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3,266,014

ROTATING BEACON LANTERN

Filed Jan. 21, 1964

4 Sheets-Sheet 1

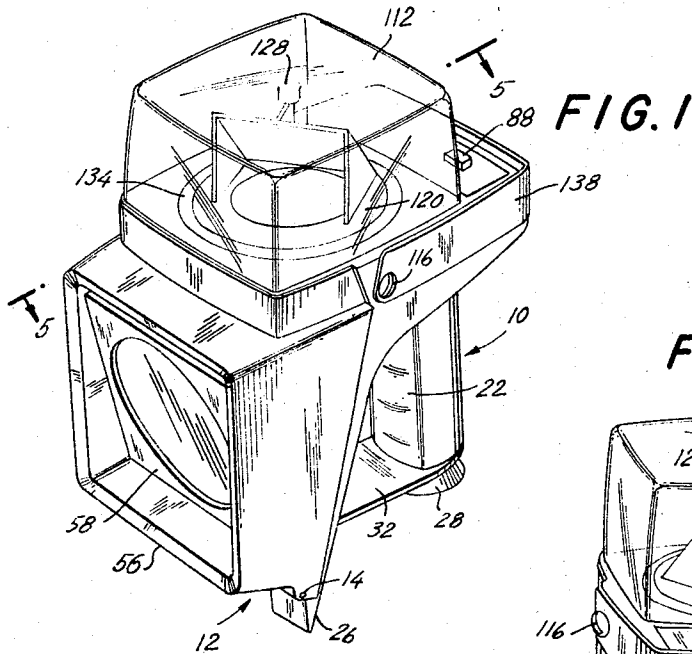


FIG. 2

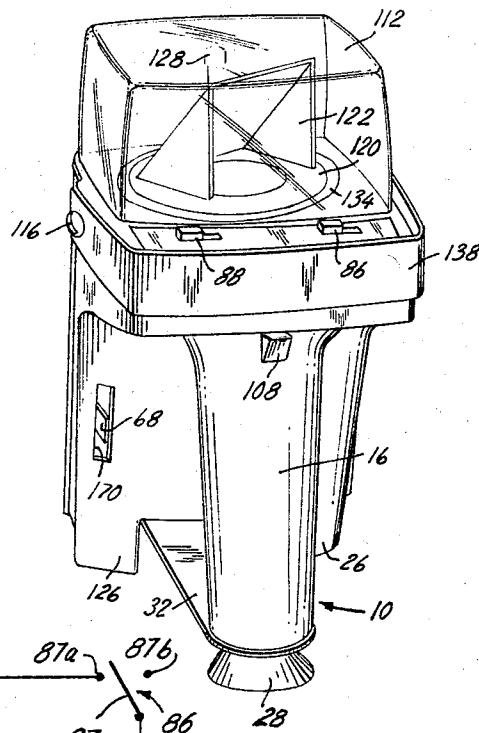
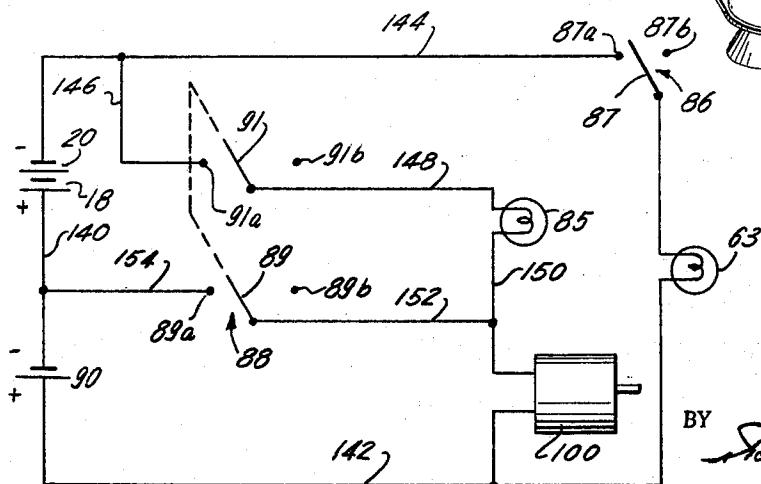


