United States Patent

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[54] **SAFETY SOCKET**
10 Claims, 4 Drawing Figs.

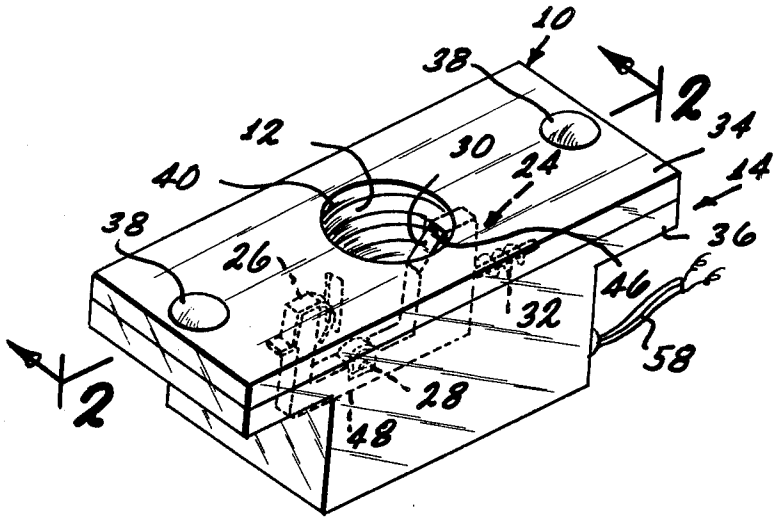
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H01r 33/08, H01r 33/54
[50] **Field of Search** 339/34, 36,
40, 50—56, 75, 176 (L), 180; 200/51.09, 51.14

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ABSTRACT: A socket for an ordinary incandescent lamp which prevents electrical shock if a child sticks his finger into it, comprising an aperture for receiving the base of a lamp and a shuttle which carries an operating arm and a pair of electrical contacts. The shuttle is spring biased to a position wherein the arm lies within the aperture while the contacts are spaced from the aperture. However, when a lamp is screwed into the aperture, it pushes the operating arm and shifts the shuttle so that the electrical contacts move to the aperture to contact the base of the lamp.



