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ILLUMINATING DEVICE

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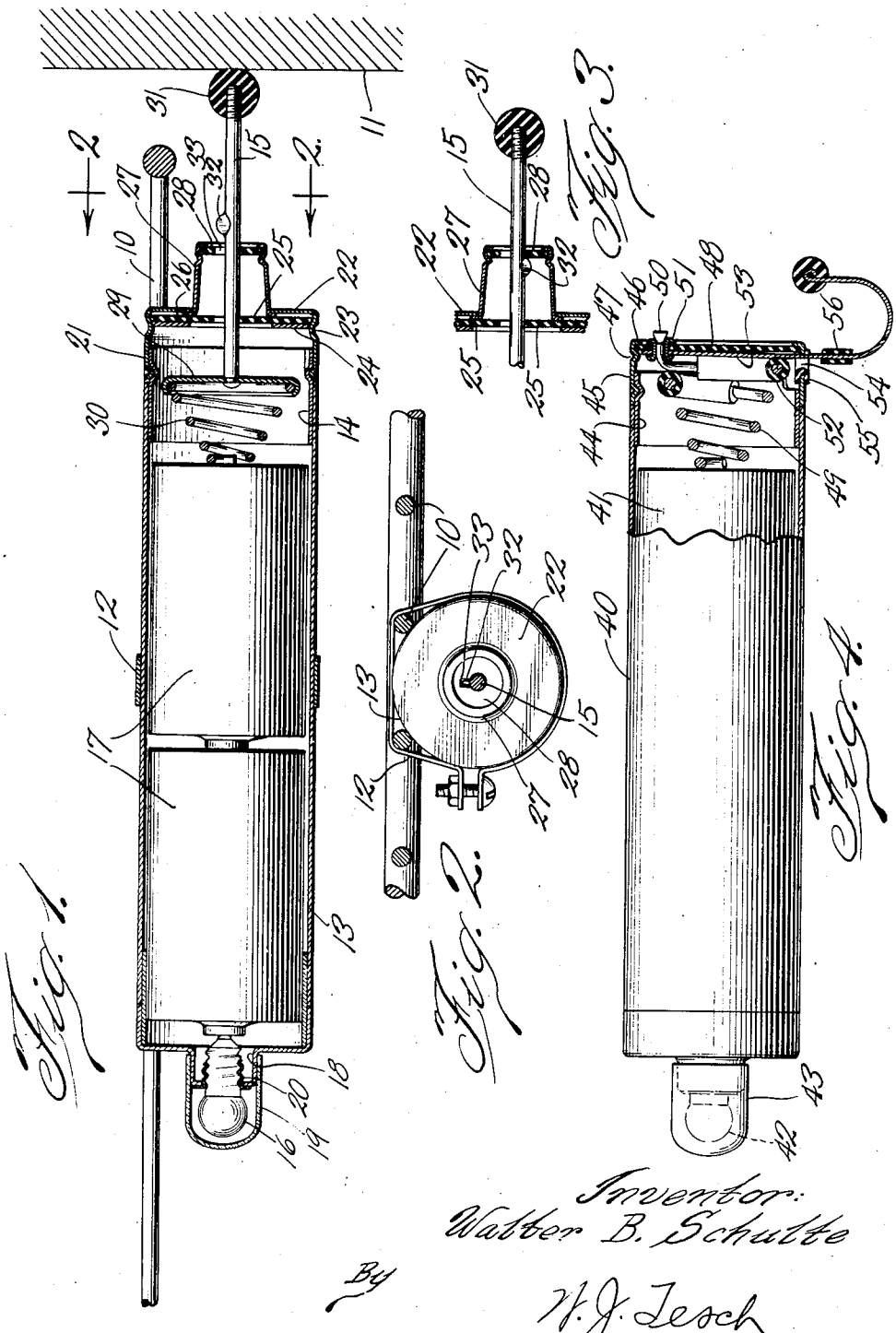


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

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ILLUMINATING DEVICE

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13 Claims. (Cl. 240—4)

This invention relates to an illuminating device for enclosures, and particularly enclosures having doors, in which the device is adapted to be rendered operative or inoperative automatically upon the opening and closing of the door respectively. It is particularly adapted for use in refrigerators but it is not restricted to this use and may be used in any enclosure such as clothes chests, closets, etc., in which it is desired to illuminate the interior upon the opening of the door or other closure.

It is the object of this invention to provide an improved self contained illuminating device of the character mentioned which has the following advantages: does not require an external source of energy, occupies unused or seldom used space, may be placed at substantially any desired position, illuminates substantially the entire interior thereof, and may be locked in the inoperative position when this is desired.

