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[56]

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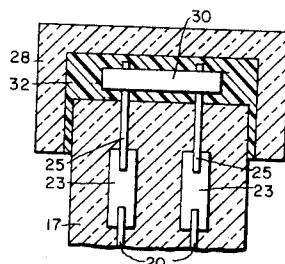
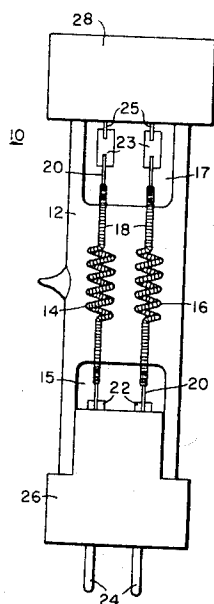
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[54] **SINGLE-ENDED INCANDESCENT PROJECTION LAMP HAVING DUAL SERIES-CONNECTED FILAMENTS AND AN INTEGRAL GRIPPING CAP**
6 Claims, 3 Drawing Figs.

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313/217
 [51] Int. Cl..... **H01j 5/48,**
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272, 273, 274, 275, 276, 277, 278, 279, 318, 331,
217, 315, 316

ABSTRACT: A pair of elongated filaments, preferably of coiled coil construction, are suspended in side-by-side longitudinally-extending relationship within a tubular quartz envelope that contains a halogen gas and is closed at each end by a press seal. The filaments are connected in series with each other by a short-circuiting conductor that is located either within or exterior of the envelope. The press seal which constitutes the top of the envelope is provided with a cap of insulating material which serves both as a protective enclosure for that end of the lamp and means for gripping the lamp during insertion and withdrawal from its socket.



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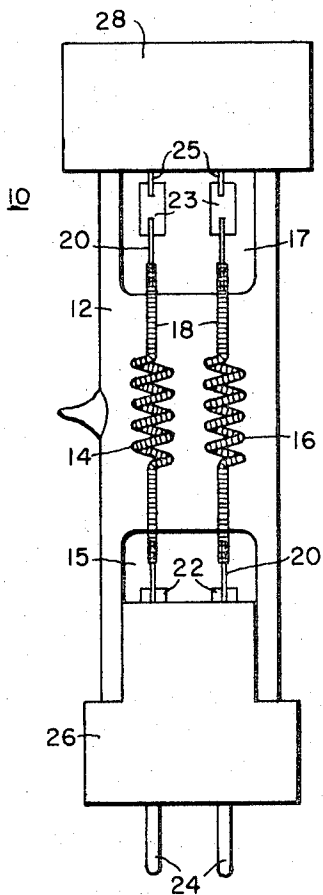


FIG. 1.

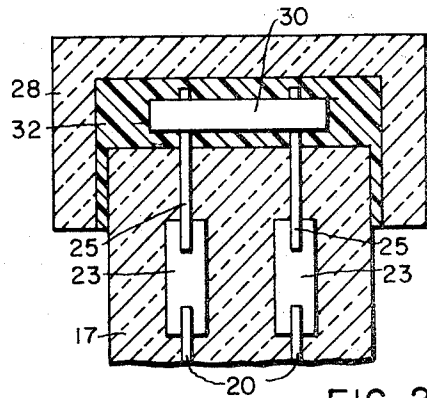


FIG. 2.

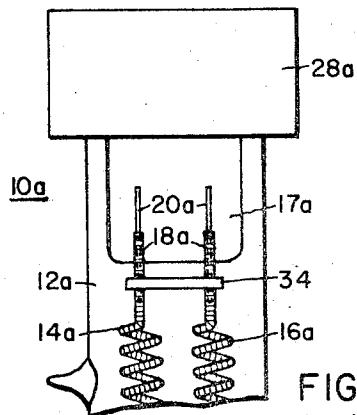


FIG. 3.

