

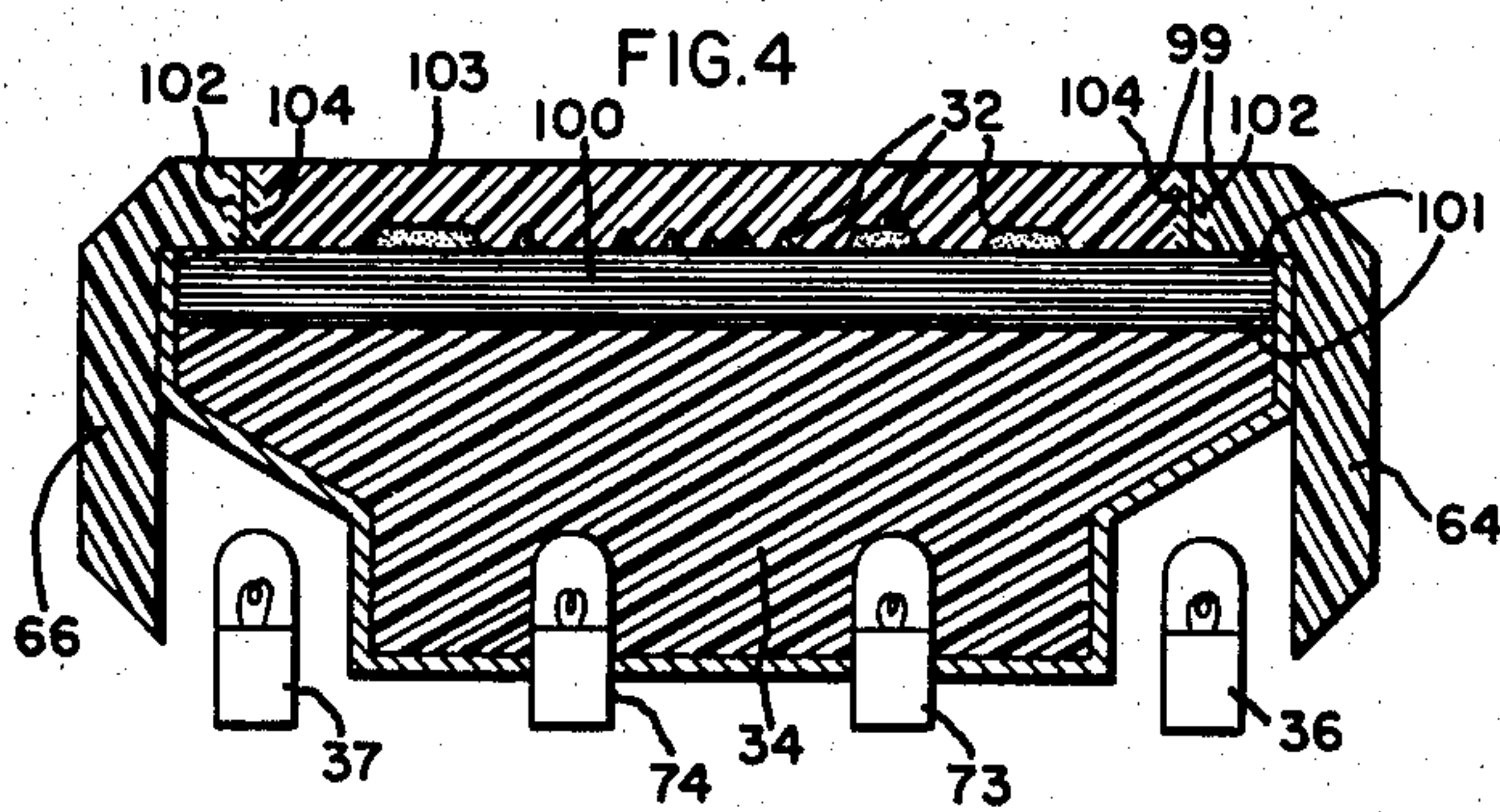
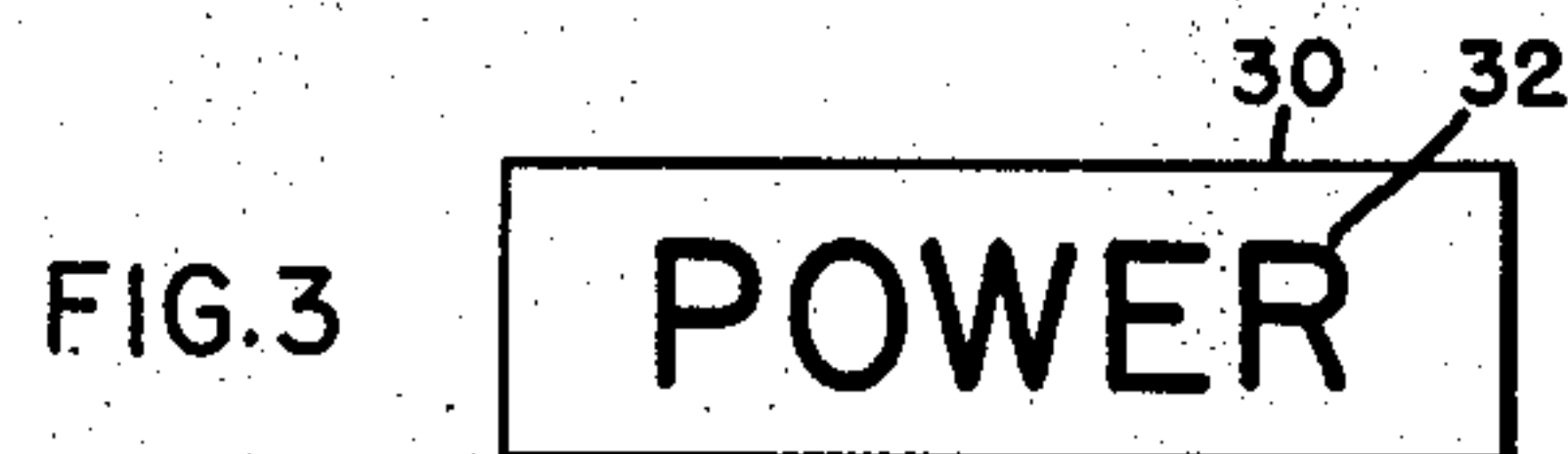
