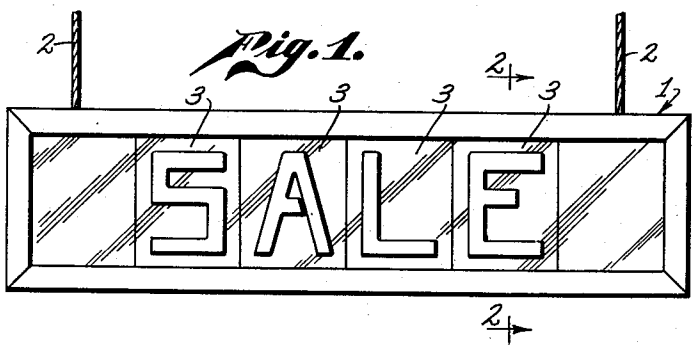
Jan. 25, 1938. A. L. SMITH 2,106,331

ELECTRIC SIGN DISPLAY AND METHOD OF MAKING SAME

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Fig. 1.



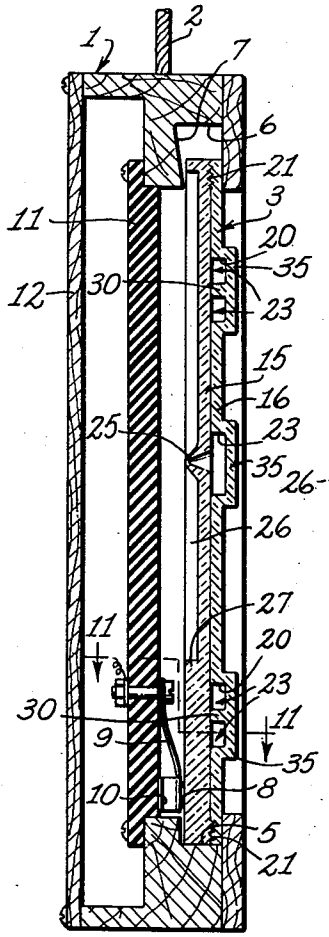
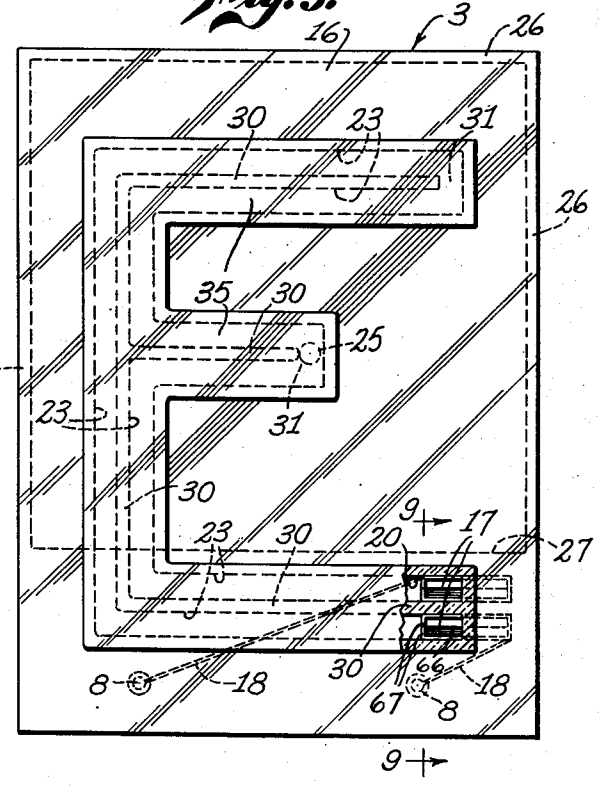


Fig. 2.

Fig. 3.



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By Thurston & Thurston

Attorneys

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ELECTRIC SIGN DISPLAY AND METHOD OF MAKING SAME

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Fig. 4.

