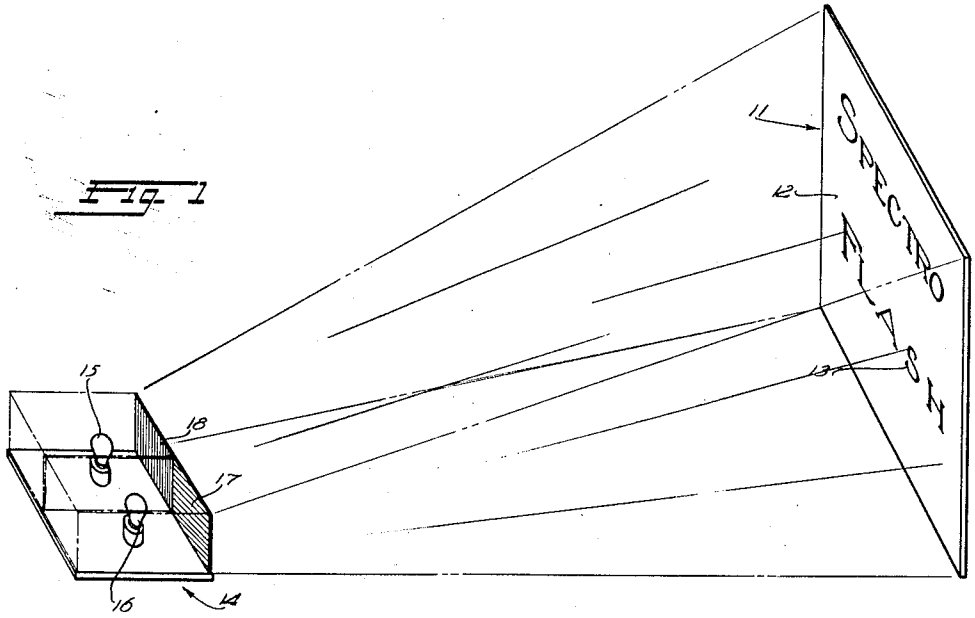
Aug. 1, 1939. J. G. BEST 2,168,113

ILLUMINATED SIGN APPARATUS AND METHOD

Filed Oct. 17, 1938 2 Sheets-Sheet 1

Fig. 1



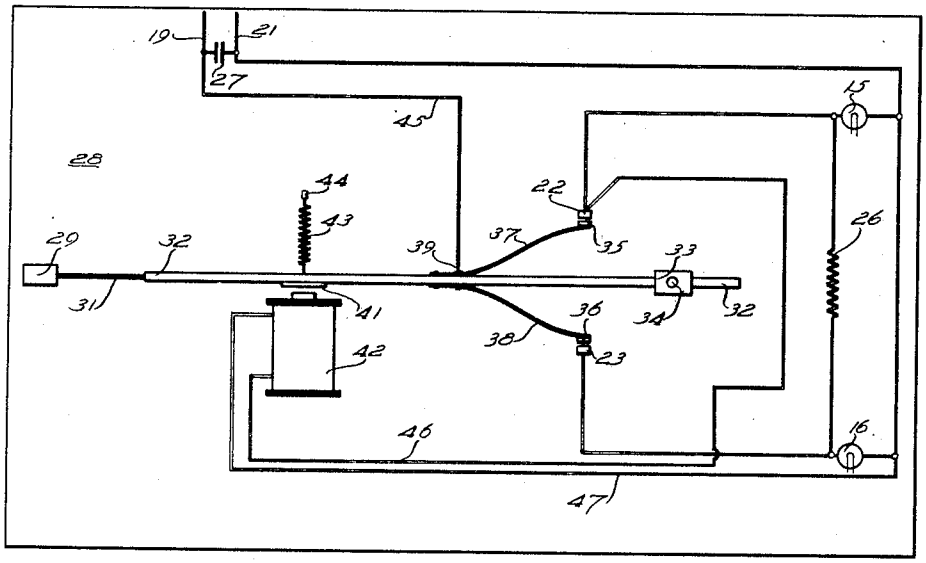


Fig. 3

Inventor
John Gordon Best

By Strauch & Hoffman
Attorneys