FIG. 3



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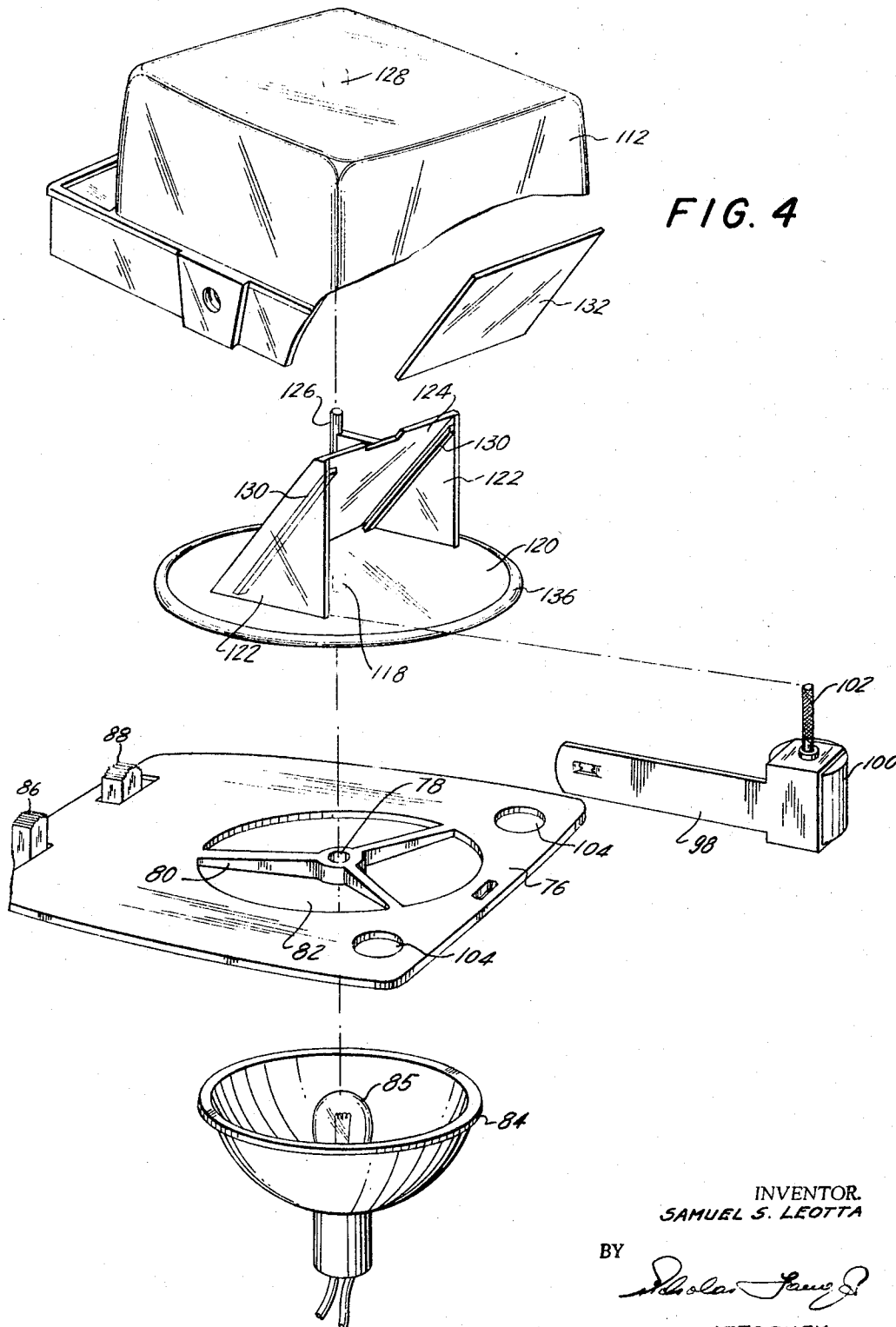
