June 18, 1929. F. J. KAEHNI ET AL 1,717,785

METHOD OF AND MEANS FOR PRODUCING ILLUMINATION EFFECTS

Filed June 25, 1928 7 Sheets-Sheet 1

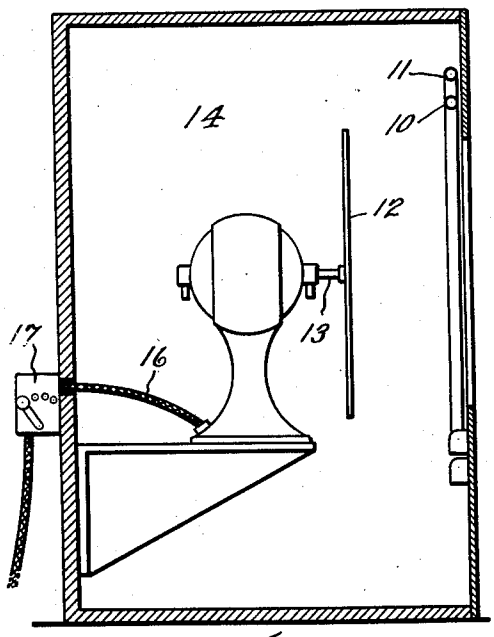

Fig. 1

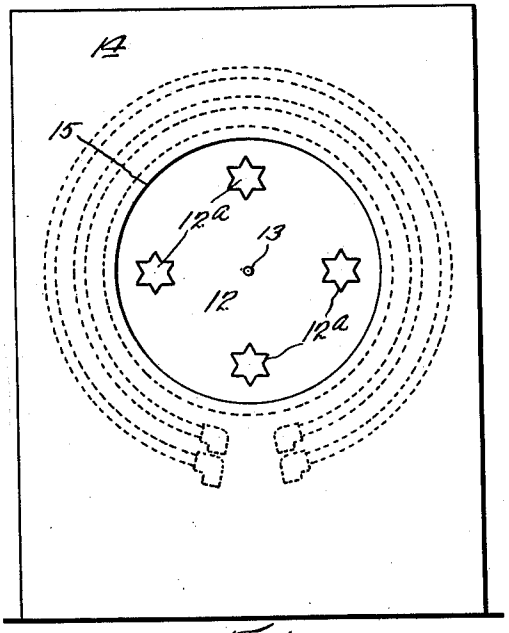

Fig. 2

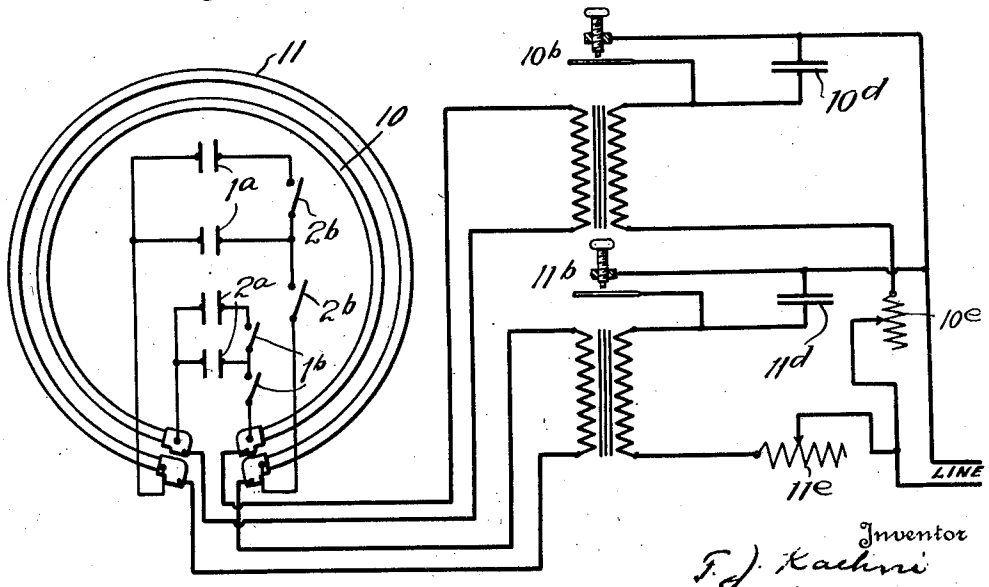

Fig. 3

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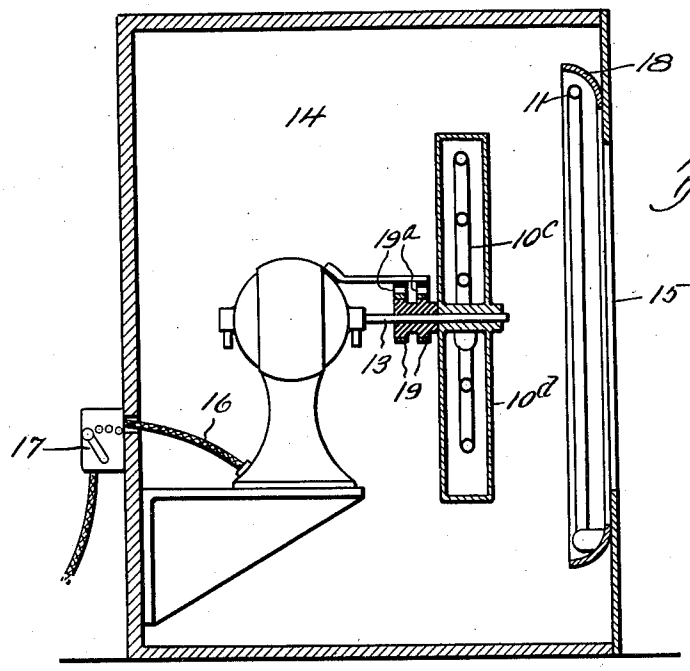

