

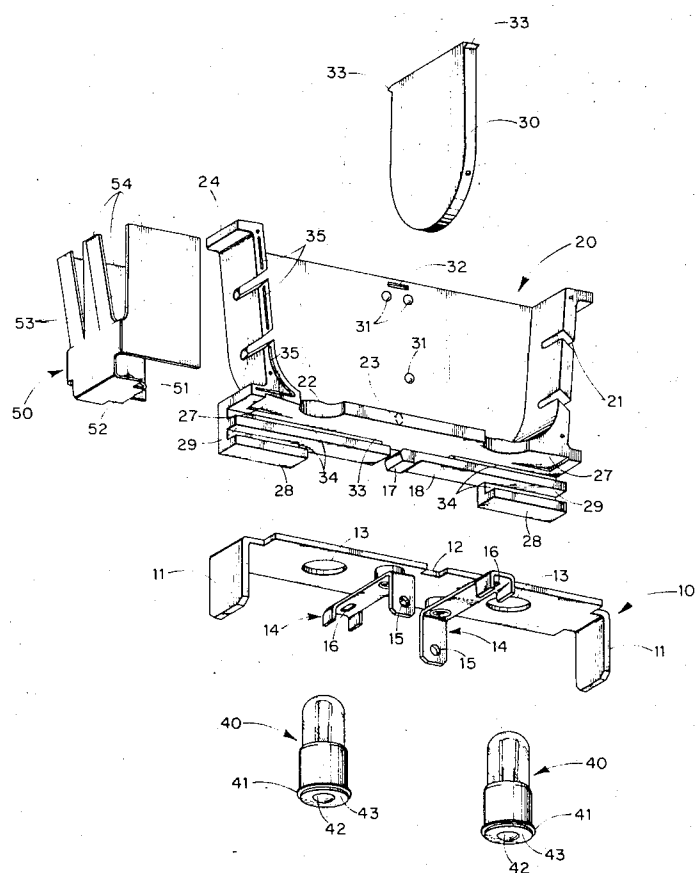
[54] LAMP HOUSING ASSEMBLY
[75] Inventor: John W. Blomstedt, Bedford, Mass.
[73] Assignee: Honeywell Information Systems Inc.,
Waltham, Mass.
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[52] U.S. Cl. 240/73 R, 240/2.1, 240/8.16,
240/52.1, 340/381
[51] Int. Cl. F21s 1/02
[58] Field of Search 240/73 R, 73 DA,
240/73 QD, 52.1, 2.1, 1 R, 8.16; 340/381

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Primary Examiner—Richard L. Moses
Attorney—William W. Holloway, Jr. et al.

[57] ABSTRACT
A lamp housing assembly, including a baseplate and two substantially identical molded members, for supporting light bulbs used in illuminating regions of a display panel. The two molded members are bonded together and the baseplate is removably attached to the bonded molded members. The bonded molded members are adapted to receive springs, which removably couple the lamp housing assembly to a display panel backplate. The lamp housing assembly can also be removably fastened to mounting strips by projections coupled to the baseplate. A plurality of lamps, secured in the lamp housing assembly by the baseplate provide continuous illumination in event of failure of one of the lamps. Removable partitions can be inserted in the lamp housing assembly, utilizing redundant light bulbs to illuminate separate areas of the display panel. Apertures are provided to ventilate the heat produced by the bulbs, while minimizing stray light.

