

[54] **AMBIENT CONDITION RESPONSIVE VISUAL INDICATOR**

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[52] **U.S. Cl.**..... **340/366 R, 340/148 R, 340/380 R**

[51] **Int. Cl.**..... **G08b 5/00**

[58] **Field of Search**..... **340/148; 40/130, 135**

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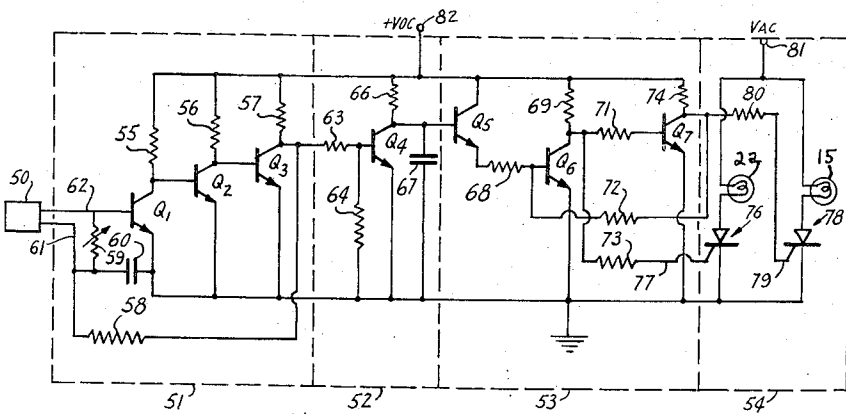
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[57] **ABSTRACT**

A visual indicating system comprised of a translucent panel including an opaque reflected image formed on its front surface and an opaque coating on its back surface which includes uncoated areas which form a transmitted image. The transmitted light image includes areas colored identically to the reflective image which are positioned immediately behind and encompassing the reflective image of similar color. Selective illumination means are disposed for illuminating the translucent panel thereby causing one of the images to be dominate over the other.

