June 27, 1939. I. V. MANSELL 2,163,614

LUMINOUS TUBE SIGN

Filed Nov. 30, 1937 3 Sheets-Sheet 1

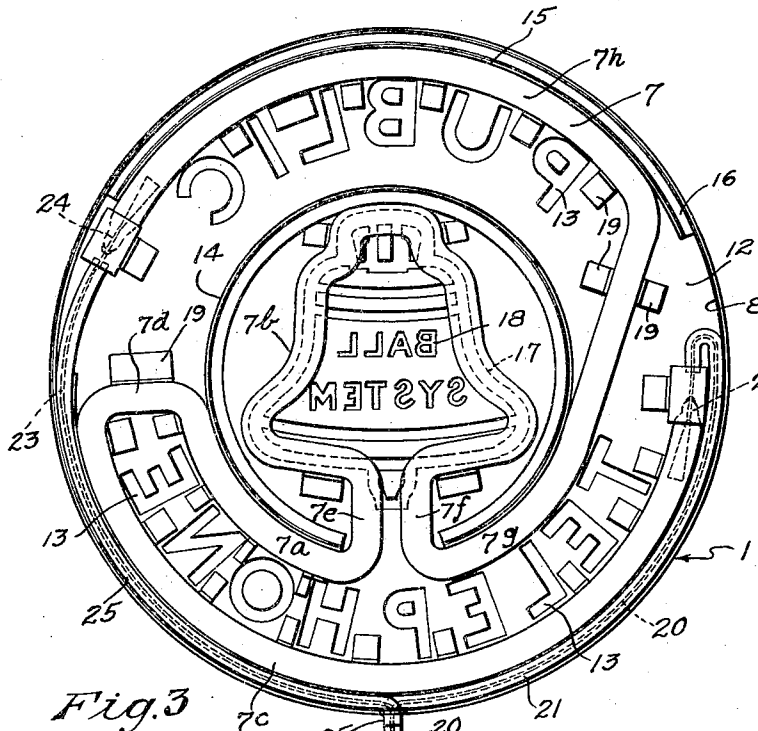


Fig. 3

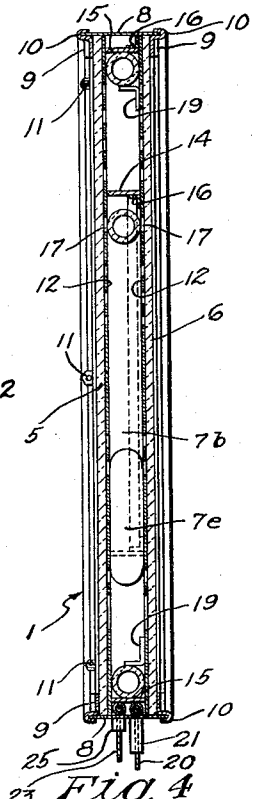


Fig. 4

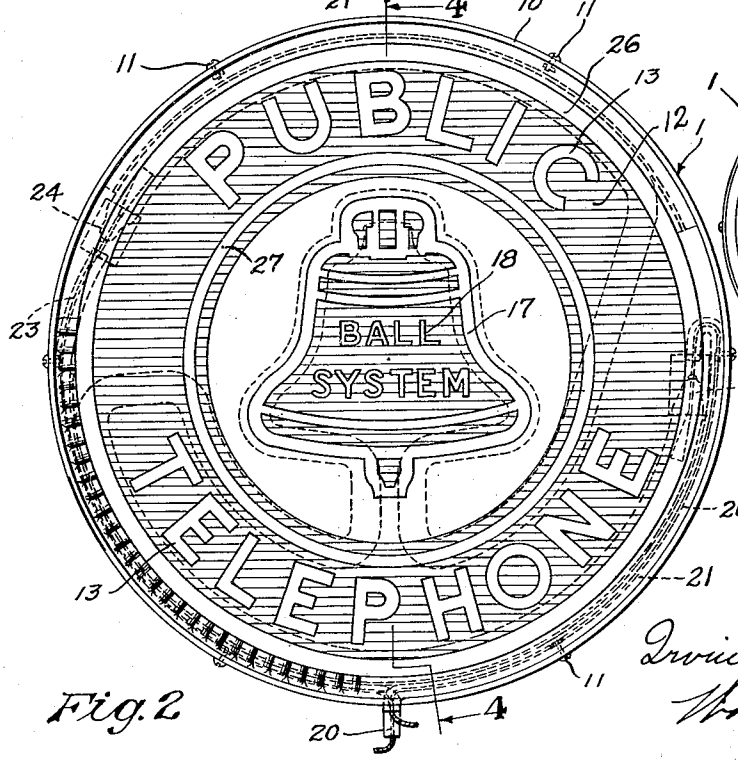


Fig. 2

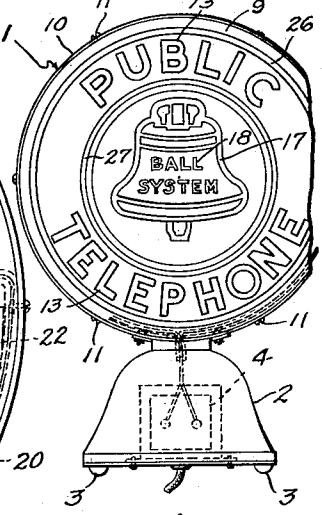


Fig. 1

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LUMINOUS TUBE SIGN

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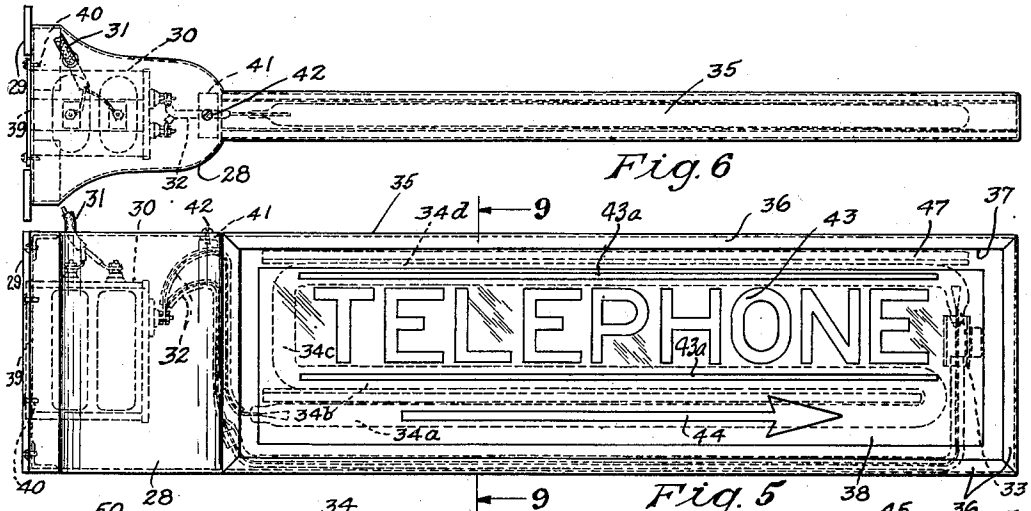


