

M. A. HOYT,  
INCANDESCENT ELECTRIC LAMP.  
APPLICATION FILED JULY 11, 1916.

1,293,781.

Patented Feb. 11, 1919.

Fig. 1.

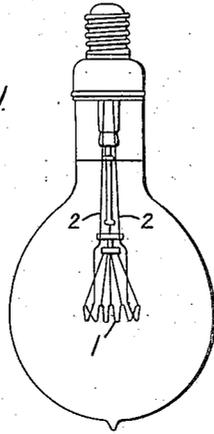
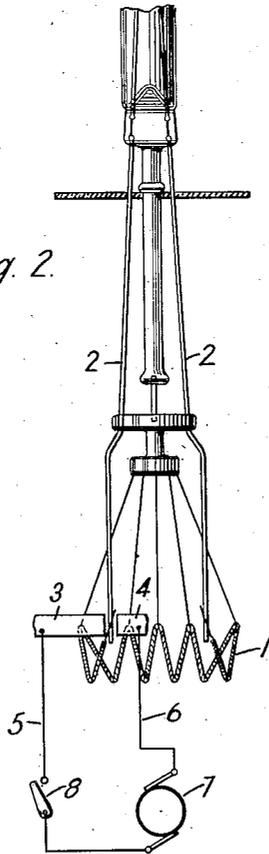


Fig. 2.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## INCANDESCENT ELECTRIC LAMP.

1,293,781.

Specification of Letters Patent.

Patented Feb. 11, 1919.

Application filed July 11, 1916. Serial No. 108,585.

*To all whom it may concern:*

Be it known that I, MILTON A. HOYT, a citizen of the United States, and a resident of Bloomfield, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Incandescent Electric Lamps, of which the following is a specification.

My invention relates to the manufacture of incandescent electric lamps and other devices that include incandescent elements and it has for one of its objects to provide a rapid and effective method of forming connections between the incandescent elements of such devices and their leading-in wires.

Another object of my invention is to provide an incandescent electric lamp having improved connections between the filament and the leading-in wires which shall avoid the use of loops, hooks, solder and all other connecting attachments and materials which have heretofore been used.

In the accompanying drawing, Figure 1 is a side elevational view of an incandescent electric lamp of a well-known commercial type and Fig. 2 is an enlarged elevational view of the mount structure of the lamp shown in Fig. 1, together with a diagrammatic illustration of apparatus suitable for carrying out the process of my present invention.

In lamps of the type illustrated in the drawing, the incandescent filament 1 is commonly made of tungsten or other highly refractory metal, while the leading-in wires 2 generally consist of nickel or of some other metal that has a considerably lower melting point than the filament, and these leading-in wires are of considerably greater diameter than the wire composing the filament. In order to attach the filament to the leading-in wires, it has heretofore been the practice to form the ends of the wire into interlocking hooks or loops, a considerable amount of dexterity and time being required in order to properly form such attachments and insure that the parts will not become separated during the use of the lamp.

According to my present invention, I greatly simplify the method of making connections in lamps of this character by bringing the filament and the leading-in wire into contact, passing electric current through the joint and simultaneously applying sufficient pressure to cause the refractory fila-

ment to sink into the leading-in wire, which is of lower melting point and is rendered locally plastic by the electrically generated heat. The apparatus and the manipulations employed are similar to those which are used in ordinary electric welding, but, in the present case, the filament is not welded to or alloyed with the leading-in wire, but is merely embedded within it, either wholly or in part. This is indicated by the fact that, assuming nickel and tungsten to be the metals employed, the nickel may afterward be dissolved away from the tungsten with acid, when the tungsten appears perfectly smooth and free from pits. The unalloyed character of the joint is also shown by the fact that microscopic sections through such joints show sharp lines of demarcation between the two metals. However, although no actual welding takes place in the practice of my process, the joints produced are sufficiently strong to withstand severe shocks and stresses and will not become separated in the ordinary handling and use of the lamp.

Any suitable apparatus may be employed for carrying out my process, the essential parts of such apparatus, as diagrammatically shown in Fig. 2, consisting of a pair of pressure jaws 3 and 4 adapted to clamp the ends of the wires 1 and 2 between them and to apply pressure to the joint, the jaws being made of conducting material and being connected by means of conductors 5 and 6 to the terminals of a current generator 7 or other source of electric energy. A switch 8 is provided for controlling the welding circuit.

The above-described method, in addition to producing strong and permanent connections, avoids the twisting of the filament which is a necessary incident to other methods of making these connections, and which may cause distortion of the filament during burning.

My invention is not only applicable to the attachment of tungsten filaments to leading-in wires, but may also be employed for joining conductors of other refractory materials to terminals of any relatively soft metal. It should also be observed that my invention is not confined to the manufacture of lamps of the specific type and construction shown in the drawing, but may be applied to any incandescent lamps having refractory fila-

ments and leading-in wires of less refractory metal. It is therefore to be understood that the materials and process steps specifically described herein are merely illustrative and that no limitations are to be imposed upon my invention except such as are indicated in the appended claims.

I claim as my invention:

1. The method of attaching incandescent filaments of refractory metal to terminal wires of a metal of lower melting point that comprises pressing the filament and the wire together and simultaneously passing an electric current through the joint.

2. The method of making incandescent electric lamps that comprises attaching a tungsten filament to a leading-in wire of less refractory metal by pressing the filament and the wire together and simultaneously passing an electric current through the joint.

3. The method of making incandescent electric lamps that comprises pressing together a tungsten filament and a nickel leading-in wire, and simultaneously passing electric current through the joint.

In testimony whereof, I have hereunto subscribed my name this 19 June 1916.

MILTON A. HOYT.