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SINGLE-ENDED INCANDESCENT PROJECTION LAMP HAVING DUAL SERIES-CONNECTED FILAMENTS AND AN INTEGRAL GRIPPING CAP

CROSS-REFERENCES TO RELATED APPLICATIONS

The subject matter of this application is an improvement over the invention disclosed and claimed in pending U.S. application, Ser. No. 716,822, filed Mar. 28, 1968, by James J. Palermo et al. now U.S. Pat. No. 3,496,403.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to electric lamps and has particular reference to an improved single-ended incandescent lamp that is adapted for use in slide and movie projectors.

2. Description of the Prior Art

Compact single-ended incandescent projection lamps having multisection coiled filaments that are suspended within an envelope by support members which engage the domed end of the envelope or by a supporting bridge structure that is attached to rigid lead wires anchored in the sealed end of the envelope are well known in the art. A single-ended lamp of this type having a coiled coil filament of CC2V configuration that is suspended within the envelope by a resilient wire support loop that engages the domed end of the lamp is disclosed in the aforesaid pending application Ser. No. 716,822 of Palermo et al. now U.S. Pat. No. 3,496,403, which application is assigned to the assignee of the present application. A compact single-ended lamp having a monoplane or biplane-type filament that is suspended within the lamp envelope by a bridge-type supporting structure is disclosed in pending application Ser. No. 859,531 filed May 2, 1969, by A. A. Bottone et al., which application is a continuation of application Ser. No. 641,250 filed May 25, 1967 and is also assigned to the assignee of the present application.

While lamps having such filament-supporting structures achieve the desired objective of suspending the multisection filaments in the desired position within the envelopes, the filament support structures are quite complicated and are thus difficult and expensive to assemble. Such single-ended lamps have an additional shortcoming in that they could only be inserted into and withdrawn from the lamp socket by gripping the top of the lamp envelope. In the case of halogen type lamps having quartz envelopes, such handling is undesirable since it frequently leaves fingerprints or smudges on the envelope which are subsequently etched into the surface of the hot quartz when the lamp is operated.

SUMMARY OF THE INVENTION

It is accordingly the general object of the present invention to provide an improved single-ended incandescent lamp which avoids the aforementioned prior art problems and deficiencies.

A more specific object of the invention is the provision of a compact single-ended incandescent lamp that contains a concentrated multisection filament which is suspended within the lamp envelope by a structure which is simple and economical to manufacture.

Still another object is the provision of an improved single-ended projection lamp of the halogen type which has a simplified filament-supporting structure and provides means for handling and socketing the finished lamp without touching the lamp envelope.

The foregoing objects and other advantages are achieved in accordance with the present invention by employing a tubular envelope that is closed at each of its ends by a press seal and by utilizing such press seals to suspend a pair of separate coiled coil filaments in parallel side-by-side relationship within the envelope to provide a 2CC8-type mount. The filaments are supported in such position by anchoring their coiled legs in the respective press seals. The filaments are connected in series with one another by a short-circuiting conductor that is

connected to the adjacent coiled legs of the filaments within the lamp envelope or to the exposed ends of lead-in conductor assemblies that are embedded in the press seal which constitutes the top of the lamp envelope. A ceramic cap is attached to the press seal located at the top of the envelope and serves both as a protective enclosure for this end of the lamp and as a gripping member by which the lamp can be handled and inserted into and withdrawn from its socket. The improved lamp is thus very rugged and can be economically manufactured since it does not require the complicated filament-supporting structures of the prior art and utilizes an envelope that has press seals at each of its ends, which construction is employed in conventional double-ended tubular lamps of the halogen type.

BRIEF DESCRIPTION OF THE DRAWING

A better understanding of the invention will be obtained by referring to the accompanying drawing, wherein:

FIG. 1 is a front elevational view of an improved compact dual-filament single-ended incandescent projection lamp which embodies the present invention;

FIG. 2 is an enlarged cross-sectional view through the capped end of the lamp shown in FIG. 1, illustrating the disposition of the exterior short-circuiting conductor within the cap member; and

FIG. 3 is a fragmentary front elevational view of the capped end on an alternative lamp embodiment wherein the short-circuiting conductor is located within the lamp envelope.