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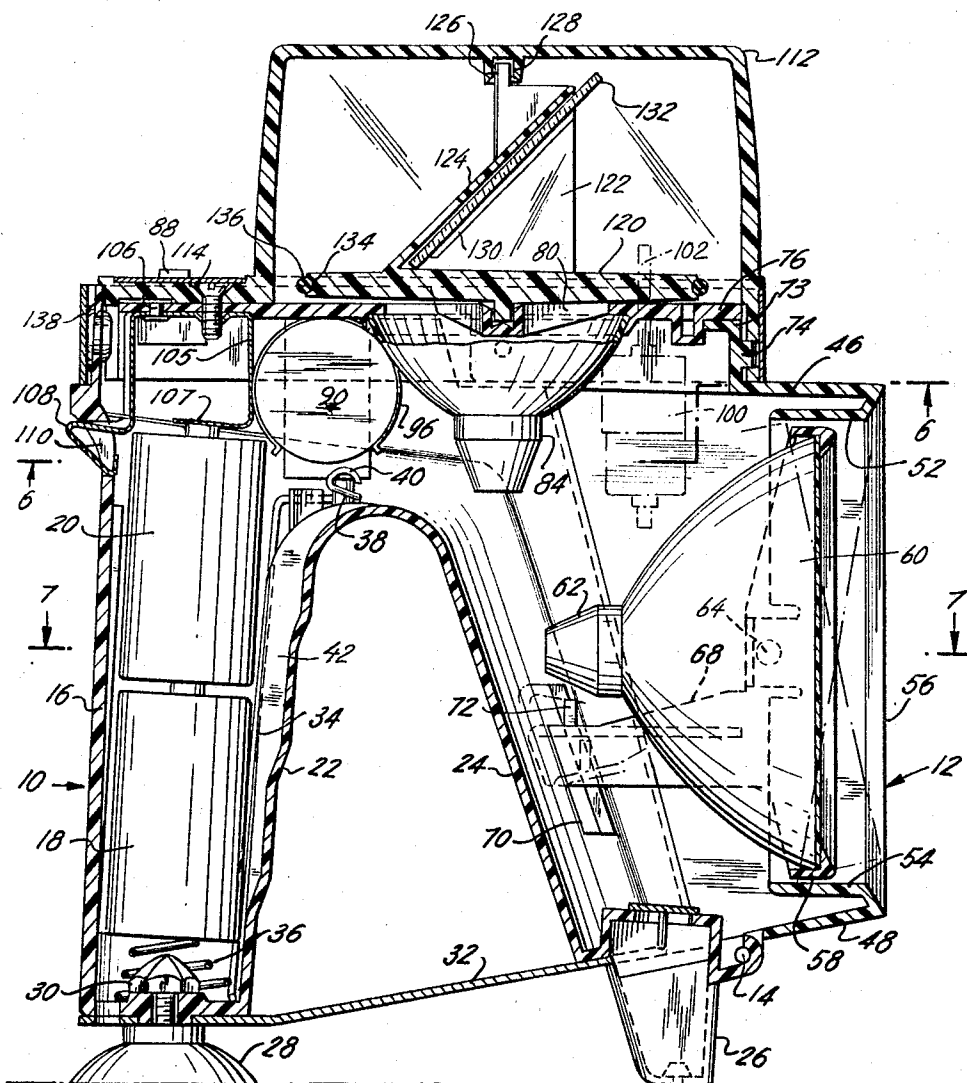
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FIG. 5