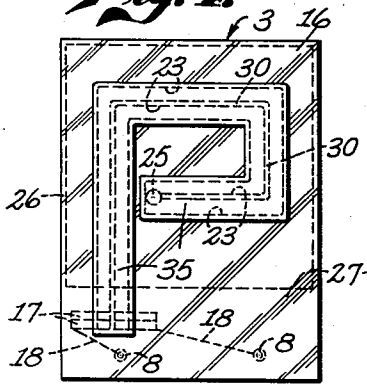


Fig. 5.

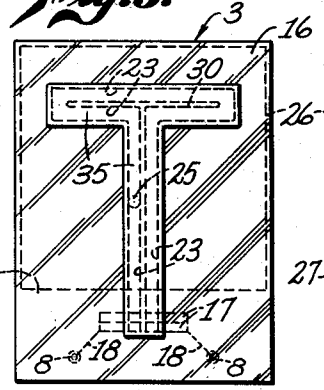


Fig. 6.

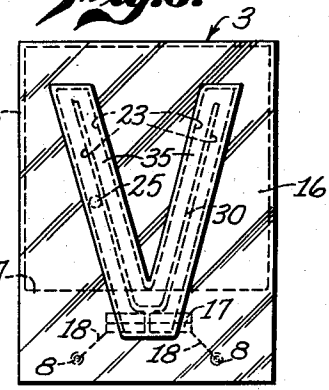


Fig. 9.

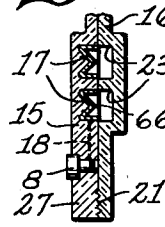


Fig. 13.

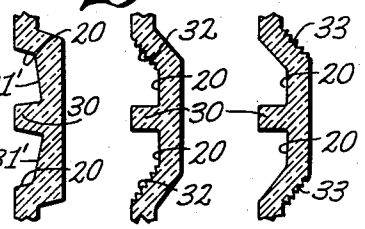


Fig. 12.

Fig. 14.

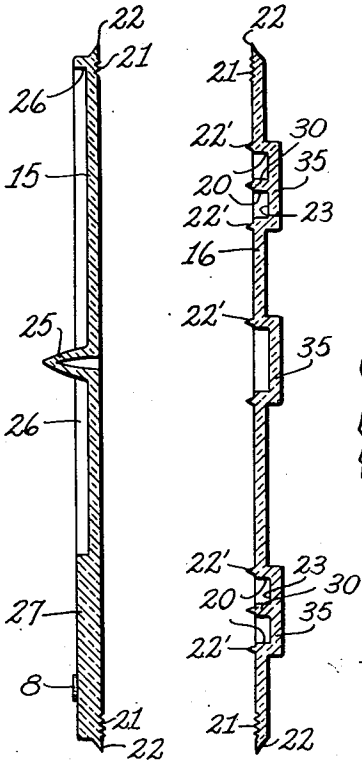


Fig. 7.

Fig. 8.

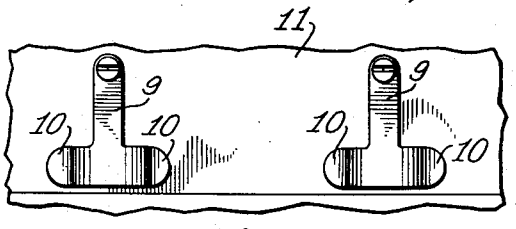


Fig. 10.

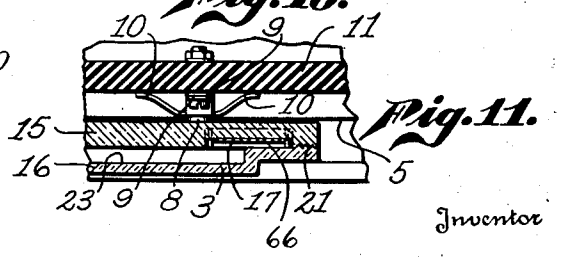


Fig. 11.

