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I. LADOFF.

ELECTRICAL CONDUCTOR FOR LIGHTING PURPOSES.

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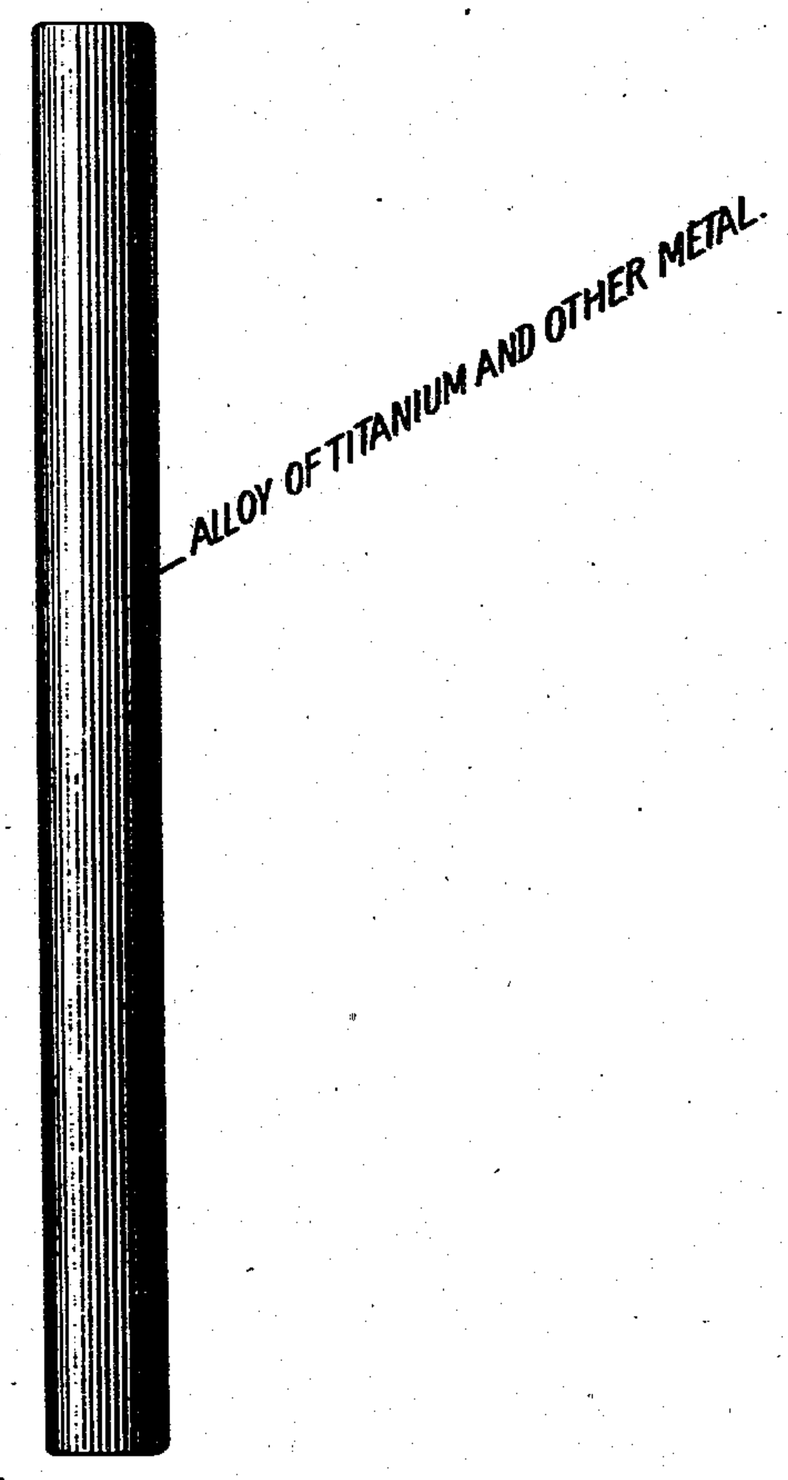

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ELECTRICAL CONDUCTOR FOR LIGHTING PURPOSES.