Fig. 6

Fig. 5

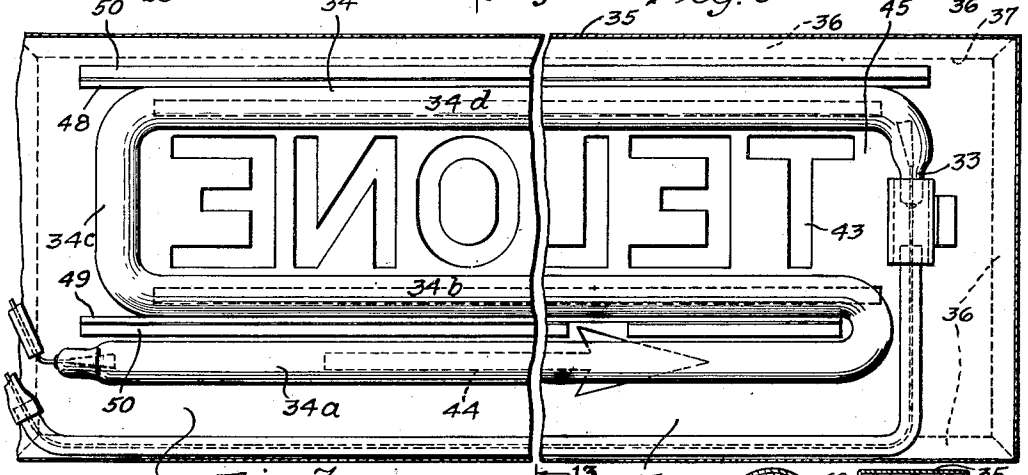


Fig. 7

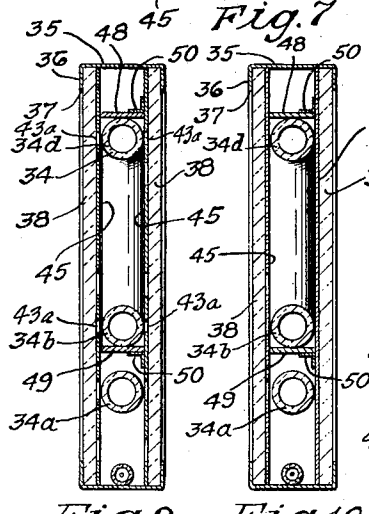


Fig. 9

Fig. 10

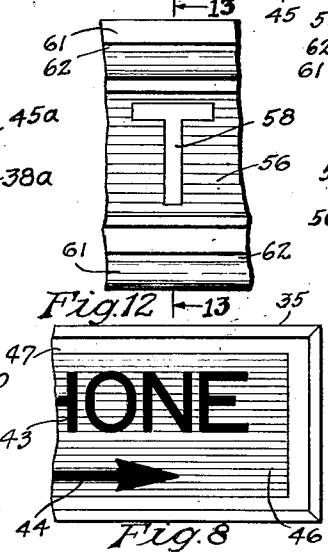


Fig. 12

Fig. 8

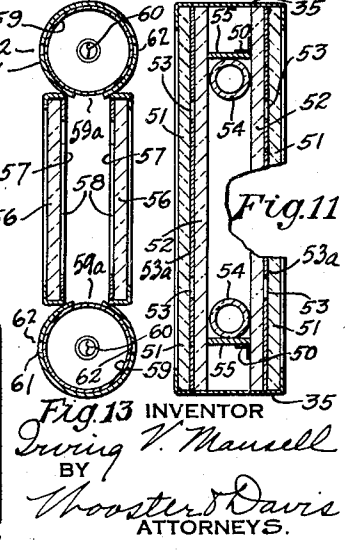


Fig. 11

Fig. 13

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LUMINOUS TUBE SIGN

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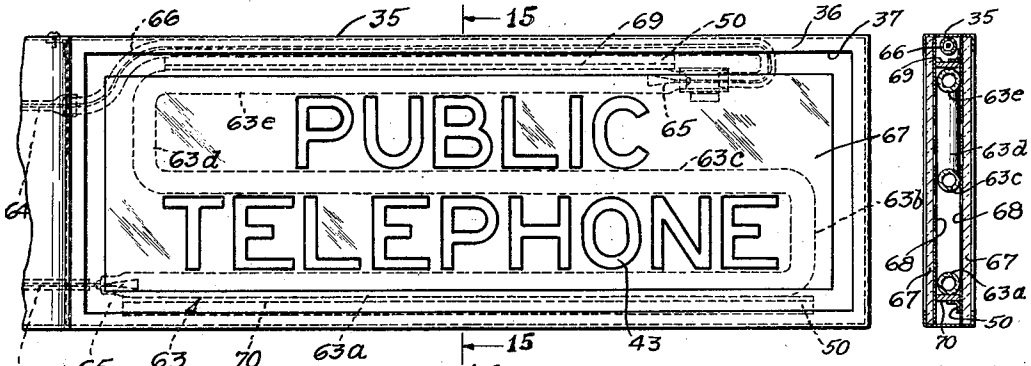


