V. M. WEAVER.
PROCESS OF PURIFICATION.
APPLICATION FILED AUG. 9, 1915.

1,269,236. Patented June 11, 1918.

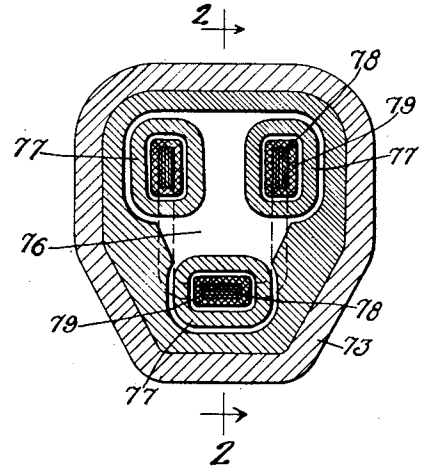

Fig. 1.

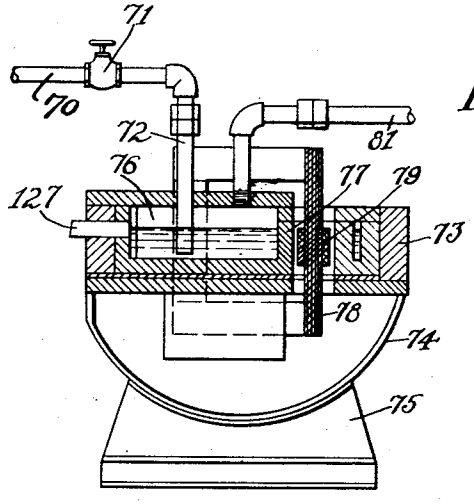

Fig. 2.

Inventor
Victor M. Weaver
by Brown, Hanson & Bottcher,
Attys.

UNITED STATES PATENT OFFICE.

VICTOR M. WEAVER, OF HARRISBURG, PENNSYLVANIA, ASSIGNOR TO WEAVER COMPANY, A CORPORATION OF WISCONSIN.

PROCESS OF PURIFICATION.

1,269,236. Specification of Letters Patent. Patented June 11, 1918.

Original application filed August 22, 1914, Serial No. 858,001. Divided and this application filed August 9, 1915. Serial No. 44,518.

To all whom it may concern:

Be it known that I, VICTOR M. WEAVER, a citizen of the United States, residing at Harrisburg, in the county of Dauphin and State of Pennsylvania, have invented a certain new and useful Improvement in Processes of Purification, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to the purification of chemical compounds and is concerned with a novel method of effecting purification by replacement. The invention lies in the manner in which this replacement is carried out.

While it will appear that my invention may be utilized with compounds other than that referred to hereinafter, I shall describe my invention specifically in the treatment of aluminum chlorid. It is the purification of aluminum chlorid that has been my particular purpose and some of the more limited of the appended claims are restricted to that compound. It will be understood, however, that the broader claims are drawn with the idea of protecting the broadly new features of my invention, regardless of the particular substance to be purified, so long as it is adaptable, and regardless of the environment in which they are found adaptable.

This application is divisional from my copending application, Serial No. 1,559, filed January 11, 1915, which, in turn, is divisional from the application which resulted in my Patent No. 1,238,604 dated August 28, 1917. The parent case concerns a process of winning metals in which the present process of purification is described as forming a part.

In the treatment of clay, which I refer to as an example, I break up the compound by the use of chlorin gas so as to produce aluminum chlorid and silicon tetrachlorid, this action being carried on under special restrictions and conditions, and then separate the chlorids, as described in my patent referred to. In this instance I am concerned, as above stated, with purification, and I shall refer, in order to advise those skilled in the art of an example of my invention, to the purification of this aluminum chlorid.

My invention will be more readily understood by reference to the accompanying drawings, in which:

Figure 1 is a sectional view taken on a horizontal plane of the furnace which is employed; and,

Fig. 2 is a sectional view taken on the plane of the lines 2—2 of Fig. 1 and looking in the direction indicated by the arrows.