DESCRIPTION OF THE PREFERRED EMBODIMENT (FIGS. 1 and 2)

In FIG. 1 there is shown a compact 300 watt T4 single-ended incandescent projection lamp 10 which embodies the invention and comprises a tubular envelope 12 that is composed of quartz or a suitable high melting point glass such as "Vycor" glass and contains a pair of coiled coil filaments 14, 16 that are suspended in parallel side-by-side relationship on opposite sides of the longitudinal axis of the envelope. The envelope 12 is closed at each end by press seals 15 and 17 and the filaments 14, 16 are held in the aforesaid position by anchoring the ends of the respective coiled legs 18 of the filaments within the press seals. Each of the filament legs 18 is provided with a wire insert 20 that is composed of a suitable refractory metal such as molybdenum or tungsten and is electrically connected to the enclosing leg as by spot welding. The inserts 20 attached to the coiled legs 18 located at the basal end of the lamp 10 are electrically connected, as by spot welding, to ribbon conductors 22 that are embedded in the press seal 15 and have outer lead wires (not shown) attached to their outermost ends. The exposed ends of these outer lead wires are connected to a pair of rigid terminal pins 24 which are fastened to and extend longitudinally from a ceramic base member 26 that is attached to the press seal 15 by a suitable high-temperature cement (not shown).

The coiled legs 18 at the opposite ends of the filaments 14, 16 are connected through their wire inserts 20 to a second pair of ribbon conductors 23 which are embedded in the press seal 17 and provided with a pair of adjoined outer lead wires 25 that are anchored in and extend beyond the seal. A ceramic cap 28 is attached to the press seal 17 and thus serves both as an enclosure for the top of the lamp 10 and the protruding portions of the outer leads 25 and as a means for gripping the lamp 10 without touching the envelope 12.

As shown in FIG. 2, the exposed ends of the outer lead wires 25 are electrically connected by a short-circuiting conductor 30 so that the filaments 14, 16 are connected in series with one another and thus provide a 2CC8 filament mount structure. As will be noted in FIG. 2, the ceramic closure-gripper cap 28 is attached to the press seal 17 by a suitable high-temperature cement 30 (such as a cement which is commercially available and known in the trade as "Sauereisen" No. 31) and is of hollow rectangular configuration so that it totally en-

closes the end of the press seal 17 and the exposed ends of the outer lead wires 25 and attached short-circuiting conductor 30. The conductor 30 according to this embodiment comprises a ribbon of suitable metal such as molybdenum that is spot welded to the protruding ends of the outer lead wires 25, which are also composed of molybdenum.

The base 26 and cap 28 are composed of a suitable high-temperature ceramic material such as steatite.

The lamp 10 is preferably of the halogen type and accordingly contains an amount of iodine, bromine or other halogen gas which is sufficient to establish a gettering cycle during lamp operation. The filaments 14, 16 and the wire inserts 20 are, in this case, fabricated from tungsten or other suitable refractory material that is not chemically attacked by the halogen atmosphere.

ALTERNATIVE EMBODIMENT (FIG. 3)

In FIG. 3 there is shown an alternative lamp embodiment 10a that has the same basic structural features as the lamp embodiment 10 in that it has a tubular envelope 12 that is closed at each end by press seals and contains a pair of parallel-spaced series-connected coiled coil filaments 14a and 16a. Lamp 10a, however, has a modified short-circuiting arrangement. As illustrated, the filaments 14a and 16a are electrically connected in series according to this embodiment by a short-circuiting conductor 34 that is attached, as by spot welding, to the portions of the coiled legs 18a of the respective filaments that are located within the envelope 12a. The outer ends of the legs 18a are embedded in the press seal 17a along with their wire inserts 20a. The short-circuiting conductor 34 is, accordingly, located within the envelope 12a. The outer end of the press seal 17a that is cemented to the ceramic cap 28a is thus devoid of any ribbon or lead-in conductors and constitutes a solid piece of quartz or glass.