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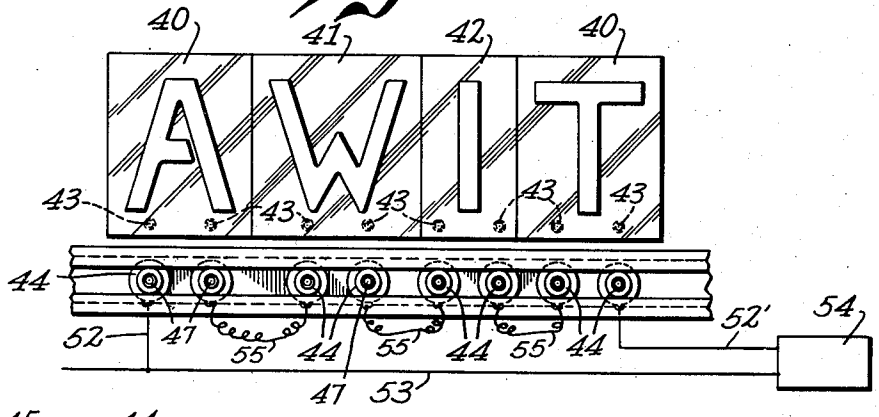
Attorney

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ELECTRIC SIGN DISPLAY AND METHOD OF MAKING SAME

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Fig. 15.



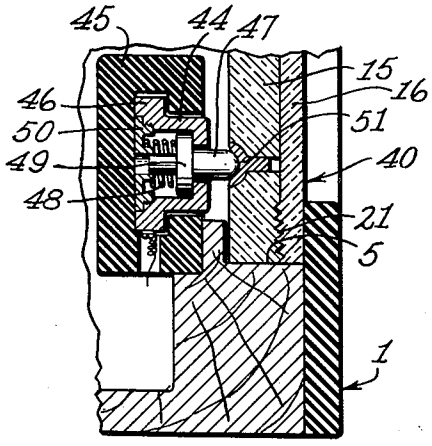


Fig. 16.

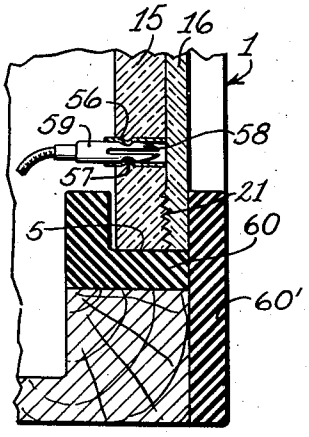


Fig. 17.

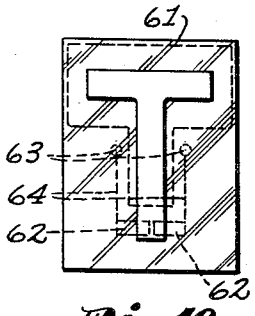


Fig. 18.



Fig. 20.

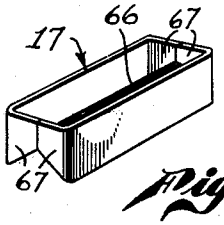


Fig. 19.

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Patented Jan. 25, 1938 2,106,331

UNITED STATES PATENT OFFICE

2,106,331

ELECTRIC SIGN DISPLAY AND METHOD OF MAKING SAME

Arthur Laurence Smith, La Canada, Calif., assignor to Neon Lights, Incorporated, Los Angeles, Calif., a corporation of California

Application November 6, 1935, Serial No. 48,457

11 Claims. (Cl. 40—130)

My invention relates to the art of electrical displays such as are commonly used for advertising purposes and which consist of luminous letters, figures and designs. My invention, however, is more particularly directed to that class of electrical displays which utilize as a lighting medium neon or other rare gases and lends itself to the use of interchangeable molded glass units which may be readily assembled in a suitable frame, such as a marquee, for the purpose of forming what is commonly designated as a sign.

