Jan. 31, 1967 W. H. HAIRE 3,300,885

PANEL TYPE DISPLAY SIGNS

Filed Feb. 24, 1965 3 Sheets-Sheet 1

FIG. 1

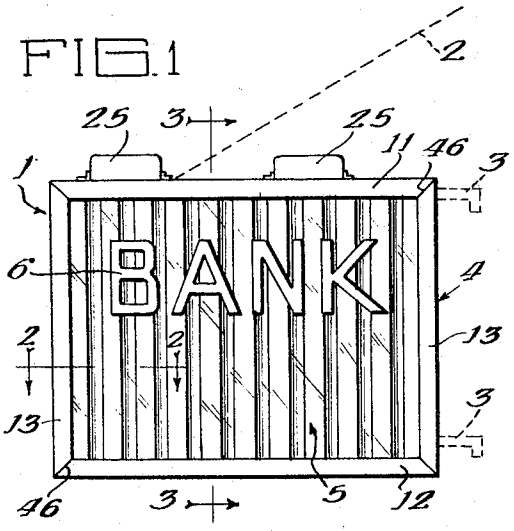


FIG. 2

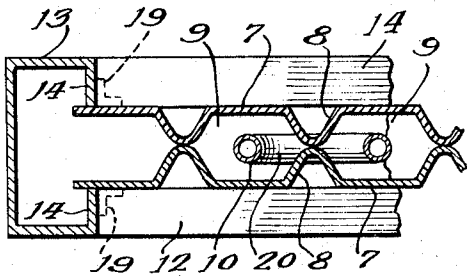


FIG. 4

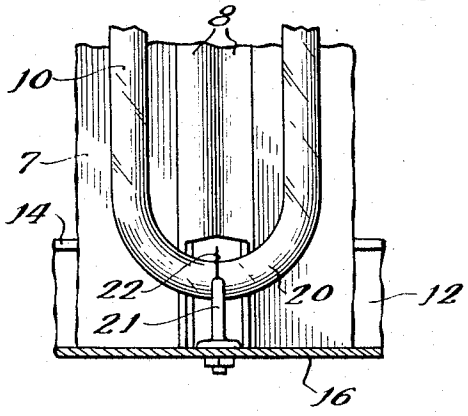


FIG. 3

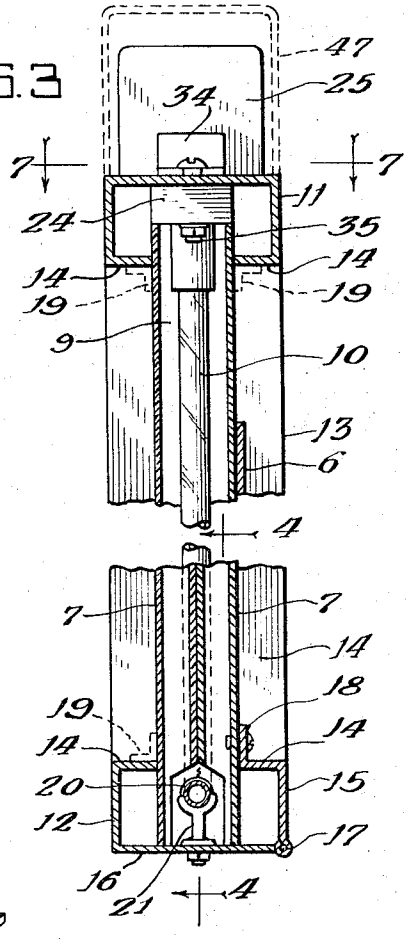


FIG. 7

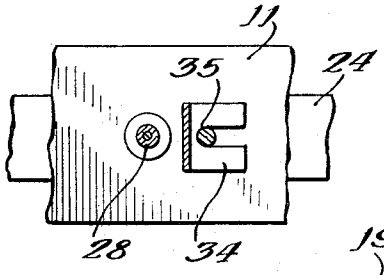
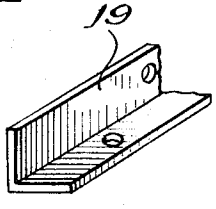


