

Aug. 6, 1940.

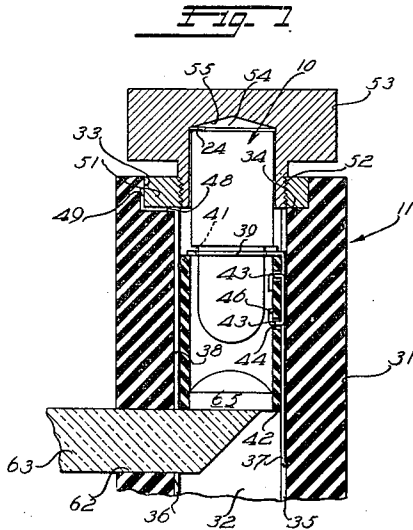
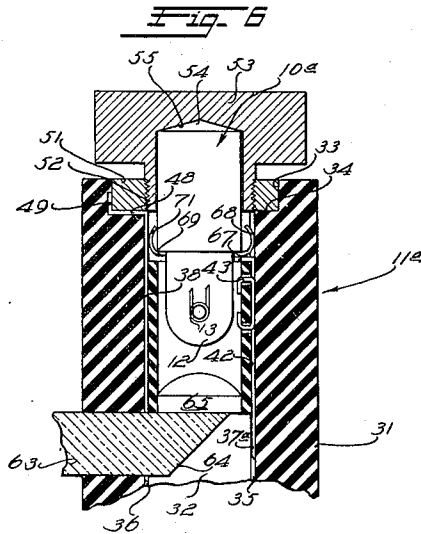
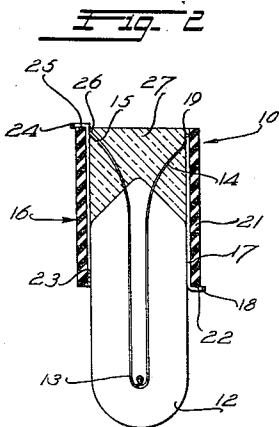
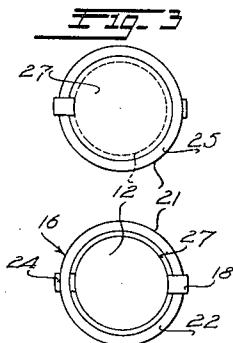
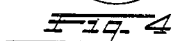
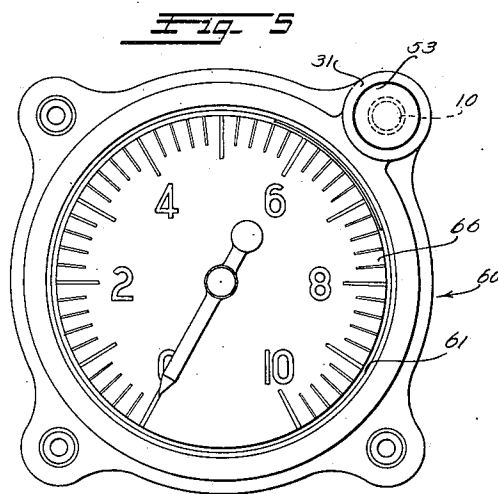
M. KLEIN ET AL