16 Claims, 6 Drawing Figures



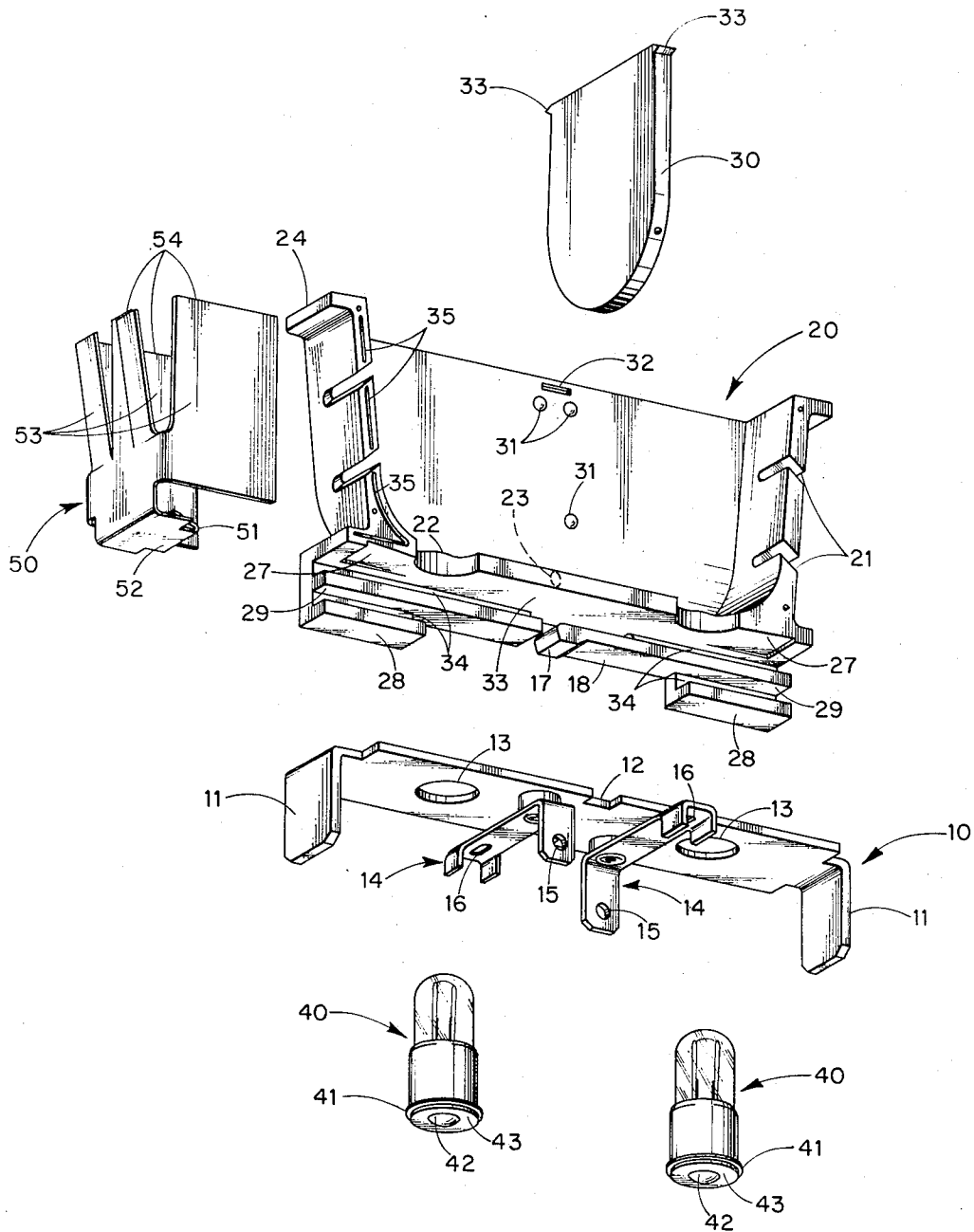


Fig. 1.

SHEET 2 OF 4

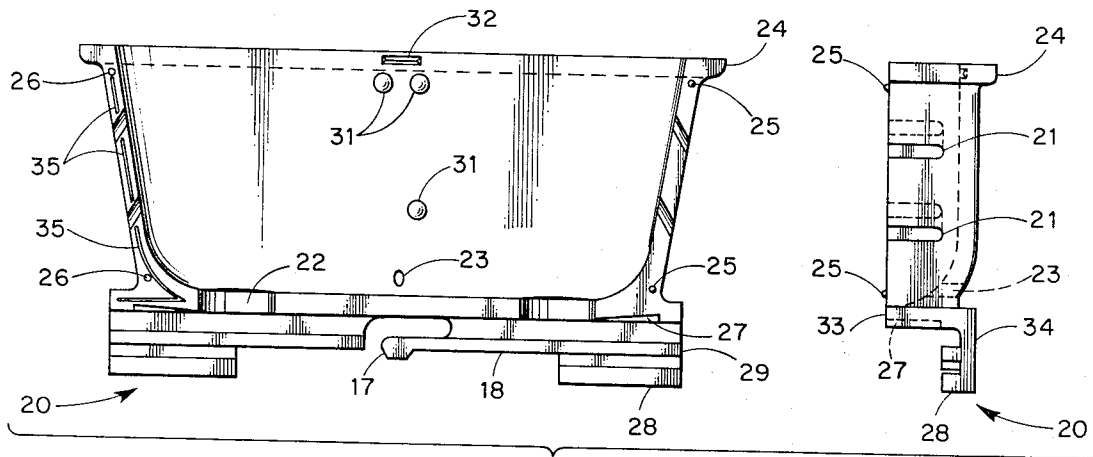


Fig. 2.

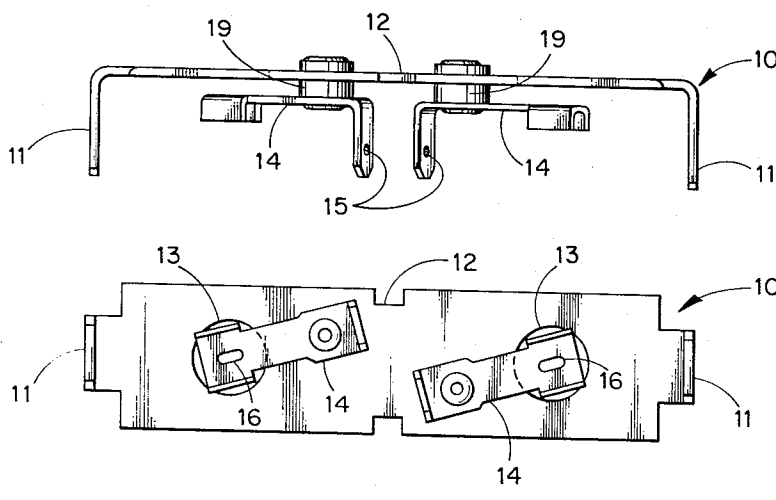


Fig. 3.