FIG. 11



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FIG. 5

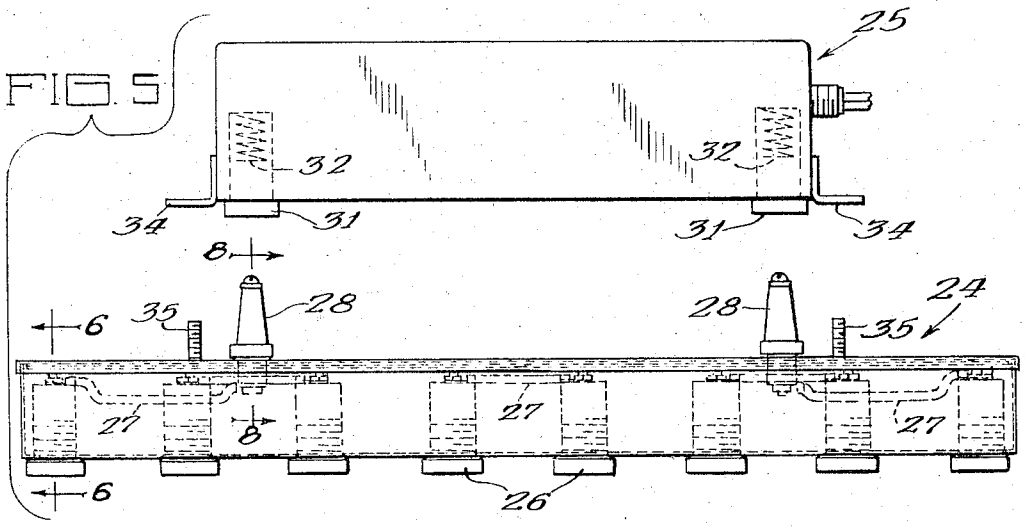


FIG. 8

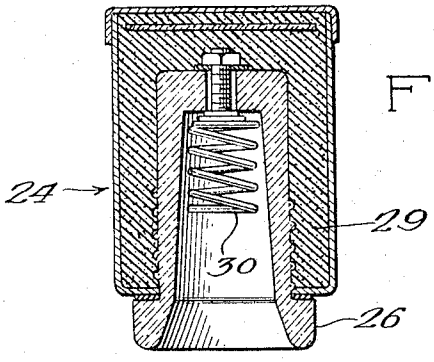


FIG. 6

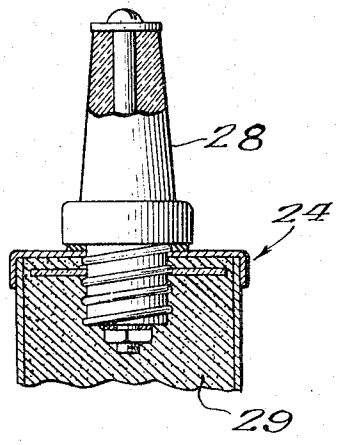


FIG. 9

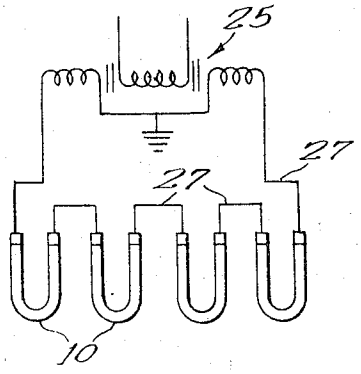
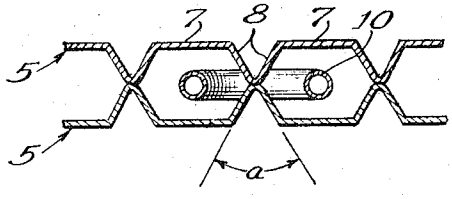


