No. 731,453. PATENTED JUNE 23, 1903.

J. HARGREAVES, J. W. STUBBS & J. KEARSLEY.

ELECTRODE.

APPLICATION FILED NOV. 8, 1902.

NO MODEL.

Fig. 1

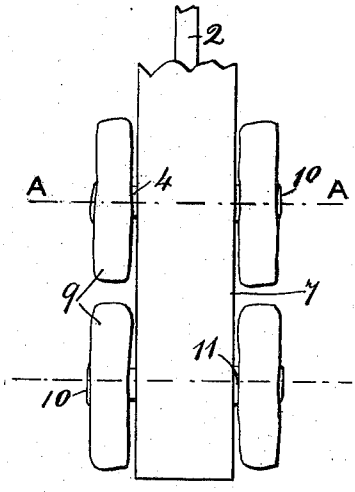


Fig. 2

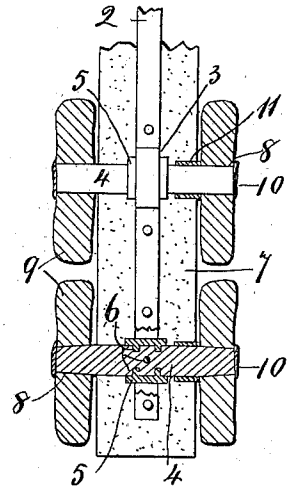


Fig. 3

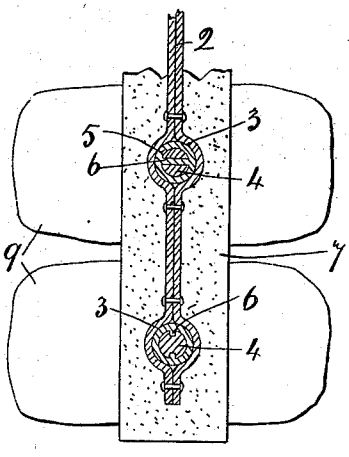
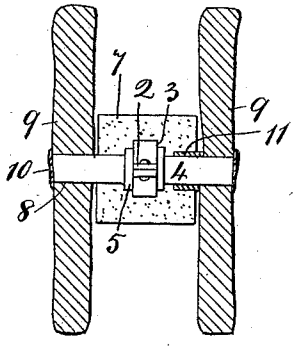


Fig. 4



Witnesses

W. B. Johnson

F. Bennett

Inventors

James Hargreaves.

John William Stubbs

John Kearsley

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 731,453. Patented June 23, 1903.

UNITED STATES PATENT OFFICE.

JAMES HARGREAVES, JOHN WILLIAM STUBBS, AND JOHN KEARSLEY, OF MIDDLEWICH, ENGLAND.

ELECTRODE.

SPECIFICATION forming part of Letters Patent No. 731,453, dated June 23, 1903.

Application filed November 8, 1902. Serial No. 130,519. (No model.)

To all whom it may concern:

Be it known that we, JAMES HARGREAVES, JOHN WILLIAM STUBBS, and JOHN KEARSLEY, subjects of the King of Great Britain, and residents of Middlewich, in the county of Chester, England, have invented new and useful Improvements in Electrodes, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation, Figs. 2 and 3 are central vertical sections at right angles to each other, and Fig. 4 is a horizontal section at the line A A on Fig. 1, all of part of an electrode embodying our improvements.

This invention relates to anodes or electrodes consisting partly of carbon, for use more particularly in electrolytic cells; and the object is to so construct such electrodes that less resistance will be offered to the electric current and that parts of the electrodes may be readily renewed when worn or broken.

On the drawings, 2 is a conductor-bar, of metal, connected in any convenient way to a source of electricity. The bar may be made of two strips riveted together, as shown, and bent out at intervals to form openings 3, or the bar may be solid with the openings made therein.

4 represents nipples, rods, or bars of carbon of suitable electric conductivity passed through the openings 3, but not fitting closely therein. To make electric contact between the bar 2 and nipples 4, we cast melted lead or other suitable metal 5 into the annular spaces or openings 3 between the bar and nipples, which also holds the nipples firmly in position. The large area of lead in contact with the nipple allows passage of electric current with but little resistance. To still further improve contact and diminish resistance, we may, if necessary, form indentations or perforations 6 into or through the nipples 4, into which the melted lead flows, care being taken to let air escape. The bar 2 and lead 5 are preferably then coated with tar, pitch, paraffin-wax, or like impervious insulating material and are then, together with part of the nipples 4, covered with Portland or other suitable cement or insulating composition 7. The coating of impervious material prevents diffusion or access of the electrolyte to the metal bar 2 and prevents corrosion of same. The ends of the nipples 4 project through the cement covering and are preferably fitted closely into openings 8 in blocks or pieces 9 of gas-retort or other suitable carbon, which form the electric diffusing-surface of the electrode in contact with the electrolyte. The ends of the nipples may be cylindrical or conical or of other convenient form; but in all cases they should fit the openings 8 perfectly and tightly, so as to make good electric contact and prevent access of electrolyte, which would allow rapid wearing away of the nipples. The extremities of the nipples are covered with cement or other insulating material 10 to prevent wearing at those points. To further protect the nipples, they may be covered with sheaths 11 of insulating material, such as india-rubber or asbestos, impregnated with oil. If desired, the blocks 9 may be held against the ends of the nipples 4 by insulated bolts.

We claim—

1. An electrode consisting of a metallic conductor-bar having openings therein, rods of carbon passing through the openings, castings of lead to make electric contact between the conductor-bar and rods a cement covering for the conductor-bar and lead castings, and blocks of carbon connected to the ends of the rods, substantially as set forth.

2. An electrode consisting of a metallic conductor-bar having openings therein, rods of carbon passing through the openings, fusible metal to make electric contact between the conductor-bar and rods a cement covering for the conductor-bar and fusible metal and blocks of carbon connected to the ends of the rods, substantially as set forth.

3. An electrode consisting of a metallic conductor-bar having openings therein, perforated rods of carbon passing through the openings, fusible metal to make electric contact between the conductor-bar and rods, an insulating-covering for the conductor-bar and fusible metal, and blocks of carbon connected to the ends of the rods, substantially as set forth.

4. An electrode consisting of a metallic conductor-bar having openings therein, rods of carbon passing through the openings, cast-

ings of lead to make electric contact between the conductor-bar and rods, a cement covering for the conductor-bar and lead castings, and blocks of carbon having openings into which the ends of the rods are closely fitted, substantially as set forth.

5. An electrode consisting of a metallic conductor-bar having openings therein, rods of carbon passing through the openings, fusible metal to make electric contact between the conductor-bar and rods a cement covering for the conductor-bar and fusible metal and blocks of carbon having openings into which the ends of the rods are closely fitted, substantially as set forth.

6. An electrode consisting of a metallic conductor-bar having openings therein, perforated rods of carbon passing through the openings, fusible metal to make electric contact between the conductor-bar and rods, an insulating-covering for the conductor-bar and fusible metal, and blocks of carbon having openings into which the ends of the rods are closely fitted, substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JAMES HARGREAVES.
JOHN WILLIAM STUBBS.
JOHN KEARSLEY.

Witnesses:
W. B. JOHNSON,
F. BENNETT.