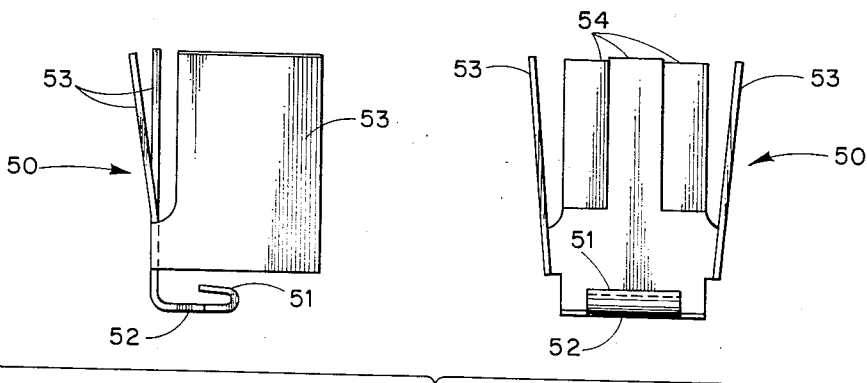


Fig. 4.

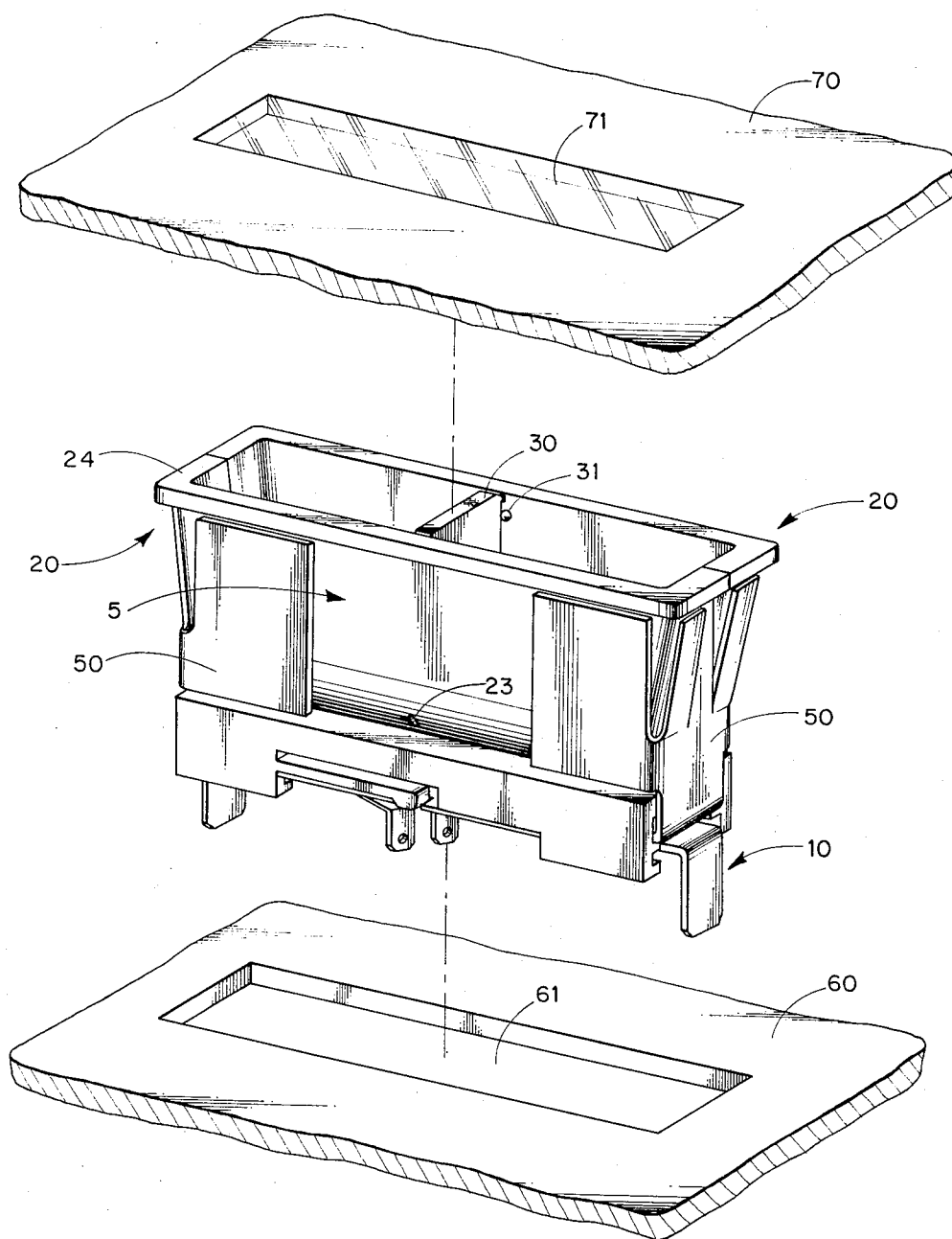


Fig. 5.