24 Claims, 14 Drawing Figures



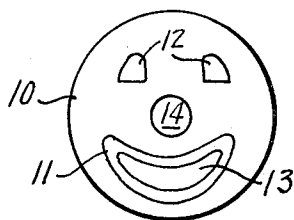


FIG. 1A

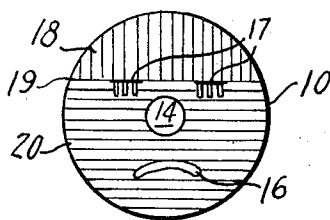


FIG. 1B

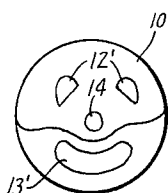


FIG. 1C

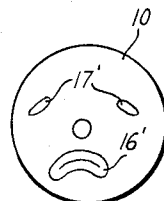


FIG. 1D

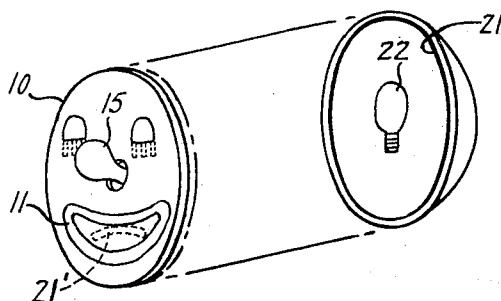


FIG. 2

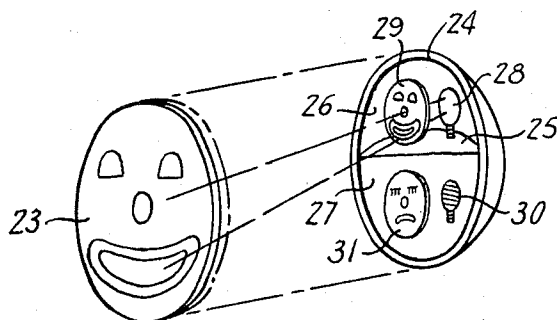


FIG. 3

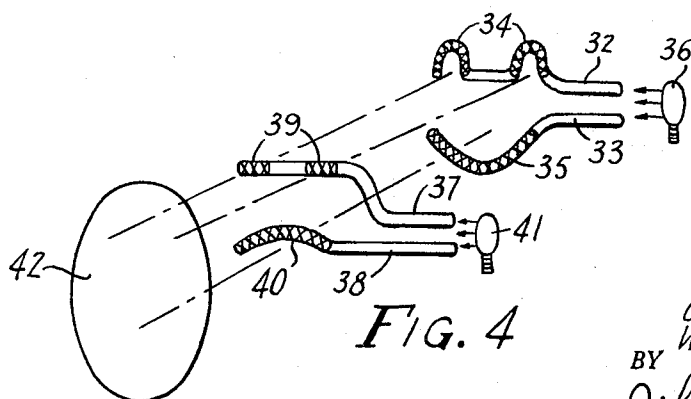


FIG. 4

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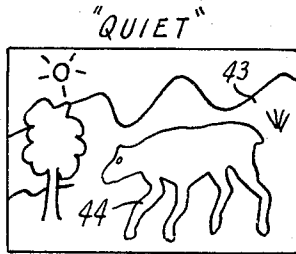


FIG. 5A

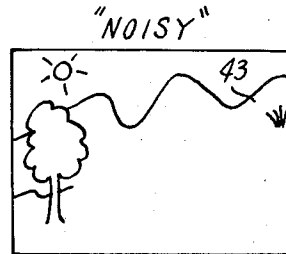


FIG. 5B

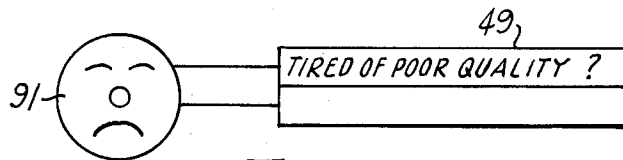


FIG. 6A

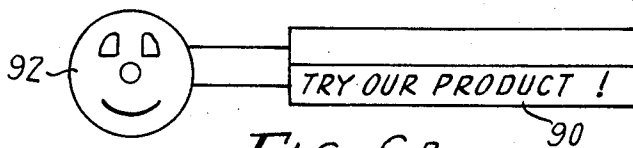


FIG. 6B

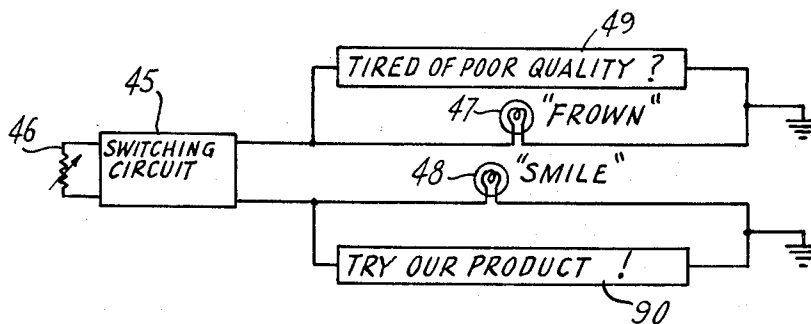


FIG. 6C

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AMBIENT CONDITION RESPONSIVE VISUAL INDICATOR

BACKGROUND OF THE INVENTION

This invention is an improvement of U.S. Pat. No. 3,440,349 issued on Apr. 22, 1969, to C. H. Gibbs, a coinventor hereof. The disclosure of said patent forms a part of this disclosure and is incorporated by reference herein.

The description in the above identified patent is directed to a sound responsive system for changing a facial expression from a smile to a frown when the sound level in a room raises above a predetermined level. Expression changes are affected by using two light conducting layers, each displaying a different expression. Each of the light conductive layers is associated with a separate lamp and accordingly each layer is individually illuminated as the lamps are lit at different times.

Although the above described system is very satisfactory, further study since its conception has resulted in various improvements which have reduced its complexity and consequently the cost of fabrication. The additional study has also resulted in the finding of broader and different applications of the invention.

BRIEF DESCRIPTION OF THE INVENTION

In its broadest aspects the invention discloses a system for changing a pictorial representation in response to changes in an ambient condition. A single layer of translucent material has a design configuration deposited on its outer surface by use of light reflecting materials, such as reflective paint. The inner surface is provided with a different configuration by use of a light filtering substance, such as translucent paint.

A combination of opaque substances with transparent substances or opaque substances along with the light translucent layer can also be used on the inner surface to produce the different configuration.

