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**abandoned.**

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222, 315, 318; 339/144, 145

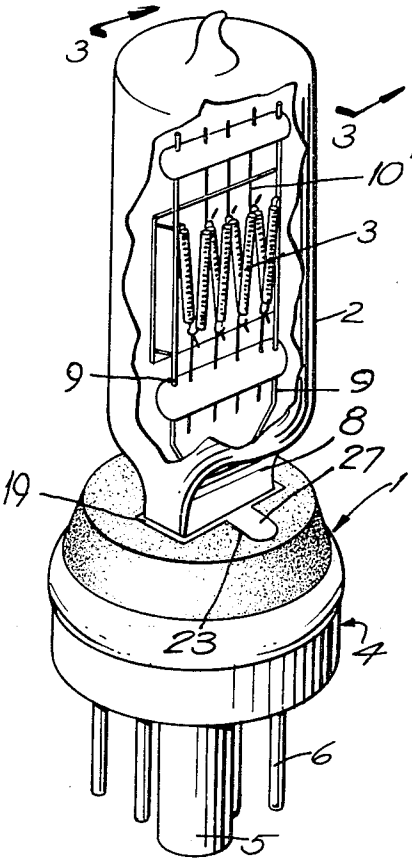
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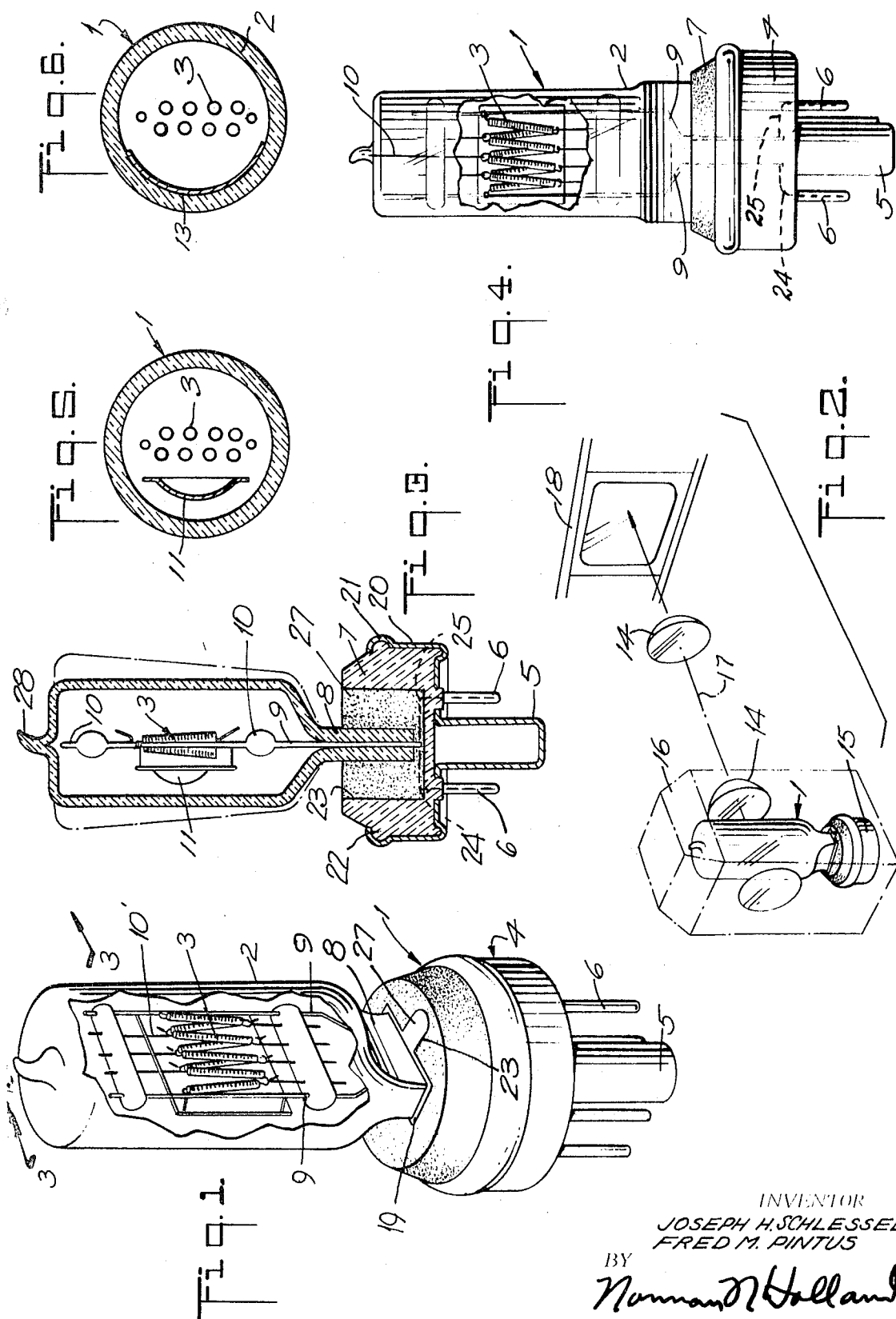
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[54] **INTERCHANGEABLE TUNGSTEN HALOGEN**  
**LAMP**  
**4 Claims, 6 Drawing Figs.**

