

May 2, 1939.

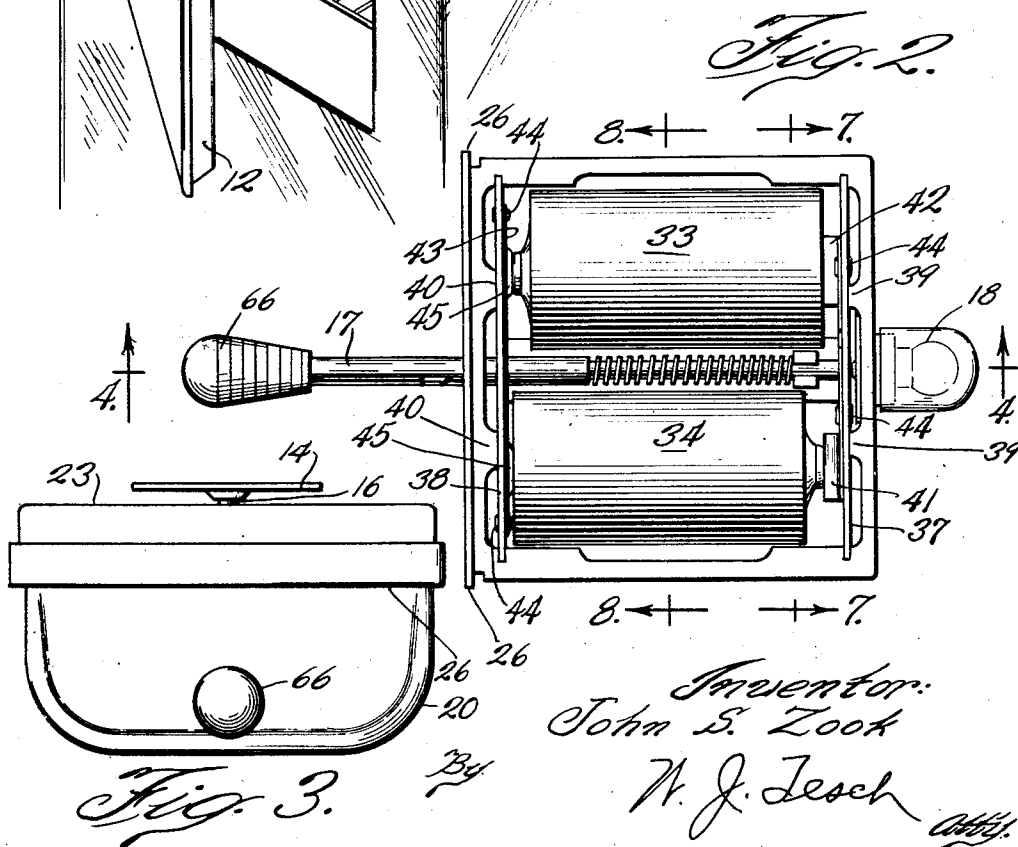
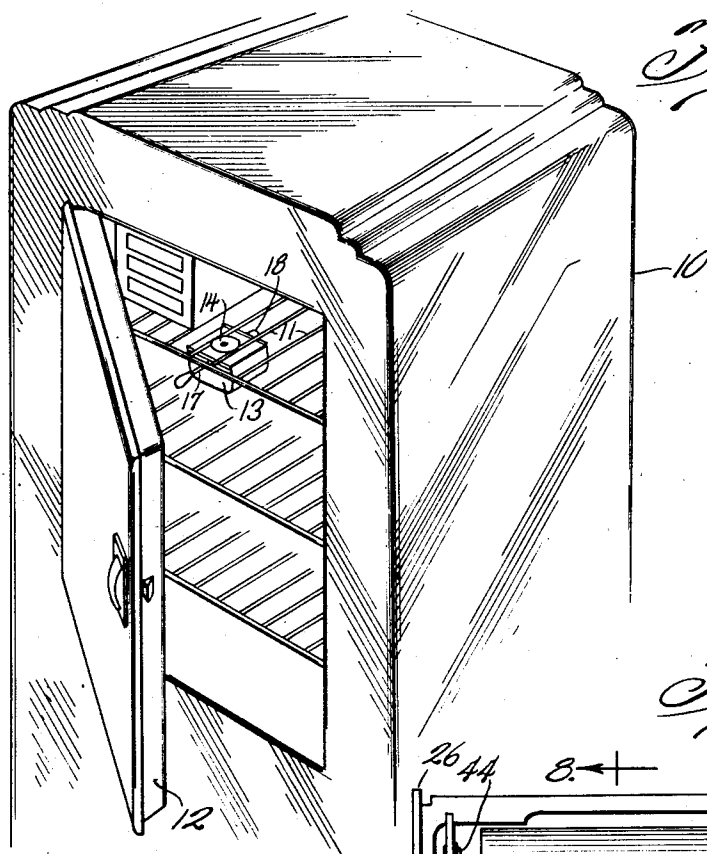
J. S. ZOOK

