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ELECTRIC LANTERN

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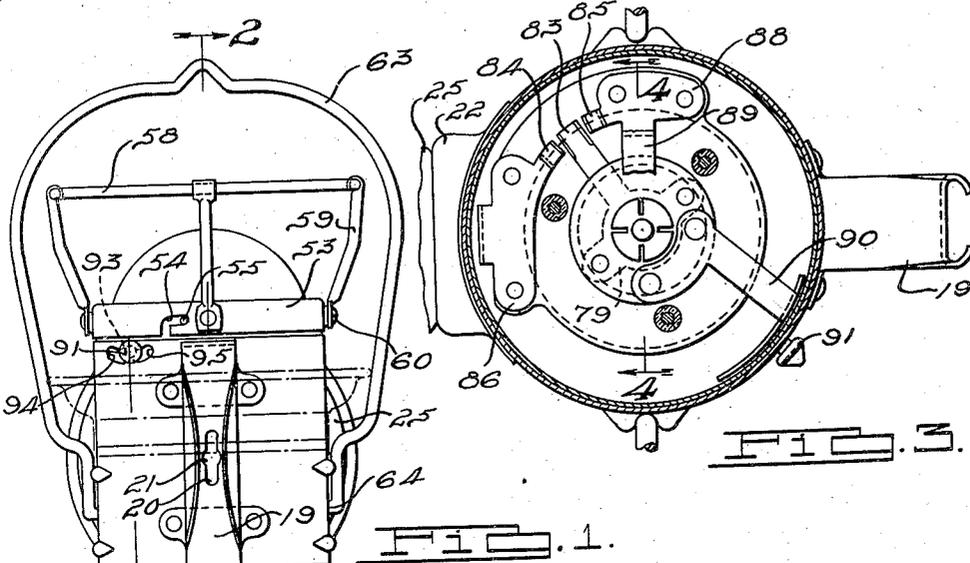


FIG. 1.

FIG. 3.

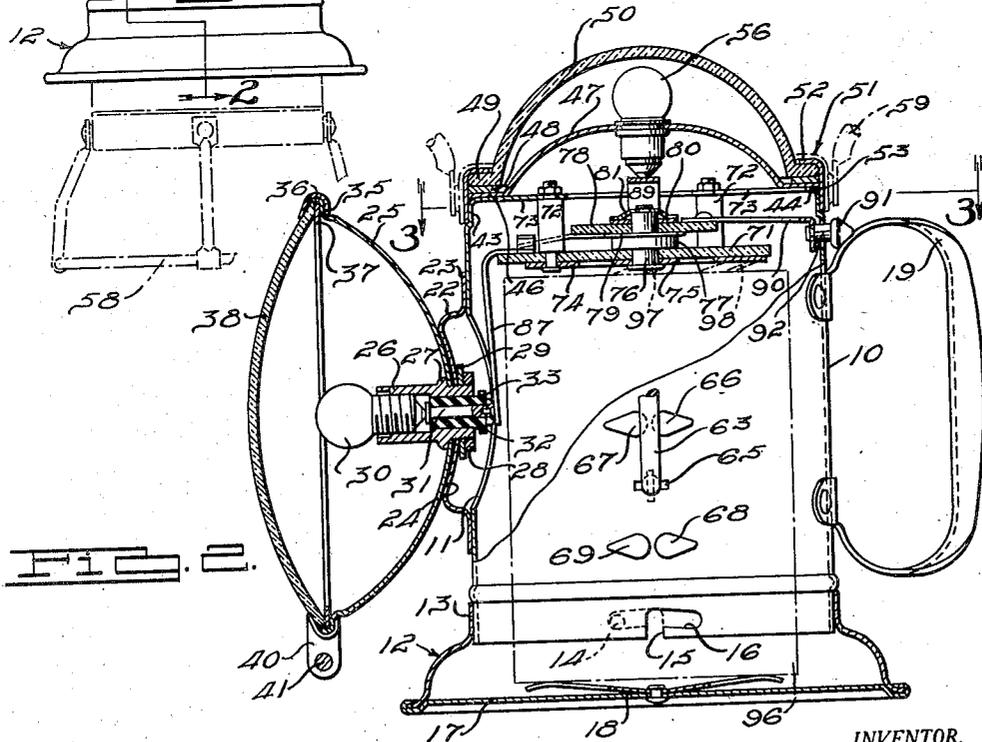


FIG. 2.

