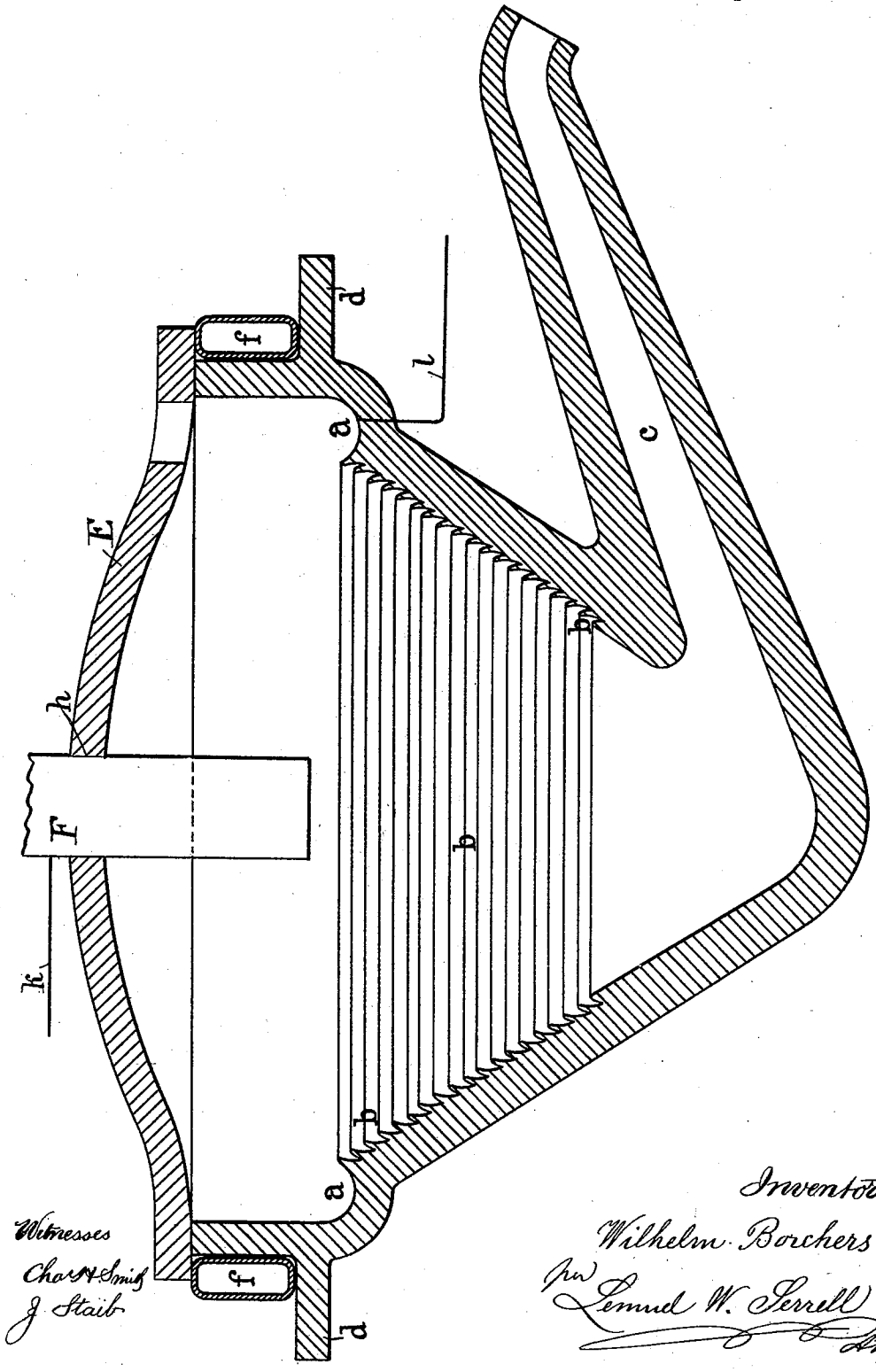
(No Model.)

W. BORCHERS.

VESSEL FOR ELECTROLYTIC SEPARATION.

No. 544,153. Patented Aug. 6, 1895.



Witnesses
Chas. A. Smith
J. Stair

Inventor
Wilhelm Borchers
by Lemuel W. Serrell
Atty.

UNITED STATES PATENT OFFICE.

WILHELM BORCHERS, OF DUISBURG, GERMANY.