[52] U.S. Cl..... **313/318,**  
**313/113, 313/222, 313/315, 339/144 R**  
[51] Int. Cl..... **H01j 5/48**

**ABSTRACT:** An incandescent lamp of the type known as a halogen cycle lamp having a quartz envelope selectively positioned in a supporting base of the socket-type having a centering and stabilizing pin and surrounding electric prongs and formed for use interchangeably in sockets adapted for regular incandescent lamps.





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**INTERCHANGEABLE TUNGSTEN HALOGEN LAMP**

This application is a continuation of application, Ser. No. 816,843 filed Apr. 16, 1969 which was a continuation of application, Ser. No. 611,417 filed Jan. 24, 1967, both of which are now abandoned.

**SUMMARY**

The present invention relates to an improved lamp of the type used for forming a high-intensity light beam in a picture projector or similar device and more particularly to an improved halogen cycle lamp adapted for interchangeable use with regular incandescent lamps in such devices.

A recently developed special type of incandescent lamp known as a quartz iodine or tungsten halogen lamp is being used for film projectors and other devices having both a longer lamp life and a reduced aging or darkening effect as compared with regular vacuum-type incandescent filament lamps.

Heretofore the special requirements of these lamps and particularly the shape and mounting and handling of the special quartz or high-silica glass envelopes have required special lamp base designs dissimilar to the prior more conventional lamps. The tungsten halogen lamps have also required specially designed lamp housings and optical systems.

It has now been found desirable to make use of the advantages of these lamps in home-style and other picture projectors and similar devices which are produced in great quantities. This has been done heretofore by designing special projector lamp mountings and optical systems for the tungsten halogen lamps. This has prevented these lamps from being used in existing projectors without modifications or adapters and has also prevented the new lamps from being used interchangeably in the devices both by projector owners and by projector manufacturers. It has been found particularly desirable, for example, for projector manufacturers to produce a projector which may be distributed for certain uses with conventional incandescent lamps and which may be distributed without change for other applications including the halogen cycle or tungsten halogen lamps or for use interchangeably with either the regular lamps or the newer lamps.

The tungsten halogen lamp of the present invention is suited by its particular structure and method of formation to have both an overall effective size and a mounting base equivalent to and interchangeable with the regular incandescent projection lamps, such as those identified in the lampmaking industry as the 500-watt CZA lamp or the 500-watt DAK lamp and others. The lamp in accordance with the invention may also be made in a variety of wattage and voltage ratings with no change in mounting and for use in the same devices interchangeably with such 500-watt lamps, as the tungsten halogen lamps of as high as 1,000-watt rating will operate satisfactorily in a cooling system normally used for the 500-watt regular incandescent lamps.

The lamp in accordance with the present invention employs a tungsten filament in a heat resistant quartz or high silica heat resistant envelope which will operate satisfactorily at 600° C. or higher. The envelope is filled with the usual gas filling plus a quantity of a halogen which serves as a regenerative getter. Tungsten vapors which are volatilized from the hot filament, and which are in a regular incandescent lamp 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 of the filament. The halogen is then free to combine with additional tungsten to repeat this cycle. Lamps of this type employing iodine as the getter are disclosed, for example, in U.S. Pat. No. 2,883,571 issued Apr. 21, 1959.

Accordingly an object of the present invention is to provide an improved high intensity lamp of the type used in picture projectors and the like.

Another object of the present invention is to provide a lamp of the quartz iodine or tungsten halogen type which is fully interchangeable with prior lamps and particularly with prior prefocused lamps having keyed pin-type bases.

