May 12, 1936. N. P. SMITH 2,040,538

ANIMATED SIGN AND METHOD OF OPERATING IT

Filed Oct. 25, 1935

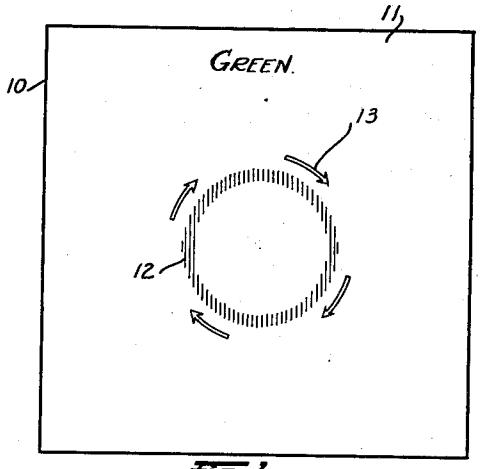


Fig. 1

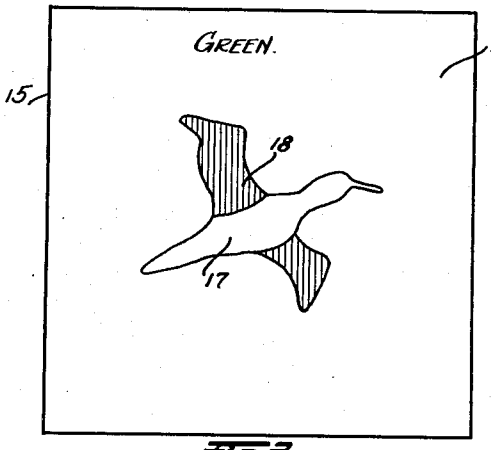


Fig. 2

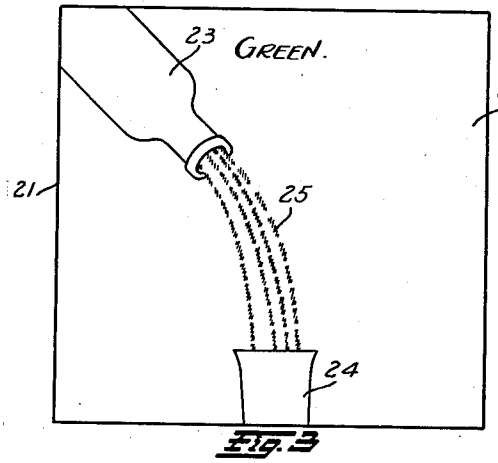


Fig. 3

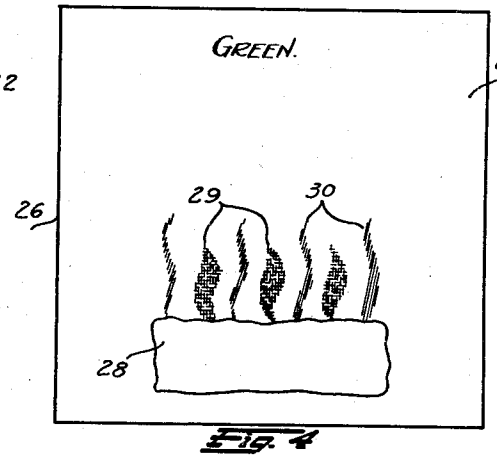


Fig. 4

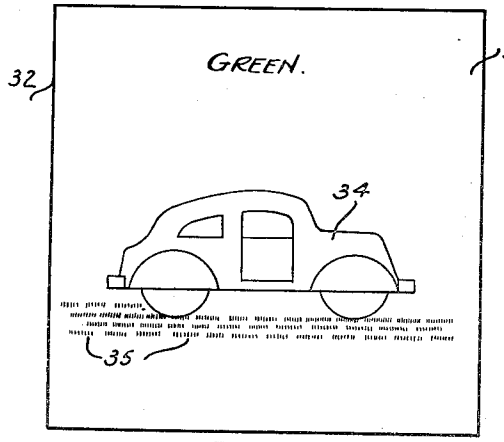


Fig. 5

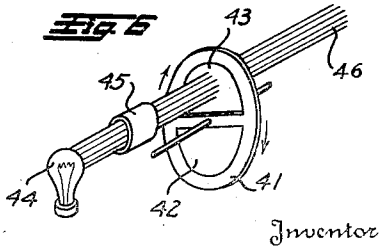


Fig. 6

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ANIMATED SIGN AND METHOD OF OPERATING IT

