June 13, 1933. C. M. H. NELSON 1,913,815

COMPOSITE LUMINESCENT TUBE CIRCUIT

Filed Dec. 15, 1931 2 Sheets-Sheet 1

FIG. 1.

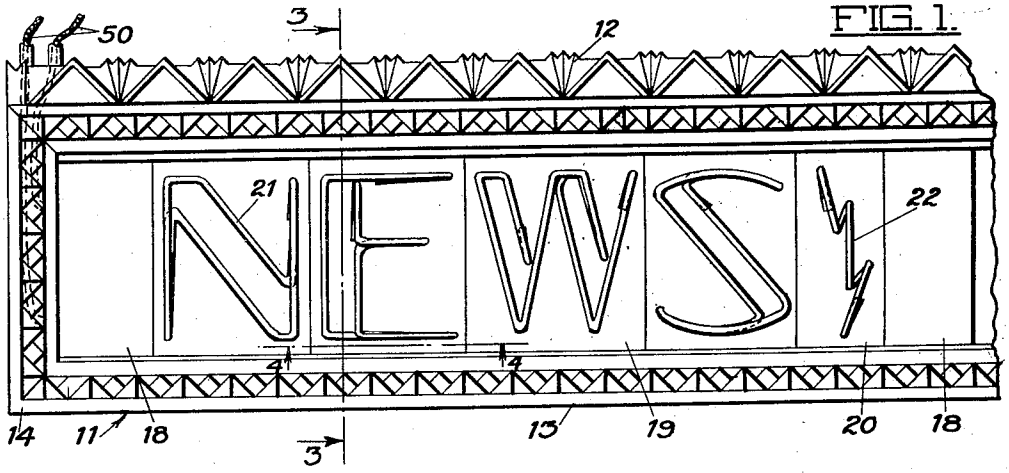


FIG. 2.

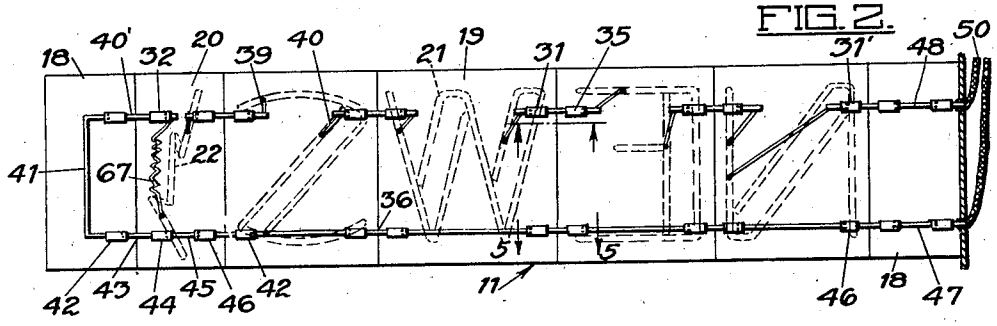
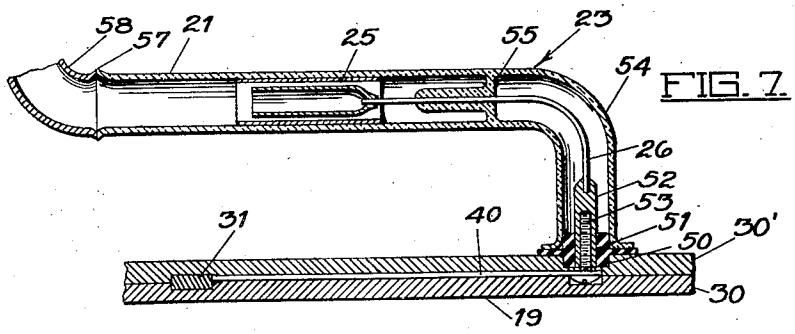


FIG. 7.



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FIG. 3.

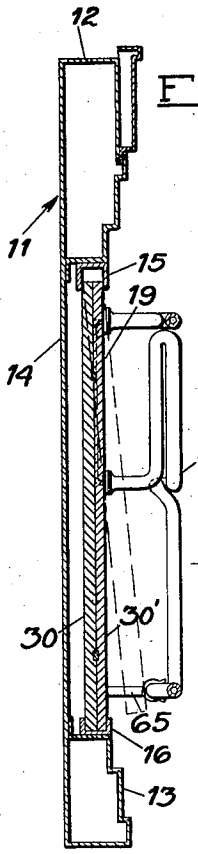


FIG. 6.