A transducer is exposed to an ambient condition and yields an output which varies in response to changes in the condition. The transducer output changes are used to actuate a control circuit which controls the selective illumination of the surfaces of the translucent layer. As an example the transducer can be a microphone and the two surfaces designed to show a smiling face when the noise level is low and a frowning face when the noise level raises to an objectionable level. As another example, the low level design can show a shy animal, such as a deer or rabbit. When the sound level becomes objectionable the animal disappears as if it were frightened away.

The specific embodiments fully described hereinafter are directed to sound responsive systems. This is done only as a convenience in describing the system as conditions other than sound can be used. It is apparent that designs other than faces and animals can be used. For example, the transducer can be light responsive and the design can be a sign which warns of inadequate lighting in stairways or halls.

The system can also be used to change the wording and configuration of an advertising display.

The system can also be temperature responsive and indicate, for example, "above freezing" and "below freezing" or "swimming weather" and "non-swimming

weather" as the temperature varies about a preselected value.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1a and 1b show the front and rear surfaces of a single translucent layer capable of changing a pictorial showing.

FIGS. 1c and 1d show an embodiment utilizing opaque paint and a translucent surface.

FIG. 2 is an exploded view of a preferred embodiment of a single layer, two lamp system.

FIG. 3 is an exploded view of an embodiment utilizing a light projection scheme.

FIG. 4 is an embodiment which utilizes light conducting rods.

FIGS. 5a and 5b show an embodiment in which a portion of the scene disappears in response to a change in the sensed condition.

FIGS. 6a, b and c show an embodiment used in an advertising display.

FIG. 7 is a preferred embodiment of a control circuit for any of the two lamp systems.

FIG. 8 is a preferred embodiment utilizing fiber optics and bundles of light conducting rods.

DETAILED DESCRIPTION OF THE INVENTION

FIGS. 1a and 1b show the front (FIG. 1a) and rear (FIG. 1b) surfaces of a translucent layer 10. The front surface of layer 10 includes smiling lips 11, a pair of happy eyes 12, and a mouth 13. The eyes, lips, and mouth can be painted on with light reflective paint, and obviously different colors can be used. For example, the eyes can be red, the lips white, and the mouth blue. An aperture 14, which extends completely through layer 10, is positioned in the location where a nose would ordinarily be found. A lamp 15 (FIG. 2) is positioned in aperture 14 and serves as a nose.

The rear surface (FIG. 1b) of layer 10 has a frowning mouth 16 and a pair of sad eyes 17. Mouth 16 and eyes 17 can be applied by using translucent paint. The rear surface is further coated with various colors of translucent paint. Accordingly, the portion 18 which lies above line 19 is red and that portion 20 below line 19 is blue. Mouth 16 and eyes 17 can be white paint, for example. By using this exemplary color scheme, and the exemplary colors hereinabove for eyes 12 and mouth 13, when the rear surface is illuminated the light passes through the translucent paint and therefore washes out the colors on the front surfaces. In this manner the expression changes from a smile to a frown.

The expression change can also be effectively accomplished by using an opaque coating on the rear surface of layer 10 except for eyes 17' and mouth 16' where no coating is used. The entire front surface is coated except for the eyes 12' and mouth 13' where no coating is used, as illustrated in FIGS. 1C and 1D. By making sad eyes 17' and sad mouth 16' of the rear expression coincide with the unpainted eyes 12' and mouth 13' of the front surface a maximum amount of light passes from back to front when the rear light is on. Thus, the normally visible front expression is overridden by the brightness and sharp edge definition of the rear expression, rather than by color wash out from rear translucent materials as in the FIGS. 1A and 1B embodiment. The edges of the eyes on the front surface need not be a color which is different from the surrounding area; these edges may be made molded or formed into the

layer itself. Furthermore, the entire front surface need not be colored at all. The front expression can be made visible from just a molded or formed impression in the layer. A front color (or colors) may be used if desired. However, all the facial features on the front surface shown in FIG. 1C can be unpainted or painted the same or different colors. The only requirement is that the front surface is translucent.

FIG. 2 is an exploded view showing the mounting of layer 10 onto an opaque cavity 21. Cavity 21 can be formed from metal or any opaque material simply by making a cup like member having a radius substantially equal to that of layer 10. A second lamp 22 is mounted within cavity 21. Layer 10 is then affixed to the edge of cavity 22 and a sealing substance or some other convenient method is used to close any gap through which light from lamp 22 could pass.

