April 4, 1967 J. F. MOTSON 3,312,852

BASE ELEMENT FOR ELECTROLUMINESCENT LAMP

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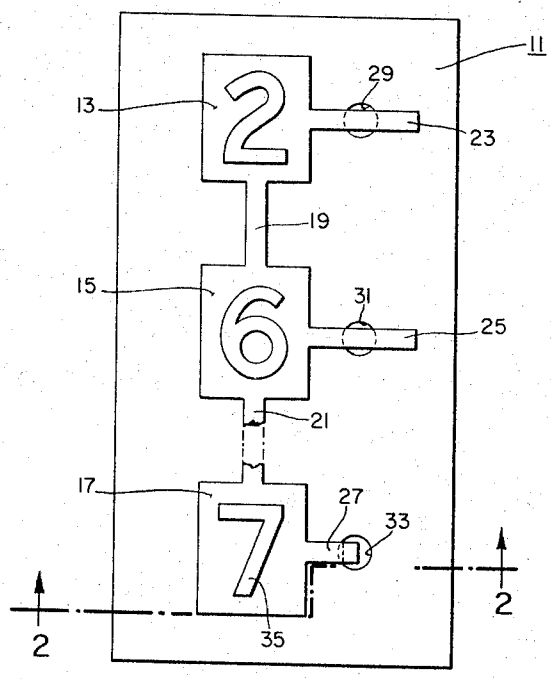
Fig. 1



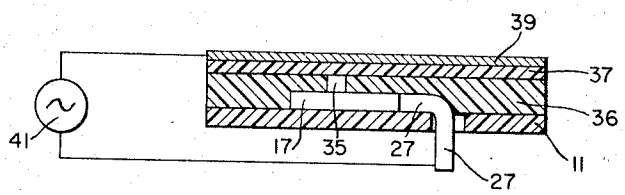


Fig. 2

INVENTOR.
JAMES F. MOTSON
BY William E. Cleaver
ATTORNEY

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BASE ELEMENT FOR ELECTROLUMINESCENT LAMP

James F. Motson, 798 Welsh Road,
Huntingdon Valley, Pa. 19006

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6 Claims. (Cl. 313—108)

This invention relates to electroluminescent lamps and more particularly to improved base members for such such lamps.

In accordance with my copending application, "Electroluminescent Lamp," Ser. No. 351,331, filed Mar. 12, 1964, now abandoned, an electroluminescent lamp, whose main purpose is to provide brightly-lighted, selected areas (such as letters of a display sign), is provided by first employing a conducting base member with embossed indicia thereon.

The conducting base member is generally secured to some non-conducting substrate such as a phenolic base or some other non-conducting plastic or ceramic material. When such a conducting base member is secured to a non-conducting base, it has been the practice to form a hole through the non-conducting base and solder or braze a lead wire to the conducting base. While such an arrangement is satisfactorily operative in the electrical sense, these arrangements have been wanting in ruggedness and structural strength. In addition, the soldering, or brazing, technique itself requires additional effort, when compared with the present invention, and therefore is more time consuming and costly than is necessary.

The present invention provides a means to fabricate the lead-in signal channel as an integral part of the conducting base structure, thereby providing ruggedness and reduced cost to the electroluminescent lamp.

Accordingly it is an object of the present invention to provide an improved electroluminescent lamp.

It is a further object of the present invention to provide an electroluminescent lamp wherein the conducting base member and the lead-in signal channel are one integral device.

In accordance with a main feature of the present invention there is provided a conducting base member which has a tail-like structure protruding from one side thereof. The tail-like structure is inserted through an associated hole or aperture in a non-conducting base member to provide an electrical terminal on the side of the non-conducting base which lies opposite the conducting base member.

In accordance with another feature of the present invention there are provided location members which play the double role of locating the conducting element with respect to one another and simultaneously serve as an optional common connector to each of the conducting elements.

The foregoing and other objects and features of this invention will be best understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings, wherein:

FIGURE 1 shows a pictorial schematic of three conducting elements in relationship to a non-conducting base;

FIGURE 2 is a sectionalized view of an electroluminescent lamp which could be built on the base of FIGURE 1.

At the outset it should be understood that while the present invention is described in respect to an indicia-lighted electroluminescent lamp, the present invention could be used with any conducting base element wherein a lead-in channel can advantageously be made integral

with the conducting base element to accomplish improved structural strength.

Referring to FIGURE 1, there is shown a non-conducting base member **11**. The non-conducting base member **11** can be phenolic, or any one of many plastic or ceramic materials which are non-conducting and have a good strength characteristic.

Further in FIGURE 1 there are shown three conducting elements **13**, **15** and **17**. The elements **13**, **15** and **17** respectively have the indicia, two, six and seven embossed thereon, but these elements can be considered as elements which do not have embossed indicia, but instead may simply represent a shaped area.

As might be suggested by examining FIGURE 1, the conducting elements **13**, **15** and **17** are mass produced from larger pieces of conducting material, by etching or some other well known techniques. In a preferred embodiment the indicia of the conducting elements **13**, **15** and **17** are etched from a piece of zinc metal and then a large section of the zinc metal blank is machined away leaving the metal strips **19** and **21** and the tail-like members **23**, **25** and **27**.

When the conducting elements are mass produced, to be later secured to a non-conducting base, separation elements, or location members, are left between the conducting elements. In FIGURE 1, the metal strips **19** and **21** respectively separate and locate the conducting elements **13** and **15**, and **15** and **17**. The location members **19** and **21** enable the conducting elements **13**, **15** and **17** to be readily disposed on the non-conducting base and simultaneously be correctly located with respect to one another.

