June 2, 1970 SHOHEI TAKAKUWA 3,515,931

PINCH SEAL PORTION OF DISCHARGE LAMPS OR THE LIKE

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Fig. 1

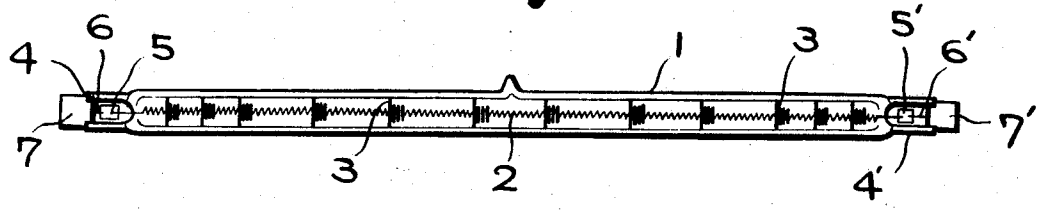


Fig. 2

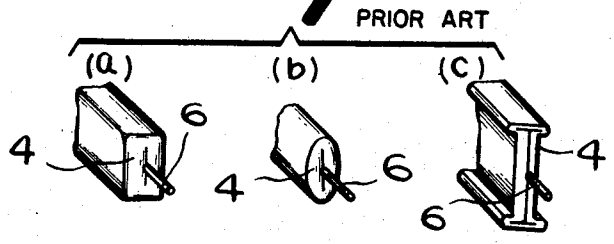


Fig. 3

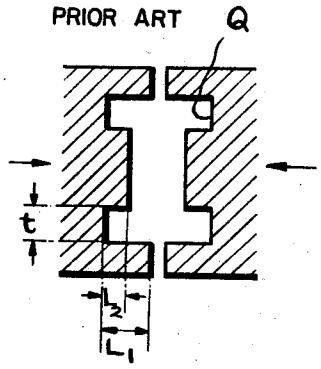


Fig. 4

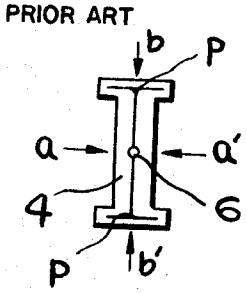


Fig. 5

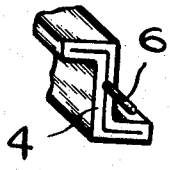


Fig. 6

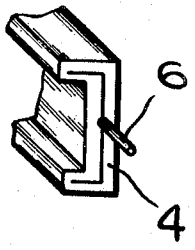


Fig. 7

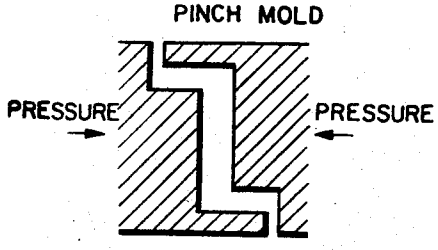
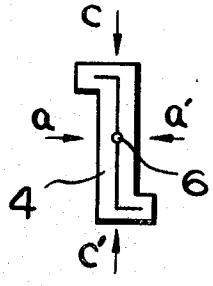


Fig. 8



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PINCH SEAL PORTION OF DISCHARGE LAMPS OR THE LIKE

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Int. Cl. H01j 5/48, 5/50
U.S. Cl. 313—318 2 Claims

ABSTRACT OF THE DISCLOSURE

An electric lamp comprising a sealed envelope of quartz containing electric energy translation means and having an external pinch seal portion at opposite ends thereof and a lead-in conductor extending therethrough from said energy translation means.

Said seal portions have a Z-shape or]-shape in section.

The present invention relates to a structure of a pinch seal portion of discharge lamps of the double end sealed type or single end sealed type or halogen incandescent lamps.

An object of this invention is to provide a pinch seal portion of a discharge lamp or the like which is Z-shaped in section.

Another object of the invention is to provide a pinch seal portion of a discharge lamp or the like which is]-shaped in section.

Still another object of the invention is to provide a pinch seal portion which is free from the occurrence of I-shaped cracks which cross each other in the shape of a letter T at the upper and lower end in the interior of the seal portion.

Other objects and advantages of the invention will become apparent from consideration of the description set forth hereunder when taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a view in explanation of an incandescent lamp of the prior art;

FIGS. 2(*a*), 2(*b*) and 2(*c*) are views in explanation of pinch seal portions of incandescent lamps or discharge lamps of the prior art;

FIG. 3 is a view in explanation of a pinch mold for forming a conventional I-shaped pinch seal portion;

FIG. 4 is a view in explanation of the manner in which pressure is applied during the process of forming a conventional I-shaped pinch seal portion;

FIGS. 5 and 6 are views in explanation of pinch seal portions embodying the present invention;

FIG. 7 is a view in explanation of a pinch mold for forming a pinch seal portion of Z-shaped section according to this invention; and

FIG. 8 is a view in explanation of the manner in which pressure is applied during the process of forming a pinch seal portion of Z-shaped section according to this invention.

One embodiment of the invention will now be explained with reference to the accompanying drawings.