In operation lamps 15 and 22 are connected into a control circuit, such as shown in FIG. 7, fully described hereinafter. A sound level detection device detects the noise level in the room where the system is mounted on a wall, for example.

When the noise level is normal, or not objectionable, lamp 15 is illuminated and lamp 22 is not. Accordingly, light from lamp 15 is reflected from the facial characteristics 11, 12, and 13 and a smiling face is seen.

When the noise level raises above the acceptable level, the control circuit changes states and lamp 15 is extinguished and lamp 22 illuminated. Light from lamp 22 then passes through the translucent paint layers 18 and 20 as well as the sad eyes 17 and frown 16. The happy eyes 12 and mouth 13 are then effectively washed out and a frowning face is seen. The opaque embodiment shown in FIGS. 1C and 1D can also be used in this manner.

The electronic circuit can be designed to "punish." For example, the expression can be made to remain sad a given length of time after room conditions are quiet. Also, hysteresis can be built into the circuit so that once it switches to sad, the noise level must drop below the noise level that made it switch to sad originally before it will switch back to happy. This is a second method of designed in punishment. The first effect can be accomplished by placing a delay in the switching circuit. The second can be accomplished by preventing switching of the circuit back to its normal state during the period in which the noise level remains above the switching level. Both of these can be done in any of several manners by those skilled in the art.

An alternative operation can be realized by allowing lamp 15 to burn continuously and switching only lamp 22. In this operation lamp 22 switches on and off as the sound level increases and decreases. The light passing layer 10 when lamp 22 is illuminated is effective to wash out the happy characteristics and display the sad characteristics.

In the description above, the happy expression is placed on the front surface of layer 10 and the sad expression on the rear surface. These can be reversed if desired. However, the switching sequence would also have to be changed.

Another mode of operation is made possible by omitting lamp 15. In this instance aperture 14 is replaced with a reflective nose painted any desired color. The ambient light reflects from the front surface and shows a smiling face when the noise level is acceptable. When

the noise level becomes objectionable, lamp 22 is illuminated and the expression changes to a frown.

This operation has the disadvantage of not operating at night. The other embodiments have a continuously burning lamp and a smiling face. Consequently the system can also serve as a night light for a nursery. The smiling face and cheery light would be comforting to a child. The figure can also be a man-in-the-moon which changes from a full moon to a partial moon. This embodiment can be operated by a noise circuit or can be switched manually like a desk lamp.

Since this model is to be used in a darkened room, the new moon expression does not have to be very bright, and luminescent paint can be used.

The change in expression can be achieved as previously described with a front lamp and rear lamp as shown in FIGS. 1A and 1B. A second method for changing expression is to use a front bulb to show the first expression and luminescent or fluorescent paint to show the second expression. When the front lamp goes out, the luminescent expression becomes dominant in the darkened room. The single lamp can also be placed behind the translucent layer if desired. The luminescent expression can be painted on either the front or rear surface of the translucent layer.

FIG. 3 is an embodiment in which the facial expressions are projected onto the translucent layer. Accordingly translucent layer 23 is not painted on either surface. Opaque shell 24 is divided into two compartments 26 and 27 by an opaque separator 25. Compartment 26 contains a lamp 28 and a happy transparent image 29. Image 29 is in the form of a positive and accordingly the facial characteristics are the same colors as those desired in the projected image. Light rays emanating from lamp 28 are naturally divergent and consequently an enlargement of the image 29 will appear on layer 28. However, a diverging lens can be used to enlarge the image and also to enhance the sharpness of the projected image.

The projected image can also be dimensionally increased by placing an opaque hollow right cylinder between layer 23 and shell 24.

Compartment 27 contains a lamp 30 and a sad transparent image 31. Sad image 31 is identical in construction to happy image 29. The only difference in the two images is the facial expressions they project onto layer 23.

FIG. 4 shows an embodiment which utilizes light conducting rods. A happy expression is created by the use of two light rods 32 and 33 which are preferably situated in the same vertical plane. Eyes 34 are formed in rod 32 by bending the rod into two arcs. A mouth 35 is created by the formation of a longer arc. The eyes 34 and mouth 35 are caused to transmit light by roughening the surface of rods 32 and 33 in the areas where light must pass radially from the rods. This effect can also be realized by cutting grooves into the rods at the appropriate areas.

