Aug. 8, 1933. S. N. BUCHANAN 1,921,069

SAFETY LAMP

Filed Sept. 4, 1931

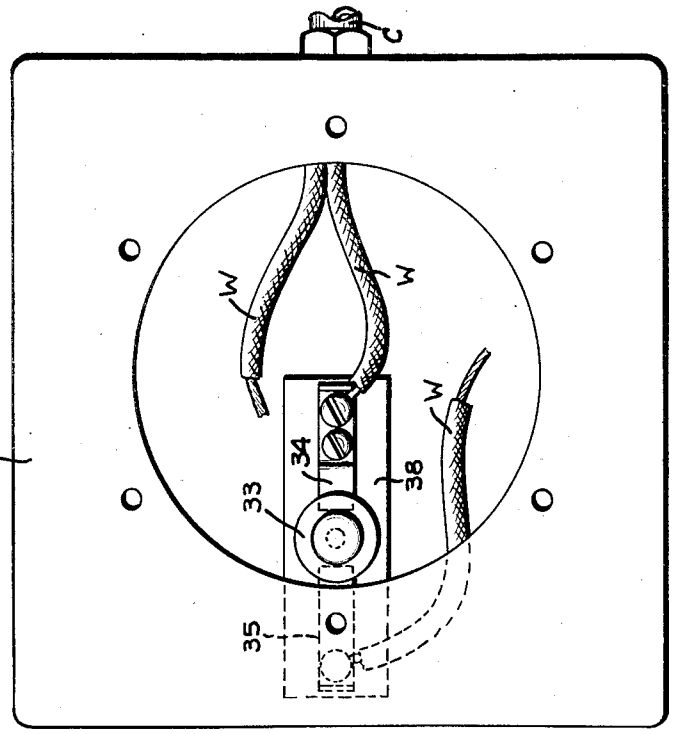

Fig. 2.