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FIG. 6

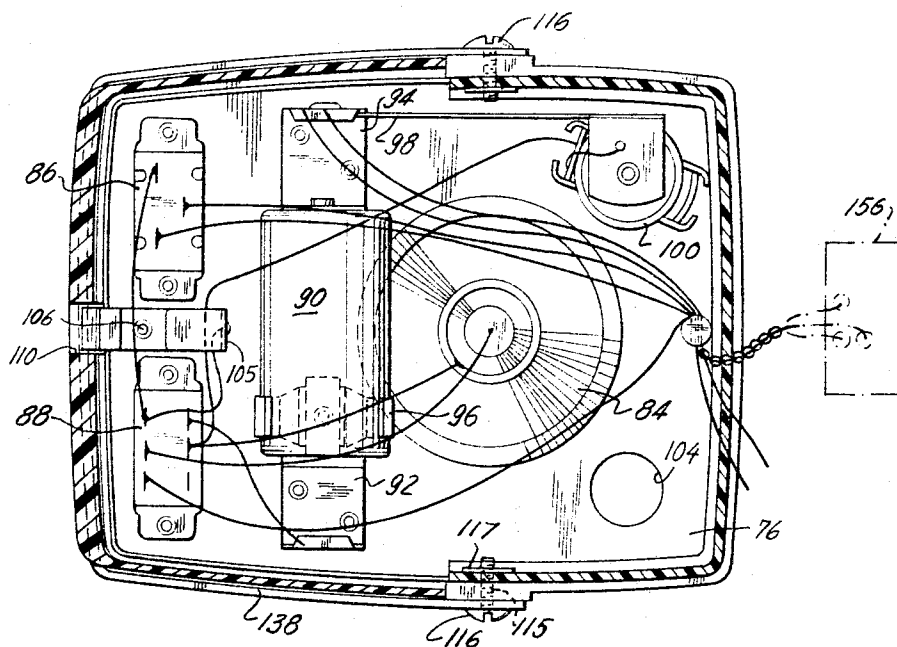
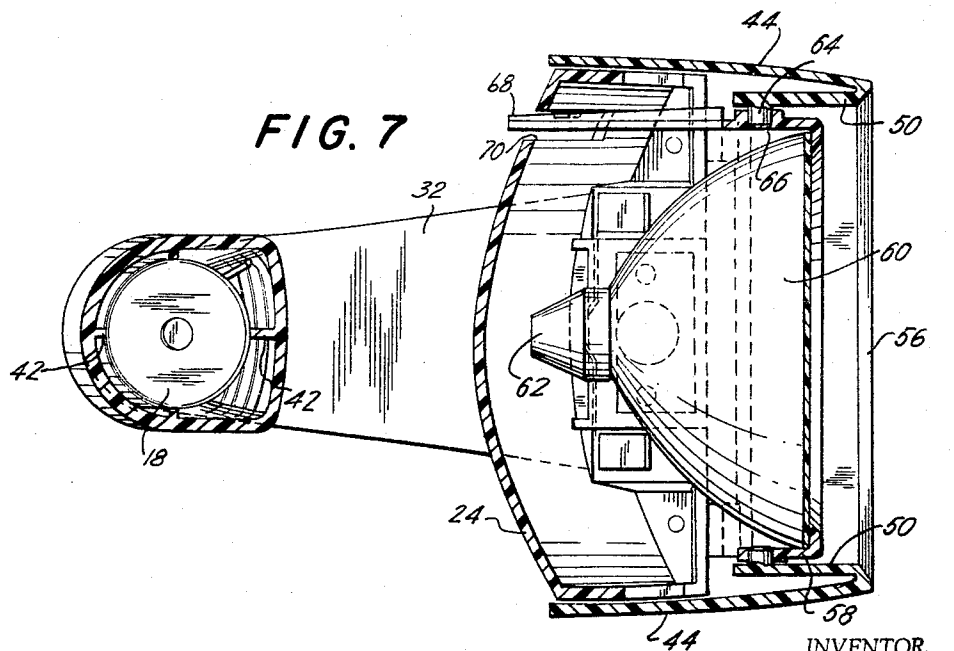


FIG. 7



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3,266,014

ROTATING BEACON LANTERN

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10 Claims. (Cl. 340—50)

This invention relates to attention-attracting warning lights suitable for both stationary and mobile applications, and, more particularly, to a rotating beacon lantern of novel and improved type.

It is an object of the present invention to improve warning lights and lanterns of the described character.

It is another object of the present invention to provide a novel and improved rotating beacon lantern in which a stationary light beam is converted into a rotating beam by imparting rotation to a suitable optical reflecting element, such as a mirror.

A further object of the invention is to provide a rotating beacon lantern in which the light source in the form of an incandescent bulb is not rotated and thus does not require slip rings or similar means for maintaining an electrical circuit between its stationary and its rotatable elements.

It is also within contemplation of the invention to provide an improved lantern suitable of producing either or both a rotating beam warning signal and a stationary spotlight of high intensity.

The invention also contemplates a rotating beacon lantern which is simple in construction, reliable in operation and which may be readily manufactured on a quantity production scale at a low cost.