Rods 32 and 33 are illuminated by exposing the ends of the rods to a light source 36 in a manner known in the art.

A sad expression is created by the use of light conducting rods 37 and 38. Eyes 39 are formed by cutting grooves or roughening rod 37 in the appropriate areas. The eyes 39 then appear narrow and sad, while eyes 34 appear wide and joyous. An unhappy mouth 40 is formed from an arc which curves downwardly.

Rods 37 and 38 are positioned in a vertical plane and can be either behind or in front of the plane in which rods 34 and 35 lie. The sad expression is created by illuminating their ends with a light source 41.

A translucent layer 42 is positioned in a plane parallel to those in which the rods 32, 33 and 37, 38 lie. The rods and lamps 36 and 41 are placed into an opaque container and layer 42 is placed over the open end.

The expression appearing on the layer 42 is changed from happy to sad by extinguishing lamp 36 and actuating lamp 41.

Another embodiment using light conducting rods is shown in FIG. 8. In this embodiment a number of light conducting 85 rods (fiber optics) are used for each facial expression by forming the eyes 86 and mouth 87 form different bundles of rods. A single lamp 88 illuminates all of the optical fibers so that the illuminated rods are visible on a screen 89. The facial expressions are thus formed by the end of the rods, or light dispersing bulbs on the rod ends. A translucent layer can be used to hide the rods and lamps. A change of expression is effected by lighting a second bundle of fiber elements 90 with a second lamp 91. The second bundle of fibers 90 is used to form a frowning expression as illustrated in FIG. 8.

Another embodiment is suggested by FIG. 4. Light conducting rods 32, 33, 37 and 38 and lamps 36 and 41 can be replaced with neon tubes. The tubes are opaque in all areas except those where a facial characteristic is desired. In these areas the portion of the tube forming layer 42 is transparent. Obviously, various colors can be used for the various characteristics. This embodiment would be particularly useful with an advertising embodiment described with reference to FIG. 6.

FIGS. 5a and 5b show an embodiment in which an increase in sound level is indicated by the disappearance of a portion of the scene. A tranquil scene 43, such as a woods, includes a shy animal 44, such as a deer, rabbit, or butterfly, as shown in FIG. 5a. When the sound level becomes excessive, the increase is indicated by the disappearance of the animal, as illustrated in FIG. 5b.

The disappearance of the animal 44 can be effected in any of the hereinabove described methods. Animal 44 can be painted on the outer surface of the scene with reflective paint. A coating of translucent paint of the same color is placed on the rear surface of the scene. The translucent layer must extend beyond all the sides of the animal figure 44. The front surface is illuminated by either a lamp or the ambient light. This light is reflected by the reflective paint and therefore the animal figure is visible. When the noise level increases, a lamp (not shown) behind the animal figure is actuated and the color of the translucent paint is visible on the front surface of scene 43. This causes the animal figure 44 to appear to disappear.

It is readily apparent that the projection technique shown in FIG. 3 and the light conducting medium technique shown in FIG. 4 can also be used to cause the running away of a shy animal.

The light conducting medium can be used by applying the entire scene, except for the animal, on the outer surface of the translucent layer. The animal figure is then formed from a light conducting medium, such as a piece of flat plastic, and placed behind the layer. A light source illuminates the edge of the figure during low noise levels to show the animal. When the noise in-

creases, the lamp is extinguished and the animal disappears. The front surface can be illuminated either by a separate lamp or by ambient light.

FIG. 6 is a preferred embodiment showing the use of the invention in an advertising display. For this usage the condition responsive transducer is replaced with a free running switching circuit, such as a multivibrator 45. The switching frequency can be adjusted by the use of a potentiometer 46. Multivibrators and other forms of switching circuitry are known in art and further description is therefore not required.

Changes in the state of switching circuit 45 result in the alternate actuation of lamps 47 and 48 as well as the alternate actuation of written displays 49 and 90 (FIG. 6a). When lamp 47 is actuated, a sad expression 91 is shown (FIG. 6a). At the same time a written message 49 is displayed. When switching circuit 45 changes states, a smiling face 92 (FIG. 6b) and written message 90 are visible. Any of the techniques described hereinabove can be used to effect the facial changes. The written changes can be effected by the use of a series of lamps or neon lights in manners well known in the art. However, the inventive technique herein described can also be used to effect the written message changes.

