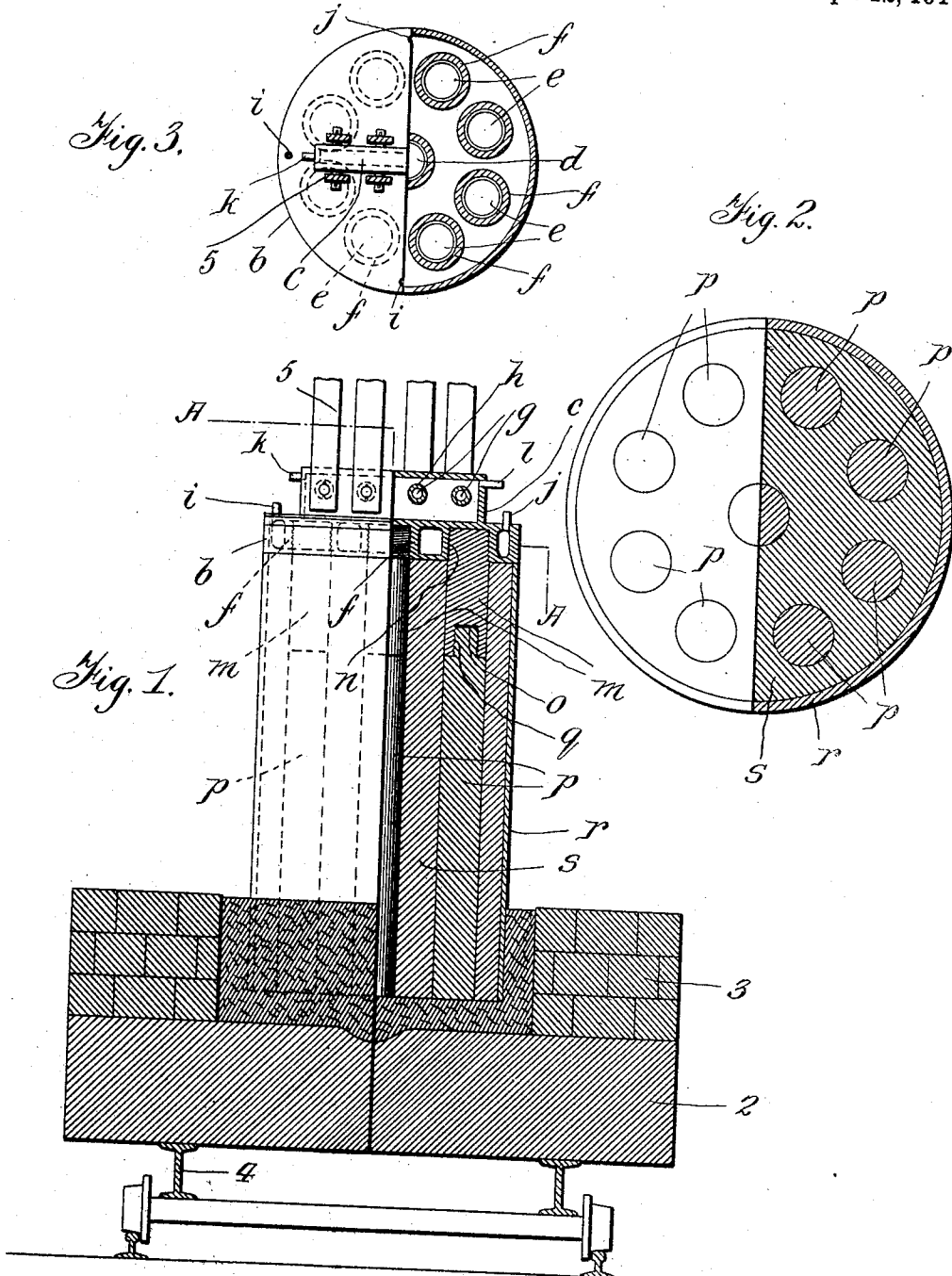


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ELECTRODE FOR ELECTRIC FURNACES.
APPLICATION FILED APR. 28, 1910.

1,003,354.

Patented Sept. 12, 1911.



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UNITED STATES PATENT OFFICE.

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ELECTRODE FOR ELECTRIC FURNACES.

1,003,354.

Specification of Letters Patent.

Patented Sept. 12, 1911.

Application filed April 28, 1910. Serial No. 558,305.

To all whom it may concern:

Be it known that we, WILLIAM TAYLOR GIBBS, of Buckingham, and ROBERT ALLEN WITHERSPOON, of Shawinigan Falls, both in the Province of Quebec, Canada, have invented certain new and useful Improvements in Electrodes for Electric Furnaces; and we do hereby declare that the following is a full, clear, and exact description of the same.

Our invention relates particularly to electrodes such as are employed for carrying into an electric furnace very large electric currents, for example twenty-five thousand (25,000) amperes, and it has for its object to provide an effective, durable, and low cost electrode for a furnace of this type specially designed for the manufacture of calcium carbide.

