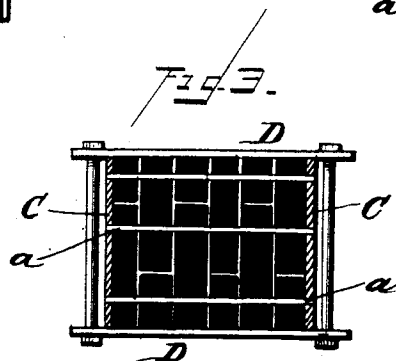
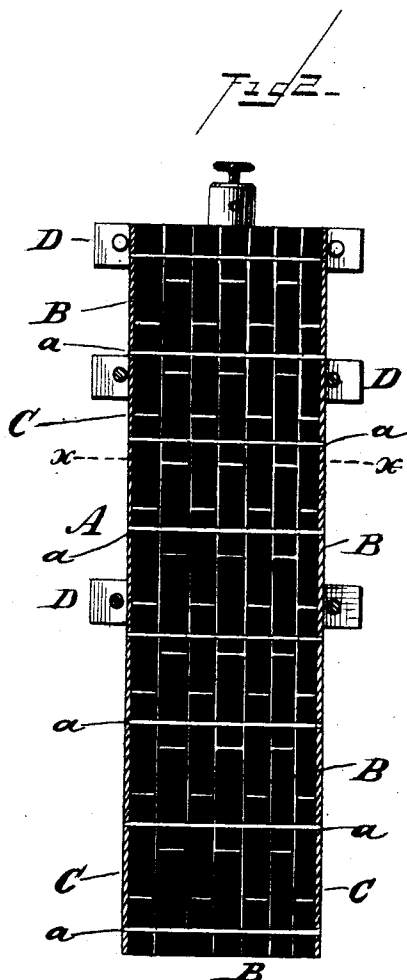
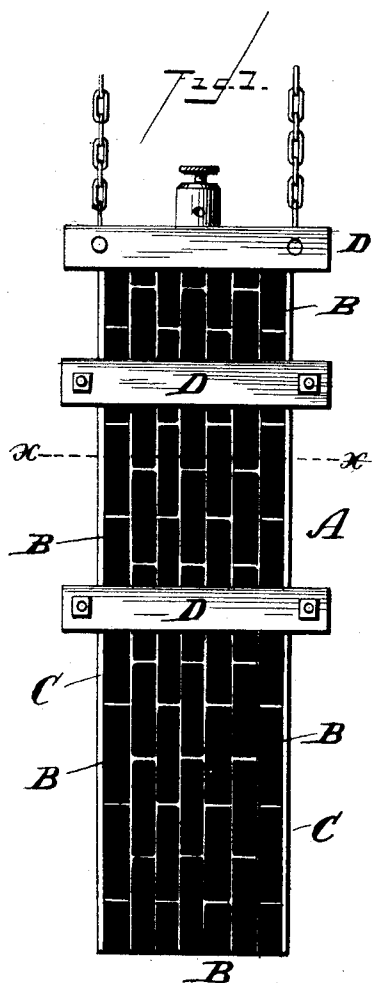


(No Model.)

P. L. T. HÉROULT.  
ELECTRODE.

No. 473,393.

Patented Apr. 19, 1892.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

PAUL LOUIS TOUSSAINT HÉROULT, OF SCHAFFHAUSEN, SWITZERLAND,  
ASSIGNOR TO THE UNITED STATES ALUMINIUM METAL COMPANY, OF  
NEW YORK.

## ELECTRODE.

SPECIFICATION forming part of Letters Patent No. 473,393, dated April 19, 1892.

Application filed August 8, 1889. Serial No. 320,146. (No model.) Patented in England December 7, 1887, No. 16,853.

*To all whom it may concern:*

Be it known that I, PAUL LOUIS TOUSSAINT HÉROULT, a citizen of the Republic of France, and a resident of Schaffhausen, in the Republic of Switzerland, have invented certain new and useful Improvements in Electrodes; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention, for which Letters Patent of Great Britain, No. 16,853, of December 7, 1887, have been granted with my consent, relates to apparatus for producing pure metals, as well as alloys, from ores adapted for metallurgical purposes through the heating and electrolytical action of an electric current upon the ore which is to be reduced; and my improvement consists in the construction of an electrode for use in such apparatus, as will be hereinafter more fully set forth.