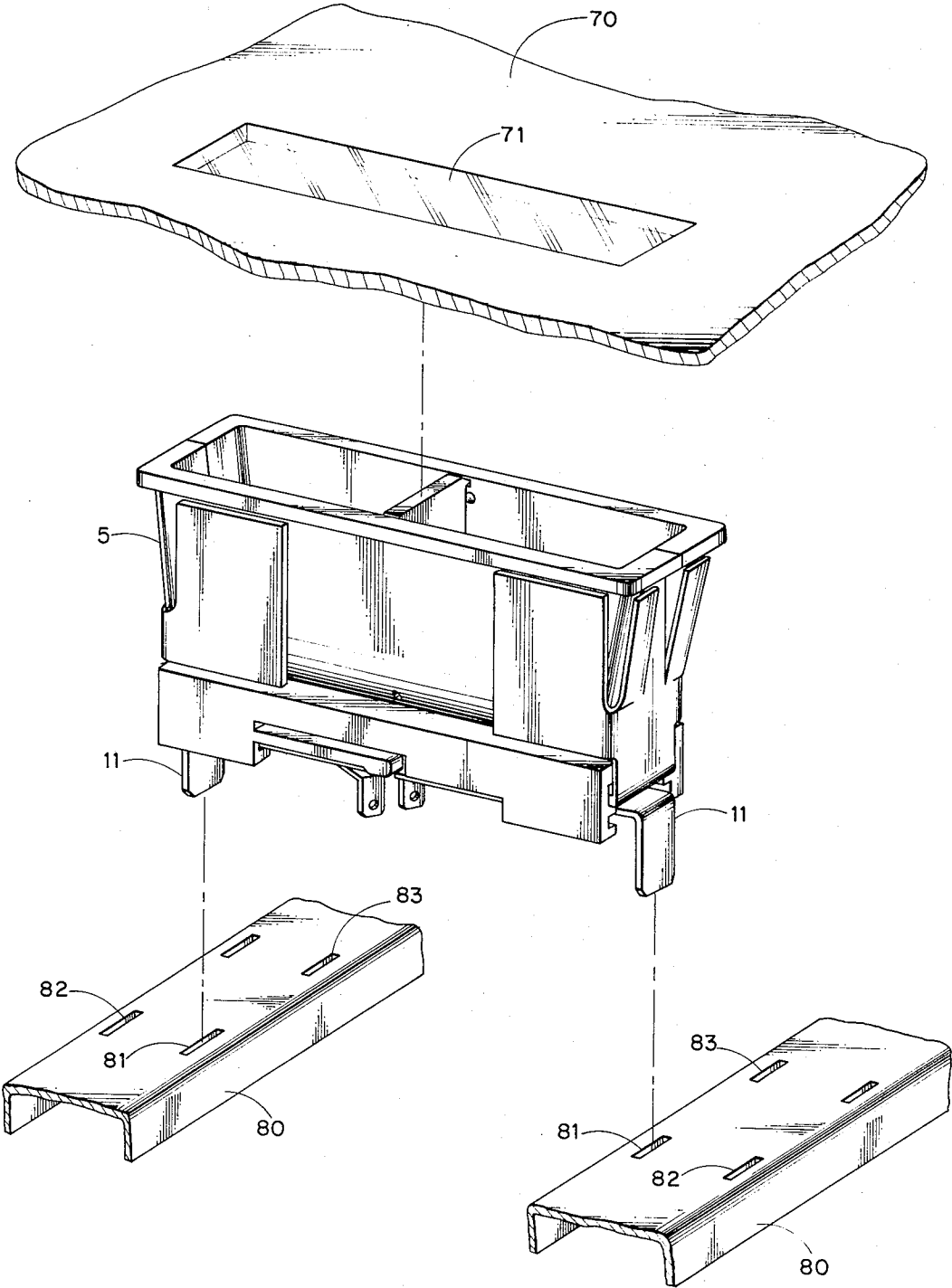


Fig. 6.

LAMP HOUSING ASSEMBLY

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to display panels and, more particularly, to a lamp housing assembly for mounting the light bulbs which illuminate specified portions of the display panels.

2. Description of the Prior Art

A display unit can be formed by illuminating selected translucent regions of a display panel. The illumination of the translucent areas is the result of activation of lamps behind the display panel in response to appropriate signals. Lamp housing assembly units structurally support the light bulbs and optically isolate the translucent regions.

It is known in the prior art to fabricate lamp housing assembly units from single blocks of material. These units are typically machined or cast from metal and provide support for a multiplicity of light bulbs for reasons concerned with economy of fabrication. Another approach is to provide compartments for the light bulbs formed by regions of interlaced opaque strips. The light bulbs themselves are supported on a plate attached to the rear of the interlaced strips. The plurality of light bulbs provide illumination for a multiplicity of translucent regions of the display panels. However, a lamp housing assembly, which contains several light bulbs, or the compartment assembly restricts the variety of display panel configurations which can be accommodated. Moreover, the reduction of the number of lamps in each lamp housing assembly, to increase the number of compatible display panel configurations, results in an unacceptable increase in the cost illumination of each translucent display area.

