April 28, 1959 R. H. GILLER 2,884,513

MEDICAL HEADLIGHT

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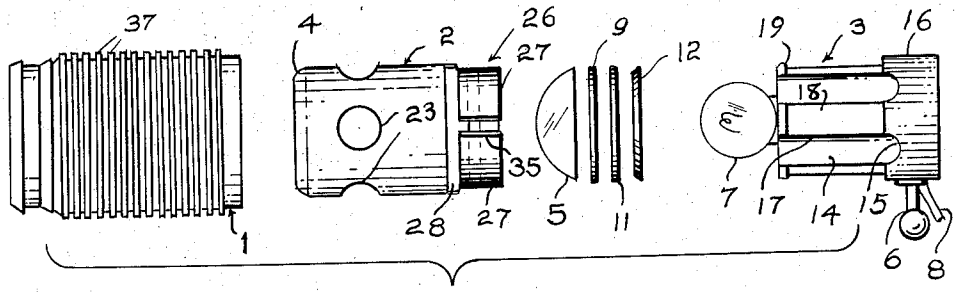


Fig 1

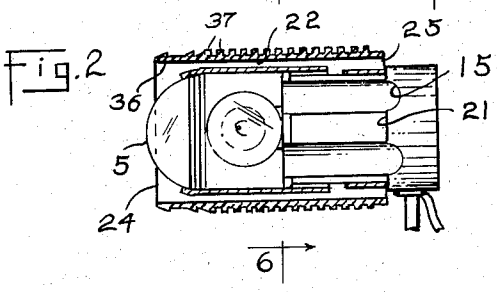


Fig. 2

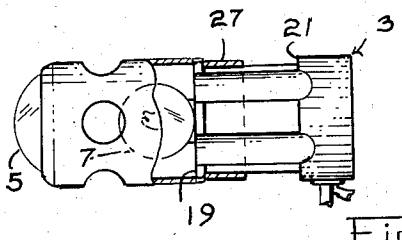


Fig. 3

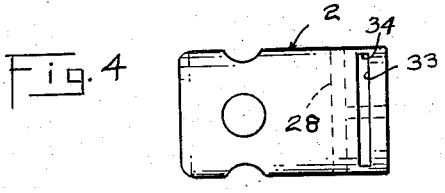


Fig. 4

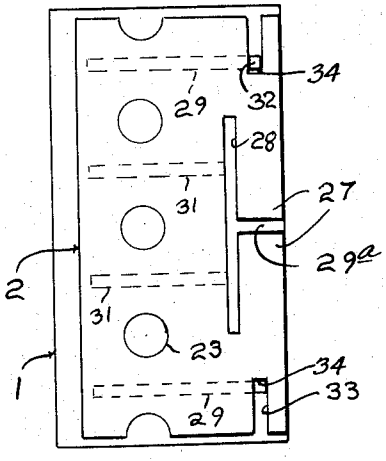


Fig. 5

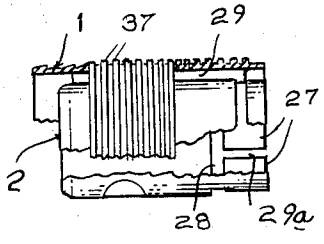


Fig. 7

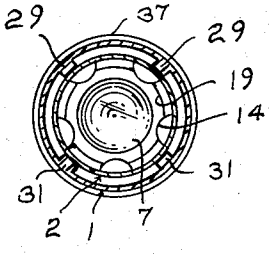


Fig. 6

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MEDICAL HEADLIGHT

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7 Claims. (Cl. 240—41.15)

This invention relates to medical headlights. More particularly, it is concerned with new and useful improvements in such devices, whereby a highly desirable and practical medical headlight is provided.

The headlight of the present invention is attachable by a suitable band to the forehead. It is used by the wearer to throw light upon a subject under observation so as to permit a clear visual examination of the subject. It includes a lens assembly which is manually adjustable whereby the light of a lamp in the headlight may be focused as desired upon the object.

A feature of the invention lies in its structure, whereby the heat from the lamp housed therein is rapidly dissipated so that the device does not become hot. It therefore can be comfortably handled.

A further feature of the invention lies in the arrangement of the lens in the device, whereby "blind" focusing of the device may be made without danger of manually touching the lens. An advantage of this feature is that the possibility of fouling the lens surface is reduced to a minimum.

Another feature of the invention lies in improved means for locking the housing of the device to a sleeve carrying the lens and in other means for locking the lens in the sleeve.

