

1

3,120,986

INDICATING LAMP DEVICE

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Filed May 22, 1962, Ser. No. 196,648

4 Claims. (Cl. 339-45)

This invention relates to indicating lamp devices and has particular relation to indicating lamp devices employing miniature lamps.

In recent years indicating lamp devices have found wide application in association with high speed computers to provide a visual indication of the state of electrical circuits in such computers. In such applications a very large number of indicating lamp devices may be associated with a computer and it frequently is necessary that the lamp devices be mounted very close together to occupy a minimum amount of panel space. It is also desirable that the lamp devices project a minimum distance from the front surface of the mounting panel.

To satisfy the above requirements very effective miniature lamps have been developed which may be panel mounted with less than one inch between lamp centers and with approximately three-eighths inch projection from the panel front surface. It can be appreciated that in such installations considerable difficulty has been encountered in removing the lamps from their mounting sockets for replacement or other purposes. The problem of lamp removal is particularly troublesome when the lamp includes a rounded bulb and is of the plug-in type requiring the application of an axial force on the lamp to remove it from its socket. It is practically impossible to remove such lamps from their sockets without the use of special tools which are designed specifically for such purpose and which are relatively expensive.

It is therefore a primary object of the invention to provide an indicating lamp device including a lamp-receiving socket of novel and improved arrangement permitting rapid removal of a lamp from the socket without requiring the use of special lamp-gripping tools.

It is another object of the invention to provide a plug-in socket for receiving a miniature lamp with the socket having a unique configuration permitting rapid removal of a lamp therefrom without the use of special lamp-gripping tools.

It is a further object of the invention to provide a lamp device including a plug-in socket to receive a miniature lamp and having a specially-shaped surface adapted to receive a readily available element, such as the pointed end of a pencil, for applying a force to a mounted lamp effective to quickly eject the lamp from the socket.

In carrying out the invention in one preferred form a lamp device is provided including a socket adapted to receive a miniature lamp by movement of the lamp axially of the socket into plug-in engagement with spaced terminals mounted at the bottom of the socket. The socket includes an annular inner wall which defines a lamp-receiving passage opening at an end wall of the socket, and the inner wall has its inner surface adjacent the end wall sloped outwardly at an angle to the axis of the passage. The end wall of the socket is formed with a depression providing an inclined surface which extends to the sloped inner wall and which has a greater angle of inclination than the sloped inner wall relative to the socket passage. The inclined surface is configured to permit insertion and manipulation of a common element, such as the pointed end of a conventional pencil, in the space between the lamp bulb and the inner wall of the socket to establish an axial force component on the bulb acting to eject the lamp from the socket.

Other objects and advantages of the invention will become apparent from the following description taken

2

in conjunction with the accompanying drawings in which:

FIG. 1 is a view in side elevation showing a plurality of indicating lamp devices of the present invention mounted on a panel;

FIG. 2 is a view in top plan of a socket forming part of one of the lamp devices of FIG. 1.

FIG. 3 is a view showing the socket in section taken along the line 3-3 of FIG. 2 with a lamp therein; and

FIG. 4 is a view showing the socket in section along the line 4-4 of FIG. 2 with a lamp therein and illustrating the manner of removing the lamp from the socket.

Referring now to the drawings there is illustrated in FIG. 1 a plurality of indicating lamp devices represented generally by the number 10 and mounted on a suitable support such as a panel 11. Each of the devices 10 is of similar construction and includes a socket 12 for receiving a miniature lamp 13 by a plug-in connection so that the lamp 13 is insertable and removable from the socket 12 by movement thereof in vertical directions as viewed in FIG. 1. Suitable caps C are attached to the socket 12 to enclose the exposed portion of the lamp 13.

The lamp 13 may be of any suitable type and is preferably of the type known as a General Electric miniature lamp No. 12 pin type bulb. The lamp 13 includes a filament 14 connected to spaced terminals 15 which are frictionally received in sockets 16 formed on connectors 17 detachably mounted by the socket 12 as will presently appear. The filament 14 is surrounded by a glass bulb 18 having a generally spherical upper portion and which is sealed at the terminals 15.

The construction and configuration of the socket 12 are best shown in FIGS. 2-4. As there shown, the socket 12 is formed of a suitable insulating material and has an annular inner wall 20 defining a central passage 21 extending slightly more than half way throughout the axial length of the socket. The passage 21 opens at the upper end of the socket 12 as viewed in FIG. 3 at an enlarged end wall 22 of generally square configuration as viewed in FIG. 2. When the socket 12 is operatively positioned with respect to the panel 11, the lower surface of the end wall 22 is adapted to engage the upper surface of the panel 11 as shown in FIG. 1, with the remaining part of the socket extending through an opening of the panel 11. The socket 12 is secured to the panel 11 in any suitable manner.