The lamp housing assembly units of the prior art typically provide a single method of coupling housing units to a display unit, thereby limiting the different types of display configurations with which the lamp housing assembly units may be utilized.

In many display applications, a translucent area is normally illuminated by more than one lamp to provide an operable display even in the presence of a single lamp failure. This lamp redundancy feature is unimportant, however, in many display applications where each light bulb can be used to illuminate a separate region of the display panel. In the prior art, no method is provided for conveniently changing a lamp housing assembly to or from a lamp - redundancy mode of operation.

The heat of the light bulbs is ventilated by apertures in the lamp housing assembly unit. These apertures require additional fabrication in the lamp housing assemblies of the prior art.

It is therefore an object of the present invention to provide an improved lamp housing assembly.

It is a further object of the present invention to provide an easily fabricated lamp housing assembly without reduction of the structural integrity.

It is a still further object of the present invention to provide a variety of methods of coupling the lamp housing assembly units to the display panel units.

It is another object of the present invention to isolate optically the light bulbs in each lamp housing assembly or to illuminate an area of a display panel with at least two light bulbs according to the requirements of the application.

It is another object of the present invention to provide heat-venting apertures without increasing the complexity of fabrication.

It is still another object of the present invention to provide a method for conveniently reconfiguring arrangements of lamp housing assembly units to be compatible with different display configurations.

It is still another object of the present invention to provide a single inexpensive lamp housing assembly without requiring the presence of a large multiplicity of light bulbs.

SUMMARY OF THE INVENTION

The aforementioned and other objects are accomplished, according to the present invention, by a lamp housing assembly comprised of a baseplate and two substantially identical molded housing units. The molded housing units are placed oppositely and bonded together to form a lamp housing assembly body. The baseplate is demountably attached to the assembly body and, in addition to providing additional strength for the lamp housing assembly, removably secures a plurality of light bulbs inside the assembly body.

The lamp housing assembly is adapted to receive springs which provide apparatus for removably attaching the lamp housing assembly to a display panel unit. Projections, coupled to the baseplate, provide an alternative method of removably attaching the lamp housing assembly to the ventilation panel unit.

The molded housing units are fabricated so that one or more removable partitions can be attached to the assembly body to isolate optically each one or selected groups of the plurality of light bulbs. The structure of the molded housing units provided ventilation apertures in the assembly body without additional fabrication.

These and other features of the invention will be understood upon reading of the following description along with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view of a lamp housing assembly according to the preferred embodiment. One of the two substantially identical members forming the lamp housing body and one of the leaf spring units have been omitted.

FIG. 2 is an elevational view of a molded member forming one half of the lamp housing body.

FIG. 3 is a plan and an elevational view of the demountable baseplate of the lamp housing assembly.

FIG. 4 is an elevational view of a leaf spring unit for demountably coupling the lamp housing assembly to a display panel backplate.

FIG. 5 is a perspective view of a method of demountably coupling the lamp housing assembly to a backplate of a display panel.

FIG. 6 is a perspective view of a method of demountably coupling the lamp housing assembly to mounting strips behind a display panel.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Detailed Description of the Figures

Referring now to FIG. 1, a schematic perspective diagram of a portion of a Lamp Housing Assembly is shown. A Lamp Housing Unit 20, a removable partition 30, a Base plate 10, Light Bulbs 40, and a Leaf Spring

Unit 50 are shown. A second substantially identical, Lamp Housing Unit 20, positioned oppositely to the first Housing Unit 20, and a second substantially identical Leaf Spring Unit 50 are omitted from FIG. 1. The arrangement of these elements is evident from FIG. 5.

Referring now to FIG. 1 and FIG. 3, a plan view of Baseplate 10, the elements comprising Baseplate 10 are shown. Baseplate 10 is comprised of a conducting material and forms an electrical connection for Light Bulbs 40. Projections 11 of Baseplate 10 are used to couple an electrical contact to the Lamp Housing Assembly and/or to demountable couple the Lamp Housing Assembly mechanically to a display unit.

Baseplate 10 has two Baseplate Openings 13 for Positioning Light Bulbs 40. Conducting Lips 41 prevent Light Bulbs 40 from passing completely through Openings 13, as well as providing an electrical contact between the Light Bulbs 40 and Baseplate 10.

Light Bulbs 40 are removably secured in Openings 13 by Conducting Springs 14. Spring Openings 16 are adapted to engage Protuberances 42 of Light Bulbs 40, thereby securing Light Bulbs 40 in Baseplate Openings 13. Conducting Springs 14, by mechanically contacting Protuberances 42, provide second electrical terminals for Light Bulbs 40. Connection Openings 15 provide a convenient method for attaching electrical leads from a power source to Conducting Springs 14.

