May 19, 1942. W. R. KOPP ET AL 2,283,559

HAND LAMP

Filed April 11, 1941

Fig. 1,

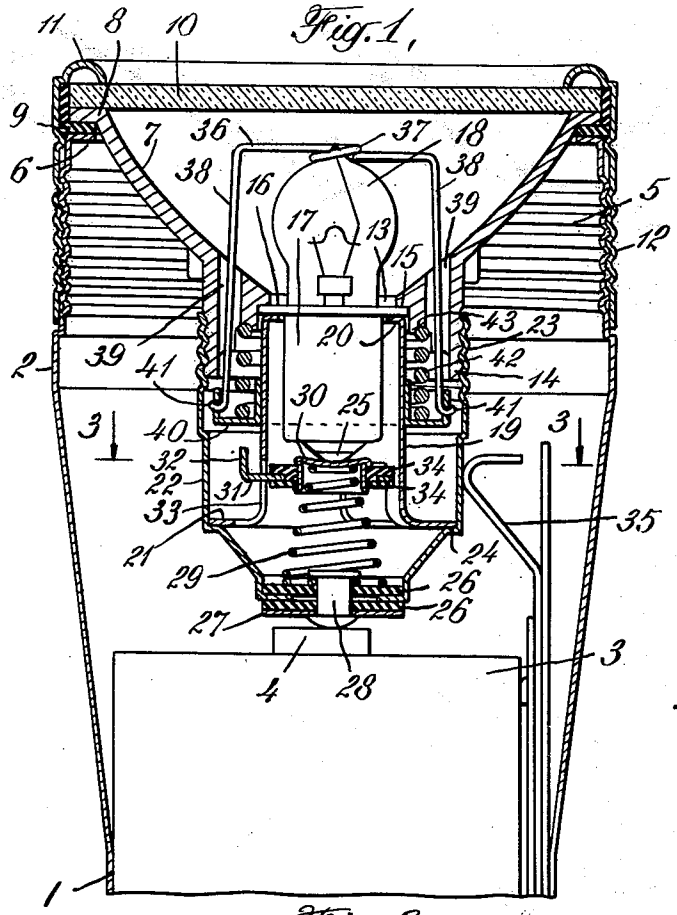


Fig. 2,

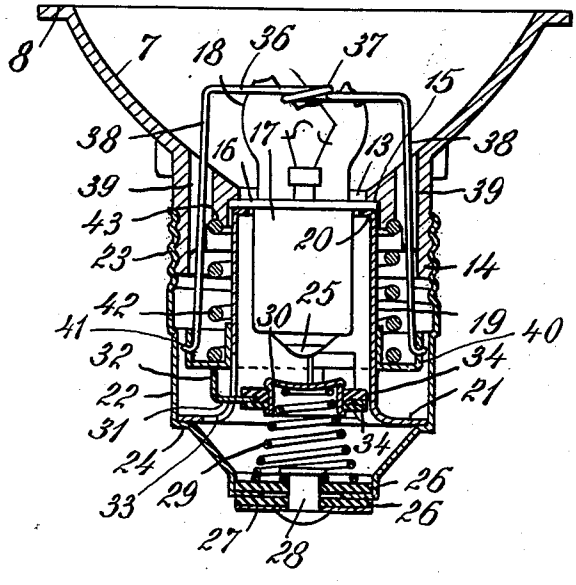


Fig. 3,

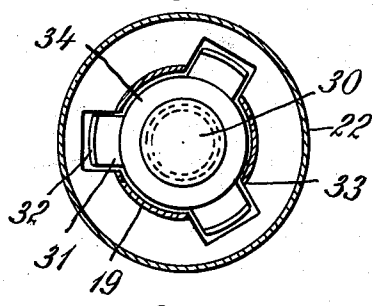


Fig. 4

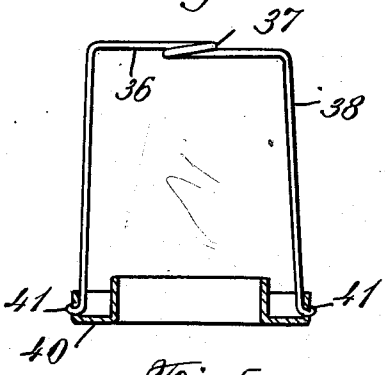


Fig. 5,

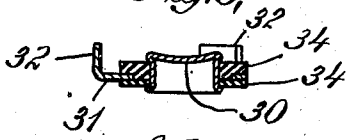
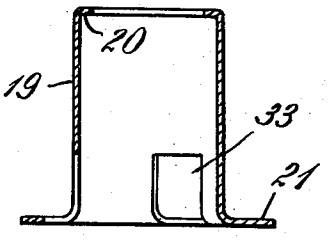


Fig. 6



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HAND LAMP

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Application April 11, 1941, Serial No. 388,118

6 Claims. (Cl. 240—11.3)

This invention relates to portable hand lamps and more particularly to an explosion-proof hand lamp.

