(No Model.)

S. W. SKINNER & W. M. THOMAS.

METHOD OF MAKING IRIDIUM TIPPED METALLIC RODS.

No. 250,590. Patented Dec. 6, 1881

Fig. 1.

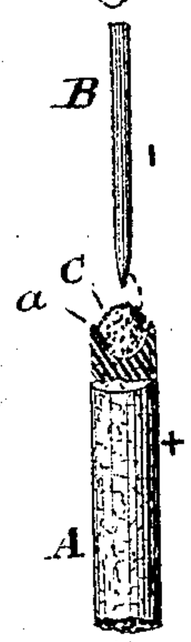

Fig. 2.

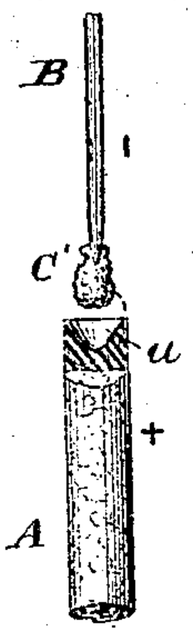

Fig. 3.

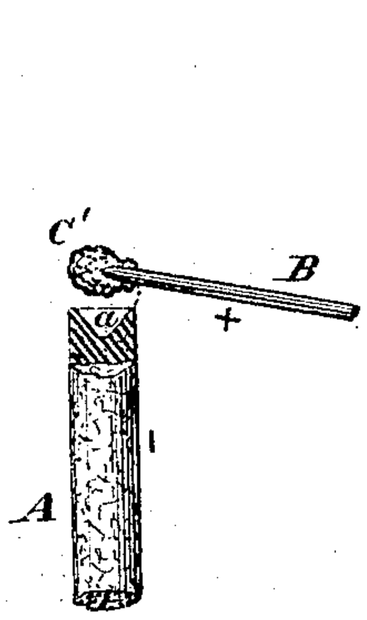

Fig. 4.

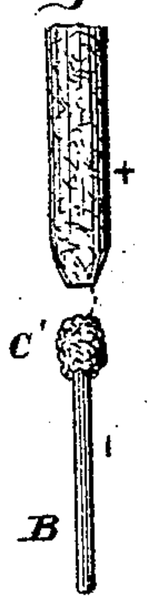

Fig. 5.

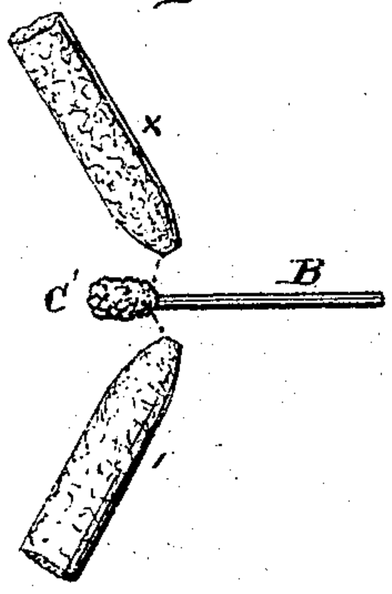

Fig. 6.

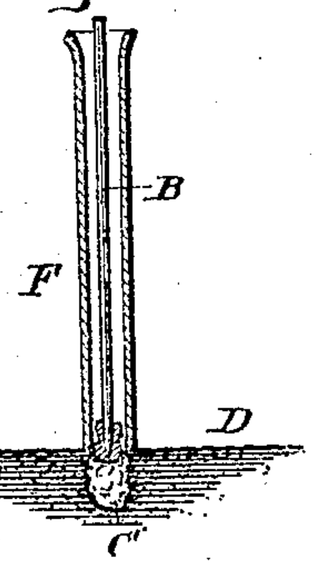

Fig. 7.

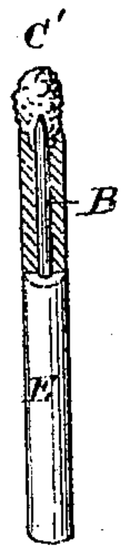

Fig. 8.

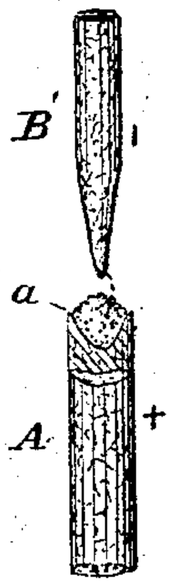

Fig. 9.