Conducting Springs 14 are electrically isolated from Conducting Lips 41 by Insulating Regions 43 of the Light Bulbs 40, and are electrically isolated from Baseplate by Insulating Washers 19.

Notches 12 in Baseplate 10 have been provided for positioning and demountably securing Baseplate 10 to a Lamp Housing Body 5. The Lamp Housing Body 5 is comprised of two substantially identical Lamp Housing Units 20, positioned oppositely and ultrasonically bonded together in the preferred embodiments.

Referring next to FIG. 1 and FIG. 2, which is a plan view of a Lamp Housing Unit 20, the elements of the Lamp Housing Units 20 are shown. In the preferred embodiment, Lamp Housing Units 20 have been molded from high impact plastic, but other materials can be used.

Ventilation Openings 21 provide apertures in the Lamp Housing Body 5 to vent air heated by the Light Bulbs 40. Lamp Openings 22 provide structure which allows Light Bulbs 40 to extend into the Lamp Housing Body 5. Housing Openings 23 are provided for additional hot air ventilation or can be used to couple a Wire Spring Unit, used in place of the Leaf Spring Unit 50 shown in FIG. 1 and FIG. 4. Housing Openings 23 can also be used to align and support a plurality of Lamping Housing Assemblies, which are positioned side by side.

Housing Rim 24 of Lamp Housing Unit 20 provides additional strength for the Lamp Housing Body. Housing Rim 24 is also used in combination with Leaf Spring Units 21 or Wire Spring Units to secure a Lamp Housing Assembly in a Display Panel Backplate Opening 61 of a Display Panel Backplate 60 (i.e., shown in FIG. 5).

Projections 25 are inserted into Holes 26, when two Lamp Housing Units 20 are placed oppositely, to position accurately the Lamp Housing Units 20 of the bonded Lamp Housing Body. Housing Ribs 35 provide the excess material used in ultrasonically bonding the two Lamp Housing units 20 together.

Housing Side 34, extending below Lamp Housing Base 33, is coupled to Baseplate Ridge 28 and Leaf Spring Ridge 29. Baseplate 10 is removably secured between Base Plate Ridge 28 and Leaf Spring Ridge 29 of the two bonded Lamp Housing Units when Protrusion 17 is coupled with Notch 12. Projection Coupling 18, which supports Protrusion 17, provides sufficient flexibility so that Protrusion 17 can be extracted from Notch 12 and Baseplate 10 can be withdrawn from the lamp housing Body.

Leaf Spring Unit 50 is shown FIG. 1 and, on a plan view, in FIG. 4. Leaf Spring Units 50 are attached to the Lamp Housing Body when Spring Surface 52 is supported by the upper surface of Leaf Spring Ridge 29 and Spring Finger 51 is engaged by Groove 27 in Lamp Housing Base 33. The Leaf Springs 53 of Leaf Spring Unit 50 extend the Leaf Spring Edges 54 after passing through the Display Panel Baseplate Opening 61 of Display Panel Backplate 60 (i.e., FIG. 5). Then the Lamp Housing Assembly is demountable secured to the Display Panel Backplate by Leaf Spring Edges 54 and Lamp Housing Rim 24.

In the embodiment shown in FIG. 1, two Light Bulbs 40 are provided in each Lamp Housing Assembly. To isolate the Light Bulbs optically, a Partition 30 can be removably secured in the Lamp Housing Body 5. Partition 30 has Partition Ridges 33 which fit into Partition Resesses 32 of the Lamp Housing Unit 20. The positioning of Partition 30 is determined by Partition Guides 31 of Lamp Housing Unit 20, positioned in the interior of the Lamp Housing Body.

Referring next to FIG. 5, a translucent Region 71 in a Display Panel 70 is shown. Immediately behind the Display Panel 70, Display Panel Backplate 60 is positioned so that Display Panel Backplate Opening 61 is directly behind the Translucent Area 71. The Lamp Housing Assembly is coupled in Backplate Opening 61 by compressing the Leaf Springs 53 of Leaf Spring Unit 50. After passing through the Display Panel Backplate Opening 61, the Leaf Springs 53 expand so that the Lamp Housing Assembly is secured to the Display Panel Backplate 60 by the underside of Housing Rim 24 and the Leaf Spring Edges 54. To remove the Lamp Housing Assembly, the Leaf Spring Unit 50 is manually contracted so that passage through the Display Panel Backplate Opening 61 is possible. The Display Panel Backplate 60 must be sufficiently close to Display Panel 70 to prevent stray light from reaching adjoining Translucent Areas.

Instead of Leaf Spring Units 50, Wire Spring Units, coupled to the Lamp Housing Assembly 5, (i.e. to Opening 23), may be employed in a similar fashion.