2,210,764

MINIATURE BULB AND SOCKET CONSTRUCTION

Filed Nov. 29, 1939

2 Sheets-Sheet 1



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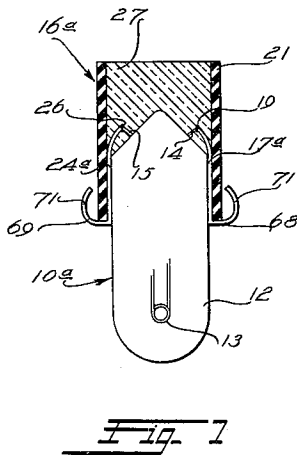
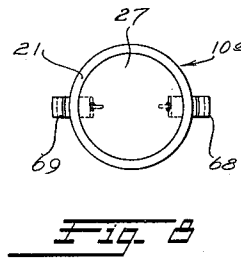
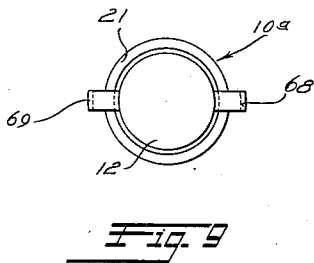
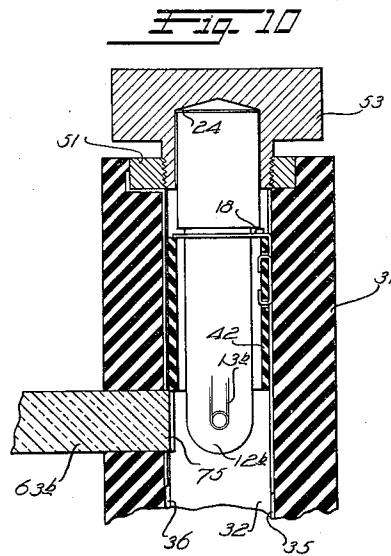
M. KLEIN ET AL

2,210,764

MINIATURE BULB AND SOCKET CONSTRUCTION

Filed Nov. 29, 1933

2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

2,210,764

MINIATURE BULB AND SOCKET  
CONSTRUCTION

Maximilian Klein, Sellersville, and William E. Pfeffer, South Perkaskie, Pa., assignors to United States Gauge Company, Sellersville, Pa., a corporation of Pennsylvania

Application November 29, 1938, Serial No. 243,047

10 Claims. (Cl. 176—32)

The present invention relates to a novel electric bulb and socket structure. More particularly, the present invention relates to a novel miniature lamp bulb and socket structure adapted for use in the illumination of dial and pointer instruments, inscribed or decorative panels, small electrical inspection and medical instruments, and devices of like characteristics.

Electrical bulbs of the above mentioned character are extremely small having an overall length of approximately one-half an inch and a diameter of approximately one-eighth of an inch. As a result of the small size of these bulbs, difficulty has been experienced in assembling the glass bulb with its extremely fine filaments in the bulb base.

It is, therefore, the primary object of the present invention to provide an exceedingly simple base structure that will enable ready assembly and connection of the glass bulb and filament, and convenient connection of the lamp to the instrument casing by means of a cap with which the lamp is removably associated.

A further important object of the present invention resides in the provision of an electric lamp and base assembly capable of being inserted into a socket portion so as to make contact with the socket forwardly of the base of the lamp or adjacent the end of the bulb that contains the filament.

A further object of the present invention resides in the provision of an electrical lamp made up of four relatively simple parts designed to be held in assembled relation with each other and with the glass bulb by a suitable cement.

Still another object of the present invention resides in the provision of a novel socket adapted to receive a miniature light bulb.

A further object of the present invention resides in the construction of a lamp socket having a permanent contact for one terminal of the bulb and a readily removable contact designed to complete the circuit to the other terminal of the bulb and to secure the bulb in snug engagement with the socket.

Further objects of the invention will appear from the following description when read in conjunction with the appended claims and attached drawings, wherein:

Figure 1 is a transverse sectional view through a bulb socket made in accordance with the present invention and a preferred form of bulb in assembled relation therein illustrating one method of employing the present bulb and socket structures;

Figure 2 is a transverse sectional view of the

bulb assembly of Figure 1 illustrating the manner of insulating the contact elements from each other and of securing the glass bulb in place;

Figure 3 is a plan view of the bulb of Figure 2 as viewed from the front of the bulb;

Figure 4 is a plan view of the bulb of Figure 2 as viewed from the rear of the bulb;

Figure 5 is a plan view of a dial and pointer instrument illustrating an application of the method of illumination disclosed in Figure 1;

Figure 6 is a view similar to Figure 1, illustrating a modified form of bulb made in accordance with the present invention.

Figures 7 to 9 are views corresponding to Figures 2 to 4 illustrating the modified form of bulb shown in Figure 6; and

Figure 10 is a view similar to Figure 1, illustrating a further modification of the bulb structure used in another manner to illuminate an instrument such as that shown in Figure 5.

With continued reference to the drawings wherein like reference numerals are used to indicate the same parts throughout the several figures, numeral 10 indicates generally a lamp made in accordance with the present invention, and numeral 11 indicates generally the novel socket of the present invention.

