No. 789,269. Patented May 9, 1905.

# UNITED STATES PATENT OFFICE.

CARLETON ELLIS, OF BOSTON, MASSACHUSETTS.

## PROCESS OF PRODUCING TARTARIC ACID AND ITS SALTS.

SPECIFICATION forming part of Letters Patent No. 789,269, dated May 9, 1905.

Application filed December 3, 1903. Serial No. 183,629.

*To all whom it may concern:*

Be it known that I, CARLETON ELLIS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Processes of Producing Tartaric Acid, of which the following is a specification.

The object of this invention is to provide a means for making tartaric acid and its salts or its isomers and their salts from saccharine matter by electrical oxidation. By my process as hereinafter described an inexpensive source of oxygen in its most active form is secured by the employment of the electric current, and a good yield of tartaric acid is obtained.

The general reaction in the electrolysis of the alcohols or alcohol-aldehydes composing saccharine matter is one of successive oxidation. The electrolytic oxygen gradually oxidizes these substances, the final product being carbon dioxid. Intermediate products are formed, their quantity partly depending on the duration of the electrolysis, but chiefly to their solubility or insolubility, and therefore to their behavior as electrolytes. If the product of oxidation first formed is a good conductor of the electric current, it will undergo further oxidation. If it is insoluble, it escapes the further action of the current. Hence the possibility of isolating the products which are formed.

The gradual oxidation by electrolysis of saccharine matter produces various monobasic and diabasic acids—as, for instance, gluconic, saccharic, tartaric, lactic, formic, and carbonic acid. Owing to this successive oxidation, the relative quantity of any one of the higher acids in the electrolyte during electrolysis is very small. For instance, gluconic acid forms only to be converted into saccharic acid, and this in turn into tartaric acid, and so on until the final product, carbon dioxid, appears at the anode. By my process the conditions are made such that the oxidation proceeds up to the point where tartaric acid is formed, but is largely prevented from going further by the conversion of the tartaric acid into an insoluble or slightly-soluble product. As an example of the method the anodic oxidation of grape-sugar may be given.

A ten-per-cent. solution of grape-sugar is made slightly alkaline by the addition of one per cent. carbonate of potash and is electrolyzed by a strong electric current. The temperature is maintained at about 10° centigrade. The current strength is kept at about two amperes, and the electromotive force ought not to exceed ten volts. The electrolyte is gently stirred, and gradually a crystalline precipitate of acid potassium tartrate forms and deposits. More alkali is added from time to time to supply the necessary potash, and the electrolysis is continued as long as the tartrate continues to form. From two to ten per cent. of tartaric acid may in this way be obtained. Various saline compounds—such, for instance, as potassium sulfate—may be introduced into the electrolyte to improve its conductivity. Potassium acetate may be used in place of potassium carbonate as a source of potash for the formation of insoluble potassium hydrogen tartrate, in which case the electrolyte may be kept acid in reaction. The tartaric acid compounds as thus obtained may be purified from traces of saccharates by crystallization.

What I claim as my process, and desire to secure by Letters Patent, is—

The anodic oxidation of saccharine solutions to produce tartaric acid and salts thereof consisting in exposing such solutions to the action of an electric current in the presence of bodies forming with tartaric acid relatively insoluble compounds and in causing said compounds to be removed from the field of oxidation.

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

CARLETON ELLIS.

Witnesses:
SOPHIA WILSON,
NATHANIEL L. FOSTER.