FIG. 1 shows an incandescent lamp which includes an envelope of quartz **1**, a filament **2**, supporter members **3** for said filament **2**, pinch seal portions **4** and **4'** disposed at opposite ends of said envelope of quartz **1**, lead-in conductors **5** and **5'** sealed in said pinch seal portions **4** and **4'** respectively and connected to opposite ends of said filament **2**, lead wires **6** and **6'** connected to said lead-in conductors **5** and **5'** respectively, and terminals **7** and **7'** connected to said lead wires **6** and **6'** respectively. The pinch seal portions **4** and **4'** of conventional halogen

incandescent lamps and discharge lamps have hitherto been formed such that they are rectangular, circular or I-shaped in section as shown in FIGS. 2(*a*), 2(*b*) and 2(*c*). The pinch seal portions having a rectangular section or a circular section have been partly formed by manual operation and a combination of manual operation with mechanical sealing, but the pinch seal portions with an I-shaped section have nearly all been formed by mechanical sealing.

The pinch seal portion **4** and **4'** of I-shaped section which rely on mechanical sealing are formed by using an I-shaped pinch mold which is formed with recessed dead end portions Q on the portions of the pressure applying inner surfaces of the mold which correspond to opposite ends of upper and lower horizontal lines of the letter I as shown in FIG. 3. In the forming operation, pressure is initially applied in two directions as shown by the arrows *a* and *a'* as shown in FIG. 4, but in later stages of the operation pressure is also applied in the direction of arrows *b* and *b'* so that in the final stage of the operation pressure is applied in four directions before forming is completed. This results in I-shaped cracks occurring in the interior of the formed seal portion as shown in FIG. 4, the cracks crossing each other in the shape of a letter T as shown at P in the upper and lower parts of the seal portion. It is quite difficult to provide a perfect airtight seal to the T-shaped intersections P by mechanical sealing in a subsequent operation. More specifically, it is easy to provide an airtight seal if the quartz envelopes **1** with which the seal portions are sealed are accurately dimensioned in diameter and thickness. However, variations are liable to occure in the diameter of quartz envelopes because of their production process, making it difficult to provide quartz envelopes which are precisely and accurately dimensioned as designed. On the other hand, the distance between inner surfaces of the pinch mold which applied pressure to the material in the mold is uniform, making it difficult to provide a perfect airtight seal to all the seal portions to be sealed in the quartz envelopes. This inability to provide a perfect airtight seal in the sealing operation has been mainly responsible for a reduction in the yield of the lamps.

The aforementioned disadvantage of seal portions of the prior art is obviated by the present invention. To attain this end, the invention provides a pinch seal portion which is Z-shaped or]-shaped in section as shown in FIGS. 5 and 6.

FIG. 7 shows a pinch mold for producing a pinch seal portion of Z-shaped section according to this invention.

The pinch seal portion of discharge lamps or the like according to this invention has a structure as aforementioned, so that a pinch mold for forming same has no dead end portions Q on the pressure applying inner surfaces thereof as are the case with conventional I-shaped pinch molds. When a seal portion is formed by using this mold, stresses applied to opposite ends of the seal portion are directed outwardly as indicated by the arrows *c* and *c'* as shown in FIG. 8, so that no four direction pressing occurs and no intersections P are formed. In producing conventional seal portions of I-shaped section, it has hitherto been customary to determine the dimensions L_1, L_2 and t of various portions of the pinch mold shown in FIG. 3 by trial and error in accordance with the diameter and thickness of quartz envelopes. However, in producing seal portions embodying the present invention, the pinch mold used may be essentially dimensioned such that excess material for forming a seal portion can be released to outside. This permits to achieve a high yield in the sealing operation even if

the pinch mold used for forming seal portions is more or less poorly designed.

The table set forth hereunder shows the yields of pinch seal portions of Z-shaped section according to this invention in comparison with those of seal portions of I-shaped section when the diameter and thickness of quartz envelopes **1** are varied.

Quartz Envelope (m./m.)			Yield (percent)	
Diameter	Thickness	Variation in thickness	I-shape	Z-shape
8	0.9	±0.1	97.5	98.5
10	0.9	±0.1	97.0	98.5
12	1.0	±0.1	98.0	99.0
15	1.2	±0.15	97.5	99.0

From the foregoing description, it will be appreciated that since no intersections P of cracks occur in the interior of pinch seal portions of discharge lamps or the like embodying this invention, the invention offers the advantage of markedly increasing the yield of lamps of the type described in the sealing operation by reducing, if not eliminating at all, imperfect airtight seal portions.

It is to be understood that the same results can be achieved in another embodiment of the invention in which the seal portion as a]-shaped section as in the embodiment described above.

While the invention has been illustrated by the above

description of species thereof, it will be understood that the base and terminal structure may be widely varied and modified within the spirit and scope of the invention.

What is claimed is:

1. An electric lamp comprising a sealed envelope of quartz containing a filament and having external pinch seal portions at opposite ends of the envelope and lead-in conductors extending through the external pinch seal portions from said filament, said seal portions have a Z-shape in section.

2. An electric lamp comprising a sealed envelope of quartz containing a filament having external pinch seal portions at opposite ends of the envelope and lead-in conductors extending through the external pinch seal portions from said filament, said seal portions have a]-shape in section.

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U.S. Cl. X.R.

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