The form in which my improvement is illustrated in the accompanying drawings is that of a positive electrode or anode, such as is used in carrying out the process of preparing aluminium bronze, for which Letters Patent of the United States, No. 387,876, were granted to me on the 14th day of August, 1888; but I desire it to be understood that the invention may be embodied in other forms and used for kindred electro-metallurgical and similar purposes.

Reference being made to the accompanying drawings, Figure 1 is a side elevation of my improved electrode. Fig. 2 is a longitudinal sectional view of the same, and Fig. 3 is a transverse sectional view taken on line *x x*.

Like letters of reference denote corresponding parts in the several figures.

The electrode A is composed of carbon blocks or slabs B, comparatively small in size and of regular shape. These slabs are fitted together closely so as to break joints both longitudinally and laterally or only in one direction, as may be desired, and they form a compact solid body of the desired dimensions. The slabs are held firmly together by means of transverse pins or dowels *a* of carbon or metal in conjunction with metallic plates C, clamped on two or more opposite sides of the

body A, against which they bear, and conforming in shape and dimensions thereto.

If the electrode is intended to be used in the production of aluminium bronze, then the plates C C, as well as the pins A, (if made of metal,) should be of copper. If, on the other hand, the electrode is intended to be employed in the preparation of ferro-aluminium, then the plates and dowels (if of metal) should be made of iron, and if, again, it is contemplated to use the electrode in the production of pure aluminium then these plates and pins (if of metal) should be of aluminium. In other words, the metallic plates C and pins or dowels *a* (if of metal) should preferably be made of metal, which either, first, constitutes one of the metals of the alloy, (as, for example, copper in the preparation of aluminium bronze or iron in the manufacture of ferro-aluminium,) or, second, is the same metal that results from the reduction of the ore undergoing electrolysis, (as, for example, aluminium in the preparation of pure aluminium.) These metallic plates C C are firmly compressed against the sides of the carbon body A by movable clamps D, which are adjustable lengthwise of the electrode, and may be reset from time to time as the electrode is gradually consumed at its lower end. As the process continues and the electrode is gradually consumed, these plates will melt gradually and drop into the fused-metal bath in the bottom of the crucible or furnace within which the anode is suspended, and thus form a part of the resultant alloy or pure metal, as the case may be.

The metallic side plates C C not only serve as clamping-plates to firmly bind together in a compact mass the carbon slabs composing the body of the anode, but they serve other important functions, among which are the following: They materially diminish the resistance of the electrode, thereby saving power; they prevent the burning of that part of the electrode which is exposed to the open air, thereby saving material, and they prevent abrasion or injury to the carbon body of the anode in readjusting the clamping-bands D.

In the manner described above it is possible to construct an electrode of considerable

size, such as is needed for the purpose intended, which will permit the necessary contraction and expansion without cracking or breaking the electrode—a danger liable to occur when it is made in a single piece, but which considered as a conductor is practically homogeneous in all its parts.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. An electrode for electro-metallurgical and similar processes, consisting of carbon, a plate of metal extending substantially the entire length of the electrode, and means for securing the metal plate to the carbon.

2. An electrode for electro-metallurgical and similar purposes, consisting of carbon blocks or slabs of comparatively small size relatively to the electrode, and fitted together to form a compact solid body, transverse pins or dowels binding the blocks together, and metallic plates fitting the sides and extending

substantially the entire length of the electrode and secured thereto, as described.

3. An electrode for electro-metallurgical and similar purposes, composed of carbon plates or slabs fitted together, metallic plates fitting the sides and extending substantially the entire length of the electrode, and clamps binding the parts together, as described.

4. In an electrode for electro-metallurgical and similar purposes, the combination of the carbon plates or slabs with the metallic side plates fitted thereto and the clamps surrounding said plates and adjustable lengthwise of the electrode.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

PAUL LOUIS TOUSSAINT HEROUT.

Witnesses:

FRED. L. DEWEY,  
W. F. BARNARD.