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LAMP BASE AND SOCKET

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This invention relates to an improved lamp base and socket structure in which very accurate adjustment and positioning of the lamp and the beam emitted thereby are obtained and maintained in service, notwithstanding jars, vibration and other impacts or forces tending to cant or tilt the lamp and disrupt the adjustment, and in which, when like lamps are interchanged or replaced in the socket, the previous adjustment and positioning of the inserted lamp and the beam emitted thereby are retained.

The invention is especially applicable, although not limited thereto, to arc discharge lamps in which a highly concentrated "point" light source may be projected for considerable distances to impinge upon a target, screen or other medium. Such a projected beam, which may be made highly directional, may also be used for signaling purposes, the beam being modulated at a transmitting station in accordance with the signals to be transmitted, and received and detected at a distance by a radiant energy receiving station on which the beam is focused or towards which it is directed. The position of the source of light or radiant energy, and the beam emanating from the lamp, must be very accurately adjusted and maintained in such adjustment when in use in order that the signaling beam will produce the optimum effect desired at the receiving end. In the lamp base and socket structures heretofore employed, the lamp has been held in its socket or base by various means such as screw threads, prongs, bayonet sockets and the like, but such structures do not prevent undesired canting, tilting or other misalignment of the lamp due to accidental jars or vibration when the lamp is in service. Also, such lamps require replacement at intervals, and the replacement of lamps usually has caused serious misalignment or variation in the former adjustment of the projected beam.

An object of the present invention is a lamp base and socket in which the adjustment difficulties of the prior structures are obviated, and which is capable of producing and maintaining accurately in service a desired predetermined adjustment of the lamp and the beam projected thereby.

Another object is a structure of the character disclosed which enables lamp replacements to be made without disturbing the former adjustment, and with which no special skill is required to insert the lamps so that the desired adjustment obtains.

Still another object is a lamp base and socket

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having the foregoing advantages and which requires only a small departure from the conventional cylindrical lamp base and socket structures at present in use.

Other objects and advantages of the invention will be apparent from the following detailed description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a view, in elevation, of a cold cathode discharge tube or lamp of the concentrated-arc type, having a base constructed in accordance with the principles of the instant invention;

Fig. 2 is a view, partly in section, of a socket embodying the invention, the socket being adapted to receive and position the lamp of Fig. 1;

Fig. 3 is an enlarged view, partly in section, of the lamp when inserted in the socket of Fig. 2, showing the lamp as viewed in the direction of the arrow A in Fig. 1; and

Fig. 4 is a top plan view, looking down on Fig. 3, with the socket shown in full lines and parts of the lamp omitted for the sake of clarity.

Referring particularly to Fig. 1 of the drawings, the lamp there illustrated is a cathode arc discharge tube comprising a sealed envelope 10, composed of glass, quartz or other suitable heat-resistant material, depending upon the wattage of the lamp. The envelope encloses two spaced electrodes 12 and 13, the electrodes being supported by a suitable arbor structure which includes the conductive supporting rods or posts 14 and 15, the rods being welded, brazed or otherwise mechanically and electrically connected to lead-in wires 16 and 17 that pass through and are supported by the press 18 of the tube, the lead-in wires being hermetically sealed in the press in known manner. The rod 14 and conductor 17, which form one side of the lamp circuit, are connected to the cathode 12, and the rod 15 and conductor 17, which comprise the other side of the lamp circuit, are connected to the circular anode 13 of the lamp. Surrounding the posts 14 and 15 are circular metal bushings 25, the bushings being received within holes in a cross-brace 26 of insulating material. For simplicity, other details of the arbor structure usually employed in such a lamp are omitted.