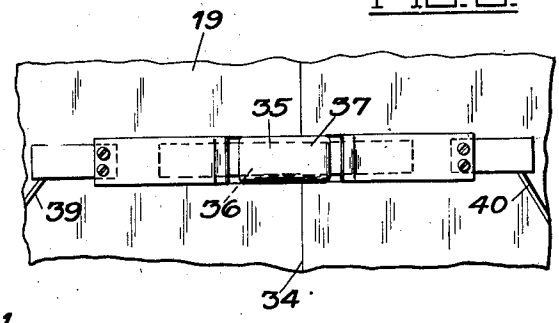


FIG. 5.

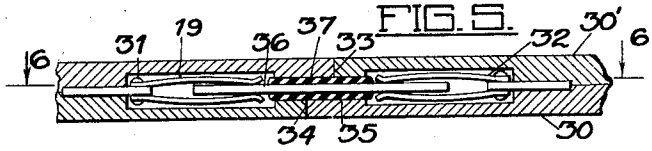


FIG. 4.

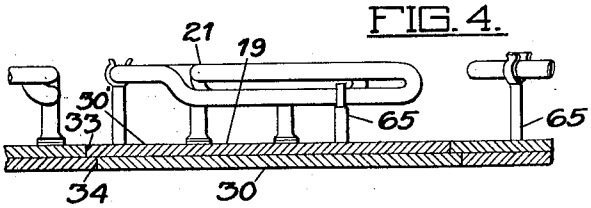
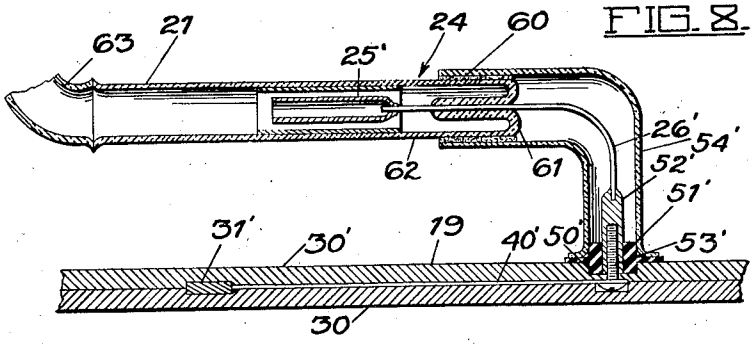


FIG. 8.



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UNITED STATES PATENT OFFICE

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COMPOSITE LUMINESCENT TUBE CIRCUIT

Application filed December 15, 1931. Serial No. 581,171.

This invention has to do in a general way with illuminated signs such as are used on marquees, store fronts, sign boards and the like, and is more particularly related to signs of this nature which employ the so-called neon or gas-filled luminescent tubular indicia or characters. It is a primary object of this invention to produce a sign of this character which is of simple form and construction in which the individual letter or indicia units can be independently removed and changed so as to produce a sign having any desired characteristic or reading matter thereon.

I am aware of the fact that attempts have been made to produce signs of the general character referred to above wherein the sign proper is made of individual letter units, the letter in each unit comprising a "neon tube". So far as I am aware, however, signs of this character comprise a backing plate which is associated with a box of considerable depth and the box for each backing plate contains a transformer connected to the electrodes of the letter which extend through the backing plate. It will be seen that in signs of this character there must be as many transformers as there are letters, making the sign very heavy and very expensive. Furthermore, the depth of the box which contains the transformer and the extending ends of the electrode makes the individual units very bulky so that these units are difficult to remove and install. Signs of this character have not therefore come into general use. Furthermore, the electrodes extending through the backing plates are liable to breakage, and, if broken, this peculiar construction makes the replacement of the electrodes or the placement of new letters on the signs extremely difficult.

It is, therefore, one object of this invention to produce a sign of the class described wherein a single transformer will supply the high frequency and high potential electrical energy for a whole series of individual units. This feature of the invention reduces the weight of the sign to a very great extent; it also reduces the bulk of the individual units and facilitates their handling so that they may be easily and quickly changed by one person. With a further view to facilitating the installation and removal of the units, I have devised a novel form of connection whereby the conducting portions or conductors in the individual units may be easily and quickly interconnected.

It is a further object of this invention to eliminate the breakage of the individual electrodes and to facilitate the construction of the signs by providing a novel means for connecting the tubular indicia or letter units to the backing plate itself.