Aug. 1, 1939. J. G. BEST 2,168,113

ILLUMINATED SIGN APPARATUS AND METHOD

Filed Oct. 17, 1938 2 Sheets-Sheet 2

Fig. 4

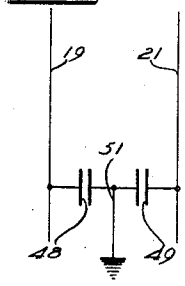


Fig. 2

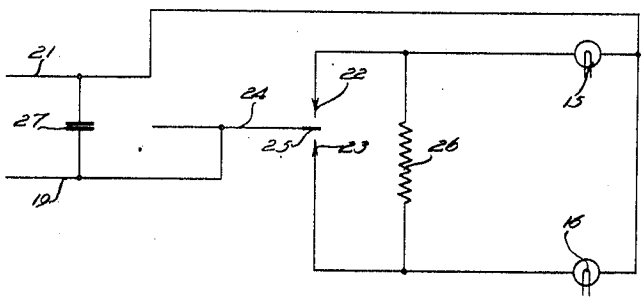


Fig. 5

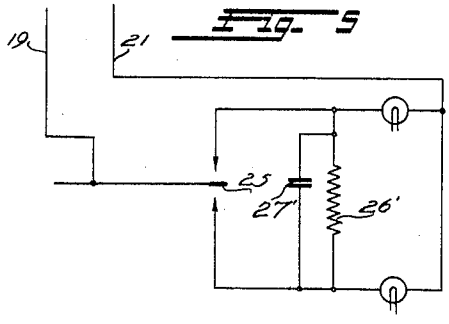
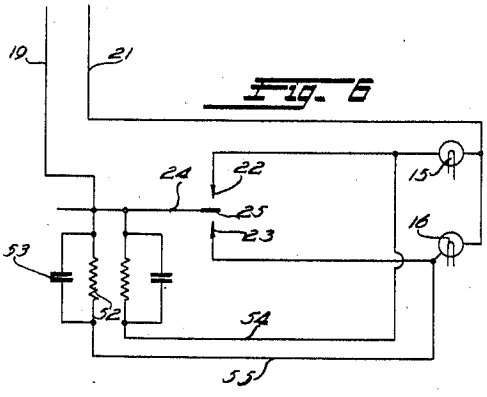