The units, above referred to, whether used in assembled fashion as above referred to or when used separately as individual displays are preferably formed of two molded plates of glass, one of which plates has molded wholly in its face a groove or channel in the shape of the figure desired, such as for instance, a letter. The channel in the face of one plate when the two plates are joined as hereinafter described, forms a conduit for the gas and constitutes a continuous gas chamber, appropriate electrodes being arranged at each end of the chamber with the necessary electrical connections embedded in the glass to contact terminals which are exposed on the outer rear surface of the unit. A noteworthy feature of the units is that all of the electrical operative parts are embedded in what I term the back plate of the unit, the front plate containing only the groove or channel forming the illuminated portion of the display.

The ordinary well known type of neon sign has a number of limitations which limit the field of use of such signs due partly to the fact that they consist of a fragile tube of glass forming a structure which permits of no flexibility or change after the sign or its component elements have been completed.

One of the principal objects of my invention is to produce what may be termed a unit sign or display in which interchangeable units are employed, each unit being composed of molded glass formed by the union of a front and back plate, one of the plates containing the gas chamber and the other plate containing the necessary electrical equipment for the ionization of the gas in the chamber or passage in the other plate.

Another object of my invention is to make such units of substantial structure each unit being a complete molded envelope for the gas and electrodes therein.

Another object of my invention is the production of luminous sign units constructed in such a manner as to permit the use of types of letters and designs other than the ordinary script letter of the common neon sign, and another object of the invention is to provide molded glass sign units having provision made by which the unit may be refilled with gas by a simple and economical operation. Other objects and advantages will appear hereinafter from the following description and the drawings.

Referring to the drawings which are for illustrative purposes only—

Fig. 1 is a face view of a marquee or frame having a display therein formed of units diagrammatically illustrating the arrangement of units embodying my invention;

Fig. 2 is an enlarged vertical sectional view on line 2—2 of Fig. 1;

Fig. 3 is a face view of the unit shown in Fig. 2;

Fig. 4 is a face view of a unit showing the arrangement used for the letter "P";

Fig. 5 is a face view of one of the units illustrating the letter "T";

Fig. 6 is a face view of one of the units illustrating the letter "V";

Fig. 7 is a vertical sectional view of the back plate of one of the units showing the evacuating extension in its form prior to the gas filling operation;

Fig. 8 is a corresponding vertical section view of the front plate of one of the units;

Fig. 9 is a sectional view on line 9—9 Fig. 3, the section being taken through the electrodes and associated parts;

Fig. 10 is a face view illustrating a form of spring contact used on the contact or control board;

Fig. 11 is a sectional plan view on line 11—11 Fig. 2;

Fig. 12 is an enlarged fragmentary sectional view through the gas conduit or chamber of a front plate showing a modified manner of forming the walls of the conduit;

Fig. 13 is a view similar to Fig. 12 showing another modified form of the walls of the conduit;

Fig. 14 is a view similar to Fig. 12 showing a further modified form of the walls of the conduit;

Fig. 15 is a diagrammatical illustration of a series of units and a modified manner of arranging the electrical connections of such units;

Fig. 16 is an enlarged vertical sectional view illustrating a portion of the lower part of one of the units and the modified arrangement of the electrical connections therefor of the form shown in Fig. 15;

Fig. 17 is a view similar to Fig. 16 showing another form of an electrical connection;

Fig. 18 is a diagrammatic face view of one of the units showing a modified form of arrangement of the electrical connections in the unit, in which form such connections are so arranged as to be disposed centrally of the unit and therefore distant from any metal supporting member;

Fig. 19 is a perspective view of one form of electrode;

Fig. 20 is a diagrammatic face view of a display showing a design.

Referring more particularly to the drawings, I

indicates the frame of a display or marquee supported by cables 2; the numeral 3 indicates display units forming the complete display.