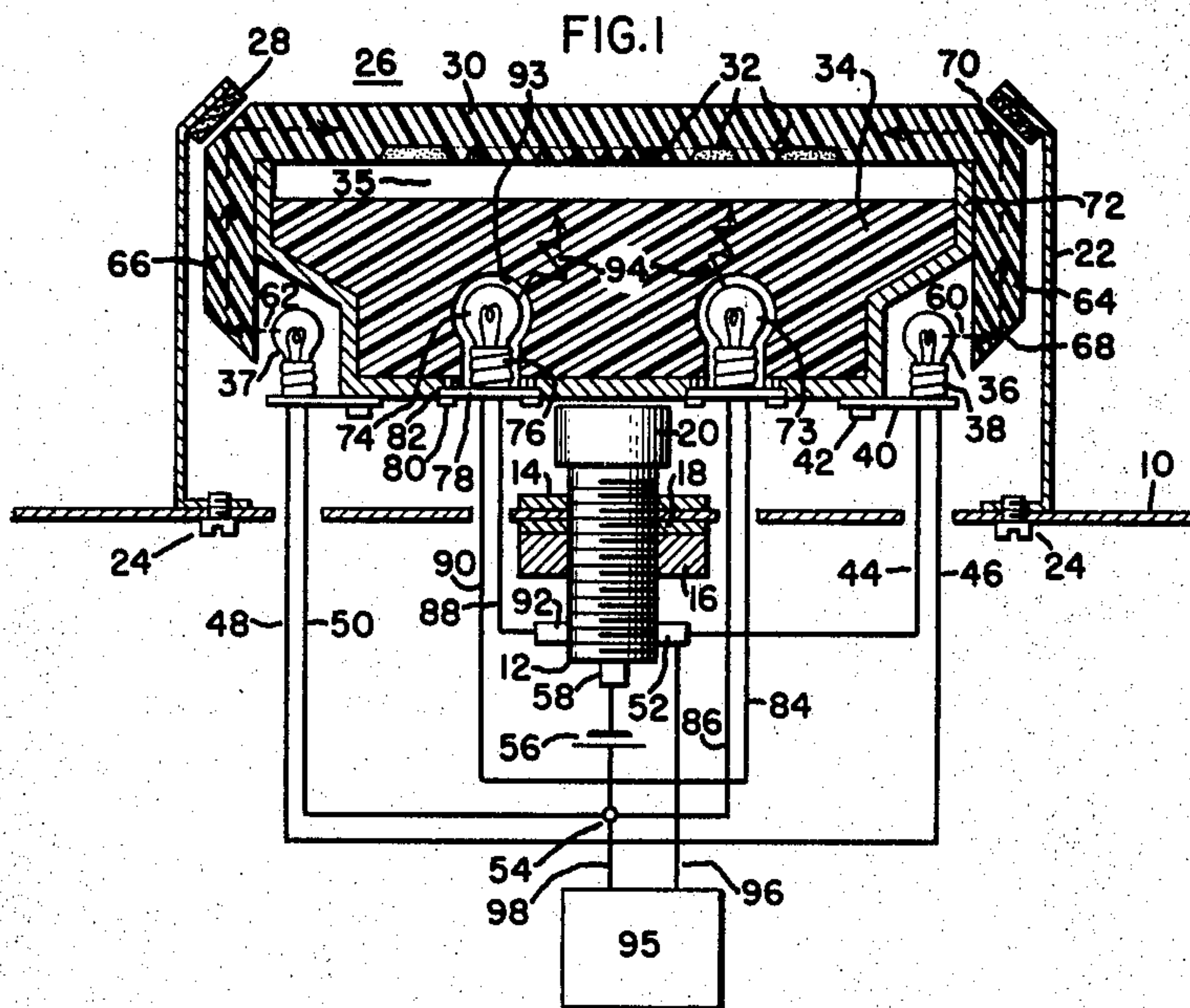
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R. C. BASSETT, JR