Referring next to FIG. 6, Mounting Strips 80 with appropriately positioned Mounting Slits 81, 82, 83, etc can be employed to detachably mount the Lamp Housing Assembly. Projections 11 are inserted in appropriate pairs of Mounting Slits 81, and not only support the Lamp Housing Assembly behind a Translucent Portion 71 of Display Panel 70, but also provide an electrical connection for the Baseplate 10. Mounting Strips 80 must be sufficiently near to Display Panel 70 to prevent stray light from reaching adjoining Translucent Areas. A second Lamp Housing Assembly may be positioned side-by-side with a first Assembly by placing the second Assembly in Mounting Slits 83. Placing one Baseplate Projection 11 in Terminal Strip Opening 82, the second Baseplate Projection 11 being inserted in an opening in

an appropriately located Mounting Slit, Lamp Housing Assemblies can be positioned end-to-end.

Application of the Preferred Embodiment

The two substantially identical Lamp Housing Units can be produced from a single mold. The use of the molded Lamp Housing Units allows features, such as the Ventilation Apertures to be added without additional fabrication.

Strength is added to the Lamp Housing Assembly in the preferred embodiment by using a metallic Baseplate 10. Light Bulbs are accessible from the rear of a Lamp Housing Assembly so that replacement of the Light Bulbs is possible without disturbing the display panel configuration.

The Lamp Housing Assembly, according to the preferred embodiment, contains two light Bulbs 40. With the dividing Partition 30 removed, the two Light Bulbs 40 provide a redundancy feature important in selected applications. The arrangement with two bulbs permits the maximum flexibility of display configuration, while maintaining the redundancy feature. When the Partition 30 is replaced in the Lamp Housing Assembly, two separate display regions may be illuminated, individually or collectively.

The two methods of mounting a Lamp Housing Assembly, shown in FIG. 5 and FIG. 6, provide flexibility in display configurations possible. Display Panel Backplate Openings may be added with comparative ease. Similarly, the positions of the Mounting Strips and the Mounting Slits can be conveniently altered. Because each Lamp Housing Assembly in the preferred embodiment contains only two Light Bulbs, additional flexibility is achieved.

In the preferred embodiment, two Light Bulbs have been employed in the Lamp Housing Assembly. However a Lamp Housing Assembly can be constructed with several Light Bulbs. For example, a Lamp Housing Assembly with ten Light Bulbs and nine Partitions could be used to illuminate an in-line decimal display.

In the preferred embodiments shown in FIG. 5 and FIG. 6, a translucent portion of a Display Panel 70 is demonstrated. However the translucent portion of the display can be attached to the front of the Lamp Housing Assembly itself. Thus for example in FIG. 5, Translucent Portion 71 is coupled directly to Lamp Housing Body 5 and the Display Panel 70 is not used. This display system has greater flexibility than the illumination of a part of a fixed Display Panel.

The above description is included to illustrate the operation of the preferred embodiment and is not meant to limit the scope of the invention. The scope of the invention is to be limited only by the following claims. From the above discussion, many variations will be apparent to one skilled in the art that would yet be encompassed by the spirit and scope of the invention.

What is claimed is:

1. A lamp housing assembly for supporting a plurality of lamps in a display unit comprising:
 - at least one removable partition;
 - a first part including a base section, first housing wall, a second housing wall and a third housing wall, said first housing wall extending above an upper surface at an exterior side of said base section, said second and said third housing walls extending above said upper surface at ends of said base section, said first housing wall connected to said second and third

- housing walls, said base section having portions removed from an interior side of said base section, said first housing wall including positioning means;
 - a second part substantially identical to said first molded part, said interior sides of said parts bonded together, wherein said third housing wall of each of said parts is bonded to said second housing walls of a remaining one of said part, said first, second and third housing walls forming an interior region of said lamp housing assembly, said lamps extending into said interior region through apertures formed by said portions removed from said base section, and said removable partition positioned in said interior region by said positioning means for optically separating at least one of said lamps from a remainder of said lamps; and
 - a base plate including means for removably coupling said plurality of lamps, said first and second parts further including fourth walls extending below a lower surface of said exterior side of said base section, said fourth walls further including first grooves generally parallel to said lower surface on interior sides of said fourth walls, said base plate slidably mounted in said first grooves.
2. The lamp housing assembly of claim 1 wherein said base plate includes a first coupling means for coupling said assembly to said display unit.
 3. The lamp housing assembly of claim 2 wherein said base plate includes at least two notches and wherein each of said first grooves contains a flexible projection, said flexible projection of said first and second parts engaging said grooves for positioning said base plate removably in said first grooves.
 4. The lamp housing assembly of claim 3 further including at least one leaf spring, wherein each of said fourth walls includes a second groove generally parallel to said lower surface, and disposed between said first groove and said lower surface, wherein each of said first, second and third walls contain a flange exterior to said lamp housing assembly, said leaf spring being coupled to said lamp housing assembly by engaging said second grooves, said exterior flange and said coupled leaf spring forming a second coupling means for coupling said lamp housing assembly to said display unit.
 5. The lamp housing assembly of claim 3 further including a wire spring, wherein each of said first housing walls including an opening, said wire spring being coupled to said lamp housing assembly by engaging said opening, said coupled wire spring and said exterior flange providing third coupling means for coupling said lamp housing assembly to said display unit.
 6. A display unit lamp housing module, said lamp housing module used in conjunction with a base plate and at least one leaf spring, said base plate having a first means for coupling to said display unit and means for coupling a plurality of removable lamps to said base plate, comprising:
 - at least one removable partition, and
 - two substantially identical mated molded parts, each of said molded parts including a base portion and a wall portion extending from an upper surface of said base portion, said wall portions of said molded parts and said upper surfaces of said molded parts forming an interior region of said lamp housing module, said wall portions including outer flanges on an exterior of said lamp housing module, said each molded part further including a support wall

