

- [54] **DUAL FILAMENT READOUT LAMP**
 [75] Inventor: **Philip C. Demarest**, Pine Brook, N.J.
 [73] Assignee: **Refac Technology Development Corporation**, New York, N.Y.
 [22] Filed: **May 6, 1971**
 [21] Appl. No.: **141,009**

Related U.S. Application Data

- [63] Continuation of Ser. No. 806,431, March 12, 1969, abandoned.
 [52] U.S. Cl. **313/109.5, 313/316**
 [51] Int. Cl. **H01k 9/00, H01j 61/66**
 [58] Field of Search **315/169; 313/108 R, 313/108 H, 109.5, 210, 316**

References Cited

UNITED STATES PATENTS

- 1,787,470 1/1931 Bone 313/316 X
 2,391,922 1/1946 Roper 313/316 X

- 2,862,147 11/1958 Conti 313/316 X
 2,878,418 3/1959 Garfinkel et al. 315/69
 3,408,523 10/1968 Demarest et al. 313/316 X
 3,418,509 12/1968 Frouws et al. 313/109.5

Primary Examiner—Robert Segal

Attorney—Lawrence I. Lerner, Sidney David, Joseph S. Littenberg and Richard I. Samuel

[57]

ABSTRACT

A readout lamp for producing numeric or alpha-numeric displays in which two sets of incandescent filament segments in parallel spaced relationship with each other are employed to produce a double lined number or letter. Failure of one or more filaments will still enable the lamp to produce an intelligible display. The two sets of filaments are slightly displaced vertically from each other to prevent electrical contact without destroying the substantially uniplanar appearance of the display.

