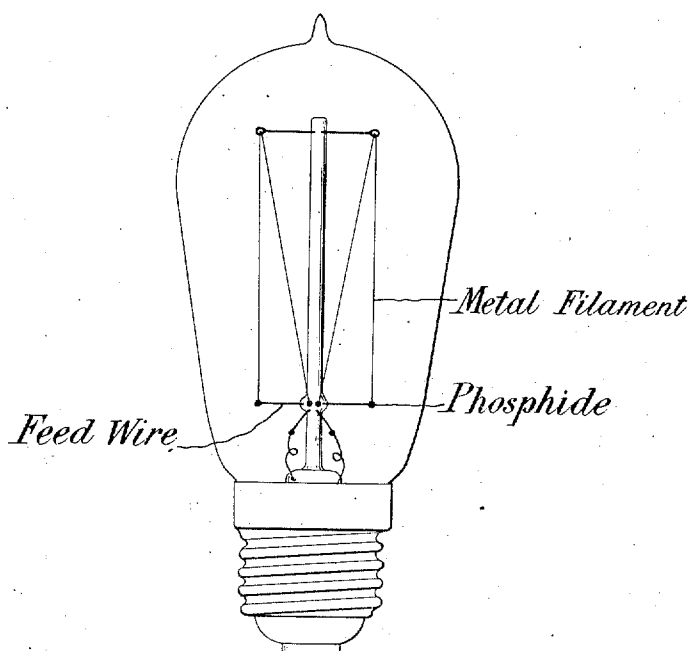


F. HANAMAN.
CONNECTION BETWEEN METALLIC FILAMENTS AND FEED WIRES OF ELECTRIC INCANDESCENT
LAMPS.

APPLICATION FILED MAY 20, 1909.

1,046,780.

Patented Dec. 10, 1912



WITNESSES:

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UNITED STATES PATENT OFFICE.

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CONNECTION BETWEEN METALLIC FILAMENTS AND FEED-WIRES OF ELECTRIC INCANDESCENT LAMPS.

1,046,780.

Specification of Letters Patent.

Patented Dec. 10, 1912.

Application filed May 20, 1909. Serial No. 497,177.

To all whom it may concern:

Be it known that I, FRANZ HANAMAN, a subject of the King of Hungary, and a resident of Budapest, Austria-Hungary, have invented certain new and useful Improvements in Connections Between Metallic Filaments and Feed-Wires of Electric Incandescent Lamps, of which the following is a specification.

In the manufacture of electric incandescent lamps provided with metal filaments, it is important to secure a good electrical connection between the filament and the feed for leading-in wires. This connection must not only produce a firm mechanical joint between the filament and wires, but must provide at the same time a good electrical conductivity so that any considerable resistance to the current is avoided. Various metallic connections have been hitherto proposed.

The present invention relates to a connection between such filament and feed wires, and to the process of making the same, such connection being formed of a material which has metallic properties without being a metal. I have found that the phosphids of various metals in a molten or sintered condition form a very firm connection of good conductivity between the filaments and the feed wires. Among the phosphids which can be used are those of copper, manganese, nickel, cobalt, chromium, molybdenum, tungsten, gold and platinum. These phosphids are distinguished by their comparatively easy fusibility as well as their resistance to oxidation; they have also a good electrical conductivity which enables them to form an excellent solder for making the connection between the ends of the filaments and the feed wires in a very simple manner.

Any suitable method of forming the connection may be used, but I prefer the following:—The finely divided phosphids of one or more of the above-mentioned metals are triturated with a little water, or better still with some other liquid evaporating without any residue, such as xylol, etc. until a paste is formed which is applied to the end of the filament and feed wire in such quantities that the soldering knot obtained has the desired thickness. The filament frames prepared in this manner are then preferably dried in the air or in a drying kiln at tem-

peratures up to about 80° C., when they may if desired be placed in a suitably arranged glass receptacle in which there are reducing or indifferent gases, such as hydrogen, etc. Here the sintering or melting of the soldering knots takes place in the manner well known, that is, with the aid of the electric current or arc.

A most important advantage, however, is that the connection can be made in the open air. While the phosphids mentioned may be capable of oxidation when heated for a length of time in the presence of air, I have found that during the brief time required no appreciable oxidation takes place. This is of particular value with metallic filament lamps, since the presence of oxides in the bulb is very disadvantageous, as they deposit themselves on the glass and interfere with the illuminating efficiency of the lamp.

Good connections may also be obtained by rubbing finely divided phosphids with an addition of finely divided oxides or hydroxides of metals, such as copper, manganese, nickel, cobalt, chrome, molybdenum, tungsten, gold and platinum in moist condition until a material suitable for coating is formed which is then applied to the connecting joint. The soldering knot is then melted or sintered in the manner above described.

It will be understood that the precise physical properties of the solder connection, and particularly the raising or lowering of the melting point thereof, differ according as the phosphids of the different metals are used alone or mixed with each other. These physical properties also change with the alloys or mixtures of the phosphids, if the metals mentioned are used. Although gold phosphid is considered a compound which can be decomposed by heat, a very considerable decomposition does not take place in the present instance because the heat of the phosphid at the connection joint lasts but a very short time, perhaps a fraction of a second.

In the drawing I have illustrated my invention somewhat diagrammatically. The drawing represents an ordinary lamp bulb with a standard or holder and metallic filaments strung upon the holder, each filament being connected with a feed wire. I have used the term "feed wire" herein to indicate any wire to which the metal filament

is connected. Such connection is usually electrical as well as mechanical, although in certain instances it may be mechanical only while in other instances the main purpose of the connection may be to establish an electrical connection.

While I have described in detail the preferred form of my invention, it will be understood that I do not wish to be limited thereto, as many changes may be made therein without departing from the invention. It will also be understood that while I have indicated certain phosphids which are used by me, I do not wish to be limited to these specific phosphids. While the invention is of most importance with metallic filament lamps, it is also applicable to lamps with carbon and other filaments.

What I claim is:—

1. A joint between a filament and a feed

wire, comprising a substance containing a phosphid of a metal.

2. A joint between a metallic filament and a feed wire, comprising a substance containing a phosphid of a metal.

3. The combination in an incandescent lamp of a metallic filament, a feed wire, and a joint connecting them together containing a phosphid of a metal.

4. The combination in an incandescent lamp of a metallic filament, a feed wire, and a joint comprising a phosphid of a metal connecting said filament and feed wire.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

FRANZ HANAMAN.

Witnesses:

EUGENE V. MYERS,

WILLIAM F. MARTINEZ.

Correction in Letters Patent No. 1,046,780.

It is hereby certified that in Letters Patent No. 1,046,780, granted December 10, 1912, upon the application of Franz Hanaman, of Budapest, Austria-Hungary, for an improvement in "Connections Between Metallic Filaments and Feed-Wires of Electric Incandescent Lamps," an error appears in the printed specification requiring correction as follows: Page 1, line 14, for the word "for" read *or*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of February, A. D., 1913.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.

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