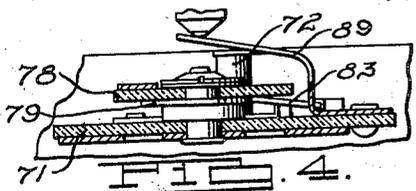


FIG. 4.

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ELECTRIC LANTERN

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3 Claims. (Cl. 240—10.6)

The invention relates to electric lights and it has particular relation to a transportable electric lantern of the battery operated type.

One object of the invention is to provide an electric lantern which optionally may be used to throw a beam of light in any direction depending upon manual manipulation of the lantern, or to provide a soft and diffused light around the lantern when it rests on a supporting surface.

Another object of the invention is to provide an electric lantern having facilities for directing a beam of light from one part of the lantern, and facilities for throwing off a diffused and soft light from another part of the lantern.

Another object of the invention is to provide an electric lantern of the above mentioned character in which a battery is employed and wherein the battery is used optionally with one light or the other.

Another object of the invention is to provide an electric lantern having direct beam lighting facilities in one of its side walls, and diffused light facilities in one of its ends walls.

Another object of the invention is to provide an electric lantern having lighting facilities in one of its end walls, and which is so constructed that either end may be used as a supporting base.

Another object of the invention is to provide an electric lantern which has improved safety features enabling a safer use of the lantern in mines or other places where gases have been known to explode as a result of the use of electric lights.

Another object of the invention is to provide an electric lantern having a ball pivotally secured thereon for the purposes of manually carrying the lantern, in which the position of the lantern with respect to the ball may be reversed so that the lantern may be carried in one position or in an inverted position.

Another object of the invention is to provide an electric lantern having an improved arrangement for supporting dry cells and completing an electrical circuit therethrough and through lighting bulbs mounted in the lantern casing.

Other objects of the invention will become apparent from the following description, the drawings relating thereto and the claims hereinafter set forth.

For a better understanding of the invention reference may be had to the drawings, wherein:

Figure 1 is a rear elevational view of an electric lantern constructed according to one form of the invention and showing by broken lines how the position of the lantern may be inverted.

Fig. 2 is a cross-sectional view on a larger scale

taken substantially along the line 2—2 of Fig. 1.

Fig. 3 is a cross-sectional view taken substantially along the line 3—3 of Fig. 2.

Fig. 4 is a cross-sectional view taken substantially along the line 4—4 of Fig. 3.

Fig. 5 is a side elevational view of an adapter for supporting separated dry cells, which may be used in the construction shown by Figs. 1 and 2 instead of a single battery of larger voltage.

Fig. 6 is a side elevational view of the construction shown by Fig. 5 and showing how the adapter with the cells supported thereon cooperate with other parts of the lantern.

Fig. 7 is a plan view of the adapter shown by Fig. 5 with the dry cells mounted thereon.

Fig. 8 is a fragmentary cross-sectional view of a lantern constructed according to another form of the invention and which is particularly adapted for use in mines or other places where gas is apt to be present.

Fig. 9 is a plan view on a larger scale and partly in cross section, of the bulb mounting and lens in the front wall of the lantern shown by Fig. 8.

Fig. 10 is a cross-sectional view on a larger scale taken substantially along the line 10—10 of Fig. 8.

