

Dec. 13, 1938.

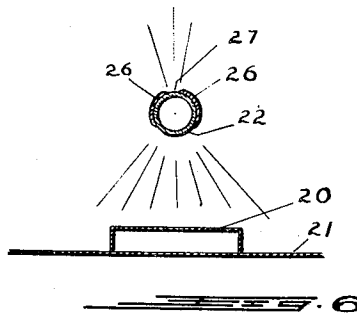
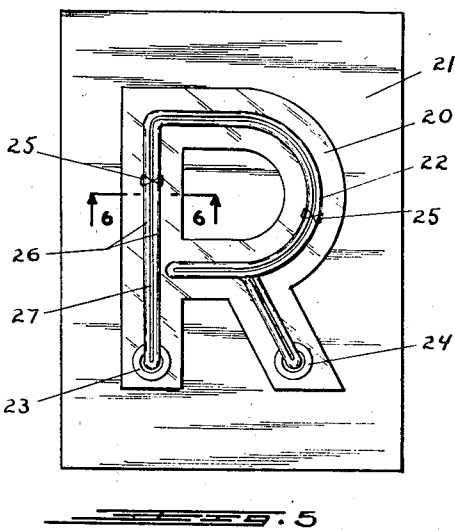
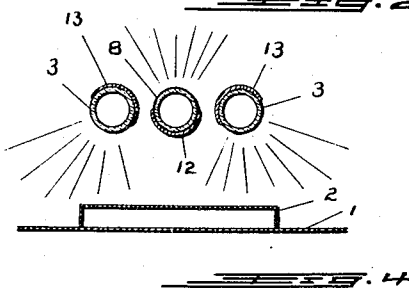
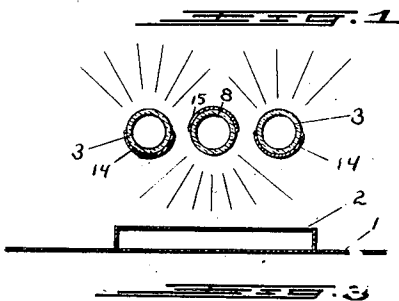
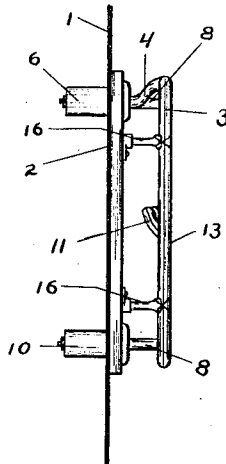
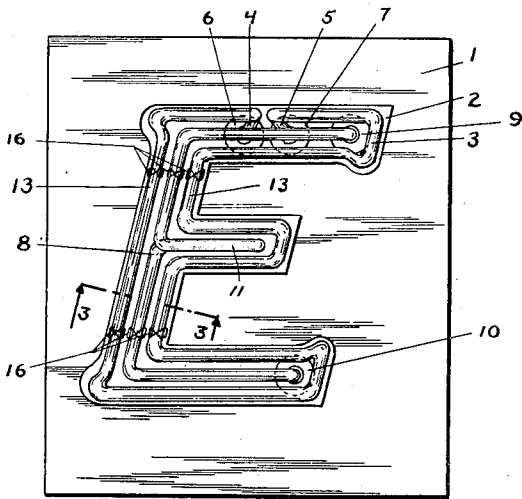
A. C. DEANS

