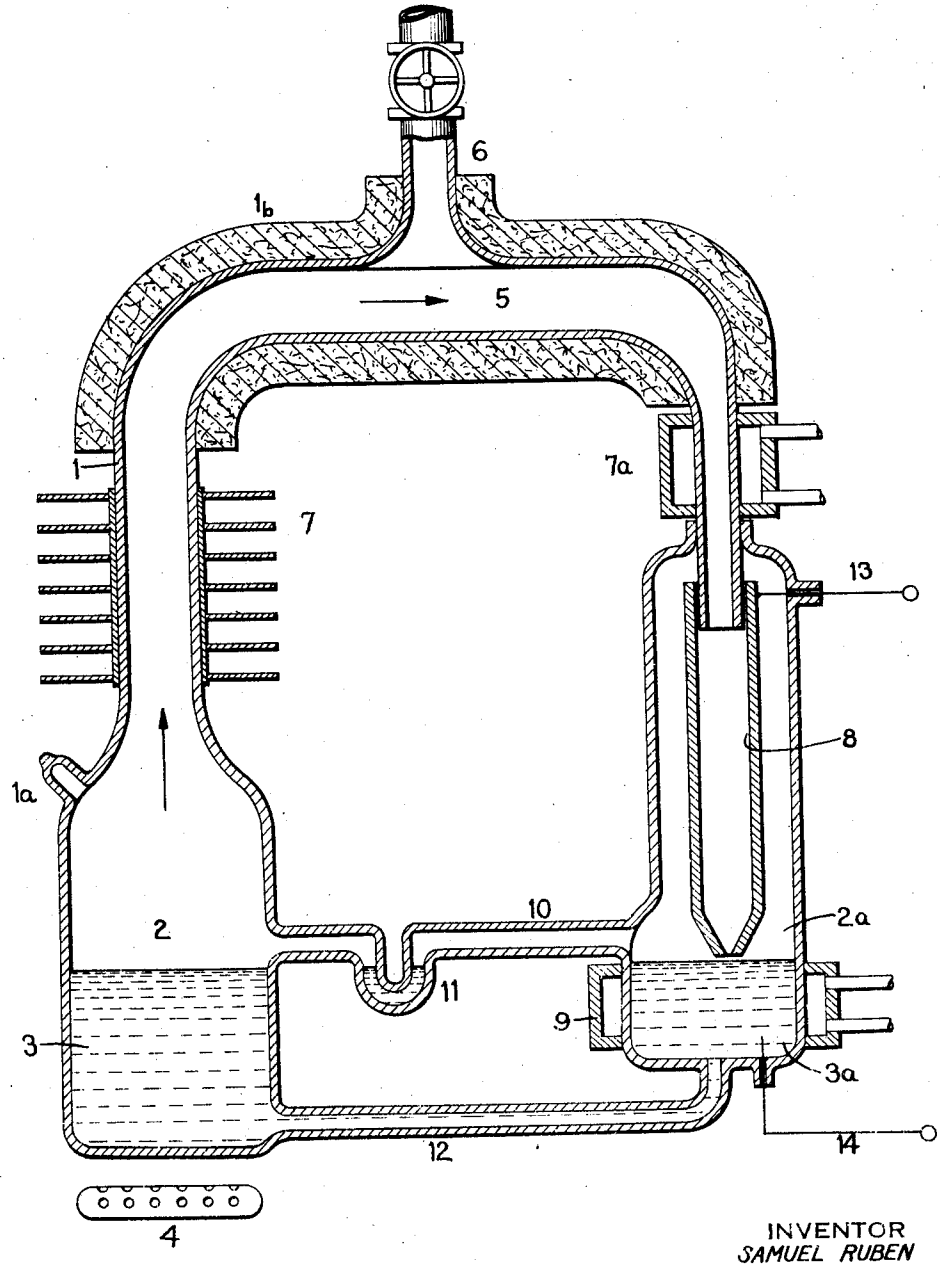
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APPARATUS FOR GENERATING ELECTRICAL POTENTIAL

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UNITED STATES PATENT OFFICE

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APPARATUS FOR GENERATING ELECTRICAL POTENTIAL

Original application filed March 6, 1930, Serial No. 433,830. Divided and this application filed December 9, 1930. Serial No. 501,045.

This invention relates to an apparatus for generating electrical potential; and particularly it relates to such an apparatus by means of which a potential is generated directly from the heat due to the amalgamation of an electro-negative material with an alkali metal. The invention is an improvement upon that described in my co-pending application filed September 23, 1929, bearing Serial Number 393,307, and constitutes a division of my application filed March 6, 1930, bearing Serial Number 433,830. An object of the invention is the provision of an efficient device for thermo-chemically generating an electrical potential.