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REVERSIBLE CONTRAST ILLUMINATED CONTROL INDICATOR

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INVENTOR:  
RAYMOND C. BASSETT JR.,

BY *T. E. Kristoferson*  
HIS ATTORNEY.



1

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## REVERSIBLE CONTRAST ILLUMINATED CONTROL INDICATOR

Raymond C. Bassett, Jr., Fayetteville, N.Y., assignor to  
General Electric Company, a corporation of New York

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This invention relates to control indicators, and more particularly, relates to an illuminated control indicator capable of visually indicating the state of a two-state device operated thereby.

Mounted on the control panels of operating equipment such as the control panel of radar equipment are many two-state devices such as electrical switches. To enable the operator to know what operating circuitry is controlled by each of such switches, a label identifying the function is positioned adjacent the switch. To enable equipment operation under all conditions of ambient lighting including the low level lighting for radar control centers, the label is illuminated by a panel mounted lamp. To indicate the state of the two-position switch, e.g. "on—off," a separate indicator such as a panel light is provided. In an arrangement known to the art the panel indicator light, such as a green or red light, is illuminated when power is applied to the circuit controlled by the switch by coupling the lamp filament in parallel with the circuitry or by applying power to the filament by separate contacts closed by switch operation.

However, the panel density of present equipments sometimes precludes the use of separate indicators and controls. This is particularly true in air-borne applications where space is at a premium. Further, the high panel density sometimes precludes adequate spacing between controls and indicators to adequately ensure unmistakable operation thereof during rapid operator scan.

It is, therefore, one object of my invention to provide a control indicator which carries a title thereon to identify the control function and in which the contrast between the characters in the title and the background is reversed to indicate the function state.

It is a further object of this invention to provide an information indicator for a function having two states of operation in which the function is identified by characters presented against a background and in which the state of the function is identified by the relative contrast between the characters and the background.

It is a further object of this invention to provide an illuminated control indicator to control a function by movement thereof and in which the function is identified by a title presented against a background. The operating state of the control function is identified by the state of the contrast between the title and the background e.g. a white title against a black background or a black title against a white background.