extending from a lower surface of said base portion, said each support wall including a pair of inwardly facing flanges, said flanges and said lower surface forming an upper and a lower groove, lower grooves of said mated parts slidably engaging said base plate, said base portion having selected portions removed to form apertures in said module, said lamps extending into said interior region through said apertures, upper grooves of said mated parts for securing said leaf spring, said leaf spring and said outer flanges provided a second means for coupling to said display unit, said wall portions of said interior regions having positioning means for slidably coupling a said removable portion to said housing module, said partition adapted to isolate optically at least one of said plurality of lamps from a remainder of lamps.

7. The lamp housing module of claim 6 for use in conjunction with a wire spring whereby said wall portions contain cavities for securing said wire spring, said wire spring and said out flanges forming a third means for coupling to said display unit.

8. The lamp housing module of claim 6 wherein a one of said pair of flanges includes a projection for positioning said base plate, said projection engaging a notch in said base plate.

9. The lamp housing module of claim 8 wherein surfaces of said mated parts to be positioned in contact include cavities and pins, cavities of a first of said mated parts engaging pins of said first mated part engaging cavities of said second mated part.

10. The lamp module of claim 9 wherein said parts are molded from high impact plastic and wherein said molded parts are ultrasonically bonded together.

11. A lamp housing assembly for positioning a plurality of lamps in a display unit comprising:

at least one removable partition

a lamp housing including two substantially identical molded mated parts, each of said molded parts including a base section and a housing wall extending from an upper surface of said base section, said base sections and said housing walls forming an interior of said lamp housing assembly, said housing walls having an exterior flange, said base sections having portion removed to form a plurality base section apertures in said lamp housing, each of said molded parts further including a support wall extending from a lower surface of said base section, each of said support walls including a first and a second flange, said first flanges and said lower surfaces forming first grooves of said lamp housing, said first flanges and said second flanges forming second grooves of said lamp housing, said housing walls of said interior further including positioning means for positioning and securing said at least one removable partition;

a base plate having means for removably coupling said plurality of lamps to said base plate, said base plate slidably engaged in said second grooves, said lamps coupled to said base plate extending into said interior region, said removable partition opti-

cally separating at least one of said lamps from a remainder of said base plate further including means for coupling said lamps to a controllable power source, said base plate still further including a first coupling means for removably attaching said lamp housing assembly to said display unit; and

at least one leaf spring, said leaf spring secured in said first grooves of said lamp housing, said leaf spring and said exterior flange being a second coupling means for removably attaching said lamp housing assembly to said display unit.

12. The lamp housing assembly of claim 11 wherein said one of said first and second flanges includes a projection, and wherein said base plate includes at least two notches, said lamp housing projections engaging said notches to position removably said base plate relative to said lamp assembly.

13. The lamp housing assembly of claim 12 further including a wire spring, wherein said lamp housing walls have openings, said wire spring being attached to said lamp housing by being inserted in said openings, said wire spring and said exterior flange forming a third means for coupling said lamp housing assembly to said display unit.

14. The lamp housing assembly of claim 12 further including translucent areas, said translucent areas coupled to said lamp housing.

15. A display unit, utilizing a plurality of lamps for exhibiting patterns, comprising:

at least one front panel including a plurality of translucent areas, a selected translucent area exhibiting a one of said patterns when said area is illuminated by at least one lamp;

a plurality of lamp housing assemblies, each of said assemblies supporting at least two removable lamps in an interior region of said assemblies, each lamp housing assembly including at least one partition and means for removably coupling said partition to a remainder of said lamp housing assembly, said partition dividing said interior region, wherein two of said translucent areas can be illuminated by said removable lamps when said partition is coupled to said remainder of said lamp housing assembly, wherein one of said translucent areas region can be illuminated by more than one lamp when said partition is removed from said remainder of said lamp housing assembly; and

support means for positioning a one of said lamp housing assemblies behind a selected translucent area containing at least one of said patterns to be exhibited, wherein said support means includes movable mounting strips containing slots for removably engaging prongs of said lamp housing assembly.

16. The display unit of claim 15 wherein said support means further includes a display unit back plate and wherein said lamp housing assembly includes at least one leaf spring and an exterior rim for mounting said lamp housing assembly to said display unit base plate.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,775,607 Dated November 27, 1973

Inventor(s) John W. Blomstedt

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 7, line 17, after "of", insert --said--.

Signed and sealed this 7th day of May 1974.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents