E. WEINTRAUB.

ELECTRIC TERMINAL.

APPLICATION FILED SEPT. 18, 1914.

1,134,788. Patented Apr. 6, 1915.

Fig. 1.

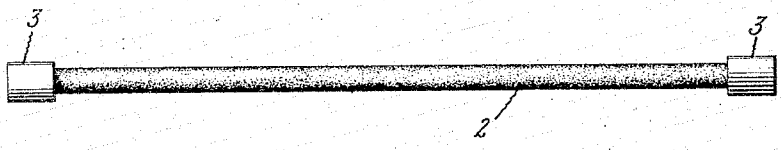
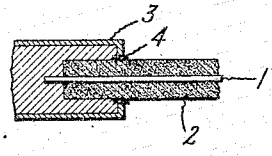


Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

EZECHIEL WEINTRAUB, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC TERMINAL.

1,134,788. Specification of Letters Patent. Patented Apr. 6, 1915.

Application filed September 18, 1914. Serial No. 862,339.

To all whom it may concern:

Be it known that I, EZECHIEL WEINTRAUB, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Electric Terminals, of which the following is a specification.

This application is a continuation in part of my application, Serial No. 795,559, filed October 16, 1913.

The present invention relates to resistances consisting either partly or wholly of elemental silicon, and comprises particularly an electrical current connection or terminal therefor.

Silicon cannot be efficiently joined to current conductors by the means usually employed. One difficulty appears to be the formation at higher temperatures of a very thin superficial film of oxid which increases the resistance at the terminal and makes the starting of current passage difficult; another difficulty is caused by the appearance at higher temperatures of thermoelectromotive forces of large magnitude which cause local heating at the terminal and a rapid deterioration of the current connection. The difficulties are the more severe the higher the temperature at which the silicon heater operates.

In accordance with my invention I have provided a terminal which is united with the silicon surface intimately so as to entirely exclude the air and thus prevent the formation of the oxid film and which gives rise to only a small thermoelectromotive force and consequently inappreciable local heating. This terminal consists of an alloy of silicon and a metal, such as an alloy of silicon and aluminum.

In the accompanying drawings, Figure 1 shows in elevation a silicon heater provided with terminals, and Fig. 2 is a sectional view of the end of the silicon resistor and a terminal.

The particular resistor illustrated, as shown in section in Fig. 2, comprises a core 1 consisting of graphite, or other like highly refractory conductor with a rising volt-ampere characteristic, and a shell or coating 2 of silicon, but my invention of course is applicable to any form of resistor consisting entirely or in part of silicon. Silicon has when cold a high resistance which rapidly decreases with a rise of temperature and hence a core of good conducting material enables the silicon to be easily brought to a high temperature at a moderate voltage. On the other hand by properly proportioning the core and shell an increase in voltage drop with increase in current may be secured thus enabling the resistor to be operated without special regulating or current limiting devices. This resistor is described and claimed in my co-pending application, Serial No. 795,559, filed October 16, 1913, of which the present application is a continuation in part.

At the end of the resistor I provide a cap 3 consisting of cast iron, steel or other refractory metal or alloy which can run at low red heat without excessive deterioration due to oxidation. If desired an asbestos washer 4 may be placed between the cup 3 and the resistor to make a mechanical fit. Into this space between the cup 3 and the resistor is cast the refractory alloy of silicon and a metal, preferably aluminum. This alloy is made by adding aluminum to molten silicon until a homogeneous mixture is made. A similar alloy of copper or even iron may be used but these alloys have the disadvantage of slowly disintegrating into the form of a powder. Any suitable mechanical current connection may be made to the metal shell 3. Due to the fact that the filling is cast into contact with the silicon it conforms closely to the surface configuration of the silicon and thus prevents the formation of the superficial film of oxid. A resistor thus made as shown in Fig. 1 may be operated indefinitely at temperatures up to 1200° C. or even higher, without appreciable change of resistance at the terminals, without deleterious local heating at the contact and consequent breaking apart.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. An electrical conductor consisting at least in part of elemental silicon and a current-conveying terminal therefor comprising a metal cap spaced apart from said conductor and a mass of a refractory alloy of silicon and a metal adhering to said silicon conductor.

2. An electrical conductor consisting at least in part of elemental silicon and means for conducting current thereto comprising a conductive material containing aluminum and silicon as constituents.

3. An electrical conductor comprising elemental silicon, a metal cap spaced apart from said resistor and a filling of cast conducting material therein conforming closely with the surface configuration of the silicon to protect it from oxidation.

4. An electrical conductor comprising elemental silicon, a metal cap spaced apart from said resistor and a filling therein consisting of a refractory material containing silicon and aluminum as constituents.

In witness whereof, I have hereunto set my hand this sixteenth day of September 1914.

EZECHIEL WEINTRAUB.

Witnesses:
JOHN A. McMANUS, Jr.,
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