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Application October 25, 1935, Serial No. 46,820

3 Claims. (Cl. 40—130)

My invention relates to animated signs and methods of operating them, and it is more particularly concerned with pictorially portraying objects etc. upon a sign surface in such a manner and illuminating them by light or lights of special characteristics as to cause the pictorial representations to appear to assume motion which is natural to the object portrayed.

The invention is dependent upon a preliminary or basic means of producing an illusion of animation on certain parts of the indicia on the sign.

It is the object of the invention to provide novel signs and methods of operating them which create the illusion of animation of the pictorial representation pictured on the sign when lights of different colors are cast upon it.

The primary or basic animation is dependent upon various known laws of color reflection and absorption, color combinations employed in the sign background and in the indicia, color combinations employed in the lighting device for illuminating the sign, frequency of cyclic color change in the lighting device, certain physiological optical phenomena such as irradiation, chromatic aberration etc. This basic animation is produced physiologically. The present invention, while dependent on and being an improvement upon the basic animation, is based upon psychological phenomena rather than upon physiological phenomena. As an example of one method of obtaining the basic animation referred to and using one specific set of color combinations both in the sign and in the lighting device, but to which method and color combinations the present invention is not limited as there are other equivalents of both method and color combinations, we will presume that a red indicium is placed on a sign with a green background. To produce the basic animation red and green lights are alternately projected upon the sign at suitable frequencies of cyclic color change to produce the desired animation. This is usually in the range of between one and twenty cyclic color changes per second.

The physiological effect produced is that the red indicium appears to have a pulsating movement and a bodily movement in space relative to the background. There is also a stereoscopic effect so that the indicium appears to stand out from the background. When the frequency of cyclic color change is above that at which a continuously retained retinal impression of both the indicia and background, each in its own color, begins a very arresting effect of animation is present.

The above illusions of animation are the primary and basic animation which the present invention produces.

Some of the methods equivalent to the lighting method which I described above are:

A. The green light may be kept on continuously and the red light alternated on and off at suitable frequencies.

B. The red or green light may be kept on continuously and a polychromatic or orthochromatic light alternated on and off at suitable frequencies.

C. Red light and polychromatic or orthochromatic light may be alternated at suitable frequencies of cyclic light change.

D. Green light and polychromatic or orthochromatic light may be alternated at suitable frequencies of cyclic light change.

The particular method selected will depend upon the nature of the sign and the kind of animation desired.

For the sake of simplicity of explanation the previously referred to color combination: e. g. red and green, with the animating indicia in red upon a green background, will be used in the following examples and explanations of my invention.

Further objects of my invention will become apparent as the specification proceeds in connection with the annexed drawing, and from the appended claims.

In the drawing:

Figure 1 is a view of a sign forming part of my invention and illustrates the manner in which a circle may be made to appear to rotate.

Figure 2 is a view of another sign embodying my invention and illustrates the manner in which a bird may be animated.

Figure 3 is a view of another sign of my invention and illustrates a bottle and tumbler, the fluid pouring from one to the other undergoing an apparent animation when the sign is illuminated according to my invention.

Figure 4 is a view of a further sign of this invention and illustrates a fire which creates the illusion of flames when illuminated in accordance with this invention.

Figure 5 is a view of a still further embodiment of my invention and illustrates the manner in which a vehicle may be made to appear to undergo animation, and

Figure 6 is a diagrammatic illustration of one form of apparatus for illuminating the signs of my invention.

In all of the figures of the drawing, the backgrounds have been designated by indicia rather

than by cross-hatching, in order to clarify the disclosure.