Lamp 10 comprises a glass bulb 12 having the usual filament 13 therein and protruding filament connections 14 and 15 extending from the rear of the glass bulb. Glass bulb 12 is preferably manufactured in accordance with well known practices and is assembled with the novel bulb base assembly 16 of the present invention in the following manner.

Base assembly 16 comprises a metal contact 17 composed of a relatively narrow strip of metal having a flange 18 at one end thereof. Contact 17 comprises one contact element for lamp 10 and is connected to filament lead 14 by a suitable soldering operation at 19.

After contact 17 is connected to filament lead 14 it is forced into an insulating sleeve 21 and the shoulder 18 is brought into abutting relation with end 22 of sleeve 21.

The assembled glass bulb 12, contact 17 and sleeve 21 is then provided with a further contact 23 having a flange 24 at one end thereof. Contact 23 is identical in structure to contact 17 and is forced into the opposite end of sleeve 21 at a point substantially diametrically opposite contact 17 until flange 24 abuts end 25 of sleeve 21. Filament lead 15 is then soldered to sleeve 23 at 26.

The space surrounding glass bulb 12 and the rear of sleeve 21 is then filled with an insulating

cement 27 by pouring the cement in its plastic condition into the open rear end of sleeve 21. Cement 27 completely fills the space between glass bulb 12 and sleeve 21 so as to unite these elements and contact strips 17 and 23 together. From the above description it will be clear that bulb 10 is made of relatively few and simple parts, and that, due to the fact that the various parts are readily accessible during the assembly operation, very little difficulty is experienced in making the soldered connections 19 and 26, and in assembling the glass bulb 12 with its base 16.

While lamp 10 may be used in any suitable socket structure, the socket structure 11 of the present invention is preferred. Socket 11 comprises a body portion 31 of insulating material having a bore 32 therein. The upper end of bore 32 is preferably enlarged as at 33 to provide an annular shoulder 34. At suitable points in the interior of body 31 the walls of bore 32 are provided with longitudinally extending grooves 35 and 36. Grooves 35 and 36 receive electrical conduits 37 and 38, which are connected in any suitable manner to a source of electrical energy.

Conduit 37 preferably constitutes the live conduit and is provided with an annular contact portion 39 having a centrally disposed opening 41 therein. In order to properly position contact 39 in bore 32, conduit 37 is secured to an insulating sleeve 42 by means of arms 43 which pass through suitable apertures 44 in the wall of sleeve 42. Arms 43 are bent over so as to clamp sleeve 42 at 46. Sleeve 42 with conduit 37 secured thereto is then inserted into bore 32, preferably from the lower end, and forced upwardly through bore 32 until contact 39 is at the proper level. While a frictional fit between sleeve 42 and bore 32 is usually sufficient to retain the sleeve in proper position, suitable cement may be used.

Contact 38 in groove 36 extends beyond the shoulder 37 and is then bent over to provide a portion 48, in engagement with shoulder 34, and a portion 49 in engagement with the wall of enlarged portion 33 of bore 32. A metal ring 51 having internal threads 52 therein is positioned in enlarged portion 33 and clamps portions 48 and 49 of conduit 38 in place. Metal ring 51 may be associated with body 31 in any suitable manner. It is preferable that ring 51 fit enlarged bore 33 snugly so as to be retained by friction, but it may be cemented in place.

Ring 51, in the illustrated embodiment, is adapted to receive an externally threaded metal cap 53 having an internal bore 54 therein. Bore 54 freely receives base 16 of lamp 10, and the tapered walls 55 thereof engage contact 24 and force lamp 10 into snug engagement with contact 39. Cap 53 in addition completes the return circuit from filament 15, contact 24 to metal ring 51, and conduit 38.