Fig. 4

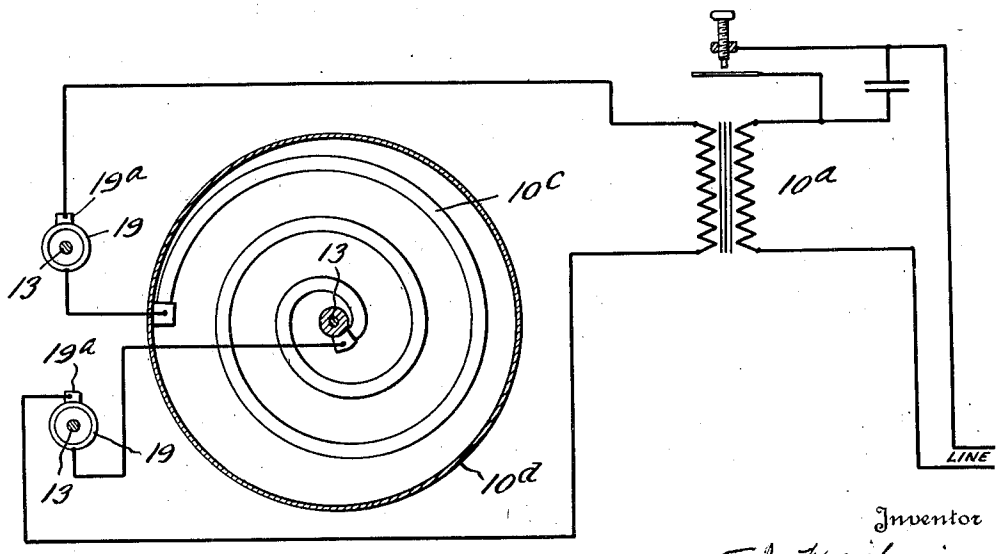

Fig. 5

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METHOD OF AND MEANS FOR PRODUCING ILLUMINATION EFFECTS

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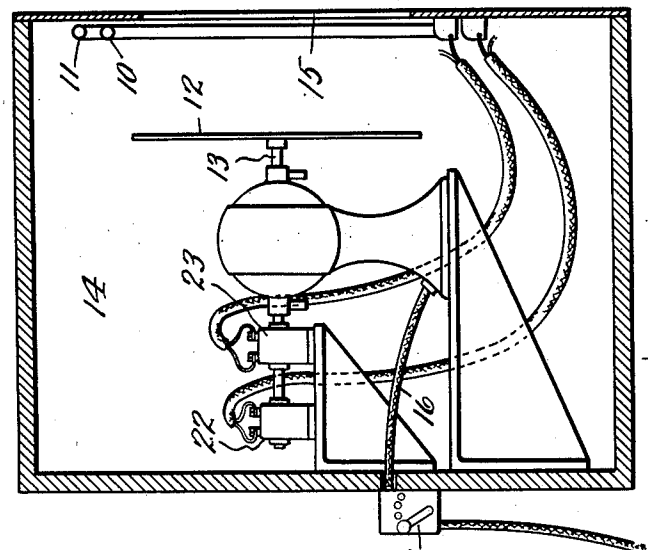
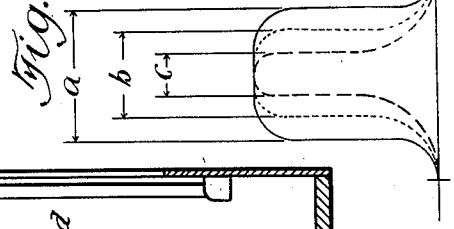


Fig. 7

Fig. 13.



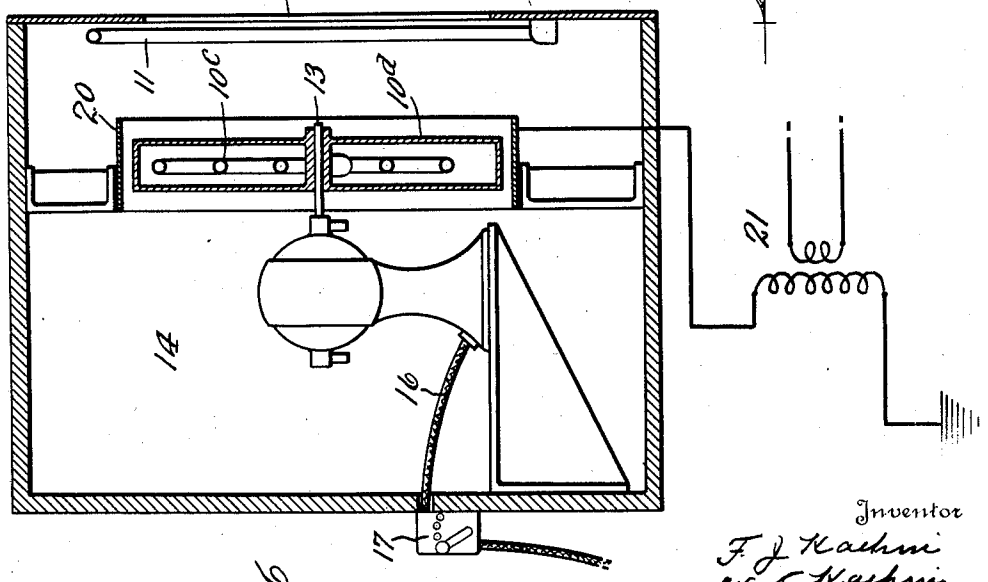


Fig. 6

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METHOD OF AND MEANS FOR PRODUCING ILLUMINATION EFFECTS

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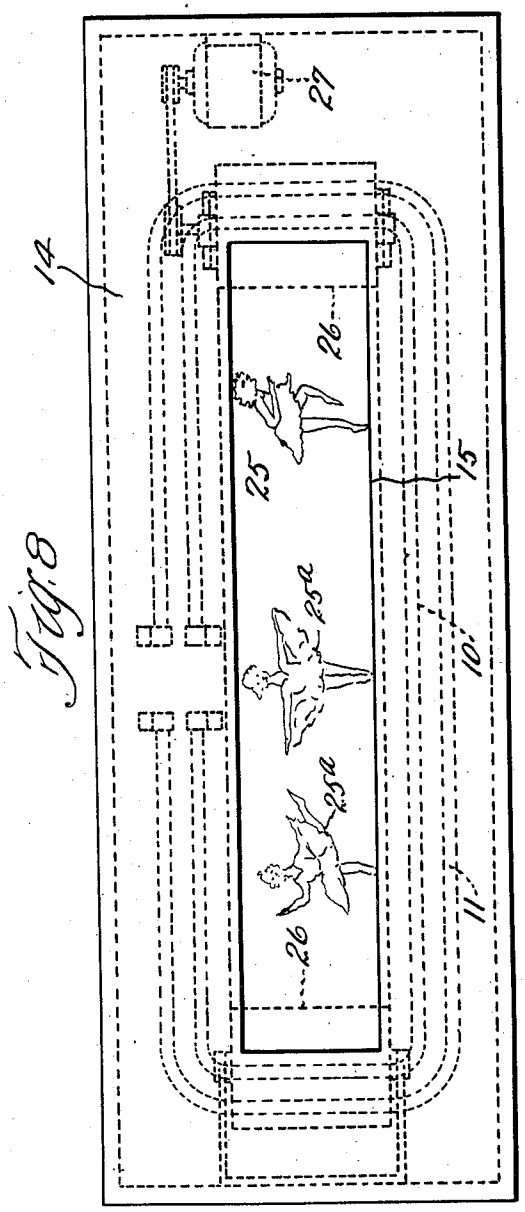