Other objects and advantages of my invention will appear hereinafter.

In accordance with these objects I have provided in one embodiment of my invention an illuminated control indicator comprising a clear plastic bar with the function title engraved in the back. The function title is filled with an opaque white pigment. A frosted diffuser is applied to the back of the plastic bar. The control indicator engages a switch controlling the state of an associated function. In one state the title is edge-lit through the clear plastic and will appear as white letters on a black

2

background. When the control indicator is moved to switch the function to the second state, the edge lighting is extinguished and the indicator is illuminated through the diffuser. Since the characters comprising the title are opaque, the title will now appear as black letters upon a white background. Thus, the control indicator indicates the function controlled by characters and indicates the function state by reversible relative contrast between the characters and background.

A preferred embodiment is shown in the drawing which: Figure 1 is a sectioned view showing of one embodiment of the control indicator in accordance with this invention.

Figure 2 is a plan view of the face of the indicator shown in figure 1 in one state of indication.

Figure 3 is a plan view of the face of the indicator shown in figure 1 in the other state of indication; and

Figure 4 is a partially sectioned view of another embodiment of an indicator in accordance with this invention.

Referring to Figure 1 there is shown a panel 10 of an operating equipment such as a radar set. A switch mounted on the face of the panel controls a function within the equipment. The barrel 12 of the switch is inserted through an aperture in the control panel and is secured thereto by the coaction of nuts 14 and 16 threadably engaging the switch barrel 12. A lock washer 18 may be interposed to secure nut 16 and prevent loosening thereof under vibrational stress. The switch is the usual "push-push" type having a cap 20 movably mounted on the barrel thereof. The cap is spring biased and suitably restrained by an internal stop so that its rest position will be in a first axial position. Upon pressing the cap so that it moves axially in telescopic relationship to the barrel, the switch will make a connection between one set of contacts and break a connection between another set of contacts. The connections so established remain in this position until the cap is again depressed from its rest position. The switch is similar to the dimmer switch installed on cars, but I have found it preferable to employ the miniature switches of the same type which are commercially available. This describes a mechanical bi-stable switch. It will work equally well with an electrical bi-stable (commonly a "flip-flop" or multibrater) circuit, which the switch only furnishes a pulse to.

A rectangular housing 22 is mounted on the panel 10 by screws 24. Mounted within the housing is an illuminated control indicator generally designated 26. The control indicator is movably mounted within the housing and is guided thereby by frictional engagement therewith or may be guided by suitable guide channels and coacting runners in conventional fashion dependent on the application intended. The control indicator 26 is in operating contact with the cap 20 of the switch, the spring bias of which serves to return the indicator to a rest position in peripheral contact with a resilient seat 28. The resilient seat 28 may be a pad formed of fibrous material to cushion the indicator as it returns to the rest position and to light seal the housing to prevent escape of illumination therefrom which might distract the operator of the equipment.

The indicator comprises a clear plastic face plate 30 with the function title characters 32 engraved in the back thereof. The function title characters 32 are filled with an opaque white pigment such as titanium dioxide. A diffuser panel 34 is mounted behind the face plate with an air gap 35 therebetween. To indicate a change in state of the function controlled by the switch, the relative contrast between the background and the function title is reversed. One state of the function will be indicated by white characters against a dark background as is shown in Figure 2. For this state lamps 36 and 37 are provided. The lamp 36 is mounted in a socket 38