It will be appreciated from the foregoing that the objects of the invention have been achieved in that a compact single-ended incandescent lamp has been provided which includes a multisection coiled filament structure which is suspended within the lamp envelope without the complicated and expensive bridge or supporting assemblies heretofore employed in lamps of this type. The manufacturing cost of the improved lamp is further reduced by employing press seals at each end of the envelope and by connecting the ends of the filament together with the short-circuiting member so that the separately formed filaments operate in series with one another. The dual purpose closure-and-gripping cap affords advantageous functional features and improves the appearance of the finished lamp.

While several embodiments have been illustrated and described, it will be appreciated that various changes can be made in the arrangement and configuration of the lamp components without departing from the spirit and scope of the invention. For example, it is within the scope of the invention to attach the short-circuiting member to the portions of the coiled legs of the filaments that are embedded in the associated press seal so that such member would also be embedded in the press seal instead of being located within the hollow interior of the lamp envelope.

I claim:

1. A single-ended electric incandescent lamp comprising: an elongated tubular envelope that is hermetically closed at each end by a press seal;
- a pair of elongated filaments disposed in side-by-side longitudinally-extending relationship within said envelope;
- means holding said filaments in such position comprising (a) a pair of spaced lead-in conductor assemblies that are fastened to adjacent ends of said filaments and extend through one of said press seals, and (b) a pair of spaced rigid support members that are fastened to the opposite

ends of said filaments and are anchored in the other of said press seals;

a base member attached to the press seal from which said lead-in conductor assemblies extend;

a pair of terminals carried by said base member and connected to the protruding ends of said pair of lead-in conductor assemblies;

means short-circuiting the ends of said filaments that are fastened to said support members and thereby connecting said filaments in series with one another and the respective terminals; and

a cap fastened to and at least partially enclosing the press seal opposite said base member and thereby providing a protective closure and means at that end of the envelope for gripping the lamp and inserting it into and removing it from a socket.

2. The incandescent lamp of claim 1 wherein:

said support members comprise integral parts of a second pair of spaced lead-in conductor assemblies that are embedded in and extend through the associated press seal;

said short-circuiting means comprises a conductor that is connected to the protruding ends of said second pair of lead-in conductor assemblies and is thus located outside of the lamp envelope; and

said closure-and-gripping cap is composed of insulating material and encloses the protruding ends of said second pair of lead-in conductor assemblies and the associated short-circuiting conductor.

3. The incandescent lamp of claim 1 wherein said short-circuiting means comprises a conductor that is connected to the ends of the filaments that are fastened to the support members and said short-circuiting conductor is thus located within the lamp envelope.

4. The incandescent lamp of claim 1 wherein:

both of said filaments are of the coiled coil type and are suspended in substantially parallel relationship with one another on opposite sides of the envelope axis;

said envelope is composed of quartz and contains a halogen gas;

said base member and cap are composed of ceramic material and are attached to the respective press seals by cement; and

said terminals comprise a pair of rigid pins that extend longitudinally from said base member.

5. The incandescent lamp of claim 4 wherein:

said support members comprise wire inserts that extend into and are connected to the coiled legs of the respective coiled coil filaments and have their opposite ends connected to a pair of ribbon conductors that are embedded in the associated press seal;

a pair of outer lead wires are connected to the respective ribbon conductors and are anchored in and extend beyond the associated press seal;

said short-circuiting means comprises a conductor that is fastened to the protruding ends of said outer lead wires and said short-circuiting conductor is thus located outside the lamp envelope; and

said cap encloses the protruding ends of said outer lead wires and the attached short-circuiting conductor.

6. The incandescent lamp of claim 4 wherein:

said support members comprise wire inserts that extend into and are connected to the coiled legs of the respective coiled coil filaments and have their opposite ends embedded in the associated press seal; and

said short-circuiting means comprises a conductor that is fastened to portions of the coiled legs of said filaments that are connected to said wire inserts so that said short-circuiting conductor is located within said envelope.