

June 24, 1924.

1,499,059

C. H. KELSEA

ILLUMINATING APPARATUS

Filed Jan. 20, 1920

3 Sheets-Sheet 1

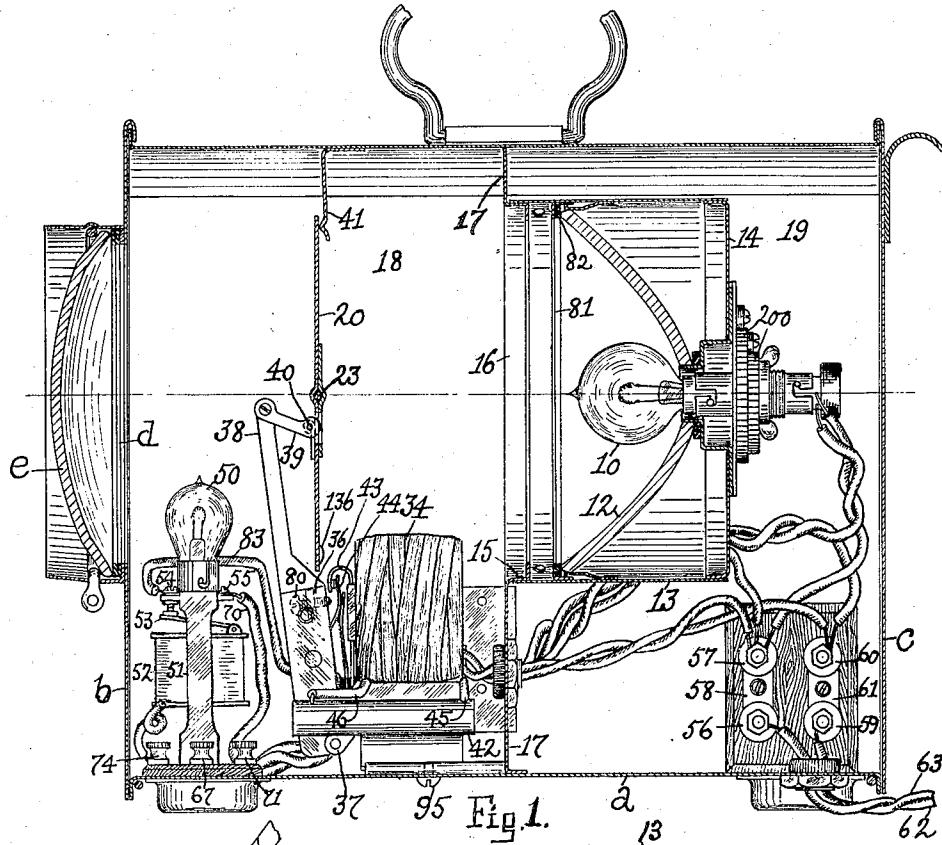


Fig. 1.

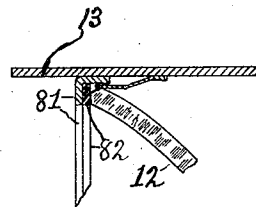


Fig. 4.

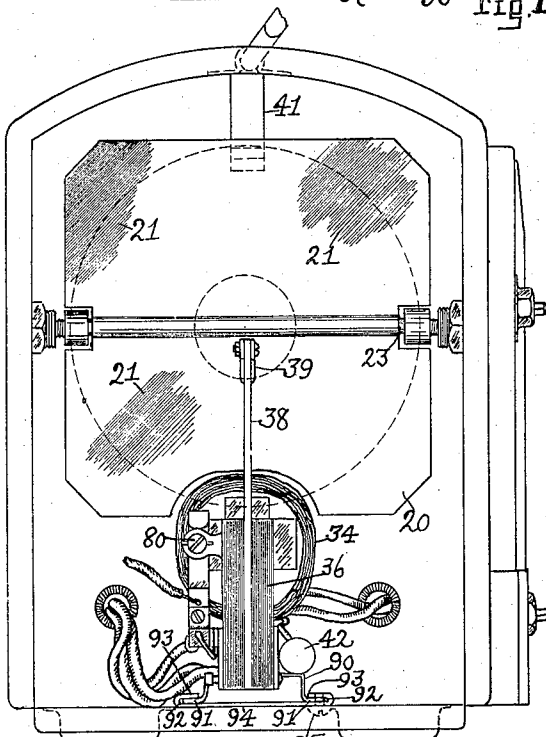
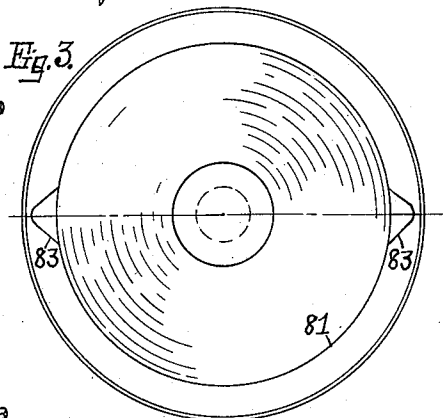


