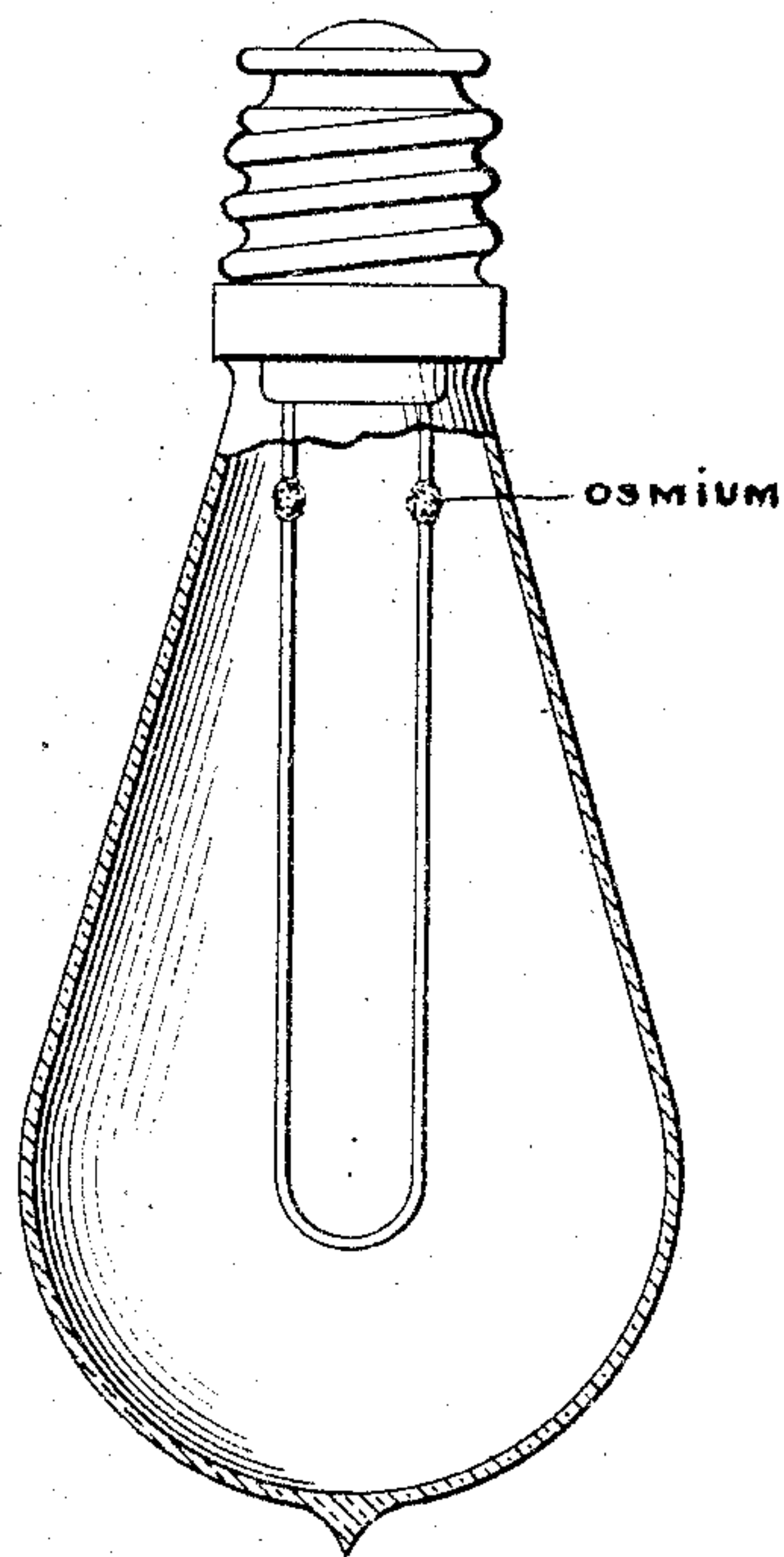


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MANUFACTURE OF ELECTRIC FILAMENTS.
APPLICATION FILED AUG. 9, 1898.

976,528.

Patented Nov. 22, 1910.



Witnesses:

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MANUFACTURE OF ELECTRIC FILAMENTS.

976,528.

Specification of Letters Patent.

Patented Nov. 22, 1910.

Application filed August 9, 1898. Serial No. 688,204.

To all whom it may concern:

Be it known that I, CARL AUER VON WELSBACH, a subject of the Emperor of Austria-Hungary, residing at Vienna, Austria-Hungary, have invented or discovered a certain new and useful Improvement in the Manufacture of Electric Filaments, of which the following is a specification.

My invention relates to the manufacture of incandescent electric lamps and has for its object principally to unite an osmium filament or a filament containing osmium or its alloys with the leading-in wires of an incandescent electric light bulb.

The invention is conventionally illustrated in the single figure of the accompanying drawing.

In other applications for Letters Patent of the United States of even date herewith, I have described an incandescent electric light filament wherein, during the course of manufacture the filamentary body in a preliminary stage of its preparation consists of osmium, or osmium alloy with or without certain refractory rare earths in the presence of a carbonaceous carrier or binder, as, for instance, a carbonaceous thread or a carbonaceous agglutinant. The carbonaceous carrier or binder referred to, after the filamentary body has been dried, is brought into the form required for the ultimate filament and is then slightly heated in a reducing atmosphere. The resulting carbon skeleton imparts to the filament as a whole, increased strength, elasticity and conductivity for its subsequent treatment, which consists in placing the filament in a chamber filled with suitable reducing gases together with vapors of water, when on heating the filament electrically the carbon is eliminated and the filament is then ready for inserting in the leading in wires of the bulb as follows: The free ends of the customary platinum leading-in wires are formed for the reception of the corresponding ends of the filament whereupon the points of juncture are covered with or embedded in a small quantity of the cement consisting of finely divided osmium or an osmium compound to which may be added a small quantity of the salt or salts of the other platinum metals such as ruthenium or rhodium, or of these metals or their alloys with a small quantity of a binding material such as sugar and water sufficient to bring it to a creamy paste-like consistency. But

when the filament is one of osmium I have found that the cement must likewise be of osmium and that if the metallic base of the filament be other than of osmium then the metallic base of the cement may be the same as that of the filament.