It is a further object of this invention to produce a sign of the class described which is substantially weather proof and the arrangement of the conducting elements in the various units is such as to prevent the loss of current due to arcing over and corona effects ordinarily present where currents of high frequency and high potential are employed.

The general construction of the sign contemplated by this invention comprises a frame which may be formed on a marquee, a store front or a sign board and such frame is provided with means for supporting a plurality of individual plate units. Each of these plate units is provided with a letter or other suitable character preferably formed from a glass tube and provided with an electrode in its end portions. The tube is filled with a suitable gas under the proper pressure conditions to permit its illumination when the electrodes are subject to a current of high frequency and high potential. The backs of these individual plates or supports are provided with conducting clips, two of which are oppositely disposed and arranged in parallel relation and are connected to the two electrodes of the letter by means of a suitable conductor. In addition to these two clips the back of each individual plate is provided with a bus-bar which has its end portions connected to similar clips, the bus-bars and the spaced clips on all of the individual units being arranged so that they fall in alignment when the units are placed in the supporting frame. The clips and the bus-bars with their associated clips are interconnected by means of connecting mem-

bers which extend through suitable spaces either provided in or formed behind the plate members. The end electrodes of one end unit of the series are interconnected so that all of the letters are connected in series and the end electrodes at the other end of the series are connected to a source of high potential and high frequency electrical energy. In order that the clips and their associated bus-bars and connecting members may be insulated from each other, I prefer to form the supporting plates of a dielectric or non-conducting material such as glass or bakelite and to facilitate the construction of the unit I propose to form these units of two such plates which are secured with their faces in substantial engagement.

The details in the construction of a preferred form of my invention, together with other objects attending its production, will be best understood from the following description of the accompanying drawings which are chosen for illustrative purposes only, and in which—

Fig. 1 is an elevational view showing a portion of the front surface of a marquee equipped with a preferred embodiment of my invention;

Fig. 2 is an elevational view showing the back of the sign portion shown in Fig. 1 with one set of plates which go to make up the individual supporting units removed so as to show the conducting clip and bus-bar connections;

Fig. 3 is a sectional elevation which may be considered as having been taken in a plane represented by the line 3—3 in Fig. 1;

Fig. 4 is an inverted plan section taken in a plane represented by the line 4—4 in Fig. 1;

Fig. 5 is an enlarged sectional view taken through the bus-bar and clip connection between two adjacent plates in a preferred form of my invention;

Fig. 6 is a sectional view taken in a plane represented by the line 6—6 in Fig. 5;

Fig. 7 is a sectional view illustrating the details in the construction of a preferred form of electrode support;

Fig. 8 is a sectional view similar to Fig. 7, illustrating a modified form of electrode support.

More particularly describing the invention as herein illustrated, reference numeral 11 indicates what I may term a frame having a top member 12, a bottom member 13, and an end member 14. The frame is shown in Fig. 3 as being of pressed metal construction and the top and bottom members 12 and 13 are interconnected by a back plate 14. Grooves or channels 15 and 16 are formed on the inner edge of the top and bottom members 12 and 13 and these grooves are adapted to removably receive individual plate units which I have indicated by reference numerals 18, 19 and 20. The plate units 18 are shown as having plain front surfaces, the plate units 19 are shown as having letters 21 provided on their front surfaces and the plate unit 20 is shown as being provided with another form of indicia 22.

Each of the letter members 21 is formed from a glass tube of the usual type employed in the construction of so-called neon signs. The end portions of these tubes are provided with electrodes either on the top, shown at 23 in Fig. 7, or 24 in Fig. 8. The manner of mounting these characters on the various plate members will be described in detail in connection with Figs. 7 and 8. Suffice it to say at this time that the two electrodes 25 and 25′ in each character are connected to conductors 26 and 26′ through which current is supplied to the electrodes.

As pointed out in the fore part of the specification, I consider it preferable for the purpose of insulating the unit and avoiding the presence of the so-called corona effect or arcing over between the different conductors, to form the supporting plates from two plate members which are secured together with their inner faces in substantial engagement. This construction is perhaps best illustrated in Figs. 3, 4, 5, 7 and 8 where the supporting plates are shown as being made up of two members indicated by reference numerals 30 and 30′. These members are preferably composed of suitable dielectric material such as glass or some non-conducting composition such as bakelite and one or both of the members near their upper edges are provided with recesses for the reception of conducting bars or clip members indicated by reference numerals 31 and 32. It will also be observed that the adjacent edges of the plates are arranged so as to have overlapping lips indicated by reference numerals 33 and 34 and in alignment with the clips the edges of the plate members are provided with recessed portions 35 through which a connecting bar 36 extends.