Fig. 8

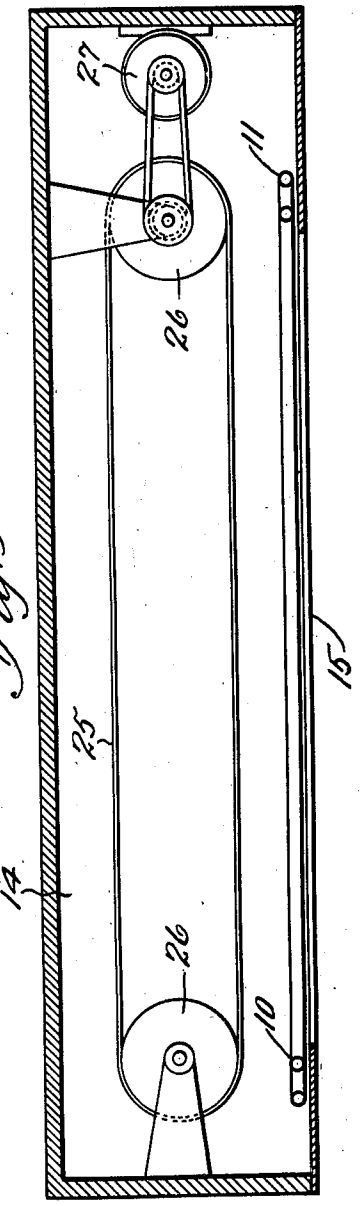

Fig. 9

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METHOD OF AND MEANS FOR PRODUCING ILLUMINATION EFFECTS

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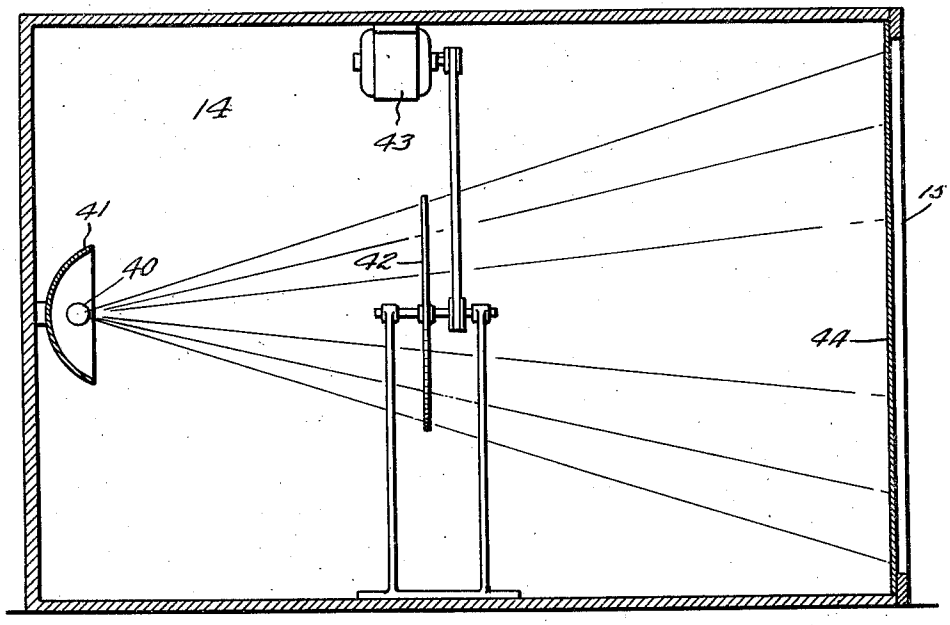

Fig. 10.

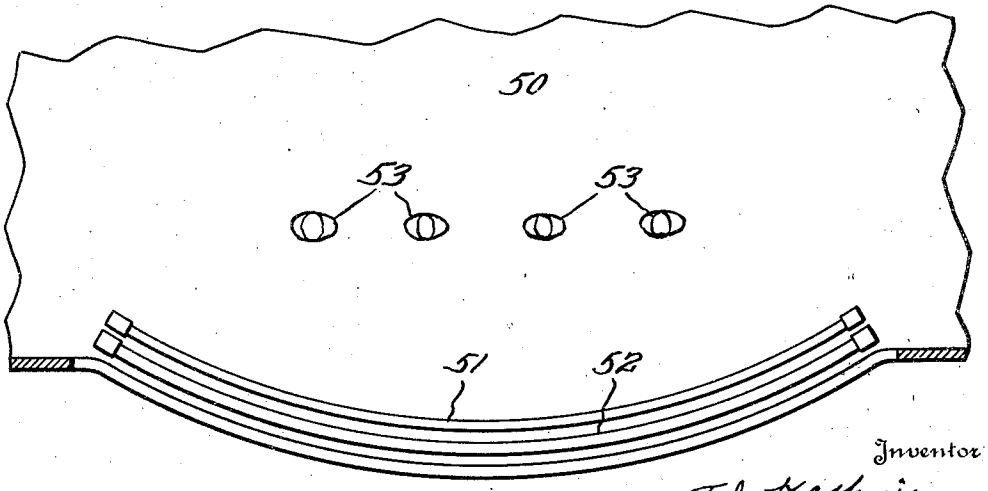

Fig. 11.