Referring to Figs. 1, 2 and 3, the lantern comprises a generally cylindrical casing 10 composed of sheet metal which is open at its upper and lower ends, and is provided with a generally circular opening 11 in its side wall substantially midway between its ends. The lower end of the casing is normally closed by a releasable base and cover 12 having a cylindrical upper portion 13 telescopically receiving the lower end of the casing. This base is releasably secured to the casing by diametrically disposed pins 14 thereon which are adapted to move upwardly into slots 15 in the casing wall and then be turned with the base, into generally circumferential portions 16 of the slots. The side wall of the base flares outwardly and at its lower edge is interlocked with a base plate 17, which at its center has a bar spring 18 secured thereto, adapted for supporting battery elements in the casing.

At that side of the casing opposite the opening 11, a handle 19 is secured to the casing wall for manual carrying and manipulation of the lantern and this handle is disposed in a position substantially equidistant from both ends of the casing. At its center and as best shown by Fig. 1, the handle is provided with a vertically extending and elongated opening 20 which is enlarged at its center as indicated at 21 so that the lantern may be hung on a nail or other similar support either

with the lantern in the position shown or in an inverted position. It will be understood that in hanging the lantern a nail or other support will pass through the larger portion 21 of the opening 20 and then upon movement of the lantern downwardly the nail will move into the upper end of the opening.

Around the opening 11 in the wall of the casing, an outwardly projecting metal element 22 is provided which has a flange 23 welded or otherwise suitably secured to the casing wall around the opening. This element is provided with a front wall 24 of concave formation which forms a seat for a reflector 25. The reflector and wall 24 are provided with centrally located, coinciding openings, and such openings receive a metal lamp socket 26 having a shoulder 27 engaging the outer surface of the reflector around the opening therein, and a threaded portion projecting through the opening to a point behind the wall 24. At the inner end of such threaded portion, a nut 28 is provided which abuts a washer 29 engaging the wall 24. This arrangement not only maintains the lamp socket in position, but holds the reflector positively located with respect to the element 22 and the casing. A bulb 30 is threaded in the outer end of the lamp socket, and the central terminal of the bulb engages a terminal 31 rigidly secured in a tubular insulating element 32 closely fitting in an opening in the base of the socket, but which is movable therein. The inner end of the insulating element 32 has a shoulder 33 to limit outward movement of such element and the terminal 31, and the inner end of the terminal 31 is exposed and is adapted to engage a contact which will be referred to hereinafter. It will be apparent that the position of the bulb may be varied by varying the degree it is threaded into the socket and that the terminal 31 may be varied in position by moving the insulating element 32 correspondingly. It will also be apparent that the outer terminal of the bulb, through the socket 26, and the element 22, is electrically in contact with the wall of the casing.

The free edge of the reflector 25 has an annular flat portion 35 and a rim portion 36 and between such portions, an annular ring 37 is provided which serves as a support for a lens or glass 38. To hold the lens in position and to provide an efficient seal around the junction of the lens with the reflector, an annular ring 40 split at one point, encompasses the edges of the lens and reflector and the ends thereof are adjustably connected by screw adjusting means 41. By tightening the screw adjusting means, the seal around the edge of the glass can be made very effective.

The upper and open end of the casing has a slightly inset wall portion 43 which terminates in an inwardly directed, annular flange portion 44, which supports a flange portion 45 of an upwardly projecting convex reflector 47 extending over the upper and open end of the casing. Over the flange 46, a flexible sealing ring 48 is provided, and against this ring, a rim portion 49 of an upper lens 50 is disposed. The lens, ring 48 and reflector are maintained in definite positions as shown, by an annular retaining element 51 having a flange portion 52 overlapping the rim 49 of the lens, and a side portion 53 telescopically receiving the inset wall portion 43 of the casing. The retaining element 51 is releasably held in position as best shown by Fig. 1, by means of diametrically disposed slots 54 therein, which are similar to the slots 15 in the bottom edge of the casing, and pins 55 on the casing element adapted

to move into and out of the slots. At its center, the reflector 47 is provided with a bulb 56 which in this construction is threaded into a socket permanently mounted with respect to the reflector.