As best shown in FIG. 3, the inner wall 20 of the socket 12 includes an annular surface portion 23 adjacent the open end of the socket which is sloped outwardly at an angle to the axis of the passage 21 of the socket 12, and in the illustrated embodiment the angle of slope of the surface portion 23 is approximately twenty-three degrees. The lower portion of the socket 12 is formed with two spaced parallel passages 24 which open at the bottom wall 25 of the socket 12 and which communicate with two enlarged parallel passages 26 defined by an annular shoulder 27 formed on a central part of the socket. The passages 26 in turn communicate with the main passage 21 which is enlarged with respect to the passages 26 by an annular shoulder 28 formed on the inner wall of the socket.

The socket connectors 17 are mounted by inserting them through the open end of the socket 12 and through the main passage 21 into the openings 24 so that the ends 29 of the connectors 17 extend through the openings 24 externally of the socket 12, and the sockets 16 of the connectors are positioned within the passages 26. The connectors 17 are retained in such positions by bending the ends 29 thereof outwardly and downwardly as shown in FIGS. 1 and 3. The connectors 17 are loosely mount-

3

ed by the socket 12 which permits transverse movement of the lamp 13 relative to the socket 12.

To assemble the lamp 13 relative to the socket 12 the lamp is inserted into the passage 21 so that its terminals 15 project into the sockets 16 of the connectors 17 in press fit relation whereby the connectors 17 serve to mount the lamp and to provide electrical connections thereto. In order to remove the lamp 13 from the socket 12 it is necessary to apply a force to the lamp 13 acting axially thereof in an upward direction as viewed in FIGS. 1, 3 and 4.

When a large number of the units 10 are mounted in closely spaced relation on the panel 11 it becomes quite difficult to effect removal of a lamp 13 with respect to its socket 12, and in many instances such removal requires the application of specially constructed tools to the lamp. Removal of a lamp 13 from its socket by finger manipulation is practically impossible due to the close spacing of the units and due also to the fact that the upper part of the bulb 18 is rounded and projects a very small distance beyond the outer surface of the end wall 22 of the socket. The very close spacing between the bulb 18 and the adjacent surface portion 23 of the socket and the comparatively small angle of inclination of the surface portion 23 act to prevent insertion and manipulation of an element in such small space in a manner effective to move the lamp upwardly and detach its terminals 15 from the sockets 16 of the connectors 17.

In accord with the present invention the socket 12 is configured so as to permit the insertion of a readily available common element between the bulb 18 and a surface of the socket 12 at an angle such that the lamp can be readily ejected from its socket by simple manipulation of such element when inserted. For this purpose the socket 12 is formed with an opening communicating with the passage 21 to receive a common element, and in the illustrated embodiment such opening is in the form of one or more depressions or guide surfaces 30 formed in the socket end wall 22 adjacent the corners thereof to extend to the sloped surface portion 23 with an inclination which is greater than the inclination of the surface portion 23. In the illustrated embodiment the surface 30 forms an angle of approximately fifty-one degrees with the axis of the passage 21. While a pair of diametrically opposed surfaces 30 are shown in FIGS. 2 and 4, it is understood that more or less of such surfaces may be provided as desired.

When the lamp 13 is mounted within the socket 12, it is observed with reference to FIGS. 3 and 4 that an inwardly and downwardly curved surface portion 31 of the bulb 18 is positioned adjacent the sloped surface portion 23 and is spaced by a very small distance from the surface portion 23. Each of the depressions 30 is configured to permit insertion therethrough of a readily available element, such as the pointed end of a pencil 33, into pressure contact with the bulb surface 31 to establish a force acting on the lamp to displace it upwardly relative to the socket 12 as viewed in FIG. 4.

In FIG. 4 the pointed end of the pencil 33 is shown wedged between the bulb surface 31 and the inclined surface portion 23 of the socket 12 so as to establish a force acting on the bulb 18 which urges the bulb toward the left to the position shown in FIG. 4 against the inclined surface portion 23, such movement of the bulb being permitted by the loose mounting of the connectors 17 in the socket 12. The surface portion 23 against which the bulb is thus moved produces a force acting on the bulb, and these forces applied to the bulb produce a resultant force component acting upwardly on the bulb 18 as viewed in FIG. 4 which effects upward displacement of the lamp 13 relative to the passage 21 of the socket 12. The more severely inwardly curved lower surface 35 of the bulb 18 is thereby moved upwardly to allow deeper insertion of the pencil point and subsequent pivoting of the pencil in the direction of arrow 34 into contact with

4

the surface 30. The point of the pencil is thereby pivoted upwardly against the surface 35 to completely detach the terminals 15 of the lamp from the sockets 16 of the connectors 17.