2,156,443

ILLUMINATING DEVICE

Filed Dec. 19, 1936

2 Sheets-Sheet 1



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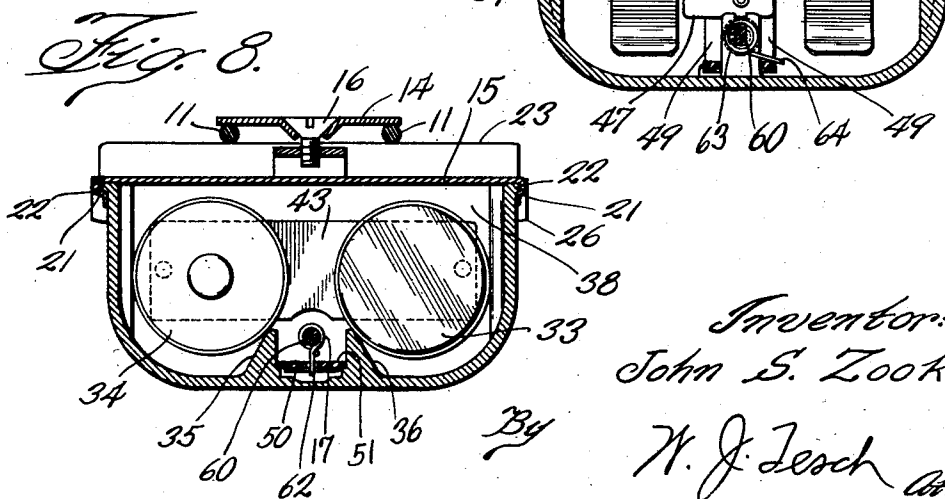
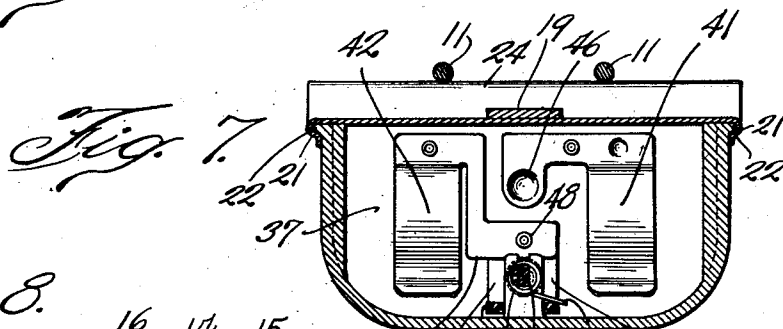
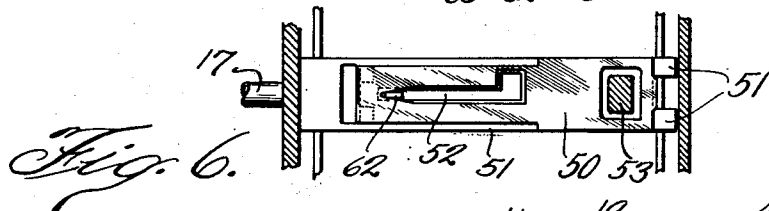
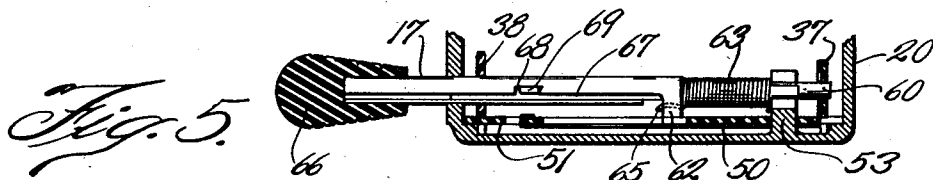
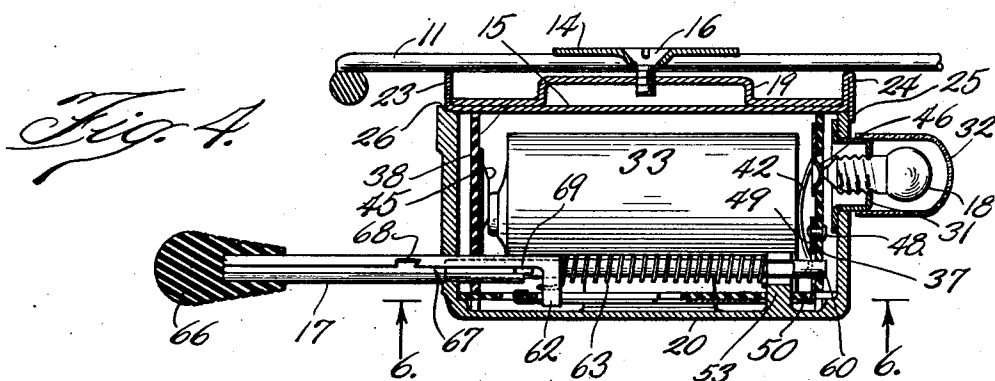
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2 Sheets-Sheet 2