It is to be understood that the supporting frame or marquee may vary in construction but in the form shown, as illustrated in Fig. 2, the frame 1 is provided with channels 5 and 6, arranged to receive the units 3 which units are inserted in the channels by tilting the lower edge of the unit outwardly and inserting the upper edge of the unit in channel 6, which channel is cut away as illustrated at 7, to permit the insertion of the upper edge of the unit when so tilted. After the upper end of the unit is received by the channel 6 the lower end is moved inwardly into the channel 5 and the unit assumes the position shown in Fig. 2. Each unit is provided with two contact terminals 8 preferably formed of brass which are arranged either with one face flush with, or slightly extended beyond the rear face of the unit or slightly below the rear face of the unit. When the unit is in place, as above described with the form shown, such contact terminals are engaged by spring contact plate 9, such contact plates having lateral extensions, indicated at 10, to insure that the terminals 8 on the plate are engaged by such spring contacts. The spring contacts 9 are mounted in any preferred manner on what I have termed a contact or control board 11, preferably formed of insulating material, secured to the frame of the marquee in any suitable manner, the contact board and electrical connections being covered by means of a back cover plate indicated at 12.

Each of the units 3 is formed of two plates of molded glass, a back plate 15 and a front plate 16, the back plate 15 having embedded therein the contact terminals 8, heretofore referred to as electrodes, illustrated at 17, and the connections, such as wires or straps 18 between the electrodes and the terminals 8, the only portion of such electrical connections exposed when the unit is finished being the face of the terminals 8, as clearly shown in Fig. 9. The front plate 16 is molded with the channels 20 forming the display therein. The corresponding faces of the front and back plates are corrugated or grooved as indicated at 21, and are formed with outwardly extending lips 22 for the purposes hereinafter described. The corresponding faces of the two plates, that is the inner surface or faces of the front and back plates of the unit, while still at a high temperature, though not at a temperature to allow "flow" of the glass, are further heated to bring such surfaces to a temperature which is sufficiently high to fuse or join the two plates into a single unitary structure when they are pressed together. The corrugations or grooves of the respective plates are interfitting, and together with the joined faces of the plates, seal the plates together thereby forming the vacuum unit, above referred to. It will be understood that when these two plates are pressed together that the back plate closes the channel 20 thereby forming a sealed passage or gas chamber, indicated at 23 in Fig. 2, which may be in any desired form, for the reception of such gas as may be used in the particular unit. If it is desired ridges or pointed ribs indicated at 22' may be formed on the back of the front plate which extend parallel with the channel 20 so that when the two plates are pressed together in a heated state the additional glass forming the ribs flattens out and insures sealing of the two plates about the channel. The deformation of these ribs 22' during the joining operation, caused by the heat and pressure, precludes any possibility of the ribs acting to space the plates apart.

As an additional sealing means after the two plates have been pressed together and formed into a unit, as above described, and while the unit is still in heated condition, a torch is applied to the lips 22 melting such lips down and thereby further joining and sealing the two plates together insuring a perfect vacuum seal.

It is to be understood that any of the well known methods may be used in properly supporting the terminals and the electrodes with their connecting wires in the mold until the glass is poured and that such means as for instance cover plates may be used as necessary to prevent the molten glass from flowing into the electrodes during the molding operation of the back plate so that the electrode will be exposed on the inner surface of the back plate when the molding operation is completed.

While for the purpose of illustrating the complete finished unit, as for instance in Fig. 2, a line indicates a division in the unit between the front and back plate, it is to be understood that when the unit is completed that no such division in fact exists due to the fact that the contacting faces of the front and back plates are fused, or welded together thereby forming in fact a single unit from molded plates.