In the cathode arc discharge device shown, the envelope of the lamp contains a quantity of a suitable gas or vapor, depending upon the color or type of radiation desired, and the arc strikes to the tip of the cathode 12, providing a cathode spot of intense brilliance at or near the cathode tip, the beam of light or radiant energy being projected through an aperture or sight 13a in the

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anode 13, as indicated by the dot-and-dash line x in Fig. 1. The envelope at its lower end is embedded and sealed within a generally cylindrical base 20, preferably of insulating material, such as a phenolic condensation product or other suitable base material, and embedded in the base are metallic connecting prongs 21, 22 and 23. In the lamp shown, the lead-in wire 16 is electrically connected to the prong 21, and the lead-in wire 17 is electrically connected to the prong 22; the prong 23 is connected when a three-electrode tube is used instead of the two-electrode tube illustrated. The base 20 of the lamp also has a recessed portion or tapered hole 27, Figs. 1 and 3, in the periphery thereof, which recessed portion comprises one of the positioning and supporting means when the lamp is inserted in the socket as hereinafter described.

Fig. 2 shows the lamp socket which comprises a cylindrical body portion 29 composed of a phenolic condensation product or other suitable insulating compound, the body having a cylindrical wall portion 30 for receiving the base 20 of the lamp when inserted therein. Embedded in the body 29 are metallic tubes or sheaths such as 31 to 33, Figs. 2 and 4, which receive the prongs 21 to 23 with a frictional fit for connecting the lamp terminals to an external circuit, the ends of the members 31 to 33 having circuit conductors such as 34 and 35 soldered or otherwise electrically secured thereto. The wall portion 30 of the socket has a tapped hole which receives a retractile supporting member, such as a threaded screw 40, the screw being advanced or retracted through the aperture in the wall, by means of a knurled nut 41 secured to the outer end of the screw for turning the latter. The inner end of the screw 40 has a conical point 42 which is adapted to enter the complementary apertured portion 27 of the base 20 of the lamp and position the same when the lamp is inserted in the socket, as shown in Figs. 3 and 4. Referring to Figs. 1, 3 and 4, it will be seen that the outer curved surface of the base 20 of the lamp has a recessed area 45 which, in the form illustrated, is a generally flat surface extending along one side of the cylindrical body 20 for the entire length thereof. The intersection of the outer cylindrical surface of the lamp base and the recessed or flat area 45 forms two supporting edges 46 and 47, Figs. 1 and 4, extending along the entire height of the base 20 and forming line contact surfaces with the inner wall of the shell 30 against which the portions 46 and 47 abut when the lamp is in position in the socket. These contact edges 46 and 47 together with the recessed tapered portion 27, which is firmly engaged by the end 42 of the securing screw 40 when the lamp is within the socket, cause the lamp base to be supported firmly at three spaced points or places, that is, at the point 27 and the edges 46 and 47. Preferably, and as shown, the point 27 lies substantially on a line which is perpendicular to and bisects the base 45 extending between the edges 46 and 47, and the three points of support define an isosceles triangle with equal sides 27, 46 and 27, 47, shown in dot-and-dash lines in Fig. 4, the point 27 representing the apex of the triangle. By reason of the triangular arrangement of the supporting portions 27, 46, 47, the position and adjustment of the lamp and the light beam projected therefrom is rigidly and accurately secured in a predetermined position, both as to the height of the lamp in the socket and the angular position of the lamp in the socket,

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it being understood that the socket is firmly mounted in proper position on a supporting structure. No particular skill is required of the person inserting or replacing the lamp in the socket, since all that is necessary is to insert the lamp and advance the screw 40 so that the point 42 enters and firmly engages the complementary apertured portion 27 of the base, and the supporting portions 46 and 47 of the base will automatically be caused to abut and be supported in proper position by the inner circular wall of the socket shell 30 due to the thrust imposed by the screw 40 on the lamp base 20 at the apex of the isosceles triangle formed by the three points of support. The line contact portions 46 and 47 engage the shell 30 throughout their length and prevent canting or tilting of the lamp in service.

The spacing between the bottom of the lamp base 20 and the bottom 30a of the socket is sufficiently large so that a slight clearance is present when the end 42 of the screw 40 has entered and seated within the recessed portion 27 of the lamp base. With the triangular supporting arrangement disclosed, it has been found in practice that the position of a reinserted or replacement lamp will be accurate within one ten-thousandth of an inch relative to the previous position of the lamp, and that notwithstanding accidental jars, vibration and other forces tending to distort or change the adjustment, the latter remains true and constant. Thus, any substantial deviation in any direction of the beam x projected by the lamp or tube is obviated, even though the tube is taken out for inspection and reinserted or replaced by a like tube.