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METHOD OF AND MEANS FOR PRODUCING ILLUMINATION EFFECTS

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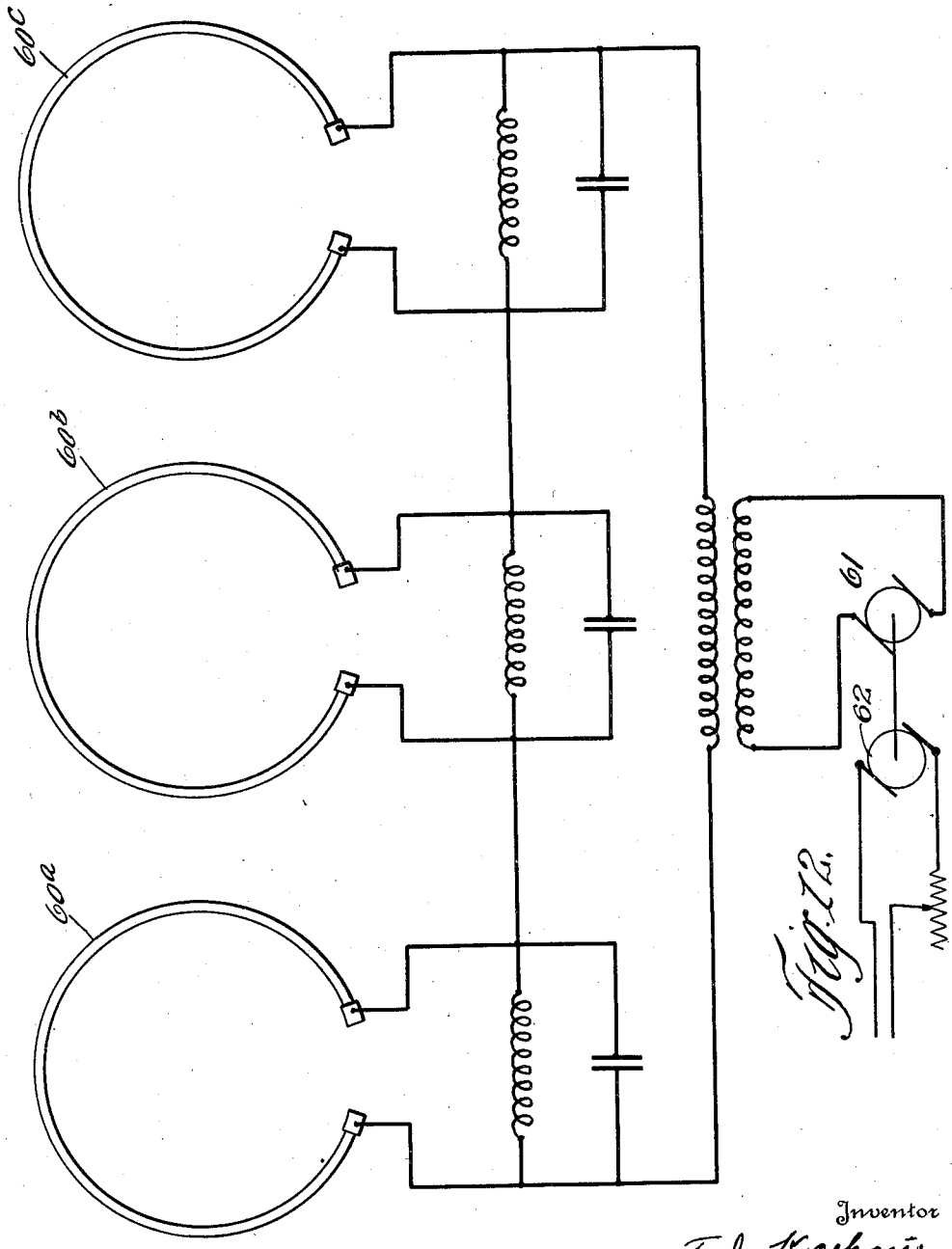

Fig. 12.

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METHOD OF AND MEANS FOR PRODUCING ILLUMINATION EFFECTS

Filed June 25, 1928 7 Sheets-Sheet 7

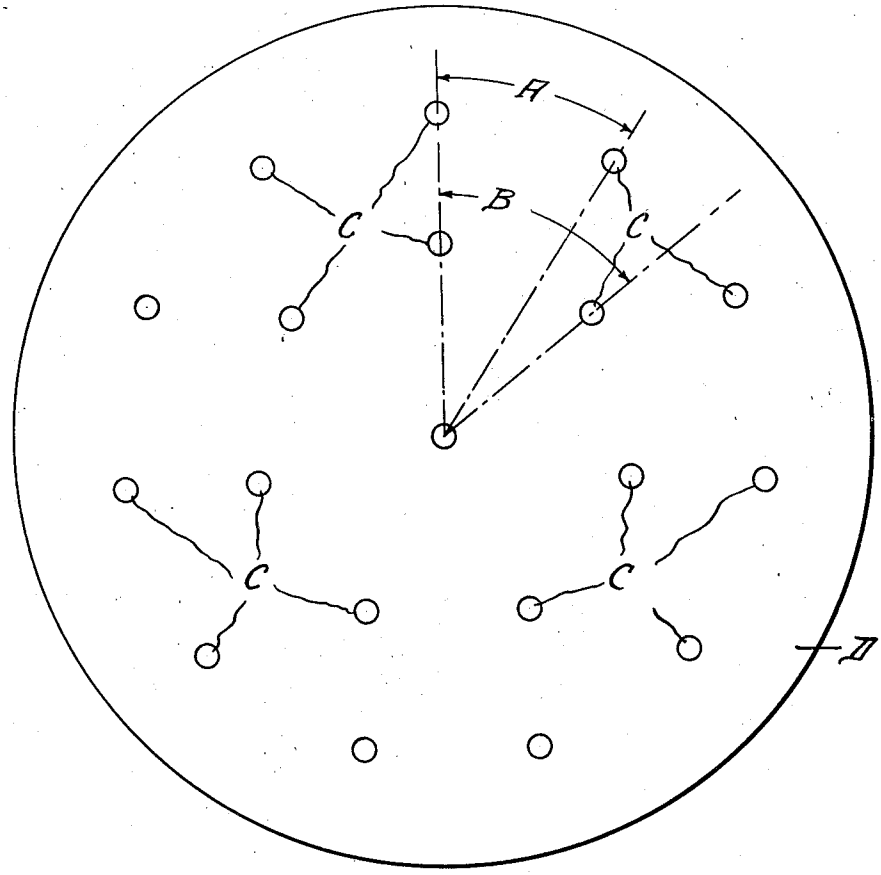

Fig. 1A

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UNITED STATES PATENT OFFICE.

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METHOD OF AND MEANS FOR PRODUCING ILLUMINATION EFFECTS.

Application filed June 25, 1928. Serial No. 288,091.

This invention relates to a method and apparatus for producing illumination effects. The object of the invention is to provide a novel method and apparatus for obtaining a great variety of illuminated designs or effects and also changes in said designs or effects without making any mechanical changes in the apparatus itself.

Broadly speaking, the invention consists in providing a moving object which may or may not bear one or more designs or marks thereon, and illuminating this movable object by one or more gas filled tubes, and then varying either the frequency of illumination or changing the speed or rate of movement of the movable object or both, whereby different effects are produced. It is well known that the illumination of a gas filled tube is produced by an interrupted current, and although the gas or vapor in the tube seems to be continuously luminous there are, as a matter of fact, a large number of periods of interruption which are not at all visible to the human eye and due to the fact that the gas or vapor is instantly illuminated and extinguished, we have found it possible to produce a variety of different designs, colors, shapes and effects by changing the frequency of the illumination of the vapor or gaseous sources of light.

At the present time these gas or vapor lights are of different colors, the principal ones in use being red, blue, green and yellow and our invention contemplates not only the use of one color to produce a variety of effects but the employment of a plurality of different colors for producing an infinite variety of effects.

The applications of the fundamental idea are very numerous and the invention can be used in connection with either animate or inanimate moving objects.

With reference to the use of the invention in connection with animate objects, it can be used with a single animate object or a plurality of animate objects. The invention is therefore particularly useful for the production of stage or theatrical effects both in connection with animate and inanimate objects, as we shall more fully set forth hereinafter.

In connection with inanimate objects the invention can be used not only to provide an infinite variety of geometrical or lineal effects, but also a great variety of color combinations in combination with these geometrical or lineal changes.