Another object of the present invention is to provide an iodine cycle or tungsten halogen lamp for use with a keyed lamp base and adapted for being precisely focused or optically oriented during lamp assembly.

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 claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A further 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 perspective view particularly cut away of a preferred embodiment of the lamp in accordance with the present invention;

FIG. 2 is a diagrammatic view illustrating a preferred embodiment of a lamp in accordance with the present invention in a typical projector optical system;

FIG. 3 is a vertical section of the lamp taken along line 3—3 of FIG. 1;

FIG. 4 is a front-elevation view partially cut away of the lamp of FIG. 1; and

FIGS. 5 and 6 are horizontal sectional views through the filament portions of lamps illustrating two embodiments of reflecting elements.

The lamp will now be described with particular reference to FIG. 1 and the other figures as indicated. The lamp 1 comprises a temperature resistant transparent envelope 2 such as a high silica glass or quartz envelope capable of withstanding temperatures in excess of 600° C. The envelope 2 contains a tungsten filament 3 and is designed to operate as a tungsten halogen lamp in the manner described above for the tungsten halogen or quartz iodine cycle. As indicated, this cycle is obtained by placing the walls of the envelope 2 in close proximity to the filament 3 for operation at higher than normal temperatures and by including a halogen such as iodine in the atmosphere in the envelope 2 so that the iodine acts as a getter in the tungsten halogen cycle as described above.

A preferred form of the filament 3 is shown forming a generally planar area by a zigzag two-layer arrangement of the coiled tungsten wires as illustrated at 3. This filament arrangement is mounted on support and electrical lead rods 9 using horizontal quartz or high-silica glass insulators 10 and support wires 10' to obtain the planar form and to connect the opposite ends of the filament 3 to a source of voltage through terminal pins 6 in base 4. A reflector 11 preferably is mounted with the envelope 2 and behind the filament 3 to increase the efficiency of the lamp 1 by a forward reflection of the filament light.

With the above described filament arrangement both with or without a reflector, it is desirable to obtain maximum efficiency of the lamp by a focusing or aligning operation wherein the light rays from the lamp are effectively centered and directed along the axis of the projector optical system. As will be more fully described below, the novel lamp mounting of the present invention provides for an effective initial focusing or aligning of the filament 3 and for a subsequent retention of the focusing position throughout lamp life and independently of the particular projector or system in which the lamp 1 is used.

FIG. 2 illustrates diagrammatically a lamp 1 mounted in a typical projector optical system. This system may be of the type now commonly used for the above mentioned regular incandescent projector lamps such as the CZA- or DAK-type. In such systems, a lamp socket 15 is provided at a suitable lamp housing 16. This socket 15 preferably is of the type for providing an exact positioning of the projector lamp both with respect to its height as well as the axial position of the lamp filament to obtain the advantages of prefocusing or prealigning of the lamp to provide maximum lamp intensity along the optical axis 17 of the system. The tungsten halogen lamp 1 in accordance with the invention is shown in the system in the

housing 16 adjacent to suitable and typical condenser lenses 14 and behind a transparent slide 18 which is being projected through a conventional projection lens (not shown). In the system illustrated in FIG. 2, a reflector is illustrated in the lamp housing 16 for use in systems where no reflector is provided in the lamp 1 itself. As already indicated, a preferred embodiment of the lamp includes an internal reflector 11 positioned within the envelope 2.

The preferred lamp 1 includes a mounting which facilitates the initial focusing or aligning of the lamp filaments 3 and which provides for the retention of its focusing of alignment throughout lamp life even where the lamp is used interchangeably in projector systems which may have been designed for using regular incandescent lamps.

The preferred embodiment of the lamp mounting comprises a lamp base 4 preferably having a hollow metallic outer shell 20 including an integral-keyed central guide pin 5 for orienting and firmly positioning the lamp 1 in a socket. The high-silica glass or quartz envelope 2 has a lower mounting portion of reduced cross section and normally solid as illustrated at 8 in FIG. 3 and which is inserted in a slot 19 provided in the preformed ceramic collar 7. The collar 7 is preferably formed of a heat resistant and electrically insulating material such as a ceramic of the type having a relatively low coefficient of expansion. The collar 7 may conveniently be preformed or precast in the shape desired and so that the metal shell 20 may be thereafter attached to the collar 7 as for example by having an upper bead 21 pressed or rolled against a cooperating bead 22 on the collar 7. The mounting slot 19 in the collar 7 is seen to include a central portion formed slightly larger than the cross section of the envelope 2 at its lower portion 8 and to have two projecting portions 23 to facilitate the coupling of one rod 9 by lead wire 24 to one terminal pin 6 and the other rod 9 by a lead wire 25 to another terminal pin 6. The terminal pins 6 are hollow pins to receive wires 24 and 25 and may be inserted in suitable apertures in the collar 7 being press fit, integrally molded or cemented therein. The portions 23 of the slot 19 expose the tops of the pins 6 to facilitate the insertion and attachment of lead wires 24 and 25 to rods 9 as the glass envelope 2 is inserted into the collar 7. One of the connecting lead wires 24 or 25 may be formed of fuse wire to protect the projector's lamp circuit.