While the ejecting element is shown in the form of a conventional pointed pencil 33, it can be appreciated that other elements may be employed. It is thus seen that an arrangement has been provided according to the invention to greatly facilitate the removal of a miniature lamp from its plug-in socket without the employment of special tools which are comparatively expensive and which may not be readily available.

While I have shown and described particular embodiments of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from my invention in its broader aspects and I, therefore, intend in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A lamp device comprising a socket having an end wall and an inner wall defining a lamp-receiving passage opening at the end wall, said inner wall having its inner surface adjacent the end wall sloped outwardly at an angle to the axis of the passage, and a lamp adapted for insertion and withdrawal into and out of the passage through the open end wall, said socket including means for retaining the lamp in inserted position, said lamp when inserted being releasable from said means for retaining in response to application to the lamp of a force acting axially of the passage toward the open end wall, said lamp having a bulb with an annular surface portion positioned adjacent and slightly spaced from said sloped inner wall portion when the lamp is inserted, said end wall having an opening communicating with said passage to receive an element for movement toward the passage axis into contact with said bulb and to permit manipulation of a received element for establishing an axial force component on said lamp acting to eject the lamp from the socket.

2. A lamp device comprising a socket having an end wall and an inner wall defining a lamp-receiving passage opening at the end wall, said inner wall having its inner surface adjacent the end wall sloped outwardly at an angle to the axis of the passage, and a lamp adapted for insertion and withdrawal into and out of the passage through the open end wall, said socket including means for retaining the lamp in inserted position and for permitting movement of a retained lamp transversely of the socket, said lamp when inserted being releasable from said means for retaining in response to application to the lamp of a force acting axially of the passage toward the open end wall, said lamp having a bulb with an annular surface portion positioned adjacent and slightly spaced from said sloped inner wall portion when the lamp is inserted, and an inclined surface on said end wall extending to said sloped inner wall portion and having a greater angle of inclination than said sloped inner wall portion, said inclined surface being configured to receive an element for movement into pressure contact with said bulb surface to displace said lamp transversely of the socket against the sloped inner wall portion to establish an axial force component acting on said lamp to eject the lamp from the socket.

3. A lamp device comprising a socket having an enlarged end wall and an annular inner wall defining a lamp-receiving passage opening at the enlarged end wall, said inner wall having its inner surface adjacent the end wall sloped outwardly at an angle to the axis of the passage, and a lamp adapted for insertion and withdrawal into and out of the passage through the open end wall, said socket including means for retaining the lamp in inserted position, said lamp when inserted being releasable from said means for retaining in response to application to the lamp

5

of a force acting axially of the passage toward the open end wall, said lamp having a bulb with a rounded portion extending beyond the end wall and with an annular surface portion curved inwardly and downwardly toward the bottom wall of the socket and positioned adjacent said sloped inner wall portion when the lamp is inserted, said end wall having an opening communicating with said passage to receive an element for movement toward the passage axis into contact with said annular bulb surface and to permit manipulation of a received element to establish an axial force component on said lamp acting to eject the lamp from the socket.

4. A lamp device comprising a socket having an enlarged end wall of generally square configuration and an annular inner wall defining a lamp receiving passage opening at the enlarged end wall, said inner wall having its inner surface adjacent the end wall sloped outwardly at an angle to the axis of the passage, and a lamp adapted for insertion and withdrawal into and out of the passage through the open end wall, said socket including means for retaining the lamp in inserted position and for permitting

6

movement of a retained lamp transversely of the socket, said lamp when inserted being releasable from said means for retaining in response to application to the lamp of a force acting axially of the passage toward the open end wall, said lamp having a bulb with a rounded portion extending beyond the end wall and with an annular surface portion curved inwardly and downwardly toward the bottom wall of the socket and positioned adjacent said sloped inner wall portion when the lamp is inserted, and an inclined surface on said end wall adjacent a corner thereof extending to said sloped inner wall portion and having a greater angle of inclination than said sloped inner wall portion, said inclined surface being configured to receive an element for movement into pressure contact with said bulb surface to displace said lamp transversely of the socket against said sloped inner wall portion to establish an axial force component acting on said lamp to eject the lamp from the socket.

No references cited.