The bulb and socket structure just described is particularly useful in illuminating inscribed panels or dials, such as those used on radio receiving and sending sets, and pressure and like dial and pointer instruments. A typical installation is shown in Figure 5. In this figure a recess 31 is provided in the instrument body at one side of an instrument 60, and said recess forms the socket already described. The wall of instrument 60 is provided with an aperture 62 interconnecting bore 32 and the interior 61 of the instrument. Aperture 62 may receive a prism 63, one edge of which extends into bore 32 and provides a totally reflective surface 64. Surface 64 is lo-

cated directly below sleeve 42 so that light rays from lamp 10 may be reflected from surface 64 through the body of prism 63 into instrument casing 66. To assure proper projection of the light rays, the lower end of sleeve 42 may carry a bull's eye lens 65, which causes the normally divergent rays of light from lamp 10 to pass out of lens 65 and strike surface 64 as parallel rays.

The rays reflected by surface 64 pass through the body of prism 63 and into the edge of a light transmitting panel or dial 66.

The rays entering dial 66 are diffused in suitable manner throughout the body of the dial so as to illuminate the markings and numerals on the dial face. A preferred method of diffusing the light and illuminating such a dial is illustrated in the copending application of Maximilian Klein and William E. Pfeffer entitled "Illuminating indicating instruments" Serial No. 243,045, filed on even date herewith.

Although the preceding description contemplates that the body 31 be of insulating material, it will be appreciated that body 31 may be formed of metal provided conduit 37 is suitably insulated therefrom. If such a structure is resorted to, ring 51 and conduit 38 may be omitted and cap 53 may be screwed directly into the metal body portion which can be connected in a suitable manner to the ground lead of the electrical source and serve to complete the electrical circuit.

A modified form of the present invention is illustrated in Figures 5 to 8, inclusive. In this form of the invention many of the parts are identical to those previously described and will be given the same reference numerals and the detailed description thereof will be omitted.

Lamp 10a comprises a glass bulb 12 having the usual filament 13 therein and protruding filament connections 14 and 15 extending from the rear of the glass bulb. Base assembly 16a comprises an insulating sleeve 21 and spring metal contacts 17a and 24a formed from relatively narrow strips of metal. Filament lead 14 is connected by a suitable soldering operation to contact 17a at 19 while contact 24a is similarly connected at 26 to filament lead 15.

Glass bulb 12 with contacts 17a and 24a connected thereto is then inserted into sleeve 21 and the sleeve is filled with cement 27 by pouring the cement in its plastic condition into the open rear end of bulb assembly 10a. The cement 27 completely fills the space between the glass bulb 12 and sleeve 21 to connect these elements and contact strips 17a and 24a into a unitary assembly.

While lamp 10a may be used in any suitable socket structure, socket structure 11a similar in all respects to socket 11, except for the live contact indicated by numeral 37a, is preferred. Contact 37a comprises a relatively narrow strip of metal extending upwardly through groove 35 and secured to sleeve 42 by means of arms 43 in the manner heretofore described. The annular contact 39, however, is omitted and the upper end of contact strip 37a is bent over the end of sleeve 42 to provide a contact element 67.

Lamp 10a is inserted through the upper end of bore 32 and contact portion 68 at the end of contact 17 engages contact 67 to complete the circuit to bulb 10a. Contact portion 69 at the end of contact strip 24 engages conduit 38 at a point slightly above sleeve 42 to complete the return circuit from lamp 10a.

Contact portions 68 and 69 are bowed outwardly at 71 and are compressed as the bulb 10a is in-

serted into bore 32. These contact portions, therefore, will flex outwardly due to the spring material and bear upon the wall of groove 35 and conduit 38, respectively, to retain lamp 10a in bore 32.

The circuit in this form of the invention is completed through lamp 10a without passing through cap 53 and ring 51. As a consequence, these parts, although illustrated as being of metal, may be formed of any suitable material, including insulating material, without affecting the operation of lamp 10a and ring 51 may, if desired, be omitted.

Cap 53 in this form of the invention, through surfaces 55, serves to press bulb 10a closely upon contact 67 to assure a good contact at this point and prevent accidental injury to the bulb base which otherwise would be exposed.

