

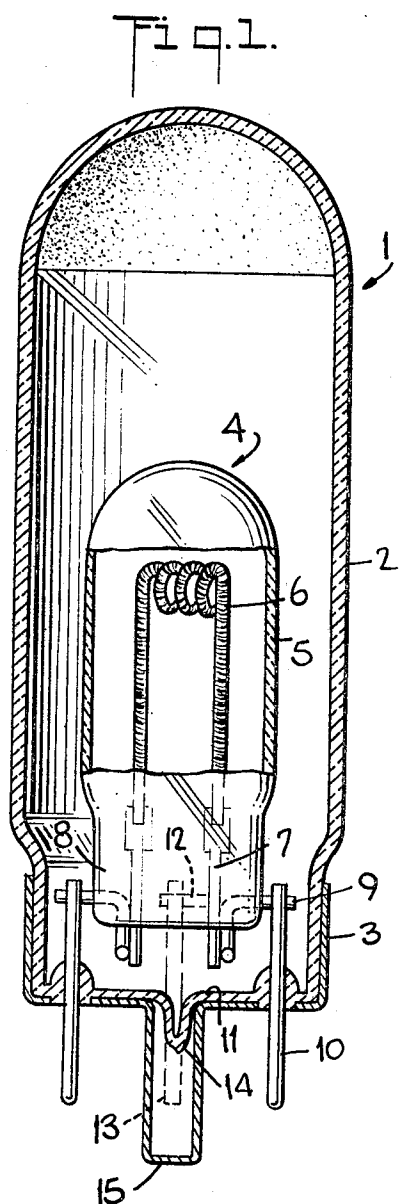
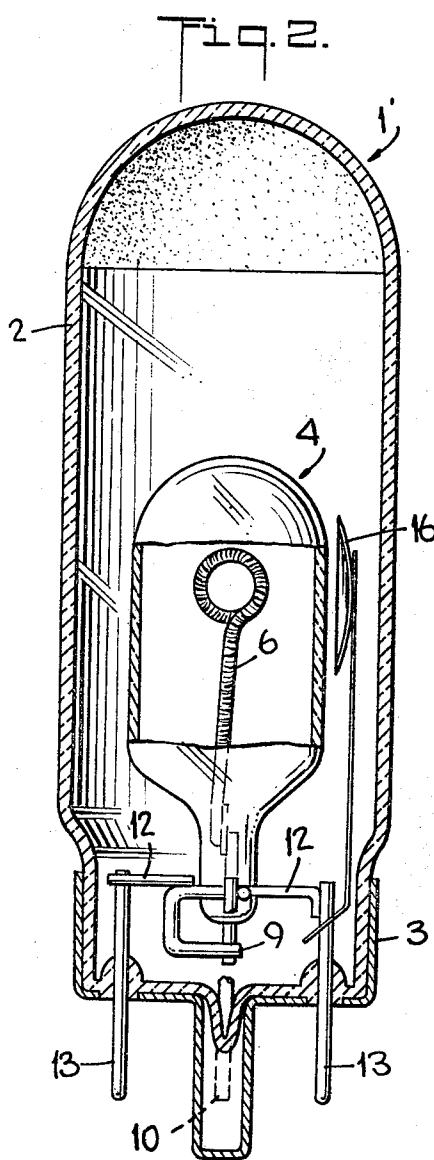
Nov. 18, 1969

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3,479,548

ENVELOPED QUARTZ IODINE LAMP

Filed July 6, 1966



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ENVELOPED QUARTZ IODINE LAMP

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Filed July 6, 1966, Ser. No. 563,243

Int. Cl. H01j 5/16, 61/40

U.S. Cl. 313-113

1 Claim

ABSTRACT OF THE DISCLOSURE

A tubular quartz iodine projection lamp that has a halogen regenerant, which is surrounded by a protective glass envelope and which has a reflector element in the space between the lamp and envelope, said space being either partially evacuated or filled with an inert gas.

The present invention relates to an improved high intensity lamp of the type used in picture projectors or similar devices and more particularly to an improved incandescent lamp of the type known as an iodine cycle lamp.

