This invention relates to a safety device for electric lamp assemblies. More particularly the invention relates to a device, including a lamp in an electric circuit, which provides a means for automatically breaking the electric circuit when the lamp is ruptured, so as to expose the filament therein, such means also providing against accidental re-establishment of the circuit prior to the insertion of a new lamp. Specifically, the invention relates to a device of such nature, including means to crush the lamp filament upon rupture of the lamp, and to interrupt the flow of current normally passing through the lamp circuit. It is an object of this invention to provide a device of such nature that, when used in an explosive or inflammable atmosphere, it shall be substantially explosion-proof.

These purposes, and other objects of the invention, not specifically enumerated, may be fully understood from the specifications hereinafter set forth, when read in conjunction with the accompanying drawing, in which:

Fig. 1 is a side elevation showing the support, casing and exterior portion of the operating mechanism in one form of the invention.

Fig. 2 is a plan view of the structure shown in Fig. 1.

Fig. 3 is an enlarged view, in vertical section, of the device according to Fig. 1.

Fig. 4 is an enlarged view, in vertical section of a portion of the device according to Fig. 1 showing the relation of parts upon rupture of the lamp.

Fig. 5 is a section view taken on the line 5—8 of Fig. 3.

Fig. 6 is a side elevation of another form of the invention adapted for use in connection with a conventional lighting system.

Fig. 7 is a detailed view of an alternate form of snuffer for the lamp filament.

Referring to the drawing, and in particular to Figures 1 to 5 inclusive, there is shown, as illustrative of the invention, a device suitable for use in connection with a signal lantern. A bracket or supporting member 1 is provided with a boss 2 on its upper surface, the boss having a neck portion 3 of less diameter forming a shoulder 4. A cylindrical shell or casing 5, the lower edge of which is flanged as at 6, is tightly fitted over the neck 3 with the flange 6 abutting against the shoulder 4. The boss 2 is provided with centrally disposed vertical passageway 7 and an eccentrically disposed vertical guideway 8, both of which open into the casing 5 when that member is applied.

In the upper end of the casing 5, there is a central aperture 9 which is adapted to receive a sleeve 10. The sleeve 10 is preferably formed of a compressible and deformable substance such as rubber to provide a fluid and vapor-tight joint between the edges of the aperture 9 and a lamp socket 11 disposed within the sleeve 10. This sleeve extends upwardly beyond the aperture 9 for a short distance and engages the sidewalls of the lamp 12 threaded into the socket 11. Also in the upper wall of the casing 5, an eccentrically disposed aperture 13 is provided for arrangement in spaced correlation with the guideway 8.

A bolt and nut 14 extending through an opening in a wall of the casing adjustably secures a bracket 15 to said wall, the bracket 15 having a slotted portion 16 engaged by the nut, and an annular disc shaped portion 17 disposed at the upper end of the slotted portion 16 in substantially right angular relation thereto, and supported thereby centrally of the casing.

Above the disc 17 are disposed an annular insulating washer 18, an annular contact disc 19 and the lamp socket 11. Below the disc 17 are disposed an annular insulating washer 20 and a contact disc 21. A rivet 22 passing through the bottom wall of the socket 11, without contact therewith, and insulated therefrom by the washer 23, extends downwardly through the center openings of the members 15, 16, 17, 20 and 21 and serves to rigidly connect these members with the socket 11 with the disc 17, carried by the bracket 15, supporting the assembly. The rivet 22 is of copper or another material which will readily conduct an electric current. The central openings of the discs 17 and 19 are large enough to prevent contact with the sides of the rivet 22.

A wire 22a is secured to the contact disc 19 as by a tab 24 on the disc, as shown in Fig. 4. The wire extends downward in the casing and through the passageway 7, to a source of electric energy. The lamp 12 when threaded into the socket 11 makes contact with the head of the rivet 22.

Disposed in the aperture 13, a sleeve 25 carries a plunger rod 26 in close fitting slidable relation in the sleeve bore, the rod extending downwardly through sleeve and casing, with the lower end of the rod slidably engaging the inner wall of the guideway 8. The upper end of the rod 26 is bent at 27 to form an angularly extending arm 28 which carries a member 29 adapted to engage the curved, upper surface of the lamp 12. The
member 29 may be formed by deformation of the end portion of the arm 28 into a substantially circular shape, with the end 30 extending diametrically across the portion thus formed. Within the casing 5, a rectangular or a round block 31, of non-conductive material such as Bakelite, is secured to the rod 26 at a point intermediate its length, and extends outwardly from the rod in the same direction with and substantially parallel to the rod 28. The block 30 may be rigidly affixed to the rod 26, or may be freely supported thereon as by the fixed collar 31A. A spring member 32 is disposed on the rod 26 with its upper end abutting against the sleeve 25, and its lower end against the member 31. The portion of the member 31 which extends beyond the rod is disposed beneath the disc 21 supported by the bracket 15, and having a passage 33 in its outer end, this member 31 provides a sleeve for a resiliently mounted contact plunger 34.

