No. 627,573. Patented June 27, 1899.

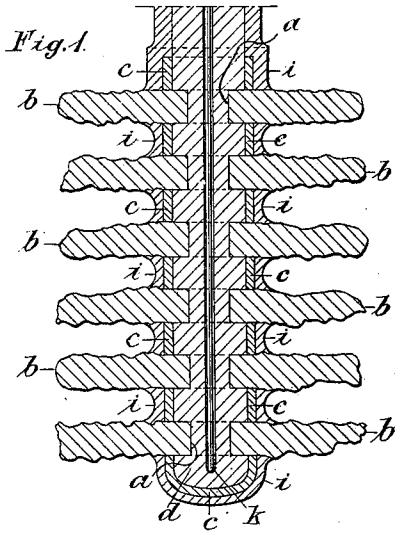
C. C. CONNOR.

ELECTRODE.

(Application filed Dec. 28, 1897.)

(No Model.)

Fig. 1.



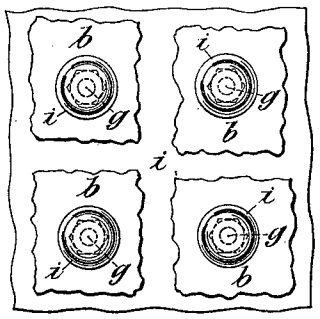


Fig. 4.

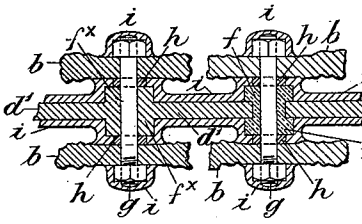


Fig. 5.

Fig. 2.

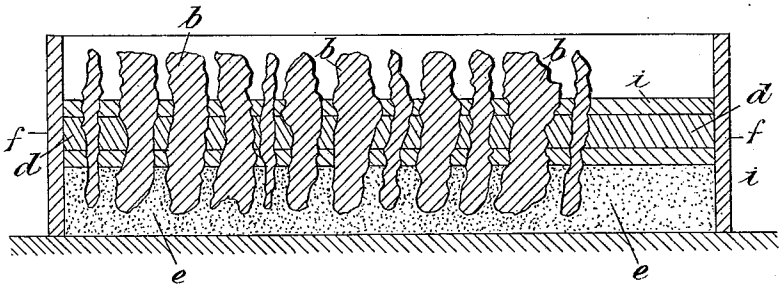
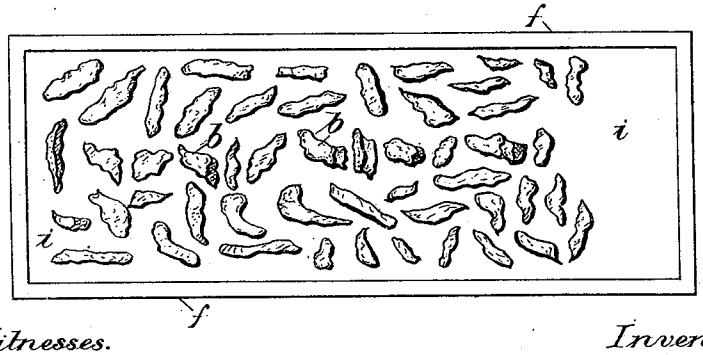


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

CHARLES CUNNINGHAM CONNOR, OF BELFAST, IRELAND.

ELECTRODE.

SPECIFICATION forming part of Letters Patent No. 627,573, dated June 27, 1899.

Application filed December 28, 1897. Serial No. 663,960. (No model.)

To all whom it may concern:

Be it known that I, CHARLES CUNNINGHAM CONNOR, a subject of Her Majesty the Queen of Great Britain and Ireland, residing at 4 Queen's Elms, Belfast, in the county of Antrim, Ireland, have invented certain new and useful Improvements in Electrodes, (for which I have obtained a patent in France, No. 263,208, dated January 19, 1897, and in respect whereof I have applied for Letters Patent in Great Britain, No. 26,059, to bear date November 18, 1896,) of which the following is a specification.

It is well known in the production of electrodes that much difficulty has existed in procuring carbon blocks of suitable size and shape and at the same time possessed of the requisite conductivity and power of resistance to wear or disintegration when under the action of the electric current, more particularly when such carbon blocks, plates, or rods are of large size and are to serve as anodes in electrolytic processes.