A still further feature lies in novel means whereby the lens assembly, which is slidable on a support carried by the headband, is prevented from being pulled free of the support in the "blind" focusing operation.

Another feature of the invention lies in the construction of the housing, whereby the latter not only aids in dissipating the heat of the lamp, but is tough, durable, and not subject to cracking under customary conditions of use.

A general object of this invention is, therefore, to provide a headlight which is long lasting and of an improved and practical nature, making it highly desirable for use as a medical headlight.

A more particular object of the invention is to provide a medical headlight which is not hot to the touch, can be focused without being pulled apart, and is of lightweight and sturdy construction.

The invention further lies in the particular construction and general organization of its compartment parts as well as in their cooperative association with one another to effect the results intended herein.

The foregoing and other objects and advantages of the invention will appear more fully hereinafter from a consideration of the detailed description which follows, taken together with the accompanying drawings wherein an embodiment of the invention is illustrated. It is to be expressly understood, however, that the drawings are for purposes of illustration and description, and are not to be construed as defining the limits of the invention.

In the drawings:

Fig. 1 is an exploded view of a medical headlight illustrating the invention;

Fig. 2 is a longitudinal section through the assembled device;

Fig. 3 is a view of the sleeve member moved to its most forward position on the lamp socket support;

Fig. 4 is a view of the sleeve member in a position rotated 180 degrees from that shown in Fig. 1;

Fig. 5 is a rolled-out-flat view of the sleeve member and housing;

Fig. 6 is a cross section taken on the line 6—6 of Fig. 2; and

Fig. 7 is a sectional detail showing a detent of one of the housing ribs engaged in a slot of the sleeve member.

Reference is now directed to the several drawings for a more detailed description. The drawings disclose a medical headlight comprising a cylindrical housing or jacket 1 in which is fitted a cylindrical sleeve member 2 carried for slidable movement on a lamp socket support 3 and having locked in a nosed end 4 a lens 5. The support 3 is fitted with a shaft and ball 6, forming part of a swivel joint which is attached to a headband, not shown.

The lamp support 3 is of cylindrical form, and is made of hard material, which may be phenolic resin, or the like. Its forward end is counterbored so as to accommodate an electric socket in which is received a lamp 7. An electric supply cord 8 extends from the rear area of the support. Light given off by the lamp is projected outwardly by lens 5. The projected light may be focused by simply sliding the sleeve member 2 in a longitudinal direction on the support 3 so as to adjust the position of the lens relative to the lamp. The diameter of the lamp is less than that of the sleeve so as to allow the latter to slide clear thereof.

The sleeve member 2 is fashioned of thin gauge slightly resilient metal, preferably of lightweight. It is fully open at both ends. The forward end is, however, nosed slightly inward, as indicated by the marginal conical portion 4. Lens 5 is plano-convex. The major portion of its curvature projects through the forward open end of the sleeve, and is prevented from escape therefrom by a rear portion seated against the inner wall of the nosed portion 4. In order, rearwardly of the lens, is a thin washer 9, a color absorbing and correcting member 11, and a washer 12 having a slightly conical form which abuts the rear of member 11 and is press fitted into locked condition against the inner wall of the sleeve member. By this arrangement, the lens assembly is securely locked in position.

The lamp 7 gives off considerable heat. Practical means is here provided for rapidly carrying off and dissipating this heat, so that the device will not become hot. A hot headlight is not only uncomfortable to the wearer, but is also uncomfortable to handle, particularly when focusing the device. To this end of dissipating the heat as rapidly as possible, the body of the socket support 3 is fluted, as indicated by the longitudinally extending grooves 14. The latter open out at the forward end of the support. At the rear, the grooves taper, as at 15, up to the surface of a radially enlarged portion 16 of the support. The flutes or grooves 14 are separated by lands 17. The lands provide a reduced peripheral surface 18 which is due to a slightly raised rib 19 at the forward end of each land, and a shoulder 21 formed at the rear of each land by the enlarged portion 16. When the sleeve member has been moved to its most rearward position on the support 3, the rear tapered ends 15 of the flutes are exposed to atmosphere, as in Fig. 2. By this construction, heated air within the sleeve escapes through the vented flutes to atmosphere. To provide a cooling draft to the interior and surrounding surface of the sleeve member, the latter is spaced, as at 22, from the inner wall of the outer housing. It is

also provided with a plurality of circumferentially spaced holes **23**. These are located preferably near the forward end of the sleeve. It is clear, that cool air will flow through the open ends **24**, **25** of the outer housing to the space **22**. It will swirl over the metal sleeve, pass through the holes **23**, over the lamp **7**, and will escape through the vented flutes **14** to atmosphere.