which may be a screw type socket or a bayonet socket dependent on the lamps selected. The socket is mounted on a panel 40 secured to the back of the diffuser by means such as a screw 42. For simplicity of mounting it is usually preferable to form this panel of an insulator such as a standard grade phenolic through which the terminals of the lamp socket protrude. Lamp 37 is provided with a similar socket and mounting arrangement. Leads 44 and 46 and returns 48 and 50 extending from lamps 36 and 37 respectively serve to couple the lamps serially. The serially coupled lamps are connected across terminal 52 of the switch and terminal 54 of battery 56, the other terminal of which is connected to terminal 58 on the switch. For indication of this state the switch will connect terminals 52 and 58 internally so that battery power is applied across the serially coupled lamps. The illumination from lamps 36, 37 indicated by arrows 60, 62 respectively are connected to the face plate 30 of the indicator switch by light pipes 64, 66 respectively. The light pipes are formed of clear plastic material having polished reflector surfaces 68 and 70 to reflect light incident thereupon. The surfaces are at 45° to the light path, which is then deflected through two right angles and is directed to the clear plastic face as indicated by the arrow-heads on the light paths 60 and 62. Since the light is then incident upon the etched characters of the function title, the title will appear as white letters upon a dark background. An opaque barrier 72 separates the light pipe from the diffuser panel so that no illumination will penetrate the diffuser and it will remain dark to the eye of the operator.

Contrast reversal is provided for by the placement of lamps 73, 74 mounted within the diffuser panel. Each lamp is mounted within a socket 76 which, in turn, is mounted on an opaque panel 78 secured to the diffuser panel by means such as screws 80. Again, I have found it preferable to form these panels of an opaque insulator such as a phenolic. The panel 78 bears against a shoulder 82 formed in the opaque barrier 72 to form a continuous opaque barrier after mounting of the panels therein. Leads 84 and 86 and leads 88 and 90 from the respective lamps 73 and 74 are led out through the panel and serially couple the lamp filaments across switch terminal 92 and terminal 54 of the battery 56. Depression of the control indicator 26 will cause the switch to open the connection between terminal 52 and 58 thereof and complete a connection between terminals 58 and 92 thereof. The change in connections will remove power extinguishing lamps 36, 37 and lighting lamps 73, 74. Light from lamps 73 and 74 will enter the diffuser panel 34 through wall 93 of the mounting hole therein and pass in a path indicated by arrows 94 to the boundary surface between the diffuser panel 34 and the air gap 35. The diffuser panel 34 is preferably constructed of plastic containing diffuser material suspended therein so that the illumination of the boundary is even. Since the characters are filled with an opaque white pigment, the characters will interrupt the light path passing from the boundary to the observer through the air gap and the face plate, and the observer will view the characters as black letters upon a white background as shown in Figure 3.

It is convenient to form the barrier 72 of structural material such as a phenolic and bond the diffuser panel 34 and the face plate 30 thereto.

When the circuit represented by the utilization circuit 95 is of such nature that it requires voltage of the same order of magnitude as that supplied to the lamps, the circuit can be controlled by coupling the circuit across switch terminal 52 and the battery terminal 54 by respective leads 96 and 98. A typical application for such circuitry would be the supply of heater voltage to the tubes in an electronic circuit. In applications where higher voltages or different operating functions are required, the utilization circuit 95 may include a suitable

power supply connected to the circuitry by relays operated by battery power.

It will be noted that additional switch contacts operable by movement of cap 20 may be provided for function control purposes.

In this manner, I have provided in a single control indicator, an illuminated indicator having the title of the function control thereby presented on the face thereof. Thus, the operator is unmistakably guided to the proper control for activation of the function in the circuitry. Depressing the control indicator will operate the control function and the operation thereof is simultaneously reflected by the reversal of contrast between the title characters and the background. I have found the operator can be trained very quickly to understand the state of the function by inspection of the relative contrast between the function title and the background. Illumination intensity can be suitably controlled by variation of the potential of battery 56 or by separate voltage control circuitry to give the proper illumination intensity for the application intended.

In some applications it is desirable that the relative contrast be made higher than that obtainable with the embodiment shown in Figure 1.

In such applications the embodiment shown in Figure 4 may advantageously be employed. In Figure 4 there is shown a control indicator comprising a clear plastic face plate 99 containing a title block 103 in which character titles 32 are engraved and filled with an opaque white pigment such as titanium dioxide. To indicate one state of operation, lamps 36 and 37 are provided. The illumination therefrom is guided by the respective light pipes 64 and 66 to the face plate 99 for illumination of the character titles 32 by side lighting.

