

UNITED STATES PATENT OFFICE.

WILLIAM E. SAWYER, OF NEW YORK, AND ALBON MAN, OF BROOKLYN,
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CARBON FOR ELECTRIC LIGHTS.

SPECIFICATION forming part of Letters Patent No. 229 335, dated June 29, 1880

Application filed November 23, 1878.

To all whom it may concern:

Be it known that we, WILLIAM EDWARD SAWYER, of the city, county, and State of New York, and ALBON MAN, of Brooklyn, county of Kings, and State aforesaid, have jointly invented certain Improvements in Carbons for Electric Lights; and we do hereby declare the following to be a description of the same, and of the manner and process of making, constructing, and using them, in such full, clear, concise, and exact terms as will enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, and use the same, reference being had to certain Letters Patent of the United States heretofore granted to us for certain inventions hereunto appertaining, and to which especial reference will hereinafter be made.

Our invention consists of a new article of manufacture, consisting of an improved illuminating conductor for electric lamps, composed of consolidated carbon created by electric action.

In Letters Patent of the United States No. 205,144, granted to us, we have shown and described an electric lamp, in which a pencil of carbon is heated to incandescence in a nitrogen or other carbon-preservative atmosphere.

One of the principal obstacles to successful electric lighting by incandescence is the dissociated character of nearly all obtainable carbon. In most of such carbon there is danger of fracture as well as of the establishment of the voltaic arc; and, furthermore, the carbon, unless specially prepared by our process, naturally occludes sufficient air or oxygen to render its consumption a mere question of time, since, as fully set forth in the Letters Patent referred to, the least quantity of oxygen in a sealed lamp is sufficient to combust an indefinite quantity of carbon.

As is well known, carbon suitable for electric lighting by the voltaic arc is naturally produced in gas retorts; but generally the rods or carbons used in the "regulator-lamps," so-called, are molded from the powdered material. Neither the one nor the other quality of carbon is suitable for electric lighting by incandescence. In both there is a lack of homo-

geneity. The pencil is not sufficiently hard and dense, because, in the first place, the heat required to produce the proper character of carbon is as high as 7,000° Fahrenheit, and such a temperature is not obtainable in the retort; and in the second place the mechanical subdivisions of the material and the pressure necessary to produce the perfect article are practically unattainable. Carbon of the ordinary sort, when heated by the electric current, exhibits points and lines of unequal brilliancy. Carbon prepared by our process, when so heated, glows with a uniform brilliancy throughout.

We have found that a pencil of carbon immersed in a hydrocarbon gas or liquid and heated to an extremely high temperature by the voltaic current is not itself attacked, but decomposes the surrounding matter, the carbon of which enters and fills up its pores to an extent impossible except with matter in a very attenuated state, and deposits a perfectly homogeneous layer, generally of a bright gray color, upon the exterior surface. As the carbon increases in size more current is required to maintain its temperature, and if the current is gradually increased in accordance with the demand for it there is appearingly no limit to the increase in mass of the homogeneous exterior deposit. Carbon pencils may be cut from this deposit, or the original pencil with its coating may be used in the lamps.

In this process it would seem that the carbon is never in contact with the liquid in which it is immersed, but surrounded by a carbon gas of a very high temperature. Naphtha, turpentine, beeswax, balsam, and most oils, if pure, operate satisfactorily. Almost any hydrocarbon, in fact, will answer.

We do not confine ourselves to the treatment of carbon alone, since it is obvious that many infusible substances, non-conductors of electricity, may be heated in hydrocarbon liquids or gases, so as to render them conductors of electricity—as, for instance, a tube of lime inclosing a pencil of carbon, through which the electric current is caused to circulate.

In the Letters Patent hereinbefore referred to we have described a method of charging a

sealed globe with pure nitrogen gas. We will
suppose that the pencil of carbon, held be-
tween two carbon pieces of greater mass than
that of the pencil, as shown in the said Let-
ters Patent, is immersed in the hydrocarbon
5 liquid and heated in the manner already de-
scribed. Being then cleansed in alcohol, the
pencil and its holders, without having been
disturbed, are placed in the globe, in which
10 they are to be hermetically sealed. The globe
is charged with pure nitrogen, and then, while
still allowing pure nitrogen to flow into and
out of the globe, we heat the carbon to incan-
descence, thus driving out all impurities and
15 occluded gases, which are carried out of the
lamp by the current of nitrogen.

With this operation the preparation of the
carbon is completed, and the lamp, now being
hermetically sealed, as described in the Let-
ters Patent referred to, is ready for use. 20

Having thus described our invention, we
claim and desire to secure by Letters Pat-
ent—

Carbon consolidated and purified by elec-
trically treating it, in combination with a car- 25
bonaceous substance, for the production of elec-
tric burners.

WILLIAM EDWARD SAWYER.

ALBON MAN.

Witnesses:

AMOS BROADNAX,

THOS. CROCKER.