Broadly, my invention comprises, a thermally insulated vessel composed preferably of an electrically insulating material, and having a plurality of chambers connected by suitable conduits, also a means for heating an amalgam, a means for partial vapor condensation, a means for the condensation of other vapors and means for passing the vapor from the second condenser area into another chamber in contact with an alkali metal, to a vaporizing temperature in one of the vessel's chambers, together with means for carrying off some of the heat due to the amalgamation in the second chamber, contacting with alkali metal and for connecting the condensed vapor and the amalgamating mass in an external electrical circuit. The device is similar to that described in my said co-pending application bearing Serial Number 393,307. However, in the present apparatus a rectifier means is provided just above the vaporization chamber to secure the condensation and retention within the chamber of all vapors, with the exception of those of the electro-negative element of the amalgam reaching that area. A manifold having a trap therein extends from above the vaporizing chamber to the second amalgam chamber. The vapors of the electro-negative material, preferably mercury, pass therethrough until they reach a region in the manifold within which they are condensed just above the second chamber, passing thence through a metal conduit having an outlet closely adjacent the alkali metal within the second chamber, the condensed vapors forming an amalgam with the alkali metal, a potential being thereby generated. The metal conduit and the amalgam within the second chamber are connected in an external electrical circuit. Means are provided for carrying off heat generated by the amalgamation process in the second chamber. With an increase in the amount of amalgam in the latter chamber, gravity forces a flow into the vaporization chamber. The partial cooling process may be assisted by the presence of an inert gas at low pressure within the vessel.

Reference is made to the accompanying drawing in which 1 represents an evacuated vessel having walls of electrically insulating material, 1_a an exhaust outlet, 1_b thermal insulation for the vessel, 2 the vaporization chamber of the vessel, 2_a a chamber for the formation of amalgam, 3 a body of amalgam within the vaporization chamber 2, and 3_a a body of potassium or weak amalgam in chamber 2_a, 4 being the heating means for vaporizing amalgam 3. At 5 is a manifold connecting the two chambers. A lower end of the manifold consists of a metal tube 8, having a small orifice closely adjacent to the level of the weak amalgam. Just above the vaporization chamber are rectifier plates 7, and about the manifold above the second chamber 2_a is a cooling device 7_a, for condensing the electro-negative metal or mercury vapor. The chambers 2 and 2_a are connected by an upper conduit having a trap 11, the lower regions of the chambers being connected by conduit 12. Cooling means 9, surrounds chamber 2_a to carry off heat generated by the amalgamation process. The weak amalgam 3_a, and the metal tube 8, are connected in an external electrical circuit respectively by leads 14 and 13.

What I claim is:

1. An apparatus for generating electrical potential comprising a vessel composed of an electrical insulating material partially thermally insulated and having a vaporizing chamber containing a body of amalgam, another chamber containing another body of amalgam, a manifold for the passage of metal vapors from said vaporizing chamber,

means for partially condensing said vapors above the vaporizing chamber, means for condensing the uncondensed vapors, and means for discharging said later condensed vapors into contact with said second mentioned body of amalgam, said means comprising a metal conductor having an outlet adjacent the second mentioned body of amalgam, a conduit having a trap therein, connecting the upper levels of said bodies of amalgam, means for connecting the contents of the second mentioned chamber and the metal conductor in an external electrical circuit, and means for heating the content of the first mentioned chamber.

2. An apparatus for generating electrical potential comprising a vessel composed of an electrical insulating material partially thermally insulated and having a vaporizing chamber containing a body of amalgam, another chamber containing another body of amalgam, a manifold for the passage of metal vapors from said vaporizing chamber, means for partially condensing said vapors, means for condensing the uncondensed vapors, and means for discharging said later condensed vapors into contact with said second mentioned body of amalgam, said means comprising a metal conductor having an outlet adjacent the second mentioned body of amalgam, a conduit having a trap therein, connecting the upper levels of said bodies of amalgam, another conduit connecting the lower regions of said chambers, means for connecting the contents of the second mentioned chamber and the metal conductor in an external electrical circuit, and means for heating the content of the first mentioned chamber.

3. An apparatus for generating electrical potential comprising a vessel composed of an electrically insulating material partially thermally insulated and having a vaporizing chamber containing a body of amalgam, another chamber containing another body of amalgam, a manifold for the passage of metal vapors from said vaporizing chamber, means for partially condensing said vapors above the vaporizing chamber, means for condensing the uncondensed vapors, and means for discharging said later condensed vapors into contact with said second mentioned body of amalgam, said means comprising a metal conductor having an outlet adjacent the second mentioned amalgam, a conduit connecting said chambers for the passage of amalgam from the second mentioned chamber to the vaporizing chamber, means for connecting the contents of the second mentioned chamber and the metal conductor in an external electrical circuit, means for heating the content of the first mentioned chamber and means for cooling the content of the second mentioned chamber.