One of the important features of my invention is the arrangement of the structure of the unit so that evacuation of the unit may be simply performed. This is done by forming, during the molding of the back plate, a tubular extension, best shown in Fig. 7 at 25. It will be noted that this tubular extension coincides with the passage 23 in the front plate and when closed, in the usual manner after evacuation of the unit the extension is within what may be termed a depressed portion of the back of the plate, such plate being formed with a flange 26 extending around the edge of the plate at both sides and at the top of the plate above the lower portion 27 of the plate, which lower portion of the plate is of the full thickness of the plate for the purpose of receiving the electrodes, terminals and connections heretofore referred to.

It is to be understood that evacuation or pumping of the unit is performed through the tubular extension 25 after the front and back plates have been formed into one unitary structure, the extension then being sealed, as is well known in practice, assuming the form shown in Fig. 2.

One of the important features of my invention is the novel construction of the channels forming the gas chamber or conduit. Each channel 20 comprises two parallel courses divided by a thin wall or web 30 therebetween except at such points as for instance as illustrated at 31 in Fig. 3, the web is omitted thereby forming an open channel with an electrode in each end as shown in the broken away portion of Fig. 3. Upon the gas therein being energized and luminous this arrangement of the gas channel produces the appearance of wide letters equal to the width of the two parallel courses of the channel thereby producing an entirely new effect in luminous displays. This arrangement, of what might be termed parallel courses of the channel, lends itself to the accomplishment of a very desirable object in the production and also the use of unit displays of the class herein described. This feature referred to is the arrangement of the electrodes and the contact terminals in the units

in corresponding locations so that when the units are assembled in a sign or display it permits the contact terminals of the various units to be symmetrical if so desired. It will be noted that preferably the contact terminals in the different units, shown in Figs. 3 to 6 inclusive, are all arranged in the same position in the respective units, and that in these different units the electrodes are all arranged on the same horizontal line equidistant from the bottom of the units, such arrangement of the electrodes being permitted by reason of the fact that the letters are formed with the parallel or double course channel arrangement hereinabove described, in which the ends of the channel are adjacent to each other at the lower end of each letter. It will be readily apparent that with the electrodes arranged as described, both at one end of the channel, that no linear ionization of the gas in the channel would take place without provision of the web or wall 30 which in fact divides the channel into two courses the ends of which are coincident with the electrodes.

The form of channel used in the production of letters particularly lends itself to variations in construction which may be used for increasing the lumen output of the display. Several of such modifications are shown in Figs. 12 to 14 inclusive, where the walls 31' of the channel, shown in Fig. 12, are angularly disposed, the walls 32 of the channel shown in Fig. 13 being formed of refracting prisms and as shown in Fig. 14, the back or outer portion of the channel, indicated at 33 being formed of a series of refracting prisms.

As clearly shown in Figs. 2 and 8, the front plate is flat except that the glass walls of the channels are raised above the face of the plate as indicated at 35. The result of so molding the glass is that the letter or design on the unit is raised or stands out on the surface of the unit forming a daylight sign or display. This effect may be made more pronounced in various ways among which may be mentioned the application to the front face of the unit, except the raised letter or design, of glass enamel of different colors or the use of opal or colored glass for the back plate of the unit in which instance the front plate or front half of the unit would be of clear glass permitting the rear white opal glass to be visible in the configuration only.

Various forms of electrically connecting the units to the source of power may be used and while I have generally described a simple form of a spring contact as shown particularly in Figs. 10 and 11, I have particularly illustrated a simple modified form of contact in Figs. 15 and 16. This form of electrical connection is desirable where units of different widths are used. For instance, while the units designated at 40 in Fig. 15 are of the same width, the unit "W" indicated at 41 is wider than the units 40 and the unit containing the letter "I" indicated at 42 is narrower than any of its associated units. For the purpose of readily making contact between the source of electricity and the contact terminals, diagrammatically illustrated at 43, a series of roller contact members, such as indicated at 44, are mounted in one or more tracks 45 of non-conducting material. The roller 44 has a flange 46 which rides in the grooved portion of the track. Each roller 44 contains a contact pin 47 which is yieldably pressed outwardly by means of a coil spring 48 which spring engages between a flange 49 on the pin 47 and a screw cap 50 threaded into the back of the roller. The yieldable contact pin 47 extends into and engages a cup contact, indicated at 51, which has been molded in the back plate 15 of the unit 40, it being understood that the unit is mounted in any suitable frame in the manner heretofore described with respect to Fig. 2.