2,139,884

LUMINOUS TUBE SIGN CHARACTER

Filed Aug. 13, 1937

3 Sheets-Sheet 1



INVENTOR

Arthur Clifton Deans

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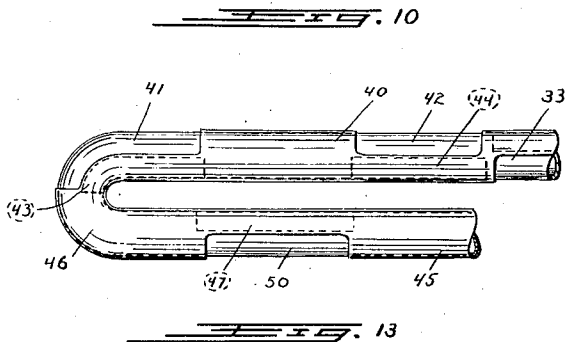
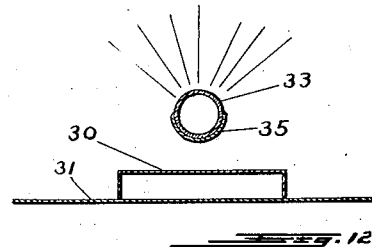
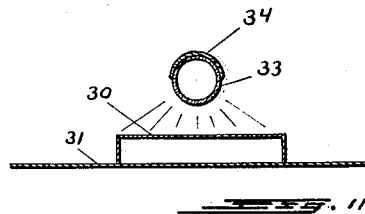
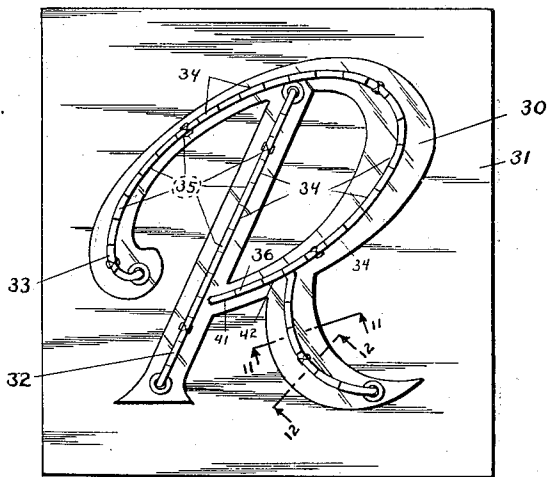
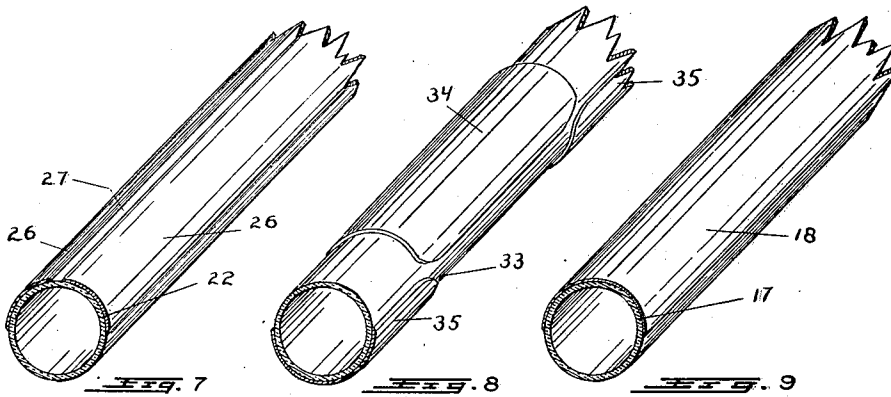
A. C. DEANS

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LUMINOUS TUBE SIGN CHARACTER

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3 Sheets-Sheet 2



INVENTOR

INVENTOR
Arthur Cifton Deans.

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LUMINOUS TUBE SIGN CHARACTER