An incandescent lamp has previously been developed having a high efficiency and a long life with freedom from darkening. A tungsten filament is used in a compact bulb enclosing the usual gas filling plus a quantity of a halogen serving as a regenerative getter. During operation the walls of this bulb are heated to a high temperature. Tungsten vapors which are volatilized from the hot filament and which are then normally deposited on the bulb walls combine chemically with the halogen to form a tungsten-halogen compound which migrates to the vicinity of the filament where it releases the tungsten for redeposit on the filament. The halogen then returns to the bulb walls to combine with additional tungsten deposited thereon to repeat this cycle. Lamps of this type employing iodine as the getter are disclosed for example in United States Patent No. 2,883,571, issued Apr. 21, 1959.

Such iodine lamps having a quartz envelope have been manufactured having a physical size and a wattage appropriate for use in various picture projectors such as home slide or motion picture projectors or industrial or display projectors of the same general type. These quartz iodine lamps have several advantages over the more widely used incandescent lamps of the vacuum or inert gas filled types. Quartz iodine lamps, for example, have a greater lumen to wattage ratio and this greater electrical efficiency results in a lower heat output. In addition, the quartz iodine lamps have been found to have a greater life than the regular vacuum lamps of a magnitude as much as three or four times as great. The quartz iodine lamps have also a substantially constant light output over the entire life of the lamp.

In spite of these obvious advances, these lamps are not now widely used in projectors as they have several disadvantages. These lamps, for example, have a quartz envelope which is adversely affected by normal handling. Also the temperature requirements of the tungsten halogen cycle require relatively small lamp bulbs so that these lamps are not interchangeable with the more conventional projector lamps.

A lamp made in accordance with the present invention has been found to have all of the advantages of a quartz iodine lamp in addition to the advantages of the regular type lamps. In addition, an improved reflector lamp is provided which is interchangeable with the more conventional lamps now provided as standard with most projectors so that the advantages of the quartz iodine lamp may be obtained by simply replacing the projector

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lamp and without changing the projector optical or electrical system.

A double walled lamp of this general type using a glass support for the inner bulb has been described in United States Patent No. 3,194,625, issued July 13, 1965.

As will be more fully described below, the improved lamp of this invention utilizes an envelope construction having an inner quartz envelope including a halogen such as iodine preformed and mounted on a stable metallic support structure, and spaced inwardly from an outer protective glass envelope. As will also be described further below, the improved lamp structure and metallic mounting adapts itself to the addition of a reflector element positioned between the quartz envelope and the outer glass envelope where it is protected from direct exposure to the relatively high filament temperature.

In addition to combining the best features of the two lamp systems as described above, an additional increase in lamp life may be obtained where a vacuum is drawn between the inner and outer envelopes or where an inert gas is injected into the space between the envelopes.

Accordingly, an object of the present invention is to provide an improved projector lamp.

Another object of the present invention is to provide an improved projector lamp of the quartz iodine type.

Another object of the present invention is to provide a quartz iodine lamp having increased life.

Another object of the present invention is to provide a more rugged quartz iodine lamp not injured by normal handling.

Another object of the present invention is to provide a high efficiency lamp of the quartz iodine type which is interchangeable with standard vacuum or inert gas lamps.

Another object of the present invention is to provide an improved double envelope lamp construction and method of assembly and an improved reflector mounting arrangement in such a lamp.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claim, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a vertical sectional view of a preferred embodiment of a lamp in accordance with the present invention; and

FIG. 2 is a vertical sectional view of another embodiment of an improved reflector-type lamp in accordance with the present invention.

As illustrated in the drawing, the improved lamp 1 in accordance with the present invention comprises an outer glass envelope 2 sealed at its lower end and attached to a suitable base 3 permitting the lamp to be inserted in a conventional projector lamp socket. The general outline of the glass envelope 2 and of the metal base 3, as illustrated, are typical of projector lamps now in general use. The use of such a standard base 3 is preferable as it makes the improved lamp interchangeable with presently used lamps.