Fig. 6



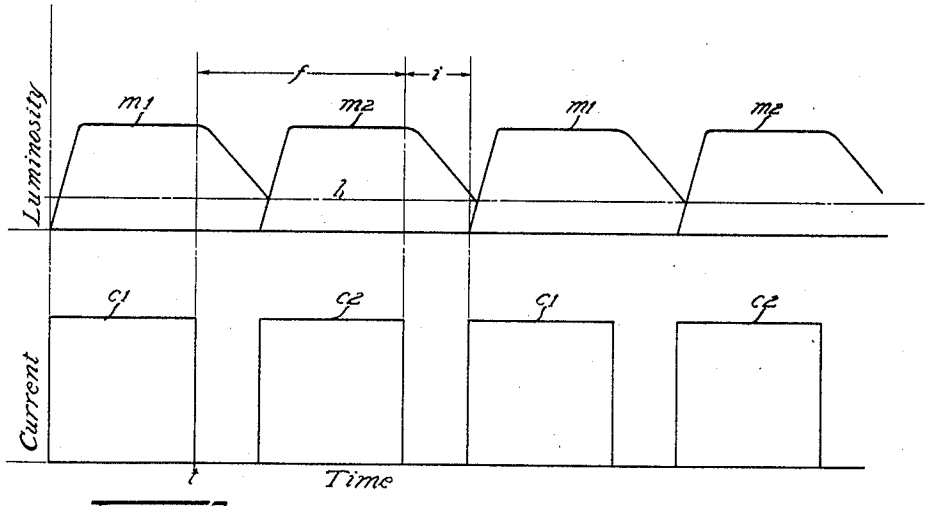


Fig. 7

Inventor
John Gordon Best

By Strauch & Hoffman
Attorneys

Patented Aug. 1, 1939 2,168,113

UNITED STATES PATENT OFFICE

2,168,113

ILLUMINATED SIGN APPARATUS AND METHOD

John Gordon Best, Toronto, Ontario, Canada, assignor to General Animated Signs, Limited, Toronto, Ontario, Canada, a company of Ontario, Canada

Application October 17, 1938, Serial No. 235,491

17 Claims. (Cl. 40—130)

This invention relates to variably illuminated signs and more particularly to signs of the type in which different areas or parts of the sign are of different colours and in which part of the sign or the whole is cyclically illuminated with light of different colors, one, at least, usually corresponding to a color of a part of the sign itself, whereby an effect of animation is produced in the sign. Signs of this type are disclosed in detail in my copending application Serial No. 179,196, filed December 10, 1937, and the present invention is designed as an improvement over the apparatus and methods disclosed in that application, especially with regard to the apparatus for casting the various colored lights upon the sign.

It has been found in signs of this general character operated at a relatively low cyclic color change such as a frequency of from 1–10 cycles per second, particularly when low wattage lamps, such as from 75 watts down, are employed, that an objectionable flicker is produced over the sign areas. This flicker is no part of the animating effect proper, and is due to the fact that such lamps tend to become entirely extinguished during their off periods and thereby create sharp brightness contrasts upon the surface of the sign.

It is, accordingly, the major object of the present invention to provide novel sign illuminating apparatus and methods for producing smooth animating effects and in which sharp brightness contrasts and changes on the surface of the sign are eliminated, whereby objectionable flicker effects caused by such contrasts are prevented.

A further object of the invention is to provide novel sign illuminating apparatus and methods utilizing relatively low wattage lamps operated at relatively low cyclic light characteristic changes wherein sharp brightness contrasts on the sign surface are prevented. Specifically, these low wattage lamps are below 75 watts and are operated to produce cyclic color changes of from 1–10 cycles per second.

A further object of the invention is to provide novel sign animating apparatus in which bright lights of different color are alternately flashed upon the sign and in which harsh brightness contrasts on the surface of the sign are prevented by maintaining dim illumination of the sign by one of the lights when the other light is bright and vice versa, so that at no time is the sign surface entirely without illumination or "dark." Specifically, in one form of the invention suitable resistance means are inserted alternately and automatically in each light circuit to provide such dimming.

Signs of this character are usually illuminated by electric lamps and suitable switching apparatus, including contact makers and breakers are employed to alternately energize the electric lamps employed to illuminate the sign. The switching apparatus, involving frequent periodic making and breaking of electrical contacts is, however, liable to cause radio interference, and I have found it desirable to devise electric switching apparatus in which radio waves likely to cause interference are satisfactorily suppressed.

It is, therefore, a further object to provide, in a sign illuminating apparatus including periodic switching mechanism, a novel electrical circuit arrangement for preventing the switching mechanism from interfering with radio reception in the vicinity of the apparatus.

Further objects of the invention will presently appear as the description proceeds in connection with the appended claims and the annexed drawings in which:

Figure 1 is a diagrammatic view illustrating a manner in which the invention may be employed for sign illumination;

Figure 2 is a diagrammatic plan of the electrical wiring system used in a preferred form of the invention;

Figure 3 is a plan view of an electro-magnetically operated switch mechanism and wiring system for cyclically energizing the illuminating means also forming part of my inventoin;

Figure 4 illustrates a modification of the wiring systems shown in Figures 1 to 3 inclusive and in which a pair of condensers are connected across the supply line;

Figure 5 illustrates a further modified form of wiring system of the invention and in which a condenser is placed adjacent the resistance and in parallel with the latter;

Figure 6 illustrates a further modified form of wiring system of the invention and in which separate current restricting resistances are provided for each lamp; and

Figure 7 is a graphic illustration of the current and luminosity variators that occur in the illuminating system of a further modified form of the invention.

