Jan. 25, 1938. A. C. DEANS 2,106,238

LUMINOUS TUBE DISPLAY

Filed Oct. 2, 1936 3 Sheets-Sheet 1

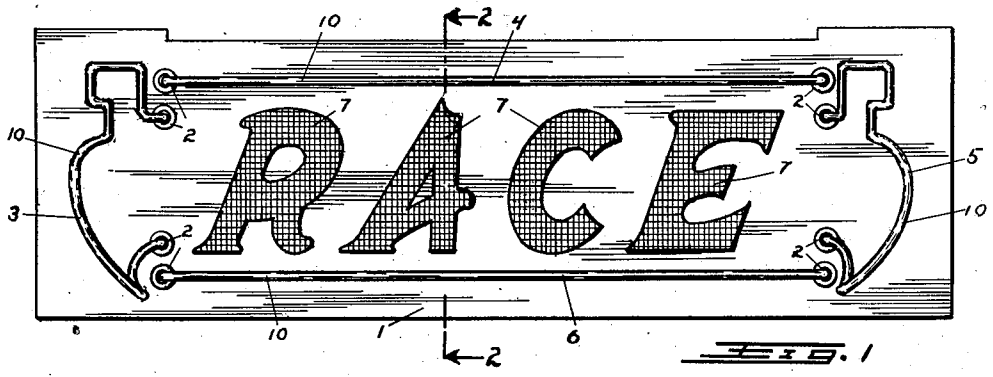


Fig. 1

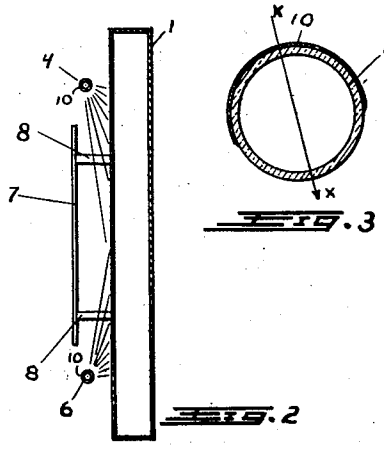


Fig. 2

Fig. 3