In connection with this specification we shall illustrate a number of different devices and methods of utilizing the broad principles of our invention, but it will be understood that these are only illustrative, and are not intended to cover all of the different forms of apparatus, or all of the different methods of carrying out the inventive thought.

In these drawings Fig. 1 is a sectional view partly in elevation of an apparatus embodying a motor driven screen or disk arranged within a suitable housing having an opening in the front thereof and through which a moving screen or disk is visible, said housing containing a plurality of neon or other gas filled tubes so positioned as to illuminate the forward or outer face of the screen or disk, which screen or disk is intended to have placed thereon one or more marks or figures either of the same or of different colors for the purpose of producing the different effects or designs as will more clearly appear as the description proceeds; Fig. 2 is a face view of the apparatus shown in Fig. 1; Fig. 3 is a diagrammatic view showing the arrangement of the illuminating tubes and the means for varying the frequency of illumination pulses; Fig. 4 is a view similar to Fig. 1 and illustrating a different form of apparatus; Fig. 5 is a diagrammatic view of the illuminating means; Fig. 6 is a view showing a slightly modified form of apparatus from that disclosed in Figs. 4 and 5; Fig. 7 is another modification of the same idea; Fig. 8 is a face view of an apparatus in which the movable object is in the form of an endless belt instead of a revolving disk and Fig. 9 is a horizontal sectional plan view of the same; Fig. 10 is a view illustrating one form of apparatus for display advertising upon an enlarged scale and Fig. 11 is a view illustrating one form of utilizing our invention in connection with the production of stage effects; Fig. 12 is a method of selectively lighting any one of several different color tubes by a change of frequency; Fig. 13 is a diagrammatic view showing the wave diagram of some of the different wave forms obtainable and Fig. 14 is a somewhat diagrammatic view illustrating one manner of arranging the design or designs upon the disk so that they will appear to move with respect to each other under certain conditions.

First of all it will be understood that the

object upon which the light is directed must be movable, and the greater the rate of movement, the greater the variety of changes can be. It will also be understood that we prefer to employ gas or vapor tubes for the source of illumination and for the best effect a variety of different colors of such lights are employed. When the illuminated object is moving, such as a rotating disk or a rapidly traveling belt or screen, and one tube of a definite color is illuminated, there will appear upon the disk or screen a definite design or figure which the human eye can perceive; and by changing the frequency of illumination of the tube, that is to say the electrical impulses which produce the flashes in the tube or varying the speed of the disk or screen with reference to the frequency of illumination a different design will appear upon the disk or screen; and if the original design or configuration placed upon the disk or screen is of one or more colors there may be in addition to the geometrical or lineal change, also a change in coloring of the design.

If now, instead of one colored light only being employed to illuminate the disk or screen, two or more different colored lights are employed, there will be a different colored design when the different colored lights have the same frequency of illumination, and a variety of both design and color when the frequency of illumination is changed, due to the fact that there is a very large number of variations in changes of frequency and there will be almost an infinite variety of changes in the design.

In addition to changing the frequency of a current which supplies the tubes, the intensity of the current can also be changed to vary the sharpness of the design produced upon the movable object. By changing the frequency of the current we can, not only, effect changes in the geometrical or lineal effect of the designs, but we can also obtain the duplication or increase the apparent number of figures or objects that are present on the display disk or screen, either in separate form, or in overlapping in varying degrees.

Furthermore, by operating a number of different colors simultaneously we can produce upon the screen movements in opposite directions so far as the human eye is concerned, while the screen is revolving or moving in one direction at a constant speed. Thus for example we can have a certain design on the screen colored red. This under the influence of certain illuminated color will appear in a certain way moving in a certain direction, but under the influence of another color whose frequency may differ from the red tube frequency, this same design may appear to move backwards in one color and forward in another color. Then by combining the various colors in different intensity combinations we can obtain a great variety of shades of colors and also some combination colors which are not present on either the screen originally or in color source illumination.

By reference to Fig. 2 it will be noted that four stars are placed upon the disk at equal distances apart and by rotating the disk at a definite rate, and illuminating one of the tubes at a definite rate we can make these stars appear in a definite position as though the disk were standing still or we can make these stars appear as four stars or eight stars or sixteen stars. By turning on another source of light and varying the frequency of one of the other sources of light, we can display a definite number of stars traveling in one direction and another number apparently traveling in the reverse direction due to the variation in frequency between the sources of illumination. By changing still further the ratios between the movable object and frequency of illumination a great variety of designs can be produced due to the overlapping of the different figures or characters marked upon the disk or screen and there will also be a variety of color changes involved in each geometrical and lineal change.

These differences are produced entirely by the design that we put on to the screen and the spacing of the component parts of the design, the speed of rotation and frequency of illumination. By combining with the above, more complicated screen design, changes in color, in light frequency, and also in rotation speeds, we can again obtain a very great variety of effects which it is impossible to obtain by any other mechanical or ordinary electrical means.

A still added effect can be obtained by changing the wave form of the current which produces the flashes of light. If the wave form is such that the duration of light is exceedingly short, we will have a very clear cut, well defined image produced on the screen. If, however, the wave form is such that the portion of light is on a relatively longer time, the images will move a fractional part of revolution during the time that the light is on, and for that reason will produce a blurred effect.

By combining clear cut flashes of one color and comparatively longer interval flashes of a different color we can obtain still further artistic and variegated color combinations.

This effect of wave form change can very readily be accomplished by changes in the electrical constants of the circuits. A very simple example of this is to connect a condenser or electrical capacity across the terminals of the neon tube. This reduces the voltage and increases the rate of discharge to such an extent that the neon tube will produce light for only a very small fraction of a second, whereas without the condenser the time that the neon tube is emitting light may be three

four, or five times as great. In the former case we will get a very clear cut image whereas in the latter case, without the condenser we will get a somewhat blurred effect. In Fig. 3 there is disclosed a pair of gas illuminated tubes each of which has a pair of condensers 1^a and 2^a respectively connected across the terminals thereof. Suitable switches 1^b and 2^b are respectively provided for selectively controlling the condensers whereby to vary the wave form of the lights respectively. In Fig. 13 there is disclosed a diagrammatic view illustrating three of the wave forms obtainable by opening or closing the switches 1^b and 2^b. In Fig. 13 the reference character *a* designates a wave form obtainable with no condenser in the circuit, that is to say, with all of the switches open. The reference character *b* in Fig. 3 designates the wave form obtainable with one of the condensers in the circuit and the reference character *c* designates the wave form obtainable with two condensers in the circuit. It will therefore be seen that by selectively operating the switches 1^b and 2^b, a variety of wave forms may be obtained so as to vary the design effects.