Before the plug which bears the platinum leading-in wires and the finished filament is inserted in the bulb the cement joint is slightly warmed, access of air not interfering with the action. It is then placed in the bulb filled with a dry reducing gas and having been put into an electric circuit and the filament brought to incandescence the organic matter of the binding material of the cement is eliminated and its metallic particles rendered dense and coherent, and partially fused or welded to the filament and caused to adhere to the leading-in wires making a strong and perfect and durable electric connection between the filament and leading-in wires and one that will withstand a current necessary to incandesce the filament which is that of a temperature beyond which platinum would fuse.

As the temperature at which the filament will incandesce is beyond that at which the platinum of the leading-in wires would fuse or alloy with the filament, obviously the cementing medium must be such as will withstand the same temperature as that of the filament and yet so reduce the temperature at the point of juncture with the platinum as to prevent its fusion, and this I do by the use of a paste the metallic base of which is the same as that of the filament and which when applied will at the point of juncture increase the cross section of the filament at that point the effect of which is to thereby reduce the electrical resistance greatly reducing the temperature produced at the point of contact between the platinum and the metal of the cementing or welding material.

By the use of this so called osmium cement I make possible the utilization of a metallic filament that incandesces at a temperature at which platinum would fuse in an incandescent electric lamp,—which so far as I know has not before been accomplished, and thus I am enabled to electrically connect or weld together in an incandescent lamp a filament which incandesces at a temperature above that at which the leading in wires would fuse, and thus make possible the pro-

duction of an incandescent electric light provided with an osmium filament.

Instead of eliminating the organic matter of the binding material after the filament has been placed in the bulb it may be eliminated prior thereto in the presence of a suitable reducing gas containing water vapor and under the action of the electric current; in either case after the filament has been placed in the bulb and the organic matter of the binding material has been eliminated, the filament must then be brought to incandescence in the presence of a dry reducing gas and while in that condition the bulb is exhausted and sealed as in the ordinary manner.

My so called osmium cement may also be used in a like manner during the manufacture of the filament as for instance in securing it into the holder used during the process of its manufacture; it may also be used for joining or welding together broken filaments as well as for strengthening filaments at weak points.

I have hereinbefore referred to the employment of a suitable reducing gas containing water vapor as one of the accessories for carrying out to advantage the purposes of the present invention. Such a reducing gas containing water vapor is presented, for instance, in the gases issuing from the burner tube of the struck back flame of a Bunsen burner, *i. e.*, of a Bunsen burner wherein the gas is ignited at the air inlet openings. Such a gas contains carbonic oxid, carbonic dioxid, hydrocarbon gases, and watery vapor, and has the property of removing the carbon, without oxidizing the osmium present.

Having thus described my invention what I claim is:

1. An incandescent electric lamp having its filament connected to its leading-in-wires by a connecting body of osmium.

2. An incandescent electric lamp having a filament containing osmium connected to the leading-in wires by an osmium connection.

3. An incandescent electric lamp having a filament containing osmium, platinum leading-in wires, and an osmium connection connecting the filament with the leading-in wires.

4. An incandescent electric lamp having leading-in wires whose ends are fashioned for the reception of the ends of the filament, a filament mounted therein and an osmium joint at the points of juncture.

5. The process of mounting filaments,

which consists in connecting the ends of the filaments to the ends of leading-in wires by a cement paste containing osmium and a carbonaceous agglutinant, warming the paste in order to obtain an initial adherence at the point of juncture, and finally removing the carbon of the paste without oxidizing the osmium by subjecting the paste to heat in the presence of reducing gases containing vapor of water.

6. An incandescent electric lamp having a metallic filament connected to its leading-in wires by a body or bodies the metallic base of which is substantially the same as the metallic base of the filament.

7. An incandescent electric lamp, having a metallic filament, and leading-in wires, the incandescing temperature of the filament being beyond that at which the metal of the leading-in wires would fuse, and a connecting metallic fuse-joint uniting the filament and leading-in wires, the metal of the fuse-joint being substantially the same as the metal of the filament.

8. The process of connecting to the leading-in wires of an incandescent lamp, a metallic filament whose temperature of incandescence is beyond that at which the metal of the leading-in wires would fuse, which consists in interposing at the juncture of the leading-in wires with the ends of the metallic filament a mounting whose fusing point is sufficient to withstand the temperature of the filament and protect the metal of the leading-in wires from fusing or alloying with the filament, and passing a welding current through the leading-in wires, mounting and filament, thereby completing the joint.

9. The process of welding the metallic filament of an incandescent electric lamp with its leading-in wires, where the incandescing temperature of the filament is beyond that at which the metal of the leading-in wires would fuse, through the medium of a mounting, the metallic base of which is substantially that of the filament, applied at the juncture between the ends of the filament and the leading-in wires so as to increase the cross section of the ends of the filament at those points thereby reducing the resistance and consequently the temperature at the point of contact of the leading-in wires with the connecting medium.

Signed this 27th day of July 1898.

CARL AUER VON WELSBACH.

Witnesses:

LUDWIG HAITINGE,
ADOLF GALLIA.