Fig. 2.

Fig. 3.



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3 Sheets-Sheet 2

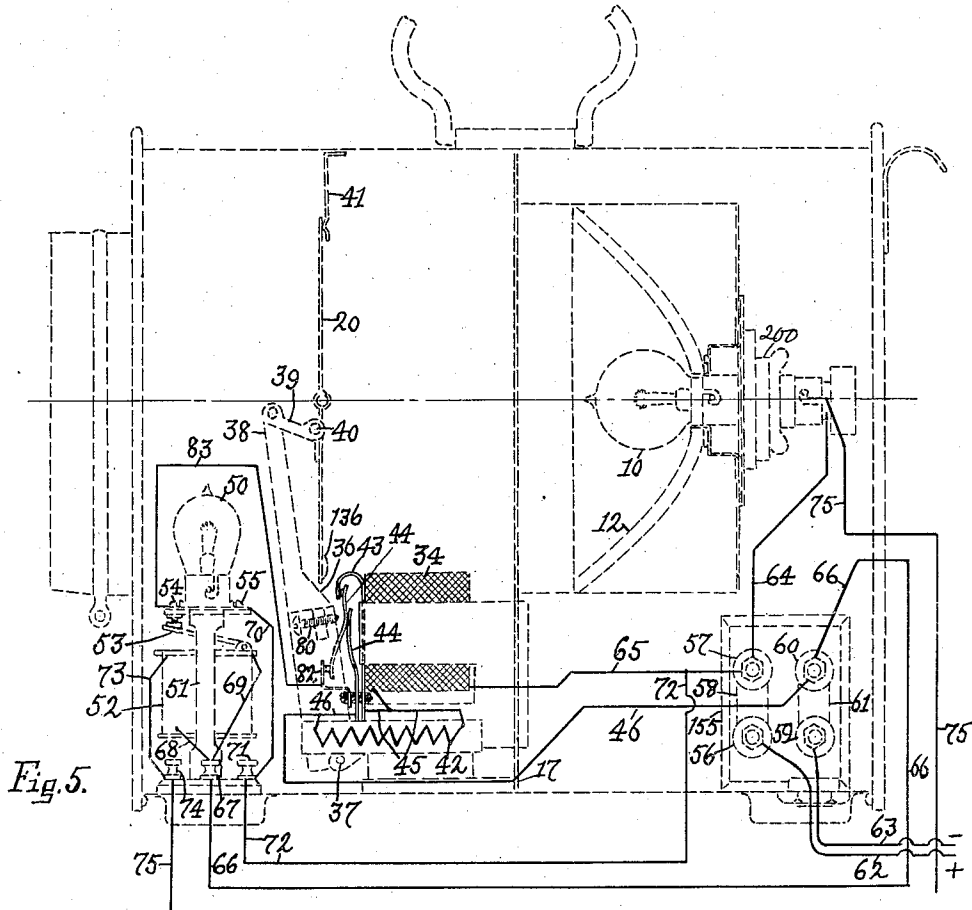


Fig. 5.