To indicate the other function, state lamps 73 and 74 are provided. The lamps are mounted within a diffuser panel 34. Interposed between the diffuser panel 34 and the face plate 99 is a polaroid screen 100 held out of contact with the face plate and diffuser panel by gaskets 101. The screen 100 is circularly polarized. The circularly polarized screen 100 will inhibit light penetration therethrough and reflection from the diffuser panel 34. Thus, the circularly polarized screen 100 has the effect of darkening the background in the mode shown in Figure 2.

To enable change of function and title the face plate title block 103 is removable. Edge lighting of the characters engraved therein is provided by the diffuser peripheral surfaces 102 and 104 in the face plate 99 and title block 103 edges respectively which engage in abutting relationship when the title block 103 is mounted in the indicator.

It will be understood that the invention may be variously modified and embodied within the scope of the subjoined claims.

What is claimed is:

1. An illuminated indicator adapted to indicate function states by reversible contrast between a function title and a background which comprises a transparent face plate having title characters engraved in one surface thereof, said characters being filled with an opaque pigment, a diffuser panel mounted adjacent the engraved surface of said face plate, means for edge lighting said indicator through said transparent face plate to indicate a first state, and means for simultaneously extinguishing said edge lighting and for illuminating the indicator through said diffuser panel to indicate a second state.

2. An illuminated indicator adapted to indicate one of two states of a function which comprises a transparent panel having a character representation of said function engraved in one surface thereof, said engraved characters being filled with an opaque white pigment, means responsive to one function state for edge lighting said transparent panel thereby to indicate said function in white letters upon a dark background; and means responsive to



5

a second state of said function for illuminating a surface adjacent said engraved title surface to thereby indicate said function in dark letters on an illuminated background.

3. An illuminated control indicator adapted to control a two-state function and to indicate the function state by relative contrast between the function title and a background which comprises a switch, a control indicator in operating engagement with said switch, said switch adapted to change said function to the first state thereof in response to a first movement of said indicator and adapted to change said function to the second state thereof in response to a second movement of said indicator, said indicator comprising a transparent face plate having characters representing said function engraved in one surface thereof, said characters being filled with an opaque pigment, means responsive to said first movement for edge lighting said transparent panel, a diffuser panel mounted adjacent the engraved surface of said transparent panel, and means responsive to said second movement for illuminating said indicator through said diffuser panel.

4. An indicator in accordance with claim 1 which includes a circularly polarized screen interposed between said diffuser panel and the engraved surface of said face panel.

5. An indicator in accordance with claim 2 which includes a circularly polarized screen interposed between said diffuser panel and the engraved surface of said face panel.

6. A control indicator in accordance with claim 3 in which a circularly polarized screen is interposed between said diffuser panel and the engraved surface of said face panel.

7. A control indicator in accordance with claim 3 which includes a housing adapted to prevent the escape of illumination from the periphery of said indicator.

8. A control indicator adapted for mounting on high

6

density control panels for the control of a function and the simultaneous indication of the function state by reversible contrast between the function title and a background which comprises a housing, a switch contained within said housing, an indicator movably mounted within said housing in operating engagement with said switch, said switch adapted to cast said function into a first state upon a first movement of said indicator, said switch adapted to cast said function into a second state upon a second movement of said indicator, said indicator comprising a transparent face plate with characters representing said function engraved therein, said characters being filled with an opaque pigment, means responsive to said first movement for edge lighting said transparent panel, a diffuser panel adjacent said engraved surface of said transparent face plate, and means responsive to said second movement for illuminating said indicator through said diffuser panel.

9. An illuminated indicator adapted to indicate one of two states of a function comprising a transparent panel having a character representation of said function engraved in one surface thereof, said engraved characters being filled with an opaque pigment, means responsive to one function state for edge lighting said transparent panel and means responsive to a second state for back lighting said panel.

10. An illuminated indicator in accordance with claim 9 in which said panel is provided with a diffuse edge surface and said edge lighting means comprise light pipes terminating in diffuse ends abutting said edges of said panel.

11. An illuminated indicator in accordance with claim 1 in which said face plate includes a removable title block, said title block having a diffuse peripheral surface which engages a mating diffuse surface in said face plate in abutting relationship therewith.

No references cited.