

United States Patent

Wiedenmann

[15] 3,701,921
[45] Oct. 31, 1972

[54] **ELECTRIC LAMP WITH REFRACTORY METAL COMPONENTS CONNECTED TO MOLYBDENUM FOILS**

[72] Inventor: **Hans Wiedenmann, Heidenheim, Germany**

[73] Assignee: **Patent-Treuhand-Gesellschaft fur elektrische Glühlampen mbH, Munich, Germany**

[22] Filed: **Oct. 21, 1970**

[21] Appl. No.: **82,685**

[30] **Foreign Application Priority Data**

Nov. 20, 1969 GermanyP 19 56 484.2

[52] U.S. Cl. **313/332, 287/75**

[51] Int. Cl. **H1j 5/00**

[58] Field of Search **313/332; 287/75**

[56] **References Cited**

UNITED STATES PATENTS

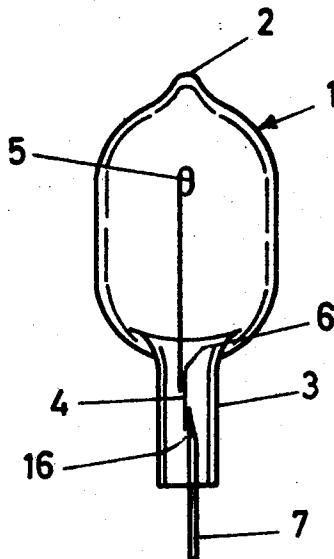
3,346,768 10/1967 Patsch 313/332 X
2,341,716 2/1944 Herdman 313/332 X

*Primary Examiner—David Schonberg
Assistant Examiner—Paul A. Sacher
Attorney—Flynn & Frishauf*

[57] **ABSTRACT**

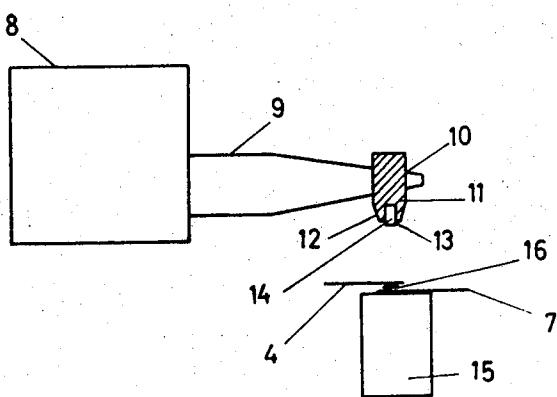
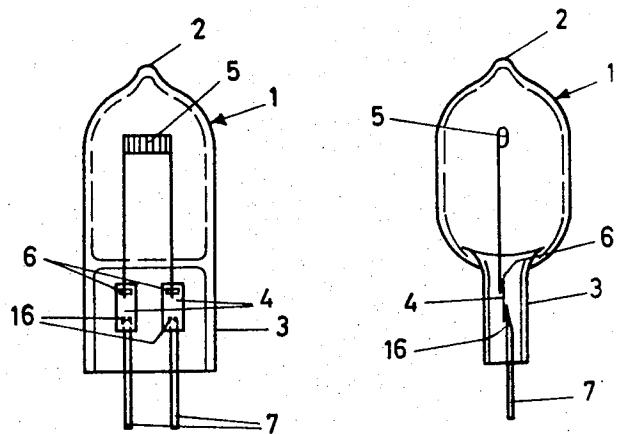
An envelope of glass of high silica content, such as quartz glass or similar, has molybdenum foils pinch-sealed into the lamp envelope. Lamp components of refractory material, such as molybdenum, or tungsten are welded to the foils, for example by ultrasonic welding, by interposition of an intermediate layer of aluminum foil, for example up to 0.1 mm. thickness.

6 Claims, 3 Drawing Figures



PATENTED OCT 31 1972

3,701,921



Hans Wiedenmann
INVENTOR

ELECTRIC LAMP WITH REFRACRY METAL COMPONENTS CONNECTED TO MOBYBDENUM FOILS

The present invention relates to an electric lamp comprising an envelope of quartz glass or some other glass of high silica content, having molybdenum foils pinch-sealed into the lamp envelope, and lamp components of a refractory metal, more particularly of molybdenum or tungsten, welded to the two ends of said foils; and to a method for producing the welds.

In lamps of this type, it is well-known to use platinum (which is expensive) as an intermediate layer to weld the lamp components to the ends of the molybdenum foils which are pinch-sealed into the lamp envelope. This known process provides a stable weld which is reliable and durable in operation of the lamps and which is heat-resistant, particularly to the high temperature occurring during the pinch-sealing of the molybdenum foils into the lamp envelope.

U.S. Pat No. 3,455,015 describes a method and device for ultrasonically welding a ductile metal such as aluminum or copper, to a hard material such as glass or other glass-like or ceramic materials, or to a metal such as tungsten or molybdenum.