With reference to the annexed drawing, in Figure 1 I have shown a sign **10**, having a green background **11**, a red circle **12** painted or otherwise portrayed thereon. A plurality of arrows **13** are associated with circle **12**, preferably beyond the periphery thereof and are colored in a non-animating color. When the sign is cyclically illuminated with red and green light at suitable frequencies the circle will appear to rotate clockwise.

In Figure 2 I have shown a sign **15** having a green background **16**, a bird's body **17** colored in a non-animating color, and having wings **18** colored in red and disposed against the background. When cyclically illuminated with red and green light at suitable frequencies of cyclic color change the wings will appear to flap up and down in natural movement. Also the body of the bird will appear to be moving forward in natural manner of a bird in flight.

In Figure 3 I have shown a further modification of the invention wherein a sign **21** is provided with a green background **22** against which is depicted a bottle **23**, and a glass **24**, each colored in a non-animating color, and red markings **25** which represent liquid flowing from bottle to glass **24**. When cyclically illuminated with red and green light at suitable frequencies of cyclic color change the liquid appears to flow from the bottle into the glass in realistic manner.

In Figure 4 there is disclosed a further form of sign **26**, having a green background **27**, fuel **28** colored in non-animating colors, a portrayal of yellow flames **29** colored in yellow, and a red portrayal of flames **30** colored in red. When cyclically illuminated with red and green light at suitable frequencies the red flames appear to move upward in a natural and flame-like manner.

In Figure 5 I have shown a further modification of the invention wherein a sign **32** is provided with a green background **33**, a portrayal of an automobile **34** colored in non-animating colors, and red lines **35**. When the sign is cyclically illuminated with red and green light at suitable frequencies the red lines animating impart to the automobile an illusion of natural and directional movement.

Any suitable form of alternating light system may be used to illuminate the signs, but I have for the sake of simplicity shown in Figure 6 a diagrammatic view of an alternator that may be used with a constant source of white light and it comprises a shutter **41** driven by a constant or variable speed motor (not shown) and having a green window or screen **42** and a red window **43**. A source of preferably white light **44** is mounted to project light rays through a condenser assembly **45** and thence in a beam **46** upon the particular sign or signs involved. In addition to the green and red light alternately thrown upon the sign by the mechanism just described monochromatic or polychromatic light may be thrown upon the sign continuously by a second source of light as previously described.

The apparatus just described has been disclosed merely to abbreviate the disclosure as I find that a plurality of neon tubes, colored red and green and mounted in the margin of the sign behind a flange and operated by a suitable commutator is very satisfactory and is the preferred mode of lighting the signs.

"Colors" may be classified into two groups. One group consists of those located in the visible part of the spectrum from yellow to red. These colors are "advancing" colors. The other group consists of those colors in the remaining portion of the visible spectrum; from green to violet. These colors are receding colors. The receding colors are generally used for backgrounds and the advancing colors for indicia. This is not always the case however as they may be reversed with excellent results in some cases and an advancing color employed for the background and a receding color for the indicia.

In all of the foregoing examples it will be noted that portions of the indicia which animate in response to illumination are drawn in a natural manner and in one position only. In all previous systems of animating signs by employing color absorption and reflection principles so as to create illusion of natural or directional movement in part or parts of the indicia, two or more discrete images of the same part or parts of an object have been shown. Each individual, set or pair of these images is portrayed or outlined in two or more sets of incandescent lamps or neon tubes which are alternately illuminated with the result that the different sets of images appear alternately or cyclically visible and convey the illusion of the sets of images being alternately or cyclically in different positions; and thus the illusion of motion or animation is created. In my invention all parts are shown in one position only and the effect of natural or directional motion is obtained by means of different optical, physiological and psychological principles than those heretofore employed.

For example let us consider the illusion of the bird's wings in the sign of Figure 2 appearing to move up and down in relation to the body of the bird. In all prior systems of the same kind the bird's wings have been depicted by lights or luminous tubes in two or more positions, with the result that when the lights alternate a series on discrete impressions or images of the wings in different positions, relative to the bird's body, are alternately and cyclically visible to the observer. This has a resultant effect of showing the wings in different relative positions on the retina of the eye which produces the illusion of movement.