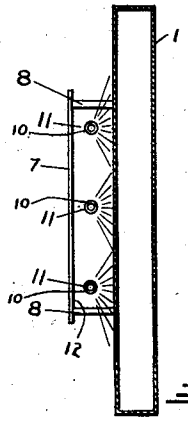


Fig. 4

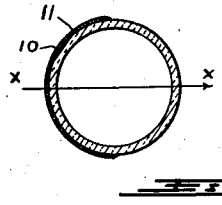


Fig. 5

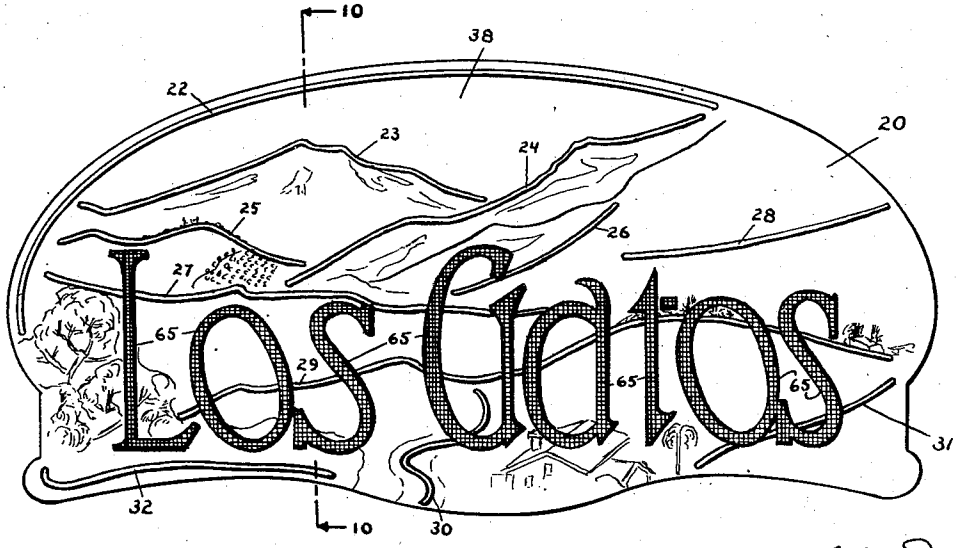


Fig. 6

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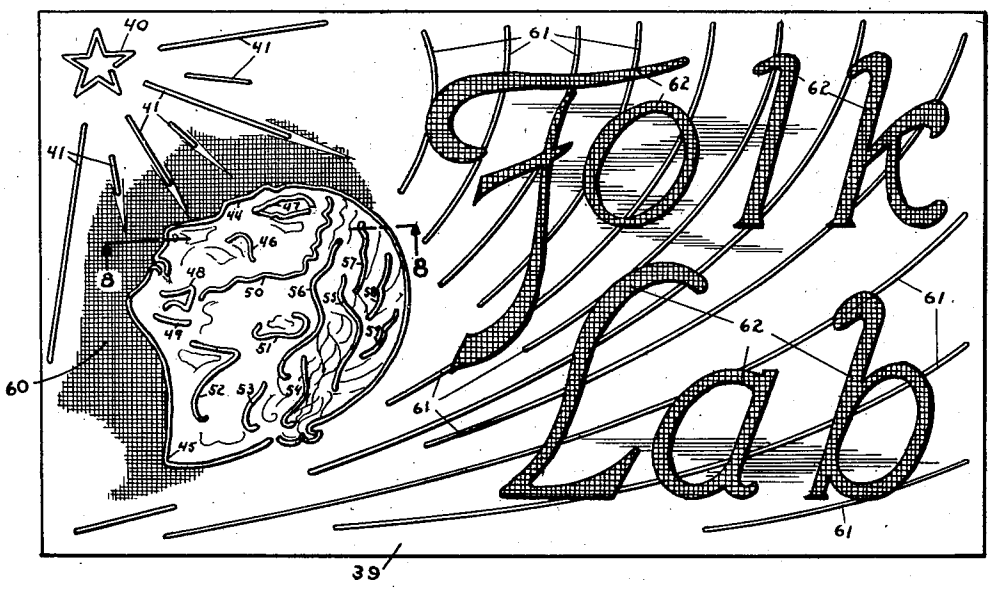