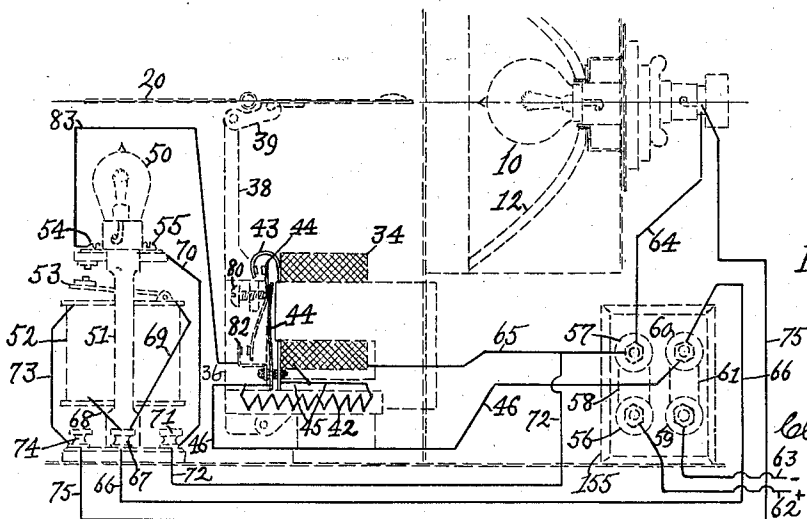


Fig. 6.

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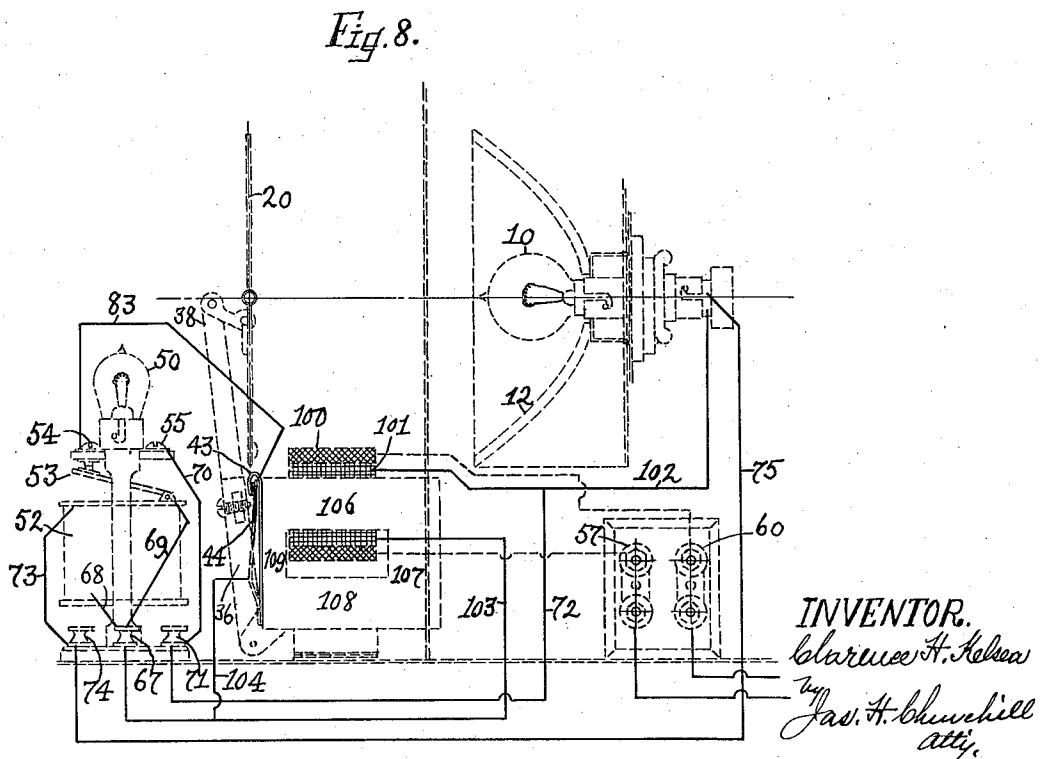
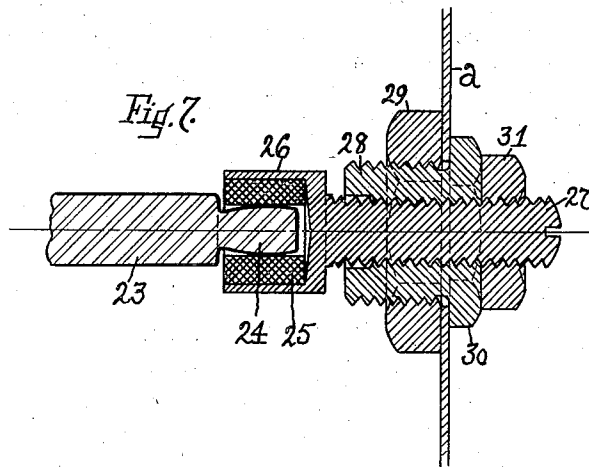
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ILLUMINATING APPARATUS

Filed Jan. 20, 1920

3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE.