No. 840,634. Specification of Letters Patent. Patented Jan. 8, 1907.

Application filed December 2, 1903. Serial No. 183,528.

To all whom it may concern:

Be it known that I, ISADOR LADOFF, a citizen of the United States, residing in Schenectady, county of Schenectady, and State of New York, have invented certain new and useful Improvements in Electrical Conductors for Lighting Purposes, of which the following is a specification.

My invention relates to the constitution of that part or parts of an electrical conductor which are adapted to produce illumination when the current is turned on—as, for instance, the pencils of the arc-light.

My researches have demonstrated that the metal titanium possesses properties which when that metal chemically uncombined with carbon is introduced into the composition of the pencil of the arc-light result in a notable increase of candle-power as compared with that derived from other substances under similar conditions and also result in increasing the life of the pencil when the current is turned on, besides rendering it exceptionally strong and durable generally, whereby manufacture is facilitated and cheapened and waste from breakage reduced. Moreover, the character of the resulting light is such as to avoid the disproportion of the red or other color lines objectionable in carbon pencils and to approach more closely than has heretofore been accomplished the desired whiteness of sunlight.

The titanium may be incorporated into the pencil in many different ways, according to conditions presented by any particular case. To illustrate, for instance, I have produced pencils embodying my invention for use in the arc-light as follows: Titanium itself being a comparatively poor conductor of electricity, to say nothing of the difficulty of procuring it in a pure state, I have taken an alloy of titanium and other metals—as, for instance, the alloy of titanium and iron now procurable in the market and known as "ferrotitanium"—and have pulverized this alloy. To the resulting powder I added a sufficient quantity of any available binding material—as, for instance, water, glycerin, tar, linseed-oil, or the like—to impart to the powder adhesion and plasticity, such as to enable the material to be pressed or squirted into the desired form in molds under hydraulic or other pressures after the manner, for instance, in which carbon pencils are now produced for a similar purpose. The resulting pencils were allowed to dry in the open air under room temperature for several hours, it being important, as will be appreciated in this art, to avoid a too rapid drying, which tends to distort the shape of the pencils. After this preliminary air-drying the pencils were further dried in an oven at a temperature of about 200° centigrade or thereabout for about forty-eight hours. After this the pencils were packed carefully in carbon and subjected for about two days and two nights to a temperature of from 1,200° to 1,500° centigrade, after which the pencils were cleaned, and thus finished ready for use. These pencils were subjected to the current in an ordinary arc-light lamp and with the advantageous results above described. In cases in which it is desirable to use my pencil with an alternating current I have found it preferable to combine by mixing with the aforesaid powdered alloy a small proportion of powdered carbon—say five per centum, for instance. If ferrotitanium produced by the carbon-reduction process is employed, such addition of carbon may be dispensed with. Alloys of other metals with titanium may be similarly employed.

It follows that in all cases my pencils comprise a metallic element having conductivity adequate for the purpose of the arc-light, which said element is homogeneously distributed throughout the body of the pencil in combination with the titaniferous element likewise homogeneously distributed. My said pencils are therefore in all cases properly characterized as being essentially metallic pencils, as distinguished from carbon pencils, for instance, or from pencils consisting of compositions of other ingredients which are supported or rendered adequately conductive, or both, by separately constructed and applied metallic devices—such, for instance, as wires, tubes, or cylinders, &c.—or by merely external metallic coatings otherwise produced, as by deoxidation of the surface of the pencil.