Fig. 14

Fig. 15

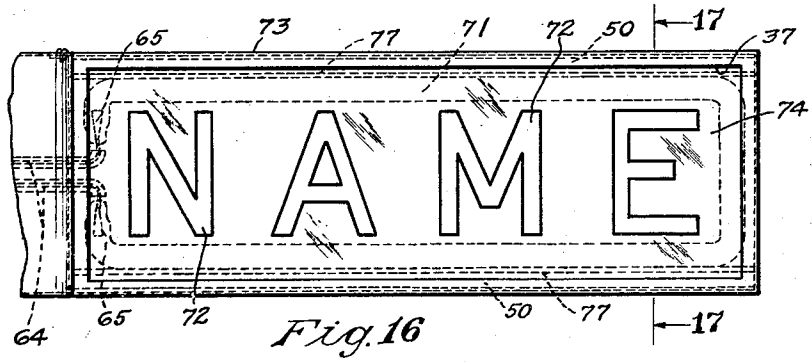


Fig. 16

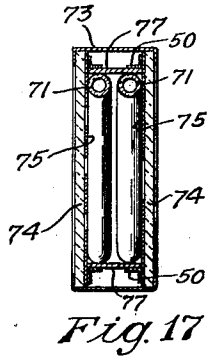


Fig. 17

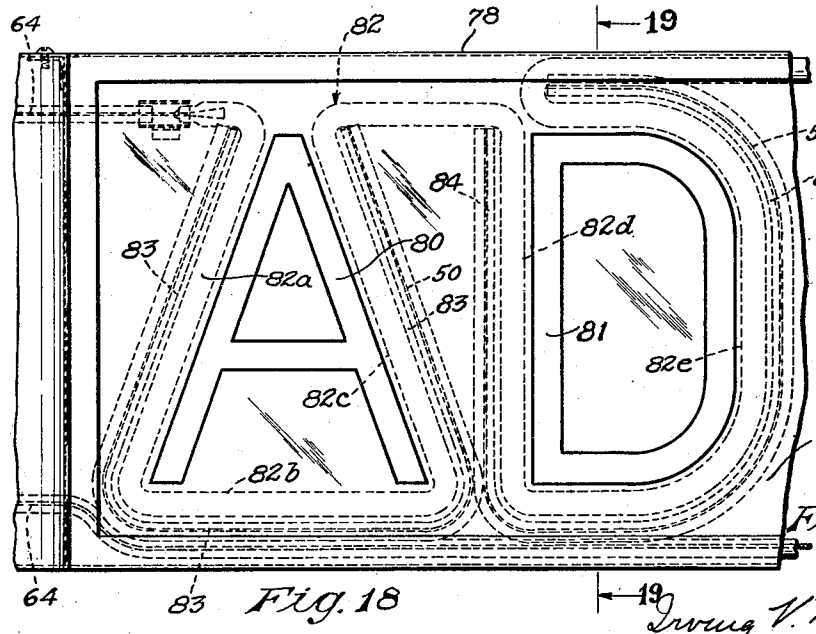


Fig. 18

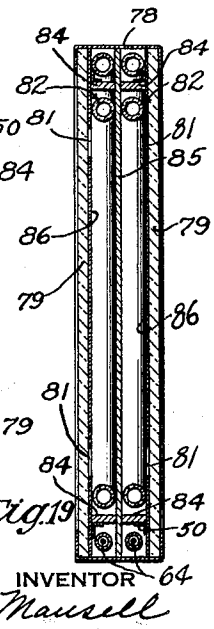


Fig. 19

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UNITED STATES PATENT OFFICE

2,163,614

LUMINOUS TUBE SIGN

Irving V. Mansell, Bridgeport, Conn.

Application November 30, 1937, Serial No. 177,260

35 Claims. (Cl. 40—133)

This invention relates to electric signs, particularly luminous tube signs where the illumination is secured from elongated tube lamps of the so-called "Neon" type, although the luminous producing light may be neon, helium, argon or other gases known to be capable of use for this purpose, or combinations of two or more of them; as well as elongated tubular lamps which may be lighted by filaments, and these tubular lamps may either be plain depending wholly on the luminosity of the gas for light and color, or the tubes may be covered, coated or impregnated with translucent, fluorescent, luminescent or phosphorescent materials of various colors to give different color and lighting effects.

An object of the invention is to provide a novel interiorly illuminated sign which is of unusually thin and neat design. The sign may be either single or double faced, but generally would be double faced, and the new design permits the proper and uniform illumination of the character strokes or sign matter on both faces of the sign with a single luminous tube (or a plurality of tubes in the same plane), it being possible with this novel construction to produce a sign in which the faces are spaced from each other just sufficient to accommodate the thickness or diameter of the luminous tube between the faces.

It is also an object of the invention to provide a construction in which the light from the luminous tube is confined to a minimum of space to thus conserve the quantity of the light and give maximum illumination to the characters.

Another object is to provide a construction in which there are reflecting, deflecting and diffusing means for the light from the tube which not only effects brighter and more uniform illumination of the sign characters, but may also be employed as a supporting means for the tube and also a means for transferring lateral pressures from one face of the sign to the other to equalize these pressures, and also, for example in large signs, to form a greater support for pressures due to wind and the like so that thinner glass plates may be employed, thus reducing the weight of the sign.

Other objects will be apparent from the following description taken in connection with the accompanying drawings forming a part of this specification and in which various arrangements of my improved sign are illustrated. It is, however, to be understood I am not to be limited to the specific details of construction shown, but different variations in construction and arrangement may be employed within the scope of the invention. I also wish it to be understood where glass plates or face plates are mentioned this term is intended to include transparent or translucent plates made of other plastic materials.

In these drawings:

Fig. 1 is a front elevation of a sign embodying my invention;

Fig. 2 is a front elevation of one face of this sign on a larger scale;

Fig. 3 is an elevation of the sign with one face removed showing the arrangement of the elements on the interior of the sign and a rear view of the opposite face of the sign;

Fig. 4 is a vertical section substantially on line 4—4 of Fig. 2;

Fig. 5 is a front elevation of a somewhat different arrangement;

Fig. 6 is a top plan view thereof;

Fig. 7 is a longitudinal vertical section on a larger scale of the sign of Fig. 5 the plane of the section being just to the rear of the front face thereof;

Fig. 8 is an elevation of the outer end portion of the sign of Fig. 5 indicating a modification which may be employed;

Fig. 9 is a vertical section substantially on the line 9—9 of Fig. 5 but to the scale of Fig. 7;

Fig. 10 is a section showing a slightly modified construction;

Fig. 11 is a similar section showing another modified construction;

Fig. 12 is an elevational view of a portion of one panel of the sign showing another modified construction;

Fig. 13 is a vertical section thereof substantially on line 13—13 of Fig. 12;

Fig. 14 is a front elevation of a sign showing still another modified arrangement;

Fig. 15 is a vertical section thereof substantially on line 15—15 of Fig. 14;

Fig. 16 is a front elevation of a sign showing still another modification;

Fig. 17 is a vertical section thereof substantially on line 17—17 of Fig. 16;

Fig. 18 is a front elevation of a portion of a sign showing a still further modification; and

Fig. 19 is a vertical section thereof substantially on line 19—19 of Fig. 18.

Referring first to Figs. 1 to 4 inclusive, the sign shown therein is a flat, thin, circular sign which of course may be made of different sizes, but in the present case is intended as a relatively small sign to be supported either on a base to sit on a desk or counter or to be hung or supported by a suitable bracket, or other suitable support-

ing means, from a wall. The construction shown comprises a flat circular body 1 mounted on a base 2 having suitable cushion feet 3 for resting on the counter or other suitable support. This base 2 is hollow and may be used to enclose and protect the transformer 4 usually employed with these luminous tube signs, although I wish it to be distinctly understood it is not necessary that the transformer be located in this base or even closely adjacent the sign, but it may be placed at any desirable location.

The sign proper 1 comprises two glass face plates 5 and 6, glass being the preferred material, although as indicated above wherever glass is mentioned I wish it to be understood as including plates of other transparent or light transmitting materials such as other plastics or non-shatterable glass plates, etc. In short any similar material may be used in the place of glass, although for convenience I will specify it as glass as this is the material which is more generally employed on account of its relatively low cost and adaptability.

The two plates 5 and 6 as shown more clearly in Fig. 4 are separated a suitable distance so that the luminous tube indicated at 7 may be mounted between them, and because of the particular arrangement of this construction the plates need be, and in effect preferably are, separated from each other only approximately the diameter of the luminous tube, thus making a very thin sign. The face plates may be mounted in any suitable manner, but as shown are mounted in a metal frame comprising a metal rim or band 8 around the peripheries of the plates with a metal ring 9 engaging the outer surface of each plate adjacent its periphery and having a flange portion 10 bent around the edge of the member 8 and to which it may be secured by any suitable means, such as soldering, welding, screws or the like. In the present case the rim 9 on the right side of Figure 4 is permanently secured to the member 8, while the left hand member 9 is detachably secured to the member 8, as for example by the screws 11, so that the plate 5 may be removed to give access to the interior of the sign.