CLARENCE H. KELSEA, OF BELMONT, MASSACHUSETTS, ASSIGNOR TO PETER GRAY & SONS, INC., OF CAMBRIDGE, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

ILLUMINATING APPARATUS.

Application filed January 20, 1920. Serial No. 352,675.

To all whom it may concern:

Be it known that I, CLARENCE H. KELSEA, a citizen of the United States, residing in Belmont, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Illuminating Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to illuminating apparatus and is herein shown as embodied in a lantern of that class in which rays of light from a source of light within the lantern are projected through a glass by a reflector within the lantern to give a signal.

Lanterns of this class are used on railways, bridges, and like places for signaling purposes, and are liable to give false signals by light from a source external to the lantern, which external light passes through the glass into the lantern and striking the reflector therein is reflected back through the glass, thereby giving false signals which are liable to cause accidents.

The present invention has for one of its objects to provide a lantern employing an electric lamp as the source of light, which is of superior construction as will be described.

The invention further has for its object to provide a signal lantern with means for preventing false signals, as will be described.

The invention also has for its object to provide an electrically illuminated lantern with a shutter which is capable of being moved with a minimum amount of current, and also with a lighting unit of novel construction as will be described.

Another object of the invention is to provide an electrically illuminated lantern with an auxiliary electric lamp which is normally inoperative while the main lamp is in use and which is automatically rendered operative if the main lamp or the shutter should become inoperative.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Fig. 1 is a longitudinal section of one form of lantern embodying this invention.

Fig. 2, a front elevation of the lantern shown in Fig. 1, with the front cover and the auxiliary lamp omitted.

Fig. 3, a front elevation of the main lighting unit shown in Fig. 1.

Fig. 4, a detail of the reflector support of the main lighting unit to be referred to.

Fig. 5, a diagrammatic view of the lantern shown in Fig. 1 in its unlighted condition, to enable the operation of the same to be clearly understood.

Fig. 6, a similar view showing the relation of parts when the lantern is lighted.

Fig. 7, an enlarged detail of the shutter bearing to be referred to, and

Fig. 8, a diagrammatic view of the lantern adapted for use with alternating current.

In the embodiment of the invention herein shown, *a* represents a metal casing or body for containing the operative parts of the lantern. The casing *a* is provided at its front and rear ends with removable covers *b*, *c*, the front cover *b* having an opening *d* with which cooperates a glass *e*, carried by said cover, and which may be colored or plain as desired.

The casing *a* contains within it a main lighting unit, which comprises essentially an electric lamp 10, a reflector 12 cooperating therewith, and a casing 13 for supporting said lamp and reflector.

The casing 13 is closed at its rear end by the head 14 and is open at its opposite end, which is detachably engaged with a flange 15 surrounding an opening 16 in a partition wall 17, secured in fixed relation to the walls of the main casing *a* and forming in the latter a front chamber 18 and a rear chamber 19.

The casing 13 is capable of being readily engaged with and disengaged from the flange 15 and may be locked to the latter if desired, in any suitable manner.

The opening 16 is in line with the opening *d* in the front cover *b*, so that under conditions of use, the light from the lamp 10 is projected through the glass *e*. To avoid false signals being given by light from an extraneous source, passing through the glass *e* and striking the reflector 12, and being projected back through the glass, a shutter 20 is located in the chamber 18 and is arranged to intercept the rays of light from the extraneous source and prevent them reaching the reflector 12. The shutter 20 is provided with a non-reflecting outer surface, which may be obtained by providing the

shutter with a coating of black paint represented by the lines 21 in Fig. 2.