FIG. 7 is a preferred embodiment of a control circuit which can be used in conjunction with any of the embodiments described with reference to FIGS. 1 to 6. A transducer 50 is exposed to an ambient condition such as noise or light. If the circuit is sound responsive, transducer 50 is a low impedance microphone. If light is the controlling condition, a photocell is used. It should be noted that for the advertising embodiment of FIG. 6 the entire control circuit except the switching circuitry is replaced with a bistable circuit such as a multivibrator.

A low gain, negative feedback D.C. amplifier 51 receives the output of transducer 50. The amplifier 51 includes three transistor stages Q_1 , Q_2 , and Q_3 , as well as appropriate collector load resistors 55, 56, and 57. Negative feedback is provided by a resistor 58 connected between the collector of transistor Q_3 and output lead 61 of microphone 50.

The D.C. gain of amplifier 51 is limited by the negative feedback which serves to stabilize the amplifier D.C. operation. Further stability can be realized by inserting a Zener diode in series with resistor 58.

The emitter of transistor Q_1 is connected to output lead 61 of transducer 50 through capacitor 60. Capacitor 60 serves as an A.C. bypass so that high A.C. gain is possible while limiting the D.C. gain. Variable resistor 59 permits adjustment of the A.C. gain.

The output of amplifier 51 is coupled to a rectifier and integrator circuit 52. Rectification is accomplished by transistor Q_4 and bias resistors 63 and 64. Values for resistors 63 and 64 are selected to bias transistor just below cut-off and consequently it does not conduct when there is no input signal from transducer 50.

When there is an input from transducer 50, transistor Q_4 conducts. Its output is coupled to an integrator comprised of a resistor 66 and capacitor 67. A bistable circuit 53, which includes transistors Q_5 , Q_6 , and Q_7 , receives the integrated output on the base of transistor Q_5 . The emitter of transistor Q_5 is coupled to the base of transistor Q_6 through a resistor 68. The base of transistor Q_6 is coupled to the collector of Q_7 through a re-

sistor 72. The values of resistors 68 and 72 determine the voltage at which the circuit will change states.

Resistor 73 couples the collector of transistor Q_6 to the control electrode 77 of a thyristor 76. Resistor 80 couples the collector of Q_7 to the control electrode 79 of thyristor 78. When the voltage on control electrode 77 is sufficient to fire thyristor 76 a current path exists from A.C. input terminal 81 through lamp 15 to ground. In similar fashion lamp 22 is actuated when a voltage sufficient to fire thyristor 78 is available on control electrode 79. Resistors 69 and 74 serve as collector load resistors for transistors Q_6 and Q_7 respectively.

Input terminal 81 can be connected to a 110 VAC supply, such as a common house supply. The D.C. voltage required for D.C. input 82 can be obtained by rectifying the A.C. input available on terminal 81. Several known rectifiers can be used for this purpose.

The operation of the circuit can be best understood by assuming that transducer 50 is sound responsive and the noise level is low. In this condition there is no output from amplifier 51 or integrator 52. Capacitor 67 charges through resistor 66 to approximately the supply voltage VDC. Transistors Q_5 and Q_6 , are therefore conductive. Since Q_7 is non-conductive, control electrode 79 of thyristor 78 is coupled to the VDC supply through resistors 74 and 80. This places a firing voltage on the control electrode 79 of thyristor 78. Lamp 15 is therefore conductive and lamp 22 is non-conductive.

When the noise level raises, an output is realized from amplifier 51. Transistor Q_4 becomes conductive and capacitor 67 discharges. Transistor Q_5 then becomes non-conductive resulting in the saturation of transistor Q_7 and resulting in Q_6 becoming non-conductive. This raises the voltage on the control electrode 77 of thyristor 76 and actuates lamp 22 and lamp 15 turns off.

The circuit can be simplified for single bulb operation by removing transistor Q_7 , thyristor 76 and resistors 71, 72, and 73. Resistor 80 would then be connected to the collector of transistor Q_6 .