FIG. 10



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FIG. 12

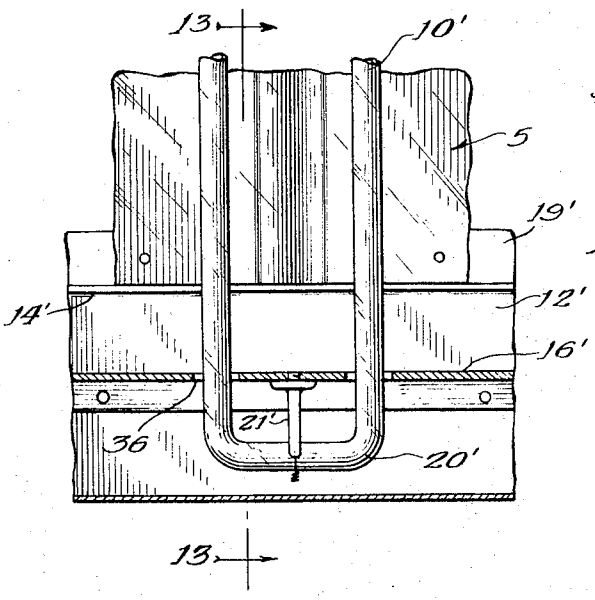
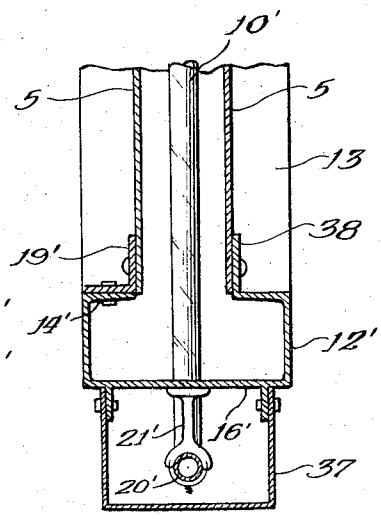


FIG. 13



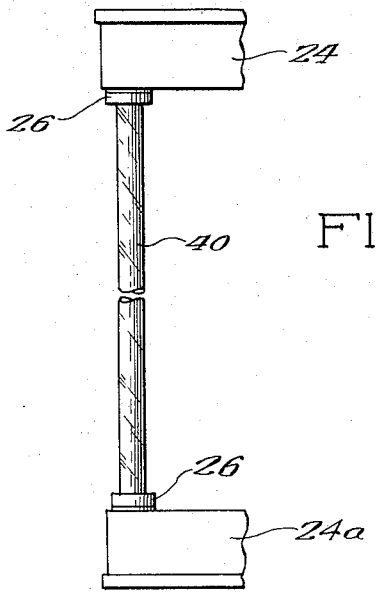


FIG. 14

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3,300,885

PANEL TYPE DISPLAY SIGNS

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Filed Feb. 24, 1965, Ser. No. 435,014
11 Claims. (Cl. 40—130)

This invention is a continuation-in-part of my copending application, Serial No. 273,948, filed April 18, 1963, now abandoned.

This invention relates to panel type display signs, known also in the trade as "plastic signs." This type of sign is characterized by two spaced translucent panels with a light source between them. The letters or other display material are made of an opaque material which is secured to or painted over the surface of the panels. The effectiveness of the sign is due to the contrast between the luminescent background and the opaque letters.

My invention provides:

(1) A plastic sign suitable for outdoor locations due to low maintenance cost; and

(2) A closer panel spacing with attendant savings in weight and cost of supporting structure.

Heretofore it has been considered necessary to employ an intense light source in order to develop the desired contrast. As a result, a number of fluorescent lamps have customarily been used. However, the plastic signs of the present day have two serious disadvantages.

One is the relatively high cost of maintenance. This is due both to cathode deterioration and to the high labor cost of lamp replacement.

For example, a fluorescent lamp is a filament type or hot cathode lamp. This filamentary cathode is subject to deterioration, and cathode deterioration is accelerated due to conditions peculiar to outdoor sign installations, such as vibration, swaying in the wind, and low temperature starts. Thus, these conditions greatly curtail the life of the fluorescent lamp below its rated life for indoor illumination.

Furthermore, since signs are relatively inaccessible as to location, the replacement cost in terms of labor is much greater than in the case of ordinary indoor lighting fixtures.

The second disadvantage of the fluorescent plastic sign is that the panels must be spaced from each other by from 8 to 12 inches in order to obtain uniform background luminosity. If more closely spaced, the luminescent background will be "streaky," the streaks corresponding to the outline of the fluoescent lamps. The wide spacing requires a wide frame and results in a correspondingly heavier and more costly supporting structure.

According to my invention, I have avoided the foregoing defects by utilizing a much less intense illumination source which permits a panel spacing of as little as two inches and I avoid the streaky effect by the provision of corrugated panels which are oppositely disposed so as to provide a plurality of elongate cells, one lamp being located in each cell. I have found that this arrangement provides a luminescent background which gives the impression of substantially uniform intensity.

The low intensity light source according to my invention is a neon type or cold cathode lamp, as contrasted with the filament type or hot cathode lamp, above mentioned. In addition to providing a less intense light source, as indicated above, the neon type or cold cathode lamp is not subject to the cathode deterioration of the filament type lamps, with the result that the average life of the neon type lamp is about four times the rated life of fluorescent lamps. Therefore, a sign embodying my invention has a much lower maintenance cost than the ordinary fluorescent type of plastic sign.