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3 Sheets-Sheet 3

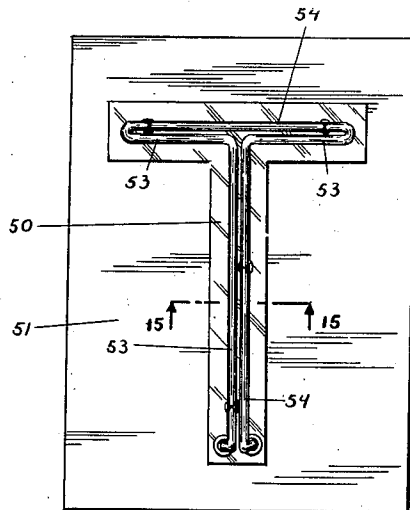


Fig. 14

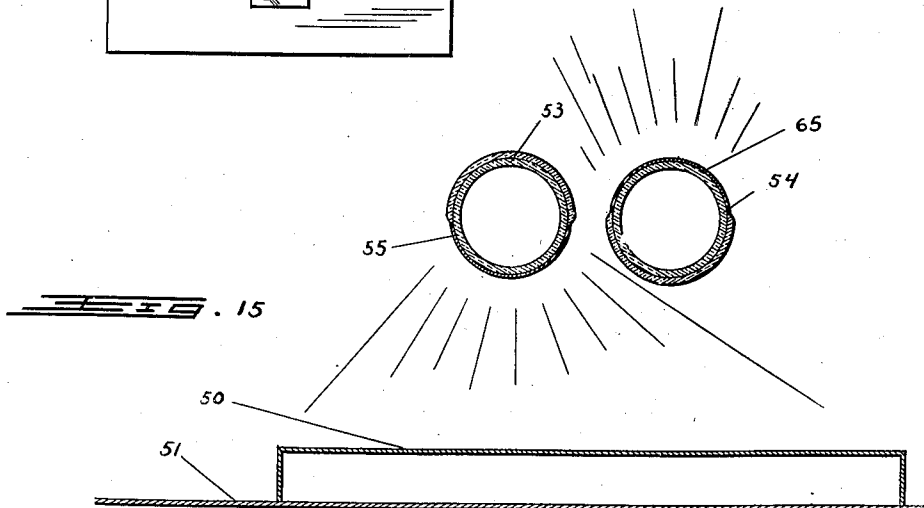


Fig. 15

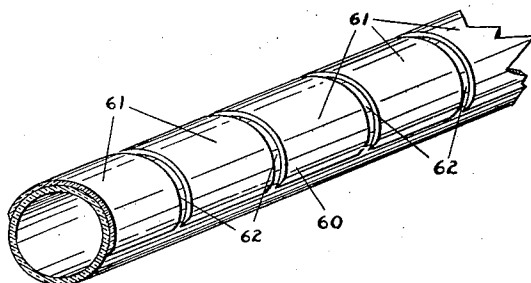


Fig. 16

INVENTOR

Arthur Clifton Deans.

UNITED STATES PATENT OFFICE

2,139,884

LUMINOUS TUBE SIGN CHARACTER

Arthur Clifton Deans, Los Angeles, Calif.

Application August 13, 1937, Serial No. 158,931

13 Claims. (Cl. 40—130)

This invention relates to a luminous tube sign character and the like and is directed to the production of novel, clean-cut and striking effects in luminous tube displays by the use of mirrored tubing having the mirroring selectively distributed over the surfaces of the tubes for controlling the intensity and distribution of the light and for emphasizing the contrasts of luminous components of the characters. By these methods and constructions a very efficient utilization of the light is attained. In the various species of the invention luminous tubes are used, singly or in sets, in connection with appropriately constructed sign bodies to produce displays of high attraction value and artistic merit.

In one species of the invention it is an object to present to view a character outlined by a sharply delineated and intense line of light apparently surrounded by a luminous halo which may be of the same or preferably of a different color. It is a further object to utilize one of a pair of tubes to provide a silhouette effect for the other tube, the one tube being mirrored to throw its light onto the background, and the other to throw its light directly toward the observer. A further object of a modification of this form of the invention is to enhance the contrasts of the character by mirroring the tube which throws its light onto the background in such manner that it throws its light away from the region behind the other tube, thus leaving that region in comparative darkness to intensify the light which passes directly to the observer.

An object of another species of the invention is to provide a luminous character indirectly lighted by a luminous tube positioned in front of the character and mirrored on the front surface and so treated that it substantially vanishes in the broad luminous stroke of the letter thus produced. Very high efficiency may thus be attained in this type of illumination while overcoming the undesirable silhouette effect of the tube itself. In this form of the invention I take advantage of a characteristic of the eye which integrates at moderate distances dark and light regions into uniformly luminous regions under such conditions as I provide in this device.

An object of still another species of the invention is to produce effects in patterned light on patterned background glows by mirroring single tubes to throw the light from alternate sections forward and backward.

A further object attained in various fashions in the different species of the invention is to provide two color effects with single tubes by

suitably filtering the light of the tube to send light of one color forward to the observer directly from the tube and light of another color backward to the background to form the glow or halo effect.

