Aug. 11, 1931. R. SUCHY ET AL 1,818,173

APPARATUS FOR THE FUSION ELECTROLYSIS OF METALLIC CHLORIDES

Filed Dec. 15, 1928

Fig. 1.

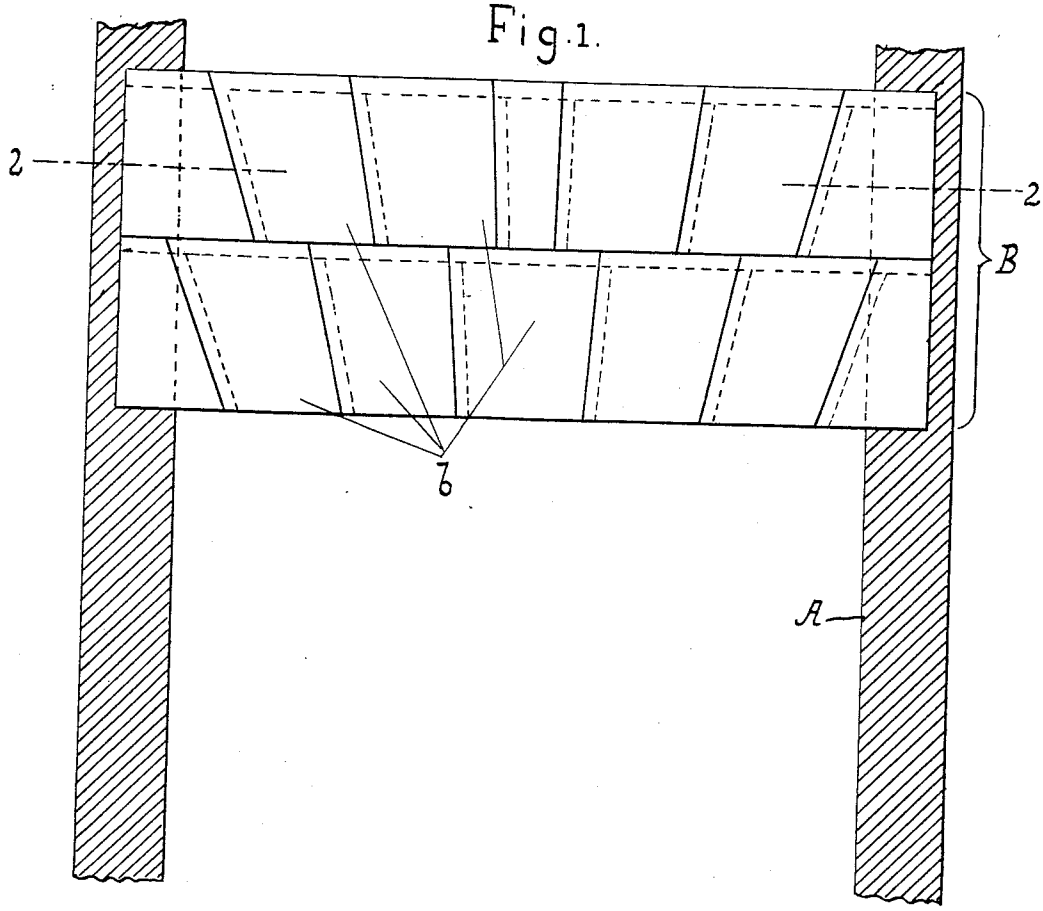
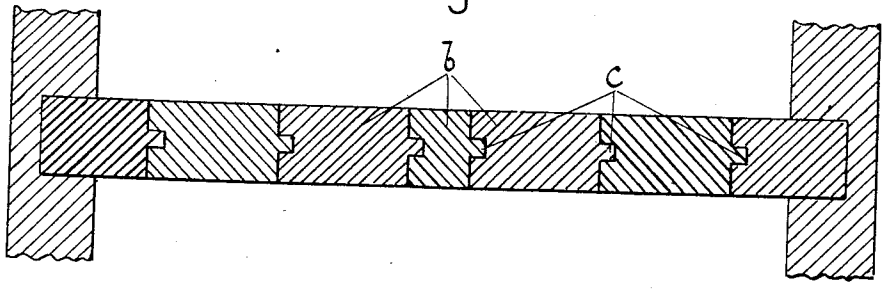


Fig. 2.



Robert Suchy
Karl Staib
Wilhelm Moschel
Inventors

By their Attorneys
Hauff & Warland

Patented Aug. 11, 1931 1,818,173

UNITED STATES PATENT OFFICE

ROBERT SUCHY, KARL STAIB, AND WILHELM MOSCHEL, OF BITTERFELD, GERMANY, ASSIGNORS TO I. G. FARBENINDUSTRIE AKTIENGESELLSCHAFT, OF FRANKFORT-ON-THE-MAIN, GERMANY, A CORPORATION OF GERMANY

APPARATUS FOR THE FUSION ELECTROLYSIS OF METALLIC CHLORIDES

Application filed December 15, 1928, Serial No. 326,330, and in Germany December 23, 1927.