The purpose of overlapping the adjacent edges of the plate members is to prevent the ingress of moisture into the recesses containing the conducting members, and as a further precaution against the conductors being shorted by moisture I provide the connecting bars 36 with a packing sleeve 37 which is preferably composed of rubber or other suitable non-conducting material.

The clip members 31 and 32 are connected through suitable conducting wires 39 and 40 with the respective electrode terminal ends of their associated letter or character. In this way it will be observed from Fig. 2 that when the clip members on adjacent sides of the adjacent plate members are connected by their respective connecting bars 36, all of the letters which make up the sign are connected in series.

In order to complete the circuit the clip member 32′ associated with the electrode at one end of the series is connected through a suitable connecting bar 40′ with a return connection 41 which is connected at its lower end to a clip member 42. This clip member 42 is connected through a connecting bar 43 with another clip member 44 which in turn is connected to a bus-bar 45 extending clear across the lower end portion of its corresponding plate member. The opposite end of the bus-bar 45 is provided with a clip member 46 which in turn is connected through another connection 42 to another clip member 44 and so on through bus-bars and clip members to the other end of the series where a plate member provided with two parallel bus-bars 47 and 48 connected to the lower bus-bar clip 46 and the upper electrode clip 31′ respectively, provide means for connecting all of the letters in the sign in series through conductors indicated at 50 with a source of high potential and high frequency electrical energy, not shown.

As pointed out above, all of these bus-bars and clip members are positioned between two plates of non-conducting material so that there is no possibility of arcing over between the conductors, and, furthermore, there is no possibility of loss of potential due to the so-called corona effect which ordinarily surrounds exposed conductors which are contacting high frequency and high potential electrical energy.

It will be seen from the construction so far described that the sign contemplated by this invention is constructed so that it is very light in weight, the individual units may be easily and quickly replaced, the only operation for removal being the slight longitudinal sliding movement to disconnect the connecting bars, followed by a lifting movement to raise the upper end of the plate into the channel 15 so that the lower end of the plate may be swung outwardly over the outer lip of the channel 16.

It was pointed out above that this invention also contemplates a novel type of letter or electrode support, and in Figs. 7 and 8 I have shown two such supports which are particularly adapted for use in connection with the sign contemplated by this invention. Referring to Fig. 7, it will be observed that the plate member 19, which is made up of sections 30 and 30′, has a recess 50 provided in its front face. This recess receives a flanged packing sleeve 51 which surrounds a conducting pin 52, the pin being held in the plate by means of a screw 53 which extends upwardly through the inner face of the plate 30 and which, incidently, is employed to form contact between a conductor 40 leading to a bus-bar or clip member 31 and the conducting pin 52. Reference numeral 54 indicates what I have termed an elbow sleeve which has its inner end provided with a flanged portion adapted to fit over the non-conducting or packing sleeve 51 and the bent portion of this sleeve is provided with a sealing partition 55 through which the conductor 26 extends. The outer end of this conductor 26 is attached to the pin 52 and the inner end of the conductor 26 is attached to the tube electrode 25. The upper end of the elbow sleeve 54 is shown as being welded at 57 to a tube 58 from which the letter or other indicia are formed. This tube, after being connected with the electrode, is evacuated and filled with a suitable gas in the usual manner employed in making luminescent tubular signs of this character.

In order to render the elbow sleeve and its associated parts substantially invisible when the tube is illuminated, this portion of the tube may be formed from an opaque glass or may be painted in the usual manner.

The connection shown in Fig. 8 differs from that shown in Fig. 7 in that the elbow sleeve 54′ which fits over a packing sleeve 51′ is provided in its outer end with a packing ring 60. This packing ring slidably receives a sealed end 61 of an electrode sleeve 62 which contains the electrode 25′ and is welded to or is formed with the indicia tube indicated by reference numeral 63. The electrode 25′ is connected through conductor 26′ with a conducting pin 52′ which in turn is connected with a conductor 40′ through the medium of a screw 53′. The letters or indicia comprising the sign may be supported on the plate in any preferred manner, such as by means of the stand clips indicated by reference numeral 65.

It is preferable in the construction of a sign of this nature that the overall length of each letter or character unit be substantially the same, but where the overall length of the tube comprising such character is shorter than the other tubes, as is the case in the character 22, I find it advisable to provide a resistance indicated by reference numeral 67 which extends between one electrode and its corresponding clip member in that particular unit.