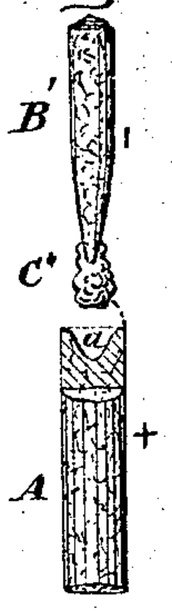

Fig. 10.

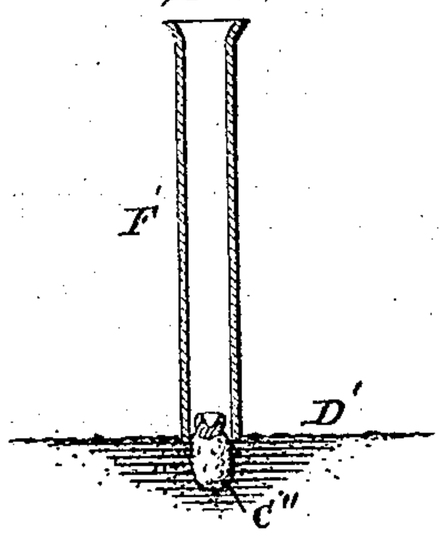

Fig. 11.

Attest:
L. M. Hopkins.
Harry E. Knight

Samuel W. Skinner
William M. Thomas
INVENTORS.
By Knight Bros. Attys.

UNITED STATES PATENT OFFICE.

SAMUEL W. SKINNER AND WILLIAM M. THOMAS, OF CINCINNATI, OHIO.

METHOD OF MAKING IRIDIUM-TIPPED METALLIC RODS.

SPECIFICATION forming part of Letters Patent No. 250,590, dated December 6, 1881.

Application filed July 21, 1881. (No model.)

To all whom it may concern:

Be it known that we, SAMUEL W. SKINNER and WILLIAM M. THOMAS, both of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Method of Making Iridium-Tipped Metallic Rods, of which the following is a specification.

Our invention relates to a new and useful manufacture of iridium-tipped metallic rods for use as electrodes in the production of electric illumination, and for other purposes, by the electro-fusion of granular iridium or iridosmium (iridosmine) upon a rod of copper or other suitable metal.

In the accompanying drawings, Figure 1 represents a carbon positive electrode whose cup-shaped pole is charged with granulated iridium, and associated with such positive electrode a negative electrode of copper. Fig. 2 shows the copper stem or rod of the said negative electrode tipped with iridium transferred from the positive electrode. Fig. 3 shows the same electrodes with current reversed for the purpose of fusing the iridium tip and the copper stem integrally together. Fig. 4 shows the two electrodes reversed in position and the current restored to its original direction. Fig. 5 shows a modification of our method of joint fusion, in which the line of contact of the iridium tip and the copper rod is brought in the path of an electric arc between two ordinary electrodes, the copper rod itself not being in the path of the electric current. Fig. 6 shows our iridium-tipped rod placed in a mold for the purpose of casting about the rod proper or stem a re-enforce of the same or some other metal than that which composes said stem, so as to produce the modification of our invention shown in Fig. 7. Figs. 8 to 11, inclusive, represent successive stages in the manufacture of a modification of our invention. In these figures, Fig. 8 has its lower electrode cup-formed and positive and charged with granulated iridium or iridosmium. Fig. 9 represents the same electrodes with the iridium tip formed upon the negative electrode by electro-fusion and aggregation. Fig. 10 shows the iridium tip broken off of the negative electrode and placed in a mold for casting a copper or other suitable metallic stem. Fig. 11 represents our iridium-tipped rod formed by the successive operations shown in Figs. 8, 9, and 10.

For the manufacture of our said iridium-tipped rod we provide an electrode, A, of gas-retort carbon or its equivalent. This electrode has formed in its free extremity or pole a cavity, *a*, which cavity is presented upward and is charged with a quantity of iridium, C, (or one of the native alloys of that metal, such as iridosmium,) preferably in the granulated form. We further provide an electrode, B, of copper or other suitable refractory metal of good electrical conductivity, whose pole is presented in suitable proximity to that of electrode A. These electrodes having been so connected with a dynamo-magnetic machine or other source of electricity as to direct the positive current to A, and the poles having been sufficiently approximated to evolve an electric arc, and retained in that position until the surface of the iridium has become sufficiently fused and the tip of the negative electrode B has become sufficiently softened by heat, the poles are brought into momentary contact, so as to cause a portion of the molten or semi-molten iridium to adhere to the softened tip of the negative B. This process is repeated until there adheres to the negative B a compact nodule or mass, C′, of iridium of the desired dimensions. The said pole-contacts being made and broken quickly, and with a sensible interval of time between the contacts, secure the double advantage of intimate incorporation of the electrode-stem B with its iridium tip C′ by molecular interfusion at their plane of junction with an external lamina of pure and therefore highly refractory iridium. Instead, however, of thus tipping the negative electrode, we sometimes place the rod to be tipped out of the path of the electric current, merely heating up its tip in the electric arc formed by proximity with such an iridium-filled positive with an ordinary carbon negative, the tip of the rod being applied as often as may be necessary to take up the granules of iridium.