The use of a portable hand lamp in which the lamp bulb is energized by a battery is dangerous, if not prohibitive, in certain locations, such as mines, oil fields, and other places where explosive gases are present in the atmosphere. The lamp bulb is generally covered by a lens, but if the lens and the glass bulb are broken the filament of the lamp is exposed. If the atmosphere should contain flammable gases an explosion may be caused.

Several types of explosion-proof hand lamps have heretofore been proposed but all of them are open to certain objections. In the conventional hand lamp construction the base terminal of the lamp bulb is connected to the central terminal of the upper cell of the battery and the outer terminal of the lamp bulb is connected, generally through the reflector and lamp socket, to the other terminal of the battery by means of a switch. The switch usually controls a movable conducting strip which is moved in and out of engagement with the reflector or some other member associated with the lamp support. One proposed type of explosion-proof is designed to break the outer contact of the lamp with the circuit. An objection to this type of explosion-proof lamp is that if the head of the lamp casing is crushed by a falling object or the like which results in the breaking of the bulb and the lens, it may also result in so crushing the reflector and other parts that the circuit will be closed regardless of the position of the switch.

The most effective type of explosion-proof lamp therefore is one in which the connection between the base terminal of the lamp and the central terminal of the upper cell of the battery is broken. Several constructions have heretofore been devised for accomplishing this result. While these constructions are effective for that purpose, they do not provide a satisfactory support for the lamp bulb under normal conditions. Devices of this character all include a member which extends over the lamp bulb and which is associated with a coil spring which is placed under tension when a lamp bulb is in position. In the devices heretofore provided for the purpose of breaking the connection between the base terminal of the lamp and the central electrode of the upper cell the lamp is merely held by the tension of the spring against the member which passes over the top of the lamp bulb under ordinary conditions.

In the present invention we provide a construction wherein the lamp is supported in the reflector in the usual manner and wherein a portion of the contact between the base terminal of the lamp bulb and the central terminal of the upper cell of the battery is moved away from the lamp bulb when the glass portion of the bulb is broken and the coil spring released. In the construction of our device the reflector is provided with a seat surrounding the central opening and means are provided for positively retaining the lamp bulb in position on the seat. A pair of circuit breaking members contact with the top of the lamp bulb and these circuit breaking members normally retain a coil spring under tension. Upon breakage of the bulb, the circuit breaking members are permitted to move and are caused to move by the spring. Movement of the spring results in movement of an associated member against a portion of the contact between the base terminal of the lamp and the central terminal of the upper cell. This contact is normally retained in engagement with the base terminal by a spring of lesser strength than the spring associated with the circuit breaking member. The result is that the stronger spring when released overcomes the spring of the contact member and moves it away from the lamp bulb.

In the accompanying drawing we have shown one embodiment of the invention. In this showing:

Fig. 1 is a longitudinal, sectional view of a portion of a hand lamp showing the invention applied and showing the circuit breaking mechanism in its normal operative position;

Fig. 2 is a similar view of the reflector and lamp assembly showing the position of the parts upon breakage of the lamp bulb and operation of the circuit breaking member;

Fig. 3 is a horizontal, sectional view on line 3—3 of Fig. 1;

Fig. 4 is a detailed view, partly in elevation and partly in section, of the circuit breaking device;

Fig. 5 is a detailed, sectional view of the lamp contact; and

Fig. 6 is a vertical, sectional view of the lamp retaining sleeve.