Briefly, the invention provides a dry battery operated electric illuminating device which is adapted to be supported substantially in any desired position upon the shelves of a refrigerator and which has an operating member projecting therefrom which is adapted to be engaged by the door of the refrigerator and operated by the opening and closing of the door in such a manner as to turn the lamp on and off, respectively. Means are provided for locking the operating member in the inoperative position.

In the drawing:

Fig. 1 is a longitudinal sectional view of the illuminating device as it appears when it is in the inoperative position;

Fig. 2 is a view along line 2—2 of Fig. 1;

Fig. 3 is a longitudinal sectional view of a portion of the device when the same is locked in the inoperative position; and

Fig. 4 is a longitudinal sectional view of a modification of the illuminating device of Fig. 1.

In Figs. 1 and 2 the illuminating device is shown mounted upon the usual metal rod shelf members 10 of a refrigerator and held in the inoperative position by the door 11 of the refrigerator. The illuminating device usually is mounted upon the under side of the top-most shelf, but it may be mounted on any shelf as desired. It is held in place by a metal clamp 12 which encircles the casing 13 of the device and passes over the rods 10 of the shelf and clamps the device and the rods together. A reciprocating plunger-type operating member 15 projects exteriorly from the forward end of the device and the latter is arranged in such a position that the plunger is adapted to be moved into the operative and inoperative positions by the opening and the closing respectively of door 11. The lamp 16 projects exteriorly from the rearward end of the device and is adapted to illuminate the entire interior of the refrigerator while at the same time being shielded from the eyes of the user.

As shown in Figs. 1 and 2, the casing 13 is of tubular shape and is adapted to receive two dry cells 17, of the ordinary flashlight type, in end-to-end relation. The dry cells have the usual cylindrical jackets of insulating material thereon, whereby they are electrically insulated from the casing 13.

The rearward portion 18 of the casing 13 is reduced to form a seat for holding by friction a translucent globe 19 which encloses the incandescent lamp 16. Globe 19 is prefereably of non-shatterable material, such as cellulose acetate, and it protects the lamp 16 and diffuses the light. In addition, should the lamp become broken, the globe will prevent the fragments of glass from dropping into the food in the refrigerator, or the clothes in the chest. The lamp socket 20 is mounted in an opening in reduced end portion 18 and the lamp is held in threaded engagement in the socket, and has its end terminal in continuous electrical connection with the positive terminal of the battery.

The forward end of casing 13 is open and has an open-ended sleeve-form member 14 fitted interiorly thereof and fixed thereto. An end cap 21 closes the casing and is held in removable engagement with the sleeve member by means of cooperating grooves and projections, as shown, which form what is known as a bayonet joint. The end cap, likewise, is open at both ends thereof, the forward end being provided with an inturned flange 22. An inwardly extending circumferential bead 23 is provided in the end cap at a short space from the said forward end thereof. Several parts are held in position within the end cap between flange 22 and bead 23, these parts comprising an annular metal ring 24, a disc 25 of electrical insulating material which rests against metal ring 24, and the outwardly extending flange 26 of a dome member 27, the flange 26 being held between disc 25 and flange 22 of the end cap. The dome member 27 is in the shape of a truncated cone and has a disc of insulating material 28 mounted so as to close the outer end thereof.

Insulating discs 25 and 28 have aligned open-

ings therein through which the rod-shaped operating plunger 15 extends. A metal plate or disc 29 is mounted in rotatable relation upon the inner end of plunger 15. A helical spring 30 is mounted on the rearward side of plate 29, the edge portion of the plate being turned so as to form a means for holding the end turn of the spring. The spring is maintained under compression between said plate 29 and the forward end of the battery, and is in continuous electrical connection with the negative terminal of the battery. A bumper member 31 of relatively soft non-conductive material, such as wood, or rubber, is fastened upon the exposed end of plunger 15 to engage the door 11 of the refrigerator. Member 31 prevents the lamp circuit from being closed between the plunger 15 and the casing 13 by any metal walls and shelves of the refrigerator itself. A cam member 32 is formed in the plunger 15 and is adapted to cooperate with a slot 33 in disc 28 for the purpose of locking the plunger in the inoperative position.

