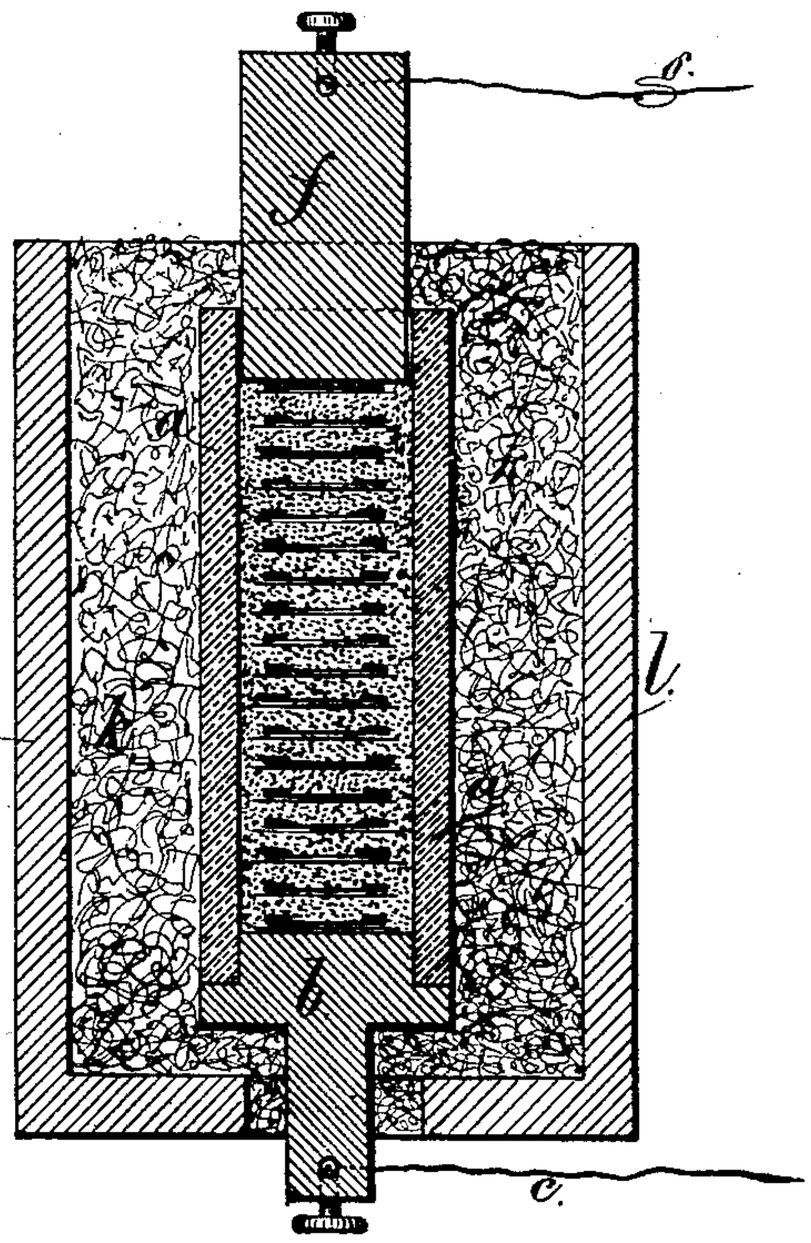
(No Model.)

C. M. BALL & J. H. GUEST.

Electrical Carbonizing Apparatus.

No. 236,478. **Patented Jan. 11, 1881.**



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UNITED STATES PATENT OFFICE.

CLINTON M. BALL, OF TROY, AND JOHN H. GUEST, OF BROOKLYN, N. Y.

ELECTRICAL CARBONIZING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 236,478, dated January 11, 1881.

Application filed October 15, 1880. (No model.)

To all whom it may concern:

Be it known that we, CLINTON M. BALL, of Troy, in the State of New York, and JOHN H. GUEST, of Brooklyn, in the State of New York, have invented an Improvement in Electrical Carbonizing Apparatus, of which the following is a specification.

In the manufacture of carbons for electric lights a flask or mold has been used to contain one or more strips of paper or other materials, and external fire heat has been employed for carbonizing the same. The electric current passing through the arc of carbon has been employed to complete the carbonization.

Our invention relates to an apparatus for carbonizing arcs of paper or other materials or articles by the direct application of an electric current to such materials or articles while confined in a case or muffle of non-conducting material.

In the drawing we have represented our improvement by a vertical section.

The case or muffle *a* is made of clay or other refractory substance that is a non-conductor of electricity, and it is of a size and shape adapted to the reception of the paper arcs for electric lights, or to other articles that require to be carbonized. This muffle *a* should be of uniform size throughout, and will usually be cylindrical. The bottom end of this muffle is closed by a stopper or cover, *b*, that is composed of metal or dense carbon, or made with a metal inner face, and one wire, *c*, of the electric circuit is attached to this stopper. The paper strips, arcs, or other articles to be carbonized are laid flatwise in a pile, one above the other, in the said muffle, and finely-pulverized carbon is placed within the muffle, to fill up the spaces between the articles and the interior of the muffle, and it is preferable to employ this finely-divided carbon between one article and the next; and where the articles require to be kept flat, disks of paper may be laid between one article and the next; but it is essential that the disks of paper should be smaller than the diameter of the muffle, or be perforated, so that the carbon powder is uninterrupted and forms a partial conductor for the electric current from one end of the muffle to the other.

At the upper end of the muffle a plug, *f*, is inserted. The same fills the muffle; but it is sufficiently loose to rest upon the pulverized carbon containing the articles to be carbonized, and to sink down as the carbonization causes the said articles to contract in size. The other wire, *g*, of the electric circuit is connected with this plug *f*, and it will now be understood that the powerful electric current passing between the electrodes *b* and *f*, through the carbon powder, or equivalent inferior conductor of electricity, meets with a great resistance, and a powerful and uniform heat is developed, which carbonizes the paper filaments for electric lights or other articles with great uniformity, and the heat thus developed can be regulated by varying the strength of the current, so as to carbonize the papers or other articles to whatever extent is necessary. The gases and vapors pass away between the plug and the muffle, and the plug *f* applies a constant pressure to the articles under treatment, so as to keep them from assuming an improper shape, and at the same time the atmosphere is excluded, or nearly so.

The muffle is preferably surrounded by a non-conducting envelope, such as ashes, as shown at *k*, the same being within the cylinder *l*, in order that loss of heat by radiation or conduction may be prevented. This, however, is not always employed.

We claim as our invention—

1. In a carbonizing apparatus, the combination, with a muffle or case containing the articles to be carbonized, of two electrodes, one at each end of the muffle, to which the wires in an electric circuit are connected, substantially as and for the purposes set forth.

2. In a carbonizing apparatus, the combination, with a muffle or case containing the articles to be carbonized, of two electrodes, one at each end of the muffle, to which the wires in an electric circuit are connected, and to one of which electrodes a movement lengthwise of the case is permitted, substantially as and for the purposes set forth.

3. The combination, in a carbonizing apparatus, of a muffle, two stoppers for the same, one at each end, and to which circuit-wires are connected, so that said stoppers become electrodes, and a surrounding case and intervening non-conductor of heat, substantially as set forth.

Signed by us this 13th day of October, A. D. 1880.

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Witnesses:
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