

# UNITED STATES PATENT OFFICE.

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## METHOD OF TREATING ALKALI-METAL AMALGAM.

SPECIFICATION forming part of Letters Patent No. 782,893, dated February 21, 1905.

Application filed April 15, 1904. Serial No. 203,374.

*To all whom it may concern:*

Be it known that we, CHARLES E. BAKER and ARTHUR W. BURWELL, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Methods of Treating Alkali-Metal Amalgam, of which the following is a specification.

This invention is a method of treating amalgams containing mercury and an alkali metal, more specifically amalgams of mercury with sodium or potassium, for the purpose of separating the constituents thereof. According to our method the amalgam is heated in an atmosphere containing hydrogen to such temperature as will effect the distillation of mercury, the alkali metal uniting with hydrogen to form a hydrid, which remains as a residue. Thereafter the temperature is increased to or above the decomposing-point of the hydrid to liberate hydrogen and free the alkali metal.

In practice we prefer to proceed substantially as follows: The amalgam, derived from any source—as, for instance, an electrolytic cell provided with a cathode of mercury—is drawn into a suitable retort and heated therein in an atmosphere of hydrogen to such temperature as will suffice to vaporize the mercury while forming a hydrid of the alkali metal, said hydrid being substantially non-volatile at the temperature of vaporization of mercury. The amalgam may be heated to a variable temperature, provided it is above the vaporizing-point of mercury and below the decomposition-point of sodium hydrid. We have found that the mercury distills off more freely by alternately raising and lowering the temperature of the amalgam between these limits. In case the amalgam is derived from an electrolytic cell, the vapors of mercury may be condensed and returned to the cathode substantially as described in our prior patent, No. 739,139, issued September 15, 1903. The mercury may, if desired, be distilled in a current of hydrogen. The residual alkali-metal hydrid is then heated to a temperature sufficient to decompose it with liberation of hydrogen, the resulting alkali metal being recovered and utilized as desired. By providing a plurality of interconnected retorts the method may be operated without

substantial loss of hydrogen, the hydrogen derived from the decomposition of the hydrid in one retort being preferably absorbed in another retort with the production of further quantities of hydrid.

We claim—

1. The herein-described method of treating alkali-metal amalgam, which consists in converting the alkali metal into hydrid and distilling mercury therefrom, substantially as described.

2. The herein-described method of treating alkali-metal amalgam, which consists in converting the alkali metal into hydrid, distilling mercury therefrom, decomposing said hydrid and freeing the alkali metal, substantially as described.

3. The herein-described method of recovering alkali metal from an amalgam containing the same, which consists in heating the amalgam in presence of hydrogen to form a hydrid of the alkali metal, distilling the mercury, then increasing the temperature to decompose said hydrid and free the alkali metal, substantially as described.

4. The herein-described electrolytic method, which consists in electrolyzing an alkali-metal compound with a cathode of mercury, thereby forming an amalgam of the alkali metal, distilling the said amalgam in presence of hydrogen, thereby separating mercury and producing the hydrid of the alkali metal, condensing the mercury and returning it to the cathode, substantially as described.

5. The herein-described electrolytic method, which consists in electrolyzing an alkali-metal compound with a cathode of mercury, thereby forming an amalgam of the alkali metal, distilling said amalgam in presence of hydrid, thereby separating mercury and producing the hydrid of the alkali metal, condensing the mercury and returning it to the cathode, decomposing said hydrid, and recovering the alkali metal, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

CHARLES E. BAKER.  
ARTHUR W. BURWELL.

Witnesses:

F. N. SEALAND,  
R. G. SMITH.