The invention may be said to consist of the construction and particular combination of parts hereinafter described and pointed out in the claims. For full comprehension, however, of our invention reference must be had to the accompanying drawings forming a part of this specification, in which similar reference characters indicate the same parts and wherein—

Figure 1 is a transverse vertical sectional view taken on two vertical planes one extending from the outside of an electric furnace across the front of the electrode to a point in line with the center thereof and the other extending from the center of the electrode through the opposite side of the furnace; Fig. 2 is an end elevation of the electrode partly in section and drawn to a larger scale; and Fig. 3 is a plan view of the head partly in section, the section being taken on line A, A, Fig. 1.

Broadly speaking our improved electrode comprises a series of electrically connected members of high electrical conductivity each consisting of distinct substances of different degrees of hardness and a substance also of high electrical conductivity but not to such a degree as the said members, is intimately connected with and braces the latter and increases the transmitting properties of the electrode.

The head of our improved electrode consists of a casting of circular shallow horizontal box form, *b*, having a diametrical hollow flange *c* upon its top, and the hori-

zontal box portion has a central opening *d* encircled by a series of similar openings *e*, sockets being formed in inward continuation of such openings *d* and *e* by cylindrical webs *f* while these sockets are interiorly screw threaded. The flange acts as a terminal and also as means for connecting the electrode to a crane or other hoisting apparatus to facilitate which a series of through holes *g* are formed therein, those in the opposite sides of the flange being connected together by sleeve-like webs *h* thus forming a water chamber within the flange. The water chamber within the head proper has feed and discharge pipes *i* and *j* connected thereto, and pipes *k* and *l* serve the chamber within the flange. The sockets formed by the openings *d* and *e* and sleeves *f* are screw-threaded.

A series of graphite (graphitic carbon) plugs or short rods *m* externally screw-threaded at one end as at *n*, and axially recessed as at *o* and internally screw-threaded at its other end, have their externally screw-threaded ends screwed into the sockets in the head; and projections of these plugs or rods are formed by amorphous carbon (non-graphitic carbon) rods *p*, one end of each of which is reduced and screw-threaded as at *q* and screwed into the recessed end *o* of the graphite plugs, thus forming pencils part graphite and part amorphous carbon. These pencils constitute members of high electrical conductivity and they are supplemented and protected against breakage by a substance also of high electrical conductivity but not to such a degree as the said members.

A sheet iron shell *r* corresponding in horizontal contour with the head incloses the pencils, and a filler *s* consisting of a conducting substance is packed around and between the pencils and preferably molded and baked before the shell is set in place.

The packing substance we prefer to use consists of:—ground coke 100 parts, by weight; redistilled tar $27\frac{1}{2}$ parts, by weight; pitch $27\frac{1}{2}$ parts, by weight.

Our improved electrode is particularly adapted for use in connection with a furnace for the manufacture of calcium carbide, supported on a wheel truck 4 and having a carbon base 2 and lime stone walls 3, the wheeled truck being for facilitating the

repair or renewal of the members of the electrode which is raised by a crane the connection for which are in part indicated at 5, and the furnace shifted from beneath it to enable the repair or renewal to be effected.

The reason for using a graphite electrode in the water cooled head is because we have found that amorphous carbon electrode, when used in such water cooled head is liable to break, while a graphite electrode will not break, and we thus obtain the advantage of both the non-breakable quality of the graphite electrode and the lesser cost of the amorphous carbon electrode. We do not limit ourselves to the particular use defined however, as the electrode may be applied with advantage to other uses without departing from the spirit of our invention.

What we claim is as follows:—

1. In an electrode for an electric furnace, a pencil made up of distinct sections of electrical conductive substances of different degrees of hardness, and a body of electrical conductive substance united to and supplementing the said pencil, the latter being of higher electrical conductivity than the supplementing body.

2. An electrode for an electric furnace, comprising a head consisting of metal having high electrical conductivity, pencils fixed in the said head and consisting of distinct sections of graphite and amorphous carbon, and a packing incasing the said pencils consisting of a substance of high electrical conductivity.

3. An electrode for an electric furnace, comprising a head consisting of metal having high electrical conductivity and presenting a plurality of sockets; pencils fixed in the said sockets and consisting of distinct sections of graphite and amorphous carbon, and a packing incasing the said

pencils consisting of a substance of high electrical conductivity.

4. An electrode for an electric furnace comprising a metal head capable of conducting electricity and presenting a plurality of sockets; graphite plugs or short rods set in and projecting from the sockets; amorphous carbon rods fastened to the plugs or short rods; and a substance capable of conducting electricity incasing the said pencils.

5. An electrode for an electric furnace comprising a metal head capable of conducting electricity and presenting a plurality of screw-threaded sockets; graphite plugs or short rods screwed into the sockets and presenting interiorly screw-threaded recessed ends; amorphous carbon rods screwed at one end into the recessed end of the plugs or short rods; a substance capable of conducting electricity incasing the said pencils, and a sheet iron shell inclosing the said substance and rods.

6. The combination with a furnace having a base adapted to conduct electricity, of an electrode comprising a head consisting of metal having high electrical conductivity and presenting a plurality of sockets; graphite pencils in said sockets and having amorphous carbon extensions and a packing incasing the said pencils consisting of a substance of high electrical conductivity.

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

WILLIAM TAYLOR GIBBS.
R. A. WITHERSPOON.

Witnesses to signature of Gibbs:
EDGAR ROY,
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Witnesses to signature of Witherspoon:
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