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GASEOUS GLOW PLURAL CHARACTER PRESENTATION DEVICE

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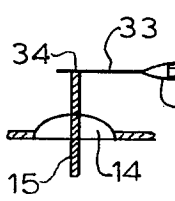

FIG. 3

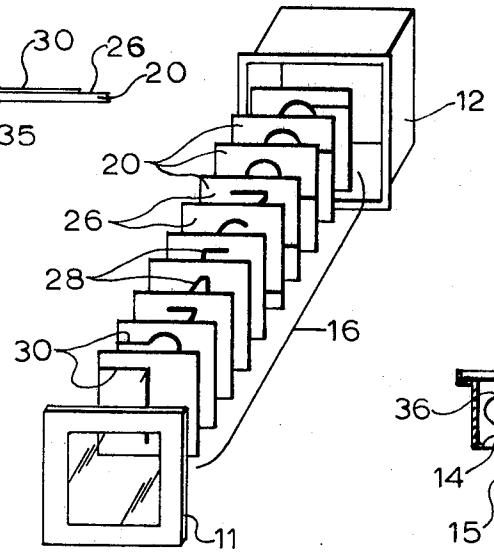

FIG. 2

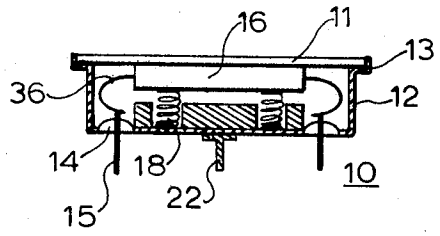

FIG. 1

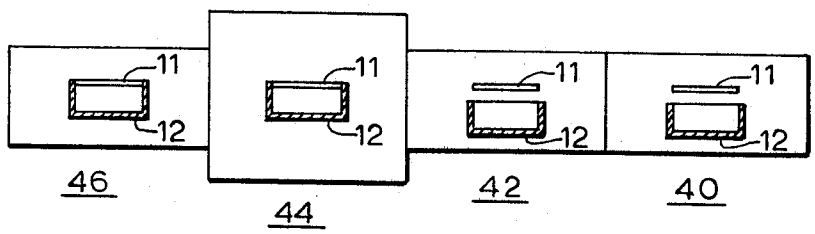

FIG. 4

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GASEOUS GLOW PLURAL CHARACTER PRESENTATION DEVICE

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ABSTRACT OF THE DISCLOSURE

Our invention relates to a gaseous flow character presentation device using an envelope comprising a metal box supporting a light transparent window through which gaseous glow characters are viewed. The envelope contains an ionizable medium and a number of character shaped electrodes; the metal box thereof designed to serve as the anode electrode for the cathode electrodes. Character shaped cathode electrodes are supported on light transparent sheets, each being in the form of a letter, numeral, etc., and the character supporting sheets are positioned one upon the other and held in the box portion of the envelope with spring support means so that the characters may be observed through the window. Neither portion of the envelope has any sealed-off tubulation since the assembly of the device is performed very readily within a required environment of an evacuation chamber.

BACKGROUND OF THE INVENTION

In a very general way this invention relates to glow lamps presently available comprising a glass envelope which contains at least one anode electrode and a number of cathode electrodes, and an ionizable medium. Upon connecting a predetermined voltage between the anode electrode therein and one of the cathode electrodes, current flow between these connected electrodes causes the medium to glow around the cathode electrode in the form of the shaped electrode. Devices such as these are usually placed side-by-side for displaying numerals, letters, etc., which correspond to the shaped cathode electrodes within each device.

Those devices being referred to make use of an envelope in the form of a glass bulb and the bulb contains a number of cathode electrodes in the shape of characters, one or more anode electrodes, supporting means for such electrodes and electrical conductors extending from each of the electrodes to terminal means in the envelope of the device. Prior art devices, however, utilize space in height, width and depth out of proportion to the size of the characters being displayed by the device. Their overall size, therefore, in relation to character size represents a definite disadvantage in many of the data display applications of these indicating devices.

SUMMARY OF THE INVENTION

The invention described herein is an improvement of the present state of the art in that the nature of the envelope of the device, the electrodes therein and the means for supporting the electrodes in the envelope provide the means for increasing the size of the characters displayed in relation to the outside dimensions and space requirements of the device.

The novel features that are considered characteristic of this invention are set forth with particularity in the appended claims. They include the use of a metal box having a window in a wall thereof as the envelope for housing a set of character shaped cathode electrodes, and

having the metal box portion of the envelope serve as the anode electrode of the device. The object of using part of the envelope as the anode electrode is to provide a more compact envelope structure and a device for eliminating the need of an anode electrode within the envelope.

A further space saving object of the invention is to utilize glass sheet supported character shaped cathode electrodes connected with, and supported by, spring force means within the envelope.

Still another object of the invention is to have the window united with the box portion of the envelope with a vacuum sealing material means following an evacuation and gas-filling of the envelope in order to avoid the requirement of a sealed-off tubulation.

The invention itself, both as to its originality and method of operation, and additional objects and advantages, will best be understood from the following description when read with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIGURE 1 represents a partly cross sectional view of the device showing all of the essential parts of the device;

FIGURE 2 shows an exploded view of the invention including ten sheets of transparent material supporting character shaped cathode electrodes which take the form of a compact assembly in FIGURE 1, immediately adjacent the window of the device;

FIGURE 3 is a detail to exemplify at least one method of electrically connecting a cathode electrode to a lead-through conductor of the device; and

FIGURE 4 exemplifies diagrammatically an evacuation, gas and mercury fill system utilized in avoiding the use of sealed-off tubulations in a finished product of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGURE 1, an indicating device **10** of this invention is illustrated partly in cross section to show an envelope comprised of a light transparent window **11**, such as glass, plastic or other suitable material, joined along a vacuum sealable interface **13** to a metal box portion **12** thereof, with a vacuum sealing material such as silver chloride, solder, an epoxy, or, a gasket of indium with gallium seal material. In the box portion **12** of the envelope glass-seal lead-through conductor assemblies **14** are included, each having an electrical conductor **15** therein which may be used as a means for supporting the device **10** in a socket (not shown). Although these conductors **15** are shown as being in a rear wall of the box **12**, depending upon the application requirements, conductors **15** may be supported in a side or top wall thereof.