The upper end of the plunger 34 has a head 35 which is adapted to make contact with the disc 21. A coiled spring member 36 surrounds the plunger 34 abutting at one end against the head 35, and at the other against the block 31. The lower end of the passage 33 extending beyond the block, wire 37 is secured, and extends downwardly from the casing through the passageway 1 to a source of electric energy, and with the wire 24, completing the lamp circuit. By use of this resilient mounting, adjustment of the socket assembly is facilitated, the position of the contact plunger 34 being variable by the action of spring 36. If desired, a manual switch, an automatic blinker switch, or both, may be introduced into the circuit in any conventional manner.

In the form of the invention illustrated by Fig. 6, an adapter for a conventional lamp socket, the general construction involved is identical with that previously described in connection with Figs. 1 to 5 inclusive, with the exception that it may be necessary to provide for angular entry of the rod 26A into the casing 5A in order to avoid contact of the rod with the curved side of the lamp 12A in the socket 11A. The casing 5A while of somewhat different form and provided with a threaded plug connection 30 contains structural elements which are substantially similar to those shown in the casing 5 as illustrated in Figs. 3 and 4.

In Fig. 7, an alternate form for the member 29, of the previous figures, is shown, which form is preferred for use with the adapter shown in Fig. 6. According to this modification, the member 29A carries an extensible spring member 39 having a bar 40 disposed diametrically of its lower end. The spring 39 is normally held compressed within the member 29A when that member is supported on the upper end of the lamp 12A.

As has been stated, the device set forth above is designed to permit the use of an electric lamp in the presence of inflammable vapors, or any other atmosphere of an explosive or combustible nature, without substantial danger of ignition should the lamp be broken, and the filament therein exposed. When a device of the nature set forth is not used, the filament will flash or glow until fused and destroyed, and during such period, may ignite any inflammable material which may be present. This device operates automatically, upon rupture of the lamp, to both break the circuit to the lamp socket and simultaneously fracture the filament of the lamp, snuffing out any residual glow in the exposed filament, and adding to the dissipation of heat in the filament.

Commercial devices have been previously disclosed for accomplishing similar objectives, but in general, they have been dependent upon movement of the lamp or lamp socket to both break the electrical circuit and to fracture the filament of the lamp. Moreover, previous devices of this nature have been rendered unserviceable by the interference with their operation of corrosion, moisture, dirt and glass particles from the fractured lamp. Few, if any, of the devices previously disclosed provided for adjustment of the lamp assembly for the purpose of focusing or otherwise.

The assembly as shown in Figs. 1, 2, 3 and 6, is illustrated as it appears in condition for normal operation, and with the protective device in position and ready to break the electrical circuit if the lamp should be fractured. In this position of the spring 32, acting against the block 31 attached to the rod 26, is urging the rod downward so that the member 29, carried by the rod, presses against the top of the lamp. As long as this condition exists, the head 35 of the plunger 34 is pressed upward by means of the spring 36 into contact with the contact disc 21 which, through the rivet 22, is in electrical contact with the lamp base. The outer shell of the lamp 12 is in contact with the socket member 11 and this member in turn is in electrical contact with the disc 19 to the tab 24 to which one end of the wire 23A is connected. Thus the circuit is completed through the lamp.

If at any time the bulb of the lamp should break there will be nothing to hold the member 29 and the rod 26, to which it is connected, in the raised position shown in Figs. 1, 3 and 6, so that the rod 26 will be forced down instantly by the action of the spring 32. As the rod 26 moves downward in the sleeve 25, it does so very rapidly and sufficiently far to move the head 35 of the plunger 34 entirely away from the contact member 21 and automatically opens or breaks the circuit through the filament of the lamp. This action takes place so quickly whenever the bulb breaks, that the exposed filament will not flash nor glow. Subsequently, the member 29 destroys the lamp filament, breaking it into small pieces from which residual heat is rapidly and safely dissipated. The circuit cannot be re-established accidentally, as a positive action—raising of the rod 26—is required to do so. Obviously the rod will not be raised except upon insertion of a new lamp in the socket 11.

The rod 26 together with its arm 2 is adapted to be turned because the rod is revoluble in the sleeve 25 as well as in the block 31. To replace the destroyed lamp, it is only necessary to grasp the arm 28 and rotate the rod 26 to swing the cross arm away from the lamp socket. Then the broken lamp may be unscrewed from the socket and a new lamp may be screwed into it so that the unbroken bulb of the new lamp projects above the casing. The cross arm 28 may then be grasped and with this arm, together with the rod 26 may be raised by pulling against the tension of the spring 32 and 36 until the arm is level with or above the top of the bulb, whereupon the arm may be turned until the member 23 is in line with and rests upon the top of the bulb, at which time the condition shown in Figs. 1, 2, 3 and 6 will be restored.
When the rod \( 26 \) is thus lifted, the block \( 31 \) moves with it and the head \( 36 \) of the plunger \( 34 \) is pressed against the under side of the contact member \( 29 \) so that the circuit is again completed through the lamp. While the spring \( 32 \) in itself would permit the plunger \( 34 \) to be held in contact with the contact member \( 21 \), it is preferred to provide the spring \( 33 \) for pressing the plunger upward in the manner described above.