Fig. 7

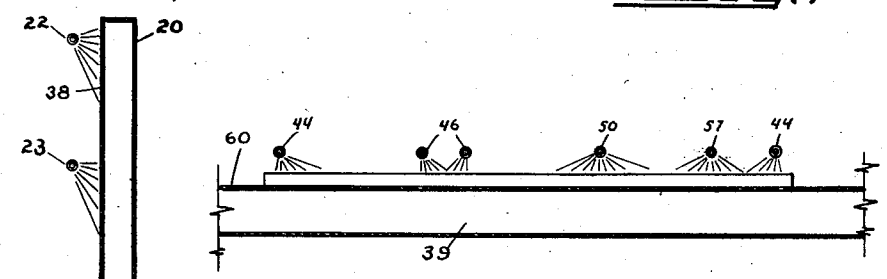


Fig. 8

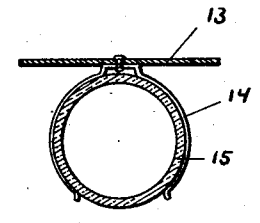


Fig. 9

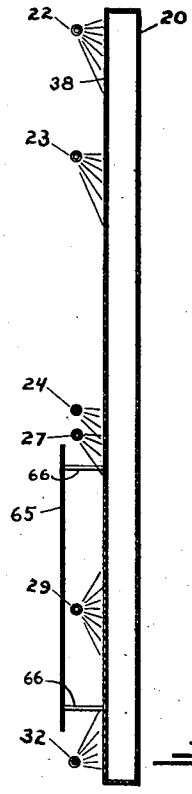


Fig. 10

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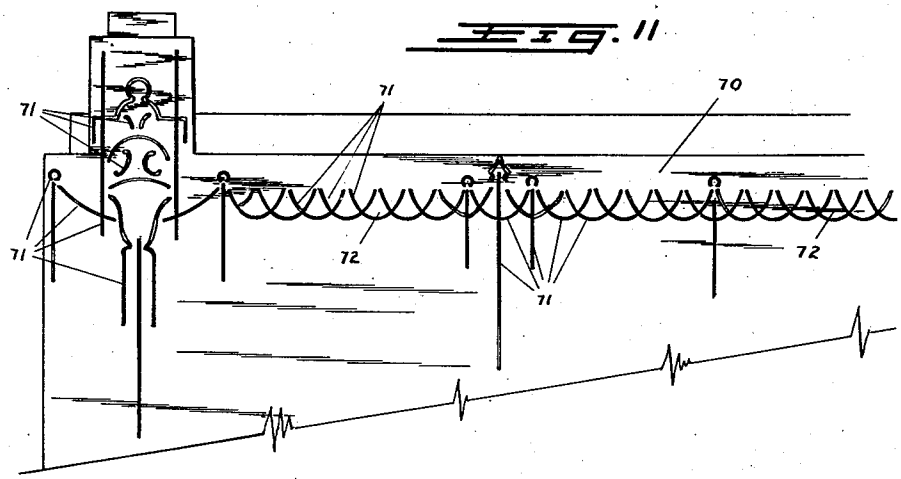
Arthur Clifton Deans

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Fig. 11



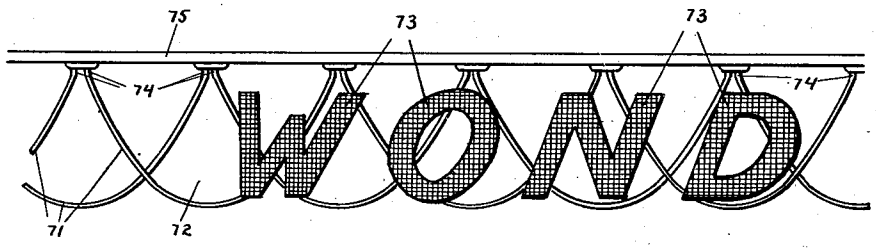


Fig. 13

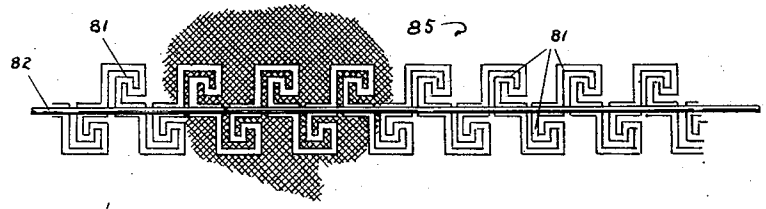


Fig. 12

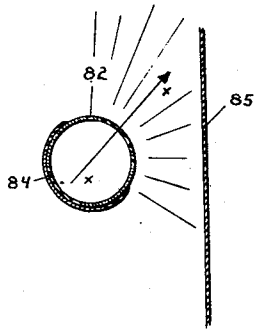


Fig. 14

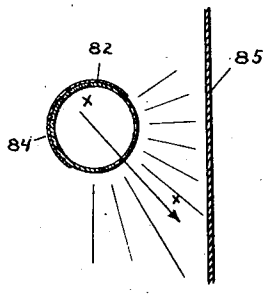


Fig. 15

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UNITED STATES PATENT OFFICE

2,106,238

LUMINOUS TUBE DISPLAY

Arthur Clifton Deans, Los Angeles, Calif.

Application October 2, 1936, Serial No. 103,705

11 Claims. (Cl. 40—130)

This invention relates to luminous tube displays of the indirectly lighted type. It has for its main object the production of new, artistic and striking effects by the use of tubes provided with means to reflect and/or selectively distribute the light back onto the background surfaces. By means of the novel combinations thus provided I have produced several distinctly new combinations, all within the generic features of the invention.

The objects of the invention have to do with the development of effects in lighting which are not practical with the devices of the prior art. Other objects have to do with simplifying the construction of signs, increasing the electrical efficiency and eliminating bulky and objectionable reflectors.