Other and further objects and advantages of the present invention will become apparent from the following description, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective side view of a lantern embodying the invention;

FIG. 2 is a perspective rear view of the lantern shown in FIG. 1;

FIG. 3 is a schematic representation of the electric circuit of the lantern of the invention;

FIG. 4 is an exploded perspective view illustrating the structure and the cooperation of the rotating beacon producing elements of the lantern;

FIG. 5 is a vertical section taken on line 5—5 of FIG. 1;

FIG. 6 is a horizontal section taken on line 6—6 of FIG. 5; and

FIG. 7 is a horizontal section taken on line 7—7 of FIG. 5.

Referring now more particularly to the drawings, numeral 10 denotes a rear housing and 12 a forward housing, made of a suitable plastic and jointedly connected to each other by means of a hinge 14. The rear housing comprises a hollow handle 16 adapted to accommodate a pair of superposed primary cells 18 and 20 in its interior and to constitute a corrugated pistol grip 22 at its exterior whereby the lantern may be securely grasped and conveniently aimed by an operator. The rear housing is integrally formed with a curved, inclined wall 24, the lower end of which constitutes a pair of feet 26 cooperating with a suction cup 28 secured in the bottom of handle 16 by means of a screw 30 for supporting the lantern. Additional strength and rigidity is imparted to the rear housing by means of a metal plate 32, one end of which is secured to the lower portion of rear housing 12 and the other end of which is clamped between the lower end of handle 16 and suction cup 28 by means of screw 30. A length of spring steel wire 34 extends downwardly in the interior of handle 16.

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The lower end of the said wire is wound into a coil spring 36, applying resilient axial pressure on cells 18 and 20, while its upper end is bent around a boss 38 and forms a loop adapted to be engaged by the inner edge of a contact spring 92 thereby to connect the bottom terminal of the serially connected cells to an electric circuit. Integrally formed ribs or webs 42 extend radially into the interior of handle 16 and assure accurate centering of the cells, as this will be best observed in FIG. 7.

The forward housing generally denoted by numeral 12 comprises side walls 44, a top wall 46 and a bottom wall 48. These walls reverse their directions at their front ends and have reentrant portions 50, 52 and 54, respectively, which define a rectangular frame 56. In this frame is held an apertured spotlight supporting frame 58 to which is secured reflector 60 and bulb holder 62, the said frame having small, circular apertures 64 into which extend studs 66 integrally formed with reentrant side walls 50. An integrally formed tongue 68 extends rearwardly from frame 58 through an aperture 70, one side of which is provided with three protuberances 72 against which the edge of tongue 68 may abut. Thus, the frame 58 may be adjusted into any one of three different positions, causing corresponding adjustment of the direction of the spotlight emitted by the reflector.

The structure of the beacon subassembly will be best observed in FIG. 4. It is built around a horizontal bearing plate 76 made of a suitable opaque plastic and comprises a central bearing 78 held by three uniformly spaced radially extending arms 80, which define three segmentary apertures 82 therebetween. In addition to carrying the lower bearing 78 for the mirror holder to be described later, it also constitutes a supporting base on which the electrical, mechanical and optical elements producing the rotating beacon are located. These elements include (FIG. 6) a beacon reflector and bulb assembly 84, a single-pole double-throw slide switch 86, a double-pole double-throw slide switch 88, and a third primary cell 90 having its end terminals held between the inner legs of a pair of U-shaped contact springs 92 and 94, lateral displacement of the said cell being prevented by the two curved arms of a mounting spring 96 having no electrical function. On the outer leg of contact spring 94 is mounted one end of a flat leaf spring 98 to the other end of which is secured a small electric motor 100 having its serrated shaft 102 extending through one of the openings 104 in the bearing plate. Bearing plate also has a downwardly extending inverted U-shaped leaf spring 105 secured thereto by an eyelet 106, one leg 107 of which spring is bent horizontally and resiliently engages the top center contact of cell 20, while its other leg is bent into an elbow 108 extending outwardly through slot 110 of the rear housing and constitutes a spring catch for holding the hinged forward and rear housings together.

