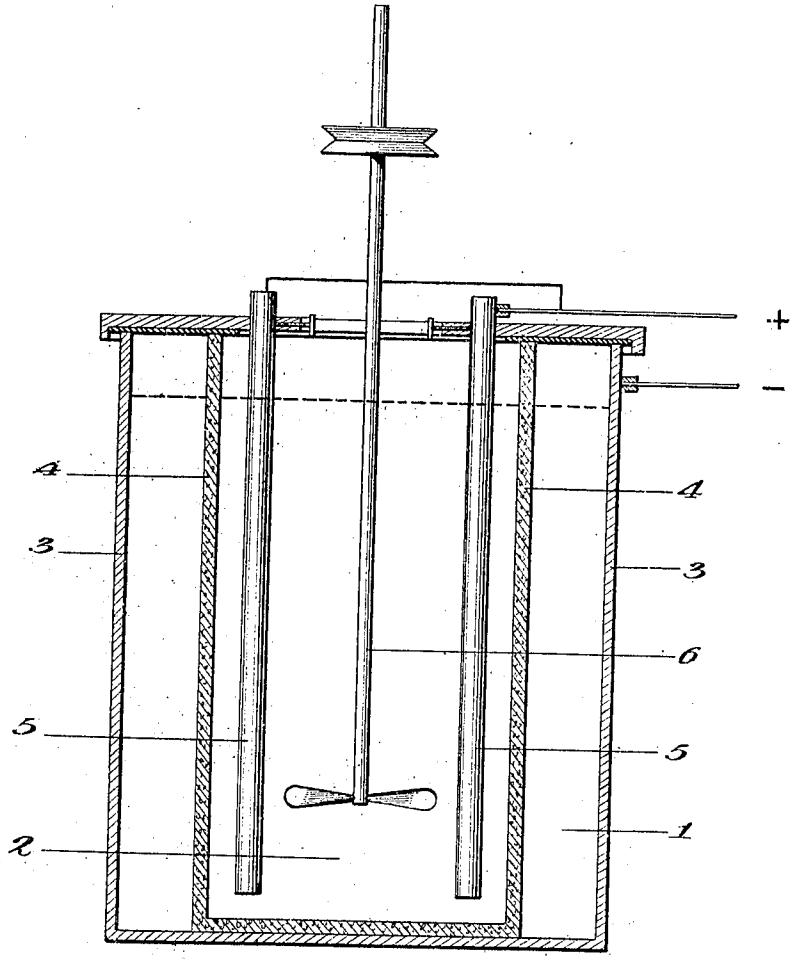
B. F. LOVELACE, C. E. LANNING & W. L. JUDEFIND.

ELECTROLYTIC PRODUCTION OF PERMANGANATES.

APPLICATION FILED JAN. 21, 1918.

1,291,682.

Patented Jan. 14, 1919.



Inventors:

Benjamin F. Lovelace

Charles E. Lanning.

Wm. Lee Judefind

UNITED STATES PATENT OFFICE.

BENJAMIN F. LOVELACE, CHARLES E. LANNING, AND WILLIAM LEE JUDEFIND, OF BALTIMORE, MARYLAND.

ELECTROLYTIC PRODUCTION OF PERMANGANATES.

1,291,682. Specification of Letters Patent. Patented Jan. 14, 1919.

Application filed January 21, 1918. Serial No. 213,094.

(FILED UNDER THE ACT OF MARCH 3, 1883, 22 STAT. L., 625.)

To all whom it may concern:

Be it known that we, BENJAMIN F. LOVELACE, CHARLES E. LANNING, and WILLIAM LEE JUDEFIND, citizens of the United States, and residents of the city of Baltimore, State of Maryland, and employees of the United States Bureau of Mines, have invented certain new and useful Improvements in the Electrolytic Production of Permanganates, of which the following is a full, clear, and exact description.

This application is made under the act of March 3, 1883, c. 143 (U. S. Stat., 22, p. 625) and the discoveries described herein, if patented, may be used by the Government, or any of its officers or employees in prosecution of work for the Government, or by any other person in the United States, without the payment to them of any royalty thereon.

This invention relates to the art of making permanganates and particularly to a process for the electrolytic production of various permanganates.

The object of this invention is to produce in a simple and economic manner permanganates of the alkali and alkaline earth metals.

As an example of an apparatus which may be used in practising this process, reference may be had to the accompanying drawing wherein the figure is a vertical section of one type of cell.

The electrolytic cell consists of two compartments, 1 and 2, formed by an outer container, 3, and an inner vessel, 4, which is made of porous material such as cement or asbestos, and serves as a diaphragm to prevent passage of the permanganate salt to the outer container. The anodes, 5, are placed in the inner compartment, 2. They contain manganese and one or more of the following elements: silicon, tungsten, molybdenum and carbon, which may be combined chemically or may be uncombined. They may be prepared by adding the appropriate amount of one or more of these elements to molten manganese.

As an example, 10 parts by weight of tungsten may be added to 100 parts by weight of molten manganese while the latter is in the furnace and the resulting melt cast in suitable shape for use as an anode.

The solution in compartment 2 should be vigorously agitated by the stirrer, 6, during the electrolysis in order continuously to secure uniform distribution of the dissolved substances. The electrolyte used in both anode and cathode compartments may consist of the hydroxid of the metal, the permanganate of which is desired. The carbonate, silicate or other salt which, by hydrolysis, gives an excess of hydroxyl ions in solution may be employed in certain cases. Fresh electrolyte may be added from time to time to keep up the concentration as may be necessary.

When a large current is employed the solution should be cooled by any appropriate means, not shown.

In the preparation of sodium permanganate, for example, the operation is as follows:

The compartments, 1 and 2, are filled with a solution of sodium hydroxid and the solution electrolyzed. Sodium permanganate is formed at the anode and remains in the anode compartment, 2. More sodium hydroxid may be added from time to time as may be necessary.

It is known that sodium permanganate can be produced by electrolyzing a solution of sodium hydroxid while using an anode of manganese or manganese carbid. This is disclosed in German Patent No. 125,060.

In this application we desire to claim the species of our invention in which the anode consists of manganese and tungsten which we have found produces excellent results. In other applications Serial Nos. 213,092 and 213,093 filed concurrently herewith, we claim other species of this invention.

We claim:—

1. The method of preparing a permanganate which consists in electrolyzing a solution of a compound which by hydrolysis gives an alkaline solution, using an anode containing manganese and tungsten.

2. The method of preparing a permanganate which consists in electrolyzing a solu-

tion of hydroxid using an anode containing manganese and tungsten.

3. The method of preparing an alkali permanganate which consists in electrolyzing a solution of alkali hydroxid, using an anode containing manganese and tungsten.

4. The method according to claim 3, in which a diaphragm is placed between the anode and cathode.

In testimony whereof we hereunto affix our signatures.

BENJAMIN F. LOVELACE.
CHARLES E. LANNING.
WILLIAM LEE JUDEFIND.