The lighting arrangement in the side wall of the casing including the reflector 25 is adapted for throwing a direct beam of light over a considerable distance and the bulb mounting is such that the bulb may properly be focused to obtain the desired beam. The bulb and reflector arrangement at the upper end of the casing is adapted for creating a diffused and soft light and the convex character of the reflector enables obtaining this result in a very satisfactory manner. While the upper light may be useful under certain circumstances, it is particularly useful if the lantern is in an inverted position so that the light is then at the lower end of the casing. For enabling the use of the lantern with this light in an inverted position, a guard 58 may be provided, having arms 59 secured as indicated at 60 to the side portion 53 of the retaining element 51. This guard is of open construction and extends around the lens 50 and with the lantern in its inverted position, serves as a supporting base while still allowing light to pass through the lens 50 to the supporting surface below and around the lens. Frequently it is desirable to dispose the lantern on the ground or other surface and to have a soft light around the lantern and by providing the guard and inverting the lantern, this result may be obtained. It might be noted in this connection, that with the guard in place, it would make no difference whether or not the lantern were inverted in so far as carrying it with the handle 19 is concerned, or in so far as use of the light in the side wall of the casing is concerned.

For carrying the lantern in a suspended manner, a bail 63 is provided which has inwardly projecting trunnion portions 64 at its end, journaled in openings 65 in opposite sides of the side wall of the lantern casing. These inwardly projecting portions 64 at the inner side of the casing are flattened to permit insertion through the openings 65 which are elongated for this purpose, but such openings at their center are rounded to receive the trunnion portions of the bail. When in either of its vertical positions, the flattened portions at the inner ends of the trunnions are disposed vertically so that the handle cannot be released during manipulation of the lantern. For releasably holding the bail in its vertical position as shown by Fig. 2, beads 66 and 67 are pressed out of the lantern casing in spaced relation and these beads are of such character that parallel side portions of the bail may move past either of them but when disposed between them, the bail is normally held in this position although a forced tilting movement of the bail will cause it to pass over either of the beads. Similar beads 68 and 69 are pressed out of the lantern casing wall at the opposite side of the opening 65 so that the bail may be turned through 180° and similarly positioned with respect to beads 68 and 69. With this arrangement it is apparent that the lantern may be carried by means of the bail in the position shown by Fig. 2, or that the bail may be turned through 180° and the lantern inverted and carried in such position with the lens 50 at the then lower end of the casing. In Fig. 1, the inverted position of the lantern with the guard 58 lowermost is illustrated and it will be appreciated that the lantern then may rest on the guard if this is desired or if the lantern is in its normal posi-

tion with the ends uppermost, the base 12 may be used to support the lantern on any surface.

On the lantern casing and at the upper end thereof as shown, an insulating plate 71 is secured by means of fastening pins 72, to leg portions 73 extending inwardly from flange 44 at the end of the casing. These pins also secure a plate ring 74 composed of metal, on the lower side of the insulating plate, and it follows that the ring is electrically connected to the casing. At its center, the insulating plate 71 has a metal washer 75 secured thereto by a metal pin 76 and above the insulating plate the pin has a larger portion 77 providing a support for an oscillatory insulating plate 78 mounted on the pin above the portion 77. Between the insulating plate and the larger portion 77 of the pin, a metal contacting arm 79 is secured to the insulating plate for movement therewith in an oscillatory manner. Above the insulating plate 78, a metal washer 80 is mounted on the pin and a takeup washer 81 on the pin above the washer and positively secured to the pin, normally maintains the parts on the pin in close relation while permitting oscillatory movement of the insulating plate 78.