Referring to the drawing the reference numeral 1 designates the casing of a hand lamp which may be of any suitable construction and which may be flared at its end as indicated at 2. The casing is provided with a battery of any desired number of cells, the upper one of which

is shown at 3 and which is provided with the usual central electrode 4. An end cap (not shown) is secured on the base of the casing and establishes contact with the zinc can or outer electrode of the lower cell in the usual manner. The flared end of the casing is externally screw threaded adjacent its end as indicated at 5 and is provided with an inturned flange 6. A reflector 7 is mounted in the end of the casing, the reflector being provided with a flange 8 overlying the flange 6 and separated therefrom by suitable insulating material 9. The usual lens 10 is arranged over the reflector and these parts are held in position by an end cap 11 which has threaded engagement with the threads 5 of the casing as indicated at 12 in the usual manner.

The reflector is provided with a central opening 13 for the reception of a lamp bulb and is further provided with a boss 14 surrounding the central opening and externally threaded. The opening 13 is also provided with a seat 15 to be engaged by a flange 16 formed on the stem 17 of a lamp bulb 18. The lamp bulb is of the prefocused type and the seat 15 is positioned to properly focus the bulb in the reflector when the flange 16 is retained against the seat. The flange 16 is retained against the seat 15 by a sleevelike member 19 which has an inturned flange 20 on its upper end and an out-turned flange 21 on its lower end. This sleeve is retained in position by a cup-shaped member 22 which surrounds it and is provided with threads on its upper end 23 to engage the threaded portion of the boss 14. Adjacent the bottom the cup-shaped member is provided with a shoulder 24 on which the flange 21 of the sleeve rests.

Connection between the central terminal 4 of the battery and the base terminal 25 of the lamp bulb is normally made by a contact member which is adapted to be moved out of contact with the terminal 25 when the lamp bulb breaks. For this purpose the bottom of the cup-shaped member 22 is provided with a central opening. Insulating washers 26 are arranged on opposite sides of this opening and a washer 27 of conductive material is arranged beneath the lower washer 26. These parts are held together by a rivet 28 which in turn contacts with the central terminal 4 of the battery when the parts are assembled. A contact spring 29 is connected to the rivet 28 and extends up into the sleeve 19 when the parts are assembled. The upper end of this spring is adapted to engage a movable lamp contact 30 (see Fig. 5). This contact is carried by a spider 31 having a plurality of arms 32 which extend through slots or openings 33 in the wall of the sleeve 19. The spider is provided with a central opening and insulating washers 34 are arranged above and below the spider. The contact member 30 is crimped into the central opening of these washers to hold the parts assembled.

From the parts heretofore described it will be apparent that contact is normally made between the central terminal 4 of the battery and the terminal 25 of the lamp bulb through the rivet 28, spring 29 and contact member 30 and the spring normally retains the contact member 30 in engagement with the base terminal 25 of the lamp bulb. The other terminal of the lamp bulb is connected to the other terminal of the battery by means of a movable member 35 controlled by a switch (not shown) on the casing and adapted to be moved into and out of engagement with the cup-shaped member 22.

Upon breakage of the lamp bulb the contact 30 is moved away from the central terminal of the lamp bulb to break the circuit as shown in Fig. 2 of the drawing. To accomplish this we provide circuit breaking means comprising a circuit breaker bar 36 which extends over the lamp bulb and is provided with a central coiled portion 37 engaging the tip of the lamp bulb. At each side of the lamp bulb the circuit breaker bar extends downwardly as at 38 and passes through suitable openings 39 in the reflector. The ends of the arms 38 are received in a bushing 40 as indicated at 41. As shown, the bushing surrounds the sleeve 19. A coil spring 42 is arranged between the bushing 40 and a seat 43 formed on the boss of the reflector. This spring is placed under compression when a lamp bulb is in position in the reflector and the parts assembled in their normal position as shown in Fig. 1 of the drawing.

In operation upon breakage of the lamp bulb 18 the coil spring 42 moves the circuit breaker bar 36 downwardly as shown in Fig. 2 of the drawing to break the filament of the bulb and immediately extinguish it. At the same time, this downward movement forces the bushing 40 downwardly causing it to engage the arms 32 of spider 31. Coil spring 42 is stronger than the spring 29 and therefore moves the spider 31 downwardly in the slots of the sleeve 19 as shown in Fig. 2 of the drawing and thus moves the contact 30 out of engagement with the terminal 25 of the lamp bulb. This results in breaking the circuit and therefore prevents further glowing of the lamp filament and possible explosion of flammable gases.