The shutter 20 is fast on a shaft 23 preferably provided with journals 24 which are curved in the direction of their length, see Fig. 7, with the point of greatest diameter substantially midway of the length of the journal. Each journal 24 is supported by a cylindrical bearing 25 of anti-friction material, and located in a metal cup or housing 26, provided with a screw threaded stud 27 extended through and engaged with an internally threaded sleeve or bushing 28, which is extended through the wall of the casing *a* and is secured in fixed relation thereto by a nut 29 and head 30 of the sleeve 28. The housing 26 may be locked in its adjusted position with relation to the journal 24 by the nut 31 on the stud 27. The housing 26 may and preferably will be made of a diameter slightly less than the internal diameter of the nut 29, so that it may be removed from the casing with the bushing 28, without disturbing the adjustment of the stud 27 with relation to the bushing 28. A shutter provided with the journals and bearings just described, is capable of being moved with a minimum of power and with the least possible noise.

Provision is made for electrically operating the shutter 20 with the current which is supplied to the lamp 10, and in the present instance is shown an electromechanical unit which may be preferred, but to which it is not desired to limit the invention. The electromechanical unit herein shown consists of an electromagnet 34 included in the line circuit and in multiple with the lamp 10. The electromagnet 34 is provided with an armature 36 which is pivoted at 37.

The armature 36 is connected with the shutter 20 to turn it from a substantially vertical position shown in Fig. 5 into a substantially horizontal position represented in Fig. 6 and vice versa. In the present instance the armature 36 is provided with an arm or extension 38 which is joined by a link 39 to a pivot pin 40 carried by the shutter. The shutter 20 in its vertical position cooperates with a stop 41, see Fig. 1.

The connection between the armature 36 and the shutter 20 is such that when the armature is attracted by the coil 34 the shutter is moved from its vertical or closed position into its horizontal or open position and when the coil or winding 34 is deenergized, the armature 36 is moved back by gravity assisted by a counter weight 136 as herein shown and the shutter is turned from its open into its closed position. It will be observed that when the shutter is in its open or horizontal position, the lantern is in condition for operating normally to give the signal desired, and when the shutter is in its closed or vertical position the lantern is

rendered inoperative to give a signal either by the lamp 10 or a false signal by an extraneous source of light, such as sunlight or artificial light located outside of the lantern.

Provision may and preferably will be made for cutting down the current strength after the shutter has been moved into its open position, and to this end a resistance 42 is included in circuit with the coil or winding 34, and said resistance is short circuited by a switch or circuit controller which is normally closed and which is adapted to be opened by the armature 36 to include the resistance in series with the coil or winding 34. The short circuiting switch herein shown comprises a stationary member 43 and a movable member 44. The stationary member 43 has connected with it, see Figs. 5 and 6, one end 45 of the coil or winding 34, and the movable member 44 has connected with it a wire 46, with which is connected one end of the resistance 42, whose other end is connected with the end 45 of the coil or winding 34.

It will thus be seen that when the switch 43, 44 is closed as shown in Fig. 5, current flowing through the coil 34 passes through the switch members 43, 44 and by the resistance 42, but when the switch is opened as shown in Fig. 6, the current flowing through the coil 34 passes through the resistance 42. As a result, a relatively strong current is available for moving the armature 36 and the shutter into their operative positions, and thereafter a relatively weaker current is employed to hold the shutter in its open position.

Provision may and preferably will be made for insuring the operativeness of the lantern for normal signaling purposes in case the electric lamp 10 should become burnt out. To this end an auxiliary electric lamp 50 is located in the chamber 18 in front of the shutter 20 in its vertical position, so that its rays of light illuminate the glass *e*.

The lamp 50 is represented as mounted on a vertical standard 51 supported by the casing *a*, and provision is made for cutting out the auxiliary lamp 50 while the main lamp 10 is in condition for use, and for automatically bringing it into service when the main lamp is burnt out. To this end, a circuit controller or switch is included in circuit with the auxiliary lamp 50, which latter is connected directly with the main line, as will be described, and the circuit of the auxiliary lamp is open as long as the main lamp 10 is in use. To open the circuit of the auxiliary lamp 50 a relay 52 is provided which is represented as carried by the standard 51 and has its armature 53 constitute the movable member of the switch, the co-operating member of which is represented as a screw 54, to which one terminal of the

lamp 50 is connected, the other terminal of the lamp 50 being represented by the screw 55.