A still further object is to reduce the electrical stresses developed along a luminous tube by a conductive coating such as that formed by aluminum, taking advantage in general of the divisions of the coating required for the purposes above stated.

Various other objects of the invention will become apparent from the following specification taken in connection with the accompanying drawings. Since the invention may be modified in numerous ways and adapted into luminous displays making use of various combinations of its new features, it is my intention that it be not limited to the particular forms shown but be construed as subject to modification and adaptation in any fashion embraced by the claims.

The invention is shown in its preferred forms in the accompanying drawings in which the same numeral appearing in more than one view is used to indicate the same or equivalent part throughout.

Figure 1 is a front view of a sign character mounted on an individual plate and lighted by two tubes forming a triple outline of the character, one of which tubes is mirrored to throw its light direct to the observer and the other of which is mirrored to throw its light onto the background behind the tubes. Preferably the tubes should be charged with different gases to provide a contrasting color combination. This view is illustrative of one of many possible combinations in sign construction making use of this feature. The unit is shown in side elevation in Figure 2.

In Figure 3 I show a cross section through a character stroke taken as indicated by the section line 3—3 in Figure 1. As shown in this section, the center tube forming the single outline is mirrored on the front surface to throw its light onto the background and the tube forming the double outline is mirrored on the rear surface to throw its light forward to the observer.

Figure 4 is a cross section similarly taken of a modified form of the device showing an opposite arrangement of the mirroring. In this form the mirroring on the double outline tube is preferably disposed to throw the light to the side away from the center of the character stroke in order to leave the character behind the center tube relatively dark.

In Figures 3 and 4 and in other similar views the mirror coating is shown greatly exaggerated in thickness for purposes of illustration.

Figure 5 is a front view of an individual character adapted to produce at a moderate distance the effect of a solidly lighted character stroke. The tube is mirrored on the front surface to throw the light onto the background. By providing for a certain amount of the light from the tube to pass directly to the observer the tube is made to disappear to view by taking advantage of a certain characteristic of the eye. As shown in Figure 6 in cross section according to the section line 6—6 in Figure 5, a slit is made through the mirror coating lengthwise of the tube to allow a fine intense line of light to escape forward. The eye integrates this light to make the tube seemingly merge into the solid luminous area behind it.

Figure 7 is a perspective view of a section of a mirrored tube such as shown in Figures 5 and 6.

Figure 8 is a perspective view of a section of a mirrored tube such as shown in Figures 10, 11 and 12.

Figure 9 is a perspective view of a section of a mirrored tube such as shown in Figures 1 to 4.

In Figure 10 I show a front view of a sign character on an individual plate which is provided with a single outline tube mirrored alternately on the front and the back surfaces. A cross section of the character stroke taken as indicated by the section line 11—11 is shown in Figure 11 and a cross section taken as indicated by the section line 12—12 is shown in Figure 12. Figure 13 is a view of a return bend portion of the tube shown in Figure 10.

In Figure 14 I show a front view of a sign character provided with a single tube formed in double outline, mirrored and finished with light filtering material to produce a double color effect in a direct and indirect lighting scheme.

Figure 15 is a cross section of the same taken as indicated by the section line 15—15 in Figure 14 and considerably enlarged to more clearly show the coatings.

Figure 16 is a perspective view of a section of a tube suitable for use in place of the tube shown in Figure 5 and finished to overcome certain undesirable electrical effects which appear with tubes mirrored with conducting material such as aluminum.

In the various views the mirroring is shown as a single layer of material on the outside of the tubes. In practice the mirroring proper consists of a layer of reflective material of negligible thickness and is protected by a layer of protective material, such as paint, of material thickness. For all practical purposes we may consider the mirroring proper as coextensive with the layers shown in the various views with the exception of the return bend portion illustrated in Figure 13 which I show the extent of the reflective coating by means of broken lines.

In Figures 1 to 3, numeral 1 indicates a background plate on which is formed a character proper 2. The character is of the "block letter" type, formed by building up from the body with sheet metal. Any other suitable form of character may be used, such as a metal plate supported a short distance from the background. The character may also be formed by painting on the plate.