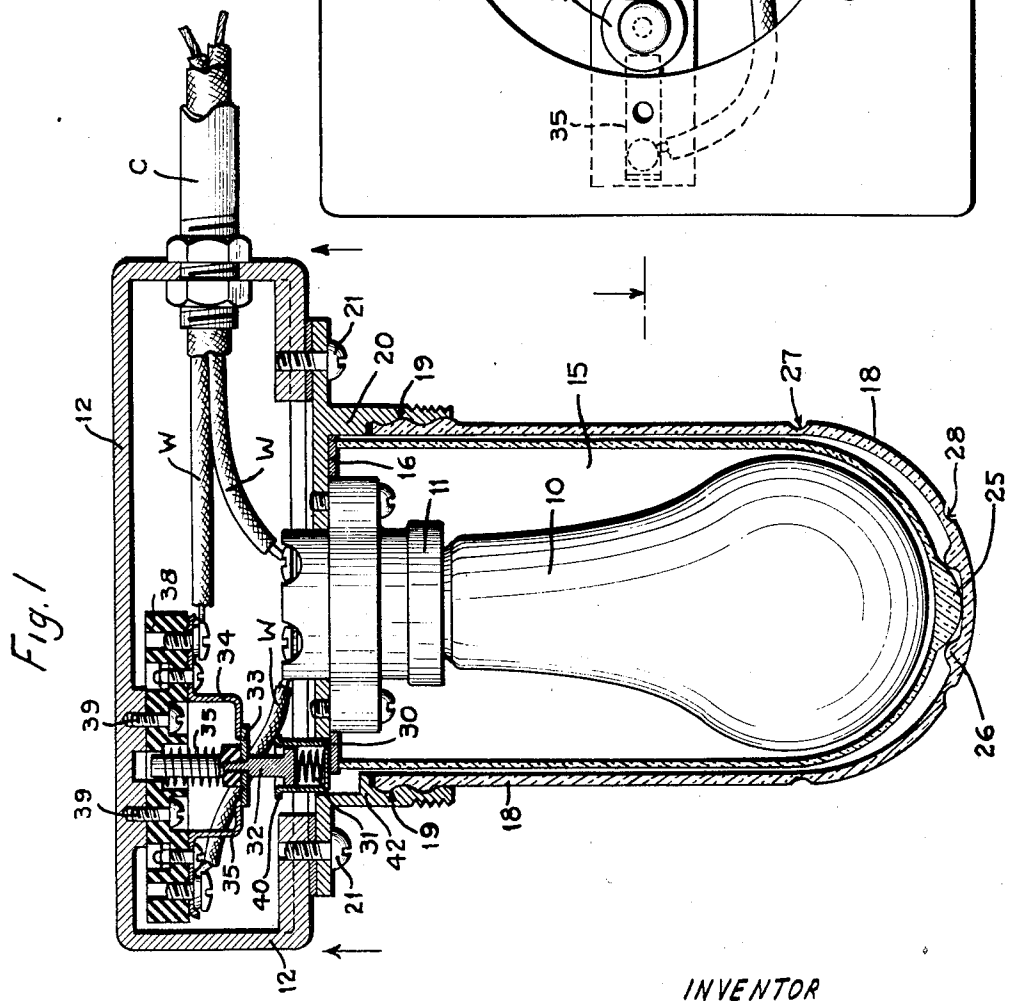

Fig. 1

INVENTOR
STEPHEN N. BUCHANAN
BY Bohleber & Ledbetter ATTORNEYS

Patented Aug. 8, 1933 1,921,069

UNITED STATES PATENT OFFICE

1,921,069

SAFETY LAMP

Stephen N. Buchanan, Elizabeth, N. J., assignor to The Thomas & Betts Co., Elizabeth, N. J., a Corporation of New Jersey

Application September 4, 1931. Serial No. 561,202

12 Claims. (Cl. 240—11.3)

The invention pertains to safety lamps adapted for use in mines, flour mills and elsewhere, where explosive mixtures are liable to be present in the air. The safety lamp is adapted for electric lights and in its preferred construction utilizes a transparent casing which encloses the electric light bulb so that the surrounding air will not come into contact with the hot bulb of the electric light and so that the outer casing will form a protective covering for the light. The casing would then receive any blow which would otherwise be struck the light bulb which latter may well have a disastrous result since the incandescent filament within the lamp usually glows for a very short period before the incandescent filament is burned out when the bulb is broken. This short period of glow however may be long enough to cause an explosion if explosive mixtures are present.

The usual manner of protecting electric lamps where explosive conditions are liable to exist is to cover them with a transparent casing, the object being that the exterior casing is cooler than the lamp itself and in case a workman strikes the lamp, it will be the transparent casing which will be broken and not the lamp itself. It frequently occurs however that the transparent protecting casing is broken and the workmen and others within the building continue to receive their light from the lamp and consequently do not bother to replace the safety casing over the lamp. As a result, such safety casings are effective only so long as the casing is unbroken, but very seldom replaced when broken because the lamp continues to give light. The purpose of the invention is therefore to devise a lamp which is not dependent upon the workmen for its safety and the construction by which this purpose is accomplished is the subject of the invention.

An object of the invention is to construct a safety lamp having a switch connected with the lamp which switch is opened when the safety means surrounding the lamp is broken so that the lamp is not illuminated when unprotected with the safety means and cannot be relighted until a new safety means surrounds the lamp.

Another object of the invention is to have a switch connected with the lamp and its socket which switch is closed by the insertion of the transparent casing in position around the lamp but which switch is opened upon breakage or removal of the casing so that the light is automatically disconnected from the electrical power lines and is not a source of danger while unprotected by the casing.

Other objects of the invention will be more apparent from the following description taken in connection with the accompanying drawing, in which:

Figure 1 is a cross-section through a lamp, its socket, the switch connected therewith, and the safety casing surrounding the socket and lamp whereby the switch to the socket or lamp is closed.

Figure 2 is a top view of the box which carries the lamp with the lamp, socket and safety casing removed, showing the switch positioned therein.

