

(No Model.)

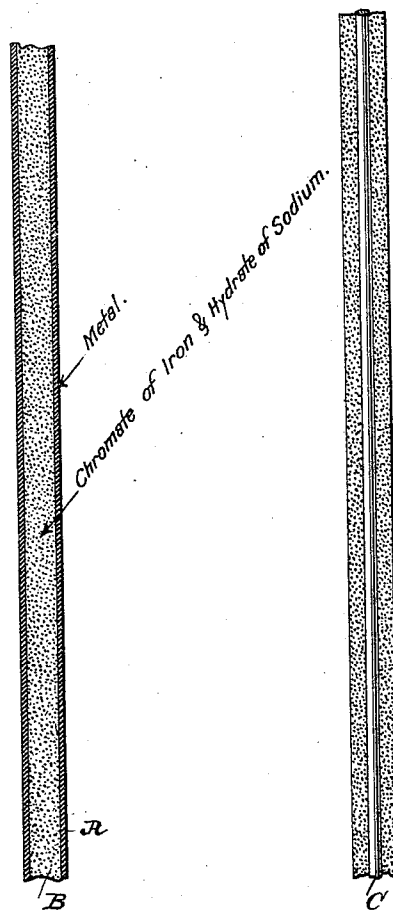
I. L. ROBERTS.
ARC LAMP PENCIL.

No. 460,595.

Patented Oct. 6, 1891.

Fig. 1

Fig. 2



Witnesses:

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UNITED STATES PATENT OFFICE.

ISAIAH L. ROBERTS, OF BROOKLYN, ASSIGNOR TO THE ROBERTS-BREVOORT
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ARC-LAMP PENCIL.

SPECIFICATION forming part of Letters Patent No. 460,595, dated October 6, 1891.

Application filed March 10, 1890. Serial No. 343,315. (No model.)

To all whom it may concern:

Be it known that I, ISAIAH L. ROBERTS, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Pencils for Electric-Arc Lamps, of which the following is a specification.

I have discovered and made pencils for electric-arc lamps which give better results than any of which I am aware. These pencils are composed of metal and a non-conducting refractory material of the special kind herein-after described, which by fusion with the metal produces a conducting slag or compound. In my researches and efforts to secure a very highly-infusible conductor for this purpose I discovered that compounds of any substance or element with chromium when fused together with certain metals—such, for example, as copper or iron—yield a slag or compound which, while a conductor of electricity even when cold, is at the same time very highly infusible and the best adapted for practical purposes of any known to me. I therefore made pencils for arc lamps by associating one or more of such compounds with a suitable metal under such conditions that by the heat of the arc the two would be fused together to form the slag. For example, I have made iron tubes and filled them with a metallic chromate or chromite or with the oxide, nitrate, sulphate, or other salt of chromium. I have also molded or formed around an iron or copper wire or core a given quantity of any of these substances. On establishing an arc between two of such pencils, the iron serving at the outset as the conductor, the two substances fuse together and form smooth hard highly-infusible points at the ends of the pencils, which are consumed very slowly and which have sufficient conductivity to re-establish the arc after it has been once extinguished and the pencils again separated. I have found that any substance into the composition of which chromium enters either chemically or mechanically may be applied and used for this purpose. For instance, I may use the common chrome-iron ore as the material to associate with the metal, but it should be very free from earthy mat-

ters, as the presence of these in the pencils gives rise to volatile fumes and smoke. The refractory material, on the other hand, may be produced artificially, and I may use chromate or chromite of iron, produced artificially in the form of a powder, for my purpose. The methods of producing these substances artificially are now well known.

The refractory and non-conducting substance and the metal may be associated in a pencil in many different ways. I prefer, however, to employ a tube of iron into which ferrous chromate is packed. These two may be used alone, but I have found it advantageous to use in conjunction with the refractory filling some substance which will increase the illuminating power of the arc. For example, I may use with the chromate five per cent. of hydrate of sodium or any of the sodium or potassium salts. I may also use in composition with the refractory filling zirconia or lime or other substances, but I do not find that any material change of result is effected thereby.

The conductivity of the slag or compound resulting from the fusion of the metal and the refractory material will vary according to the relative proportions of its elements. The proportion of the metal used as the holder is limited and determined by certain considerations well understood—as, for instance, the amount of heat that will be conducted off by it. Under ordinary circumstances, therefore, I have found that the conductivity of the slag is in proportion to the amount of chromium present in or combined with the refractory substance.

Pencils made in this way I have found to give remarkable results. Their rate of combustion is very much slower than that of the best and finest carbons, while the current required to produce and maintain an arc between them is very much less than that required under analogous conditions in arc lamps using carbon pencils.

I have shown pencils made in accordance with my invention in the accompanying drawings, Figures 1 and 2 being sectional views of two forms of the same.

A in Fig. 1 is a tube of iron, copper, silver, or other suitable metal. B is a filling of a re-

fractory non-conducting substance, which by the heat of the arc established between two pencils will fuse with the metal and form a refractory end or point of sufficient conductivity, when cold, to re-establish the arc. The material which I have stated I prefer to use for this is chromate of iron, with or without other refractory substances. This may be forced into the tube or holder in a powdered form and packed tightly therein.

In Fig. 2 C is a rod or wire of iron, around which a given quantity of the chromate of iron is compacted. To form pencils in this way I compress in a mold the pulverized chromate around the iron wire or core sufficiently to cause it to adhere thereto and then raise it slowly to a low red heat, which has the effect of hardening it. This result is more readily and perfectly obtained by moistening the chromate, mixed with hydrate of soda, before compression.

I would remark that a pencil could be made by fusing together a metal and such substances as I have described, pulverizing the slag, and making the powder up into a pencil;

but I regard this as included in the claim of my application, since it is only carrying out in a slightly-modified way the principle of my discovery or invention.

I am aware that pencils for arc lamps have heretofore been made of metal and various non-conducting and refractory substances, and I do not claim this, broadly, my invention being mainly confined to the particular class of compounds which I have herein set forth.

What I therefore claim is—

1. A pencil for arc lamps, composed of a metal associated with a substance containing chromium, as set forth.

2. A pencil for arc lamps, consisting of a metal tube or holder filled with a substance containing chromium, as set forth.

3. A pencil for arc lamps, consisting of a metal tube or holder filled with chromate of iron and an illuminant, such as hydrate of sodium.

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Witnesses:

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