The character is lighted by two tubes. The tube 3 forms a double outline character and is

mirrored on the rear surface, as indicated by 14, to throw the light forward to the observer. The tube 8 is formed in single outline and is mirrored on the front surface, as indicated by 15, to throw the light onto the character proper behind the tubes. The tube 3 terminates in the electrode terminals 4 and 5 which extend into the terminal housings 6 and 7. The tube 8 is similarly terminated in the housings 9 and 10. The tubes extend in the same plane with the exception of one portion at the return bend 11. The tubes are supported from the character by the insulating posts 16, 16, etc.

The mirroring of the tubes may be done in various fashions, but I have found that a mirror surface formed by the deposition of aluminum from the vapor in vacuum is far superior to any other known commercial finish. However, for the purposes of this invention, the mirroring may be done by any suitable method. The tubes may also be painted a light color for this purpose or they may be manufactured with reflective material on the inside surface or embedded in the glass. The terms "mirroring", "mirror surface" and the like as used in the claims are to be understood as embracing all such devices to render the tubes selective in the distribution of the light in the manner and for the purposes hereof.

The most effective results are secured by charging the tubes with different gaseous mediums such as give out different colored light. For instance, the tube 8 may contain neon gas and form a red glow on the background. The tube 3 may be charged with a gas carrying mercury vapor and form a blue double outline letter standing out in front of the red glow. In this case it would be desirable that the background proper be of a light color in order to pick up the red glow. In some cases it may be more desirable to make the character stroke wide enough to serve this purpose, paint it a light color and finish the background proper in a dark color.

In Figure 4 I show a modified arrangement in which the tube 3 is mirrored on the front surface and the tube 8 on the rear. In this case it is desirable, as a general rule, to arrange the mirroring on the tube 3 to throw the light outward from the character to leave the character proper behind the tube 8 relatively dark. In this respect the two strokes of tube 3 aid in creating a silhouette effect and help to emphasize the center tube by making it stand out strongly from the background glow.

In Figure 9 I show a piece of tubing such as used in the sign. The tube, indicated by 17, is provided with a mirroring 18 extending about one half way around the tube. The reflective coating is generally covered with a protective coating such as mirror backing or paint. The protective coating may if desired be applied to extend a distance over the edge of the mirroring for protective purposes.

In Figure 5 I show an individual character which is represented in the night by a solid bar of light for the character stroke secured by indirect lighting. In order to secure the highest efficiency the tube is positioned directly in front of the character stroke. By allowing a certain amount of direct light to pass through a slit in the mirroring to the observer the tube is caused to disappear to view at a moderate distance. This character is also of the "block letter" type as may be seen in the cross section in Figure 6. The character proper 20, is mounted on the plate 21. It is preferably finished a light color with

the plate finished dark. The tube 22 is supported from the character by the insulating posts 25, 25, and terminates in the terminal housings 23 and 24. Mirroring, indicated by 26, 26, is positioned on the front surface of the tube in such manner as to leave a longitudinal slit 27 through which light from the glowing gas column passes direct to the observer. This light is much more intense than the light reflected from a like area of the character. However, if the width of the slit as compared with the width of the mirroring be properly selected and all the dimensions be low enough, the eye will integrate the dark and light areas and the contrasts will disappear. The average luminosity of the two then need only approximate the luminosity of character behind the tube for the tube to disappear to view. It will be noted that this effect is the opposite of that produced in the device of Figure 1 where contrasts between dark and light regions are sought and secured by broad spacings which the eye cannot mistake. To secure the results desired with the device of Figure 5, tests will be necessary with each type and size of character as no definite rules can be given due to the many variables involved.

On the piece of tubing showing the mirroring in Figure 7 the mirroring and the slit may be observed in nearly normal proportions. While it is convenient from a manufacturing point of view to make the slit longitudinal with the tube, for some purposes as will be explained below, it serves a useful purpose to provide openings crossing the tube and breaking up the mirroring in short lengths along the tube. The optical result is, of course, the same if the same proportions are observed.

As a further modification of this form of the invention, the mirroring may be formed as a transparent mirror and protected by means of a transparent varnish. The density of the reflective coating may then be determined by direct tests to allow just enough light to pass to overcome the silhouette effect and make the tube disappear to view.

