

UNITED STATES PATENT OFFICE.

ARTHUR SMITH, OF BROCKLEY, COUNTY OF KENT, ENGLAND.

MANUFACTURE OF CARBONS FOR ELECTRIC LIGHTS.

SPECIFICATION forming part of Letters Patent No. 301,929, dated July 15, 1884.

Application filed February 6, 1884. (No specimens.) Patented in England March 27, 1882, No. 1,465; in France September 22, 1882, No. 151,232; in Belgium September 27, 1882, No. 59,129, and in Germany September 27, 1882, No. 23,732.

To all whom it may concern:

Be it known that I, ARTHUR SMITH, a subject of the Queen of Great Britain, residing at Brockley, in the county of Kent, England, have invented certain new and useful Improvements in the Manufacture of Carbons for Electric Lamps, (for which I have received Letters Patent in Great Britain, dated March 27, 1882, No. 1,465; France, dated September 22, 1882, No. 151,232; Belgium, dated September 27, 1882, No. 59,129; Germany, dated September 27, 1882, No. 23,732;) and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the production of carbons for electric lamps in the form of filaments of high resistance for incandescent lamps, or of rods for arc lamps.

For producing filaments I pass through the liquid furfural or fucosol hydrochloric-acid gas in excess, taking care to keep the liquid cool. The reaction produces a black liquid, which I inclose between two glass plates kept apart at a distance equivalent to the desired thickness of filament, for which purpose pieces of wire or thread of equivalent diameter may be interposed between the plates. After the material has thoroughly set, which requires from eight to twelve hours, I carefully wedge the plates apart, and place that to which the film adheres in cold water for about half an hour, in which time the sheet of carbon will detach itself. This sheet is then floated onto a flat surface of wood or cardboard, which may be cemented on a sheet of plate-glass by shellac varnish. The excess of moisture is removed by blotting-paper, and the adhering sheet is cut into strips of any required width by a sharp knife. I bend these strips between molds, of horseshoe or other suitable form, made of plaster-of-paris, and expose them to a temperature of two hundred and twelve degrees (212°) Fahrenheit. A number of the strips may be bent together round a glass tube, with their ends secured by two threads passed outside and inside the tube longitudinally. The strips thus bent form elastic rings

of carbon. The filaments, when removed from the molds or the glass tube, are subjected to a high heat in closely-covered crucibles surrounded with carbon powder, or in porcelain tubes partly filled with carbon powder, through which a current of coal-gas is passed during the process. According to another method, I pour on the glass plate a mixture of about three parts of furfural or fucosol, with one part of commercial vitriol of specific gravity about 1.84, (one, decimal, eighty-four,) and when the material is set I treat it as before described. The electrical resistance of the filaments may be varied by mixing about two and a half (2½) per cent. of lamp-black with the furfural or fucosol before treatment.

For producing carbon rods for arc lamps, I mix lamp-black or any finely-divided carbon with about sixty or seventy per cent. of furfural or fucosol and subject the mixture to compression in slightly-tapered molds, or force the pasty mass through a die; or, according to another method, dry lamp-black may be strongly compressed into molds, so as to form rods, which, on being dipped for a moment in a bath of furfural or fucosol, become thoroughly impregnated therewith. The molded or impregnated rods are then subjected to an atmosphere of hydrochloric-acid gas in vessels or tanks, which may be made of wood or slate saturated with paraffine. After remaining from twelve to twenty-four hours exposed to the gas, they are removed, and, if necessary, they may be saturated by being dipped a second time into the furfural or fucosol, and again exposed to the acid gas. Such cracks as may appear in the rods may be filled with a paste of carbon and furfural or fucosol. The rods are finished, as usual, by highly heating them in close vessels, in which they are covered with charcoal-powder.

Although I have mentioned hydrochloric-acid gas as the reagent employed, other hydrogen acids—such as hydrofluoric, hydriodic, or hydrobromic acid—may be employed; but these are more expensive and less convenient in use.

Furfural ($C_5H_4O_2$) is a volatile oil obtained when wheat-bran, sawdust, madder-root, or

other substance is acted on by dilute sulphuric acid with repeated distillations. It is nearly colorless when first prepared, but turns yellow in the dark, and brown when exposed to light. Fucusol is made in the same way, only substituting sea-weeds.

Having stated the nature of my invention and described the manner of performing the same, I declare that what I claim, and desire to secure by Letters Patent of the United States, is—

The process of manufacturing carbons for electric lamps, which consists in treating (either alone or combined with lamp-black)

furfurol or fucusol with sulphuric acid, hydrochloric-acid gas, or other hydrogen-acid reagent, and subsequently subjecting the same to a high temperature, substantially as herein described.

The foregoing specification of my improvements in the manufacture of carbons for electric lamps signed by me this 23d day of January, 1884.

ARTHUR SMITH.

Witnesses:

RUDOLPH CHAS. NICKOL,

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Both of 31 Lombard Street, London.