

UNITED STATES PATENT OFFICE.

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GAS-INCANDESCENT.

SPECIFICATION forming part of Letters Patent No. 575,263, dated January 12, 1897.

Original application filed July 3, 1896, Serial No. 598,002. Divided and this application filed November 17, 1896. Serial No. 612,498. (No specimens.)

To all whom it may concern:

Be it known that I, ROBERT MOSCHELES, a subject of the Emperor of Germany, residing at Berlin, in the Empire of Germany, have invented certain new and useful Improvements in Gas-Incandescents; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improvement in manufacture of gas-incandescents, the object being to provide a novel composition of matter out of which to constitute the incandescing filament; and it consists, essentially, in the combination of materials substantially as will be hereinafter described and claimed.

In my studies and investigations with relation to the so-called "incandescent" light, by which I refer to the phenomena produced by the characteristic property of certain mixtures of oxids to change the rays of heat into rays of light, I have found that the oxids exhibiting such phenomena may be divided primarily into kinds which, for the purpose of convenience, I designate as "carriers" and as "developers." Carriers are oxids of a high melting-point and mostly stable. Developers are always variable oxids, according to the degree of the volatility of the oxids employed, and the duration of the appearance of the incandescent light is a longer or a shorter one. The incandescent light is formed by the continuous oxidation and reduction in the edge of the flame when the oxids of any element having several stages of oxidation, such as chrome, manganese, cerium, indium, or gallium, are brought into the flame. This quickly-changing or alternate process produces a conversion of the rays of heat into rays of light. To make practical use of this physical phenomenon in the form of incandescent light, it is necessary to apply the oxid of one of the enumerated bodies, this being the developer of light in finest division, in the edge of the flame not emitting light, and wherein it should be held in a stable position. To this end bodies are employed that are constant in the glowing heat, such as thorium, aluminium, &c., which bodies I call "carriers," because they

serve as carriers for the light-developers. Indium and gallium possess the peculiarity that they may be employed in both forms.

It is unnecessary here to enter into any lengthy or detailed explanation with reference to the known combinations and developers, such as thorium and cerium oxid, aluminium and chrome oxid, &c. I will therefore proceed to describe the observations made by me to the effect that the oxids of gallium and indium are exceedingly appropriate to serve as carriers as well as developers in producing a constant incandescent light of great intensity and long duration.

I have found that, for instance, thorium, aluminium, or zircon oxid, with small additions, up to about three per cent. or four per cent. of gallium or indium, at one hand, and indium or gallium oxid, with small admixtures of about three per cent. to four per cent. of chrome, manganese, or any other valuable oxid, on the other hand, show in exquisite manner the incandescent light. This characteristic property permits of the manufacture of incandescent-light bodies containing indium or gallium oxid made by the process or method of first providing a combustible fabric and then impregnating it with salt solutions of about ten per cent. to fifteen per cent. incandescent residue of the mentioned combinations in the quoted proportions of quantity, and after drying in the ordinary manner for the production of the skeleton of ashes of the oxids; that is, the solution of the substances enumerated for the purposes of impregnation must be such that the residue resulting from the solution will after burning be from ten per cent. to fifteen per cent. By the application of heat to the impregnated combustible fabric the said fabric is burned out and the skeleton structure, composed of the infusible earthy oxids, is left as a residue, capable of readily incandescing when heat is applied.

I submit the following examples of compounds for incandescing filaments containing indium or gallium:

First. Aluminium nitrate, fifty per cent.; indium nitrate, 0.12 per cent.; zircon nitrate, 0.05 per cent.; water, 49.83 per cent.

Second. Thorium nitrate, twenty per cent.; gallium nitrate, 0.15 per cent.; calcium nitrate, 0.05 per cent.; water, 79.80 per cent.

Third. Indium nitrate, thirty per cent.;
5 chrome nitrate, .40 per cent.; barium nitrate, 0.05 per cent.; water, 69.55 per cent.

Manganese may be substituted for the chrome, if desired.

While I have described the use of gallium
10 in various combinations with the salts of refractory earths, I have not claimed the same herein, as such subject-matter is described and claimed in my application, Serial No. 598,002, filed July 3, 1896, of which the pres-
15 ent application is a division.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An incandescent burner composed of a mixture of the oxids of indium and chrome. 20

2. An incandescent composed of a mixture of the oxids of indium and chromium, in proportions substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT MOSCHELES.

Witnesses:

CHARLES H. DAY,

HENRY HARPER.