HEADLAMP FOR PHYSICIANS AND SURGEONS


Application November 1, 1951, Serial No. 254,277

18 Claims. (Cl. 128—22)

The present invention relates to headlamps for physicians and surgeons, and more particularly to an improved headlamp assembly for effectively illuminating the field of observation of a patient. It is essential in certain medical procedures that the physician or surgeon have his hands free for manipulating various surgical, diagnostic or therapeutic instruments, and at the same time, that the particular area of the patient which the physician or surgeon is treating or observing be adequately illuminated. For these purposes, doctors have hitherto customarily utilized such devices as a reflector or head mirror carried by an adjustable head band which is mounted on the doctor's head to reflect light from a separate lamp or light source onto the objective to be observed.

It is a primary object of the present invention to provide a headlamp for physicians and surgeons which is capable of intensely illuminating an object with a beam of light that is substantially shadow-free or in which shadows are reduced to a minimum, thereby greatly facilitating the surgical, diagnostic or therapeutic treatment, as the case may be.

Another object is to provide such a headlamp which enables clear and unobstructed vision of an object through light openings of improved shape and arrangement provided in the reflector supporting part of said headlamp, and giving the user greater side visibility than is usually allowed in the case of conventional headlamps hereinafter used in the medical field.

A further object is to provide a headlamp which is universally mounted in an improved manner on a supporting band adapted to be secured about the head of the user.

Still another object is to provide a headlamp for physicians and surgeons which retains the foregoing objects by means of an improved construction which comprises a combination of elements which are so arranged as to be readily assembled and/or disassembled with facility, and when assembled, being exceptionally strong and durable and including a reflector portion surrounding a light source or electric bulb, whereby an intense light in which shadows are reduced to a minimum is provided by the utilization of the direct light from the bulb in combination with the reflected or indirect light from the reflector, with both the direct and the indirect light focused on a common field of appropriate area at the usual working range when mounted on the head of the user.

Other objects and advantages of the invention will be hereinafter described and the novel features thereof defined in the appended claims.

In the drawings:

Figure 1 is a top plan view of a headlamp made in accordance with the invention;

Figure 2 is a view of the assembly in front elevation;

Figure 3 is an enlarged view in vertical section, as taken approximately on the line 3—3 of Figure 2, with certain of the parts shown in elevation;

Figure 4 is a view in transverse, vertical section, as taken on the line 4—4 of Figure 3, looking in the direction of the arrows;

Figure 5 is a view in horizontal section, as taken on the line 5—5 of Figure 4; and

Figure 6 is a view in perspective of the rear closure plate for the base of the lamp, this closure also being adapted to coat with the base to relieve any strain from the electrical connections in the base.

Like reference characters designate corresponding parts in the several figures of the drawings, wherein 1 designates a flexible headband having suitable means, such as a conventional buckle 2, for adjusting the size of the headband to fit the head of a physician, surgeon or the like, who is using the headlamp. The front of the headband 1 is preferably provided with a cushion or pad 3 which is adapted to contact the forehead of the user of the headlamp. Also mounted on the front portion of the headband 1 is a supporting plate 4, this plate being secured to the band 1 by means of a suitable number of fasteners, such as rivets 5, which extend through the plate 4, the headband 1, and into a rigid plate 6 at the inner side of the band 1, thereby clamping the headband 1 intermediate the plates 4 and 5.

Carried by the supporting plate 5 is a supporting post member 7 which is preferably provided with a ball head 8 at its outer end, the ball 8 having a pair of oppositely disposed pivot pins 9 extending outwardly therefrom on diametrically opposite sides thereof. Pivotedly mounted for upward and downward movements on the respective pins 9 is a pair of links 10, the outer or free ends of these links each having a small opening forming a recess 11, whereby to universally engage a ball 12 of a supporting member or arm 13, an adjusting or clamping screw 14 preferably being provided for adjusting the frictional contact between the links 10 and the balls 8 and 12 to thereby provide a universally adjustable support which is sufficiently rigid or stiff to support
the weight of the lamp assembly hereinafter more fully described in detail, while allowing the lamp assembly to be easily adjusted relative to the headband 1, as may be required during or preliminary to use of the same.