Referring to Figure 1, the invention is preferably used in connection with a sign illuminating apparatus of the type wherein a sign 11, having a background 12 of one color and indicia 13 of another color, is illuminated by alternate

flashes of light of different color from a suitable projector 14.

Projector 14 comprises two lamps 15 and 16, and color filters 17 and 18 are disposed respectively in front of these lamps. The color of one of these filters is substantially the same as the color of indicia 13 and this color is to be known as an animating color. The color of the other filter may be any color lacking in the distinguishing hue of the animating color. For instance, the filter colors may be red and green, and a partition is located between the two lamps.

Background 12 may be of any color which will reflect light from both color projectors and so be a non-animating color, or may be of a color corresponding to one of the projector colors and thereby be an animating color, or may be non-reflective to either projector color and thereby be a non-animating neutral color.

In operation a suitable periodic switching mechanism causes alternate energization of lamps 15 and 16 so that the sign surface is alternately brightly flooded with light of different colors thereby producing animating effects. Such animating effects have already been described in my aforementioned copending application and in the United States patent to Smith, No. 2,040,538, and need not be described in detail here. Any of the illumination color and sign combinations disclosed in said application and patent may be utilized in practicing the present invention.

The term "areas" is employed to include the background of the sign or parts thereof and any indicia displayed on the background or otherwise. The term "color" includes black and white as well as animating, non-animating and neutral colors as referred to in the aforesaid applications.

For the sake of economy and efficiency in operating such signs, it is desirable to use lamps of low wattage, preferably about 75 watts or below in size. The wattage however will depend upon the use to which the sign is to be put and the factors involved in the particular installation at hand. Ordinarily, high wattage lamps will be used for large outdoor displays and low wattage lamps, for instance in the neighborhood of 75 watts, will be used for small displays, such as indoor signs for use in show windows and the like.

It has been found that when these low wattage lamps are operated to produce low cyclic color frequency changes, the interval between the successive bright illumination periods of the lamps of the projector is of such length as to create alternate periods of darkness or no illumination upon the sign surface. This is due to the fact that the filament of a small wattage lamp loses its incandescence very quickly after the electrical energy is cut off.

These periods of darkness on the screen surface are in harsh, sharp contrast to the bright illumination which exists when the lamps are lighted and create objectionable flicker effects which are quite apparent to the observer at such low color frequency changes. Therefore, even though the animation effected by the sign at tracts the observer's eye, it will not hold his attention until the full advertising value of the sign is realized because the flicker is tiring to the eye.

Accordingly, apparatus for eliminating such flicker effects has been devised and a preferred form of the same is disclosed in Figures 2 and 3 of the drawings, which will now be described.

Referring particularly to Figure 2, 19 and 21 are supply line conductors connected with a suitable source of electrical energy. Incandescent lamps 15 and 16 are connected in parallel to the conductor 21 and also connected to the stationary contacts 22 and 23. The conductor 19 is electrically connected with a movable contact maker 24 provided with a contact 25, adapted to engage the stationary contacts 22 and 23. This contact maker 24 may be operated by any suitable mechanism and preferably takes the form of the apparatus shown in Figure 3 of the drawings and hereinafter fully described.

Connected with each lamp and bridging the gap between the stationary contacts 22 and 23 is a resistance 26.