VESSEL FOR ELECTROLYTIC SEPARATION.

SPECIFICATION forming part of Letters Patent No. 544,153, dated August 6, 1895.

Application filed December 31, 1894. Serial No. 533,376. (No model.)

To all whom it may concern:

Be it known that I, WILHELM BORCHERS, of Duisburg, Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Vessels for Electrolytic Separation and Alloyage of Metals in a Molten State, of which the following is a specification.

The invention refers to a vessel in which the electrolytic separation of a metal shall take place with the simultaneous alloyage of such metal with another metal in a molten state. The vessel for this purpose may be constructed of an electric conducting or non-conducting material. The inner wall of such vessel is formed with horizontal grooves and projections, into which grooves and over which projections the molten metal serving as means of solution and as cathode will run down during the electrolytic action in order to run off at the bottom of the vessel through a properly-arranged aperture alloyed with the other metal, which latter is separated within the vessel by electrolytic action. The vessel is usually made with inclined sides grooved horizontally, or nearly so, the edges of the grooves forming lips or dams over which the melted metal flows. These grooves and projections are for the purpose of preventing an accelerated running down of the metal, which serves as a means of solution and as a cathode, so that the inner wall of the vessel is, or is nearly, entirely covered with a thin film of molten metal.

In the drawing I have represented a vessel adapted to use in carrying out my invention, such vessel being shown by a vertical central section.

This vessel may be placed in the fire or otherwise supported while exposed to the required heat.

The part of the vessel above the flange *d* may be cooled by means of a surrounding hollow annular ring *f*, in which cooling water is allowed to circulate. This cooling will have the effect of forming a crust of solidified salt upon the inside wall above the flange, thus protecting said wall against the action of chlorine or other gases and doing away with the customary but noxious partitions or cells surrounding the anodes in other forms of apparatus. By this arrangement the resistance of the bath is remarkably decreased and much power saved, which in other processes is wasted.

In operating with the vessel a portion of the metal serving as a means of solution and as a cathode is deposited in the vessel, which may be preheated, so that the exit-pipe *c* is filled or partly filled with such metal. Then the electrolyte—that is to say, the other metal contained in a metal compound (which compound may be in a molten state or dissolved in fluid) is deposited in the vessel. The latter is covered with a suitable cover through which the anode F is introduced or suspended into the vessel either free or in an envelope. The anode may consist of charcoal or of a piece of metal or any suitable material. The cover E is provided with a suitable opening *h* for introducing or supplying during the operation metal into the upper rim or gutter *a* in a liquid or molten state. The cathode and the anode are then connected to an electric current by suitable wires, (indicated at *k l*,) or if the vessel is made of a suitable material the vessel may form the cathode and is connected with the anode by a current-conductor. The metal which by the electrolytic operation is separated from the electrolytic compound is absorbed by the metal running down in or over the grooves and projections *b* and collects at the bottom and the alloy will issue through the exit-pipe *c*.

As an example, the use of the vessel for obtaining an alloy, such as lead sodium, may be explained. The chloride of sodium forming the electrolyte is contained in the vessel either in a molten or a liquid state, the molten lead is allowed to slowly run down from the groove *a* into the grooves *b* and over their projections, and if during this contact electrolytic action is maintained on the electrolyte the latter will separate into chlorine and sodium, of which the former will escape in gaseous form through a proper opening in the cover of the vessel and the sodium will be continuously absorbed by the lead as it runs down, and these two will form the alloy lead sodium.

I claim as my invention—

1. The vessel for the electrolytic treatment of metals having an interior surface with numerous grooves, one above the other and a discharge opening from the bottom whereby

the material exposed to the electrolytic action flows downwardly from one groove to another, substantially as specified.

2. The vessel for the electrolytic treatment of metals having a gutter around the top, an interior surface with numerous grooves, one above the other and a discharge opening from the bottom whereby the material exposed to the electrolytic action flows downwardly from one groove to another, substantially as specified.

3. The vessel for the electrolytic treatment of metals having a gutter around the top, an interior surface with numerous grooves, one above the other and a discharge opening from the bottom whereby the material exposed to the electrolytic action flows downwardly from one groove to another, and a cooling ring surrounding the top of the vessel, substantially as specified.

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

WILHELM BORCHERS.

Witnesses:
EARNESTINE ANDRÉ,
WILLIAM ESSENWEIN.