As best shown by Fig. 3, the contact element 79 has a radially extending arm 83 which optionally is adapted to engage a contact 84 or a contact 85. The contact 84 forms part of a plate 86 secured to the insulating plate 71 at the margin thereof, and this plate, as best shown by Fig. 2, has a downwardly extending arm 87 normally urged by its own resiliency into engagement with the inner end of the terminal pin 31 in the lamp socket provided on the side wall of the casing. The contact 85 forms part of a plate 88 also secured to the insulating plate 71, and which has an inwardly extending contact arm 89 adapted to contact with the central terminal of the bulb 56. It will be appreciated that the outer termination of this bulb is in electrical contact with the reflector 47, and hence the casing.

For moving the contact element 79 and the arm 83 thereon from a neutral position as shown between the contacts 84 and 85, to either contact, an operating arm 90 is secured to the insulating plate 78 and extends to a point adjacent and slightly to the left of the handle 19 and the outer end of such arm terminates in a curved flange extending around the inner wall of the casing and which is secured to a button 91 having a shank portion 92 extending through the casing side wall. As best shown by Fig. 1, the shank portion of the button extends through a slot 55 having a central notch 93 for holding the button in a neutral position, and side notch portions 94 and 95 for holding the button in either of its operative positions. When the button is moved from its central position it will move the insulating plate 78 and hence the contact 83 into engagement with one of the contacts 84 and 85 depending upon the direction of movement of the button.

A dry cell battery 96 is provided within the casing and preferably this is a six volt battery having a central spring terminal 97 adapted to engage the inner end of pin 76 passing through insulating plate 71, and a side spring terminal 98 adapted to engage the plate ring 74. The lower end of the battery is resiliently supported on the spring bar 18 connected to the cover plate 11. It will be appreciated that the battery may be inserted without requiring it to be turned to a certain position because the annular ring 74 insures

contact with the terminal 98 of the battery at any point around the ring.

If the button 91 is moved counter-clockwise as seen in Fig. 3, contact 83 will engage contact 84 and this will complete a circuit through the battery from the central terminal thereof, through the contacts 83 and 84, through the central terminal of the bulb 30 and then through the bulb to the casing side wall, and from the casing side wall through the pins 72 to the plate 74 and then to the other terminal of the battery. If the button is moved in the opposite direction until contact 83 engages contact 85, an electrical circuit is completed from the battery through the central terminal thereof, through the contacts 83 and 85 to the central terminal of the bulb 56, then through the bulb to the reflector 47 and from the reflector to the side wall of the casing and then through the pins 72 and ring plate 74 to the other terminal of the battery.

While the six volt dry battery as a unit may be used as described, it may be advantageous to use an arrangement adapted to accommodate four separate dry cells and Figures 5, 6 and 7 relate to a construction which may be substituted for the six volt battery already described. Referring to these figures, a bracket support is provided, comprising upper and lower insulating plates 100 and 101 and a web plate 102 also composed of insulating material. At the left side of web 102 a metal angle plate 103 is secured to the web and the upper side of insulating plate 101 and as best shown by Fig. 5, this plate has an upwardly extending terminal 104. Vertically above the bracket plate 103 and sufficiently spaced therefrom to accommodate battery cells, a contact plate 104' is secured to the web 102 and this plate has a contact element 105 projecting away from the web and which is in vertical alignment with the projection 104. Another contact element 106 secured to the web adjacent contact 104' has separated contact points 107. A battery cell indicated at 108 is adapted to be disposed between the projection 104 and contact 105 with the central terminal at one end of the battery uppermost and engaging the contact 105 and with the opposite end of the cell engaging the projection 104. Another cell in inverted position is adapted to be disposed between the angle plate 103 and the contacts 107 and it will be understood that the central contact on the cell will be lowermost and engage the angle plate while the contact 107 will engage the opposite contacting end of the cell.