In addition, as will become more apparent hereinafter, the location elements (such as elements **19** and **21**) enable a plurality of elements to be simultaneously energized if such a use is in order.

As mentioned earlier after the indicia of the conducting elements **13**, **15** and **17** were etched from the zinc metal plate, there was formed, by machining or some other suitable method, a tail-like member for each. Conducting element **13** has a tail-like member **23**; conducting element **15** has a tail-like member **25**; while conducting element **17** has a tail-like member **27**. The tail-like members **23**, **25** and **27** serve as the signal lead-in channels for their respective conducting elements and of course are fabricated as an integral part of the conducting elements.

In the non-conducting base member **11** there are drilled three holes **29**, **31** and **33**. The tail-like members are bent, or formed, to be passed through these holes to provide a connecting terminal for each conducting element. For purposes of illustration, in FIGURE 1, only tail-like structure **27** is depicted as being formed to pass through its associated aperture, or hole.

Depending on the mode in which the lamp is used, it is very often not necessary to provide a connecting terminal for each conducting element. For instance, in FIGURE 1, if it is desired to simultaneously energize conducting elements **13** and **15**, and therefore to simultaneously light the indicia two and six, the location element **21** can be broken, as indicated, thereby electrically separating element **17** from the elements **13** and **15**. Further only one tail-like structure, either lead **23** or lead **25**, needs to be formed to pass through its associated aperture to provide a connecting terminal for both the conducting elements **13** and **15**. If it is desirable, the tail-like member which isn't used can be cut off.

It can be appreciated from the foregoing that the separation or location members **19** and **21** serve as an optional common conductor to all of the conducting elements in the array. It should be noted also that the location elements need not take the chain-like form shown in

FIGURE 1 but can assume various forms depending on the layout of the conducting elements.

By making the lead-in channels, which are the tail-like members, as an integral part of the conducting elements there is provided ruggedness for the electrical connections.

After the layout for the conducting elements is decided upon, the array is bonded to the non-conducting base with the proper lead-in members formed to pass through their associated apertures. The array can be bonded in a number of known ways and in the preferred embodiment is bonded by epoxy resin. Thereafter the complete device is potted in an epoxy resin and the necessary separation members are cut through to isolate the associated conducting elements.

In FIGURE 2, there is shown an electroluminescent lamp built on the base element of FIGURE 1, and with a sectional view along the line 2—2 of FIGURE 1.

As can be seen in FIGURE 2, the tail-like member **27** protrudes through to the rearward side of the non-conducting base member **11**. Conducting element **17** is shown bonded to non-conducting base **11**, with the indicium seven **35** in raised form. As is described in my above mentioned copending case, there is a layer of dielectric material **36**, such as epoxy resin overlaying the non-conducting base and surrounding the conducting element **17** up to, but not on to, the face of the indicium **35**. Further as can be seen in FIGURE 2, there is bonded to the epoxy resin **36** and to the face of the indicium **35**, a layer of electroluminescent material **37**. The electroluminescent material should be understood to be electroluminescent phosphors, such as zinc sulphide, mixed with activators, such as copper, with said mixture held in a binder, such as epoxy resin.

As can be further seen in FIGURE 2, bonded to the electroluminescent layer is a transparent electrode **39** which can be evaporated gold, tin or the like. Connected to the transparent electrode **39** and the tail-like structure **27** is a source **41**, of alternating current power, to provide an effective alternating electrostatic field across the electroluminescent layer **37** at the indicia areas only, thereby lighting up only the indicia.

It follows from the foregoing that the present invention provides a ruggedized electrical connection means for an electroluminescent lamp as well as an easy means for locating the conducting elements while providing an optional common electrical connection to the conducting elements.

While I have described above the principles of my invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of my invention as set forth in the objects thereof and in the accompanying claims.

What I claim is:

1. An electroluminescent lamp comprising: an electrically conducting base member having an integrally formed lead-in member; an electrically non-conducting base member having an aperture therein; said conducting base member secured to said non-conducting base member with said integrally formed lead-in member being formed to pass through said aperture to the side of said non-conducting base lying opposite said conducting base member; a layer of electroluminescent material bonded to said conducting base member; a transparent electrode bonded to said layer of electroluminescent material on the side lying opposite said conducting base member; and means connected to said conducting base member and said transparent electrode to be connected to a source of alternating current power.

2. An electroluminescent lamp according to claim **1** wherein said conducting base member has an indicium embossed thereon.

3. An electroluminescent lamp comprising: a plurality of electrically conducting base members each having an integrally formed lead-in member; an electrically non-conducting base member having a plurality of apertures therein; said plurality of conducting base members being secured to said non-conducting base member with a predetermined number of said integrally formed lead-in members being formed to pass through associated ones of said apertures to the side of said non-conducting base lying opposite said plurality of conducting base members; a layer of electroluminescent material secured to said plurality of conducting base members; a transparent electrode secured to said layer of electroluminescent material on the side lying opposite said plurality of conducting base members; and means connected to said plurality of conducting base members and said transparent electrode to be connected to a source of alternating current power.

4. An electroluminescent lamp according to claim **3** wherein each of said plurality of conducting base members has an indicium embossed thereon.

5. An electroluminescent lamp according to claim **3** wherein there is included a plurality of conducting separation members and each of said plurality of conducting base members is separated from at least one adjacent conducting base member by one of said plurality of conducting separation members.

6. An electroluminescent lamp according to claim **5** wherein certain of said plurality of conducting separation members are broken so as to interrupt continuity therethrough to permit the conducting base members which remain connected together by unbroken separation members to be energized simultaneously.

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JAMES W. LAWRENCE, *Primary Examiner.*

R. JUDD, *Assistant Examiner.*