The inner surfaces of the plates 5 and 6 are covered with material except for the sign character which will deflect and diffuse the light from the luminous tubes. In the present case the inner surfaces of the plates 5 and 6 are covered with a sheet of asbestos 12 which is non-inflammable and also provides a heat insulation between the luminous tube and the glass plates to protect these plates from the heat of the tubes, and then this sheet is covered with a white paint or similar material which is an effective medium for deflecting, reflecting and diffusing the light, but it will of course be understood this deflecting and diffusing material may be applied directly to the surface of the glass if preferred. The outline of the character strokes of the sign, such for example as the letters indicated at 13 are cut in this sheet of material 12 thus permitting the passage of light through this sheet, and for the characters or character strokes 13 the surface of the glass is coated with white or any other desired color which may be luminescent, fluorescent, phosphorescent material which renders the character stroke translucent and which gives a brighter and more uniform illumination for the characters. This material may be a luminescent, fluorescent or phosphorescent powder which distributes the light over the translucent portion giving uniform illumination. In other words this luminescent, fluorescent, or phosphorescent material in the character stroke intensifies, distributes and diffuses the light so as to give a bright uniformly lighted character stroke, and this effect is even further improved and enhanced by its use in combination with the deflecting and diffusing surface 12 which forms the back of the plates, except for the character strokes, and additional deflecting and diffusing baffle means extending transversely between the plates 5 and 6 and on the opposite side of the luminous tube 7 from the character stroke.

These transverse baffles are indicated at 14 and 15, and as will be seen from Figs. 3 and 4, the baffles 15 are closely adjacent the luminous tubes on the outer sides thereof or that is on the opposite side from the character strokes 13 and extend across the space between the face plates and engage the same. It may be secured to either plate by any suitable means, such for example as angle elements 16 of asbestos fibrous material cemented to the transverse baffle and the rear surface of the plate. Transverse baffle 14 encloses the central portion of the sign and is on the opposite side of the intermediate portion 7a of the luminous tube from the lower character strokes 13 forming the word "Telephone". This baffle is similar to the baffle 15 and is mounted in the same way so as to extend transversely between the two face plates.

In this particular sign shown there is a character in the center of the sign to indicate a bell, and I have shown it as being outlined by a narrow clear stroke 17 on the glass faces. As this is a clear stroke I have bent an intermediate portion 7b of the luminous tube 7 to follow this clear stroke 17 and be in alignment therewith, but in the case of the translucent luminescent, fluorescent, phosphorescent character 13 it is not necessary that the luminous tube follow the character stroke in order to secure bright and uniform illumination of this stroke. Within the bell are the words "Ball system" 18 which are also translucent the same as the character strokes 13. The luminous tube may be mounted in any suitable way, but as it is in a space which is substantially the diameter of the tube in width and the transverse baffles 14 and 15 are preferably closely adjacent this tube, it will be seen the tube is effectively held in position by these baffles. However, if desired, auxiliary means such as small angle pieces 19 of asbestos or other suitable material may be cemented to the back of the face plates and engage the sides of the tube at suitable locations to help retain it in position.

The electrical leads for the tubes may be led to the tube in any suitable way. Thus as shown in Fig. 1 one lead 20 is carried in a small glass tube 21 to one electrode 22 of the luminous tube 7 while the lead 23 from the other electrode 24 at the opposite end of the tube is led to the outlet through a similar small tube 25. It will be understood that the luminous tube 7 is bent to the desired shape depending upon the sign matter to be illuminated. Thus in the present case as the word "Telephone" is placed on an arc of a circle the tube 7 has a lower portion 7c bent on an arc of a circle and skirting the lower edge of the word "Telephone", but it will be seen it is not directly in back of this word but as stated is in skirting relation to it and extends just outside the word along the lower edge thereof. It is then bent inwardly as shown at 7d and skirts a portion of this word on the inner side as shown at 7a. It then extends upwardly at 7e at about the center of the

word and is bent to the outline of the bell as shown at 7b. As the character or outline stroke 17 is a narrow clear stroke this tube follows this stroke immediately back of it, but if the stroke 17 is made a translucent stroke it would not be necessary that the tube follow it although it might do so. In that case all that would be necessary would be to have the central portion 7b be made circular in shape and follow around on the inside of the baffle 14. The other end of the bell portion of the tube is bent downwardly at the center as shown at 7f adjacent the portion 7e and then skirts the inner edge of the opposite half of the word "Telephone" as indicated at 7g. It then extends to the upper word "Public" and is bent to curved form to skirt the outer or upper edge of this word at the inner side of the baffle 15 as indicated at 7h. It will thus be seen that the luminous tube 7 is in skirting arrangment with the character strokes forming the words "Public telephone" so as to provide an even illumination of the luminescent, fluorescent or phosphorescent material forming these strokes, or the light transmitting portions thereof. It is of course to be understood that these character strokes on the face of the glass plates of the sign contrast with the background formed by the covering or coating 12 so as to give daylight visibility of these character strokes, the outer surface of this backing being such as to give this contrast, but the luminous tube 7 is not directly visible through these character strokes. In Fig. 2 this background 12 is lined to show a blue color as this is a common color used with telephone signs, but of course this is merely by way of example as any color desired may be used. Also white circular narrow bands 26 and 27 are shown which may be either opaque or translucent as desired, or may be of any desired color. It will be seen the backing or coating 12 renders the background for the character strokes opaque giving maximum contrast between this background and the character strokes and thus giving maximum visibility. The character strokes 17 are preferably white for maximum visibility, but of course if desired and for special purposes may be made of different colors. The coloring matter for the background may be applied to the face of the backing 12 but it is preferably mixed with the adhesive which is applied directly to the surface of the glass for securing this backing to the glass. In this way the pigment is sealed in this material and is protected.

It will be seen from Fig. 3 that the transverse baffles 14 and 15 follow the general shape of the luminous tube and are preferably closely adjacent thereto, and that they are located on the opposite side of this side from the character strokes being illuminated so that they confine the light from the tube and assist the rear surface of the lining or coating 12 in deflecting and diffusing this light so that it might be said we have an efficient reservoir of light in the confined space in which the luminous tube is located giving a very bright and uniform illumination of the character strokes.

The remaining forms or modifications of the device shown in Figs. 5 to 19 employ the same principles, but indicate how these principles may be employed for different arrangements and types of signs.

Thus in Figs. 5 to 9 is shown a thin, flat or rectangular sign embodying these features, which is very adaptable for directional signs such as that shown, street signs including one-way traffic signs, department signs in stores, identification signs in buildings, and numerous similar uses. It will be evident that as shown in Fig. 5 when used for directional street signs it can not only give the direction of traffic but can also give the name of the street. This sign comprises a base or housing 28 which may have feet 29 whereby it may be secured to any suitable support. In this particular form it is hollow to enclose a transformer 30 to which are connected leads 31 from any suitable source of current supply connected to the primary coil, and from the secondary of which extend the leads 32 to the electrodes 33 at the opposite ends of the luminous tube 34. Extending from one edge of the housing 28 is a frame 35 which may be of any suitable cross section, but in the present case is channel shaped providing flanges 36 with rectangular openings 37 on each face of the sign outlined by these flanges. These openings are closed by the face plates 38 of glass or other suitable plastic which carry the advertizing matter to be displayed, this preferably being located on the inner surfaces of these plates. The rear end of the housing 28 is open at its central portion for insertion of the transformer 30 and is closed by a base 39 on which the transformer is mounted and by which it may be secured to the base of the housing by any suitable means such as the screws 40. After this is removed the base plates 38 may be slid longitudinally into the housing and frame 35, and after being in position may be held therein by a small bracket 41 secured to the housing at the inner upright edges of these plates by any suitable means, such as by a screw 42. It will be evident that if it is desired to remove the plates 38 and the luminous tube associated therewith all that is necessary is to first remove the transformer, then loosen the stop 41, and the plates with the tube may be slide out of the frame.