Inventor:
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UNITED STATES PATENT OFFICE

2,156,443

ILLUMINATING DEVICE

John S. Zook, Madison, Wis., assignor, by mesne assignments, to Micro Switch Corporation, Freeport, Ill., a corporation of Illinois

Application December 19, 1936, Serial No. 116,739

5 Claims. (Cl. 240—4)

This invention relates to improvements in illuminating devices for enclosures, and particularly enclosures having doors, in which the device is adapted to be rendered operative and 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 described.

Briefly, the invention provides a dry battery operated electric illuminating device which is adapted to be supported in substantially 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, the lamp being turned on when the door is open and the operating member is in its fully extended position and the lamp being turned off when the door is closed and the operating member is in its retracted position. The switch is provided with a locking mechanism whereby the device may be locked in the inoperative position when desired.

In the drawings:

Fig. 1 is a perspective view of a portion of a refrigerator showing the illuminating device of this invention mounted therein;

Fig. 2 is a top view of the illuminating device with the cover thereof removed, showing the same in the operative position;

Fig. 3 is a front plan view of the device;

Fig. 4 is a sectional view along line 4—4 of Fig. 2;

Fig. 5 is a fractional sectional view along line 4—4 of Fig. 2 showing the device in the inoperative position;

Fig. 6 is a fractional sectional view along line 6—6 of Fig. 4;

Fig. 7 is a sectional view along line 7—7 of Fig. 2; and

Fig. 8 is a sectional view along line 8—8 of Fig. 2.

In Fig. 1 the refrigerator 10 has the usual metal rod shelf members 11 and door 12. The illuminating device 13 of this invention is shown 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 means of a clamping washer 14 which is fastened in spaced rela-

tion to the cover 15 by means of a screw 16, and clamps over the rods 11 of the shelf as shown in Fig. 4. A reciprocating plunger-type operating member 17 projects exteriorly from the front of the device 13 and is adapted to be moved into the operative and the inoperative positions by the opening and closing of the door 12. The incandescent lamp 18 projects exteriorly from the rear of the device and is adapted to illuminate the interior of the refrigerator although it is shielded from the eyes of the user. The device may be mounted in the refrigerator in any position where it can be fastened so that operating member 17 is operated by the opening and closing of the door.

As shown in the drawings, the device 13 comprises an open-sided casing 20, formed preferably of cast metal, the open side being closed by the removable cover 15. The cover is formed of sheet metal and has a metal strap 19 mounted on its upper surface as by welding, the middle portion of the strap being spaced from the cover and having an opening therein adapted to receive screw 16 in threaded engagement therewith. The cover has downwardly turned flanges 21 along the side edges thereof which cooperate with outwardly extending flanges 22 on the casing 20 to hold the cover and the casing together. The ends of the cover 20 have flanges 23 and 24 turned upwardly therefrom, the material of flange 24 being turned back upon itself and extending downwardly to form an additional flange 25. The refrigerator shelf members 11 are maintained under pressure between clamping washer 14 and the top edges of flanges 23 and 24. The cover is applied to the casing by sliding it endwise of the casing with flanges 21 in engagement with flanges 22, until flange 25 engages the rearward end of the casing. The forward end of the casing is also provided with a flange 26 which engages the forward end of the cover. After the cover has been fastened upon the refrigerator shelf, the casing may be removed for replacement of the battery or lamp, by sliding the same forwardly, and may be replaced by sliding it rearwardly until the rearward end of the casing engages flange 24.