The lamp assembly as shown in the drawings, comprises a lamp base 15 which is preferably made of "Brakelite" or other suitable insulating material, although any other desired material may be utilized, if preferred, with a laterally or upwardly offset portion 16. The rear end of the base 15 is provided with an open recess 17 which extends laterally through the offset portion 16, the recess 17 being deepened in the portion 16 to form a depression 18. Adapted to close the recess 17 is a specially constructed closure plate member 19 which includes a disc-like portion 20 which is adapted to seat on a shoulder 21 formed on the base 15 about the periphery of the opening 17. The closure 19 has a laterally offset portion 22 which is complementarily formed to the portion 16 of the base 15 to form a circular neck portion. The offset portion 22 of the closure 19 is provided with a projection 23 which is adapted to engage an electrical conductor cord 24 and to deform the conductor cord 24 and depress the same into the depression 18 to relieve any strain on the electrical terminals 25 within the base, incident to any strain or pull on the conductor cord which would tend to strain or break the electrical connections at the terminals 25. The closure 19 is preferably held in conductor-cord-clamping or depressing position by means of an annular band or ferrule 26 which is adapted to encircle the neck forming portion 16 of the base 15 and the portion 22 of the closure 19. In addition to the ferrule 26, the closure 19 is held in place by means of a suitably headed screw fastener 27 which projects through the portion 28 of the closure into an enlargement 28 of the shoulder 21, a partition 29 extending diametrically across the opening 17, but inclining downwardly from the portion 28 of the shoulder 21 between the split or forked end of the conductor cord 24 which is connected to the terminals 25.

As is best shown in Figures 1 and 2, the conductor cord 24 is preferably supported on the headband 1 by means of a suitable number of strain-relief bushings 30 which are suitably secured to the headband, these strain-relief bushings being of any desired construction, such as, for instance, like that disclosed in the Klumpp patents, No. 2,424,758 or No. 2,424,759. Sufficient slack is left in the portion of the conductor cord 24 between the lamp base 15 and the nearest strain-relief bushing 30 to permit the lamp assembly to be adjusted relative to the headband, as limited by the extent of movement of which the supporting member 13 and the links 16 are capable. The end of the conductor cord 24 farthest from the lamp assembly is suitably secured to a connector member 31 which is adapted to engage a connector 32, the latter being connected to another conductor cord 33 leading from a suitable source of electric current, such as an ordinary electrical outlet (not shown).

The forward or front end of the base 15 is provided with a cylindrical projection 34 forming and adapted to fit axially with a centrally screw-threaded hub 35, this hub 35 being centrally formed on a radially extended shell 36 and preferably being an integral part thereof. The shell 36 is provided with a pair of sight openings 37 disposed on the respective opposite sides of a central partition 38, these sight openings being of substantial size and extending arcurately upwardly from the opposite sides of the partition 38 around the hub 35, thereby affording a relatively wide range of side visibility as well as forward visibility.

Disposed about the outer periphery of the shell 36 is an auxiliary reflector portion 39 which is disposed at an angle relative to the central axis of the shell, this portion 39 also preferably being curved slightly in radial section, as seen in Figure 3. The hubs 35, shell 36, partition 38 and reflector portion 39 are preferably formed as an integral unit made of a suitable transparent material, such as, for instance, "Lucite" or the like, and the rear surface of the reflector portion 39 is preferably coated with a suitable light reflective material, as indicated at 40 in Figure 3. For protecting the reflective coating 40, there is provided an opaque plastic shield 41, preferably formed of "Temnite" or other suitable material, and conforming to the form of the reflector portion 39. The shield 41 is preferably secured about the portion 39 by means of a suitable number of ears or tabs 42, these ears extending radially inward from the shield 41 and behind the shell 36 so as to be secured to the body of the shell 36, as by means of plastic pins 43, or the like, which are suitably headed to clamp the tabs 42 against the back of the shell 36.

As best seen in Figure 3, the base 15 is provided with a lamp bulb-receiving opening 44 having a pair of diametrically opposite, longitudinally extended open slots 45 adapted to slidably receive a conventional lamp bulb 46 having laterally projecting positioning pins 47, the pins 47 being slidable in the slots 45 to thus properly position the lamp bulb contacts relative to the base contacts, each of which includes a bushing 48 having a conductive sleeve 49 which houses a spring-pressed ball contact 50 adapted to make electrical contact with one of the conventional spaced contacts on the base of the lamp bulb. Each ball contact assembly is in electrical connection with one of the terminals 25, and is preferably sealed in place by a suitable cement such as litharge and glycerine or the like, so as to make the base 15 explosion-proof.

Preferably carried by the hub 35 of the shell 36 is a hollow lens member 51 having a screw-threaded shank 51' threadedly engaged with the hub 35, and tightly fitting therein in gas-tight relation thereto so as to make the lens assembly explosion-proof, with a resilient compression spring 52, or the like, disposed intermediate an interior shoulder 53 within the lens and the glass envelope of the lamp bulb 46 for urging the contacts of the lamp bulb into electrical contact with the balls 50.