In Figures 10 to 12 I show another type of character in which a novel effect in patterned lighting is produced by the use of a single outline tube mirrored alternately on the front and the rear surfaces in successive sections along the tube. The letter proper, indicated by 30, is of the raised type and is mounted on the individual letter plate 31. The two tubes 32 and 33 outline the letter, and are mounted in the usual fashion on insulating posts and terminate in terminal housings. As shown in enlarged detail in Figure 8, the mirror coatings 34, 34, etc., are spaced along the front surface of the tube, alternating with the coatings 35, 35, etc., on the rear. The cross section in Figure 11 is taken through the region of one of the front coatings and the cross section in Figure 12 through one of the rear coatings.

The effect of this character is that of spaced diffused glows on the background connected by intense broken lines of light. The effect is made more attractive in certain cases by securing a color difference by means of light filtering coatings. This may be done with either or both surfaces. For instance, with neon gas filled tubes, a deep red translucent varnish may be applied over the front of the tube to shift the shade of the direct light to a deep red away from the orange tint of the neon radiation on the background. Various other color combinations with

different gases will be immediately apparent to those skilled in the art.

In Figure 13 I show the method preferred for finishing the tube at return bends such as at 36 in Figure 10. In this view the mirroring is indicated by the broken lines under the protective coating 46. The openings through this protective coating indicated by 41 and 42 expose the glowing gas column to the front view. Reflective coatings 43 and 44 on the rear of the tube throw the light through these openings. On the under branch of the tube openings such as 50 are provided to alternate with the openings on the upper branch of the tube, and are backed up by reflective coatings such as 47 on the opposite wall of the tube.

In Figures 14 and 15 I show a character formed of a single tube in double outline. Each branch of the tube on any character stroke has mirroring on the opposite surface so that one lights the background and the other is observed by its direct light. Light filtering varnish is applied to the tube to provide a different color on the background than is observed in direct view of the gas column.

The character proper 50 is mounted on an individual plate 51 in the same manner as the characters described above. The tube 52 is formed to have a branch 53 and a branch 54 for each character stroke. The branches 53, 53, etc., are mirrored on the front surface to throw the light to the background, while the branches 54, 54, etc., are mirrored on the rear surface to throw the light forward. Light filtering material may be applied to either or both branches. In this case I prefer to provide a coating of colored varnish 55 on branch 53 of a different color than a coating 55 on branch 54. Such an arrangement is suitable with gaseous fillings such as helium which happens to be rich in colors distinct from each other in the spectrum. Mercury tubes provided with fluorescent materials of various types also produce light emissions which can be advantageously split up by filters for this purpose.

It is advantageous with mirroring of conductive material to split up the coating lengthwise along the tube to reduce the electrical stresses. Thus it will be observed in Figure 8 that each of the individual mirror coatings, indicated by 34 and 35, is separated from the next by a short space. Thus the maximum electric stress which may be set up between adjacent coatings is limited to the static charge which can be developed along the length of tube they cover.

In Figure 16 I show a piece of tube finished in a manner suitable for the purposes of the character shown in Figure 5. The tube, here indicated by 60, is provided with a mirror coating which is broken up into short sections 61, 61, etc. The slits 62, 62, etc., between the sections may be made of such width as compared with the area of the coatings that the same purpose is served as that of the longitudinal slit of the tube in Figure 5. The shorter the sections the more decided is the effect and the greater the reduction in undesirable electrostatic effects along the tube between the sections.

The background elements of the sign may be constructed in any known manner, such as by painting on the sign body or by skeleton construction in which each character is outlined by its strokes alone without a back plate. The characters may be individual characters or joined in groups as in script writing. The term "background character" as used in the claims shall be

construed as embracing all such constructions and to include any letter, figure, ornament, symbol, design or characterization.

Having thus described my invention, what I claim is:

1. In a luminous display, a background character, luminous tube means positioned in front thereof and providing at least two coextensive tube branches in correspondence to each other and a character stroke, one of said branches being provided with mirroring positioned to the front of the glowing gas column thereof to reflect the light therefrom back to said character, and the other of said branches being provided with mirroring positioned to the rear of the glowing gas column thereof to reflect the light therefrom forward to the observer.