The rearward wall of the casing 20 is provided with an opening in which an incandescent lamp socket 31 is mounted by means of a press fit, the socket being thereby connected electrically with the casing. Lamp 18 is mounted in threaded engagement with socket 31 and a transparent or translucent protective globe 32 fits frictionally over the projecting portion of the socket 31 and

encloses the lamp 18. The globe is made preferably of a non-shatterable substance, such as cellulose acetate and the like. It diffuses the light and protects the lamp bulb, and, in addition, should the lamp bulb become broken, the globe prevents the fragments of glass from dropping into the food in the refrigerator or into the clothes in the chest.

The casing 20 is of a size and shape adapted to receive two dry cells 32 and 34 of the ordinary flashlight type in side-by-side relation. The dry cells may be enclosed in the usual cylindrical jackets of electrical insulating material. Spacing members 35 and 36 (see Fig. 8) extend upwardly from the bottom wall of the casing and assist in maintaining the dry cells in their lateral positions. The dry cells are confined longitudinally between plates 37 and 38 of electrical insulating material which extend laterally across the casing 20 adjacent and spaced from the respective ends thereof. Plates 37 and 38 have their lateral end portions fitting snugly into vertical grooves in the sides of the casing as shown in Fig. 2. Vertical ribs 39 and 40 are formed in the end walls of the casing and project inwardly to form supports for the insulating plates 37 and 38 against the pressure exerted upon them by the dry cells. Shaped contact members 41 and 42 of spring metal are mounted upon the interior surface of insulating plate 37 (see Fig. 7), and a relatively long contact member 43 is mounted upon the interior surface of insulating plate 38 (see Fig. 8). The contact members are supported upon the insulating members by means of metal grommets 44 which are exposed on the outward surfaces of the insulating plates. Ribs 39 and 40, in maintaining the insulating plates 37 and 38 in spaced relation to the ends of the casing, serve to maintain the said exposed ends of the grommets out of electrical contact with the casing and prevent the contact members from being grounded to the casing. Contact members 41 and 42 are bowed toward the dry cells as shown in Fig. 4, and contact member 43 has portions 45 projecting toward the dry cells, the dry cells being held under pressure between said portions of the contact members. The dry cells can be removed and inserted individually through the open side of the casing and between the cooperating contact members.

Insulating plate 37 has an opening therein which coincides with the end terminal of the lamp 18 and contact member 41 has a laterally extending arm 46, a portion of which coincides with the said opening and is bowed outwardly into said opening and into engagement with the end terminal of lamp 18. As stated heretofore, the threaded terminal of the lamp is grounded to the casing 20 by means of the metal socket 31, and the electrical connections which have been described thus far form a series arrangement as follows: starting with casing 20 the circuit continues through socket 31, lamp 18, arm 46 of contact member 41 and the said contact member itself, dry cell 34, contact member 43, dry cell 33, and contact member 42.

The switch mechanism consists of means for connecting and disconnecting contact member 42 with respect to the casing 20. Contact member 42 has a laterally extending arm 47 which is connected by means of a grommet 48 to the vertical extension 49 of the horizontal metal switch plate 50. Grommet 48 also serves to fasten the said member and arm to supporting

plate 37. Switch plate 50 is in the form of a strip and is mounted upon the under side of a strip-form supporting plate of insulating material 51 which extends longitudinally of the casing and is spaced from the bottom of the casing. The ends of supporting plate 51 pass through openings in insulating plates 37 and 38 and are confined against upward movement by the edges of the said openings. The supporting plate 51 rests upon ledges formed at the ends of the casing as shown in Figs. 4 and 5, and ledges formed along the interior surfaces of the spacing members 35 and 36 of the casing, as shown in Fig. 8. The supporting plate is confined laterally between spacing members 35 and 36, and longitudinally between the ends of the casing 20. The rearward vertical portion 49 of the switch plate passes upwardly through an opening in the supporting plate. Slots extend inwardly from the edges of the switch plate to reduce its width at the point where it passes through the supporting plate. The forward end portion of the switch plate is also turned upwardly through an opening in the supporting plate and is clinched to the material of the supporting plate at the edge of the opening, as shown in Fig. 5. The switch plate and the supporting plate have coinciding L-shaped slots therein, indicated at 52, the angular portion of the slot being at the end thereof toward the rear of the device and the main portion extending longitudinally toward the front of the device. The slot of the mounting member 51 is slightly smaller than that of the switch plate 50 except at the forward end of the slots where the slot of the switch plate is smaller and terminates in the form of a V. The switch plate and supporting plate are provided with coinciding openings to accommodate a post 53 which extends upwardly from the bottom of the casing and supports one end of the movable switch mechanism. The switch plate is shaped and positioned so as to be out of contact with the casing.