It will be observed from the description of the electrode support that this type of support provides a unit wherein it is unnecessary to extend the electrodes through the plates so that the overall width of each letter and its associated support will be very small. Furthermore, this type of connection provides an electrode which may be easily and quickly replaced if broken and which will greatly reduce the danger of breakage.

It is to be understood that while I have herein described and illustrated certain preferred forms of my invention, the invention is not limited to the precise construction described above but includes within its scope

whatever changes fairly come within the spirit of the appended claims.

I claim as my invention:

1. A sign embodying: a frame; a plurality of plates removably mounted in said frame; a tubular gas filled character mounted on each of said plates; electrodes in said tubes; conducting means interconnecting the adjacent electrodes in the tubes on adjacent plates; and conducting means for connecting the electrodes on tubes forming the ends of a series with a source of electrical energy, said conducting means comprising bus-bars, clips on the ends of said bus-bars, and connecting bars in said clips, all of said conducting means being imbedded in said plates when said plates are assembled in said frame.

2. A sign embodying: a frame; a plurality of plates removably mounted in said frame; a tubular gas filled character mounted on each of said plates; electrodes in said tubes; conducting means interconnecting the adjacent electrodes in the tubes on adjacent plates; and conducting means for connecting the electrodes on tubes forming the ends of a series with a source of electrical energy, said plates having overlapping lips formed on the edges thereof and said conducting means comprising bus-bars imbedded in said plates, clips on the ends of said bus bars, connecting bars interposed between opposed clips and insulating sleeves mounted on said connecting bars.

3. For use in a sign of the class described, a plate member; a tubular gas filled letter mounted on the front of said plate member; a pair of spaced aligned clip members mounted on the back of said plate; electrodes in said tubular letter; conductors connecting each electrode with one of said clip members for connecting said electrodes and said clips into an electric circuit; and a bus-bar mounted on the back of said plate in spaced relation with said clip members for carrying a return circuit across the back of said plate.

4. For use in a sign of the class described, a plate member; a tubular gas filled letter mounted on the front of said plate member; a pair of spaced aligned clip members mounted on the back of said plate; electrodes in said tubular letter; conductors connecting each electrode with one of said clip members for connecting said electrodes and said clips into an electric circuit; a bus-bar mounted on the back of said plate in spaced relation with said clip members for carrying a return circuit across the back of said plate; and clips on the ends of said bus-bar.

5. For use in a sign of the class described, a plate member; a tubular gas filled letter mounted on the front of said plate member; a pair of spaced aligned clip members imbedded in said plate; electrodes in said tubular letter; conductors connecting said electrodes with said clip members for connecting said electrodes and said clips into an electric circuit; and a bus-bar imbedded in said plate in spaced relation with said clip members, for carrying a return circuit across said plate.

6. For use in a sign of the class described, a letter unit embodying: a support comprising two insulating plates secured together with their inner faces in substantial engagement; a tubular gas filled letter mounted on the front of said support; electrodes in said letter; a pair of oppositely disposed clip members mounted in aligned spaces formed between said plates; conductors extending from said electrodes between said plates to said clips for connecting said electrodes and said clips into an electric circuit; and a bus-bar mounted between said plates in spaced relation with said clips, for carrying a return circuit across said plate.

7. For use in a sign of the class described, a character unit embodying: a supporting plate; a conducting pin mounted on said supporting plate; an insulating packing sleeve mounted on said pin; an elbow sleeve having one end mounted on said insulating packing sleeve; a tubular gas filled character having a closed electrode end portion in the other end of said tube; and a conductor connecting said electrode with said conducting pin.

8. For use in a sign of the class described, a character unit embodying: a supporting plate; a conducting pin mounted on said supporting plate; an insulating packing sleeve mounted on said pin; an elbow sleeve having one end mounted on said insulating packing sleeve and having a packing ring provided in its other end; a tubular gas filled character having an electrode end portion slidably mounted in said packing ring; an electrode in the electrode end of said character; and a conductor connecting said electrode with said conducting pin.

9. For use in a sign of the class described, a character unit embodying: a supporting plate; a conducting pin mounted on said supporting plate; a packing sleeve mounted on said conducting pin; an elbow sleeve having one end mounted on said packing sleeve; a sealed electrode in said elbow sleeve; a conductor connecting said electrode with said conducting pin; and a tubular gas filled character secured to the unsealed portion of the elbow sleeve containing said electrode.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 9th day of December, 1931.

CHARLES M. H. NELSON.