From the construction described, it follows that as the member 24 is moved between the contacts 22 and 23, the circuits of the two lamps are alternately completed while at the same time there is a limited flow of current through resistance 26 and the lamp which is not connected directly with the source of supply through the contact maker 24. By the use of this resistance, an appreciable illumination level is maintained at the surface of the sign and the objectionable flicker over the surface of the sign areas which would be otherwise noticeable, is completely suppressed. A similar effect is obtained if high wattage lamps are employed in which the filaments are of sufficient thickness to remain more or less incandescent for an appreciable time after the energizing current is cut off, particularly at frequencies of 1–10 cycles per second, and it is to be understood that such an arrangement falls within the scope of my invention. When my invention assumes that form the resistance 26 may be omitted, as will later be pointed out.

To satisfactorily prevent radio interference it is necessary to introduce a condenser arranged in shunt to the contacts of the circuit maker. In Figure 2, the arrangement comprises a condenser 27 introduced between the conductors 19 and 21, between the apparatus and the source of current. Therefore, as the contacts are alternately opened and closed, any tendency for sparking is precluded by reason of the condenser.

A preferred form of periodic switching apparatus and wiring system for alternately energizing lamps 15 and 16 is disclosed in Figure 3.

A support or base 28 of Bakelite or the like is provided, and adjacent to one end is a rigid upstanding block 29, to which is secured one end of a flexible spring strip 31 of brass or the like. A bar of insulating material 32, such as Bakelite, is secured to the other end of strip 31 and extends longitudinally of base 28, but out of contact with the top surface of base 28 so that it is free to flex about its supporting flexible portion 31 in a plane generally parallel to the surface of the base.

Adjacent to its free end, bar 32 is provided with a slidable weighted block 33, which may be secured in adjusted position lengthwise of the strip by a set screw 34. The purpose of this weight will later be described.

Upon opposite sides of bar 32, electrical contacts 35 and 36 are provided upon the free ends of metal spring strips 37 and 38, respectively. Strips 37 and 38 are fastened to strip 32 and electrically connected to each other by a metallic rivet 39.

Contacts 35 and 36 are designed to engage electrical contacts 22 and 23, respectively, as bar 32 swings from side to side, and they are rigidly supported upon base 28.

Bar 32 carries, intermediate its ends, a block

of iron or some other magnetic material 41 which is responsive to a suitable electromagnet 42 mounted rigidly on base 28. On the side opposite magnet 42, bar 32 is secured to one end of a coal spring 43, whose other end is anchored to base 28 at 44.

Supply line lead 19 is attached through a suitable binding post and a flexible conductor 45 to rivet 39. The other supply line lead is connected to the lamps 15 and 16 in parallel, as shown above in Figure 2. The windings of magnet 42 are connected by leads 46 and 47 to contact 22 and supply lead 21, respectively.

When supply line 19, 21 is de-energized, spring 43 pulls bar 32 in a counter-clockwise direction (Figure 3) so that contacts 22 and 35 are pressed together or "dosed" and the contacts 23 and 36 are spaced apart or "open". When line 19, 21, is energized, current flows through line 21, lamp 15, contacts 22 and 35, spring strip 37, and conductor 45 to line 19 thus completing the circuit for brightly illuminating lamp 15.

Although contacts 23 and 36 are open, a small current simultaneously flows through lamp 16, entering through line 21 and passing through resistance 26 to contact 22 where it joins the current passing through lamp 15. Lamp 16 is thereby dimly illuminated and the strength of this illumination depends upon the size of resistance 26.

Simultaneously, electromagnet 42 is energized by current passing through line 21, lead 47, the windings of magnet 42, lead 46, contacts 22 and 35, conductor strips 37 and 45 to line 19.

Energization of magnet 42 causes block 41 to be attracted thereto and bar 32 is swung in a clockwise direction about flexible strip 31 to break contacts 22, 35 and engage contacts 23, 36. Spring strips 37 and 38 function to firmly and yet resiliently maintain the contacts engaged. Engagement of contacts 23 and 36 for an appreciable length of time, sufficient to insure a bright illumination period of proper duration from lamp 16, is assured, since the momentum of bar 32 and weight 33 is such as to overcome the combined forces of springs 43 and spring conductor 38, until the bar 32 has reached its limit of movement toward contact 23.