The mechanism of the movable switch member comprises a guide rod 60 which is mounted at a point adjacent its rearward end upon supporting post 53, said post being split as shown in Figs. 2 and 4 to accommodate the rod 60, and the rod being reduced by a flattening where it is engaged by the sides of the split portion of post 53, whereby longitudinal movement of the rod is prevented. At its forward end rod 60 telescopes into the hollow, tubular metal operating plunger 17 which is mounted reciprocally in an opening in the forward wall of the casing and is in direct contact with the casing. The rearward end of the plunger 17 has a downwardly projecting portion 62 which is adapted to reciprocate in the slots 52 of the switch plate 50 and mounting plate 51. A helical spring 63 is fitted over guide rod 60 and is maintained under compression between post 53 and the rearward end of plunger 17. The rearward end portion 64 of the spring extends laterally and rests against the upper surface of the supporting plate 51. The opposite end portion 65 of the spring extends forwardly and engages the lateral extension 62 of the plunger 17. The spring is arranged to be under a torsional stress whereby end portion 65 thereof exerts a force upon extension 62 urging the plunger to rotate in a counterclockwise direction, as viewed from the front, for a purpose which will be explained hereinafter. The plunger may be moved rearwardly against the compression of spring 63, dur-

ing which movement projection 62 moves within the longitudinal portions of slots 52. Upon the release of the plunger, spring 63 causes the plunger to return to the forward position, as shown in Fig. 4. When the plunger is in this position, projection 62 thereof, makes contact with the forward converging edges of the slot 52 of the switch plate 50, as shown in Fig. 6, and the lamp 18 is rendered operative. As explained heretofore, the lamp is operative when contact member 42 is connected to the casing and such connection is effected through extension 49, switch plate 50 and operating plunger 17, which is in direct contact with the casing. When the plunger is moved to the rearward position, projection 62 is disconnected from the switch plate and is maintained out of contact therewith by the edges of the slot 52 of the mounting plate 51, and the lamp is rendered inoperative. The said extension 62 constitutes the movable contact of the switch and switch plate 50 constitutes the stationary contact.

A bumper member 66, preferably composed of a relatively soft material such as rubber or the like, is fitted over the forward end of the operating plunger 17, and, as stated heretofore, the device is arranged in cooperative relation to the door of the refrigerator in such manner that the plunger is moved to the inoperative position by the act of closing the refrigerator door, and is moved by spring 63 to the operative position upon the opening of the refrigerator door.

Means are provided for locking the plunger 17 in the inoperative position when the device is out of the refrigerator or when the refrigerator door is open for long periods of time for cleaning, airing or other purposes. This means comprises a longitudinal slot 67 in the plunger 17, said slot having a lateral extension 68, and a cooperating cam 69 upon the rod 60. To lock the mechanism, the plunger is moved to the inoperative position and then given a slight clockwise rotary movement, whereupon cam 69 enters the slot extension 68, as shown in Fig. 5. The plunger is then allowed to move forwardly until the rearward edge of the slot extension 68 engages cam 69. The said edge extends diagonally in such manner that the plunger is retained by the cam 69 against the tendency of the plunger to rotate under the turning force exerted by spring 63, which has been described heretofore. The lateral extensions of the slots 52 in the supporting member 51 and the switch plate 50 accommodate the projection 62 of the plunger 17 when the switch is in the locked position. When it is desired to render the device operative after it has been in the locked position, it is merely necessary to exert pressure upon the plunger, as by closing the refrigerator door, and then releasing the plunger, as by opening the refrigerator door. The pressure upon the plunger disengages cam 69 from the diagonal edge of slot extension 68, whereupon the turning force exerted by spring 63 causes rotation of the plunger and movement of the cam out of the slot extension and into the longitudinal portion of the slot, after which, upon release of the plunger, the spring 63 will move the plunger forwardly to the operative position.