1 Claim, 7 Drawing Figures

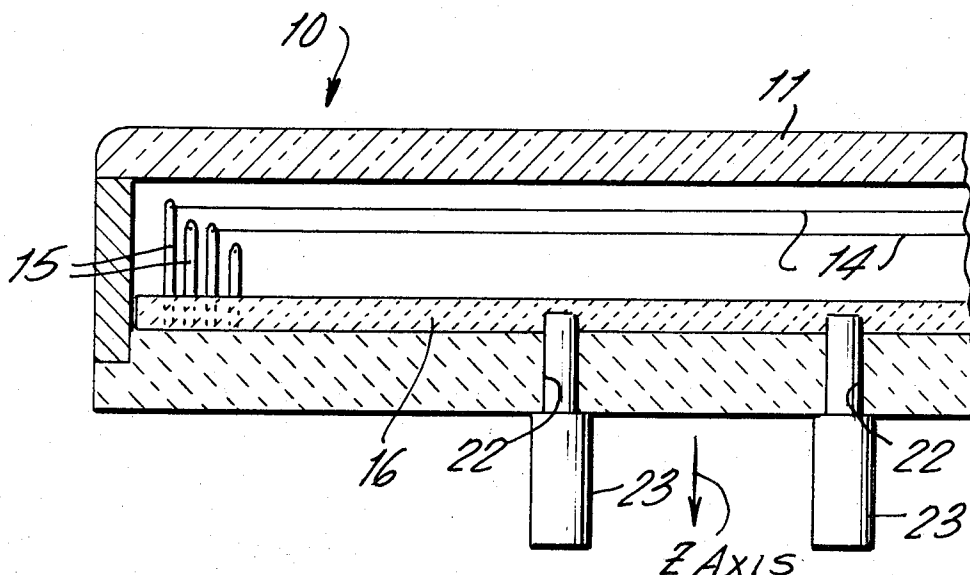


FIG. 1

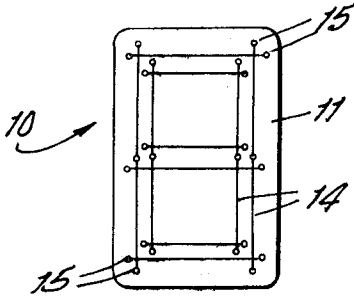


FIG. 2

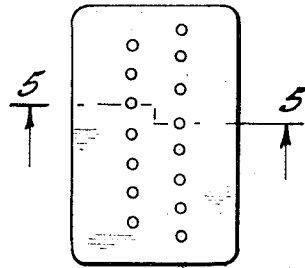


FIG. 3

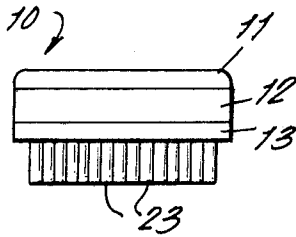
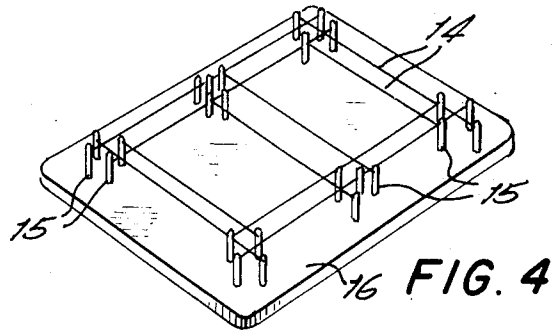
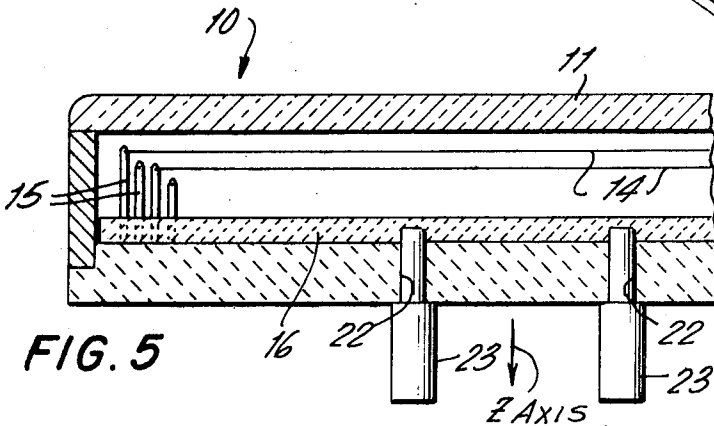
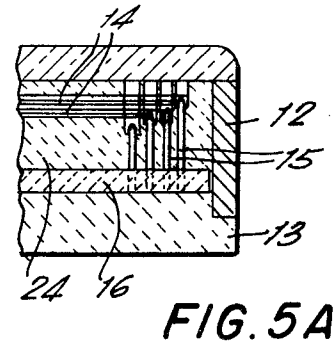


FIG. 5

FIG. 5A

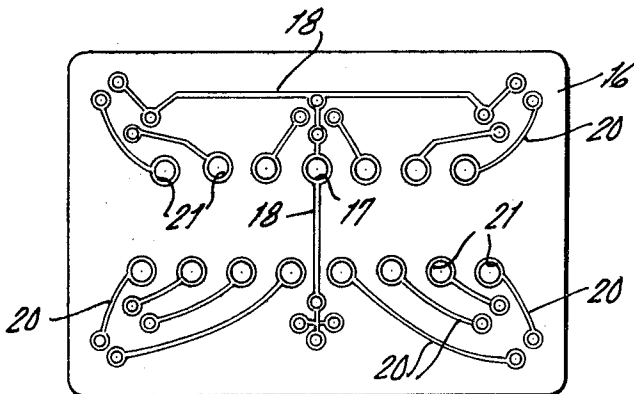


FIG. 6

INVENTOR.
PHILIP C. DEMAREST

Robert H. Korman
ATTORNEY

DUAL FILAMENT READOUT LAMP

This application is a continuation of application Ser. No. 806,431, filed Mar. 12, 1969, now abandoned.

BACKGROUND OF THE INVENTION

Incandescent filament lamps have been used in alpha-numeric displays but they have been limited in their usefulness for several reasons: A filament burn out can go un-noticed for some time and give a faulty reading, the arrangement of filament supporting posts, if carried through the envelope base, produces a complex pattern which is difficult to base; where the lamps are miniaturized the light output may be insufficient. The present invention provides two parallel direct viewing filament systems for each portion of the display. If one filament or a segment of one filament burns out, the other filament continues to function and gives notice that the lamp should be replaced. By using a printed circuit between an inner ceramic slab and a ceramic base there is no chance of short circuit between wires, the lead-in pins can be grouped in an orderly array, and considerable space is saved.

A feature of the present invention is a novel grouping of lamp components to reduce the size of readout lamps.

Another feature of the invention is the manner in which the filament posts are secured to a ceramic slab and connected to lead-in conductors.

A further function is the increased reliability secured through the use of dual filament systems.

BRIEF DESCRIPTION OF THE FIGURES

For a better understanding of the present invention, together with other details and features thereof, reference is made to the following description taken in connection with the accompanying drawings.

FIG. 1 is a plan view of the readout lamp showing the position of the filaments.

FIG. 2 is a view of the base side of the lamp showing the 15 lead-in pins.

FIG. 3 is a side view of the lamp.

FIG. 4 is an isometric view of the ceramic slab showing the filaments and their supporting posts, somewhat enlarged.

FIG. 5 is a cross sectional view of the lamp taken along line 5—5 of FIG. 2 on an enlarged scale.

FIG. 5a is a view similar to FIG. 5 showing an alternate form.

FIG. 6. is a plan view of the bottom side of the ceramic slab showing the printed circuit connections.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1, 2, and 3, the readout lamp includes an envelope 10 which is made up of a top transparent glass layer 11, a support ring 12 of metal, and a ceramic base 13. Inside the envelope 10 there are a plurality of filaments 14 having their ends secured to posts 15. The filaments 14 are formed of tungsten wire and the posts 15 are preferably made of Kovar since they are set into and secured to a ceramic slab 16. The slab 16 is first made with all the holes and depressions needed and is then metalized by adding an alloy of molybdenum-manganese to all surfaces except the top and bottom. The printed circuits are now added to the bottom surface of the slab by any of the well known methods.