The lens 51 includes a radially enlarged longitudinally arched or curved light-directing lens portion 54 extending in a generally axial direction from the shank 51', this portion 54 merging into a substantially hemispherical lens portion 55 extending axially from the portion 54. The lens 51 generally surrounds the lamp bulb 46, the lens portion 56 being adapted to direct light from the lamp bulb 46 directly forward or axially onto an objective to be illuminated and observed by the user of the headlamp. The reflector 39 is so formed as to reflect the light which is radially directed by
the lens portion 54, onto the objective. Thus it is apparent that an observer may view an object illuminated by the lamp bulb 46 through the sight openings 37 in the shell 36, the illuminating means, including the lamp bulb 46, the lens 51, and the annular reflector portion 59, being so constructed and arranged as to illuminate the object both directly, by means of the lens portion 55, and indirectly, by means of lens portion 54 and reflector 39, from a single source of light, with an intense light in which shadows are reduced to a minimum.

A shield 57 may be interposed between an exterior annular shoulder 56 on the lens 51 and the shell 36, this shield 57 preferably being made of an opaque plastic material and being cemented or otherwise secured to the shell 36 for preventing the light from glaring back into the eyes of the user of the headlamp. Another annular opaque shield 57 may be used, if desired, in addition to or in lieu of shield 57, said shield 57 being tightly held between mounting band 60 and the rear face of the shell 36, and serving to prevent light emission from any exposed corners of the mounting hub 35 of the shell.

To facilitate the assembly of the headlamp, the hub 35 is provided with an axially extended peripheral groove 58 extending therearound and also with an axially extended keyway or slot 59 formed in the base of the groove 58, the keyway 59 being open at its rear end or the end adjacent to the base 15. Disposed in the groove 58 is a band 60 which encircles the hub 35, this band 60 having the supporting member 13 secured thereto, as by means of a headed fastener member 61 projecting into the keyway 59 and thus locking or restraining the supporting member 13 and the hub 35 against rotation relative to the base 15.

In use, a physician, surgeon, or the like, can adjust the headband 1 by means of the adjustable buckle 2 to securely support the weight of the headlamp in a position directly in front of his eyes, the universally connected balls 8 and 9, links 10, and supporting member 13 enabling a wide range of universal adjustment, as may be required. With the conductor 33 connected to said source of power or the lamp bulb 46 will be illuminated, and the lens 51 will directly project the light by means of lens portion 54 and reflector 39, and also directly project the light by means of lens 55, on an object to be observed, as controlled by required adjustments of the headlamp or movements of the user's head.

The resultant illumination of the object will be intense and clear, and the user will be able to readily and clearly observe the object through the sight openings 37 in the shell 36, thus greatly facilitating surgical, therapeutic, or other operations. The opaque shields 41, 47 and 57 will preclude any light from glaring or being reflected into the user's eyes. If desired, the user may swing the lamp assembly upward to an out-of-the-way position until it is again needed.

While the specific details of the invention have been herein shown and described, changes and alterations may be made without departing from the spirit thereof as defined in the appended claims.

We claim:

1. In a headlamp for physicians, surgeons and the like, the combination with a headband, of a lamp base, means universally mounting said lamp base on the headband, a radially extended shell carried by said lamp base, said shell including an annular reflector and also including a central partition extending diametrically across the shell, said shell having a sight opening formed therein on each side of said partition, a lamp mounted in said base, an electrical conductor extending into said base and electrically connected with said lamp, and a lens surrounding said lamp, said lens having means for directing light from said lamp axially onto an object to be observed and also having means for directing light from said lamp radially to said reflector, said reflector being disposed so as to reflect the light from the last-mentioned means onto said object.

2. A headlamp as defined in claim 1, wherein the lens comprises a centrally disposed light-projecting lens portion and a radially enlarged light-directing lens portion.

3. A headlamp as defined in claim 1, wherein said central portion includes a hub, and said base includes a complementary hub portion, said hubs being connected together one within the other.

4. A headlamp of the class described, comprising a lamp base, a radially extended shell carried by said lamp base, said shell including a central partition extending diametrically across the same and an annular reflector disposed about the outer periphery thereof, said shell also having a sight opening therethrough on the respective opposite sides of said partition, a lamp bulb located centrally of said shell, means for establishing electrical contact between said lamp bulb and an electrical conductor, and lens means surrounding said lamp bulb for directing light directly forward onto an object and for directing light radially to said reflector, the reflector being disposed so as to reflect the light from said lamp bulb onto said object.