With contacts 23 and 36 engaged and contacts 22, 35 disengaged, lamp 16 is fully energized by current passing through line 21, contacts 23 and 36, strip 38, conductor 45 to line 19. A small current passes through line 21, lamp 15, resistance 26 to contact 23, where it joins the current passing through lamp 16. It will be seen, therefore, that lamp 16 is now brightly illuminated while lamp 15 is dimly illuminated.

As soon as contacts 22 and 35 have disengaged, however, the magnet 42 is de-energized and no longer pulls on bar 32, and the latter is then urged in a counter-clockwise direction by spring 43 and resisted in its forward movement by spring conductor 38. The momentum of bar 32 and weight 33 is sufficient to resist the urge of spring 43 and overcome the resistance of spring strip 38, as pointed out above, and thus insure firm engagement of contacts 23 and 36 for an appreciable length of time. Then, when bar 32 reaches its limit of swing, spring 13 pulls bar 32 in a counter-clockwise direction to again engage contacts 22 and 35 and break contacts 23 and 36, and the above cycle is repeated.

By adjusting weight 33 longitudinally along bar 32, the pendulum effect and hence the speed of vibration of the bar may be altered to obtain a cyclic color change of any desired frequency in the illuminating apparatus.

Condenser 27 suppresses spark gap discharges when the contacts of the switching mechanism are alternately made and broken, and thereby eliminates the creation of radio waves, which might cause interference with radio reception in the vicinity of the apparatus.

The invention may also be practiced to a degree by using high wattage lamps, which maintain a slowly dying incandescence for an appreciable period after de-energization. Such lamps must be carefully selected with regard to the frequency of light change desired, and when they are employed, there is no necessity for a resistance arrangement of the type illustrated in Figure 2, although one may be provided if desired.

In Figure 7 is illustrated rather diagrammatically, the conditions which must be satisfied for proper utilization of high wattage lamps according to the invention.

It is well known that lamps of high wattage have rather heavy wire filaments, which heat up relatively quickly, but cool rather slowly. The invention utilizes this property of the high wattage lamp, to maintain a reasonably high illumination level on the surface of the sign, by carefully correlating the cooling characteristics of the lamps, with the frequency of color change used for animating the sign.

In Figure 7, the discontinuous curve C_1 represents the rise and fall of current applied to one lamp, while the discontinuous curve C_2 represents the rise and fall of current applied to the other lamp, as determined by a suitable periodic switching mechanism, for instance, of the character previously described.

Above the curves C_1, C_2 is indicated the corresponding variations in illumination at the sign projector incident to the periodic switching operations. The luminosity of the two lamps is indicated by the curves M_1 and M_2. When the sign projector is first energized, the lamp through which current C_1 flows, almost immediately comes to maximum brilliancy where it remains until the current is cut off at the end of t seconds.

As soon as the current is cut off, the lighted lamp begins to dim relatively slowly as its filament loses its incandescence. However, just before the illumination from that lamp reaches a predetermined level l, the other lamp is energized by application of current C_2 thereto and the illumination produced by the sign projector again rises immediately to a maximum.

As each current cycle is repeated, the lamps variably illuminate the sign in the cycle above described, and the level of illumination of the sign is never allowed to drop below the predetermined level l. The illumination level l is dependent upon the period i, between the cutting off of the current to one lamp, and the application of current to the other lamp, and upon the rate of cooling of the lamps, and it will be seen that proper coordination of lamp size and color change frequency is of utmost importance. An examination of Figure 7 will show that the period i is independent of the frequency of color cycle change f. In other words, the frequency may be maintained constant, and period i varied at will, to effect the desired illuminating characteristics. Similarly, the period i may be maintained constant and the frequency varied, to adapt the apparatus to various desired operating characteristics.