A generally square-shaped beacon cover 112 is secured to the bearing plate by suitable fastening elements, such as a screw 114 passing through aligned openings in the said cover and plate into a threaded hole in spring 105. In case the rotating beacon lantern is intended to operate as an optical warning signal, the beacon cover is preferably made of red transparent plastic material. In bearing 78 of bearing plate 76 is seated lower stud 118 of a mirror holder disc 120 made of a transparent plastic material, which may be clear or of the same color as the beacon cover. Disc 120 has integrally formed upwardly extending triangular supports 122 connected by an inclined wall 124 from which protrudes upper stud 126, rotatably held in bearing 128 in the top center of the beacon cover. A groove 130 is provided in each of triangular supports 122, and a plane mirror 132 being slipped into the said grooves so that the reflecting face

of the mirror encloses an angle of about 45 degrees with the plane of disc 120. A circumferential groove 134 is provided around mirror holder disc 120, in which there is stretched a ring 136 of a suitable elastomer, such as silicone rubber. Against this elastic ring is pressed serrated shaft 102 of motor 100 by the resilient pressure of motor support spring 98. Thus, when the said motor is energized, mirror holder disc 120 and mirror 132 thereon are rotated around a vertical axis, the serrated shaft 102 of the motor and the elastic ring 136 constituting a simple, efficient and substantially noiseless speed reducing gear.

The beacon subassembly is secured to the forward housing 12 by placing the forward edge portion of beacon cover 112 over a U-shaped frame portion 73 on top of the said housing and rearwardly displacing the subassembly, thereby hooking stud 74 integrally formed with the housing into a corresponding depression in the beacon cover. Apertures 115 in the beacon cover and the frame portion of the housing are now aligned with each other and the said elements are fastened together by means of shoulder screws 116 extending through said apertures into nuts 117. Screws 116 also serve for pivotably holding the two ends of a U-shaped carrying handle 138 for the lantern. In its inoperative condition shown in the drawings, the said handle surrounds the lower portion of beacon cover 112 and can be raised into operative position whenever it is desired to use the same.

FIG. 3 illustrates the electrical circuit of the lantern. Cells 20, 18 are connected in series with each other and also with cell 90 through a conductor 140. The positive terminal of cell 90 is connected to one terminal of motor 100 and also to one terminal of spotlight bulb 63 through a conductor 142. The other terminal of the said bulb is connected to arm 87 of single-pole double-throw switch 86, having a working contact 87a and a rest contact 87b. Working contact 87a is connected to the negative terminal of cell 20 through a conductor 144. Double-pole double-throw switch 88 is provided with two arms of which arm 89 has a working contact 89a and a rest contact 89b, while arm 91 has a working contact 91a and a rest contact 91b. Working contact 91a of switch 88 is connected to the negative terminal of cell 20 through a conductor 146 and arm 91 of the said switch is connected to one terminal of beacon reflector bulb 85 through a conductor 148. The other terminal of bulb 85 and of motor 100 are connected to each other through a conductor 150 and to switch arm 89 through conductor 152. Working contact 89a is connected to conductor 140 by another conductor 154.

From the foregoing description, operation of the lantern of the invention will be readily understood by those skilled in the art.

Considering first operation of the electrical circuit just described in connection with FIG. 3, it will be noted that switch 86 controls the circuit of spotlight bulb 63. When it is desired to operate the said bulb, arm 87 of switch 86 is placed over working contact 87a. This will establish a closed circuit from the upper terminal of bulb 63, switch arm 87, contact 87a, conductor 144, cells 20 and 18, conductor 140, cell 90 and conductor 142 back to the lower terminal of bulb 63. Thus, the said bulb will be energized from all three cells, 20, 18 and 90, connected in series.

When, on the other hand, it is desired to operate the rotating beacon, double-pole switch 88 is displaced into its operating position wherein arm 89 engages contact 89a and arm 91 engages contact 91a. This will establish a closed circuit both for beacon bulb 85 and motor 100. The beacon bulb circuit comprises conductors 140 and 154 leading from the positive terminal of cell 18 to contact 89a, arm 89, conductors 152 and 150, bulb 85, conductor 148, arm 91, contact 91a and through conductor 146 back to the negative terminal of cell 20. The motor circuit, starting out from the positive terminal of cell 90, comprises conductor 142, motor 100, conductor 152, switch arm 89, contact 89a, conductor 154, and

back to the negative terminal of cell 90. Thus, beacon bulb 85 will be energized from the two serially connected cells 18 and 20, whereas motor 100 will be energized from the single cell 90.