This invention relates to partitions for separating the electrolytic products in the fusion electrolysis of chlorides, particularly of magnesium.

Hitherto, products of the refractory industry, such as tubes and plates of chamotte, have been suggested as means for separating the electrolytic products obtained in the fusion electrolysis of chlorides, particularly of magnesium. These products are, however, liable to undergo more or less rapid destruction, and the costs of frequent restauration may adversely affect the process even to the extent of rendering it uneconomical.

It has been found that the rapid destruction of the chamotte partitions is a purely electrolytic process. The refractory products have a porosity ranging from about 18 to 30 percent, hence they become completely saturated with the electrolyte and are then able to conduct the current, so that the metal resulting from the electrolysis, such as magnesium, is deposited, which reduces the silica.

In accordance with the present invention, the durability of the refractory partitions can be substantially increased by protecting them against the passage of the current by a layer of non-conductive ceramic material of dense structure. Thus, for example, a chamotte plate may be protected against the passage of electric current by facing the same with porcelain plates.

In some cases it may be desired to dispense with the use of a porous substance, even only as a base plate, altogether. However, there is a limit to the size of such partitions when employing a dense ceramic material alone, owing to the tendency of large plates to become fractured or to crack due to the stresses set up at the temperature of electrolysis. Obviously, these difficulties should be obviated by building up partitions of this character from smaller rectangular elements of a dense ceramic material and fitting them together by means of grooves and tongues. However, when carrying this idea into practice, further difficulties arise, inasmuch as the whole structure becomes loosened when exposed to the heat of the electrolysis owing to the thermal dilatation of the bath. This dilatation does not immediately lead to a collapse of the partition as a whole; but the interstices formed in consequence between the structural elements, although but small, suffice to offer a passage to the current, whereby the destruction of the structure, by chemical reaction, as described above, is initiated.

We have now found that the construction of large partitions of dense ceramic material can notwithstanding be carried into effect in this manner, at the same time avoiding the deficiencies mentioned before, by building up the smaller elements, provided, if desired, with tongues and grooves, and fixed together by means of a refractory mortar, in the manner of a straight arch, the elements in this case being wedge-shaped. By this method, the formation of interstices, due to thermal dilation is inhibited, the pressure on the arch mostly caused by its own weight, giving rise to a sagging effect, thus keeping up close contact between the elements of the structure with the result that the current is debarred from entering into the interior of the partitions. It could not be foreseen that this well known method of construction could find employment in baths for fusion electrolysis for partitions of the kind described.

One form of a partition embodying this principle is illustrated in the accompanying drawings, but the invention is not limited to this example.

In these drawings which form part of this specification

Fig. 1 shows in elevation and

Fig. 2 in cross section

the lateral walls of an electrolytic cell (A), in which a partition wall is inserted (B) consisting of elements (b) of a dense ceramic material, the latter being fitted together by means of grooves and tongues (C) in the manner of a straight arch.

When, owing to the rise in temperature of the cell during electrolysis, the distance between the lateral walls of the cell is slightly enlarged, the weight of the elements

of the partition wall—as well as the weight of any lid or cover resting upon the latter—comes to bear upon the structure, whereby the elements bridging the space between the walls of the cell sag downwards, thus maintaining the rigidity of the structure and close contact of its elements necessary for precluding the current from entering the interstices between said elements.

We claim:

1. In an apparatus for the fusion electrolysis of metallic chlorides, a partition for separating the products of electrolysis comprising a plurality of wedge-shaped plates of non-conductive ceramic material of dense structure, said plates being fitted together so as to form a substantially continuous surface of said partition.

2. In an apparatus for the fusion electrolysis of metallic chlorides, a partition for separating the products of electrolysis comprising a plurality of wedge-shaped plates of non-conductive ceramic material of dense structure, arranged in the manner of an arch and fitted together by a suitable binder, so as to form a substantially continuous surface of said partition.

3. In an apparatus for the fusion electrolysis of metallic chlorides, a partition for separating the products of electrolysis comprising a plurality of wedge-shaped plates of non-conductive ceramic material of dense structure, arranged in the manner of a straight arch, fitted together by means of tongues and grooves and joined together by a refractory mortar, so as to form a substantially continuous surface of said partition.

In testimony whereof we have hereunto set our hands.

ROBERT SUCHY.
KARL STAIB.
WILHELM MOSCHEL.