UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

INCANDESCENT-LAMP FILAMENT.

SPECIFICATION forming part of Letters Patent No. 485,617, dated November 8, 1892.

Application filed July 17, 1888. Renewed April 12, 1892. Serial No. 428,785. (No specimens.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, county of Essex, in the State of New Jersey, have invented a certain new and useful Improvement in Methods of Making Carbon Filaments for Incandescent Electric Lamps, (Case No. 788,) of which the following is a specification.

The object I have in view is to produce carbon filaments for incandescent electric lamps which shall have good life and which can be made cheaply. To accomplish this I form such filaments either round, square, or other shape in cross-section by squirting through suitable dies, while plastic, hydrocarbons of asphaltic or bituminous character, such as the various bitumens, asphalts, and bituminous-like residues from the distillation of organic matter, such as oils, or from the distillation of mineral oils. Almost any of the vegetable or mineral oils by distillation are capable of being reduced to the condition of a plastic residue or a solid residue which may be made plastic by the application of heat, so that the material can be given any desired shape. These residues, however, all contain so much hydrogen that they will not retain their shape when subjected to a carbonizing-heat, and hence it has been found impossible heretofore to produce carbon filaments from materials of this character. I take this material in a plastic condition, which may be produced, as before stated, by heating it slightly, and I then press it through a shaping-die or otherwise form it into a long filament or thread, which is cut into the desired lengths and bent to any required shape. The second stage of the process is to render the asphaltic filament infusible, so that it can be carbonized without losing its shape. This I accomplish by acting on the filament with a powerful dehydrogenizing agent, such as pentachloride of antimony. The chlorine of the pentachloride of antimony removes a large part of the hydrogen of the hydrocarbon filament, eliminating hydrochloric-acid gas, thus rendering it impossible to melt the filament, although its appearance is not changed. Some of the hydrogen of the hydrocarbon is exchanged for chlorine. After the dehydrogenizing process the filaments are carbonized in the usual manner now well known in the art of manufacturing incandescent electric lamps. It is best to dehydrogenize slowly, so that the action is not violent, and this I accomplish by suspending the asphaltic filaments in a glass jar filled with the vapor of the dehydrogenizing material with a supply of the same in a liquid form to keep up an atmosphere of the same. I have found pentachloride of antimony and chloride of sulphur to be the best agents; but of course there are many other chlorine compounds which hold one or more atoms of chlorine very loosely, so that they readily act as dehydrogenizing agents. Those which are not volatile can have the asphaltic filaments immersed in them.

What I claim is—

1. The method of making carbon filaments from asphalts or hydrocarbon residues, which consists in dehydrogenizing said material and after dehydrogenizing the material carbonizing the filaments, substantially as described.

2. The method of making carbon filaments, consisting in forming the filament from plastic asphaltic hydrocarbon residues, then dehydrogenizing the filament to the point where it can be carbonized without melting, and then carbonizing such filament, substantially as set forth.

3. The method of making carbon filaments, consisting in forming the filament from plastic asphaltic hydrocarbon residues, then dehydrogenizing the filament by chemical action to the point where it can be carbonized without melting, and then carbonizing the filament, substantially as set forth.

4. The method of making carbon filaments, consisting in forming the filament from plastic asphaltic hydrocarbon residues, then dehydrogenizing the filament by immersion in a chlorine compound, and then carbonizing the filament, substantially as set forth.

This specification signed and witnessed this 14th day of July, 1888.

THOS. A. EDISON.

Witnesses:
WILLIAM PELZER,
A. W. KIDDER.