Unexpectedly, it has been found that by welding the lamp components to the ends of the molybdenum foils which are pinch-sealed into the lamp envelope when using the less expensive aluminum as an intermediate layer, a weld is obtained which is equivalent to a weld with platinum as an intermediate layer, with regard to its solidity and durability during operation of the lamps. Further, the weld with aluminum possesses the same high temperature-resistance as the weld with platinum when pinch-sealing the molybdenum foils into the lamp envelope, although, as is well-known, the melting point of aluminum is considerably below the temperature which prevails during pinch-sealing of the molybdenum foils into the lamp envelope.

SUBJECT MATTER OF THE INVENTION

A lamp envelope of quartz glass or some other glass of high silica content, has molybdenum foils pinch-sealed into the lamp envelope, and lamp components of a refractory metal, more particularly of molybdenum or tungsten, are welded to the two ends of said foils. In accordance with the invention, at least the lamp components extending externally of the lamp such as lead-in wires or base pins, are welded to the pinch-sealed molybdenum foils by interposition of aluminum. Preferably, the welding is effected by ultrasonics.

The invention will be described by way of example with reference to the accompanying drawings, wherein:

FIG. 1 is a schematic vertical cross sectional view of an electric lamp such as, for instance, a halogen incandescent lamp in accordance with the invention;

FIG. 2 shows the same lamp turned about 90°; and

FIG. 3 is a schematic diagram of a welding device.

The halogen incandescent lamp 1 has a light-transmissive envelope such as quartz glass, one end of which is sealed by an exhaust tip 2 and the other end by flat

60

pinching. The lamp is filled with an inert gas such as nitrogen, and with a halogen additive such as hydrogen bromide.

Two molybdenum foils 4 are pinch-sealed into the flat pinch 3, and are welded by ultrasonics to the base pins 7 by using an aluminum foil 16 as an intermediate layer. The thickness of the aluminum foil may be up to 0.1 mm. The thickness of the molybdenum foils is about 15 to 60 μ .

The ends of a tungsten filament 5 are welded to the molybdenum foils 4 in known manner by using an intermediate layer 6 of aluminum. The aluminum may be used in form of a foil or as a powder, which is formed to a paste by a volatile vehicle. The welding of the filament ends to the molybdenum foils 4 is effected by ultrasonics.

FIG. 3 is a schematic view of an ultrasonic generator 8 with a mechanical amplitude transformer, or horn 9, for instance of steel. The horn has a bore 10, into which a cylindrical body 11, for instance of steel, with a frustoconical tip 12 is inserted. A hard body 14 consisting for instance of sintered alumina, with a particle size of from 3 to 5 μ , is pressed into a bore 13 of tip 12.

For producing the weld, the flat pinched end portion of the base pin 7 is laid on an anvil 15 of hard metal. An aluminum foil 16 is located on the base pin, and thereon the molybdenum foil 4. Instead of an aluminum foil, aluminum powder mixed with ethanol to form a paste may also be used. The molybdenum foil and the base pin are overlapping by up to approximately 5 mm. Then the components are welded by ultrasonics at a horn pressure of 25 - 40 kg/cm².

The rough surface of the alumina body 14 prevents gliding of the horn tip on the molybdenum foil during operation.

I claim:

1. In an electric lamp having an envelop of glass of high silica content, molybdenum foils (4) pinch-sealed into the lamp envelope, and elements of a refractory metal welded to the ends of said foils,

the improvement comprising

aluminum interposed, at the weld, between the pinch-sealed molybdenum foils and at least the elements extending externally of the lamp.

45 2. Lamp according to claim 1, wherein the interposed aluminum is a layer of aluminum foil of up to 0.1 mm. thickness.

3. Lamp according to claim 1, wherein the thickness of the pinch-sealed molybdenum foils is about 15 to 60 μ .

50 4. Lamp according to claim 1, wherein the lamp has internally positioned elements and aluminum is interposed in welds between the pinch-sealed molybdenum foils and the elements positioned internally of the lamp.

5. Lamp according to claim 1, wherein the elements of refractory metal include molybdenum and tungsten.

6. Lamp according to claim 1, wherein the elements of refractory material include lead-in wires or base pins.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,701,921

Dated October 31, 1972

Inventor(s) Hans WIEDENMANN

It is certified that error appears in the above-identified patent
and that said Letters Patent are hereby corrected as shown below:

Page 1, below the heading

"[30] Foreign Application Priority Data"

change "November 20, 1969" to --November 10, 1969--;

Signed and sealed this 10th day of July 1973.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

Rene Tegtmeyer
Acting Commissioner of Patents

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,701,921 Dated October 31, 1972
Inventor(s) Hans Wiedenmann

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Page 1, below the heading

"[30] Foreign Application Priority Data"

change "Noyember 20, 1969" to -- November 10, 1969 --.

Claim 1, line 1, change "envelop" to -- envelope --.

This certificate supersedes Certificate of Correction issued July 10, 1973.

Signed and sealed this 27th day of November 1973.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

RENE D. TEGTMAYER
Acting Commissioner of Patents