The sleeve member is limited in the extent of its forward sliding movement on the support **3** by means of the end ribs **19**, and in its rearward movement by the shoulder portions **21** of the support. The rib and shoulder elements **19**, **21** cooperate with a resilient clamp formation **26** formed at the rear of the sleeve member in controlling the movement of the latter. The clamp formation comprises a pair of resilient ears **27** defined by a peripheral slot **28** in the sleeve which is in turn split or slotted through as at **29***a* from its mid area to the rear outside of the sleeve. The ears are depressed slightly so as to provide an inner diameter slightly less than that of the inner diameter of the forward main body portion of the sleeve. This inner diameter of the ears is complementary to that of the surface of the lands **17** of the support **3**, and the inner diameter of the main body portion of the sleeve is complementary to the outer diameter of the ribs **19** of the support. In assembling the sleeve to the support, the ear portions **27** are forced over the ribs **19**, whereupon they resiliently grip the land area. It is clear that by this construction when the sleeve is moved rearwardly, it will be limited in the extent of this movement upon abutment of the rear edges of the ears with the shoulders **21**; it will be limited in the extent of its forward movement upon the ribs **19** passing into the slot **28** and engaging the forward edges of the ears, as in Fig. 3. Hence, in focusing the device, it is clear that the sleeve member will be prevented from escaping free of the support **3**.

The sleeve member **2** is fitted snugly into the housing and is securely locked therein. The housing **1** is of relatively thin gauge construction and is formed of sturdy, yet slightly resilient material; such as plastic, here, nylon plastic. Formed on the inner wall of the housing are a plurality of longitudinally extending ribs **29**, **31**. These ribs abut the surface of the sleeve member so as to provide the spacing **22**. The ribs are spaced equally apart from one another and are four in number. Ribs **29** are relatively longer than the others and are provided at their rear ends with slightly raised formations or detents **32**. These are adapted to engage in opposite ends of a peripheral slot **33** formed in the ear section of the sleeve oppositely to the free ends of the ears. In assembling the sleeve into the housing, the nose end of the sleeve is entered into the rear of the housing and forced over the slight elevation of the detents. In this process the solid portions of the sleeve between the holes **23** are aligned with the housing ribs **29**, **31**. The sleeve member is entered forwardly into the housing until the detents register with the slot **33**, whereupon the detents snap into the slot and lock the sleeve member against further forward or rearward movement in the housing. The spacing of the detents from each other and the angular distance of slot **33** are such that the detents also engage against opposite ends **34** of the slot, whereby rotational movement of the sleeve in the housing is prevented. The elevation of the detents is no greater than the thickness of the sleeve wall so as not to interfere with any entering movement of the support **3** into the sleeve.

It is to be noted that the free ends of the ears are lipped slightly outward, as at **35**. This prevents the free ends of the ears from biting into the grooves **14** of the support, as might otherwise happen should the sleeve be rotated on the support during a focusing operation.

Because of the "blind" location of the headlight on the forehead, focusing of the device is done "blindly," and by hand. It is accordingly desired that the lens be guarded in some way from contact with the hand. The fingers give off oils and sweat, and therefore will foul the lens upon coming in contact therewith. A suitable protection is provided here by extending the forward end of the housing so as to substantially surround the projecting curvature of lens **5**, as at **36**. By this arrangement the tendency will be when focusing, to contact the extended end of the housing instead of the lens. This extension of the housing provides a further advantage. It tends to cause air drafted into the space **22** between the housing and sleeve members to enter at an angle over the curvature of the lens, thus aiding in keeping the latter cool.

The housing or jacket **1**, besides being formed of material of poor or low heat conductivity, is characterized by a succession of closely spaced circumferential ribs **37** integrally formed on the outer surface of the jacket. These ribs are relatively cool to the touch and serve as a means permitting comfortable manual handling of the device for effecting focusing of the sleeve member **2**.

When focusing the device, there is a customary tendency to rotate the sleeve member on the support **3** so as to provide a fine adjustment. To avoid what might be called bumping sounds of the sleeve on the support when the sleeve is rotated, the lands **17** are of odd number, here five in number. By this structure there are no flats or low spots, as might otherwise occur. The lands and grooves in between are of substantially equal angular distance, and are arranged so that opposite each groove is a land, whereby the outer diameter of the land surfaces presented to the sleeve member is substantially uniform, which would not be the case were a groove disposed opposite a groove, and a land opposite a land.