Another advantage is that the cellular construction, when lamps of different color are employed, provides a color barrier between adjacent lamps to the end that striking color effects can be obtained.

The present invention provides a plastic sign having a frame, a pair of spaced translucent panels supported thereby, and a light source disposed between the two panels, characterized in that the panels are corrugated to provide a plurality of elongate parallel cells, and said light source is a low intensity tubular light source having a portion disposed in each cell and extending for substantially the full length thereof.

Certain practical difficulties are encountered in the use of low intensity lamps in this environment due to the fact that low intensity lamps, such as neon type lamps, must be series connected with the result that from 7,000 to 10,000 volts are required for each 30 feet of aggregate lamp length, depending on tube diameter. Voltages of this magnitude introduce wiring problems, and also require the use of a special high voltage cable, the insulation of which is subject to rapid deterioration due to corona effect unless great care is used in spacing the high voltage cable from all metal parts of the sign.

According to this aspect of my invention, a transformer and lamp holder assembly is provided which eliminates the wiring problems normally incident to sign fabrication, and the assembly is preferably a two part assembly in which the transformer and the lamp holder are mounted on opposite sides of a structural member of the sign to the end that the less rigid structure of the lamp holder is not called upon to support the relatively heavy and concentrated load of the transformer.

Thus, my invention is further characterized first, in the provision of a lamp holder in which the series electrical connections between the lamp terminals in the various sockets is effected by conductors which are embedded in a body of insulating material, and secondly, by the provision of a separable post and socket electrical connection between the transformer and the lamp holder so that the two may be mounted on opposite sides of a structural member of the sign.

In the drawings:

FIG. 1 is an elevation of a sign embodying my invention;

FIG. 2 is a horizontal section taken along line 2—2 of FIG. 1;

FIG. 3 is a vertical section taken along line 3—3 of FIG. 1;

FIG. 4 is an enlarged fragmentary section taken along line 4—4 of FIG. 3;

FIG. 5 is an exploded elevation of the lamp holder and transformer assembly;

FIG. 6 is an enlarged section taken along line 6—6 of FIG. 5;

FIG. 7 is a horizontal section taken along line 7—7 of FIG. 3;

FIG. 8 is an enlarged section taken along line 8—8 of FIG. 5;

FIG. 9 is a wiring diagram;

FIG. 10 is a view similar to FIG. 2;

FIG. 11 is a perspective view of the angle strip shown only in dotted lines in FIGS. 2 and 3;

FIG. 12 is a vertical section similar to the lower half of FIG. 3, but showing a modification;

FIG. 13 is a section taken along line 13—13 of FIG. 12; and

FIG. 14 is a fragmentary elevation showing the invention as applied to straight tubular lamps.

FIG. 1 shows a sign 1 which can be supported at its top by a rod 2, and at one side by brackets 3 in the usual manner. The sign comprises a frame 4 having translucent panels 5 at each side. Opaque letters 6 may be adhesively secured to the outer surfaces of the panels 5.

The panels 5 are corrugated to provide a plurality of coplanar portions or flats 7 which are separated from each other by V-shaped corrugations 8. The panels are so arranged that the corrugations 8 touch each other, thus providing a series of hexagonal cells 9 of the general proportions shown in FIGS. 2 and 10.

A tubular lamp 10 is centrally located in each cell 9, and the arrangement provides a substantially uniform illumination throughout the whole surface of each panel 5.

The frame 4, as shown in FIG. 1 comprises a top member 11, a bottom member 12, and vertical side members 13. The top and side frame members 11 and 13 are each in the form of a C-type aluminum extrusion, each of which has two inwardly directed flanges 14 which abut the flats 7 of the panels. The bottom member 12 is a similar extrusion, except that one side wall is in the form of a hingedly mounted cover 15 secured to the bottom wall 16 by hinges 17. The cover 15 is provided with a margin 18 which is suitably screwed to the flats 7 of one panel. A similar type of connection may be made between the panels 5 and the other structural members by means of angle strips 19 (FIG. 11), screwed to the flanges 14.