As already indicated, the slot 19 in the collar is formed larger than the corresponding lower portion 8 of the transparent envelope 2. As the lamp 1 is assembled, ceramic cement 27 is inserted into this space as well as into the portions of the slot 23 above the pins 6 to complete the mounting of the envelope 2 in the collar 7. Before this cement is fully hardened, the lamp base 4 is inserted into a socket in a calibrating system and the envelope is shifted with respect to the collar 7 so that most effective use is made of the filament 3 as indicated by the light intensity showings in a lamp calibrating system which may correspond generally to the system of FIG. 2 and where the lamp envelope is adjusted to obtain the maximum concentration and best positioning of the lamp beam at the optical center 17 of the system.

It is seen that the above described improved mounting permits the envelope 2 to be moved or tilted forward and back or from side-to-side within the collar 7. Initially, the height of the completed envelope 2 within the collar is determined by moving the rods 9 of the envelope assembly down against the collar 7 base and these rods 9 are precisely cut a predetermined distance from the filaments 3 to obtain an effective initial height adjustment of the envelope 2. If necessary, the height may also be adjusted during the above described securing or

aligning operation.

FIGS. 3 and 5 illustrate an interior lamp reflector 11 having a concave reflecting area. This type of reflector is particularly effective, however, other forms may be used. FIG. 6, for example, illustrates a reflector 13 formed on the interior surface of the envelope 2. In either case, the reflector may reflect both light and heat back through the filament or the reflector may be of the dichroic-type for providing a substantial light reflection while permitting heat to pass through the reflector.

It will be seen that an improved high-intensity lamp of the tungsten halogen-type has been provided having a mounting which permits the lamp to be prefocused and aligned and to be thereafter precisely mounted in projection systems and to obtain maximum advantage of the prefocusing or aligning. In addition, a tungsten halogen lamp has been provided which is interchangeable with the present projector lamps of the incandescent-type so that the long life and more uniform life intensity characteristics of the tungsten halogen lamp may be obtained in present projectors designed for the present incandescent lamps and without modifications of their optical systems.

In addition the improved lamp may be used interchangeably by both manufacturers and users so that the advantages of the tungsten halogen lamp may be obtained when desired in otherwise conventional projectors or similar devices.

As various changes may be made in the form, construction 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 tungsten halogen projector lamp comprising:

- a. a transparent heat resistant quartz envelope of generally rectangular vertical cross section and circular horizontal cross section and terminating in a centrally positioned pinched-in mounting portion;
- b. a generally planar tungsten filament within the envelope being positioned centrally thereof and intersecting and being parallel to the envelope axis;
- c. a pair of spaced vertical rods mounting said filament and attached to said pinched-in portion of said envelope;
- d. a halogen contained in the atmosphere within the envelope;
- e. a lamp base comprising an outer hollow metal shell and a heat resistant and electrically insulating inner collar attaching the envelope to the shell, the metal shell including a keyed guide pin, a plurality of terminal pins mounted in the collar and electrically coupled to said rods, the upper surface of the lamp base having a slot formed therein larger than the cross section of the lower portion of the envelope for adjustably positioning and supporting the pinched-in lower end of the envelope vertically and horizontally of the base for positioning the filament on an axis of a projection-optical system, the lower end of the envelope being adhered to the base in its adjusted position in the slot by an adhesive filling the space between the lower end of the envelope and the collar.

2. A lamp as claimed in claim 1 in which the collar is ceramic.

3. A lamp as claimed in claim 1 in which one of the terminal pins is electrically coupled to the filament through a heat fusible link.

4. A lamp as claimed in claim 1 in which a light reflector is positioned within the envelope adjacent the filament.

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