It will be observed that the titaniferous element in my pencils exists in all cases in substantial proportions—say not less in any case than three per centum of the mass—and that when so existing it dominates the more conductive metallic element with which it is,

as aforesaid, associated and controls the behavior of the latter in the pencil, so that the iron, for instance, which, as well known, is unavailable by itself alone for such pencils, owing to sparking when the current is turned on and the inadequacy and unsatisfactory character of the resulting light, fails to evince any of these prohibiting characteristics even though it should constitute as high as eighty per cent. of the mast of my pencils. On the contrary, the aforesaid advantages characteristic of my pencils are nevertheless maintained, the spectrum characteristic of titanium predominating.

That my said pencils are properly designated as "metallic" pencils follows from the fact that their arc normally in ·ves from the negative to the positive electrode, the reverse being, as is understood, the case with pencils non-metallic—as, for instance, carbon pencils or carbon pencils to which other ingredients (as, for instance, metallic salts) have been added. I am not aware that metallic pencils have prior to mine been constructed capable of being manufactured and used on an industrial scale. This difference in the direction of the arc characteristic of my said metallic pencils is of great importance and advantage. It results in the elimination in my positive electrode of the so-called "crater" formed during the passage of the current in the carbon electrode and in which crater the heat and light of the highest intensity is concentrated. On the contrary, the most intense heat and light are located at the upper surface of my negative electrode, and also the greatest dissemination of light is from the arc itself, whereby, as will be appreciated by those skilled in the art, is secured a great increase not only of light efficiency, but also of light distribution. Among the numerous other advantages secured by reason of the metallic character of my pencils may be mentioned the resulting considerably lower amperage required for their operation as compared with carbon or other non-metallic electrodes and the unprecedented durability, resistance to the influence of the elements, and elegance of appearance, due to the metallic character of my pencils, must also not be overlooked.

It will be obvious that in cases where the titanium is introduced into my pencils in metallic state—as, for instance, in an alloy with other metals, as above described—my pencils may be directly cast into molds of suitable shape, the alloy having been previously reduced to molten condition. If desired, the hereinbefore-described addition of carbon may be effected in such cases by introducing that element into the molten mass in any convenient manner.

As to the percentage of titanium in the pencil, this may be widely varied without destroying the characteristic advantages attributable to the titanium. I have in my experiments found that when the titanium is introduced into the pencil or other conductor in metallic state from fifteen to eighty per cent. of titanium gives excellent results.

I am aware that it has been previously suggested that titanium in chemically combined state with carbon, known under the designation of "carbid of titanium," might be used in the construction of the pencils for arc-lighting, and I do not wish to be understood as claiming as my invention any such use of titanium, which has proved unsuitable for the purposes described. It will be observed that in the pencils embodying my invention the carbon is not in such chemically combined state with the titanium.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is the following, viz:

1. An arc-light pencil consisting for the most part of an alloy of titanium with another metal possessing greater conductivity than titanium.

2. An arc-light pencil consisting for the most part of an alloy of titanium with iron.

3. An arc-light pencil comprising an alloy of titanium with other metal possessing greater electrical conductivity than titanium, said alloy constituting more than ten per centum of said pencil.

4. An arc-light pencil comprising an alloy of titanium with iron, said alloy constituting more than ten per centum of said pencil.

5. An arc-light pencil comprising an alloy of titanium with iron, said titanium constituting more than five per centum of said alloy.

6. An arc-light pencil comprising an alloy of titanium with other metal possessing greater electrical conductivity than titanium, said titanium constituting more than five per centum of said alloy.

7. An electrode for arc-lighting consisting of an alloy of titanium and other metal possessing greater electrical conductivity than titanium.

8. An electrode for arc-lighting consisting of an alloy of titanium and iron.

9. An electrode composed of ferrotitanium.

10. An electrode containing ferrotitanium.

11. An electrode containing considerable amounts of iron and titanium in a metallic state.

12. An electrode formed from an alloy of iron and titanium containing about thirty-five parts of titanium and about sixty-five parts of iron.

13. An electrode formed from an alloy of iron and titanium containing less than thirty-five parts of titanium and more than sixty-five parts of iron.

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