The invention is particularly directed to the illumination of extensive surfaces, poster, pictorial or ornamental displays formerly lighted by flood lights, and aims at the elimination of the heavy losses in projectors, transmission through the air and improper blocking out of areas by such devices.

Practically all commercial projectors or flood lights produce a substantial "side beam" of rays which are not directed by the reflector surface. This loss may be 50% or more. Additional losses are due to the difference in shape of the beam section which is usually round and the display surface which is usually rectangular. When several projectors are used to cover a surface there are losses due to the overlapping of the beams. In cases in which the beam hits the display surface at a sharp angle there are losses due to the varying intensity of the intercepted light.

In accordance with this invention, displays such as pictorial posters may be most economically lighted by confining the illumination to the surfaces which are to be brightly presented, thus avoiding the loss of light on dark areas suffered by flood lighting.

In architectural lighting the illumination may be confined to salient features of the structure.

In dealing with the silhouette type of signs I have found that in many classes of work a more effective display is produced by pattern lighting of the background than by uniform lighting. The problem of dealing with extensive areas is thus simplified and far more attractive results are secured. The essential condition to be observed is that the contrast between the brightest and the darkest regions of the background must not exceed that value which interferes with the readability of the silhouettes.

In order to render the tubes inconspicuous or unobservable several devices may be used. The tubes may be painted a light color over the reflecting surface to blend with the background and so positioned that a small amount of side beam from each tube hits the exposed portion of adjacent tubes. By painting the backs of the characters light a certain amount of light is reflected onto the exposed portion of the tubes with the result that they merge into the background.

In developing pictorial effects with my invention it is possible to secure very beautiful effects with a minimum of cost and to apply the light exactly where it is needed with practically no loss. If we are dealing with highlighted areas we may increase the intensity of the light over the more generally illuminated regions. Likewise shaded effects are very easily secured by taking advantage of the natural decrease of intensity of light from the tube. The distance of the tube from the background controls the decrease in intensity. In general the technique in this class of work consists in forming the tubes to follow features of the pictorial representation and providing mirroring on the tubes which differentially distributes the light to one side or the other of the tubes according to the ground below. In general, highlighted regions are best handled by running the tube along an outline thereof and sending the light down over the highlight. Very extensive displays may thus be handled at a cost for installation and operation only a fraction of that demanded by flood lighting.

One of the main objectives of the invention thus becomes clear. We are able to accomplish by my devices that which projector lighting has never accomplished, which is, the practically complete utilization of the light developed. By properly mirroring the tubes very little light is lost by side beams. Since my reflectors, in the preferred forms of the invention are on the tube surface the highest possible reflecting efficiency is secured. And further, the light is distributed where it is needed and nowhere else with no loss onto adjacent property and no loss by transmission through fog, dust and smoke in the air.

Since there is no transmitted beam in the air near the display, there is none of the glare in foggy weather which detracts so much from flood lighted displays. The display stands out sharp and clear to the view by its own light in all kinds of weather.

While in my various illustrations of the invention I have shown and described the devices made according thereto as including tubes provided

with mirroring to reflect the light onto the background, it is to be understood that the purposes of the invention may also be served in many cases by the use of tubes provided with obscurations such as dark paint on the surface thereof to cut out the light going forward to the observer.

There are numerous other objects of the invention which will become apparent from the accompanying drawings and the following specification. I have shown several preferred embodiments of the invention, but it is to be understood that since the invention is adaptable in many ways within the purview of the claims, it is my invention that it be not limited to the particular embodiments shown but is to be construed as including all such modifications as may be made within the limits delineated by the claims.

The invention is illustrated in the accompanying drawings in which the same reference numeral appearing in more than one view is used to indicate the same or the equivalent part throughout.

Figure 1 is a front elevation of a silhouette sign with mirrored tubes positioned to one side of the characters with respect to the observer.

Figure 2 is a section through the sign shown in Figure 1, taken on the section line 2—2.

Figure 3 is an enlarged section through the upper tube of the sign shown in the preceding views correspondingly positioned with respect to the vertical to show the disposition of the mirroring on the tube surface.