The relay 52 is included in series circuit with lamp 10, and is energized when the lamp 10 is lighted, and when energized attracts its armature 53 and opens the circuit of the auxiliary lamp, thereby cutting the latter out of circuit as long as the main lamp 10 is in service. If, however, the main lamp 10 should be burnt out, or the circuit for the main lamp otherwise opened, the relay 52 becomes deenergized, which allows its armature 53 to close the circuit of the auxiliary lamp 50. The casing *a* contains within the chamber 19 a terminal block or base 155 provided with binding posts 56, 57 connected by a junction strip 58 and binding posts 59, 60 connected by a junction strip 61. The binding posts 56, 57 are connected with one line wire 62 and the binding posts 59, 60 with the other line wire 63. The binding post 57 has connected to it a wire 64 leading to one terminal of the main lamp 10 and a wire 65 leading to the coil or winding 34. The binding post 60 has connected with it the wire 46 leading to the switch member 44 and also a wire 66 leading to a binding post 67 of the relay 52. The binding post 67 is connected by wire 68 to one end of the relay coil 52 and by wire 69 to the relay armature or switch member 53. The lamp terminal 55 is connected by wire 70 to a second binding post 71 which is connected by wire 72 with the wire 65 leading from the binding post 57. The relay coil 52 has its other end connected by wire 73 with a third binding post 74, which is connected by wire 75 with the second terminal of the main lamp 10.

When current is not supplied to the lantern, the parts are in the position represented in Fig. 5, and it will be seen that the main lamp 10 and the winding or coil 34 are included in circuit with the line wires 62, 63, which are open at some suitable control switch, not herein shown. It follows that when the line 62, 63 is closed at the control switch, current will be supplied to the main lamp 10 and to the winding or coil 34. The circuit to the lamp 10 may be traced as follows:—from the positive line wire 62 to binding post 56, thence by strip 58 to binding post 57, thence by wire 64 to lamp 10, thence by wire 75 to binding post 74, thence through the relay 52 to binding post 67, thence by wire 66 to negative binding post 60, strip 61 and binding post 59 to negative line wire 63. As soon as this circuit is completed, the lamp 10 is lighted and the relay 52 is energized, which attracts its armature 53 and opens the circuit of the auxiliary lamp 50. The circuit through the winding or coil 34 may be traced as follows:—from the positive binding post 57 by wire 65 to coil 34, thence by wire 45 to switch members

43, 44, thence by wire 46 to negative binding post 60. The coil 34 being energized attracts its armature 36 and effects movement of the shutter 20 from its closed or vertical position into its open or horizontal position, and at the same time, a device which is herein shown as a screw 80 carried by the armature 36 engages the movable member 44 of the switch and moves it out of contact with the switch member 43, thereby opening the short circuit across the resistance 42 and including the latter in series with the coil 34, as shown in Fig. 6, so that the current flowing through the coil 34 now passes through the resistance and is cut down thereby.

If the main lamp 10 should be burnt out or its circuit otherwise opened so as to render the lamp inoperative, the relay 52 is thereby deenergized and the circuit of the auxiliary lamp 50 automatically established. The circuit of the lamp 50 is shown closed in Fig. 5 and may be traced as follows:—from the positive binding post 57 by wires 65, 72, to binding post 71, thence by wire 70, terminal 55, lamp 50, terminal 54, armature 53, and wire 69 to binding post 67, thence by wire 66 to negative binding post 60.

Provision may and preferably will be made for lighting the auxiliary lamp 50, in case the circuit of the main lamp 10 is complete and the shutter 20 should fail to be moved into its open position, either by failure of the magnet circuit or by the shutter being held mechanically in its closed position. To this end, the movable member 44 of the switch opened by the armature 36 and controlling the resistance 42, cooperates with a terminal 82 to form a second circuit controller for the auxiliary lamp 50, the terminal 82 being connected by wire 83 with the terminal 54 of the lamp 50. The circuit controller formed by the member 44 and terminal 82 is normally closed when the armature 36 is unattracted as shown in Fig. 5 and is opened when the said armature is attracted by the magnet 34. If therefore the armature 36 should fail to be moved into its attracted position, the circuit through the auxiliary lamp 50 would be closed between the member 44 and terminal 82 and the auxiliary lamp would be lighted to give the signal with the shutter in its closed position. The circuit of the auxiliary lamp 50 under these conditions may be traced in Fig. 5 as follows:—from the terminal 57 by wires 65, 72, binding post 71, wire 70, to lamp terminal 55, thence through the lamp 50 to terminal 54, thence by wire 83, switch terminal 82, switch member 44 and line 46 to negative terminal 60.