The amount of current originally used also is a very decided controlling factor in the duration of the light flashes. By obtaining the proper current strength and the proper relation of capacity to the circuit we can obtain any duration flash that we care to for the individual needs.

In order that there be no misunderstanding of the word "flashes" we mean the light pulses which occur due to variations in the current intensity which are applied to the light source. When a certain voltage is reached it discharges through the tube producing a light pulse or flash. The neon tube, or any other gas filled luminous light source, lends itself very admirably for this form of display lighting use, because it has practically no inertia, that is to say, the electrons that emit the light, or whatever the source of the light is, has the property of being able to extinguish itself instantly after the source of current is removed. It also has the property of being able to reach its maximum brilliance instantly for all practical purposes, which is impossible with the ordinary incandescent form of light, which employs heated filaments, which filaments require considerable time to reach their maximum light emitting temperature, and also to become cold after the current is turned off.

The ordinary form of alternating current with the proper design of transformer gives a very distinct design, because the illuminating current reaches a zero value every time the current reverses. We have found in our experiments that the wave form of the current from high tension magneto such as was used on automobiles, gives a very good wave form that is applicable to this neon display lighting work, but we have found also that by connecting a high potential condenser across the terminals when used in a magneto of this kind that the duration of light was very much shorter for the individual flashes and for this reason we are able to obtain very distinct images which we were unable to obtain without the condenser. This is due to the condenser producing a much greater current at a lower voltage, and in this way discharging the generated power at a much more rapid rate. It also lowers the peak voltage and brings it nearer to the voltage at which the neon tube glows. Also for this reason the voltage reaches the discharge value later due to having to charge the condenser first. This also aids in shortening the flash duration. For display advertising work where certain figures and numbers are to be caused to appear stationary, which are to be of such a form that people can read them, it is really necessary to have the condenser across the terminals of the high tension magneto in order to make the image distinct and legible to read.

However, in some cases it is desirable to procure a more elaborate or detailed effect by carrying the above described method a few steps further. By way of illustration, a figure may be constructed of gas filled tubes or its equivalent and placed in the rear of a moving screen. In this case a screen is placed in front or in a certain relation to the figure in such a way that the figure is concealed for a predetermined length of time. It is understood, of course, that the screen is illuminated and the objects thereon are controlled by the aforementioned means and methods and that the source of light for the screen may be controlled mechanically.

Several different types of screens may be used for this purpose, for instance one might be completely transparent, another built of segments and still another with perforations. Also only a part of the screen may be of a light reflecting character.

By means of a commercial timing apparatus the source of current may be switched from the reflecting lights to the neon figure in the rear of the screen. Or the intensity of either may be such that the light of one, by color diffusion, or otherwise, may be eliminated.

Then again the neon constructed figure may be lighted at all times and displayed by means of a third screen passing between the neon illuminated screen and the figure, in which case all or part of the figure would be exposed to view, as circumstances might warrant.

In the foregoing description we have only cited cases of a screen which revolves about an axis. We can obtain the same striking results by having a screen which moves horizontally in one direction continuously such as an endless belt. In this way any screen that is in movement can have a design that is con-

tained on it appear in a multiplicity of positions by the interruption of the neon light, which is thrown upon it. A screen of this kind can either be moved backwards or forwards either right to left or again from left to right, but it can be of such a nature that it moves to the right all the time and then travels back of the sign to the left and then appears again in view, moving to the right.

This would be equivalent to an endless belt arrangement and could have the neon light either thrown upon it from the front end and have the light reflected or it could be a transparent endless belt having the source of light behind the front part of the belt or in its center. In this case the designs or images on the belt would be either opaque or of a color filtering character in contrast to the nature of the belt which carries them and in this way a variety of effects could be obtained by changes in frequency, color, and also changes in the speed of the moving screen in the form of a belt, that is, by changing the number of feet per minute which the belt moves from one side to the other.

Instead of using the belt as a moving screen to move certain designs or certain images over the path of the interrupted neon light, we can also use actual figures mounted on a belt and have these figures of different design or the same design and moving along either in front of or behind the source of light.

While the means described so far apply to inanimate or painted figures or designs, it is of course understood that human figures may be substituted for all or part of an arrangement where it is operated on a larger scale. For instance, instead of using a circular or horizontal screen a common stage may be used instead, and in describing this method we will refer to the stage as a screen as heretofore.

For instance, the stage or screen can be a dark background and a single dancer can move across the stage and during this process the source of light from a flood lighting arrangement can consist of a single or a number of neon tubes, operated from a source of current which produces intermittent flashes. In an arrangement of this kind a single dancer can be made to appear as three or four or a dozen dancers, depending on the speed of the movement of the dancer across the stage, and also upon the frequency of the light flashes produced by the neon light tubes. It is also possible to have, for example, six individuals in a row and by the proper regulation of their speed or movement and the frequency of the light flashes they can be made to appear as 12 dancers, or as 24 dancers.

By a similar arrangement a single individual or a plurality of dancers by moving their arms or their legs could be made to appear as though they had four arms each instead of two arms, or four or six legs instead of two legs. In that manner any desirable illusion could be obtained. They could even move their head from side to side and make it appear as if each individual was hydraheaded.

The action takes place in either doubling or tripling the number of component parts of a design or figure as described in the foregoing in connection with stars on the revolving disk, also holds for the explanation of how the human figures can be doubled or tripled or changed in appearance by getting the proper relation between their movement and the frequency of the light flashes that illuminates them.

The number of individual figures on the stage type of screen that we have just referred to can also be reduced by having the light source play on only a small part of the screen at one time, and in this way have the remaining part of the screen which would hold the remaining individual figures in the dark, and illuminating only a small section at a time so as to give the impression of reducing the number of individuals.

Another very realistic and unique display arrangement would be to have acrobatic acts where acrobats would swing across from one side of the stage to the other with no illumination except the illumination from neon lighting by means of interrupted flashes. In this manner one acrobat swinging through the air could be made to appear as though there were a number of them following one another in close succession.

In order to make an act of this kind still more realistic the acrobat could carry a wand or bar or other article consisting of a neon tube which would be energized by means of high frequency current pulses as described in connection with the method of energizing the tubes when used with a transparent screen and thus produce an added feature which would become the neon lighting and the reflected or indirect lighting.

It will of course be impossible to have any physical connection for the neon tube. It will also be understood that in cases where there are a plurality of dancers or other people each one may, if desired, be equipped with some type of neon tube device. In some cases where the amount of reflected light may not be sufficient, it might be desirable to have the neon tubes enclosed in a transparent or semi-transparent housing as indicated in Figs. 5 and 6 and in a case of this kind this housing would be considered a screen and would be constructed in such a way that the entire housing with or without the tubes would revolve. This housing may revolve in front of the tubes or it may revolve with the tubes. In an arrangement of this kind a slip ring connector would be employed to connect the current from the power source to the revolving neon tubes but in case the neon tubes were enclosed in a transparent revolving screen for daylight effects and to

produce more artistic effects than could be produced by the tubes alone, it is impractical to make any physical connection with the tubes and for this reason we have found that a source of high frequency current can be utilized to energize the tubes very effectively by capacity coupling because of the very small energy required to transfer a relatively large amount of current at high frequencies through a small capacity.