An inner iodine cycle lamp 4 is provided having a glass envelope 5 formed of natural or synthetic quartz to permit it to operate at the higher temperatures used in the iodine cycle lamps. The lamp 4 includes a suitable tungsten filament 6 mounted upon lead-in wires 7 embedded in the lower sealed end 8 of the lamp 4.

The lamp 4 is a high intensity incandescent lamp operating with the above described halogen regenerative

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cycle such as a tungsten iodine cycle as described in the above Patent No. 2,883,571. For this purpose, its envelope 5 contains an inert gas such as nitrogen plus a small quantity of iodine to keep the inner walls of the envelope 5 free of blackening tungsten deposits. The lead-in wires 7 of this lamp have support wires 9 welded or otherwise attached thereto. These support wires 9 are shaped to include an anchoring portion adapted to be welded or otherwise attached to the generally vertical lead-in conductors 10 sealed in the base portion 11 of the outer glass envelope 2.

In order to stabilize and mount the inner lamp 4 within the envelope 2, additional support wires 12 may be provided between either the lead-in wires 7 or the support wires 9 for the lamp 4 and additional spaced lead-in conductors as illustrated at 13.

In the assembly of the lamp 1, the base portion 11 including an exhaust tube whose remaining pinched-off portion is illustrated at 14 is first provided having the several lead-in conductors 10 and 13 embedded therein. The assembled inner lamp 4 may now be attached to the lead-in conductors 10 and 13 with the support wires 9 and 12. This assembly of the base 11 and the lamp 4 may now be inserted within the outer envelope 2 which is then fused to the base portion 11.

As already indicated above, unexpectedly increased lamp life has been experienced during tests where a partial vacuum was formed between the inner lamp 4 and the outer envelope 2 or where the air in this space is replaced by an inert gas such as nitrogen. The partial vacuum may be drawn or the nitrogen atmosphere provided through an exhaust tube on base 11 which is then tipped off and sealed as illustrated at 14.

The base 3 is now attached, as illustrated, to the lower portion of the assembled lamp 1 including the locating pin 15.

An alternate embodiment is illustrated at 1' in FIG. 2 in which the efficiency of the lamp 1 is further increased by the addition of a reflector element 16 mounted on a lead-in conductor 13 as illustrated. A further increased efficiency is obtained where the reflector element is made concave so as to form an image of the filament in its own plane thus filling the gaps between filament coils. A deflector 16 thus positioned between the spaced envelopes has been found to be particularly effective and to have an increased efficiency over a reflector where no additional envelope is provided between the reflector 16 and the hot filament 6.

It will be seen that an extremely useful and greatly improved high-intensity projector-type lamp has been described which combines the high efficiency and long life of a halogen cycle lamp such as a quartz iodine lamp with the ruggedness of standard incandescent lamps. The improved lamp is relatively easily manufactured and is readily provided in a form interchangeable with the presently used lamps for similar applications.

As various changes may be made in the form, con-

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struction, and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. A high efficiency vertical mounting halogen tungsten cycle lamp comprising the combination of an inner quartz envelope having a rounded upper end and a lower end of reduced cross section, an incandescible tungsten filament in said envelope having a closely spaced light concentrating portion adjacent to the rounded upper end, spaced metal supports passing through and hermetically sealed into the lower end of said quartz envelope with their inner ends supporting said filament, an outer glass envelope having a rounded upper end and tubular side portions which are transparent to light rays and surrounding said quartz envelope and spaced therefrom and having their central portion on a level with said light concentrating portion of said filament, said outer envelope including a generally cylindrical base with a flat circular end having three or more metal lead-in wires hermetically sealed therein and having their inner ends spaced from one another in a none linear array within said outer envelope and their opposite ends extending outwardly thereof for engaging a socket, said lead-in wires and said supports being rigidly connected together for positioning and supporting said quartz envelope within said outer glass envelope and for energizing the filament, a filling of inert gas and a halogen in said quartz envelope, a reflector means positioned opposite to said filament and between said quartz and said outer envelope, and a cup-like metal base connected to the cylindrical base and end portions of said outer envelope including a socket locating pin positioned generally centrally of the lead-in wires.

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U.S. Cl. X.R.

313—17, 25, 26, 27, 114, 115; 315—72