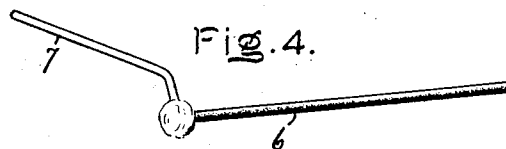
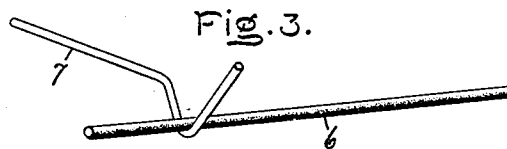
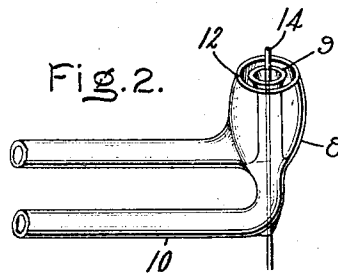
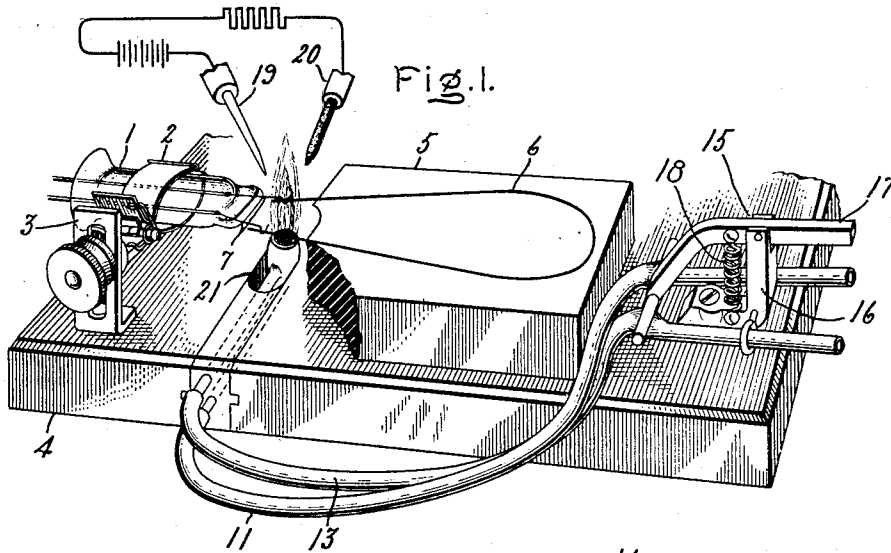


W. C. ARSEM.
MANUFACTURE OF METAL FILAMENT LAMPS.
APPLICATION FILED MAR. 16, 1907.

903,826.

Patented Nov. 17, 1908.



Witnesses:
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UNITED STATES PATENT OFFICE.

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MANUFACTURE OF METAL-FILAMENT LAMPS.

No. 908,826.

Specification of Letters Patent.

Patented Nov. 17, 1908.

Application filed March 16, 1907. Serial No. 362,617.

To all whom it may concern:

Be it known that I, WILLIAM C. ARSEM, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Manufacture of Metal-Filament Lamps, of which the following is a specification.

Lamp filaments of such refractory material as tungsten, molybdenum, boron, and similar elements can be advantageously connected to leading-in conductors or support wires by a fused or welded joint. Such a joint furnishes a secure connection to the filament and is entirely free from any carbonaceous or vaporizable material which might disintegrate under the heating action of the incandescent filaments and might act injuriously on the metal thereof.

According to my present invention, a fused or welded joint may be made in a convenient and economical manner without the use of costly or elaborate apparatus.

The implements whereby the joint is produced possess certain novel features, and are hereinafter described in detail.

During the fusing or welding operation electrical energy is applied to the junction of the filament with its leading-in or support wire, and this energy is sufficient to melt down a portion of the wire and produce a globule of metal surrounding and in intimate contact with the filament. When the globule cools, a tight joint of high electrical conductivity is produced. Such metals as tungsten are readily oxidized and must be protected from the deteriorating action of the arc when the weld is made. I find that this difficulty may be overcome by projecting a jet of reducing gas, such as hydrogen, directly on the joint so that the jet incloses all those parts of the filament which come in contact with the arc or with the highly heated metal fused by the arc. The cooling action of the jet insures a rapid solidifying of the fused metal after the arc is interrupted. It also assists in controlling the length and location of the arc. I find that the reducing gas, such as hydrogen, will not take fire provided it is surrounded by a jet of carbon dioxid or its equivalent. These gaseous jets may be small and may be in operation only while the joint is under treatment. The consumption of gas is small and its use does not

in any way interfere with the manipulation of the welding instruments or electrodes.

The accompanying drawing illustrates all the apparatus necessary in applying my improved method, though for some complex lamp structures, as when a plurality of filaments are mounted on a single stem, the arrangement might be somewhat modified to secure greater ease in the successive fusion of joints. Such modifications are obvious and require no illustration.