The metal ring 24 is in continuous electrical connection with the metal casing 13 and constitutes the stationary switch member of the device. The plate 29 constitutes the movable switch member and the lamp is rendered operative and inoperative by the longitudinal reciprocation of the plunger 15, whereby the plate 29 is moved into and out of contact with the metal ring 24. The inoperative position is shown in Fig. 1 in which the refrigerator door 11 is indicated to be in the closed position where it engages the end of the plunger and holds the latter in the inoperative position against the compression of spring member 30. When the door 11 is opened it is moved forwardly by spring member 30 until metal plate 29 engages metal ring 24 to render the lamp operative. In this position, the circuit is completed as follows: starting with the threaded terminal of the lamp it extends through the lamp socket 20, the casing 13, sleeve member 14, end cap 21, metal ring 24, metal plate 29, spring member 30 and the battery to the end terminal of the lamp.

When it is desired to lock the device in the inoperative position, plunger 15 is moved rearwardly until cam 32 has passed through the slot 33 in the forward insulating disc 28 of dome member 27, and the plunger is then given a rotary motion sufficient to bring cam 32 and the slot 33 out of register with each other, as shown in Fig. 3, and the plunger is then released. The cam 32 engages the rearward surface of the insulating disc 28 and holds the plunger and the movable switch member 29 in the inoperative position. When it is desired to render the device operative again, the plunger is rotated to a position in which cam 32 is in register with the slot 33 and the plunger is allowed to move forwardly under the pressure exerted by spring member 30. The device is located with respect to the door 11 so that in the normal operation thereof, the plunger does not move far enough rearwardly for cam 32 to pass through the slot 33, and the entire reciprocal motion of the cam takes place forwardly of the disc 28.

The modification shown in Fig. 4 is, in general, similar to that shown in Figs. 1, 2 and 3, but has a modified form of switch. It comprises an open-ended tubular casing 40 which is adapted to be fastened to the refrigerator shelf members in the same manner as described heretofore in connection with Figs. 1, 2 and 3. The casing contains dry cells 41 and has an incandescent lamp 42 and a protecting globe 43 mounted at the rearward end thereof.

The open forward end of casing 40 has a sleeve member 44 fixed therein and projecting beyond the end of the casing. The end cap 34, which is also a sleeve-form member open at both ends, fits over the end of sleeve-form member 44 in the same manner as described in connection with Figs. 1, 2 and 3. The outer end of the end cap has an in-turned flange 46 therein. Spaced inwardly from flange 46 is an inwardly extending circumferential bead 47. A closure disc of insulating material 48 is held in place between flange 46 and bead 47. A helical spring 49 is maintained under compression between the interior surface of the closure disc 48 and the end of the battery. The outer end portion 50 of the spring 49 is turned in a longitudinal direction and passes through a metal grommet 51 which is located in an opening in the closure disc. The projecting end of the spring is enlarged by being flattened as shown to anchor the spring to the closure disc. The largest turn of the spring is enclosed in a covering of insulating material 52 to prevent electrical contact between the spring and the casing if the spring should pivot within grommet 51 and swing into engagement with the casing.

The switch comprises an elongated member 53 of spring metal, which may be wire or strip-shaped. The member 53 is fastened to grommet 51 by having its inner end portion encircle the grommet. It passes laterally between the outer turn of the helical spring 49 and closure disc 48 and through coinciding openings in the sides of the sleeve 44 and the end cap 45. The member 53 then turns back upon itself forwardly to form a U-shaped outer end portion. The opening 54 of the end cap is smaller than that of the sleeve member and the rearward and lateral side edges of the opening 54 are covered with a fitted channel-shaped member 55 of electrical insulating material. A collar member 56 of insulating material fits upon the outer portion of the spring switch member 53 with a frictional sliding fit, and is of a size adapted to fit into the opening 54.

Normally, the helical spring 49 presses the switch member 53 against the non-insulated forward edge of opening 54 to close the circuit and energize the lamp 42. The circuit is completed as follows: Starting with the threaded terminal of the lamp it extends through the lamp socket, casing 40, sleeve 44, end cap 45, switch member 53, helical spring 49, dry cells 41 and the base terminal of lamp 42.

The circuit is opened when the switch member 53 is moved rearwardly out of contact with the forward edge of opening 54. The device is arranged in the refrigerator with the exposed end of the switch member 53 in cooperative relation with the refrigerator door, whereby the switch member is moved rearwardly to the inoperative position by the closing of the door, and is moved forwardly to the operative position by spring 49 when the door is opened, in a manner similar to that described in connection with the construction of Fig. 1. When it is desired to lock the switch in the inoperative position, switch member 53 is moved rearwardly so that it occupies a substantially central position in opening 54 and collar member 56 is moved along the switch member and into the opening 54 where it holds the switch member out of contact with the non-insulated edge of the opening. To release

the switch from the locked position, the collar 56 is moved manually out of opening 54.