The invention utilizes a switch controlled by a safety means, which preferably is a casing, around the lamp or bulb so that the switch is closed when the safety means is in position. Usually a spark results from the opening of a switch which would be a source of danger in the places where the safety light of the invention would be used and hence the switch utilized with the construction herein is also protected or covered so that any spark occurring when the switch is opened, because of the breakage of the safety casing or for any other reason, will not flash in the surrounding atmosphere.

In the construction of the invention the electric lamp 10 is inserted in a socket 11 of the usual form, many of which are purchasable in the market, which socket is carried by a box 12. A conduit C carries wires W into the box 12 in a manner known to the art. A safety means or casing 15 is around the socket 11 and is transparent or translucent so that the light from the lamp 10 may pass therethrough. The safety means preferably provides a completely enclosing casing or closure for the lamp so that the hot bulb does not come into contact with the surrounding air and so that the lamp 10 is completely protected against breakage in case the light is hit, since the transparent casing 15 will be the part receiving the blow. The safety casing 15 engages a soft washer 16 which forms a tight seal between the casing and the box thereby completely enclosing the lamp 10 and its socket 11 from the exterior air.

The transparent means 15 need not necessarily be an enclosing casing but may be any breakable means around the lamp which actuates the switch when broken or removed to shut off the electric current from the lamp. This

means would take the blow rather than the electric light lamp and hence serves as a safety means even though it does not completely surround or enclose the lamp. The completely enclosing transparent casing is the preferred construction however because such casing also prevents the hot bulb of the lamp 10 from coming into contact with the surrounding atmosphere.

The transparent safety casing 15 is held in position by a second or outer enclosing casing 18 which is also transparent. This outer casing or supporting means provides fragile or breakable means for holding or supporting the safety casing 15 in position against the washer 16. In its preferred construction the supporting means 18 is a second and outer transparent casing although any breakable means which holds the safety casing 15 in position and which would receive and take a blow which the lamp or safety casing 15 would otherwise have taken, is contemplated by the invention. The breakable means surrounding the inner safety casing provides an additional safety enclosure when it is a completely enclosing casing.

The outer casing or supporting means 18 is provided with threads 19 by means of which the outer casing may be threaded into the casing retaining ring 20 which is secured to the box 12 by means of the screws 21. It is clear that the supporting means 18 for the transparent casing 15 may be secured to the box 12 by any suitable mechanism or device other than the ring 20 or the screw threads 19 shown and described herein and the screw threads are means for securing the breakable means or outer casing 18 to the ring 20 or box is illustrative of one method of securing the outer casing in position.

In order to retain the safety casing 15 in position, the bottom of the safety casing may be provided with a bulbous supporting or spacing projection 25. The bulbous projection contacts with the bottom of the supporting means 18 and a circular bead 26 may be carried by the supporting means 18 for centering the projection and the safety casing 15 therein. The supportiug means 18 may carry weakening grooves 27 and 28 which insure that the supporting casing will be broken by a blow such that the saftey casing 15 will drop down sufficiently to open the switch. The grooves may be of any form and are preferably adjacent the bottom of the supporting means or casing 18 so that the casing is readily broken when struck, and will cause the bottom of the supporting means 18 to be completely broken away. When this occurs, the safety casing 15 is free to fall downwardly until it engages the unbroken part of the supporting means 18. It is this dropping downwardly or displacing of the safety casing which controls the switch for disconnecting the lamp 19 from circuit with the electrical power lines. It will be noted that the grooves 27 and 28 are so positioned at the bottom of the supporting casing 18 that part of the casing remains to catch the displaced safety casing and prevent it from being completely released and fall to the floor. The safety casing is displaced sufficiently however to open the switch.