For fixing and incorporating the iridium tip with its copper stem the plane of junction thereof is brought under the momentary action of the arc, either, as in Fig. 3, by reversing the current and directing the arc to said

junction, or, as in Fig. 5, by placing the tipped rod with its plane of junction in contact with an arc between any pair of electrodes. With either mode the rod is during contact briskly rotated upon its axis to prevent excessive fusion. The effect under either mode is to create an alloy of the materials of B and C′ at their plane of junction, and to intimately incorporate them in one continuous and integral mass.

When to be employed for illuminative purposes the thus-formed iridium-tipped rod is used as the negative electrode, in association with a positive, A, of gas-retort carbon or equivalent substance, as shown in Fig. 4, and in such arrangement the thus-formed negative electrode, being practically indestructible, may be a fixture. The point of light will thus remain in one place with corresponding steadiness of illumination.

A modification of our said iridium-tipped rod is produced by placing it in a mold, as shown in Fig. 6, and pouring metal around the stem, either of the same kind or different. For example, the stem proper or core being of platinum or steel, the re-enforce or envelope E may be of copper.

The mold may be of any desired construction. We have used and prefer such an arrangement as shown in Fig. 6, in which the tip is nearly buried in a sand bed, D, and the re-enforce metal is received in a tube, F, of the desired caliber, which surrounds the stem. Such re-enforced iridium-tipped rod is shown at Fig. 7, a portion of the re-enforce being broken away, so as to expose the core.

Still a different mode of manufacturing our iridium-tipped metallic rod is shown in Figs. 8 to 11, inclusive, in which a carbon negative, B, is employed, as shown in Fig. 8, and from which the iridium tip C″, after accumulation upon the carbon, as shown in Fig. 9, is broken off and buried in a sand bed, D′, from which only a small portion protrudes, which portion being inclosed in a tube, F′, molten copper is poured into the same, so as to form an iridium-tipped metallic rod, E′ C″, as shown in Fig. 11, a portion of the stem E′ in said figure being removed to show the connection of tip and stem.

An iridium-tipped rod manufactured as above possesses several very important advantages. Its pole being absolutely pure and free from phosphorus and other impurities, its electrical conductivity is superior to any other known electrode of sufficient durability. The purity, density, and homogeneousness of the iridium tip, and its close and intimate incorporation with the supporting rod or stem, secure a free escape of heat. A tip thus produced of pure iridium is both infusible and incombustible when used as a negative electrode. Such iridium-tipped rods may be utilized by manufacture into tools for various mechanical purposes—such, for example, as writing-pens, gravers, scribes for glaziers and millstone-dressers, dental instruments, needle-drills, &c.

The right is reserved to make one or more such manufactures the subjects of separate applications for patent.

We are aware that it has been proposed to tip metallic rods with iridium by electro-fusion of the latter upon a block of copper; but we consider such means objectionable, because of the liability of alloying the iridium by contact with the fumes of the copper positive. We therefore do not claim such process, broadly.

We claim as new and of our invention—

1. The process of manufacturing an iridium-tipped metallic rod, which consists in charging with granulated iridium a cup-formed carbon positive electrode and bringing the same, while under the action of galvanic discharge, into repeated contact with the tip of a rod of other metal, substantially as set forth.

2. The process of manufacturing an iridium-tipped metallic rod, which consists in charging with granulated iridium a cup-formed carbon positive electrode and bringing the same, while under the action of galvanic discharge, into repeated contact with the tip of a rod of other metal, the rod proper being then enveloped with a re-enforce of the same or different metal, substantially as set forth.

In testimony of which invention we hereunto set our hands.

SAMUEL W. SKINNER.
WILLIAM M. THOMAS.

Attest:
GEO. H. KNIGHT,
SAML. S. CARPENTER.