Figure 4 is a section through a modified type of sign similar to that shown in the preceding views but provided with tubes to develop a high intensity uniform illumination of the field.

Figure 5 is a typical section through the tubes of the sign shown in Figure 4 correspondingly positioned with respect to the vertical to show the disposition of the mirroring on the tubes.

Figure 6 is a front elevation of a silhouette sign with a pictorial background treated with highlight and general lighting by tubes conforming to features of the picture.

Figure 7 is a front elevation of a sign which includes three types of lighting. In this view I show one element of the display employing tubes with mirroring on the back to radiate light direct to the observer. Another element is in the representation of a face lighted by means of tubes with mirroring on the front and disposed to provide differential lighting of the areas of the picture. The third element is a silhouette sign with patterned lighting of the background.

Figure 8 is a section of a portion of the sign shown in Figure 7 taken on the section line 8—8.

Figure 9 is a section of a tube provided with an attached mirror and suitable for certain specialized uses of the invention.

Figure 10 is a section of the sign shown in Figure 6 taken on the section line 10—10.

Figure 11 is a view of the side of a warehouse type building in which patterned lighting of the extensive raw surface is used to break the monotony of the view.

Figure 12 is a view of a section of a sign having a conventional design lighted by a single tube running through the center of the design and provided with mirroring disposed to differentially light the elements of the design. Figures 14 and 15 are sections through the same taken as explained below.

Figure 13 is an enlarged view of a portion of the running design shown in Figure 11 but provided with silhouette characters in front of the tubes to form a sign.

In Figures 1 and 2, numeral 1 indicates the sign body which includes the usual transformer and high tension wiring, not shown on the drawings. The tubes 3, 4, 5, and 6 are supported on the body by the usual insulating posts which also do not show on the drawings. Each tube has two terminals extending backward into the body through the insulating bushings 2, 2, etc. The silhouette letters 7, 7, etc. are supported from the body by means of metal strips 8, 8, which appear in Figure 2. These letters are usually formed of metal and are opaque. Insofar as this invention is concerned, however, they may be constructed in any manner and may even in some cases be translucent.

The tubes 3 and 5 provide end decorations in light. They are provided with reflective coatings 10, 10, on the front surfaces to throw the light back onto the sign body. Since in this case the tubes are of material width, they will appear as dark lines against the lighted ground which is the effect desired. The tubes 4 and 6 positioned above and below the letters light the field behind the letters. The mirroring in this case is placed on at an angle as shown in Figure 3. The mirroring here also is indicated by 10. The line of maximum intensity, indicated by x—x in Figure 3 is directed toward the center of the lighted field. These tubes take the place of the conventional trough reflectors but are much more efficient and far less conspicuous.

In the modification shown in Figure 4 the tubes are located behind the letters and closer together so as to bank the field with light. The mirroring is disposed on the tubes as shown in Figure 5 so as to send the light directly back onto the ground of the sign. The outer surface over the mirroring, indicated by 11 is painted a light color to correspond to the ground. The backs 12 of the letters are also made light reflecting so that a certain amount of light is reflected from the backs of the letters onto the fronts of the tubes so as to make them blend into the ground.

In some cases it may be desired that the tubes stand out in silhouette themselves as part of the design in which cases they will be painted dark.

In providing the mirroring on the tubes I have found that the best form of mirroring is aluminum deposited from vaporized metal in a vacuum. It may be backed up with commercial mirror backing. Any other form of mirroring may be used so far as the features of this invention are concerned. In Figure 9 I show an attached mirror which may be desired for certain classes of work. Obviously also any desired form may be given to the mirror which is here indicated by numeral 13. It is riveted to the spring clip 14 and thereby held to the tube 15.

In the sign shown in Figure 6 a pictorial representation is painted on the body 20. It portrays a mountainous landscape with valleys, hill ridges and a stream, a house and trees in the foreground. The tubes, indicated by 22 to 32, inclusive, follow features of the picture. Each tube has a terminal at each end which extends backward into the sign body through suitable bushings which are not shown on the drawings. The tubes are supported a short distance from the sign body by means of insulating posts also not shown in the drawings.

The silhouette letters 65 are positioned in a plane in front of that of the tubes and held by strips 66 as shown in Figure 10.