The safety switch which is controlled by the safety casing 15 includes a push button 30 in contact with the washer 16 or otherwise depressed from its extended position upon insertion of the safety casing 15 over the socket 11 and the lamp 10. The push button 30 is impelled forwardly by means of a spring 31 retained within the push button and abutting against a switch rod 32. The spring 31 keeps the button 30 always in contact with the washer 16 or the safety casing 15 thereby compensating for the usual manufacturing inaccuracies. The switch rod 32 carries a switch element 33 for engagement with the contacts 34 and 35 to close the electric circuit. These contacts are connected by means of wires W to complete the electrical circuit to the lamp 10 and socket 11. A spring 35 impels the switch rod 32 downwardly so that the switch element 33 will be impelled away from engagement with its cooperating contacts 34 and 35 when the safety transparent casing 15 of the washer 16 is displaced thereby permitting downward movement of the switch element 33. The switch, consisting of the switch element 33, and the contacts 34 and 35 are secured upon an insulated block 38 which block is in turn secured to the box 12 by means of the screws 39.

In the construction wherein the supporting means 18 for the safety casing 15 is itself an outer enclosing casing, this casing provides additional protection for the lamp. A sharp blow against the outer or supporting casing 18 will break this casing but the inner or safety casing 15 still remains to protect the lamp from coming into contact with the air surrounding the lamp structure. Then again it may occur that the outer or supporting casing 18 may be only fractured and may not be broken sufficiently to permit the safety casing 15 to be displaced downwardly but will still remain in position in which case the safety switch is not disconnected. When this occurs the lamp is still protected by the inner safety casing 15 until the outer casing should receive another blow sufficiently hard to cause its breakage, thereby permitting the inner safety casing 15 to be displaced, which in turn disconnects the switch and the lamp 10 is no longer illuminated.

A shoulder 42 is provided to prevent the switch button 30 from being impelled entirely from its position upon the displacement of the safety casing 15. The button 30 contacts with the shoulder and thereby moves the switching element 33 sufficiently far to carry it out of contact with its cooperating contacts 34 and 35 so that the electric circuit is broken. The flange 40 upon the end of the button 30 may also serve the same purpose if desired.

Inasmuch as a spark is usually formed whenever an electric circuit is broken, the safety switch is enclosed within the box 12, which box is completely enclosed from the exterior and thereby forms a safety box for the switch. The movable contact element 33 of the switch is also preferably circular so that it or the switch rod 32 may be rotated and still engage the contacts 34 and 35 as shown in Figure 2.

The switch may be of any construction desired so long as it is actuated by the displacement of the safety casing whether such displacement occurs from breakage of the casing or its displacement for any other reason. Switch closing means is therefore provided which is depressed or moved by insertion of the safety casing in position over the socket and lamp to close the switch. Springs are then provided to impel the switch closing means outwardly when the safety casing is broken or removed thereby

closing the switch when the displacement takes place.

Various modifications will occur to those skilled in the art in the configuration, composition and disposition of the component elements going to make up the invention as a whole, as well as in the selective combination or application of the respective elements, and no limitation is intended by the phraseology of the foregoing description or illustrations in the accompanying drawing, except as indicated in the appended claims.

What is claimed is:

1. A safety light having an electric lamp comprising a lamp socket, a switch connecting with the socket, a transparent casing surrounding the socket and closing the switch when in position, and breakable means around the exterior of the transparent casing and engaging the latter at its end to support the same in closed switch position.

2. A safety light having an electric lamp comprising a lamp socket, a switch connecting with the socket, a transparent casing surrounding the socket and the lamp, switch closing means retracted upon insertion of the transparent casing in position to close the switch and advanced when the transparent casing is moved or broken to open the switch, and breakable means around the exterior of the transparent casing and engaging the latter at its end to support the same in closed switch position.

3. A safety light having an electric lamp comprising a lamp socket, a switch connecting with the socket, a transparent casing completely enclosing the socket and the lamp, switch closing means retracted upon insertion of the transparent casing in position to close the switch and advanced when the transparent casing is moved or broken to open the switch, and a breakable outer casing completely surrounding the first casing and engaging the same at its end to support the first casing in position whereby breaking it displaces the first casing and opens the switch.

4. A safety light having an electric lamp comprising a lamp socket, a switch connecting with the socket, a transparent casing completely enclosing the socket and the lamp, switch closing means retracted upon insertion of the transparent casing in position to close the switch and advanced when the transparent casing is moved or broken to open the switch, a breakable outer casing completely enclosing the first casing and engaging the same at its end to support the first casing in position whereby breaking it displaces the first casing and opens the switch, and weakening grooves in the outer casing surrounding the point of engagement of the first casing.