As switches 86 and 88 are independent from each other, it is possible to selectively operate either the spotlight or the beacon light, or both lights at the same time. In some cases, where it is desired to operate the lantern on or in proximity to a motor vehicle for long periods of time, it is advantageous to derive the operating current from the storage battery of the vehicle, a connector receptacle for this purpose being shown at 156 in FIG. 6. Of course, suitable dropping resistors have to be incorporated in the connecting cord (not shown), in order to reduce the voltage of the storage battery to the desired values required in different parts of the circuit.

Operation of the rotating beacon considered from its mechanical and optical aspects will be best understood by reference to FIG. 4 of the drawing. Light emitted by beacon bulb 85 is converted into a substantially parallel beam of light by means of reflector 84. This beam of light will pass through segmentary openings 82 of bearing plate 76 and also through transparent mirror holder disc 120 which has its bearing studs 118 and 126 rotatably supported in bearing 78 in the bearing plate 76 and in bearing 128 in the beacon cover 112, respectively. The beam of light emitted by the reflector-bulb combination 84, 85 will be reflected into a substantially horizontal beam by means of mirror 132 mounted at an angle of 45° on the mirror holder disc 120. Thus when the mirror holder disc 120 is rotated by resilient engagement of its circumferential rubber ring 136 with the serrated shaft 102 of motor 100, the horizontal beam will be likewise caused to rotate. As this beam upon passing through transparent red beacon cover 112 will be imparted a red color, it will constitute a very effective danger signal in all directions from the lantern.

When it is desired to carry the lantern, carrying handle 138 is raised from its normal horizontal position into a substantially vertical position. As an alternative, the lantern may be carried about by grasping the non-slip, pistol grip aiming handle 16. While holding the said handle with four fingers of one hand, one or both of slide switches 86, 88 can be readily actuated by the thumb of the same hand. Instead of carrying the lantern, it can be deposited on the ground or on any other suitable surface, in which case it will rest on suction cup 28 and legs 26. Suction cup 28 can be utilized for firmly attaching the lantern to any smooth surface, such as the roof of a motor vehicle. Direction of the spotlight beam can be adjusted by moving the end of tongue 68 protruding through slot 70 into one of the several positions determined by notches or protuberances 72 at one side of said slot.

To replace batteries or bulbs, carrying handle 138 is raised and catch 108 below switch panel is depressed to swing the lantern housing open around hinge 14 connecting forward housing 12 with rear housing 10. This makes the interior of the lantern readily and conveniently accessible for servicing.

Although the present invention has been disclosed in connection with a preferred embodiment thereof, variations and modifications may be resorted to by those skilled in the art without departing from the principles of the invention. All of these variations and modifications are considered to be within the true spirit and scope of the present invention, as disclosed in the foregoing description and defined by the appended claims.

What is claimed is:

1. A rotating beacon lantern comprising a bearing plate having a bearing therein surrounded by openings, a source of light below said openings and passing a beam of light therethrough, a transparent disc rotatably supported in said bearing in closely parallel-spaced position with respect to said bearing plate, a mirror mounted on said disc by supports integrally formed therewith and being adapted

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to reflect said beam, and means for rotating said disc with the mirror thereon thereby converting the stationary beam of said source into a rotating beam, said transparent disc and said mirror supports constituting a single rigid unit of substantial strength.

2. A rotating beacon lantern comprising a bearing plate of opaque material having a bearing surrounded by a plurality of segmentary openings integrally formed therein, a light source comprising an electric bulb and a reflector below said openings of the plate and passing a beam of light therethrough, a transparent disc mounted for rotation in said bearing above said plate in close parallelism with respect to the plate, a mirror mounted on said disc by supports integrally formed with said transparent disc and being adapted to reflect said beam, and means including a motor-driven shaft engaging the circumference of said disc to rotate it with the mirror thereon thereby converting the stationary beam of said source into a rotating beam, said transparent disc and supports constituting a single rigid unit of substantial strength.