The character strokes of this sign comprise the word "Telephone" 43 and the directional arrow 44. These character strokes are cut in or outlined by the backing 45 corresponding to the backing 12 of the first form and may be of similar material, and this backing has the same light deflecting, reflecting and diffusing surface as has the backing 12. The character strokes 43 and 44 on the inner surface of the glass are also the same as the character strokes of the first form comprising translucent material which is luminescent, fluorescent or phosphorescent as described. This material may be a luminescent, fluorescent or phosphorescent powder which distributes the light over the translucent portion giving uniform illumination. The letters 43 in this particular sign are white while the background is blue, but of course any desired color for these, as well as arrow 44, may be used. In Fig. 8 which shows a front view of one edge of the sign the contrasting background 46 is lined to indicate the color blue and the arrow 44 and the character strokes 43 of the word are shown as filled in and sufficiently opaque to give silhouette characters while the background 46 is translucent. To give this silhouette effect the character stroke may be opaque or substantially opaque, or sufficient contrast may in some cases be secured if the character stroke is translucent but considerably less translucent than the background. The translucency of the background may be intensified for light transmission to give greater contrast and more uniform light distribution by addition to the coating on the inner face of the glass of luminescent, fluorescent or phosphorescent material, usually in the form of a powder. Also,

in this case is shown an opaque white band **47** but this may be omitted or made translucent as desired. The luminous tube **34** is arranged with respect to these character strokes in the same manner as in Figs. 1 to 4. It will be seen it comprises a straight lower portion **34***a* immediately back of the arrow **44** and then is bent backwardly to provide a straight portion **34***b* skirting the lower edge of the word "Telephone". It then extends upwardly as at **34***c* and extends horizontally in a straight portion **34***d* which skirts the upper edge of the word "Telephone". Transverse baffles **48** and **49** extend across the space between the face plates **38** closely adjacent the luminous tube and on the opposite sides of the skirting portions **34***b* and **34***d* from the word "Telephone".

It will be seen from Fig. 9 that this is a very thin sign, the face plates being spaced only a distance corresponding to the diameter of the luminous tube, and it will be seen from Fig. 7 that the tube itself is a very simple form. The baffles **48** and **49** may be secured to the back of one of the face plates by any suitable means such for example as the asbestos angle **50** cemented to the baffle and to the back of the plate. It will be evident that these baffles effectively hold the luminous tube in proper position between the plates. The surfaces of these baffles toward the tubes are covered with the same light deflecting, reflecting and diffusing material as the inner surface of the backing **45** so as to confine the light to the space in which the tube is located, and with the backing to thoroughly diffuse and distribute the light so as to uniformly and brightly illuminate the character strokes. There may also be provided narrow clear or transparent or translucent strokes **43***a* through the glass faces bordering the word formed by characters **43**, and in alignment with and directly in front of the tube **34** to give an illuminated border if such effect is desired.

In Fig. 10 the construction is the same as in Figs. 6 to 9 except that Fig. 10 indicates that this sign may be made single face if desired. In other words one face plate **38***a* may have its entire rear surface covered with a backing material **45***a* with no character strokes in it, or the plate itself may be an opaque plate of metal, fiber or other suitable material.

In Fig. 11 a similar construction and arrangement is shown except that there are two sets of glass plates used one of which is easily removable for the purpose of changing the display matter of the sign. In this arrangement the inner glass plates **52** are clear and permanent; while the outer glass plates **51** are easily slidable into and out of the frame **35**. The inner surfaces of these members **51** are coated with the paint or other material which forms the light deflecting and diffusing means and these members **51** also carry or have therein the translucent, luminescent, fluorescent or phosphorescent character strokes **53**, and they are illuminated by the luminous tube **54** skirting these characters the same as in the other form. In other words upon these changeable glass faces **51** is processed the character strokes **53** and background **53***a* corresponding to the forms already described and providing the display matter. This arrangement permits the removal of the advertising matter of one sign and the insertion of a different plate having a different matter thereon. It thus provides an easily changeable sign, but for a permanent sign the previous construction is preferred. The transverse baffles **55** are also provided in this sign extending between the face plates **52** immediately on the opposite side of the luminous tube from the character strokes of the sign the same as in the other forms.

In the modification shown in Figs. 12 and 13 the principle is the same except there is a slightly different arrangement of the luminous tube. In the forms previously described the luminous tubes could be either gas tubes of the "Neon" type or long filament tubes, but the gas tubes are more adapted for the purpose as they operate at a much lower temperature. Figs. 12 and 13 show an arrangement in which such filament tubes can be used without objectionable heating. Here the sign comprises two glass face plates **56** having on their inner faces the opaque backing material **57** the same as in the previous forms, and on the surface of which is the paint or other material forming an effective reflecting and diffusing surface for the light and in which the character strokes **58** are formed and outlined as in the previous construction, the luminescent, fluorescent, phosphorescent material of these character strokes being applied on the inner surface of the glass plates the same as in the previous forms.

In this case, however, instead of placing the luminous tubes between the glass plates these tubes, indicated at **59**, extend along the top and bottom edges of the plates, or if preferred along one edge only, and border these plates so that the light from these tubes passes into the space between the plates **56** and is diffused by the surfaces **57** to illuminate the character strokes. These tubes **59** are indicated as filament tubes, the filament being shown at **60**. The outer portion of these tubes is covered with blocking out material or a baffle **61** which embraces the tube, and the inner surface of which is a deflecting and diffusing surface to deflect the light into the space between the plates **56**. This element **61** therefore corresponds to the baffles **48** and **49** of the previous form. This baffle is opaque and may embrace the entire portion of the tube which is outside the plates **56**, but if it is desired to have a narrow light border top and bottom of the sign it may be formed by cutting a narrow slot in this baffle along the sides of the tube to form a narrow lighted portion as indicated at **62**. It will be seen in this arrangement practically the entire tube is outside where it is in contact with circulating air and thus may be kept relatively cool, but the light is deflected and diffused to the luminous character strokes the same as in the other forms. The protection **61** may be extended so as to lie between the luminous tube and the glass plates **56** as illustrated to thus provide an insulator to protect the glass from the heat of the tube. A clear space **59***a* is left to permit the light from the filament **60** to pass into the space between the glass plates **56**.

In Figs. 14 and 15 a sign similar to Figs. 5 to 9 is shown, except that the display portion of the sign is composed of two lines of words composed of the luminous character strokes. Thus there is the word "Public" forming one line and the word "Telephone" forming the other line. In this case to secure more uniform illumination of the character strokes of these words the luminous tube **63** is in skirting relation to both longitudinal edges of these words. Thus it has a straight lower portion **63***a* skirting the lower edge of the word "Telephone", has an upwardly extending portion **63***b* and then another horizontal portion **63***c* which extends between the two words

so that this portion skirts not only the upper edge of the word "Telephone" but it also skirts the lower edge of the word "Public". The tube then extends upwardly at **63***d* and then again horizontally at **63***e* to skirt the upper edge of the word "Public". The leads **64** are connected to the electrodes **65** of the tube in the standard manner, and may be led thereto through small glass tubes **66** as is common practice. It will of course be understood that the words "Public telephone" are on the rear faces of the glass face plates **67** as in the other forms, and that on the inner surfaces of these plates is the backing material **68** coated with the light deflecting and diffusing material the same as in the other forms shown. In all the forms this backing material on its outer surface forms the contrasting background for the character strokes. In this form I also employ the transverse baffles, one being shown at **69** at the upper side of the portion **63***e* of the luminous tube and opposite the word "Public". Also there is another baffle **70** immediately below the portion **63***a* and on the opposite side thereof from the word "Telephone". In other words this modification is the same as the previous forms except it shows how a portion of the luminous tube may be extended between two lines of character strokes to skirt one edge of each line and give more uniform illumination of the character strokes.