Figure 1 is a perspective view illustrating the welding operation; Fig. 2 is a perspective of a combined welding electrode and gas distributor; Fig. 3 shows the position of the filament before the welding operation, and Fig. 4 shows the finished weld.

In Fig. 1 a lamp stem 1 is detachably held in a spring pressed clip 2 adjustably mounted on a slotted standard 3. The standard is secured to a base block 4 of wood or other suitable material. A block of insulation 5, such as hard rubber, is placed on the base block and serves as a support for a metal filament 6, during the operation of welding that filament to the leading-in wires 7 of the lamp stem. These leading-in wires may be of platinum each bent into a hook forming a seat for the tungsten filament as illustrated in Fig. 3. The vertical adjustment of the lamp stem 1 permits accurate adjustment of the filaments on the hooks of the wires. A gas projector 8 is arranged below the junction of filament and wire and serves to supply concentric jets of gas to the joint during the welding or fusing operation. This jet deflector consists of a central nozzle tube 9 communicating through a glass tube 10 and a rubber tube 11 with a suitable source of hydrogen or other reducing gas. Around this central nozzle 9 is a larger nozzle 12, disposed to form an annular discharge opening through which an inert gas such as carbon dioxid may be projected to envelop the jet of hydrogen. The carbon dioxid may be supplied through tube 13. Fig. 2 shows the gas projector as provided with a central platinum wire 14, but this wire is not necessary when the welding operation is carried out as illustrated in Fig. 1. A suitable valve mechanism 15 may be provided for simultaneously controlling the flow of gas through the rubber tubes 11 and 13. As illustrated, this valve mechanism

ism consists of a brass standard 16 mounted on the base block and carrying a pivotally supported lever 17, the end of which is held down tightly on the rubber tubes by a coiled spring 18. When the welding operation is performed, this valve is opened to permit the passage of gas from the nozzles 9 and 12. Two electrodes 19 and 20 are used for drawing the arc which produces the weld. These electrodes may be of platinum or carbon and supplied with energy from a battery or other suitable source.

To form the weld, the electrode 19 is placed in contact with the leading-in wire 7 and electrode 20 is touched to the end of the hook in which the filament is seated. The electrode is then withdrawn to produce a welding arc which fuses up the hook and produces a globule of melted metal completely inclosing and in intimate contact with the metal of the filament. The hydrogen jet projected by nozzle 9 quickly cools the globule of fused metal, it also prevents the arc from drawing out to an undue length, and prevents oxidation or other deterioration of the filament or of the leading-in wire during the sealing operation. The outer jet of carbon dioxid projected from nozzle 12 prevents ignition of the hydrogen. After the weld is completed at one joint the gas projector is moved outward in the slot 21 and placed immediately beneath the second joint.

It is sometimes convenient, as when the lamp structure is complicated, to combine one of the welding electrodes with the gas projector so that the projector and electrode may be manipulated simultaneously with one hand. Fig. 2 illustrates the electrode thus arranged. This arrangement has the further advantage that the welding arc is of necessity produced directly in the center of the hydrogen jet and at the proper distance from the nozzle. This feature is of importance when the welding operation is to be carried out commercially on a large scale and by cheap labor. If the lamp structure is complicated, as for instance when the lamp includes a plurality of loops, this combined electrode and gas deflector is

of great convenience in welding the several joints of the structure. The lamp filaments and other parts may be assembled in the open air and may remain stationary while the welding electrode and its inclosing jets are moved from one joint to another.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. The method of joining a filament to a conductor which consists in electrically heating the joint and simultaneously projecting thereon a jet of reducing gas inclosed in a jet of inert gas.

2. The method of joining a refractory metal filament to a conductor, which consists in electrically fusing a portion of said conductor about said filament and simultaneously projecting on the fused parts a jet of reducing gas inclosed in a jet of inert gas.

3. The method of protecting a metal filament from deterioration in the presence of an electric arc, which consists in locally applying a jet of reducing gas enveloped in a jet of inert gas.

4. The method which consists in arranging a metal lamp filament in proximity to a metal wire, directing a jet of inert gas on a portion of said filament, projecting a jet of reducing gas under cover of said inert gas, and drawing an arc in the center of said reducing gas to melt down a portion of said metal wire and join the wire to the filament.

5. An implement for fusing metal lamp filaments to conductors, consisting of concentrically arranged nozzles, and an electrode projecting from one of said nozzles.

6. An implement for fusing metal lamp filaments to conductors, comprising an electrode, means for projecting a jet of gas to inclose the end of said electrode, and means for projecting a jet of inert gas to inclose said jet of reducing gas.

In witness whereof, I have hereunto set my hand this 14th day of March, 1907.

WILLIAM C. ARSEM.

Witnesses:

HELEN ORFORD,
MARGARET E. WOOLLEY.