As diagrammatically illustrated in Fig. 15, the first contact member 44 is electrically connected by means of a flexible connection, illustrated at 52, to a lead wire 53 connected to a transformer 54, the last contact member is connected directly to the transformer by a wire 52' and the intermediate contacts in series by wires 55, the wires 52 being of sufficient length to permit the contact members 44 to be moved in proper position in the track or tracks 45, so that they will respectively register with the contact terminals on the respective units.

In the form of connection shown in Fig. 17, the back plate has molded therein, a metal cylinder, indicated at 56, which cylinder is formed with an inwardly extending bead 57 for the purpose of receiving and engaging the jaws 58 of a plug contact 59. As an additional safeguard against short circuiting the portions of the marquee or frame indicated at 60 and 60' may be made of insulating material.

In the event that the marquee or supporting frame for the display is made of metal, either in whole or in part, it is desirable to place the contact terminals on the units as far away from the frame as possible. Fig. 18 illustrates a unit 61 in which, while the electrodes 62 are arranged at the base of the letter as heretofore described, the contact terminals diagrammatically illustrated at 63 are centrally disposed with respect to the top and bottom of the unit, the connections 64 between the electrodes and terminals being diagrammatically illustrated on the drawings. While it is to be understood that various types of electrodes may be used I prefer to use the type shown in Fig. 19 which is formed by bending, stamping or otherwise forming a blank into the trough shape shown having an outwardly extending ridge 66 throughout its central portion and the ends being formed by bending, stamping or otherwise forming the corners, indicated at 67. When this form of electrode is used, it will be noted, as illustrated in Figs. 3 and 9, that the electrode is open to the gas passages and that by so forming the electrode, a large area of exposed electrode surfaces is obtained. This form of electrode is particularly adaptable for use as in the pouring operation of the glass forming the back plate; the open portion of the electrode may be temporarily covered by a cap or plug as is well understood by those familiar with the art.

By the arrangement of the tubular extension, above described for filling the unit with gas, it will be understood that refilling the gas chamber may readily be done without interference with the electrodes or other parts of the unit, it being practical to reheat the entire unit to a sufficient temperature for this purpose if desired. In using the method of forming the unit by reason of the fact that the device is provided with independent edge seals in addition to the surface seal of the two plates, as above described, it will be understood that the usual or severe "bombardment" will ordinarily be unnecessary as the gas may be introduced into the unit before the virgin glass (largely free of gases) unit has cooled. The electrodes and other metal parts have already been brought to highest safe temperature and

partially degassed in the mold at the time glass is poured thereinto.

It is to be understood that while I have particularly described my invention as applicable to displays consisting of a number of units, a display may consist of a single unit showing a figure, letter or any desired design. It is further to be understood that the glass units being under heat from the initial molding operation until the gas is introduced and the unit sealed that the unit is substantially free of occluded gases so that the usual bombardment may be omitted.

While I have particularly described certain embodiments of my invention it is to be understood that I do not thereby limit my invention to the precise construction as herein described, but include within its scope whatever changes fairly come within the spirit of the appended claims.

I claim as my invention:

1. A luminous sign unit comprising: a front and back plate of glass fused into a single unit, the front plate having channels formed wholly therein which when covered with the back plate form gas receiving chambers; and electrodes and conduction means molded within the back plate for energizing the gas, said electrodes having a portion thereof exposed to the channels in the front plate; said back plate having a tubular glass extension formed thereon communicating with the gas chamber in the front plate.