It will be apparent that the lamp bulb is retained in position by engagement of flange 16 and the seat 15 and is positively held in this position by the sleeve 19. The lamp support thus provided is not open to the objection to previous forms of explosion-proof hand lamps wherein the lamp is held in position merely by engagement of the bulb with the circuit breaker bar. Upon breakage of the bulb it does not move and the contact is broken by moving the contact member 30 away from the base terminal.

We claim:

1. A portable hand lamp comprising a reflector having a central opening, the reflector being provided with a seat adjacent said opening and being provided with a threaded boss surrounding said opening, a lamp engaging the seat to properly position it in the reflector, the lamp having a base terminal, a sleeve surrounding the base of the lamp to retain it in position, a yieldable contact mounted in the sleeve and engaging the base terminal of the lamp, a member secured to the threaded boss and engaging the sleeve to retain it in position, a circuit breaking member arranged within the reflector over the lamp bulb, the ends of said member extending through the reflector, and means for causing the circuit breaking member upon breakage of the lamp bulb to move the yieldable contact out of engagement with the base terminal of the lamp.

2. A portable hand lamp comprising a casing, a reflector having a central opening mounted in the casing, the reflector being provided with a seat adjacent the opening and with a threaded boss surrounding the opening, a lamp bulb having a flange engaging the seat and having a base terminal, a sleeve surrounding the base of the lamp and engaging the flange to hold it in position, a yieldable contact mounted in the sleeve and normally engaging the base terminal of the

lamp bulb, a member secured to the threaded boss and engaging the sleeve, a circuit breaking member arranged within the reflector over the lamp bulb, the ends of said member extending through the reflector, and means for causing the circuit breaking member upon breakage of the lamp bulb to move the yieldable contact out of engagement with the base terminal of the lamp.

3. A portable hand lamp comprising a casing, a reflector having a central opening mounted in the casing, the reflector being provided with a seat adjacent the opening and being provided with a threaded boss surrounding the opening, a lamp engaging the seat, the lamp being provided with a base terminal, a sleeve surrounding the base of the lamp to retain it in engagement with the seat, a yieldable contact mounted in the sleeve and engaging the base terminal of the lamp bulb, a member secured to the threaded boss and engaging the sleeve, a contact carried by said member and adapted to engage the central terminal of a battery, a spring between the contact and the yieldable contact member, a circuit breaking member arranged within the reflector over the lamp bulb, the ends of said member extending through the reflector, and means for causing the circuit breaking member upon breakage of the lamp bulb to move the yieldable contact out of engagement with the base terminal of the lamp.

4. A portable hand lamp comprising a casing, a reflector having a central opening mounted in the casing, the reflector being provided with a seat adjacent the opening and being provided with a threaded boss surrounding the opening, a lamp engaging the seat to properly position the lamp bulb within the reflector, the lamp being provided with a base terminal, a sleeve surrounding the base of the lamp and retaining it in engagement with the seat, a yieldable contact mounted in the sleeve and engaging the base terminal, a cup shaped member secured to the threaded boss and engaging the sleeve to retain it in position, a contact carried by the cup shaped member, a spring connected thereto and engaging the yieldable contact, a circuit breaking member arranged within the reflector over the lamp bulb, the ends of said member extending through the reflector, and means for causing the circuit breaking member upon breakage of the lamp bulb to move the yieldable contact out of engagement with the base terminal of the lamp.

5. A device constructed in accordance with claim 4 wherein the sleeve is provided with slots and the yieldable contact is provided with arms extending through the slots to guide the yieldable contact member.

6. A portable hand lamp comprising a casing, a reflector having a central opening mounted in the casing, the reflector being provided with a seat adjacent the opening and being provided with a threaded boss surrounding the opening, a lamp bulb having a flange engaging the seat and having a base terminal, a sleeve surrounding the lamp bulb and engaging the flange to retain the bulb in position, the rear portion of the sleeve being provided with a plurality of slots, a yieldable contact normally engaging the base terminal of the lamp bulb, the yieldable contact being provided with arms extending through said slots, a cup shaped member secured to the threaded boss to retain the sleeve in position, the cup shaped member being provided with a contact, a spring connecting said contact to the yieldable contact, a circuit breaking member arranged within the reflector over the lamp bulb, the ends of said member extending through the reflector, a bushing surrounding the sleeve and secured to the ends of the circuit breaking member, and a spring arranged between the bushing and the reflector whereby upon breakage of the lamp bulb the spring causes said bushing to engage the arms of the yieldable contact and move the yieldable contact out of engagement with the base terminal of the lamp bulb.

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