A further modified form of the invention is disclosed in Figure 10. In this form of the invention, the socket structure and bulb structure are identical to that shown in Figures 1 through 4, except that the glass bulb portion is elongated to provide a glass bulb 12b having a filament 13b therein. The bulb's eye lens 65 is omitted and a prism 63b having a vertical light transmitting face 75 in place of reflecting surface 64 is provided. Face 75 coincides with the vertical wall of bore 32. As seen in Figure 10 the coiled portion of filament 13 is disposed directly opposite face 75 and substantially centrally of bore 32. As a consequence, filament 13 for all practical purposes constitutes a point of illumination, and the rays of light therefrom radiate in all directions. Certain of these rays pass through face 75 and prism 63b into the edge of the dial to effect illumination in the manner heretofore pointed out.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. A lamp and cap assembly, consisting in a cap having a cup-like body, a finger grip portion surrounding the closed end of said cup-like body, and a threaded portion for securing said assembly in a socket, a lamp having a base freely fitting in the open end of said cup-like body with the bulb protruding therefrom, said lamp having a positive contact extending along beside said body beside a portion of said protruding bulb beyond said body and the adjacent end of said base and a negative contact for completing the circuit through said lamp.
2. The lamp and cap assembly defined in claim 1 wherein said negative contact extends along a portion of said protruding bulb and beyond said body and the adjacent end of said base in spaced relation to said positive contact.
3. The lamp and cap assembly defined in claim 1, wherein said negative contact extends beyond the other end of said base in position to be gripped between the inner end wall of said cup-like body and said base.

4. An electric lamp consisting of a sealed bulb and a filament having ends projecting from the bulb, an insulating sleeve having a portion thereof telescoped on said bulb, a pair of contacts within said sleeve connected to the ends of said filament, one of said contacts having an exposed end protruding from and lapping one end of said sleeve and the other contact having an exposed end protruding from and lapping the other end of the sleeve, and cementitious material filling said sleeve beyond said portion providing a base having one contact at the back of said sleeve and another contact forwardly of said sleeve.

5. An electric lamp, comprising a bulb having a filament, contact strips disposed at opposite sides of said bulb and connected to said filament, an insulating sleeve surrounding a portion of said bulb and said strips, one of said contact strips extending rearwardly beyond one end of said sleeve and having its extending end bent over to form a contact at the exposed end of said base and the other contact strip projecting forwardly beyond the other end of said sleeve and having its extending end bent over to form a contact between the ends of said bulb.

6. An electric lamp, comprising a bulb having a filament, contact strips disposed at opposite sides of said bulb and connected to said filament, an insulating sleeve surrounding a portion of said bulb and said strips, said contact strips projecting forwardly beyond the end of said sleeve and having their extending ends reversely bent around the end of said sleeve to form spring contacts for frictionally retaining said lamp in assembled relation in a socket.

7. A lamp socket, consisting in a recess in a non-conducting housing of an instrument or the like, an insulating sleeve disposed in said recess and having one end terminating a substantial distance inwardly from the face of said housing or the like, an electrical contact in the form of a ring secured to said sleeve and overlapping said end of said sleeve, and a second electrical contact in the form of a ring embedded in said housing in spaced relation to said first contact, said last named ring being disposed adjacent the face of said housing and having threads to receive a cap for securing a lamp in place, and electrical conductors extending along opposite walls of said recess, said conductors being connected with said rings respectively.

8. The lamp socket defined in claim 7, wherein said first contact consists of a ring abutting said end of said sleeve.

9. The lamp socket defined in claim 7, wherein said first contact comprises a relatively narrow shoulder abutting said end of said sleeve.

10. An electric lamp, comprising a bulb having a filament, contact strips at opposite sides of said bulb and connected to said filament, an open-ended insulating sleeve surrounding said strips and telescopically receiving approximately one half the length of said bulb, said sleeve protruding beyond one end of said bulb to provide an open recess for receiving a suitable cementitious material, and cementitious material filling said recess and the space between said bulb and sleeve to firmly unite said bulb, said contact strips and said sleeve into a unitary lamp assembly.

MAXIMILIAN KLEIN.  
WILLIAM E. PFEFFER.

4

CERTIFICATE OF CORRECTION.

Patent No. 2,210,764.

August 6, 1940.

MAXIMILIAN KLEIN, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, lines 57 and 58, claim 1, strike out the words "beside said body beside"; and second column, line 29, claim 6, for "insulting" read --insulating--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 10th day of September, A. D. 1940.

(Seal)

Leslie Frazer,  
Acting Commissioner of Patents.