The main lighting unit is capable of being removed from the chamber 19, and is constructed to enable the reflector 12 to be removed through the front open end of the casing, so that the latter may be provided

with the fixed head 14 carrying the device 200 for adjusting the focus of the lamp. To this end, the lamp casing 13 is provided at its front end with an inwardly extended annular flange 81 whose internal diameter is slightly less than the diameter of the front end of the reflector 12, so that the latter may bear against the flange 81 or preferably against a cushioning washer 82 on the inner side of the said flange, see Fig. 4.

The flange 81 is provided with substantially diametrically opposite slots or openings 83, see Fig. 3, which enlarge the internal diameter of the flange 81 beyond the diameter of the reflector, so that after removing the lamp 10 and partially removing the focus adjusting device 200, the reflector can be tilted or turned so as to be passed out of the casing 13 through the slots 83 in the flange 81. The focus adjusting device 200 is not herein claimed as it forms the subject matter of U. S. Patent No. 1,304,560 dated May 27, 1919, to which reference may be had.

Provision is made for mounting the shutter operating magnet in the chamber 18 so as to enable the shutter to assume a horizontal position when open and a vertical position when closed. To this end, the shutter operating magnet 34 is mounted on a carrier 90, see Fig. 2, preferably of sheet metal and provided with side flanges 91 which slide in guideways 92 formed by bent over flanges 93 of a plate 94 which is suitably fastened to the bottom of the chamber 18. The resistance 42 and the switch members 43, 44 are also attached to the carrier 90 so as to move therewith as a unit, and the carrier may be slid back and forth in the guideways 92 to properly position the armature 36 with relation to the shutter 20 so as to ensure that the shutter will assume a vertical position when closed. The carrier 90 may be secured in its adjusted position by the set screw 95.

A lantern having the electromechanical unit above described is designed to be used with a direct current, but it is not desired to limit the invention in this respect as it may be used with an alternating current by providing the lantern with an electromechanical unit responsive to alternating current. Such a unit is represented in Fig. 8 and comprises a transformer having a primary winding 100 connected with the line terminals 57, 60, and having its secondary winding 101 connected with the main lamp 10, relay 52 and auxiliary lamp 50.

As shown in Fig. 8, the secondary winding 101 is connected by wire 102 with one terminal of the lamp 10, whose other terminal is connected by wire 75 with the binding post 74 of relay 52. The other end of the secondary winding 101 is connected by wire 103 with the binding post 67 of relay 52 and

the binding post 71 is connected by wire 72 with wire 102. The relay 52 and auxiliary lamp 50 are thus included in circuit with the secondary winding 101. The circuit through the relay 52 may be traced as follows:—from the secondary winding 101 by wire 102, to lamp 10, thence by wire 75 to binding post 74, thence by wire 73, relay 52, wire 68, post 67, and wire 103 to secondary winding 101. The circuit through the auxiliary lamp 50 may be traced as follows:—from secondary winding 101 by wires 102, 72 to binding post 71, thence by wire 70, terminal 55, through lamp 50, terminal 54, armature 53, wire 69, post 67 and wire 103 back to winding 101. As soon as relay 52 is energized, the circuit of the auxiliary lamp 50 is opened by the attraction of the armature, but in case the lamp 10 burns out, the relay 52 is de-energized and the circuit of the auxiliary lamp is established. The auxiliary lamp 50 is controlled by the switch 43, 44, the member 43 being connected by wire 83 with the terminal 54, and the member 44 being connected by wire 104 with wire 103, so that in case the shutter 20 fails to be moved into its open position, the circuit of the auxiliary lamp 50 is closed and the lamp lighted irrespective of the condition of the main lamp 10. This circuit of the auxiliary lamp 50 may be traced as follows:—from secondary winding 101 by wires 102, 72 to post 71, thence by wire 70, terminal 55, lamp 50, terminal 54, wire 83, switch members 43, 44 and wires 104, 103 to secondary winding 101. When the transformer unit is used, it is preferred to provide the same with a closed magnetic circuit comprising the legs 106, 107, 108, 109, and to make the latter of a cross sectional area which is substantially one half of that of any one of the other three legs, and to make the armature 36 of a cross sectional area substantially equal to that of the leg 109 with which it cooperates, so that, when the armature or keeper 36 is attracted, the cross sectional areas of the armature and leg 109 are substantially equal to the cross sectional area of either of the other legs of the magnetic circuit.