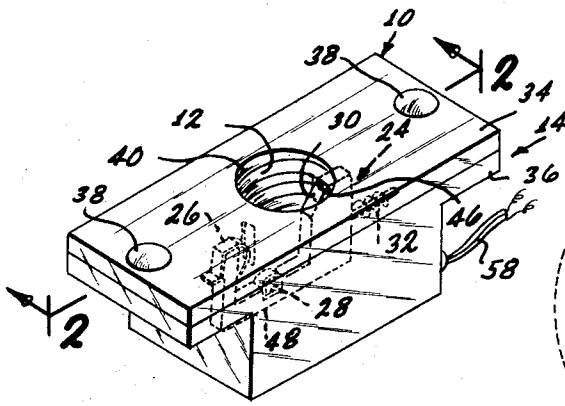


FIG. 1

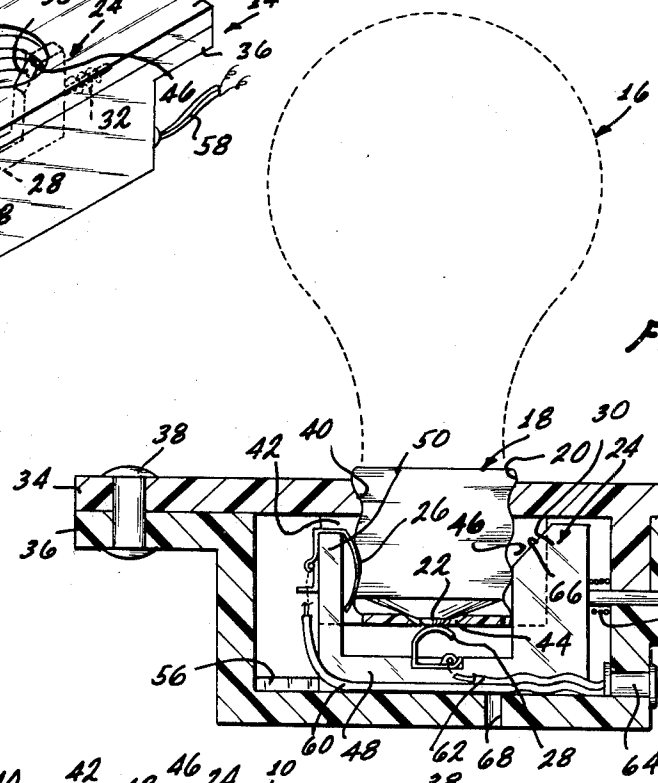
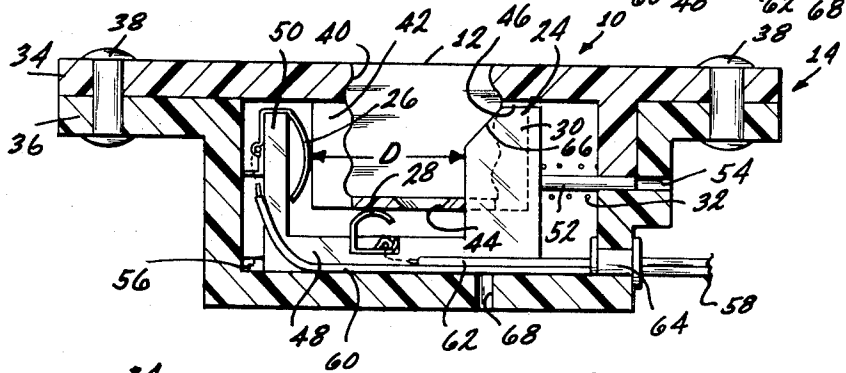


FIG. 3

FIG. 2



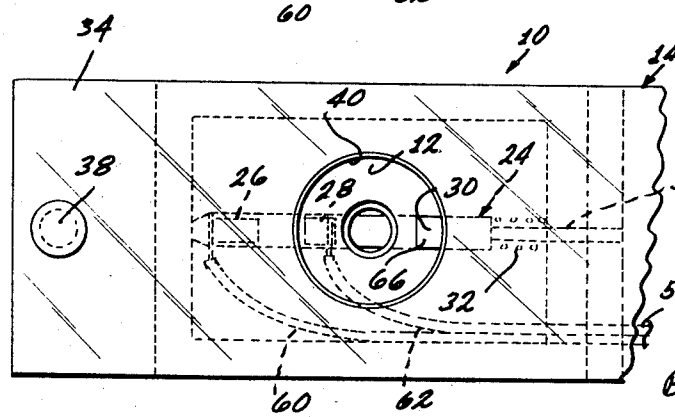


FIG. 4

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SAFETY SOCKET

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to sockets for electrical devices.

2. Description of the Prior Art

Sockets for receiving incandescent lamps are notoriously unsafe, inasmuch as a person can easily stick his finger in a "live" socket and touch the pair of exposed contacts therein so as to receive a painful shock or burn. Safety sockets have been proposed which utilize special bulbs to prevent a person from contacting both terminals when he sticks his finger therein. Such devices are generally unsatisfactory because the requirement for specially designed bulbs limits their usefulness, and because they still allow a person to touch one of the electrical terminals. A socket which allows a person to touch one electrical terminal is not entirely satisfactory because the person may establish a circuit between that terminal and the ground upon which he is standing so as to receive a shock.

A socket with a pair of contacts for supplying current to an electrical device inserted therein, which prevented a person from touching either contact when he inserted his finger into the socket, would greatly reduce the hazards of such sockets. The utility of such sockets would be enhanced if they could receive standard electrical appliances, such as incandescent lamps with screw-type bases. Such lamps generally have metal threads at the base for contacting one terminal of the socket, and a button on the bottom of the base for contacting another socket terminal.

OBJECTS AND SUMMARY OF THE INVENTION

An object of the present invention is to provide a socket for electrical devices, which reduces the likelihood of accidental shock to a person who inserts a finger therein.

Another object is to provide a safety socket for standard screw-type incandescent lamps.

In accordance with the present invention, a socket for incandescent lamps and other devices with wide bases is provided, which prevents shocking of a person who accidentally inserts his finger into the socket. The socket includes a base-receiving aperture and a pair of socket terminals, at least one of which is normally spaced away from the aperture, and an operating arm which is biased to a position within the aperture. When the base of the electrical device is inserted into the aperture, it pushes the operating arm out of the aperture. As the operating arm moves out of the aperture, it moves the socket terminal into the aperture to contact the base.