In both forms of the illuminating device the battery and the lamp may be replaced when they become exhausted. For this purpose, the casing is readily removed by loosening the clamp which fastens it to the refrigerator shelf.

The terms "inward", "outward", "forward", "rearward" and similar terms are used herein in a relative sense for the purpose of simplifying the description and are not intended as limitations.

Certain features herein shown and described are described and/or claimed in my co-pending application, Serial No. 380,589, filed July 10, 1936, and in the co-pending application of Claude Vincent Yates and Elbridge Gerry Bates, Serial No. 127,090, filed February 23, 1937.

I claim:

1. An illuminating device for refrigerators and the like comprising an elongated casing, a battery in said casing, an incandescent lamp mounted adjacent one end of said casing, a switch mounted at the opposite end of said casing, said switch comprising cooperating stationary and movable switch members and a switch operating member, said operating member projecting exteriorly of said casing, and a conductive spring member in said casing, said spring member being under compression between said battery and said movable switch member for conducting electric current therebetween and for constantly urging said battery toward said lamp and said movable witch member and said operating member toward the operative position thereof.

2. An illuminating device for refrigerators and the like comprising a casing, means for clamping said casing to a shelf of said refrigerator, a battery in said casing, an incandescent lamp mounted exteriorly upon one end of said casing, the other end of said casing being open, an end cap fitting removably on said open end of said casing, a switch mounted in said end cap, said switch comprising a stationary member, a movable member and a reciprocable plunger extending through said end cap and having an end thereof projecting exteriorly of said end cap, said movable switch member being mounted on the inner end of said plunger and a conductive spring member under compression between said movable switch member and said battery for conducting electric current therebetween and for constantly urging said movable member toward the operative position and said battery toward said closed end of said casing.

3. The illuminating device of claim 2 in which the spring member is mounted on the movable switch member and extends toward the battery.

4. An illuminating device for refrigerators and the like comprising a casing having one end thereof open, means for clamping said casing upon a shelf of said refrigerator, an incandescent lamp mounted exteriorly upon the closed end of said casing, a translucent protective globe mounted over the bulb of said lamp, a battery in said casing, an end cap fitting removably on said open end of said casing, a switch mounted in said end cap, said switch comprising cooperating stationary and movable members, and a reciprocable plunger extending through said end cap and having an end thereof projecting exteriorly of said end cap, said movable switch member being mounted upon the inner end of said plunger, a spring member under compression between said movable switch member and said battery and constantly urging said movable switch member toward the operative position and said battery toward the closed end of said casing, and means on said plunger for engaging said end cap and locking said plunger in the inoperative position thereof.

5. An illuminating device for refrigerators and the like comprising a tubular casing having one end thereof open, means for clamping said casing on a shelf of said refrigerator, an incandescent lamp mounted exteriorly upon the closed end of said casing, a battery in said casing, an end cap for said casing, a plurality of insulating discs mounted in said end cap, said insulating discs being spaced apart in a direction longitudinal of said casing and having aligned openings therein, a reciprocable plunger mounted slidably in said aligned openings and having an end thereof projecting exteriorly of said end cap, a movable switch member mounted upon the inner portion of said plunger, a spring member under compression between said plunger and said battery and constantly urging said plunger and movable switch member toward the operative position thereof, and means on said plunger for engaging at least one of said insulating discs for locking said plunger and movable switch member in the inoperative position thereof.

6. An illuminating device for refrigerators and the like comprising a casing of electrically conductive material, said casing having an opening adjacent one end thereof, a battery in said casing and electrically insulated therefrom, an incandescent lamp mounted upon said casing and having one terminal thereof in electrical connection with said casing and the second terminal thereof in electrical connection with one terminal of said battery, means for rendering said lamp operative and inoperative comprising an electrically conductive member mounted in said casing and being electrically insulated therefrom and electrically connected to the second terminal of said battery, said conductive member passing through said opening in said casing and having an end portion projecting exteriorly of said casing, said projecting end of said conductive member being movable laterally with respect to itself from an operative position in which it engages the edge of said opening of said casing to an inoperative position in which it is out of engagement with the edge of said opening, and means for constantly urging said conductive member toward said operative position.