The terms "forward", "rearward", "bottom", "top", "vertical" and "horizontal" and similar terms are used herein in a relative sense for the purpose of simplifying the description and are not intended as limitations as is evident. Al-

though only one modification of the device is described and illustrated, it is understood that the invention is not limited thereto but is limited only in accordance with the scope of the appended claims.

Certain features of construction herein shown and described are described and/or claimed in the co-pending application of Walter B. Schulte, Serial No. 94,897, filed August 8, 1936.

I claim:

1. In an illuminating device for refrigerators and the like, a casing, an incandescent lamp mounted on said casing, a battery in said casing, a switch in said casing, said switch comprising cooperating stationary and movable members, a stationary guide rod mounted in said casing, a cam on said guide rod, said movable switch member comprising a hollow plunger telescoping reciprocally on said guide rod and having an operating end thereof projecting through a wall of said casing, said plunger having a longitudinal slot therein, said slot having a lateral extension, said plunger being reciprocable into the operative and inoperative positions thereof, said cam being arranged to reciprocate in said slot of said plunger, said plunger in the inoperative position thereof being rotatable into a locked position, in which said cam is in said lateral extension of said slot and is held by an edge of said slot extension, and a helical spring encircling said guide rod and constantly urging said plunger toward the operative position thereof, said spring being arranged so as to exert a turning force on said plunger urging said plunger out of the locked position thereof.

2. In an illuminating device for refrigerators and the like, an open sided casing, a cover for said casing, said casing being slidable lengthwise into and out of engagement with said cover, means for clamping said cover to a shelf of said refrigerator, an incandescent lamp mounted on said casing, a battery in said casing, a switch in said casing, said switch comprising a reciprocating member adapted to reciprocate substantially at right angles to the forward side of said casing and having an operating end portion exposed exteriorly of said side of said casing, said casing being removable forwardly from said cover, and means for preventing said casing from moving rearwardly out of engagement with said cover.

3. In an illuminating device for refrigerators and the like, a cover, means for mounting said cover on a shelf of said refrigerator, a casing slidable into and out of engagement with said cover, an incandescent lamp mounted on said casing, a battery in said casing, and a switch in said casing, said switch having a movable member mounted for reciprocal motion substantially perpendicular to a wall of said casing, and having an operating end exposed exteriorly of said casing, whereby said switch is adapted to be actuated by the door of said refrigerator or the like.

4. An illuminating device for refrigerators and the like comprising a casing adapted to be mounted inside a refrigerator or the like, an incandescent lamp mounted upon said casing, means within said casing for receiving an electric battery and for making electrical connections thereto, a switch for controlling said lamp, and electrical connections between said lamp, switch and battery, said switch comprising cooperating stationary and movable contact members, said stationary contact member comprising

an electrically conductive plate mounted in said casing and having a longitudinal opening therein, an operating plunger for said switch, guide means for supporting and guiding said plunger, 5 said plunger being adapted to be arranged in cooperative relation to the door of the refrigerator, a switch blade carried by said plunger and projecting laterally therefrom and extending into said longitudinal opening of said switch 10 plate, a spring for urging said plunger along its guide to move said switch blade to the end of the longitudinal opening in said switch plate to bring the blade and plate into electrical engagement for closing the circuit, said guide means 15 of said plunger including means for maintaining said switch blade out of electrical engagement with said switch plate when said plunger is moved against the force of said spring away from said end of said longitudinal opening.

20 5. An illuminating device for refrigerators and the like comprising a casing of electrically conductive material adapted to be fastened to the interior of a refrigerator or the like, an incandescent lamp mounted upon said casing, said 25 casing being adapted to contain and support an electric battery, a switch mounted in said cas-

ing for controlling said lamp, electric connections between said lamp, battery and switch, said switch comprising cooperating stationary and movable contact members, an insulating plate 5 having a longitudinal slot for supporting said stationary contact member, said stationary contact member being mounted on said insulating plate at one end of its longitudinal slot, said longitudinal slot having a lateral extension 10 thereof at the other end of said slot, a metal plunger extending through the wall of said casing and adapted to be reciprocally actuated from the exterior of said casing by the door of the refrigerator, said movable contact member constituting a cam extending laterally from said 15 plunger and adapted to reciprocate in said slot of said insulating plate, guide means including the wall of said casing for supporting said plunger, said plunger being adapted to rotate to move said cam into said lateral extension of said 20 slot, and spring means for urging said cam out of said lateral extension, and for urging said cam into engagement with the stationary contact member at the opposite end of said slot.

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