UNITED STATES PATENT OFFICE.

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

INCANDESCENT CONDUCTOR FOR ELECTRIC LAMPS.

SPECIFICATION forming part of Letters Patent No. 543,985, dated August 6, 1895.

Application filed August 7, 1882. Serial No. 68,652. (No specimens.)

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 Improvement in Incandescing Conductors for Electric Lamps; and I do hereby declare that the following is a full and exact description of the same.

The object I have in view is to produce a method and material for forming flexible carbon filaments for use as the incandescing conductors of electric lamps which will be suitable for many purposes. This I accomplish by the employment of a carbohydrate, such as pure unstructural cellulose or some compound thereof, which is formed into filaments and carbonized or first carbonized and then made into filaments. By some method the cellulose or compound of cellulose is dissolved by a suitable solvent and formed into sheets or membranes by allowing it to flow upon plates and there drying it. The filaments with enlarged ends are cut or punched from the sheets or membranes thus formed, which are passed between sheets of paper or metal for the purpose, and the filaments are then carbonized by heat under strain and pressure, or the sheets or membranes may be first carbonized and the filaments punched or cut from the carbonized sheets. By another method the cellulose or compound of cellulose may be dissolved and allowed to harden, in sheets or otherwise, into a mass more or less solid, and may be then subjected to heat and pressure and forced through dies to form a fine filament, which is cut into proper lengths and carbonized by heat under strain and pressure. Before carbonization the enlarged ends may be formed by softening the ends of the filament by a solvent and attaching pieces of the softened material thereto, or the ends of the filament when softened may be doubled upon themselves or otherwise enlarged without adding extra material, the shortening of the filament being provided for in cutting; or the hardened dissolved cellulose or compound of cellulose may be forced through dies under heat and pressure and formed into sheets from which the filaments are punched before or after carbonization.

For the material I may use pure unstructural cellulose, which may be dissolved in cuprammonic hydrate, or any compound of cellulose may be employed, such as trinitro cellulose, which may be dissolved or made plastic by a suitable solvent, such as ethylic acetate, alcohol and ether, alcohol and camphor, acetone, nitro-benzol, aniline or glacial acetic acid. Other carbohydrates or nitrates or other compounds thereof could be treated with proper solvents and used for the purpose.

It is evident that a drying oil, such as linseed-oil, may be added in any of the methods before described, to increase the flexibility of the filaments produced, but the use of a drying oil I have made the subject of a separate application for patent.

The carbon filaments formed in the manner described of pure unstructural cellulose or some compound of cellulose or of other carbohydrates or compounds of the same, have the properties of flexibility and high resistance when very thin, which are essential in incandescing conductors for electric lamps.

What I claim is—

1. A flexible carbon filament for the incandescing conductor of an electric lamp composed of carbonized unstructural cellulose or other carbo-hydrate or a compound thereof, substantially as set forth.

2. The method of producing flexible carbon filaments for the incandescing conductors of electric lamps, consisting in carbonizing unstructural cellulose or other carbo-hydrate or a compound thereof, the material being reduced to the proper size and shape before or after carbonization, substantially as set forth.

3. The method of forming flexible carbon filaments for the incandescing conductors of electric lamps, consisting in dissolving unstructural cellulose or other carbo-hydrate or a compound thereof, and forming the same into sheets or membranes, and in punching or cutting filaments therefrom before

or after carbonization, substantially as set forth.

4. The method of forming flexible filaments for the incandescing conductors of electric lamps, consisting in forming unstructural cellulose or other carbo-hydrate or a compound thereof into filaments or sheets under heat and pressure, and subsequently carbonizing the same, substantially as set forth.

This specification signed and witnessed this 3d day of June, 1882.

THOS. A. EDISON.

Witnesses:
RICHD. N. DYER,
EDWARD C. ROWLAND.