In one embodiment of the invention, which is particularly useful for receiving incandescent lamps with screw-type bases, the socket has a threaded aperture of nonconductive material. The operating arm is part of a shuttle on which is mounted the two socket terminals which can contact the base of the lamp. The shuttle is spring biased to a position wherein the operating arm protrudes through a slot into the aperture, while both socket terminals are spaced from the aperture, so that a person who sticks his finger into the aperture cannot touch either terminal. However, when a bulb is screwed into the aperture, it pushes the operating arm out of the aperture. This shifts the shuttle so that both socket terminals are moved to a position to contact appropriate parts of the lamp base. The shuttle is constructed so that even if a child sticks his finger into the socket aperture and pushes on the operating arm to shift the shuttle, he cannot easily touch either of the terminals that are moved into the aperture.

The novel features of the invention are set forth with particularity in the appended claims. The invention will best be understood from the following description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a safety socket constructed in accordance with the present invention, shown in nonoperating configuration attained when no lamp is received therein;

FIG. 2 is a sectional view taken on the line 2–2 of FIG. 1;

FIG. 3 is a view similar to that of FIG. 2, but wherein the socket is in an operating configuration attained when a lamp is received therein; and

FIG. 4 is a plan view of the socket of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1, 2 and 4 show the socket 10 prior to the reception of a lamp in an aperture 12 of the socket, when there is a possibility that a child or even a adult may stick his finger into the aperture. The socket includes a housing 14 of electrically nonconductive material, such as an ordinary plastic, with walls forming a threaded aperture at 12 for receiving the base of a common household incandescent lamp. Such a lamp, which is shown at 16 in FIG. 3, has a base 18 with an outer threaded portion 20 of brass or aluminum serving as one lamp terminal, and a central button 22 at the bottom of the base serving as a second lamp terminal. The socket includes a shuttle 24 which carries a pair of socket terminals 26, 28 which can move through openings in the walls of the lamp receiving aperture to contact the terminals 20, 22 of a lamp which has been received in the aperture. However, prior to the reception of a lamp in the aperture 12, the shuttle is in a position where it holds the terminals 26, 28 away from the aperture to prevent a person from touching either socket terminal when he sticks his finger into the aperture.

The shuttle 24 has an operating arm 30 which projects partially into the lamp-receiving aperture prior to the installation of a lamp therein. As a lamp is screwed into the aperture, the lamp pushes against the operating arm 30 to push it out of the aperture against the force of a spring 32. As the operating arm is pushed out of the aperture, the shuttle 24 is shifted so that the socket terminals 26, 28 are moved into the aperture to contact the lamp therein. When the lamp is unscrewed from the socket, the shuttle returns to its former position wherein the socket terminals 26, 28 are spaced from the lamp-receiving aperture. Thus, as a lamp is installed the socket terminals are automatically moved to the lamp-receiving aperture 12 to contact the lamp terminals, and when the lamp is removed the socket terminals are automatically moved away from the aperture.

As shown in FIG. 2, the socket housing 14 includes an upper housing portion 34 and a lower housing portion 36, which are held together by a pair of rivet fasteners 38. The upper housing portion has threaded walls 40 that form the aperture 12 that receives the base of the lamp. The walls 40 have three openings, including an outer terminal opening 42 for receiving the outer socket terminal 26, a center terminal opening 44 for providing access to the central socket termal 22, and an operating arm opening 46, for receiving the operating arm 30 of the shuttle. The shuttle 24 has a carrier portion 48, with the operating arm 30 at one end and a contact-supporting arm 50 at the opposite end. A guide rod 52 extending from the operating arm projects through a hole 54 in the socket housing to guide the shuttle in back and forth sliding. The base 48 moves along a slot 56 in the socket housing to more securely guide the shuttle in sliding movement. The spring 32, which is held on the guide rod 52, urges the shuttle toward a position wherein the operating arm 30 projects to the maximum extent into the lamp-receiving aperture 12.

The socket terminals 26 and 28 are fastened to the arm 50 and carrier 48 of the shuttle by crimping them on or by other means. An electrical cord 58 for carrying current from a household electrical outlet to the socket has a pair of wires 60, 62, with bared ends that are connected to the socket terminals 26, 28 by welding or the like. The cord 58 extends through a crimping grommet 64 in the socket housing, that resists pulling of the cord out of the socket.