The lamps 10, as shown in FIGS. 2, 4 and 9, are in the form of U-shaped tubular lamps, the two legs of which are disposed in adjacent cells 9. The corrugations 8 at the bottom of the panels are cut away to accommodate the connecting portion 20, these being engaged by glass support members 21 removably mounted on the bottom wall 16 of member 12. A wire tie 22 holds the lamp 11 in place.

The upper ends or terminals of the lamps are received in a lamp holder 24. The system is energized by one or more transformers 25 mounted on the upper surface of the top frame member 11.

The practicality of my invention is considerably enhanced by the special cooperation between the transformer 25 and the lamp holder 24, as well as by the special construction of the latter, both of which enable me to construct a panel type display sign having a neon type lamp source without separately wiring each tube terminal.

The lamp holder 24 is provided with a plurality of series connected lamp sockets 26 and terminal posts 28, the series connection being made by means of conductors 27 which are embedded in a body of insulating material 29. A spring contact 30 is disposed in each socket. The arrangement connects the lamps 10 in series with each other as shown in FIG. 9 and thus eliminates all wiring problems.

Electrical connection is made with the transformer 25 by means of terminal posts 28 which extend into sockets 31 of the transformer and engage spring contacts 32.

The lamp holder 24 and the transformer 25 are mounted on opposite sides of the web of top member 11 by means of bolts 35 which pass through the lamp holder and engage brackets 34 of the transformer. The terminal posts 28 extend through an opening in the top member 11, as shown in FIG. 7.

A suitable material for the translucent panels 5 is sheet acrylic resin.

In the embodiment shown, the lamp tubing is 15 millimeters in diameter and the cross section of cell 9 is approximately 2 inches wide and 3 inches long, the lamp tubing 10 thus being spaced on 3-inch centers. Due to the thickness of the panel material, the internal dimensions of the cell will be somewhat less, ranging in width, for example, from 1⅝ inches up to slightly less than 2 inches for a nominal panel spacing of 2 inches.

The internal reflection within the cells in combination with the angular disposition of the end walls or corrugations 8 provide a substantially uniform background luminosity even though the cell width is less than four times the tube diameter. Preferably, the angle *a* (FIG. 10) between the faces of the V-shaped corrugation 8 is substantially 60° so that each face is substantially normal to the rays of the light source. However, it has been found that a substantial amount of variation is permitted without detracting from the overall effect of uniformity.

By substituting other gases for neon, or by mixing them, or by the use of coated tubing, contrasting color effects can be obtained as between adjacent cells, the cells serving as a color barrier.

The assembly 24–25 may be made in modules supplying 8000 volts for each thirty feet of lamp tubing length, representing about six square feet of panel area. Thus, in a sign having a panel area of twelve square feet, as shown in FIG. 1, two such modules are required.

By forming the structural members of the sign 11, 12 and 13, from extrusions of like dimensions, it is possible to secure them to each other by welded mitered joints 46 as shown in FIG. 1, and the hinged cover 15 permits access to and removal of the lamp supports 21, together with the adjacent panel 5, incident to lamp replacement. The shape of the structural members also provides a housing for the various parts, and a separate sheet metal cap 47, shown in dotted lines in FIG. 3, may also be provided to enclose the transformers 25.

FIGS. 12 and 13 show a modification in which the bottom wall 16′ of the bottom channel 12′ is provided with openings 36 and the U-shaped lamps 10′ extend through these openings. The lamps are maintained in their operative position with the terminals engaging the spring contacts 30 by means of inverted support members 21′ which are mounted on and extend downwardly from the wall 16′ of the bottom channel. This permits removal and replacement of the lamps without providing the special hinged wall 15 of FIG. 3. A sheet metal cap 37 is provided to enclose the connecting portions 20′ of the lamps 10′.

According to this modification, the extrusion 12′ is formed at one side with a margin 38 to which one panel 5 is secured by screws. To facilitate removal, angle strips 19′ are mounted on the opposite side panel so that the panel and angle strip assembly may be secured in place by screws taking into the flange 14′.

A further modification is shown in FIG. 14 in which straight tubular lamps 40 are substituted for the U-shaped lamps 10. This arrangement requires a second lamp holder 24*a*, somewhat similar to lamp holder 24 but without the terminal posts 28.

As a further modification, the bolts 35 may be anchored in the lamp holder 24 as shown in FIG. 5, instead of passing through same as shown in FIG. 3.