The modification of Figs. 16 and 17 employs the same principles as the forms described with a slightly different arrangement. In this arrangement there are two luminous tubes **71** shown at the top and bottom of the character strokes **72**, there being one tube immediately to the rear of each glass face plate **74**. It may be used in either single or double faced signs and is intended primarily for use where the character strokes or the signs themselves are larger. The two tubes at the top and the two tubes at the bottom arranged in this way illuminate a much larger character stroke in vertical dimension than a single tube. In this arrangement a good three quarters of the circumference area of each tube is available for light transmission.

The showing in Fig. 17 is for a double faced sign, but it will be evident may be used in a single faced sign if desired. The sign comprises the frame **73** similar to the frame **35** of the previous forms, and the two glass face plates **74** on the rear surfaces of which are the translucent luminescent, fluorescent, phosphorescent characters **72** with the surface surrounding these characters covered by the backing material **75**, the same as that of the previous forms, which backing material includes an inner surface capable of deflecting and diffusing the light from the luminous tubes **71**. In this case there is a tube **71** extending along or skirting one edge of each character. There is one of these tubes for each face of the sign. This double arrangement makes the sign somewhat thicker, but in some signs the single arrangement can be used. There are also provided in this sign the transverse baffles **77** extending across the space between the face plates, and located on the outer sides of the tubes **71** opposite to the side on which the character strokes **72** are located. The surfaces of these baffles, as in the other forms described, are covered with material for deflecting and diffusing the light into the space between the face plates to brightly and uniformly illuminate the character strokes.

In Figs. 18 and 19 is shown an arrangement whereby this principle may be effectively employed to uniformly illuminate these letters and character strokes where they are too large for effective illumination by a tube located along one edge only of the letters. In this case it will be seen the luminous tube entirely surrounds the letters or character strokes, and also has associated with it a transverse baffle entirely surrounding the character or character strokes immediately outside of the tubing, or that is, on the opposite side thereof from the character stroke. This baffle as in the other forms is for the purpose of confining the light to the letter space. This sign shown is similar to the sign of Figs. 5 to 7 comprising the frame **78** carrying the two glass face plates **79**. The letters or character strokes **80** and **81** are too large for effective illumination by the liminous tube skirting the outer edges only as in Fig. 5. Therefore the luminous tube **82** is bent to follow the outlines of the characters and surround them. Thus this tube has a portion **82***a* extending along and just laterally outside of one side of the character **80**, and then has portion **82***b* extending along another side, and the third portion **82***c* extending along the remaining side of the character so as to surround the same. The same is true in the character **81** where the tube **82** has a portion **82***d* skirting one side of this character and another portion **82***e* skirting the remainder of the character so as to surround the same. A transverse baffle **83** follows the tube around the character **80** and immediately outside the same on the opposite side thereof from the luminous tube. In the same manner a baffle **84** follows around the tube skirting the character **81** and outside the same or on the opposite side thereof from the character **81**.

Fig. 19 shows this arrangement in a double faced sign in which there is a tube **82** for each face plate **79** and there is a baffle **85** extending between these tubes to separate the light space and deflect and diffuse the light to the character strokes on the glass plates. This modification has the advantage of simplifying tube bending where the tube follows the outlines of the letters or characters, in that all double backs are eliminated, and with the tubes just off the outside edges of the character strokes or characters with baffles to confine, reflect and diffuse the light there is insured an even strong light in the character strokes.

The baffle **85** runs through the center of the sign parallel to the faces thereof for the purpose of separating the illumination for the two faces. The surfaces of this baffle are covered with the same material as the inner surfaces of the backing **86** to deflect and diffuse the light for each face directly onto the face.

It will be understood the character strokes **80** and **81** are translucent and may be formed by luminescent, fluorescent or phosphorescent material the same as in the other forms and are surrounded by the backing material **86** on the inner surfaces of the face plates forming the opaque background for the character strokes to give the daylight and night visibility. The inner surfaces of this backing, baffle **85** and the baffles **83** and **84** have their surfaces covered with the material to deflect and diffuse the light the same as in the other forms, and to confine it to the narrow space between the plates and baffles in which the tubes are located so that there is a minimum loss of light and a maximum illumination of the character strokes, providing very bright and uniform

illumination over the entire strokes. This effect is secured in all the forms shown.

The transverse baffles **14**, **15**, **48**, **49**, **55**, **69**, **70**, **71**, **83** and **84** not only serve to deflect, diffuse and confine the light and help maintain the luminous tube in the proper position, but they also act as a bracing and supporting means for the face plates thus permitting the use of thinner plates than would otherwise be required. This is especially valuable in large signs in which the wind pressure on the large surface exposed might break the glass, but it will be seen that with these baffles, particularly in such signs as that shown in Figs. 1 to 4 and 18, pressure on one glass face plate would be transmitted to the opposite glass face plate so that the combined strength of these two plates would be effective to resist the pressure on one face. It will be evident this would permit the use of thinner plates materially reducing the weight of the sign.

In all the forms shown the whole width of the character stroke may be translucent, or the character stroke may be composed of different portions such for example as a central translucent portion outlined by narrow borders contrasting with the remainder or translucent portion, these borders being preferably opaque or nearly so, or the body or central portion of the stroke may be opaque or nearly so and the borders may be composed of narrow translucent strips. In any case the translucency of the translucent portions of the sign, whether in the character stroke or in the background, may be intensified for light transmission to increase the contrast and give more uniform distribution of the light, by addition to the coating on the glass of luminescent, fluorescent or phosphorescent material, usually in the form of a powder.

Having thus set forth the nature of my invention, what I claim is:

1. In an electric sign, a glass face plate having on one face thereof a character stroke permitting passage of light therethrough and contrasting with a background for daylight visibility, an elongated tube lamp immediately back of the plate to one side of the character stroke so as to be out of alignment therewith, and a reflector for light on the opposite side of the tube from said stroke and closely adjacent the tube to reflect light from the lamp to the stroke.

2. An electric sign comprising a glass face plate having on one face thereof a translucent character stroke, an elongated tube lamp immediately back of the plate to one side of the character stroke, a reflector for light on the opposite side of the tube from the plate, and a light reflector extending transversely between the plate and the first reflector and located on the other side of the tube from the character stroke.

3. An electric sign comprising a pair of spaced glass face plates having translucent character strokes thereon, an elongated tube lamp between the plates located to one side of the character strokes, said plates being spaced substantially the diameter of the tube, and the surfaces of the plates other than the character stroke forming reflectors to reflect the light to the character stroke of the opposite plate.