A pipe 70 leads from a source of aluminum chlorid and, by way of a pipe 72, to a furnace, preferably of the Rodenhauser three-phase type, this furnace being shown in detail in Figs. 1 and 2. This furnace comprises a heavy outer housing 73, which is provided with a round bottom 74, mounted in a correspondingly shaped base 75, the idea being that when the connecting pipes are temporarily detached, the furnace can be tilted in order to tap off molten metal, if it is desired to do so, by way of the spout 127, normally closed. The lining of the furnace provides a cavity 76 for the molten metal, which is formed between and around the tubular casing parts 77, 77, within which the magnetic circuit frame and the primary coils 78 and 79, respectively, are disposed. The precise details of this furnace do not constitute part of my present invention, but I refer to them because it is a type of furnace well adapted for use as part of my system. The pipe 70 is provided with a valve 71, which controls the passage of the material to be purified to the Rodenhauser furnace, in which a bath of molten aluminum is provided, as indicated.

In the preparation of the aluminum chlorid there are likely to be impurities, principally iron, and it is the object of the step in the process now under description to eliminate this iron and to secure pure aluminum chlorid. Therefore, preliminarily, the Rodenhauser furnace is charged with aluminum, and the molten bath, as illustrated, is formed. When the valve 71 is opened and the aluminum chlorid, transformed from powder to maintained liquid form by applied heat and pressure, is fed into this bath of molten aluminum near the bottom thereof, the aluminum chlorid is

immediately reconverted into a gas due to the release of pressure and heat of bath, and passes up through the molten aluminum. Due to the greater affinity of the chlorin for the aluminum than for the iron, or other impurity for that matter, the chlorin releases the iron and takes on the proper share of aluminum. The result is that the refined aluminum chlorid will leave the bath of aluminum and will pass out of the furnace through the pipe 81. If the refined aluminum chlorid is to be further purified, it may be condensed and melted and recharged into the Rodenhauser furnace, as has been described, and this process may be repeated until the required degree of purity has been obtained. I also contemplate feeding the aluminum chlorid in powdered form, without melting, direct to the bath.

Having thus described my invention and having already explained that I do not desire to be limited to the precise elements herein referred to, I claim as new and desire to secure by Letters Patent:

1. The process of purifying aluminum chlorid which consists in melting the powder under the influence of heat and pressure, and then conducting it to and through a maintained bath of molten aluminum, and then collecting the resulting purified gas.

2. The process of purifying aluminum chlorid which consists in conducting it to and through a maintained bath of molten aluminum, and then collecting the resulting purified gas.

3. A process of purifying compounds which consists in maintaining a heated bath of liquid material the same as one of the ingredients of the compound to be purified, and feeding the compound to be purified to a point near the bottom of said bath.

4. A process of purifying compounds which consists in maintaining a bath of liquid material the same as one of the ingredients of the compound to be purified, and feeding the compound to be purified to a point near the bottom of said bath, so as to replace the impurities whose affinity for another ingredient is less than that of the material of the bath.

5. A process of purifying a metal compound which consists in maintaining a bath of molten metal the same as the metal of the compound to be purified, and feeding the compound to a point near the bottom of the bath, so as to replace the impurities whose affinity for another ingredient of the compound is less than that of the metal.

6. A process of purifying compounds which consists in maintaining a heated bath of liquid material the same as one of the ingredients of the compound to be purified, and feeding the compound to be purified to said bath in non-gaseous state, the heat of the bath transforming said compound to a gas in which state it is led from the bath.

7. A process of purifying compounds which consists in maintaining a heated bath of liquid material the same as one of the ingredients of the compound to be purified, and feeding the compound to be purified to said bath in liquid state, the heat of the bath transforming said compound to a gas in which state it is led from the bath.

In witness whereof, I hereunto subscribe my name this 3rd day of August, A. D. 1915.

VICTOR M. WEAVER.