The term "neon type lamp" as used herein refers to cold cathode lamps as contrasted with hot cathode lamps, irrespective of the particular gas used, and irrespective of whether the tube is coated or not.

The subject matter of my copending applications, Serial Nos. 273,948, filed April 18, 1963, now abandoned; 331,020, filed December 16, 1963, now abandoned; and 377,561, filed June 24, 1964, are incorporated herein by reference, insofar as consistent with the present disclosure.

Although preferred embodiments of the present invention have been described herein, it will be understood that various modifications and changes may be made in the construction shown without departing from the scope of the invention as pointed out in the appended claims.

I claim:

1. A panel type display sign having a frame, a pair of spaced evenly illuminated translucent panels supported thereby, and illuminating means disposed between the two panels, characterized in that the panels include a plurality of oppositely disposed and inwardly extending spaced V-shaped corrugations to provide a plurality of elongate parallel cells, and said illuminating means is a low intensity tubular light source having a portion disposed in each cell and extending for substantially the full length thereof, said corrugated translucent panels

providing for each of said cells two substantially parallel side walls and four angularly disposed end walls, said end walls being substantially normal to the light rays of said tubular light source, and said panels being so located that the V-shaped corrugations of one panel contact the V-shaped corrugations of the other to provide a completely enclosed cell.

2. A panel type display sign having a frame, a pair of spaced evenly illuminated translucent panels supported thereby, and illuminating means disposed between the two panels, characterized in that the panels include a plurality of oppositely disposed and inwardly extending spaced V-shaped corrugations to provide a plurality of elongate parallel cells, and said illuminating means is a low intensity tubular light source disposed in each cell and extending for substantially the full length thereof, said V-shaped corrugations providing for each of said cells end wall portions which are substantially normal to the light rays of said tubular light source, and said panels being so located that the V-shaped corrugations of one panel contact the V-shaped corrugations of the other to provide a completely enclosed cell.

3. A panel type display sign as claimed in claim 1 in which said parallel side walls are spaced from each other by substantially two inches.

4. A panel type display sign as claimed in claim 1 in which the width of said cells is less than four times the diameter of said tubular light source.

5. A panel type display sign as claimed in claim 2 in which said light source comprises a plurality of tubular neon type lamps, said panels being relatively closely spaced from each other.

6. A panel type display sign as claimed in claim 5 which includes lamp holding means mounted on said frame and comprising a body of insulating material having a plurality of lamp receiving sockets located in one surface thereof, electrical contact means disposed in said sockets and engaging the terminals of said lamps, and conductor means embedded within said body of insulating material and extending between pairs of sockets to provide a series electrical connection between said lamps.

7. A panel type display sign as claimed in claim 6 which includes a transformer having sockets formed therein, said lamp holding means including terminal posts projecting from a surface of said body and extending into the sockets of said transformer and providing electrical connection with said transformer, said terminal posts being electrically connected with the contact means of said terminal sockets.

8. A panel type display sign as claimed in claim 7 in which said frame includes a structural member, and in which said lamp holding means and said transformer are arranged on opposite sides of said structural member, said terminal posts extending through said structural member.

9. A panel type sign as claimed in claim 6 in which said lamps are U-shaped tubes, said lamp holding means being disposed only along one edge of said sign.

10. A panel type sign as claimed in claim 6 in which said lamps are straight tubes, said lamp holding means being disposed along opposite edges of said sign.

11. A panel type display sign as claimed in claim 2 in which said frame includes a top structural member having a horizontally disposed portion and in which said tubular light source comprises a plurality of upright U-shaped lamp tubes, a transformer disposed above said horizontally disposed portion, a lamp holder disposed beneath said horizontally disposed portion, means for securing said transformer and said lamp holder to said horizontally disposed portion, said lamp holder comprising a body of insulating material having a plurality of downwardly facing lamp receiving sockets located in the lower surface thereof, said upright U-shaped lamp tubes being disposed beneath said lamp holder and having their terminals received within said lamp receiving sockets, said transformer having downwardly facing sockets, and said lamp holder having terminal posts projecting from the upper surface thereof and extending through said horizontally disposed portion and into said transformer sockets, contact means disposed within said lamp receiving sockets and engaging said lamp terminals, and conductor means embedded in the material of said lamp holder and connected to said contact means and providing, in conjunction with said U-shaped lamp tubes and said contact means, a series electrical connection from one of said terminal posts to the other.

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H. F. ROSS, *Assistant Examiner.*