We have found that by tuning the tube circuit to the generated high frequency, we are able to transmit still more energy and also to do it selectively, that is, to generate several high frequency currents and by switching on any one of these we can light any one of the associated tubes that are tuned to these frequencies as most clearly illustrated in Fig. 12. In some cases where it is desirable to bring out the printing or lettering on a screen, it is often convenient to have the generator of the high voltage electrical pulses on the same shaft with the screen. In other words, we may have a mechanical coupling between the shaft on which the screen revolves and the shaft which drives the high tension magneto or generator or timer and in this way obtain absolute synchronism or accuracy of the relative speeds of the screen and the frequency of the source of the current it being understood that the frequency of the source of current may be geared up or down and yet be termed as directly connected to the screen.

In the several figures illustrating some of the many applications of our invention, 10 indicates the red neon tubes, 11 the blue neon tubes and 12 the rotating disk or screen mounted upon the end of the motor shaft 13 and contained within the housing 14 having the opening 15 in the front thereof and through which the rotating disk or screen is viewed. In the leads 16 leading to the motor there may be interposed an automatic or manual speed regulator 17 for regulating the speed of the screen. The stars or other designs marked upon the rotating disk or screen are indicated at 12^a. The adjustable current interrupters are indicated at 10^b and 11^b for controlling the changes in frequency in the neon tubes 10 and 11 respectively. The reference characters 10^d and 11^d designate fixed condensers which are connected across the terminals of the vibrator to prevent sparking. Variable rheostats 10^e and 11^e are also provided for varying the intensity of each light. If desired, reflectors 18 can be arranged in connection with the housing 14, as most clearly shown in Fig. 4 and it will be noted that in Figs. 4 and 5 the red neon tube 10^c is in the form of a spiral and contained within the semi-transparent revolving housing 10^d.

The speed regulator 17 is also employed in connection with this type of device and it will be noted that the red neon tube is rotated while the blue tube 11 is stationary. Slip rings 19 will, of course, be arranged upon the motor shaft and operate in connection with brushes 19^a to convey the current. If desired, the red neon tube can be arranged to rotate in connection with the motor shaft 13 and by surrounding the same by a metallic ring 20 and connecting this ring to a high frequency power source 21 the illumination of the red tube can be effected and the frequency thereof changed, as heretofore described.

As previously stated, the speed of the motor can be varied if desired and furthermore if desired, high voltage generators or timing devices 22 and 23, Fig. 7, may be connected with the neon tubes for the purpose of illuminating the same.

In Fig. 8 we have shown the endless traveling screen 25 traveling around the rollers 26 operated from the motor 27 and the designs 25^a are indicated thereon.

In Fig. 11 we have shown one application of our invention to a theatrical effect in which 50 indicates the stage, 51 the red neon tube, 52 the blue neon tube, these being arranged along the front of the stage similar to the arrangement of footlights or in any other suitable manner. 53 indicate the dancers or other moving objects and by changing the frequency of illumination in the tubes 51 and 52 during the movements of the dancers 53, it is obvious that the given number of dancers may be increased or decreased as desired and at times such dancers can be so illuminated as to give the effect of each having a plurality of arms and legs in various positions and likewise a plurality of overlapping heads on bodies.

In Fig. 12 we have indicated a still further application of our invention in which a plurality of tubes are arranged and tuned to different cycles, the tubes being indicated at 60^a, 60^b and 60^c, the generator of selective frequency being indicated at 61 and operated by a variable speed motor 62. The tubes are indicated as tuned for example to 30,000 cycles, 40,000 cycles and 50,000 cycles, respectively. When the generator 61 is tuned to 30,000 cycles frequency, maximum power will be used to light the red tube 60^a and by changing the frequency of generation to 40,000 or 50,000 the green tube 60^b and blue tube 60^c will be operated.

In Fig. 14 there is disclosed a somewhat diagrammatic view illustrating the manner in which the apparatus may be operated to cause different portions of the design or designs to appear to move with respect to each other. In this figure the component parts of the design or designs are indicated by the reference character C and consist of a series of circular spots arranged upon a block or disk D. The outer circle of spots are spaced apart a distance designated by the angle A. The inner circle of spots are spaced apart a distance

designated by the angle B which may be either greater or less than the angle A. If the difference between the angle A and angle B is considerable, there will be a considerable difference in the relative apparent speeds of rotation between the two series of spots. By varying the relative values between the angles A and B, various apparent directions and rates of movement of the series of spots may be obtained. In other words, the different portions of the design or designs may be caused to appear to move with respect to each other and at different speeds and either in the same or opposite direction. In this manner, when the design or designs are moved and illuminated as hereinbefore described, they will appear to change in symmetry and form and produce a kaleidoscopic effect.

It will thus be seen that we provide for a variety of changes due to changes of frequency of illumination in connection with one or more moving objects, the changes in frequency being made either in a single colored gaseous light or a plurality of different colored gaseous lights. It will also be seen that my apparatus embodies five factors which may be varied to obtain a change in the design effects. These five factors which may be changed as desired are the frequency of illumination of the light source, that is to say, the electrical impulses or the cycles of current which produce the flash of light in the tube, the color of the light or lights, the intensity of the light or lights, the wave form of the light or lights, and the rate of motion of the moving object. By varying or changing any one of these factors or any combination thereof, a change in the design effect will be obtained. Various changes may be made in the details of construction and in the arrangement and manner of operating or controlling of the various parts without departing from the spirit of our invention and it is understood that the various forms and modifications disclosed are merely illustrative and are not to be considered in a limiting sense. In order that there may be no misunderstanding as to what is meant by the expression "electrical impulses" we mean the cycle of current which produces the flash of light in the tube whether the source of current be direct or alternating.

Having thus described our invention, what we claim is:—

1. The herein described method of producing illumination design effects which consists in causing an object to move, illuminating said object by a plurality of vari-colored lights and varying the frequency of illumination simultaneously with the rate of motion of the object.

2. The herein described method of producing illumination design effects which consists in causing an object to move, illuminating said object by a plurality of vari-colored lights, and varying the frequency of illumination of said sources of light and the relative intensities of the light sources.

3. The herein described method of producing illumination design effects which consists in causing an object to move, illuminating said object by a plurality of vari-colored lights and varying the rate of motion of the object simultaneously with the change in relative intensity of the light sources.