Within the envelope there is an electrode assembly **16** consisting of a number of light transparent sheets, such as glass, mica, Lucite, or other transparent support means, each sheet supporting a character shaped cathode electrode. The assembly **16** is shown, for example, under the influence of spring force means **18**, supported against the inner surface of the window **11**. Other mechanical means, or adhesive material means, may of course be used as the principal support means, since the important object is to have the assembly positioned closely adjacent the window **11**.

If, as an example, ten sheets **20** are included in the assembly **16** and each sheet is supporting a cathode electrode as indicated, the device **10** will contain ten lead-through conductors **15**. Since there are no additional electrodes in the envelope the lead-through conductor requirements will be limited to a total of ten. Since the box **12** will serve as the anode electrode, and also part of the

envelope, it is provided with a terminal means **22** which may be secured to any part of the outside surface of the box **12** and to which a voltage will be connected. One polarity of the voltage will be connected to a terminal means **22** and the opposite polarity will be connected, selectively, to cathode electrodes of the assembly **16**, to effect a glow-discharge.

Each of the ten sheets **20** have a numeral shaped character, for example, on a surface **26**. These character electrodes are of an electrically conductive material deposited thereon electrically, by chemical etching means, or shaped metal supported thereon by any of a number of well known methods. Each numeral **28** has a conductor lead **30** extending therefrom as a means of having it connected electrically to its corresponding lead-through pin **15**. In order to limit a glow-discharge to an area immediately adjacent the cathode electrodes **28**, each lead **30**, the pins **15** and all other conductors associated therewith are coated with a material, such as an enamel, to prevent them from developing a glow discharge.

The sheets **20** may have a thickness of less than 0.005" and the cathodes thereon may have a thickness not exceeding 0.001", so as to provide a relatively thin assembly **16**, and in a relatively thin and flat device **10**, since the metal box and window thereof lends itself to making such a device **10** that will withstand pressures to less than one micron of mercury. Therefore, it should be understood that the invention as shown is for illustrative purposes only, particularly insofar as the size and configuration of FIGURE 1 is concerned.

FIGURE 3 shows at least one method of connecting each of the cathode electrodes to the lead-through pin **15**. A spring-clip type of connector **33** may be welded at a point **34** to the pin **15** and connected by spring force means **35** to a conductor lead **30**. In FIGURE 1 a connecting lead **36** is exemplified as the means of connecting a pin **15** to its corresponding character shaped electrode **28** and conductor **30** on a surface **26** of a sheet **20**.

The device **10** of this invention is intended to be evacuated and filled with a gas and mercury without having to employ an evacuation tubulation and, consequently, the high temperatures necessary to effect a sealed-off tubulation. Also, in avoiding high temperature requirements plastic material such as Lucite, or other synthetically produced materials, can be used as the window **11** and the sheets **20**, resulting in a less expensive and less fragile device **10**.

Referring now to the system in FIGURE 4, the window **11** and the box **12**, with the assembly **16** therein and ready for completion, is carried through a first chamber **40** which may be quickly evacuated to 1 mm. of mercury. From chamber **40** it will pass through a vacuum gate (not shown) to a second chamber **42**, then to a third chamber **44** and then to a fourth chamber **46**, each time passing through a vacuum gate (not shown). The chamber **40** serves as a station between a room environment and that

of chamber **42**. The latter serves as a station between chamber **40** and chamber **44**, and chamber **46** serves as a station between the room environment and station **44**.

The chambers **42** and **44** will be evacuated to 1 micron of mercury, backfilled with 25 mm. of neon gas, or argon or the like, and a sputter-inhibiting agent is also introduced, such as mercury. After passing through chamber **42** and then within chamber **44** the window **11** is joined with the box **12** to form a vacuum seal therewith. The device **10** is then passed through chamber **46** to the room environment as a completed unit.

Although I have limited myself to the showing of certain embodiments of the invention, it should be understood by those skilled in the arts that the invention is not limited in this regard since many of the other embodiments embracing the general principles and constructions hereinbefore set forth may be utilized, and still be within the ambit of the present invention.

We claim:

1. An indicating device of the gaseous glow type, utilizing an envelope containing an ionizable medium and a plurality of sheets of light transparent material therein each supporting an electrically conductive material which has been formed thereon so as to thereby provide a plurality of electrodes each representing an individual message character shaped electrode, wherein the improvement includes:

(a) an envelope comprising an electrically conducting metallic box having a light transparent window in a surface thereof through which said electrodes will be viewed, and electrical terminal means for connecting the influence of an anode potential thereto; and

(b) each of said electrodes comprising an independently formed and complete character shaped electrode having but one common electrical conductor means connected therewith and extending beyond the outside limits of said envelope for connecting thereto, and limiting the connection thereto, the influence of a cathode potential in relation to said connecting of the influence of an anode potential to the metallic box of said envelope for the establishing of a gaseous glow adjacent any individual one of said electrodes independent of any connecting of any electrical influence to more than an individual one of said plurality of electrodes.

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HAROLD I. PITTS, Primary Examiner

U.S. Cl. X.R.

340—332, 336, 380