It will be understood that the diagrammatic illustration in Figure 7 by no means represents

technically accurate relative values of time, illumination, and current, but are designed only to facilitate an understanding of the operation of the invention.

Modifications

In Figure 4 is illustrated a modification of the wiring system, in which a pair of condensers **48** and **49** are connected in series and shunted across the supply lines **19**, **21**. The condensers have a common ground **51** connected to the connection between them.

In Figure 5 another modification of the wiring system is illustrated, wherein the condenser **27'** is placed in parallel with the resistance **26**, instead of directly across the line as shown in Figure 2.

In the modification illustrated in Figure 6, each lamp, which is not fully energized, is connected through a suitable individual resistance and condenser arrangement to complete a circuit, which causes that lamp to be dimly illuminated. A resistance **52**, and a condenser **53**, are connected in parallel, and connected to leads **54** and **55** leading from lamps **15** and **16**, respectively, to movable contact support **24**, which is diagrammatically shown as a conductor.

Conclusion

The above described invention provides animated sign illumination, which is entirely free from flicker and shadow effects, caused by sudden and harsh brightness changes on the surface of the sign. An illumination level of appreciable value is always maintained on the sign surface during operation, so that the observer's eyes are enabled to adapt themselves readily to the brightness variations incident to animation.

The invention is of especial value in connection with colored signs because it is well known that the human eye is quickly fatigued by exposure to colored light, especially where the light varies widely and rapidly in both color and brightness.

Another advantage arising from the specific type of flasher above described for use with low wattage lamps is the fact that the lamps of the sign appear to have a longer useful life where they are merely dimmed instead of entirely extinguished. This is probably due to the fact that the lamp filaments are maintained energized during the operation of the sign and are not alternately cooled and heated to such extent as would be the case if they were extinguished. Thus, further economy of operation of the sign is assured.

Although I have illustrated my invention as embodying throwing two contrastingly colored lights upon a sign, for instance, red and green, it is to be understood that it is not limited to two colors. For instance, green or red light and polychromatic or orthochromatic light may be alternated at suitable frequencies of cyclic light change. The particular method selected, will be governed by the nature of the sign, the subject to be treated and the kind of animation desired, and it is to be understood that the appended claims are intended to embrace my invention when it assumes these forms.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. Apparatus for illuminating a sign or the like in which different areas are responsive to different light characteristics, comprising a plurality of electric lamp means adapted to produce light of different characteristics, each of said lamp means being connected to one side of a supply line, means comprising periodically operable switching means for completing the circuit through each lamp means in succession and electrical resistance means interconnecting said lamp means in such a manner that, when the circuit to either lamp is completed, both lamps are energized by said line, with the current flow through one of said lamps being materially restricted by said resistance means.

2. Apparatus for producing variable illumination comprising a pair of electric lamp means connected in parallel to one side of a supply line, means comprising periodically operable switching means for alternately completing the circuits of said lamps, and resistance means forming a restricted path for the flow of a predetermined amount of current through either lamp means when the circuit of the other lamp means is closed by said switching means.

3. The apparatus for producing variable illumination defined in claim 2, wherein said switching means comprises movable and stationary contacts and condenser means are arranged in shunt to said contacts.

4. The apparatus for producing variable illumination defined in claim 2, wherein each lamp is connected to said switching means by a separate lead and said resistance means is connected directly between said leads.

5. The apparatus for producing variable illumination defined in claim 2, wherein said switching means comprises movable and stationary contacts and two condensers are connected respectively to opposite sides of said supply line and a common ground, whereby they are arranged in shunt to said contacts.

6. The apparatus for producing variable illumination defined in claim 2, together with a condenser arranged in parallel with said resistance.

7. The apparatus for producing variable illumination defined in claim 2, wherein said resistance means comprises a separate resistance unit arranged in the electrical path between each of said lamps and said switching means.