4. The herein described method of producing illumination design effects which consists in causing an object to move, illuminating said object by a plurality of vari-colored lights and while holding the frequency at a constant value to change the rate of motion and the relative intensity of the light sources.

5. The herein described method of producing illumination design effects which consists in causing an object to move, illuminating said object by a plurality of vari-colored lights and holding the rate of motion constant and changing the frequency of the independent sources of light as well as their relative intensities.

6. The herein described method of producing illumination design effects which consists in causing an object to move, illuminating said object by a plurality of vari-colored lights and holding the relative intensity of the light sources constant, but changing the frequencies of the independent sources as well as changing the rate of motion.

7. The herein described method of producing illumination design effects which consists in causing an object to move, said object having a design thereon, illuminating said object by a plurality of vari-colored lights and varying the frequency of illumination of said sources of light, and then changing the rate of movement of the illuminated object.

8. The herein described method of producing illumination design effects which consists in causing an object to move, said object having a design thereon, illuminating said object by a plurality of vari-colored lights and varying the frequency of illumination of said sources of light, and then changing the intensity of the light source.

9. The herein described method of producing illumination design effects which consists in causing an object to move, said object having a design thereon, illuminating said object by a plurality of vari-colored lights and varying the frequency of illumination of said sources of light, and then changing the wave form of the energy which produces the interruptions in the source of light.

10. In a device for producing illumination design effects, a moving object and a plurality of sources of light of varying colors, and means for varying the relative frequencies of illumination of the different sources of light whereby variations in the design effects are obtained.

11. In a device for producing illumination design effects, a movable object bearing a plurality of designs, different colored light sources for illuminating said designs, and means for varying the frequency of illumination of said light sources, and the rate of movement of said object.

12. In a device for producing illumination design effects, a movable object bearing a plurality of designs, different colored light sources for illuminating said designs and means for varying the frequency of illumination of said light sources, and the light intensity whereby the design effects of the movable object will be varied.

13. In a device for producing illumination design effects, a movable object bearing a plurality of designs, different colored light sources for illuminating said designs and means for varying the frequency of illumination of said light sources, and the wave form of the power which supplies energy to the sources of the light whereby the design effects of the movable object will be varied.

14. In a device for producing illumination design effects, the combination with a movable object having one or more designs thereon, of a plurality of gas illuminated tubes for illuminating said movable object together with means for changing the relative intensity of said gas illuminated tubes whereby the design effects of the object will be varied.

15. The herein described method of producing luminous design effects which consists in causing an object to move, illuminating said object from an interrupted electrical light source and varying the number of light flashes and the number of electrical impulses whereby to cause non-uniform illumination.

16. The herein described method of producing luminous design effects which consists in causing objects to move, illuminating said objects from an interrupted electrical light source and varying the number of light flashes and the number of electrical impulses whereby to cause non-uniform illumination and changing the ratio between the rate of motion of the object and the frequency of the electrical impulses.

17. In a device for producing illumination design effects, the combination of a movable object and means for moving the same, of a gas illuminated tube excited by a regular recurring electro-motive force derived from a suitable prime source of energy, of means for varying the number of light flashes in the tube and the number of electrical impulses in the tube whereby to produce a non-uniform illumination.

18. In a device for producing illumination design effects, the combination of a movable object and means for moving the same, a gas illuminated tube excited by a regular recurring electro-motive force derived from a suitable prime source of energy, of means for varying the number of light flashes in the tube and the number of electrical impulses whereby to produce a non-uniform illumination and means for moving the object out of synchronism with the electrical impulses.

19. In a device of the character described, the combination of a movable object and means for moving the same, of a plurality of gas illuminated tubes of different colors excited by electrical impulses of different frequencies, of means for varying the number of light flashes in any of said tubes independently of the electrical impulses in the remaining tubes whereby to change the color and design effect of the moving object.

20. In a device of the character described, the combination of a movable screen having one or more designs thereon, a plurality of vari-colored gas illuminated tubes disposed adjacent said screen, means for moving said screen and means for varying the electrical impulses exciting said tubes and means for varying the intensity of any of said tubes independent of the intensity of the remaining tubes.

21. In a device of the character described, the combination of a movable screen having one or more designs thereon, a plurality of vari-colored gas illuminated tubes disposed adjacent said screen, means for moving said screen and means for varying the electrical impulses exciting said tubes, means for varying the intensity of any of said tubes independent of the intensity of the remaining tubes and means for moving the screen out of synchronism with the frequency of the electrical impulses exciting said tubes.

22. In a device of the character described, the combination of a rotary screen having one or more designs thereon, of an interrupted electrical light source disposed adjacent said screen, means for varying the electrical impulses of the light source and the number of light flashes of said light source, means for varying the intensity of the light and means for rotating said screen.

23. The herein described method of producing illumination design effects which consists in causing one or more objects to move, illuminating said object or objects from an interrupted source of light and selectively varying the frequency of said light in steps of any desired value or magnitude.

24. The herein described method of producing illumination design effects which consists in causing one or more objects to move, illuminating said object or objects from an interrupted source of light and varying the frequency of the light interruption to any desired number per second.

25. The herein described method of producing luminous design effects which consists in causing one or more objects to move, said objects having one or more designs there-

on respectively, illuminating said object or objects from an interrupted source of light and moving said object or objects at such speed with respect to the periodicity of the light as to cause various portions of the design or designs to appear to change in symmetry and form and to appear to move with respect to each other.

26. The herein described method of producing luminous design effects which consists in moving an object having a design thereon and illuminating said object from an interrupted source of light and moving said object at such a speed with respect to the periodicity of the light that different portions of said design will appear to move with respect to each other and to change in symmetry and form and produce a kaleidoscopic effect.

27. The herein described method of producing luminous design effects which consists in moving an object having a design thereon and illuminating said object from an interrupted source of light and moving said object at such a speed with respect to the periodicity of the light that different portions of said design will appear to move with respect to each other and to change in symmetry and form and produce a kaleidoscopic effect and changing the ratio between the rate of movement of the object and the periodicity of the light so as to produce a variety of design effects.

28. In a device for producing luminous design effects, the combination of an interrupted source of light and a movable object disposed so as to be illuminated by said light, a design carried by said object, means for producing a kaleidoscopic effect comprising means for moving said object at such speed with respect to the periodicity of said light that different portions of the design will appear to move at different speeds with respect to each other and the design will appear to change in symmetry and form..

29. The herein described method of producing illumination design effects which consists in causing one or more objects to move, illuminating said object or objects from an interrupted source of light and adjusting the ratio between the frequency of said light interruptions and the rate of movement of the object to any desired value so as to cause different portions of the object or objects to appear to move at different speeds with respect to each other.

In testimony whereof, we hereunto affix our signatures.

FRANK J. KAEHNI.
WILLIAM L. KAEHNI.