As shown in FIG. 3, the insertion of a lamp 16 into the socket causes the shuttle 24 to shift in position. As the bulb is screwed into the socket, it pushes against an inclined surface 66 on the operating arm to push the arm to a position substantially out of the aperture (i.e., at the periphery) and to thereby move the shuttle sidewardly. As the shuttle shifts position, the

outer socket terminal **26** moves through the opening **42** into a position at least at the periphery of the base-receiving aperture **12** to contact the outer lamp terminal **20**. The center socket terminal **28** is also shifted to a position at the center terminal opening **44**, although it is moved to a position opposite the center terminal opening **44** in the aperture walls instead of being positively moved through the walls into the lamp-receiving aperture.

Both socket terminals **26, 28** are constructed of spring material, which allows them to deflect when pressed against the lamp base. The central socket terminal **28** is positioned on the shuttle so that it tends to spring upwardly, and moves partly through the opening **44** when it is positioned opposite the opening. However, contact between lamp terminal **22** and socket terminal **28** is assured by the fact that the central lamp terminal or button **22** projects downwardly into the aperture **44** to contact the central socket terminal even if it should lie below the level of the aperture wall. The outer socket terminal **26** is spaced from the operating arm **30** by a distance D which is slightly less than the outer diameter of the lamp base threads. When the lamp is installed, the terminal **26** deflects against the lamp base to establish good contact with it.

When the socket is unoccupied, so it is in the configuration of FIG. **2**, both socket terminals **26, 28** are spaced from aperture **12**. If a person inserts his finger into the aperture **12**, he will not touch either socket terminal, and therefore will not receive a shock. If a child should not only stick his finger into the aperture, but should also push hard against the operating arm **30** to move the shuttle, he is still unlikely to be shocked because outer socket terminal **26** is located on the opposite side of the aperture **12** from where his finger is, while the center socket terminal **28** generally does not protrude into the aperture. Of course, it is possible to manipulate the socket apparatus so as to cause a shock, but the chance of this occurring accidentally is at a minimum.

The socket illustrated in the FIGS. is not designed to be opened by the consumer to replace the cord **58** or for repairs. It is relatively well sealed, although a hole **68** is provided to allow any water which may be accidentally received to drain out.

Thus, the invention provides a safety socket which resists shocking not only if an adult inserts his finger into the socket when it is "live," but also if a child sticks his finger into the socket and plays with it. The socket not only prevents a person from simultaneously touching both socket terminals, which can lead to the most severe shocks and burns, but also prevents him from touching even one terminal. Touching even one terminal can lead to a shock if that terminal is the one which is above or below ground voltage, and if some other part of the person is grounded, as when he touches a pipe or other grounded structure either directly or through a wet floor. These safety features are provided in a socket which is of simple and economical construction, yet which readily receives ordinary household incandescent lamps.

Although particular embodiments of the invention have been described and illustrated herein, it is recognized that modifications and variations may readily occur to those skilled in the art and, consequently, it is intended that the claims be interpreted to cover such modifications and equivalents.

I claim:

1. A safety socket for receiving an electrical device comprising:

a socket housing having an aperture for receiving an electrical device;

an operating arm mounted on said housing for movement between a first position in the path of an electrical device moving into said aperture and a second position out of the way of said device;

a socket terminal movable between a second position to establish electrical contact with a device in said aperture and a first position to break electrical contact therewith;

means for coupling said operating arm to said socket terminal to move said terminal between its first and second positions as said operating arm moves between its first and second positions, respectively;

means for urging said operating arm toward said first position thereof;

said electrical device having a pair of spaced electrical device terminals for reception in said aperture;

said socket terminal being positioned to make and break contact with a first of said device terminals;

a second socket terminal movable between second and first positions to make and break contact, respectively, with a second of said device terminals; and

means for coupling said operating arm to said second socket terminal to move said second socket terminal between its first and second positions as said operating arm moves between its first and second positions as said operating arm moves between its first and second positions, respectively.