Before proceeding to a detailed description of the various signs it will be helpful to define the various terms employed in the specification and claims.

By "basic or primary animation" I designate the physiologically produced animation in contradistinction to the secondary and psychologically produced illusion of natural and directional motion.

By "mutually exclusive" I mean that the two or more colors referred to are taken from different parts of the visible spectrum and that the predominant hue in each is deficient in the predominant hue of the others.

By "indicia" I mean markings on the sign. The indicium may be animating or non-animating. It may represent moving objects or stationary objects.

By "natural manner" I mean that the animated portion or portions of the object portrayed appear to move in the manner or fashion generally ascribed to them and which is inherently natural.

By "corresponding" I mean colors which are made up of similar spectral components. The term "hue", as applied to the signs and the light thrown upon them, is used in its broad sense; namely, a color of a certain hue may as a matter of fact embody other hues, but the color is dis-

tinguished by the predominance of the one hue over the other hues present.

By "discrete" I mean separate and individual as distinguished from images that tend to optically merge or blend.

By "luminous" I mean that the indicium referred to appears brighter than its background.

By "non-animating" I mean that the part or parts referred to are colored in colors which are not animated when subjected to the light which animates other portions of the sign. In amplification of the nature of non-animating colors, the properties of a color which render it "non-animating" are based on the green-red color combination disclosed:

(*a*) Its ability to reflect back both of the colors alternately cast upon the sign, e. g. white, gray, brown, yellow, etc.

(*b*) Its ability to absorb both colors cast upon the sign, e. g. black, dark blue, etc.

(*c*) Its close spectral relationship to its adjoining background, e. g. in a sign with a green background and red indicia, blue would be non-animating on the green background because its reaction to the changing lights would be similar to the reaction of the green of the background, and hence would not "animate". However, if blue were used against a red background it would animate because its reactions in response to alternate green and red lights would be opposite to the reactions of the red of the background. The "non-animating" colors preferably employed are black and white.

By "illumination" I mean the casting of colored lights upon the sign in accordance with this invention and at a frequenty of from two to twenty color cycles per second.

By "alternately visible" I mean that the frequency of the cyclic color change of the lighting device is low enough so that the eye is able to accommodate itself and register separate views of the sign as it is illuminated by each color of the light successively and cyclically, although in the upper part of the range (from one to twenty cycles per second) some blending will naturally occur by reason of the phenomena of "persistence of vision".

Referring to Figure 2, in my invention the wings are shown in one position only and when light of similar spectral components as the wings, and light of similar spectral components as the contiguous background are alternately projected on the sign at the described frequencies of cyclic color change or one of the equivalent methods of illuminating the sign so as to produce basic animation is employed, there is a secondary effect of the wings appearing to move in a natural manner, e. g. flap up and down. The illusion of natural movement is almost entirely psychological. This is entirely different from prior methods where the effect of directional or natural movement is created by physiological means.

While the amplitude of basic animation produced physiologically may be small the amplitude of the secondary and psychologically produced illusion may be quite large, e. g., a minor basic animation may result in a major secondary illusion of natural or directional movement.

From the foregoing examples it will be seen that one of the manifestations of my invention is a method of portrayal whereby an animating portion of an indicia will impart an illusion of natural movement to a non-animating portion of the indicia. The animating portion may be part of the object portrayed; it may be separate markings, e. g. the "speed lines" in the case of the automobile; or it may be a combination of both.

It will be observed from the examples that in some instances a non-animating portion of the indicia will impart the illusion of directional or natural movement to an animating portion of the indicia. For example, the non-animating arrows around the periphery of the animating circle make the circle appear to rotate in the direction in which the arrows are pointing. This illusion is entirely psychological in origin as the circle would appear to rotate in the opposite direction if the direction of the arrows were reversed. Non-animating indicia may be employed to produce a natural or directional movemnt on animating portions of the indicia where in some cases no illusion of directional or natural movemnt would be present in the animating portions even though the basic animation be present. The non-animating bottle and glass in Figure 3 illustrates this very well. If the red representations of the liquid flowing upon the green background were isolated from the rest of the sign the effect would be meaningless and no illusion of either directional or natural movement would occur though the basic animation be present.