An angle plate 109 identical to plate 103, but oppositely disposed and secured to the upper insulating plate 100 and web at the opposite side of the latter has a projection 110 similar to projection 104 but which is at the diagonally opposite corner of the web 102. Contacts 111 and 112 identical to contact elements 104' and 107 but oppositely disposed and below the latter, are provided on the opposite side of the web 102 for supporting another pair of dry cells. A metal bar 113 connected to the contact plate 106 extends vertically along the web and through an opening in the upper insulating plate 100 and terminates in a resilient portion 114 adapted to engage the ring plate 74 in the lantern casing. A bar 115 connected by means of a second bar 116 to the contact 111 also extends along the web and through an opening in the upper insulating plate 100 and is adapted to engage the pin 76 in the lantern casing. The contacts 105 and 112 are in electrical contact through a fastening device 117 used to secure the plate 104 to the web 102. As

thus arranged with four dry cells in position the cells are connected in series, through the bars 115 and 116, the contact 111, through the dry cell supported by this contact, through the projection 110 on the upper angle plate 109, through this plate to the adjacent cell supported by contact 112, then through this contact and the fastening device 117 to the contact 105, then through the dry cell below this contact and through the lower angle plate 103 and then through this plate and through the cell above it, to contact 107 and bar 113. Thus the two bars 113 and 115 constitute terminals of four cells arranged in series, thus providing approximately six volts as mentioned previously. This assembly may be inserted in the lantern and used in the same manner as the single battery already described and is advantageous particularly in making replacements where, because of expense or possibly inconvenience, users might want individual cells.

The arrangement shown by Figs. 8, 9 and 10 is particularly adapted for use where the lantern is employed in mines or other places in which explosive gas is apt to collect. These constructions provide arrangements wherein the bulbs are sealed between the lens and inner wall portions so that gas or vapor is prevented from gaining ingress into and around the bulb. Also in these constructions, means are provided for breaking the electric circuit through either bulb in the event either lens becomes broken. This is advantageous because often times the heat of the bulb will cause an explosion and if the lens should break it is important that the circuit through the bulb be instantaneously broken.

The upper bulb is threaded into a slidable socket 120 which is slidable in a base 121 secured to the reflector 47 and such base has oppositely disposed slots 122 into which projections 123 on the socket slidably project. A spring 124 between the base 121 and socket 120 normally urges the bulb outwardly but it will be appreciated that the projections 123 will engage the rim of the reflector 47 and prevent complete removal of the socket. The bulb and socket 120 are normally maintained in the position shown by engagement of the bulb with the lens 50 and if this lens breaks, the spring 124 will instantly throw the socket and bulb outwardly. The central terminal of the bulb engages a terminal 126 which projects through an insulating plate 127 secured to the projections 73 at the upper end of the casing side wall and while a close fit is obtained between the terminal pin 126 and the opening in the insulating plate 127, the pin may be moved up and down therein upon turning of the bulb. This pin is adapted to engage the contact arm 89 previously described. The space around the bulb is efficiently sealed against ingress of gas or vapor by the reflector, lens and bulb mounting, and in the event the lens breaks the bulb is immediately thrown upwardly to break any electrical circuit therethrough. If found necessary, an annular flange may be used in place of projections 73, so that the insulating plate 127 will seal the space between it and reflectors 47.

In the front light, a base 130 similar to base 26 is provided which slidably receives a socket 131 for the bulb 30. Socket 131 has diametrically opposed projections 132 slidable in slots 133 in the base 130 but complete removal of the socket is prevented by a retaining ring 134 disposed in a groove around the outer edge of the base. A spring 135 normally urges the socket 131 outwardly. Owing to the fact that a direct beam of light

is desired and one which can be focused, it is preferred that the bulb 30 not engage the lens 38 but that it be adjustable in its socket and in order to accomplish this result and at the same time cause breaking of the circuit in case the lens 38 breaks, a sleeve 136 surrounds the base 130 and is slidable thereon and this sleeve has notches receiving the projections 132 on the slidable socket 131. At opposite sides of the bulb, the sleeve 136 has arms 138 which engage the lens as shown by Fig. 9 particularly. Now if the lens breaks, it is apparent that the spring will cause the circuit to be broken but that normally the lens through its engagement with the arms 138 will maintain the circuit completed.