5. A headlamp as defined in claim 4, wherein the lamp base and the shell include complementary hub portions, said hub portions being cooperatively interengaged one within the other for securing the shell to said lamp base.

6. A headlamp as defined in claim 4, wherein the lamp base and the shell include complementary hub portions, said hub portions being cooperatively interengaged one within the other for securing the shell to said lamp base, and the lens means including a lens having a shank portion mounted on one side of said hub portion.

7. A headlamp as defined in claim 4, wherein the lamp base includes an exteriorly threaded hub, and the shell includes a complementary interiorly threaded hub, said hubs being connected together by said threads with the lamp base hub disposed within said shell hub.

8. A headlamp as defined in claim 4, wherein the lamp base includes an exteriorly threaded hub, and the shell includes a complementary interiorly threaded hub, said hubs being connected together by said threaded shank portion of said shank portion engaged with the threads in said shell hub.

9. A headlamp as defined in claim 4, wherein said shell is made of a transparent material, the annular reflector having on its sides coated with a light-reflective material, and an opaque reflector cover carried by said shell and disposed about the coated side of said annular reflector.

10. A headlamp as defined in claim 4, wherein said shell is made of a transparent material, the lens means including a lens having a shank portion connected with said shell, and an opaque shield disposed about said shank portion for
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Shielding the eyes of the user when the headlamp is in use.

11. A headlamp as defined in claim 4, wherein the lamp base includes a portion having an electrical conductor-receiving opening, connecting means for the conductor disposed in said opening, a removable closure for said opening, said lamp base having a depression therein, and said closure having a projection extending into said depression for deforming the conductor to relieve any strain from said connecting means incident to strain on the conductor, and means for securing said closure across said opening.

12. A headlamp as defined in claim 4, wherein the lamp base includes a portion having an electrical conductor-receiving opening, connecting means for the conductor disposed in said opening, a removable closure for said opening, said lamp base having a depression therein, and said closure having a projection extending into said depression for deforming the conductor to relieve any strain from said connecting means incident to strain on the conductor, said lamp base and said closure each having an offset portion together forming an offset conductor inlet neck, and a band slidably engageable about said neck for securing said closure across said opening in strain-relieving cooperation with said conductor.

13. A headlamp as defined in claim 4, wherein the lens means includes a lens having an axially extended light-directing portion and a radially enlarged light-directing portion.

14. A headlamp as defined in claim 4, wherein the lens means includes a lens having a shank, a radially enlarged and longitudinally curved light-directing portion extending axially from said shank, and a hemispherical portion extending axially forward from said light-directing enlargement.

15. A headlamp of the class described, comprising a lamp base, a radially extended shell carried by said lamp base, said shell having sight openings therethrough and also having an annular reflector about the outer margin thereof, said base having a lamp socket formed therein, a lamp bulb axially slidable into and out of said socket, electrical contact means carried by said base, a hollow lens carried by said shell, said lens surrounding a portion of said lamp bulb, and resilient means interposed between said lens and said lamp bulb for urging said lamp bulb into contact with said electrical contact means, said electrical contact means being adapted to be electrically connected to an electrical conductor.

16. A headlamp of the class described, comprising a lamp base, a hub on said base, a radially extended shell having an annular peripheral reflector and having sight openings therein, said shell also having a hub complementary to the hub on said base, said hubs being detachably connected together one within the other, one of said hubs having a groove extending therearound and also having an axially extended keyway in the base of said groove, said keyway being open at one end, a band extending around the hub having the groove and seated in said groove, a lamp base-supporting member, a fastener member fastening said supporting member to said band, said fastening member having a portion projecting into said keyway for restraining said supporting member and the hub having the keyway against relative rotative movement, and illuminating means carried by said lamp base, said illuminating means and the annular reflector being so arranged as to illuminate an objective both directly and indirectly, when observed through the sight openings in the shell aforesaid, with an intense light.

17. A headlamp as defined in claim 16, wherein an opaque shield is disposed about the central portion of said shell, said shield being secured against the rear face of said shell by said band.

18. A headlamp of the class described, comprising a lamp base, a radially extended transparent shield carried by said lamp base, said shield including a central partition extending diametrically across the same and an annular reflector disposed about the outer periphery thereof, said shell also having a sight opening thereon on the respective opposite sides of said partition, a lamp bulb located centrally of said shell, means for establishing electrical contact between said lamp bulb and an electrical conductor, lens means surrounding said lamp bulb for directing light directly forward onto an object and for directing light radially to said reflector, the reflector being disposed so as to reflect the light from said lamp bulb onto said object, and an annular opaque shield disposed about the central portion of said shell for shielding the eyes of the user when the headlamp is in use.

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