2. In a luminous display, a background character, luminous tube means positioned in front thereof and providing at least two coextensive tube branches in correspondence to each other and a character stroke, mirroring on one of said branches positioned to the front of the glowing gas column thereof to reflect the light therefrom back to said character, mirroring on the other of said branches positioned to the rear of the glowing gas column thereof to reflect the light therefrom forward to the observer, and light filtering means on at least one of said tube branches to create a color contrast between the gas column of the last said branch and the character stroke lighted by the first said branch.

3. In a luminous display, a background character, luminous tube means positioned in front thereof and providing at least two coextensive tube branches for a character stroke, one of said branches being provided with means to obstruct light going forward to the observer, and the other of said branches being provided with means to obstruct light going backward to said character, and light filtering means on at least one of said branches to create a color contrast between the last said branch and the character stroke lighted by the first said branch.

4. In a luminous display, a background character, a luminous tube positioned in front thereof and corresponding in outline thereto, and mirroring on said tube positioned over spaced areas thereof and in front of the glowing gas column thereof to reflect the light of the corresponding portions of said column back toward said character.

5. In a luminous display, a background character, a luminous tube positioned in front thereof and corresponding in outline thereto, and mirroring on said tube positioned over spaced areas thereof and in the rear of the glowing gas column thereof to reflect the light of the corresponding portions of said column forward to the observer.

6. In a luminous display, a background character, a luminous tube positioned in front thereof and corresponding in outline thereto, and mirroring on said tube positioned over spaced areas thereof alternating to the front and to the rear of the glowing gas column thereof to reflect the light of a spaced series of portions of said gas column to said character, and to reflect the light of a spaced series of portions of said column alternating with the first said series forward to the observer.

7. In a luminous display, a background character, a luminous tube positioned in front there-

of and corresponding in outline thereto, mirroring on said tube positioned over spaced areas thereof alternating to the front and the rear of the glowing gas column thereof whereby to illuminate a series of spaced areas of said character and expose to direct view spaced portions of the said gas column by its own light between said lighted portions of said character, and light filtering material on said tube positioned to create a color difference between the character portions thus lighted and the gas column thus observed.

8. In a luminous display, a background character, a luminous tube positioned in front thereof and corresponding in outline thereto, mirroring distributed over selected areas of the front and rear of said tube to illuminate portions of said character and expose to direct view portions of the glowing gas column of said tube by its own light, and light filtering means distributed on said tube to provide a color difference between the character portions thus illuminated and the gas column thus observed.

9. A luminous display including a background character, a luminous tube positioned a short distance in front thereof and light reflecting means associated with said tube and positioned to reflect the light of portions of said tube forward to the observer and the light of other portions of said tube toward said character.

10. A luminous display including a background character, luminous tube lighting means including tube portions corresponding in general to the outline of said character and light reflecting means associated therewith and disposed to reflect the light of at least one of said tube portions toward said character and the light of at least one of said tube portions forward to the observer.

11. A luminous display including a background character, luminous tube lighting means including tube portions corresponding in general to the outline of said character, light reflecting means associated therewith and disposed to reflect the light of at least one of said tube portions toward said character and the light of at least one of said tube portions forward to the observer, and light filtering means associated with said tube to filter the light of at least one of said portions whereby to effect a distinct color difference between the light thus cast onto said character and the light directly cast toward the observer.

12. In a luminous display, a background character, luminous tube means positioned in front thereof and providing three coextensive tube branches for a character stroke, light obstructing means on one of said branches positioned to obstruct the light radiated either toward the observer or toward the character, and light obstructing means on the other two branches oppositely positioned with respect to the said light obstructing means on the first said branch.

13. In a luminous display, a background character, luminous tube means positioned in front thereof and providing three coextensive tube branches for a character stroke, mirroring on one of said tube branches positioned to reflect the light therefrom either toward or away from the observer, and mirroring on the other of said tube branches oppositely positioned with respect to the mirroring on the first said tube branch.

ARTHUR CLIFTON DEANS.