8. Apparatus for illuminating a sign in which different areas of the sign are of different colors, comprising means including an electric supply circuit and electric lamps for cyclically illuminating the sign with lights of different colors, said means including also a periodically operable switching device adapted to cyclically complete the circuits of the said lamps, and resistance means between the lamps forming a restricted path for the flow of a limited amount of current through any lamp while its circuit is opened by said switching device.

9. Apparatus for illuminating a sign in which different areas of the sign are of different colors, comprising means including an electric supply circuit and electric lamps for cyclically illuminating the sign with lights of different colors, said means including also a contact maker with movable and stationary contacts adapted to cyclically complete the circuits of said lamps, re-

sistance means between the lamps forming a restricted path for the flow of a limited amount of current through any lamp while its circuit is opened by the circuit maker, and a condenser arranged in shunt to the contacts of the contact maker.

10. A method of illuminating a sign provided with areas of different colors which comprises cyclically illuminating the sign with light of different colors at least one of which has the same dominant hue as the color of a sign area, the cycle of each light comprising a bright period and a dimmed period with the latter occurring during the bright period of another light.

11. A method of illuminating a sign provided with areas of different colors, which comprises cyclically illuminating the sign with lights of different colors, at least one of which has the same dominant hue as the color of a sign area, by means of electric lamps, the cycle of each lamp comprising a bright period and a period in which the lamp is partly de-energized and which occurs during the bright period of another lamp.

12. A method of illuminating a sign provided with areas responsive to light of different characteristics which comprises successively brightly illuminating the sign with light of different characteristics, at least one of which characteristics is the same as that of a sign area, while maintaining said sign dimly illuminated during said periods of bright illumination with light of a different characteristic from the light producing said bright illumination, whereby sharp brightness contrasts and objectionable flicker effects resulting therefrom are avoided.

13. A method of illuminating a sign provided with areas responsive to light of different colors which comprises alternately brightly illuminating the sign with light of a color corresponding to the color of one of said areas and simultaneously dimly illuminating said sign with light of a color different from that producing said bright illumination, whereby sharp brightness contrasts and objectionable flicker effects resulting therefrom are avoided.

14. A method of illuminating a sign provided with areas of different colors which comprises cyclically illuminating the sign with light of different colors at least one of which has the same dominant hue as the color of a sign area, the cycle of each light comprising a bright period and a dimmed period, the latter occurring during the bright period of another light, the dimming of one occurring while the other is brightening and vice versa.

15. A method of illuminating and animating a sign having areas of different colors, which comprises cyclically brightly illuminating said sign with lights of different colors, one of said lights being substantialy of the same color as one of said sign areas, at a frequency of from 1–10 cycles per second, whereby animating effects are secured, and simultaneously dimly illuminating said sign during each period of said bright illumination with light of a different color than that producing said bright illumination, whereby sharp brightness contrasts and objectionable flicker effects resulting therefrom are avoided.

16. A method of illuminating a sign having at least two separate color areas which comprises alternately brightly and dimly illuminating said sign with light of a color corresponding to one of said color areas and light of a different color from said one color area, the bright period of each light occurring during the dim period of the other light so that the general illumination of the sign is maintained at a level at least equal to said dim illumination and sharp brightness contrasts are avoided.

17. The method of illuminating a sign having areas of different colors, comprising casting at least two different colored lights upon said sign by means of incandescent filament lamps, said colors of said lights corresponding respectively to two contrastingly colored parts of said sign, whereby the latter will be alternately visually prominent as said lights are alternately cast upon the sign, said lights having an alternating frequency of from 1 to 10 cycles per second, and the point of energization of one lamp being sufficiently proximate to the point of de-energization of the other lamp to restore illumination of said sign before the filament of said one lamp cools sufficiently to allow said sign to become totally dark.

JOHN GORDON BEST.