It is now evident that a system for changing a visual indication in response to changes in an ambient condition can be realized by the use of a single translucent layer. The result can be accomplished using two lamps, both of which are switches, or only one of which is switched. Alternatively a single lamp can be used in conjunction with ambient light. Several types of visual indicators can be used; such as changing facial expressions, the disappearance of a shy animal, or changing written messages.

We claim:

1. A visual indicating system, comprising: a translucent panel including front and back surfaces, an opaque reflective image formed on said front surface, an opaque coating on said back surface including uncoated areas forming a transmitted light image, said transmitted light image including areas colored identically to said reflective image and positioned immediately behind and encompassing said reflective image of similar color, and selective illumination means disposed for illuminating said translucent panel thereby causing one of said images to be dominant over the other.

2. The system of claim 1 wherein said reflective image is illuminated by ambient light and said selective illumination means includes a dominant light source

disposed behind said translucent panel for selectively illuminating said transparent image and masking said reflective image.

3. The system of claim 1 wherein said translucent image is illuminated by ambient light and said selective illumination means includes a dominant light source disposed in front of said translucent panel for selectively illuminating said reflective image and masking said translucent image.

4. The system of claim 1 wherein said selective illumination means includes a first dominant light source disposed in front of said translucent panel for selectively illuminating said reflective image, and a second dominant light source disposed behind said translucent panel for selectively illuminating said transparent image.

5. The system of claim 2 wherein said dominant light source includes configured light conducting rods and separate illumination means to selectively illuminate individual ones of said rods.

6. The system of claim 4 wherein said second dominant light source includes configured light conducting rods, and separate illumination means to selectively illuminate individual ones of said rods.

7. The system of claim 4 wherein said second dominant light source includes at least one light conductive medium formed in a desired pattern and actuated by at least one light source, and at least one other light conductive medium formed in a different desired pattern and actuated by a second light source, said light conductive medium being scarred in areas selected to radially pass light.

8. The system of claim 7 wherein said light conductive mediums are rods arranged in separate planes in the proximity of said translucent panel.

9. The system of claim 4 wherein said second dominant light source includes a light conductive design configuration in the proximity of said translucent panel and arranged for illumination thereof.

10. The system of claim 4 wherein said second dominant light source includes a plurality of light conductive mediums, said mediums forming a bundle illuminated at one end and the other ends of said mediums being grouped into features of said transparent image.

11. The system of claim 4 further including an opaque shell for containing said second dominant light source, said translucent panel being affixed across an aperture in said shell.

12. The system of claim 1 wherein said transparent image is replaced by an opaque image.

13. The system of claim 1 wherein said transparent image or said reflective image contains a fluorescent substance.

14. The system of claim 1 further including means for selectively actuating said selective illumination means in response to ambient changes.

15. The system of claim 1 wherein said dominant light source includes at least one light conductive medium formed in a desired pattern and actuated by said at least one light source; and at least one other light conductive medium formed in a different desired pattern and actuated by a second light source; said light conductive mediums being scarred in areas selected to radially pass light.

16. The system of claim 15 wherein said light conductive mediums are rods arranged in separate planes in the proximity of said translucent panel.

17. The system of claim 2 wherein said dominant light source includes a light conductive design configuration in the proximity of said translucent panel and arranged for illumination thereof.

18. The system of claim 2 further including an opaque shell for containing said dominant light source; said translucent panel being affixed across an aperture in said shell.

19. The system of claim 14 wherein said means for selectively actuating includes a transducer for actuating said selective illumination means as said ambient condition varies about a preselected level; and a bistable control circuit which changes condition in response to said variations.

20. The system of claim 19 wherein said transducer is a sound responsive element and said bistable control circuit includes a pair of separately actuated thyristors.

21. The system of claim 20 wherein said control circuit further includes an integrator for changing the condition of said thyristors.

22. The system of claim 2 wherein said dominant light source includes a plurality of light conductive mediums; said mediums forming a bundle illuminated at one end and the other ends of said mediums being grouped into features of said transparent image.

23. The system of claim 19 further including means for delaying actuation of said selective illumination means for a predetermined period of time after said ambient condition returns to said preselected level.

24. The system of claim 19 wherein said selective illumination means remains in a switched state until said ambient condition falls below said preselected level.

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