The recessed portion 45 of the tube base preferably is flat, but it will be appreciated that it need not be a flat or plane surface so long as there is sufficient clearance between this portion of the base and the adjacent inner wall of the shell 30 as to enable the edge portions 46 and 47 to abut or contact the wall of the socket for properly positioning the lamp base within the socket.

In the embodiment of the invention illustrated herein the supporting surfaces 27, 46 and 47 are so spaced relative to each other as to define an isosceles triangle, and such an arrangement is preferable. In its broader aspect, however, the invention is not limited thereto, since irrespective of whether the supporting surfaces are so spaced as to define a triangle which is isosceles or otherwise, nevertheless the line contact surfaces 46 and 47 engage the shell 30 throughout their length in such manner as to firmly wedge and hold the lamp within the socket and prevent tilting or canting of the lamp once it is inserted in the desired position. Also, it is to be understood that the lamp base and the receiving socket may have configurations other than circular or cylindrical and yet substantially retain the advantages of the invention.

For brevity in the specification and claims, the word "lamp" is employed in a generic sense to define a lamp, electric discharge tube or like device, and irrespective of whether the radiant energy emitted by the device is within the visible spectrum or without the visible spectrum as, for example, within the invisible infrared portion of the spectrum. Also, it will be understood that the invention may be employed advantageously with lamps or tubes for purposes other than projecting radiant energy beams, such as rectifiers, relays and tubes for various other purposes in which accurate adjustment and maintenance of

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the lamp or tube in a predetermined operating position is desirable or necessary.

While there is shown and described herein a particular embodiment of the invention for the purpose of illustration, many other and varied forms and uses will present themselves to those versed in the art without departing from the invention, and the invention is, therefore, not limited except as indicated by the scope of the appended claims.

We claim:

1. A lamp base and socket for receiving and maintaining a lamp accurately in a predetermined adjusted position in the socket, said socket having a curved inner wall for receiving the lamp base, lamp base retractile supporting means positioned at a point in said wall, said lamp base being generally cylindrical and having three supporting portions spaced in triangular arrangement about the outer curved surface of the base, two of said supporting portions respectively comprising edge portions extending longitudinally along the base for abutting against the inner curved wall of the socket, and the third supporting portion of the base being disposed opposite said two supporting portions and engageable by the retractile supporting means positioned in the wall of the socket.

2. A lamp base and socket for receiving and maintaining a lamp accurately in a predetermined adjusted position in the socket, said socket having a hollow cylindrical wall portion and supporting means at a point in said wall portion for engaging said lamp base, said lamp base having a generally cylindrical form with a recessed area extending along one side of the cylinder, said base having three supporting portions thereon spaced in triangular arrangement about the peripheral surface thereof, two of said supporting portions comprising edge portions formed by the intersection of the cylindrical surface and said recessed area of the base and adapted to extend longitudinally along and abut against the inner curved wall of the socket, and the third

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supporting portion of the base being engageable by said supporting means in the wall of the socket and positioned opposite the said two edge portions of the base.

3. A lamp base and socket for receiving and maintaining a lamp accurately in a predetermined adjusted position in the socket, said socket having an inner curved wall and retractile supporting means positioned at a point in said wall for engaging said lamp base, said lamp base having a generally curved peripheral surface with a plane recessed area extending along one side of the base, said base having three supporting means thereon spaced in triangular arrangement about the peripheral surface of the base, two of said supporting means of the base respectively comprising edges formed by the intersection of the curved surface and said plane recessed area and adapted to extend longitudinally along and abut against the inner curved wall of the socket, and the third supporting means comprising an apertured portion in the peripheral surface of the base and positioned opposite the said two supporting means of the base, said apertured portion being engageable by said retractile supporting means in the wall of the socket.

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