7. An illuminating device for refrigerators and the like comprising a casing of electrically conductive material said casing having an opening in a side thereof, a battery in said casing and electrically insulated therefrom, an incandescent lamp mounted upon said casing and having one terminal thereof in electrical connection with said casing and the second terminal thereof in electrical connection with one terminal of said battery, a spring member of electrically conductive material under compression between the other terminal of said battery and an end of said casing and being insulated from said casing, means for rendering said lamp operative and inoperative comprising an electrically conductive elongated member having a portion extending transversely of said casing and through said opening in the side of said casing, said conductive member being in electrical connection with said spring member and being constantly urged by said spring member into engagement with the edge of said opening, said member being adapted to be moved out of engagement with the edge of said

opening against the pressure of said spring member.

8. An illuminating device for refrigerators and the like comprising an electrically conductive casing, a battery in said casing and electrically insulated therefrom, an incandescent lamp projecting exteriorly at one end of said casing, said lamp having one terminal thereof in electrical connection with said casing and the second terminal thereof in electrical connection with one terminal of said battery, an end cap for the end of said casing opposite said lamp, said end cap having an opening therein, means for rendering said lamp operative and inoperative comprising an elongated electrical conductive member mounted in said end cap and electrically insulated therefrom, said conductive member extending through said opening in said end cap and projecting exteriorly thereof, and a spring member in compression between said battery and said conductive member and electrically connecting the second terminal of said battery with said conductive member, said conductive member being adapted to be moved laterally of itself from an operative position in which it is in contact with the edge of said opening to an inoperative position in which it is out of engagement with the edge of said opening, said spring member constantly urging said conductive member toward said operative position, and means for locking said conductive member in said inoperative position.

9. An illuminating device for refrigerators and the like comprising a casing, a battery, a lamp, a switch for controlling said lamp, electrical connections for connecting said battery, lamp, and switch, said switch including an elongated operating member extending from the case and movable laterally with respect to itself to turn the switch on and off, said switch being biased to its on position, and means for locking said operating member to hold said switch open including a bushing carried by said operating member and manually slidable along said member.

10. An illuminating device for refrigerators and the like comprising a casing, a battery, a lamp, a switch for controlling said lamp, electrical connections for connecting said battery, lamp and switch, said switch including a conductive elongated operating member extending from the case and movable laterally with respect to itself, said switch including also a stationary conductive stop for said movable operating member, said member and stop constituting the cooperating contact elements of said switch, said movable operating member being biased to lie against said stop to close the circuit through said battery and lamp, and means for blocking said operating member to hold said switch open including an insulating piece carried by said operating member and slidable along said operating member into position between the cooperating contact surfaces of said operating member and said stop.

11. An illuminating device for refrigerators and the like comprising a tubular casing having a removable end cap, an incandescent lamp, a battery in said casing for operating said lamp, a switch for controlling the operation of said lamp, said switch including a pair of spaced apart insulating washers mounted in said removable end cap, and including also a metal rod reciprocable of said tubular casing in the aligned apertures of said washers, the contacts of said switch comprising a conducting member carried by said metal rod interiorly of said casing and a stationary conducting member, said metal rod extending out of the end of said tubular casing to permit actuation of said switch.

12. An illuminating device for refrigerators and the like comprising a casing, an incandescent lamp, a battery in said casing for operating said lamp, a switch for controlling the operation of said lamp, said switch including means providing a pair of aligned, spaced apart apertures and including also an actuating plunger reciprocable in said aligned apertures to operate the switch, a spring for urging said plunger to the "on" position of said switch, said plunger being rotatable in said apertures, one of said apertures being non-circular and said plunger having a non-circular portion such that in one rotated position of said plunger, said non-circular portion passes through said non-circular aperture to permit operation of the switch and in another rotated position of said plunger said non-circular portion fails to pass through said non-circular aperture and so locks said switch in the off position thereof.

13. An illuminating device for refrigerators and the like comprising a tubular casing, an incandescent lamp, a battery in said casing for operating said lamp, a switch for controlling the operation of said lamp, said switch including means providing a pair of aligned, spaced apart apertures and including also an actuating plunger reciprocable in said aligned apertures and including also an actuating plunger reciprocable in said aligned apertures to operate the switch, a spring for urging said plunger to the "on" position of said switch, one of said apertures being non-circular and said plunger having a non-circular shoulder portion such that in one rotated position of said plunger said shoulder portion passes through said non-circular aperture, and in another rotated position of said plunger said non-circular shoulder portion fails to pass through said non-circular aperture, said non-circular shoulder portion being so positioned on said plunger with respect to the longitudinal dimension thereof, that said non-circular shoulder portion of said plunger may pass through said non-circular aperture as said plunger moves away from the "on" position of said switch against the force of said spring, said plunger being then rotatable into a position such as to prevent said shoulder portion from passing through said non-circular aperture, whereby to lock said plunger against movement by said spring to hold said switch in the "off" position.

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