This invention has for its object the production from carbon of durable electrodes of suitable sizes and shapes wherein the anode-surface and the current are well distributed. According to one mode of procedure I take suitable pieces of carbon of superior quality and of good conductivity and power of resistance to wear or disintegration under the action of the electric current, and I join them together by means of a metallic conductor or of metallic conductors in such a manner that a good electrical union or contact is made between the carbons and the conductors to enable the current to pass. In some cases this metallic connection is continuous, either passing through or surrounding all the pieces of carbon; but various modifications may be effected without departing from the principle of my invention.

I have found suitable and prefer for the purpose of this invention such carbons as gas-retort carbon, hard and dense coke, graphite, and the like.

In the accompanying drawings I have illustrated by way of example three modes of carrying out my invention.

Figure 1 is a vertical section of an electrode comprising a number of pieces of carbon having fusible metal run through the same; Figs. 2 and 3, a longitudinal section and a plan, respectively, of an electrode wherein the fusible metal is cast around a number of pieces of carbon; and Figs. 4 and 5, a fragmentary side elevation and a horizontal section, respectively, of another construction of electrode wherein the carbons are bolted to metallic plates, the bolts passing through soft-metal bushes or washers cast in or resting upon such plates.

According to the mode illustrated in Fig. 1 I make holes *a* through a number of small pieces of carbon *b* and build them up one above another, so that a longitudinal passage is formed by the series of holes, the pieces of carbon so arranged being preferably kept out of contact by means of rings *c* of asbestos. Molten lead *d* is then run into the passage. The distance-rings *c* may be made of a mixture of asbestos and tar and afterward heated.

According to the mode illustrated in Figs. 2 and 3 a pavement of pieces of carbon *b* is formed in a bedding of sand *e*, contained in a suitable molding-box *f*, and the lead *d* may then be run in so as to surround them. A portion of the electrode (at the right-hand end) is preferably free of carbons for the purpose of connecting the conductors.

According to another mode of construction (illustrated in Figs. 4 and 5) I make holes at suitable distances apart in a metallic plate *d'* and cast therein lead bushes *f*, the said bushes projecting through each side of the plate. Pieces of carbon *b b* are then secured to the faces of the bushes by means of the bolts *g*, which pass through the bushes and the carbons. To make a good contact between the carbons and the bushes, I sometimes place a soft-metal washer *h* between them. Instead of casting bushes *f* in holes in the plate *d'* bosses $f^{\times}$ $f^{\times}$ may be formed thereon by casting the same in one with the plate *d'*, the carbons *b b* being attached to the bosses on each side by means of a bolt *g* and soft-metal washer *h*, as above described.

When pieces of carbon *b b* are joined or connected together in either of the modes above described, the exposed metallic surfaces and the asbestos distance-rings are carefully protected from contact with or the circulation of the electrolyte or the products of electrolysis by a covering *i* of some substance

which will be indifferent to or unattacked by such electrolyte or products of electrolysis under the temperature and the conditions of the electrolytic process, such as Portland or other cement, paraffin, enamel, or pitch. In some cases, particularly in manufacturing electrodes of large size for use with heavy currents, I embed in the casting of lead or other like fusible metal or alloy *d*, which connects the pieces of carbon, a rod *k*, or rods or wires of copper, iron, or other suitable metal, preferably tinned, the objects being to reduce the section of the conducting metal and to render the electrodes less bulky. This may be accomplished when producing electrodes according to the mode first above described by inserting the metallic rod *k* (preferably of copper) in the passage formed through the carbons and distance-rings before running in the lead, the latter when run into the said passage surrounding the rod, or when producing electrodes according to the construction illustrated in Figs. 2 and 3 lengths of copper wire of suitable gage may be joined together around the pieces of carbon, the casting of lead covering and inclosing the said wires.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An electrode comprising a number of pieces of carbon each having a perforation therein, arranged one above another with a distance-ring between each piece, and connected together by a longitudinal core of cast-lead or other like metal or alloy, substantially as herein described.

2. An electrode comprising a number of pieces of carbon, each having a perforation therein, arranged one above another with a distance-ring between each piece, and connected together by a longitudinal core of cast-lead or other like metal or alloy, the core being furnished with a protective covering of cement or other suitable medium, substantially as herein described.

3. In an electrode, the combination, with lead or like metal core or conducting medium *d* connecting a number of pieces of carbon *b* separated by distance-rings *c*, the core and rings being served with a protective covering *i*, of a metallic rod *k*, substantially as and for the purposes set forth.

CHARLES CUNNINGHAM CONNOR.

Witnesses:
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JAMES BARRON.