3. A rotating beacon lantern comprising a bearing plate of opaque material having a spider integrally formed therein defining a central bearing surrounded by a plurality of segmentary openings, an electric bulb and a reflector below and passing a beam of light through said openings, a transparent disc mounted for rotation in said bearing above said plate in close parallelism with respect to the plate and having a ring of elastic material around its circumference, a mirror mounted on said disc by supports integrally formed with the disc and being adapted to reflect said beam, a motor having a serrated shaft, and resilient means urging said shaft into contact with said elastic ring thereby to rotate said disc with the mirror thereon and converting the stationary beam of the bulb and reflector into a rotating beam, said transparent disc and supports constituting a single rigid unit of substantial strength.

4. A rotating beacon lantern comprising a bearing plate having a spider integrally formed therein defining a lower bearing surrounded by a plurality of segmentary openings, a reflector below and passing a beam of light through said openings, a transparent disc having a circumferential groove mounted for rotation in said lower bearing above and in close parallelism with respect to said plate, a ring of elastic material in said groove, a mirror holder integrally formed with said transparent disc and having a stud upwardly extending therefrom, a mirror in said holder adapted to reflect said beam, a stationary transparent beacon cover for said disc and mirror holder and having an upper bearing therein rotatably receiving said stud, a motor having a serrated shaft, and resilient means urging said shaft into contact with said elastic ring thereby to rotate said disc and the mirror thereon and converting the stationary beam of the reflector into a rotating beam, said transparent disc and mirror holder constituting a single rigid unit of substantial strength.

5. A rotating beacon lantern comprising a lower bearing, a transparent disc having a stud downwardly extending into said bearing, a mirror holder integrally formed with said disc and having a mirror therein, a transparent beacon cover over said disc and mirror holder and having an upper bearing therein, an upwardly extending stud on said mirror holder rotatably received in said upper bearing, means for passing a stationary beam of light

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through said disc to be reflected by said mirror, and means for rotating said disc with the mirror thereon for converting said stationary beam into a rotating beam emerging through said beacon cover and constituting a warning signal, said transparent disc and mirror holder constituting a single rigid unit of substantial strength.

6. A rotating beacon lantern as claimed in claim 5, in which the beacon cover is made of transparent red plastic material.

7. A rotating beacon lantern comprising a forward housing and a rear housing hingedly connected with each other, said forward housing having therein a beacon reflector adapted to emit a beam of light substantially in the vertical direction; means including a rotatable transparent disc integrally formed with a mirror holder having a mirror therein superposed on said beacon reflector for changing direction of the beam of light emitted thereby, said transparent disc and mirror holder constituting a single rigid unit of substantial strength, electric driving means for rotating said disc and mirror and the reflected beam, switching means for setting up an energizing circuit for said reflector and driving means, and a beacon cover of transparent plastic material for said disc and mirror assembly; said rear housing comprising a generally tubular portion accommodating a source of current in its interior and constituting a pistol grip handle on its exterior.

8. A rotating beacon lantern comprising a forward housing and a rear housing hingedly connected with each other; said forward housing having therein a spotlight reflector adapted to emit a beam of light substantially in the horizontal direction and a beacon reflector adapted to emit a beam of light substantially in the vertical direction; means including a rotatable transparent mirror holder disc integrally formed with a mirror holder having a mirror therein superposed on said beacon reflector for changing direction of the beam of light emitted thereby, said transparent disc and mirror holder constituting a single rigid unit of substantial strength, electric driving means for rotating said disc and the emitted beam of light, and switching means for selectively energizing said spotlight and said beacon reflector with the driving means of said disc; said rear housing comprising a hollow pistol grip handle accommodating a source of current in its interior.

9. A rotating beacon lantern as claimed in claim 8, in which a beacon cover of transparent red plastic material is superposed on the mirror-disc assembly for imparting a red color to the rotating beam passing therethrough.

10. A rotating beacon lantern as claimed in claim 8, in which the hingedly connected forward and rear housings may be swung away from each other to make the interior of the lantern accessible for servicing.

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