metal, it may be in some instances so constructed that the inner surface shall serve as the cathode. It is evident that different forms of plants may be used in this process. A simple and practical arrangement of the electrolytic tank is to suspend a zinc plate or plates in the tank to act as an anode and opposite thereto a corresponding cathode of metal, similar in form to the zinc anode, both electrodes being attached to the conductors that are connected to a direct-current dynamo or other source of electricity. No nitrous fumes are generated at any stage of the process, and the solution remains neutral except for the formation after some time of barely-discoverable ammonia, due to electrolysis of an insignificant quantity of nitrite. The observable phenomena indicate that the process proceeds according to the formula:

$$2Zn+NaNO_3+H_2O=2ZnO+NaNO_2+H_2.$$

The nitrate or nitrates employed may be the nitrate or nitrates of an alkali metal or metals or of an alkaline-earth metal or metals or of ammonium. When subjected to the electric current, a rapid yielding of the required products is obtained, particularly in a strong solution with or without application of heat. The electric current has to be adjusted as regards amperage to the capacity of the tank or tanks and as to voltage to the number of tanks in series. A single tank may be operated by a current of six volts or less; but a higher voltage is preferable, so as to overcome the resistance of the electrolyte and increase its output.

In the process described the practical results of the electrolytic action are the reduction of the nitrate in the solution to nitrite, which remains in the solution, and the formation of nearly-insoluble zinc oxid, most of which separates from the zinc anode and is precipitated to the bottom of the tank or into a suitable receptacle below the anode, which may be in the form of a deep tray resting on

the bottom of the tank and removable after the solution of nitrite shall have been drawn off from the tank. The zinc oxid settles quickly and forms a compact mass of precipitate.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The process herein described of producing zinc oxid and a nitrite or nitrites, by electrolysis, which consists in subjecting an electrolyte consisting of an aqueous solution or bath of a nitrate or nitrates to the action of an electric current passing between an anode formed of zinc and a cathode formed of suitable material, substantially as set forth.

2. The process herein described of producing zinc oxid and a nitrite or nitrites, by electrolysis, which consists in subjecting an electrolyte consisting of an aqueous solution or bath of a nitrate or nitrates to the action of an electric current passing between an anode formed of zinc and a cathode formed of carbon, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

EDWARD D. KENDALL.

Witnesses:

PAUL GOEPEL,

GEO. C. GEIBEL.