UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY, ASSIGNOR TO THE EDISON ELECTRIC LIGHT COMPANY, OF NEW YORK, N. Y.

PROCESS OF MAKING INCANDESCENTS.

SPECIFICATION forming part of Letters Patent No. 263,145, dated August 22, 1882.

Application filed April 26, 1881. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented a new and useful Method of Manufacturing Articles of Carbon, (Case No. 303;) and I do hereby declare that the following is a full and exact description of the same.

In several prior applications for patents by me made are described various methods of manufacturing from various materials the incandescing carbon conductors for the electric lamps used in my system. Such carbons, though differing in materials and methods of manufacture, possessed certain essential unitary or common properties—viz., flexibility and high resistance. Plumbago is, under some circumstances, an excellent and desirable material to use for such purpose, and in an application numbered 27,191 I have described a method of utilizing it for the incandescing conductors of electric lamps.

The object of this invention is to furnish another method for treating carbon, plumbago, and allied substances so that a very flexible, durable, and effective incandescing conductor of any desired resistance may be readily and economically made from such materials. Where for this purpose plumbago or graphitoidal silicon, boron, or zirconium are used the treatment is as follows: The material used is reduced to an impalpable powder, and a quantity thereof is placed in a metal box sufficiently strong to withstand a high pressure. The box should have a perfectly smooth polished bottom, and edges or sides extending upwardly so as to form a chamber about one-sixteenth of an inch deep, or even more, if relatively quite thick sheets are desired. A die with smooth polished face is used, fitting into this box, which is substantially a mold, and may be so designated. The mold is filled with the pulverized material, the top thereof evened off, and the die brought down thereon with great pressure, for which purpose it is preferable to use a hydraulic press. The result is a sheet of homogeneous material whose density depends upon the pressure used, which may be varied to suit the requirements of special purposes.

If it is desired to increase the resistance of the resultant material, the preferable way is to incorporate with the material noted, before pressure into sheets, a proportion of powdered carbon or charcoal. The larger the proportion of carbon or charcoal used the greater the resistance of the sheets of any given density.

As the density may be varied by varying the pressure used, and the resistance regulated by proportioning the amounts of pulverized carbon or charcoal mingled with the basic material, it follows that both density and resistance may be regulated to suit the varying requirements of different systems of lamps.

While all kinds of carbon may be used, as a rule, the substances first mentioned are the easiest of manipulation. If, however, it be desired to use carbons having little or no cohesion—such as charcoal—it may be done by mixing therewith a fluid having in solution a hydrocarbon, the menstruum being one that is readily evaporable, the resultant paste being dried, powdered, pressed, and treated with hydrocarbon vapor, as hereinafter noted.

From the sheets before noted the conductors or "horseshoes" are to be stamped or cut, and so that the enlarged ends for clamping are made homogeneous with the body of the conductor. In such operation there is a certain percentage of loss or breakage. This percentage is materially reduced by treating the sheets with hydrocarbon while heated to incandescence, or at least to a very high heat. To this end the sheets may be placed in a closed flask or retort provided with means whereby hydrocarbon vapor may be passed therethrough over and around the sheets, the flask or retort placed in a furnace, and the sheets brought up to a very high heat; or the material may be heated by electrical incandescence while in a hydrocarbon vapor, the result being that the material becomes tough and flexible.

Instead of the dry powdered material being placed in the mold, it may be made into a paste or dough with any readily-evaporable agent, and the mold filled with the paste or dough and allowed to dry.

The mold may be of any desired size, and it may be of the configuration desired for the loop or horseshoe, so as to form the same di-

rectly, or after the sheets are formed the loops or horseshoes, or any desired shape, may be cut or stamped out, and then treated with the hydrocarbon, as described, instead of the sheets being so treated before cutting or stamping; but the latter is preferable.

What I claim is—

The method of manufacturing incandescing conductors, consisting in pressing the powdered graphite or other material into sheets, then heating the sheets in the presence of a hydrocarbon vapor, as described, and then cutting or stamping the conductors therefrom, substantially as set forth.

This specification signed and witnessed this 19th day of April, 1881.

THOMAS A. EDISON.

Witnesses:

BERNARD J. KELLY,

SAMUEL INSULL.