The section shown in Figure 10 illustrates the general scheme of distribution of the light effected by means of the disposition of the mirroring on the surfaces of the tubes. Tube 22 casts the light downward onto the light colored ground 38 representing the sky. Tube 23 also directs the light downward to the tops of the mountains to pick out the highlights of snow caps thereon represented. Tube 24 on its upper reaches is also handled in the same manner although the lower reaches of the tube where it follows more generalized scenery will be treated at the discretion of the artist. The remaining tubes are treated in accordance with the fine detail of the scene which can not be brought up in the drawings due to the fact that the color treatment takes predominant position in determining the proper distribution of the light.

In providing the mirroring on the tubes it may be disposed in different fashions at different places along the tube. For instance, tube 30 in the foreground may be provided with a narrow strip of mirroring centrally positioned to spread the light in both directions to light the hollow through which the stream thus represented flows. Tube 29 which follows the crests of low hills may have mirroring disposed in several different manners along its length to place the light on features of the scene along its course.

In the view in Figure 10 the tubes are shown in their relative positions with respect to each other. The mirroring however, is not shown on the small scale section. The rays are represented to indicate the manner in which the tubes are mirrored at the section.

In Figure 7 I have shown a sign which includes different types of lighting. The sign body, indicated by 39 carries a number of tubes each of which is supported a short distance from the body by means of insulating posts, not shown in the drawings, and each of which has two terminals extending backward into the sign through insulating bushings not shown on the drawings.

The tube 40, representing a star, and the tubes 41, 41, etc., representing rays, are provided with mirroring on the rear so as to be visible directly to the observer by their own light. The face is illuminated by tubes mirrored on the side toward the observer and treated to differentially distribute the light to the features. The tubes behind the letters are also mirrored on the side toward the observer.

The face is painted in accordance with a technique which brings out the features by means of blocks of colors. This style may only be roughly conveyed by the drawings in black and white on a small scale. It will be seen however, that the tubes 44 to 50 follow familiar facial features. In Figure 8, taken on the section line 8—8, several of these tubes are shown with the direction of radiation from the tube consequent to the positioning of the mirroring thereon indicated. It will be seen that tube 44 directs the light inward to the face and casts no light on the darkened area indicated by 60. The tube 46 which picks out the eye in highlight throws the light downward and inward. Tubes 50 and 57 function to light the areas over which they pass without preference to the region to one side or the other. The remaining tubes likewise are treated in accordance with the demands of the painting.

Over the main area of the sign the tubes 61, 61, etc., provide a patterned lighting as a background for the silhouette letters 62, 62, etc. It is obvious that various modifications may be made in the design and quite a few artistic effects secured by the distribution of light in such displays. The light in this case is cast directly backward onto the sign from the tubes, but in certain types of displays very fine effects may be secured by making them selective to the areas on the opposite sides of the tubes.

In Figure 11 I have shown the upper portion of a building wall over which a pattern of light is provided by means of various tubes following an open design. The wall is indicated by 70 and the tubes by 71, 71, etc. In Figure 13 I have shown a portion of the running design 72 enlarged with silhouette letters 73 positioned in front of the tubes. The tubes here are shown with the terminals 74, 74, etc., extending into bushings in a running trough conduit 75 which carries the connections. In Figure 11 no connections to the tube are shown due to the smallness of the scale.

By this treatment extensive exposed areas of buildings may be lighted in a very effective manner at moderate expense and spaces provided over which advertising copy may be provided for the tenants when desired and changed at will.

In Fig. 12 I have shown a conventionalized border design in which the alternative elements 81, 81, etc., occur on two sides of a center line. Down the center line and a short distance from the body of the sign the tube 82 is located. It is provided with mirroring which selectively distributes the light to one side or the other of the tube. In Figure 14 the tube is shown at a typical section through the elements of the design above the tube. The mirroring, indicated by 84 is disposed to place the axis of maximum intensity as indicated by x—x. In Figure 15 the typical section through the elements below the tube is shown with the axis of maximum intensity indicated at x—x. The sign body is indicated by 85.