4. An apparatus for generating electrical potential comprising a vessel containing an inert gas and composed of an electrical insulating material partially thermally insulated and having a vaporizing chamber containing a body of amalgam, another chamber containing another body of amalgam, a manifold for the passage of metal vapors from said vaporizing chamber, means for partially condensing said vapors above the vaporizing chamber, means for condensing the uncondensed vapors, and means for discharging said later condensed vapors into contact with said second mentioned body of amalgam, said means comprising a metal conductor having an outlet adjacent the second mentioned body of amalgam, a conduit having a trap therein, connecting the upper levels of said bodies of amalgam, another conduit, connecting the lower regions of said chamber, means for connecting the contents of the second mentioned chamber and the metal conductor in an external electrical circuit, and means for heating the content of the first mentioned chamber.

5. An apparatus for generating electrical potential comprising a vessel composed of an electrical insulating material partially thermally insulated and having a vaporizing chamber containing a body of amalgam, another chamber containing another body of amalgam, a manifold for the passage of metal vapors from said vaporizing chamber, means for partially condensing said vapors above the vaporizing chamber, means for condensing the uncondensed vapors adjacent the second mentioned chamber, and means for discharging said later condensed vapors into contact with said second mentioned body of amalgam, said means comprising a metal conductor having an outlet adjacent the second mentioned body of amalgam, a conduit having a trap therein, connecting the upper levels of said bodies of amalgam, means for connecting the contents of the second mentioned chamber and the metal conductor in an external electrical circuit, and means for heating the content of the first mentioned chamber.

6. An apparatus for generating electrical potential comprising a vessel composed of an electrical insulating material partially thermally insulated and having a vaporizing chamber containing a body of amalgam, another chamber containing another body of amalgam, a manifold for the passage of metal vapors from said vaporizing chamber, means for partially condensing said vapors, means for condensing the uncondensed vapors adjacent the second mentioned chamber, and means for discharging said later condensed vapors into contact with said second mentioned body of amalgam, said means comprising a metal conductor having an outlet adjacent the second mentioned body of amalgam, a conduit having a trap therein,

connecting the upper levels of said bodies of amalgam, another conduit connecting the lower regions of said chambers, means for connecting the contents of the second mentioned chamber and the metal conductor in an external electrical circuit, means for heating the content of the first mentioned chamber, and means for cooling the content of the second mentioned chamber.

7. An apparatus for generating electrical potential comprising a vessel composed of an electrical insulating material partially thermally insulated and having an atmosphere containing an inert gas, a vaporizing chamber containing a body of amalgam, another chamber containing another body of amalgam, a manifold for the passage of metal vapors from said vaporizing chamber, means for partially condensing said vapors above the vaporizing chamber, means for condensing the uncondensed vapors, and means for discharging said later condensed vapors into contact with said second mentioned body of amalgam, said means comprising a metal conductor having an outlet adjacent the second mentioned body of amalgam, a conduit having a trap therein, connecting the upper levels of said bodies of amalgam, means for connecting the contents of the second mentioned chamber and the metal conductor in an external electrical circuit, and means for heating the content of the first mentioned chamber.

8. An apparatus for generating electrical potential, comprising a thermally insulated vessel having a vaporizing chamber, a second chamber, a manifold connecting said chambers, means for partial vapor condensation adjacent the vaporizing chamber, means for condensing other vapors in the manifold adjacent the second chamber, means for discharging said other condensed vapors in contact with an electrically conductive body between the area of the condensation of said other vapors and the second chamber, means for cooling the condensed vapor in the second chamber, a conduit for discharging fluids directly between the chambers, means for connecting in an electrical circuit the said electrically conductive body and the condensed vapor in the second chamber.

9. An apparatus for generating electrical potential, comprising a thermally insulated vessel having a vaporizing chamber, a second chamber, a manifold connecting said chambers, means for the partial condensation of vapors adjacent the vaporizing chamber, means for condensing other vapors in the manifold adjacent the second chamber, means for discharging condensed vapors in contact with an electrically conductive body between the area of said second condensation and the second chamber, a conduit for discharging fluids directly between the chambers, means for connecting in an electrical circuit the said electrically conductive body and the condensed vapor in the second chamber.

10. An apparatus for generating electrical potential, comprising a thermally insulated vessel having a vaporizing chamber, a second chamber, a manifold connecting said chambers, means for partial vapor condensation adjacent the vaporizing champer, means for condensing other vapors in the manifold adjacent the second chamber, means for discharging said other condensed vapors in contact with an electrically conductive body between the area of the condensation of said other vapors and the second chamber, means for cooling the condensed vapor in the second chamber, a conduit for discharging fluids directly between the chambers, means for connecting in an electrical circuit the said electrically conductive body and the condensed vapor in the second chamber, and a conduit having a trap therein between the upper regions of the said chambers.

Signed at New York, in the county of New York and State of New York, this 4th day of December, A. D. 1930.

SAMUEL RUBEN.