As a result of this construction, a practically noiseless mechanism for operating the shutter is obtained, inasmuch as the leg 109 acts to bypass a portion of the magnetic flux and allows only a limited portion of the flux to be used in attracting the keeper or armature 36. By thus bypassing a portion of the magnetic flux and using only a portion thereof for attracting the armature, danger of injuring the apparatus is avoided.

Claims:

1. In an illuminating apparatus, in combination, a casing, a reflector and an electric lamp within it, a glass in front of said reflector and spaced therefrom, a non-reflecting shutter, and electro-mechanical means

for moving said shutter to cover said reflector when said lamp is extinguished to prevent light from an extraneous source passing to the reflector and back again to give a false light and to uncover said reflector when said lamp is lighted.

2. In an illuminating apparatus, in combination, a casing provided with an opening and with a glass co-operating with said opening, an electric light therein, a reflector in said casing in line with said glass and cooperating with said light, a shutter located in said casing between said glass and reflector and co-operating with the latter and movable into a closed position to intercept rays of light from the reflector and into an open position to permit rays of light to be projected by the reflector out of said casing, a transformer provided with a movable keeper operatively connected with said shutter and having its secondary winding in circuit with said lamp.

3. In an illuminating apparatus, in combination, a main casing provided with a partition wall forming within said main casing a front chamber and a rear chamber, and having an opening connecting said chambers, a lighting unit supported by said partition wall and comprising a supplemental casing having an opening which co-operates with the opening in said partition wall and containing an electric lamp and a reflector co-operating with said lamp to project rays of light through the opening in said partition wall, a shutter located in said front chamber and normally opposing the opening in the partition wall, and an electrical unit in said front chamber to operate said shutter and move it into a position to permit rays of light from the reflector to pass by the shutter.

4. In an illuminating apparatus, in combination, a casing, a reflector and an electric light located in said casing, a pivoted shutter located in front of said reflector, an electromagnet having its armature operatively connected with said shutter, a carrier for said electromagnet adjustably mounted in said casing to ensure said shutter being properly positioned with respect to said reflector to intercept the light therefrom when said electromagnet is deenergized.

5. In an illuminating apparatus, in combination, a casing open at one end and pro-

vided with an internal annular flange having substantially diametrically opposite slots, an electric lamp within said casing, and a reflector co-operating with said lamp and with said flange and insertable into and removable from said casing through the slots in said flange.

6. In an illuminating apparatus, in combination, a casing provided with an internal flange having substantially diametrically opposite slots, a lamp carried by said casing, and a reflector located in said casing to co-operate with said lamp and removable from the casing through the slots in said flange.

7. In an illuminating apparatus, in combination, a casing, a reflector and a main electric light located in said casing, a shutter cooperating with said reflector and movable into a closed position to intercept the rays of light projected by said reflector and into an open position to permit said rays of light to be projected out of the casing, an auxiliary electric light located in front of the shutter in the closed position of the latter, and means for controlling said auxiliary light to render it inoperative while the shutter is in its open position and to permit it to operate with the shutter in its closed position.

8. In an illuminating apparatus, in combination, a casing, a reflector and a main electric light located in said casing, an auxiliary electric light located in said casing, a shutter co-operating with the main electric light, and an electromechanical unit for operating said shutter and for controlling said auxiliary light to light the auxiliary light in case the shutter fails to operate.

9. In an illuminating apparatus, a lens, a reflector and a main electric lamp located in the rear of the lens, a shutter normally in closed position located between the reflector and the lens, an auxiliary electric lamp located between the shutter and the lens, electric means for moving the shutter to open position, circuits for said lamps and said means simultaneously effective to energize said lamps and said means and means whereby the circuit of the auxiliary lamp is opened by the operation of the first means to move the shutter to open position.

In testimony whereof, I have signed my name to this specification.

CLARENCE H. KELSEA.