2. A luminous sign unit comprising: a front and back plate of glass sealed together in a single unit, said front plate having a gas chamber wholly therein, said back plate having a depressed portion in its rear face; laterally extending electrodes at each end of the chamber wholly within the back plate; and a tubular glass extension in the back plate opening into said chamber in the front plate, said tubular extension being within said depressed portion of the back plate and being shorter in length than the depth of the depressed portion.

3. A luminous molded glass sign unit comprising: two sealed plates of glass; one of the plates having channels formed wholly therein which together with the inner face of the other plate form a gas conduit; a sealed-in electrode at each end of the gas conduit within the other plate; terminals embedded in the unit having an exposed portion on the face of one plate; and wires sealed in the unit extending from the electrodes to the terminals.

4. A luminous molded glass sign unit comprising: two sealed plates of glass; one of the plates having channels formed wholly therein which together with the inner face of the other plate form a gas conduit; a sealed-in electrode at each end of the gas conduit within the other plate; terminals embedded in the unit having an exposed portion; and wires sealed in the unit extending from the electrodes to the terminals; said electrodes being exposed to and coincident with the ends of the channel in the other plate.

5. A luminous molded glass sign unit comprising: two sealed plates of glass; one of the plates having channels formed wholly therein which together with the inner face of the other plate form a gas conduit; a sealed-in electrode at each end of the gas conduit within the other plate; terminals embedded in the unit having an exposed portion; and conductors sealed in the unit extending from the electrodes to the terminals; said electrodes each consisting of a trough shaped member exposed to the channel in the other plate.

6. A luminous molded glass unit formed of two flat plates of glass sealed together having a gas conduit therein; and an electrode at each end of the conduit; walls on one plate of the unit forming the conduit forming raised portions on the plate outlining the configuration of the conduit, such raised portions of the one plate having a division wall formed thereon extending inwardly to the other plate dividing said conduit.

7. The method of making luminous sign units which consists in molding a front and back plate of glass, the front plate being formed with a channel wholly therein and having ribs extending from its rear face around the edges of the channel; applying additional heat to the rear face of the front plate; heating the front face of the back plate; and sealing the channel by pressing the heated faces of the plates together to deform the ribs and form a seal.

8. The method of making luminous sign units which consists in molding a front and back plate of glass, the front plate being formed with a double course channel wholly therein and having ribs extending from its rear face around the edges of the channel, and the back plate having embedded therein electrodes coincident with the ends of the courses in the other plate; applying additional heat to the rear face of the front plate; applying additional heat to the front face of the back plate; pressing the heated faces of the plates together deforming said ribs to form a gas chamber of the channel and seal the electrodes within the unit; and then melting the edges of the plates about the unit to form an additional seal.

9. The method of making luminous sign units which consists in molding two plates of glass one of which is formed with a channel therein and having ribs extending from its rear face around the edges of the channel and the other of which has embedded in the glass an electrode coincident with the ends of the channel in the other plate, applying additional heat to the surface of the plate having the channel therein, applying additional heat to one surface of the other plate, and pressing the heated surfaces of the plates together deforming said ribs to form a gas chamber of the channel and seal the electrodes within the unit; then filling the chamber with gas before the unit has cooled to normal temperature.

10. In a luminous sign of the class described, the combination of: a front and back plate of glass fused into a single unit forming a gas chamber therein, said back plate having terminals molded therein with exposed portions on the surface of said plate; and movable roller contact members adapted to engage the exposed portions of said terminals, said roller contact members being adapted to be connected to a source of electrical current.

11. In a luminous sign of the class described, the combination of: a plurality of luminous glass units having gas chambers therein and having terminals molded therein with exposed portions on the surface of said units; a member mounted adjacent to said glass units having recessed portions therein forming a track; roller contact members movably mounted in the track of said member, said contact members being adapted to engage the exposed portion of said terminals and means for connecting said contact members to a source of electrical current.

ARTHUR LAURENCE SMITH.