In the various forms of the invention the tubes may be provided to give different color combinations of light. For instance, in pictorial work the tubes may be charged with such gases as to give out colors conforming to the colors of the picture at the different areas thereof. In patterned lighting of the background the light colors may enter into the ornamental combinations. In banked tube lighting of backgrounds behind silhouette letters the tubes may be selected to blend the light colors for the production of white light.

The following definitions shall apply in interpreting the claims:

The term "mirrored surface" and the like shall include any finishing of the surface of the tubes such as to reflect a substantial proportion of the light falling on such surface back through the tube and out of the opposite wall. It shall include paint and lacquer finishes and all similar finishes even though they be partially light transmitting and shall include also mechanical finishing of the surface for the purpose set forth.

The term "character" when used in reference to the silhouette members shall include members in the form of any inscription, letter, numeral, symbol, ornament, design or sign.

The term "light color" shall include white and light grey.

The term "short distance" shall include any distance between the elements thus described at which the effects set forth are produced.

The term "luminous tube" shall include any light source in the form of a luminous tube such

as an incandescent lamp when used in the manner set forth in the claims.

The term "pictorial representation" shall include ornamental designs and the like.

The term "extending across said picture" and the like shall apply to tubes so described and extending in any direction wholly or partially across the picture or display.

Having thus described my invention what I claim is:

1. A luminous display including a background member having a pictorial representation thereon and a luminous tube positioned a short distance in front thereof and conforming in outline to an element of said picture, said tube being provided with means to reflect the light back onto said picture.

2. A luminous display including a background member having a pictorial representation thereon and a luminous tube positioned a short distance in front thereof and conforming in outline to an element of said picture, said tube being provided with a mirrored surface to reflect the light back onto said background and to one side of the perpendicular from said tube to said background for at least a portion of its length.

3. A luminous display including a background member having a pictorial representation thereon and a luminous tube positioned a short distance in front thereof and following a course around outlines of elements of said picture, said tube being provided with a mirrored surface disposed to reflect the light back to said picture and to one side or the other of the perpendicular from said tube to said background at various sections of its length to light said elements of said picture.

4. A luminous display including a background member having a pictorial representation thereon and a plurality of luminous tubes positioned a short distance in front thereof and following outlines of features of said picture across said picture such as to render said tubes relatively inconspicuous, said tubes thereby approaching the important areas of said picture to be lighted, and means in association with said tubes to selectively reflect the light onto said areas.

5. A luminous display including a background member, a silhouette character positioned in front thereof and a luminous tube exposed to view and positioned between said background and said character, said tube being provided with a mirrored surface disposed to reflect the light onto said background, the outer surface of said mirroring exposed to the observer being finished in a light color to reflect light incidentally falling thereon to cause the same to blend into said background in appearance when said display is lighted.

6. A luminous display including a light reflective background, a silhouette character positioned in front thereof and a luminous tube exposed to view between said background and said character and means to render said tube relatively inconspicuous to the observer.

7. A luminous display including a light reflective background, silhouette characters positioned in front thereof and a plurality of luminous tubes between said characters and said background extending across the display thus formed and exposed to view between said characters and means to render said tubes relatively inconspicuous when said display is lighted.

8. A luminous display including a background member having a pictorial representation thereon, a luminous tube positioned a short distance in front thereof and extending across said picture and conforming in outline to certain features thereof and a silhouette character positioned in front of the surface thus lighted.

9. In a luminous display, a background member having a pictorial representation thereon, a luminous tube positioned a short distance in front thereof and conforming to feature outlines of said picture, and means on a surface of said tube to obstruct the light emitted from the glowing gas column toward the observer.

10. In a luminous display, a background member having a pictorial representation thereon, a luminous tube positioned a short distance in front thereof and conforming to outlines of selected features of said picture, means on a surface of said tube to obstruct light going forward from the glowing gas column to the observer, and a silhouette character in front of the background surface thus lighted.

11. A luminous display including a background member having a pictorial representation thereon, a luminous tube positioned a short distance in front thereof and extending across said picture and conforming in outline to certain features thereof and a silhouette character positioned in front of said tube and the surface thus lighted.

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