It will be apparent that a lantern has been provided having facilities for obtaining a direct beam of light and also optional facilities for obtaining a soft, glowing light, and that the arrangement readily permits inverting of the lantern so that the soft glow light may be either at the top or bottom of the lantern casing. Moreover, the handling facilities are of such character that the lantern may be used as well in one position as in an inverted position. It is also apparent that an arrangement is provided which is particularly useful when the lantern is inverted and the soft glow light is at the bottom, as the open guard provides a support for the lantern in its inverted position while still allowing the soft glow light to light up space surrounding the guard and lantern. Additionally, an optional means is provided which permits use of dry cells in place of a single battery and under certain circumstances this may be preferable by the user of the lantern. Furthermore, the invention provides a safety lantern having the direct beam and soft glow features and inverting characteristics, in which the circuit to either bulb will be broken in the event the lens for that bulb becomes broken. Along this line it will be appreciated that each bulb is sealed to the outside so that gas or vapor may not gain ingress to the bulb and possibly explode by the heat thereof. Experiments have determined that the greatest danger in using electric lanterns or the like in mines or other places where gas is apt to collect is not from any spark that may occur but is from the heat of the bulb itself and for this reason it is particularly important that the circuit to the bulb be instantaneously broken upon breaking of the lens.

It will be appreciated that in the front light, focusing of the bulb in order to properly obtain a beam is advantageous and if the bulb directly engaged the lens, this usually would be difficult. In the construction illustrated, however, it is apparent that focusing of the bulb may be obtained properly while still obtaining an operative engagement with the lens to the end that if the latter becomes broken, the bulb will be quickly moved outwardly and the circuit therethrough broken.

It will also be appreciated that the lantern casing is of such character, that the upper and lower ends thereof may be opened quickly and that a battery may be readily inserted through the lower end.

Although more than one form of the invention has been illustrated and described in detail, it will be apparent to those skilled in the art that various modifications may be made without departing from the scope of the appended claims.

What I claim is:

1. An electric lantern comprising a casing, a lens or glass mounted on the casing, a bulb, sock-

et means movably mounted on the casing at the inner side of the lens for receiving the bulb, spring means acting to move the socket means, means for completing an electrical circuit through the bulb and socket means, means for breaking the circuit through the bulb and socket means upon breaking of the lens and including an element engaging the inner side of the lens and holding the socket means against movement, means for limiting movement of the socket means and bulb, and means for separately adjusting the bulb towards or from the lens without interrupting the circuit normally completed through the bulb when the element is in engagement with the lens.

2. An electric lantern comprising a casing, an insulating plate in the casing, battery contacts on one side of the plate and adapted to engage terminals of a battery in the casing, a pin extending through the plate and connected to one of said contacts, a second pin extending through the plate and connected to the other contact, means mounting the plate on the casing including one of the pins, a bulb contact mounted on the plate at the side thereof opposite the battery contacts and being insulated from the latter and from the pins, and a movable switch arm on the other of said pins and which is adapted to

engage the bulb contact upon movement of the arm, said bulb contact comprising a strip of metal fastened to the plate and having a portion in the path of movement of the arm and a resilient free end portion extending over the arm and which is adapted to engage the bulb.

3. An electric lantern comprising a casing, an insulating plate in the casing, battery contacts on one side of the plate and adapted to engage terminals of a battery in the casing, a pin extending through the plate and connected to one of said contacts, a second pin extending through the plate and connected to the other contact, means mounting the plate on the casing including one of the pins, a bulb contact mounted on the plate at the side thereof opposite the battery contacts and being insulated from the latter and from the pins, and a movable switch arm on the other of said pins and which is adapted to engage the bulb contact upon movement of the arm, said bulb contact comprising a strip of metal fastened to the plate and having a portion in the path of movement of the arm and having a resilient free end portion extending over the edge of the plate and beyond the opposite side thereof and which is adapted to engage the bulb.

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