4. An electric sign comprising a pair of spaced glass face plates having translucent character strokes thereon, as elongated tube lamp between the plates located to one side of the character strokes, said plates being spaced substantially the diameter of the tube, reflectors for light on the inner surfaces of each plate to reflect light from the tube to the character stroke on the other plate, and a transverse reflector extending between the plates and located on the other side of the tube from the character stroke.

5. An electric sign comprising a pair of laterally spaced glass face plates having translucent character strokes thereon, an elongated tube lamp between the plates located to one side of the character strokes, said plates being spaced a distance substantially the diameter of the tube, light reflectors on the surfaces of the plates other than the character strokes, and transverse reflectors extending between and engaging the plates to transmit pressure from one plate thereon to the other plate, said transverse reflectors being adjacent the tubes at the opposite sides thereof from the character strokes.

6. In an electric sign, a glass plate having light transmitting character strokes thereon contrasting with a background to give daylight visibility, and an elongated tube lamp immediately to the rear of said plate in skirting arrangement with said character strokes so as to provide even illumination for said character strokes, means on the opposite side of the lamp from said strokes for reflecting light from the lamp into the strokes, and said tube being arranged so as not to be directly visible through the character strokes.

7. An electric sign comprising a glass plate having translucent character strokes thereon contrasting with a background for daylight visibility, an elongated tube lamp immediately to the rear of said plate in skirting arrangement with said character strokes so as not to be directly visible through said strokes, a baffle a the opposite side of the tube from the character stroke, and the inner surfaces of the baffle and the background being capable of deflecting and diffusing the light from the tube to provide an even illumination for the character strokes.

8. In an electric sign, a glass plate having light transmitting character strokes thereon contrasting with a background to give daylight visibility, an elongated tube lamp immediately to the rear of said plate in skirting relation to said character strokes; and means having light reflecting and diffusing surfaces associated with said tube to direct the illumination from said tube toward and into the character strokes.

9. An electric sign comprising a glass plate having light transmitting character strokes thereon, an elongated tube lamp immediately to the rear of said plate in skirting relation to the character strokes in position not to be directly visible through said strokes, a plate on the opposite side of the tube from said face plate, and means on the rear of the face plate surrounding the character strokes and on said second plate for reflecting and diffusing the light from said tube to illuminate the character strokes.

10. An electric sign comprising a pair of spaced glass plates having light transmitting character strokes thereon contrasting with a background for daylight visibility, an elongated tube lamp between the plates arranged in skirting relation to said character strokes so as not to be directly visible through said strokes, said plates being separated a distance not substantially greater than the diameter of the tube, and the rear faces of said plates being provided with means surrounding the character strokes having surfaces forming reflecting and diffusing means for the light from the tube to illuminate the character strokes.

11. In an electric sign, a glass face plate having

on one face thereon a character stroke contrasting with a background, at least a part of said character stroke being light transmitting, an elongated tube lamp directly back of the plate and to one side of the character stroke so as not to be directly visible through the stroke, and a reflector for light on the opposite side of said tube from said plate and closely adjacent the tube to reflect light coming from the opposite side of the tube into the stroke.

12. A double faced electric sign having a restricted volume of space for creating an efficient reservoir of light, which space is formed by two parallel glass face plates and an elongated tube lamp between the plates forming the top and bottom of the reservoir, said plates being spaced substantially the diameter of the tubes, and said face plates having character strokes thereon contrasting with a background to give daylight visibility, one of the surfaces forming the strokes or the background being translucent and illuminated from said reservoir, and the rear surfaces of said plates being provided with means having surfaces forming reflecting and diffusing means for the light from the tube to illuminate the character strokes.

13. An electric sign comprising a glass face plate having translucent character strokes thereon contrasting with a background for daylight visibility, an elongated tube lamp immediately to the rear of said plate in skirting arrangement with said character strokes and arranged so as not to be directly visible through the character strokes, and said background having therein a narrow light transmitting strip directly over the tube and extending longitudinally thereof to form a border strip for the characters.

14. An electric sign comprising a glass face plate having on one face thereof translucent portions and other portions contrasting therewith for daylight visibility, an elongated tube lamp positioned adjacent the translucent portions to illuminate them and located to one side thereof so as not to be directly visible through said portions, and said translucent portions comprising luminescent, fluorescent or phosphorescent material to intensify the translucency for greater contrast and uniform distribution of the light, and means on the opposite side of the lamp from said portions to reflect light coming from the opposite side of the lamp into said portions.

15. A double faced electric sign having a restricted volume of space or spaces between the faces for creating an efficient reservoir of illumination, said space or spaces being formed by two spaced glass face plates with elongated tubular lamps positioned at top and bottom of said space or spaces, both faces having sign character strokes contrasting with a background for daylight visibility, said character strokes being light transmitting and said background being substantially opaque, and said face plates being spaced apart a distance not substantially greater than the diameter of the tubular lamps.

16. In an electric sign two glass face plates having a character stroke on each face plate permitting passage of light therethrough and contrasting with a background, an elongated tube lamp located between the face plates to one side of the character strokes, and said face plates being spaced apart not substantially farther than the diameter of the tubular lamp.

17. An electric sign comprising a pair of laterally spaced glass face plates having character strokes thereon contrasting with a background for daylight visibility, at least a portion of said character strokes being light transmitting, elongated tubular lamps located between said face plates in skirting arrangement with lines of the character strokes, transverse baffle reflectors engaging the faces on sides of the tubular lamps opposite the character strokes and separating the faces to prevent pressure on the tubular lamps, and said reflectors forming the top and bottom of the space or spaces between the face plates and reflecting light toward the character strokes.

18. An electric sign comprising a glass face plate having a line of character strokes contrasting with a background, said strokes being light transmitting, and an elongated tubular lamp extending longitudinally of the said line of strokes to illuminate it and located at one side thereof so as not to be visible through the strokes.

19. An electric sign comprising a glass face plate having a single line of character strokes contrasting with a background, one of said line of strokes or said background being light transmitting and the other substantially opaque, and an elongated tubular lamp extending longitudinally of said line of strokes at one side thereof in skirting relation to said line to illuminate the rear of said plate.

20. An electric sign comprising a glass face plate having a line of character strokes contrasting with a background, said strokes being substantially opaque and the background field around the characters being translucent, and an elongated tubular lamp extending longitudinally of said line of strokes at one side thereof in skirting relation to said line to illuminate the rear of the plate.

21. In an electric sign a glass face plate having a character stroke thereon, said character stroke being light transmitting and in color effect contrasting with a substantially opaque background, an elongated tubular lamp located adjacent the rear surface of the face plate and adjacent the character stroke, a reflector or reflecting surface to the rear of and adjacent the lamp, and surfaces of the face plate facing the lamp, other than the character stroke, also provisioned as reflecting surfaces so as to create an efficient reservoir of confined illumination for the purpose of illuminating the light transmitting character stroke.

22. In an electric sign a glass face plate having lines of character strokes thereon contrasting with a background in daylight visibility, said character strokes being light transmitting, an elongated tubular lamp located adjacent the rear of the glass face and adjacent two lines of character strokes for the purpose of illuminating said lines of character strokes, said tubular lamp and said lines of character strokes being inclosed from the rear with surfaces forming reflecting and diffusing means to confine and efficiently conserve the light from the lamp for comparative bright showing through the light transmitting character strokes.

