

UNITED STATES PATENT OFFICE.

ROBERT MOSCHELES, OF BERLIN, GERMANY, ASSIGNOR TO LOUIS H. HALL,
OF PHILADELPHIA, PENNSYLVANIA.

GAS-INCANDESCENT.

SPECIFICATION forming part of Letters Patent No. 588,077, dated August 10, 1897.

Original application filed July 3, 1896, Serial No. 598,002. Divided and this application filed November 17, 1896. Serial No. 612,496. (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 two 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 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 or four per cent. of gallium or indium on one hand and indium or gallium oxid with small admixtures of about three 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 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 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.; chrome nitrate, .40 per cent.; barium nitrate, 5 0.05 per cent.; water, 69.55 per cent.

Manganese may be substituted for the chrome, if desired, and instead of thirty per cent. of indium nitrate I may use fifteen per cent. of indium nitrate and fifteen per cent. 10 of gallium nitrate or the two said nitrates may be used in other proportions.

While I have described the use of gallium in various combinations with the salts of refractory earths, I have not broadly claimed 15 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 present application is a division.

Having thus described my invention, what

I claim as new, and desire to secure by Letters 20 Patent, is—

1. An incandescent containing oxid of indium.

2. An incandescent consisting of a mixture 25 of the oxids of gallium and indium.

3. A filament, fabric or textile frame of combustible material impregnated with the salts of refractory earths and of indium.

4. An incandescent composed of a mixture 30 of oxids, in which the oxids of gallium and indium are contained.

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

ROBERT MOSCHELES.

Witnesses:

CHARLES H. DAY,
HENRY HARPER.