In the case of the bird, the non-animating body of the bird adds an additional effect of directional movement to the wings. If the wings were to be isolated from the body of the bird they would not have any illusion of translation or going forward in space, even though they appeared to flap up and down. By adding the body of the bird to the wings, and depicting the body in non-animating colors, in a manner to suggest a bird in flight, the body adds the illusion of directional movement of the wings. This same principle may be employed in a large number of signs embodying the invention by merely making a brief analysis of the subject to be portrayed and selecting the parts to be colored in non-animating colors.

For best effects the speed or frequency of cyclic color change in the lighting device will be accommodated to the particular portrayal which it is animating. For example, the frequency when lighting a gull in flight would be slower than that employed to show liquid pouring or an automobile travelling at high speed.

The production of basic animation in connection with this invention has been exemplified by only one set of color combinations both in the lighting equipment and in the sign, but obviously there are a number of equivalents for these examples. The essential differences between the colors of the lights in the lighting device is that one of the colors is similar to one of the colors of the sign—preferably the animating indicia—and the other "color" may be similar to the color of the background or may be polychromatic or orthochromatic. In any system or method where a steady light is employed that light is preferably deficient in the predominating hue of the color of the animating indicia. In no case, however, should an orthochromatic light be kept on constantly with a light of more or less monochromatic spectral character alternating on and off on the sign.

Regardless of the method of lighting the signs it is essential in all cases that the colors of the animating indicia and the colors of the contiguous backgrounds be mutually exclusive in spectral components, for instance the red and green combination disclosed in the present embodiments of the invention.

The most pronounced effects will be obtained

when the colors of the indicia and background correspond fairly accurately with the colors of the lighting device. Complementary colors are usually the best but some sets of complementary colors produce a better effect than others when normal light sources are employed. For example, red and green are very good when the light source is an incandescent lamp as this type of light source is rich in both colors. Blue and orange, although complementary are not so effective as the incandescent lamp is not rich in blue and the proportions of blue and orange light reflected from the sign to the eye are very unequal and the retina has some difficulty in accommodating itself to the relatively small quantity of blue light after having been exposed to the relatively large quantity of orange light. This combination would accordingly produce a "flicker". There are physiological phenomena present in the relative sensitivity of the retina of the human eye to different bands of the visible spectrum which are outside the scope of this application but which govern, more or less, the selections of the various color combinations which may be employed both on the sign and in the lighting device.

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. In an animated sign, a sign having a pictorial representation and a background thereon, said pictorial representation comprising a primary part, which may be of a pictorially animate or inanimate character, and a secondary animated part, which may also be of a pictorially animate or inanimate character, said secondary part of said pictorial representation and said background being colored in two contrasting hues and which are deficient in the distinguishing hues of each other, and said primary part being colored in a non-animating color, and means for throwing light of differently colored hues alternately upon said sign so as to convey the sensation of animation of the sign to the eyes of an observer, said means being operable to cause said primary parts to be constantly visible and to cause said background and said secondary parts to be alternately visible, said means having a frequency of from one to twenty cycles per second.

2. The animated sign described in claim 1, wherein said primary part of said indicia constitutes a pictorial representation which inherently conveys the illusion of animation to the eyes of an observer.

3. In an animated sign, a sign having a pictorial representation and a background thereon, said pictorial representation comprising a primary part, which may be of a pictorially animate or inanimate character, and a secondary animated part, which may also be of a pictorially animate or inanimate character, said secondary part of said pictorial representation and said background being colored in two contrasting hues and which are deficient in the distinguishing hues of each other, and said primary part being colored in a mixed color containing the hue of each of said first-named colors, and means for alternately flooding said entire sign with light rays of two differently colored hues at speeds of from one to twenty cycles per second, to convey the sensation of animation of the sign to the eyes of an observer, each of said light rays corresponding to one of said contrasting hues, said means being operable to cause said primary parts to be constantly visible and to cause said background and said secondary parts to be alternately visible.

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