23. In an electric sign a glass face plate having character strokes contrasting with a background, said character strokes being substantially opaque and said background being translucent, an elongated tubular lamp or lamps located adjacent the rear of said face plate, and reflecting and diffusing surfaces to the rear of the lamp or lamps forming an enclosure for the lamp or lamps and area of the face plate to be illuminated so as to efficiently conserve the illumination for showing

through the light transmitting sections of the face plate.

24. In an electric sign a glass face plate having portions light transmitting and other portions substantially opaque, an elongated tubular lamp or lamps adjacent the rear face of the face plate so as not to be directly visible therethrough, an enclosure located to the rear of said lamp or lamps to confine the light from the lamp or lamps to a restricted volume of space, and surfaces facing within said enclosure excepting light transmitting sections of the face plate bieng provisioned so as to be light reflecting and diffusing surfaces, so that when the lamp or lamps are illuminated said enclosed space becomes a restricted reservoir of comparatively bright illumination for illuminating the light transmitting portions of the face plate.

25. In a double faced electric sign two glass face plates having character strokes thereon, said character strokes in daylight visibility contrasting with a background, said character strokes or said background arranged to be light transmitting, an elongated tubular lamp or lamps for illumination located between the faces adjacent to both faces, and surfaces other than light transmitting sections of the face plates being provisioned on their respective sides facing the lamp or lamps for light reflection and diffusion, the proximity of faces with their reflecting and diffusing surfaces facing the lamp or lamps between the faces thereby creating an efficient reservoir of comparatively intense illumination to illuminate the light transmitting sections of the face plate.

26. A double faced electric sign comprising a pair of parallel spaced glass face plates having light transmitting character strokes thereon giving daylight visibility, an elongated tubular lamp or lamps so located between the face plates as not to be defined through the character strokes, the inner surfaces of each face plate other than the character strokes being provisioned as light reflecting and diffusing surfaces, and said face plates being so spaced from each other as to form an efficient reservoir of comparatively bright illumination for showing through the character strokes.

27. In an electric sign, a glass face plate having light transmitting character strokes thereon contrasting with a background for daylight visibility, on enclosure to the rear of the face plate forming with the face plate a restricted, efficient reservoir for illumination, said enclosure extending outwardly of an edge of the face plate, said enclosure on its inner surface and said face plate on its inner surface other than the character strokes being provisioned as light reflecting and diffusing surfaces, and an elongated tubular lamp located within the enclosure in proximity with the edge of the face plate for the purpose of illuminating the reservoir for showing through the character strokes.

28. In an electric sign, a glass face plate having light transmitting character strokes thereon contrasting with a background for daylight visibility, an enclosure to the rear of the face plate forming with the face plate a restricted. efficient reservoir for illumination, said enclosure extending below the bottom and above the top of the face plate, said enclosure on its inner surface and said face plate on its inner surface other than the character strokes being provisioned as light reflecting and diffusing surfaces, and elongated tubular lamps located within the enclosure both top and bottom in proximity with top and bottom of the face plate for the purpose of illuminating the reservoir for showing through the character strokes.

29. In an electric sign a pair of spaced glass face plates having light transmitting character strokes thereon contrasting with a background for daylight visibility, an enclosure to the rear of the face plates forming with these plates a restricted, efficient reservoir for illumination, said enclosure extending outwardly of adjacent edges of the face plates, said enclosure on its inner surface and said face plates on their inner surfaces other than the character strokes being provisioned as light reflecting and diffusing surfaces, and an elongated tubular lamp located within the enclosure in proximity with said edges of the face plates for the purpose of illuminating the reservoir for showing through the character strokes.

30. A double faced electric sign comprising a pair of laterally spaced glass face plates having light transmitting character strokes thereon contrasting with a background giving daylight visibility, each face plate having an elongated tubular lamp or lamps immediately to the rear thereof positioned in arrangement with the character strokes so as not to be directly visible therethrough, and the rear surface of each face plate other than the character strokes being provisioned as light reflecting and diffusing means to diffuse and reflect light to the opposite face for showing through the character strokes.

31. In a double faced electric sign, a pair of parallel spaced glass face plates having light transmitting character strokes thereon contrasting with a background for daylight color effect, an elongated tubular lamp or lamps positioned between the face plates for illumination, the inner surfaces of the face plates other than the character strokes being provisioned as light diffusion and reflecting means, said face plates in conjunction with said tubular lamp or lamps being spaced to form an efficient reservoir of light illuminating the character strokes, and said face plates having light transmitting strips or sections through the background directly over or adjacent the tubular lamp or lamps providing an illuminated ornamental showing or border effect.

32. In an electric sign, a glass face plate having light transmitting character strokes contrasting with a background for daylight visibility, an enclosure to the rear of said face plate enclosing an elongated tubular lamp or lamps for illumination, the inner surface of the enclosure and the inner surface of the face plate other than the character strokes being provisioned as light diffusing and reflecting means, said face plate having a strip or sections through the background directly over or adjacent the tubular lamp for the purpose of an illuminated border or ornamental showing, and said face plate, enclosure and internal positioned tubular lamp or lamps forming an efficient reservoir of light for showing through the light transmitting sections of the face plate.

33. A double faced electric sign comprising a pair of parallel spaced glass face plates having light transmitting character strokes thereon contrasting with a background giving daylight visibility, elongated tubular lamps of different colors of illumination so located between the face plates that said lamps do not show defined through the character strokes, the inner surfaces of the face plates other than the character strokes being provisioned as light reflecting and diffusing

means, and reflecting and separating baffles extending from face to face separating the illumination from the tubular lamps of different colors for showing through their respectively intended character strokes thereby forming with the face plates efficient and restricted reservoirs of colored illumination for showing through the character strokes.

34. In an electric sign, a glass face plate having light transmitting character strokes thereon contrasting with a background for daylight visibility, elongated tubular lamps of different colors located to the rear of the face plate so as not to show defined therethrough, an enclosure positioned to the rear of the tubular lamps, and separating baffles extending between the face plate and said enclosure between the lamps of different colors, said enclosure and baffles forming with the face plate efficient restricted reservoirs of different colored illumination, and inner facing surfaces of said face plate other than the character strokes, the enclosure and baffles being provisioned as light reflecting and diffusing means.

35. A double faced electric sign comprising a pair of parallel spaced glass face plates having light transmitting character strokes thereon contrasting with a background for daylight visibility, an elongated tubular lamp or lamps located between the face plates so that said lamp or lamps do not show defined therethrough, baffles extending from face plate to face plate positioned to confine the illumination from said lamp or lamps, and said baffles on their inner surfaces and said face plates on their inner surfaces excepting character strokes being provisioned as reflecting and diffusing surfaces for creating a restricted reservoir of illumination for showing through the character strokes.

IRVING V. MANSELL.

CERTIFICATE OF CORRECTION.

Patent No. 2,163,614. June 27, 1939.

IRVING V. MANSELL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 56, after the word "leads" insert --in--; page 3, first column, line 28, for "of" before "these" read --to--; line 57, for "side" second occurrence, read --tube--; page 6, first column, line 17, for "strangth" read --strength--; and second column, line 35, claim 7, for "baffle a" read --baffle at--; page 8, first column, line 12, claim 24, for "bieng" read --being--; line 52, claim 27, for "on" read --an--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of November, A. D. 1940.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)