2. A safety socket for receiving an electrical device comprising:

a socket housing having an aperture for receiving an electrical device, said socket housing having first and second openings at opposite sides of said aperture;

an operating arm mounted on said housing for movement between a first position in the path of an electrical device moving into said aperture and a second position out of the way of said device;

a socket terminal movable between a second position to establish electrical contact with a device in said aperture and a first position to break electrical contact therewith, said operating arm and socket terminal being positioned to move through said first and second openings, respectively, in moving between their first and second positions;

means for coupling said operating arm to said socket terminal to move said terminal between its first and second positions as said operating arm moves between its first and second positions, respectively; and

means for urging said operating arm toward said first position thereof.

3. A safety socket for receiving an electrical device comprising:

a socket housing having an aperture for receiving an electrical device;

an operating arm mounted on said housing for movement between a first position in the path of an electrical device moving into said aperture and a second position out of the way of said device;

a socket terminal movable between a second position to establish electrical contact with a device in said aperture and a first position to break electrical contact therewith;

means for coupling said operating arm to said socket terminal to move said socket terminal between its first and second positions as said operating arm moves between its first and second positions, respectively; and

means for urging said operating arm toward said first position thereof;

said aperture defining threads having a predetermined outer diameter;

said means for coupling comprising a shuttle slidably mounted on said housing;

said operating arm and socket terminal being mounted on said shuttle at opposite sides of said aperture and at a spacing slightly less than the outer diameter of said threads; and

said socket terminal being constructed to deflect when pressed against a device in said aperture.

4. A safety socket for receiving an electrical device comprising:

a socket housing having an aperture for receiving an electrical device;

an operating arm mounted on said housing for movement between a first position in the path of an electrical device moving into said aperture and a second position out of the way of said device;

a socket terminal movable between a second position to establish electrical contact with a device in said aperture and a first position to break electrical contact therewith;

means for coupling said operating arm to said socket terminal to move said terminal between its first and second positions as said operating arm moves between its first and second positions, respectively; and

means for urging said operating arm toward said first position thereof;

the walls of said aperture being constructed of a material which is substantially electrically nonconductive, said walls having an opening therein for permitting the passage of said socket terminal into and out of said aperture to directly touch and break contact with said electrical device, respectively.

5. A safety socket for receiving a lamp or other device having a threaded base with thread walls that serve as one device terminal and a button on the bottom of the base that serves an another device terminal, comprising:

a socket housing having walls forming a threaded aperture for receiving said base, said walls having first and second openings at opposite sides thereof;

a member having an operating arm and a first socket terminal, said member movably mounted on said socket housing for movement between a first position wherein said operating arm projects into said aperture while said first terminal is spaced from said aperture, and a second position wherein said first terminal is at least at the periphery of said aperture to contact said base while said arm is substantially out of said aperture;

means for biasing said member toward sad fist position; and

a second socket terminal.

6. The safety socket described in claim 5 wherein:

said walls forming a threaded aperture include a third opening at the bottom thereof for receiving said button of said device; and

said second socket terminal is mounted on said member for movement between a position spaced from said third opening when said member is in said first position and a position at said third opening when said member is in said second position.

7. A safety socket for receiving a lamp having a threaded base that serves as a first lamp terminal and a button on the bottom of the base that serves as a second lamp terminal, comprising:

a socket housing having walls forming a threaded aperture for receiving said lamp base, said walls having an operating arm opening therein;

a shuttle slidably mounted on said housing, said shuttle having an operating arm at one end for movement through said opening in said aperture walls, and a socket terminal at an opposite end for movement into and out of electrical contact with said first lamp terminal as said operating arm moves substantially out of and into said aperture, respectively; and

means for biasing said shuttle toward a position wherein said operating arm is within said aperture.

8. The safety socket described in claim 7 wherein;

said aperture walls are constructed of a substantially electrically nonconductive material, and have a second opening opposite said operating arm opening; and

said socket terminal is mounted on said shuttle for movement through said second opening in said aperture walls to directly contact a lamp base within said aperture.

9. The safety socket described in claim 7 including:

a second socket terminal mounted on said shuttle for movement between a first position to establish electrical contact with the second lamp terminal of a lamp base within said aperture and to break electrical contact therewith, as said operating arm moves substantially out of and into said aperture, respectively.

10. The safety socket described in claim 9 wherein:

said walls of said aperture include a central hole at the bottom of said aperture for receiving said second lamp terminal of a lamp received in said aperture; and

said second socket terminal is mounted for movement between a first position in alignment with said opening at the bottom of said aperture walls and a second position out of alignment with said opening.