FIG. 6 shows the general layout of the connections. A ground cavity 17 is connected by a conductive film 18 to 10 of the holes which are to receive the posts 15. The ground cavity 17 is to act as the common connection for all the filaments 14. Conductive films 20 are also deposited between selected depressions 21 and other post holes.

The slab 16 is now ready for the tungsten filaments 14. These are strung between the top ends of the posts 15 and secured by welding or any other suitable means. The arrangement of filaments is shown in FIGS. 1 and 4.

The base 13 is next fabricated in a manner similar to the preparation of the slab 16. After the holes 22 for the lead-in pins 23 have been properly formed, the base 13 is metalized on all surfaces except the top and bottom. Then the entire lamp can be assembled, inserting all the pins 23 in their holes 22, applying the Kovar ring 12 onto the step 13a at the periphery of the base 13, dropping the slab 16 into the recess, and finally placing the glass top 11 on the Kovar ring. The assembled lamp is now placed in a hydrogen furnace and the metalized surfaces are fused to each other. Contacts are thereby made between the lead-in pins 23 and the printed circuit films. The posts 15 are joined to the circuit films and mechanically secured as well. The lamp is now ready for pumping and filling with an inert gas such as argon. Evacuation may be done through a hollow pin 23 which is finally pinched off.

When the lamp is in use, the filaments are not heated to full brilliance, i.e. the brightness associated with incandescent lamps. The observer looks directly at the lamp and observes the display. For some installations little more than red heat is necessary. Under these conditions of use, the filaments have a life of over 100,000 hours.

An examination of the preferred embodiment illustrated in the drawing will show that the display character is formed by a seven segment arrangement of incandescent tungsten filaments or light bars 14. Spaced inwardly from the first set of light bars is a second seven segment set of filaments, parallel to but slightly vertically displaced along the Z axis from the first set. The two sets of filaments may be electrically and mechanically separate to provide substantially parallel arranged characters. The adjacent filaments are preferably sufficiently separated to indicate mode failure.

With suitable switching means well known in the art, it is possible to select specific filaments in either of these displays to form letters or numerals if so desired or employ both displays at the same time. Where both displays are employed at once, additional illumination is available for ease in reading.

It will be apparent that failure of one or more of the filaments in the dual filament readout lamp will still provide an intelligible image to the observer. This dual reliability or redundancy may be of extreme importance where the lamp is used in cockpit displays, multiplex systems, and the like.

FIG. 5a illustrates an alternate form of the present invention in which dielectric block, 24 is placed within the envelope 10. The block 24 is suitably channeled to receive the filaments 14 and posts 15 therein. In the event of a burn-out or a break in any of the filament segments the dielectric block 24 will prevent contact and possible damage by the broken portion to the adjacent filaments.

Having thus fully described the invention, what is claimed as new and desired to be secured by Letters Patents of the United States is:

1. A miniature dual filament system numeric or alpha-numeric readout lamp comprising:
 - a sealed envelope;
 - a transparent faceplate for said envelope;
 - a ceramic slab spaced from and beneath said transparent faceplate;
 - a ring sealingly connecting the peripheries of said faceplate and slab;
 - a first plurality of electrically conductive posts secured at one end to said slab and extending above its upper surface towards said transparent faceplate; said first plurality of electrically conductive posts being arranged in a first predetermined pattern;
 - a first set of incandescent filaments secured to the free ends of said first plurality of electrically conductive posts for the passage of current and for selectively producing a first display;
 - a second plurality of electrically conductive posts secured at one end to said slab and extending above its upper surface towards the transparent faceplate arranged in a second predetermined pattern similar to said first predetermined pattern;
 - each of said second plurality of electrically conductive posts being adjacent to one of said first plural-

- ity of electrically conductive posts;
- a second set of incandescent filaments vertically displaced from said first set of filaments a distance sufficient to permit filament cross-over while retaining the substantially uniplanar aspect of the display and secured to the free ends of said second plurality of electrically conductive posts for the passage of current and for selectively producing a second display;
- said second set of filaments being disposed substantially parallel to said first set of filaments so that said second display is substantially the same as said first display;
- electrically connecting means on the surface of said slab opposite said filaments in contact with said posts, said means including separate connections for each free end so that the display produced by the first set of incandescent filaments is independent of the display produced by the second set of incandescent filaments;
- a plurality of lead-in conductors for said connecting means for connecting the filaments to an external source of power; and
- a block of dielectric material having filament receiving bores therein, and means to support the block within the sealed envelope.

* * * * *

30

35

40

45

50

55

60

65