

UNITED STATES PATENT OFFICE.

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GLOWER FOR ELECTRICAL INCANDESCENT LAMPS.

1,074,333.

Specification of Letters Patent.

Patented Sept. 30, 1913.

No Drawing. Original application filed January 20, 1911, Serial No. 603,663. Divided and this application filed March 14, 1912. Serial No. 683,878.

To all whom it may concern:

Be it known that I, ORLANDO M. THOWLESS, a subject of the King of Great Britain, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Glowlers for Electrical Incandescent Lamps, of which the following is a specification.

My invention relates to glowers or illuminants for electrical incandescent lamps, and more particularly to filamentary glowers, although tubes, rods or other forms may be made for the purpose, the said glowers being made from finely powdered materials and when finished shall be conductive and luminous under the action of a suitable electric current.

The object of this invention is to produce glowers which shall be more regular and even in their light-emitting qualities and which shall have a higher specific resistance as compared with solid metal filaments, so that shorter and thicker glowers may be used than those made entirely of metal. In this form the powders forming the filament can be so changed and arranged as to enable the maker to control and plan any resistance for them at a given length and cross-section, this being accomplished by adding a varying quantity of refractory resistance material to metal powders.

As an illustration of my invention and to show how it is carried into effect I will give here one form of refractory metal powder and one form of resistance material with the methods of making the same into glowers.

Metal powder, such as tungsten, is intimately mixed with a powder such as oxid of zirconium, oxid of aluminum or other refractory oxid and this mixture is formed into a paste with a binding substance such as paraffin. This paste is then forced through a fine hole into a filamentary form, having a thread-like appearance. This is cut into proper lengths and shaped into filaments suitable for lamps. The binding substance is eliminated by heat and a high temperature is caused to act upon the filaments, in a suitable vessel, exhausted of air or containing indifferent gas, until all the particles are united together in a manner simi-

lar to fritting or welding. The filaments then receive a deposit of refractory metal to reduce their resistance to commercial requirements and to make them uniform in their light-giving qualities. The metal is deposited on the filaments from the vapor of halogen or other salts of metals in the presence of hydrogen or other suitable reducing gas, by means of an electric current traversing the filament and raising it to a temperature sufficient to decompose the vapors and produce a deposition of the metal. In case tungsten is the metal which is to be deposited on the basic filament a salt of tungsten, such as the pentachlorid, WCl_5 , or the hexachlorid WCl_6 , is prepared and placed in a receptacle connected with a flashing-jar and heated to a vaporizing temperature. The filament is placed therein and connected with electrical terminals, the flashing-jar is exhausted of air, the vapor of the tungsten salt is mixed with pure hydrogen gas and these mixed vapors are caused to enter the exhausted jar. A proper current, sufficient to raise the filament to a temperature high enough to cause the vapors to decompose, is made to traverse the filament which results in a deposit of tungsten thereon.

While it may be better in most cases to deposit the same metal as that used in the basic filament yet any of the highly refractory metals may be used for the deposit.

Another method of making the high resistance filament is to form a paste of metal powder with a solution of a salt which, under the action of heat, will become changed to an oxid. For instance, nitrate of aluminum dissolved in water and somewhat concentrated will form a jelly-like mass. This is mixed with the metal powder and, in this condition, serves as a binding substance. The mass is then forced through a die-hole, formed into filaments and the nitrate of aluminum changed into oxid of aluminum by means of heat. This may be performed in a bell-jar under the action of an exhaust pump while the filament is raised to a high temperature by means of an electric current. The filament may then be coated with the refractory metal in the manner previously set forth.

The present application is, in accordance

with the requirements of the Patent Office, divided out of my application, Serial No. 603,663, filed January 20, 1911.

Having thus described my invention I
5 claim:

1. A glower for an electrical incandescent lamp consisting of a filament composed of tungsten and oxid of aluminum covered with refractory metal.
- 10 2. A glower for an electrical incandescent lamp consisting of a filament composed of a mixture of tungsten and oxid of aluminum covered with a deposit of tungsten.
3. A glower for an electrical incandescent
15 lamp consisting of a fritted body composed of tungsten and oxid of aluminum covered with a coating of tungsten.
4. The method of making glowers for
20 electrical incandescent lamps which consists in mixing a salt-binding material with a

metal powder, forming the mixture into filaments and heating the filaments until all undesirable material is eliminated therefrom, a refractory oxid formed therein and the particles of the filament fritted together. 25

5. The method of making glowers for electrical incandescent lamps which consists in mixing a salt-binding material with metal powder, forming the mixture into filaments, heating the filaments until all undesirable 30 material is eliminated therefrom, refractory oxid formed therein, the particles of the filaments fritted together and covering them with a deposit of refractory metal in such a manner as to make them uniform in their 35 light-giving qualities.

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Witnesses:

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