5. A safety light having an electric lamp comprising a lamp socket, a switch connecting with the socket, a transparent casing completely surrounding the socket and the lamp, switch closing means retracted upon insertion of the transparent casing in position to close the switch and advanced when the transparent casing is moved or broken to open the switch, a projection upon the end of the transparent casing, and breakable means surrounding the transparent casing and engaging the projection thereby supporting the transparent casing in position.

6. A safety light having an electric lamp comprising a lamp socket, a switch connecting with the socket, a transparent casing completely surrounding the socket and the lamp, switch closing means retracted upon insertion of the transparent casing in position to close the switch and advanced when the transparent casing is moved or broken to open the switch, a projection upon the exterior of and at the end of the transparent casing, breakable means surrounding the transparent casing and engaging the projection thereby supporting the transparent casing in position, and at least one weakening groove in the breakable means circling the projection.

7. A safety light having an electric lamp comprising a lamp socket, a switch connecting with the socket, a transparent casing completely surrounding the socket and the lamp, switch closing means retracted upon insertion of the transparent casing in position to close the switch and advanced when the transparent casing is moved or broken to open the switch, a projection upon the end of the transparent casing, an outer casing completely surrounding the transparent casing and engaging the projection to support the transparent casing in position, and at least one weakening groove in the outer casing circling the projection.

8. A safety light having an electric lamp comprising a lamp socket, a switch connecting with the socket, a transparent casing surrounding the socket and the lamp, switch closing means retracted upon insertion of the transparent casing in position to close the switch and advanced when the transparent casing is moved or broken to open the switch, a projection upon the exterior of and at the end of the transparent casing, breakable means surrounding the transparent casing and engaging the projection thereby supporting the transparent casing in position, and a centering bead circling the projection upon the inner side of the breakable means.

9. A safety light having an electric lamp comprising a box having an opening therein, a plate secured to the box and covering the opening, a lamp socket carried by the plate, a switch within the box and connected with the socket, a transparent casing completely surrounding the socket and the lamp, switch closing means retracted upon insertion of the transparent casing in position to close the switch and advanced when the transparent casing is moved or broken to open the switch, breakable means surrounding the transparent casing and engaging the end thereof thereby supporting the transparent casing in position, and means securing the breakable means to the plate.

10. A safety light having an electric lamp comprising a box, an opening in the box, a plate secured to the box and covering the opening, a lamp socket carried by the plate, a switch within the box and connected with the socket, a transparent casing completely surrounding the socket and the lamp, switch closing means retracted upon insertion of the transparent casing in position to close the switch and advanced when the transparent casing is moved or broken to open the switch, an outer casing completely surrounding the transparent casing and engaging the end thereof thereby supporting the transparent casing in position, and means securing the outer casing to the plate.

11. A safety light having an electric lamp comprising a box, an opening in the box, a plate secured to the box and covering the opening, a lamp socket carried by the plate, a switch within the box and connected with the socket, a transparent casing completely surrounding the

socket and the lamp, switch closing means retracted upon insertion of the transparent casing in position to close the switch and advanced when the transparent casing is moved or broken to open the switch, an outer casing completely surrounding the transparent casing and engaging the end thereof thereby supporting the transparent casing in position, screw threads upon the outer casing, and screw threads carried by the plate to receive the screw threads upon the outer casing.

12. A safety light having an electric lamp comprising a lamp socket, a switch connecting with the socket, a transparent casing completely surrounding the socket and the lamp and forming a closed enclosure therefor, a switch carried by the safety light, a spring impelled switch actuator tending to open the switch, a spring impelled button carried by the switch actuator engaging the safety casing and retracted thereby with the switch actuator upon insertion of the safety casing in position over the socket, and breakable means completely surrounding the transparent casing and engaging the end thereof thereby supporting the transparent casing in position.

STEPHEN N. BUCHANAN.