From the above it will be apparent that we are able to use an ordinary or standard type of lamp and to screw it firmly in its socket in the same manner that lamps are applied to ordinary or standard sockets. It will also be apparent that the lamp itself is not moved by the circuit breaking device when the bulb breaks and no movement of the bulb there is no possibility of dirt or fragments of the broken bulb getting between the base of the lamp and its socket and interfering with the movement of the lamp. As a matter of fact, no fragments or glass can enter between the base of the lamp and its socket because of the rubber sleeve \( 13 \).

The vertically moving rod \( 23 \) can be moved faster and its movement is more dependable than where the lamp is bodily moved to open the circuit.

In Fig. 3 we have shown the device adapted to be used for protecting any type of electric lamp, that is to say, it is not necessarily employed in connection with a signal lamp but it may be used to protect the circuit of the ordinary lighting lamp in factories, oil works, etc., to protect the lamp from explosion or inflammable vapors or gases may exist. In this form the device is made as an adapter. The shell \( 5c \), preferably of cylindrical form, has a tubular extension \( 3c \) at one end, adapted to be screwed into any ordinary lamp socket in any lighting circuit. At the other end of the casing there is a socket \( 11a \) to receive the base of an ordinary electric lamp \( 12a \). The adapter may be screwed into any lamp socket and the lamp may be screwed into the other end of the adapter after which the rod \( 26c \) and the cross arm \( 30c \) and the rod turned until the member \( 22c \) on the cross arm presses down on the top of the bulb.

The device will then operate in connection with this bulb in the same manner and for the same purpose as the device shown in Figs. 1 to 5 inclusive. With this type of adapter all ordinary lamps may be protected and it is not necessary either to provide a special socket for the adapter nor to provide a special type of lamp. The rod \( 26c \) in this device is preferably disposed at an angle to the axis of the shell in order to pass over the larger diameter of the bulb.

Although, for the purpose of illustration a preferred form of the invention has been set forth above, it is obvious that various alterations and alternative arrangements may be made therein without substantially departing from the inventive concept. And it is not intended that the invention be limited by such illustrative disclosure, but only by the appended claims in which it is intended to claim all novelty inherent in the invention.

We claim:

1. In combination, an incandescent lamp socket, a housing for said socket, a lamp bulb in the socket having a filament supported therein, a quenching element engaging the bulb, and movable in a path extending through the bulb filament, a support member integral with said element, extending into the housing adjacent the socket, disposed for movement substantially longitudinally therein, and resilient means within the housing engaging said member to move the quenching element through the filament upon fracture of the bulb.

2. In a device according to claim 1, a quenching element, comprising a spiral coil element, and an end portion on said element extending diametrically across the inner circle formed by the spiral coil.

3. In a device according to claim 1, a quenching element, comprising a helical coil spring element dependent from said support member at the greatest diameter of said coil, said spring element being normally compressed in nested relation, by engagement with a lamp bulb.

4. In combination, an incandescent lamp socket, a housing for said socket, a lamp bulb in the socket having a filament supported therein, a quenching element end moveable in a path extending through said filament, a support member integral with said element, extending into the housing adjacent the socket, disposed for movement substantially longitudinally therein, an electric circuit through said lamp bulb and socket, and means resiliently carried by said support member within the housing to make and break said circuit, and resilient means within the housing engaging said support member and housing to move the quenching element through the filament, and break the circuit upon fracture of the bulb.

5. A device of the character described, comprising in combination, a housing, a lamp socket integrally supported in said housing, extending outward therethrough, a lamp bulb mounted in a removable fixed relation in said socket, an electric circuit through said bulb and socket, and means disposed within the housing to make and break the circuit consisting of a rotatable rod extending outward through the housing adjacent the socket, an arm on the outer end of said rod to engage the bulb, a support element intermediate the rod within the housing, a contact element in the circuit resiliently mounted in said support, and spring means between the support and housing to hold the arm in contact with the bulb, and move the rod and support substantially longitudinally of the housing upon fracture of the bulb to break said circuit.

6. A device of the character described, including a socket adapted to receive and hold an electric lamp, a member mounted to slide and having means to engage the bulb of a lamp in said socket, spring means for operating said sliding member to cause it to press on the lamp bulb and to move if the bulb breaks, a member carried by said sliding member, a plunger carried by said members, a spring for moving said plunger relatively to said sliding member, a contact member included in circuit with said lamp and in contact with which said plunger is held by its spring, the plunger being adapted to be moved from said contact member when said sliding member is moved by its spring upon the breaking of said bulb.

7. A device of the character described, including a socket adapted to receive and hold an electric lamp, a member mounted to slide and having means to engage the bulb of a lamp in said socket, spring means for moving said sliding member in one direction to cause it to press on the lamp bulb and to move if the bulb...
breaks, a member carried by said sliding member, a plunger carried by said members, a spring for moving said plunger in the opposite direction to the movement of said sliding member by its spring, a contact member included in an electric circuit with said lamp and in contact with which said plunger is held by its spring, the plunger being adapted to be moved from said contact member when said sliding member is moved by its spring upon the breaking of said bulb.

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