As earlier mentioned, the device of the present invention provides a practical and highly desirable medical headlight. Focusing of the light provides from a tiny spot (converging beam) for ear, nose and throat work, to a medium spot (parallel beam) for throat, vaginal and rectal work, up to a large spot (diverging beam) for general surface work.

The color absorbing or correcting member **11** is preferably bluish. It serves to enhance vision and minimize eyestrain, thus benefiting diagnostic and surgical accuracy by aiding tissue identification, revealing small blood vessels, minute hemorrhages, etc., that are difficult or impossible to define under ordinary incandescent filament light. This color absorbing or correcting member functions to remove sufficient red and yellow rays of incandescent light, so that the projected beam approaches daylight in color. This is of particular advantage in diagnosis and surgery, as it makes tissue and fine vessels more distinct. Whereas, without this member, the tissue appears excessively fatty and many fine blood vessels are not visible.

While an embodiment of the invention has been illustrated and described in detail, it is to be expressly understood that the invention is not limited thereto. Various changes can be made in the design and arrangement of the parts without departing from the spirit and scope of the invention as the same will now be understood by those skilled in the art; and it is my intent, therefore, to claim the invention not only as shown and described but also in all such forms and modifications thereof as may reasonably be construed to fall within the spirit of the invention and the scope of the appended claims.

What I claim is:

1. In a medical headlight comprising an elongated support attachable at its rear to a headband, an electrical socket contained in a counterbore of the forward end of the support and carrying a lamp, and a sleeve slidable back and forth on the support over the lamp and having in one end forwardly of the lamp a lens, shoulder means in the rear area of the support to limit the extent of rearward movement of the sleeve relative to the lamp upon abutment of the rear of the sleeve with the shoul-

der means, and radially extending detent means on the forward end of the support engageable with circumferentially disposed slot means in the rear area of the sleeve so as to limit the extent of forward movement of the sleeve relative to the lamp, wherein the sleeve is adapted to become hot from the lamp and is characterized by means to permit manual handling thereof, said latter means being a covering jacket fitted tightly upon the sleeve for movement with the latter as a unit, the jacket being formed of material of low heat conductivity and having integrally projecting from its surface a succession of closely spaced narrow ribs which are relatively cool to the touch.

2. A medical headlight comprising a slightly resilient cylindrical housing open in its ends, rib elements formed longitudinally of the inner wall of the housing and spaced equally apart, a cylindrical metal sleeve fitted snugly within the housing in surface abutment with the ribs whereby the sleeve is spaced from the inner wall of the housing, slight radial elevations on a neighboring pair of the ribs engaged in opposite ends of a circumferential slot of the sleeve whereby the sleeve is locked against longitudinal as well as rotational movement relative to the housing, a lens assembly closing over an open forward end of the sleeve, a socket support, the forward end of which is slidably received in a rear open end of the sleeve, a lamp disposed in the forward end of the support, and means for attaching the support at its rear to a fixed headband, wherein the socket support is provided with peripheral shoulder means on its rear, peripheral rib means at its front end, and a reduced inbetween area, the sleeve is formed with a second circumferential slot forwardly of the first mentioned slot and in an opposed portion of the sleeve wall and a pair of resilient ears defined by a split from the second slot to the rear outside of the sleeve, the ears being in resilient engagement with the reduced area of the support, whereby the extent of rearward movement of the sleeve is limited upon abutment of the rear edges of the ears with the shoulder means and the forward movement of the sleeve is limited upon engagement of the peripheral rib means with the forward edges of the ears, the reduced area of the support having a greater longitudinal dimension than the ears.

3. A medical headlight as in claim 2, wherein the support is provided with a plurality of longitudinal flutes which open out at their forward ends through the peripheral rib means into the sleeve and at their rear a little beyond the peripheral shoulder means, and the sleeve has a plurality of circumferential holes near its forward end, whereby a chimney effect is provided through the spacing between the sleeve and housing and by the holes and the flutes to rapidly draft to the outside heat generated by the lamp.

4. A medical headlight as in claim 3, wherein the flutes are spaced one from the other by land portions of the support, the angular distance of the lands and flutes being substantially equal, and the lands and flutes being odd in number whereby each flute is opposed to a land.

5. In a medical headlight including a focusing sleeve and a lamp support for the sleeve, the sleeve being characterized by an open forward end tapering in its marginal portion slightly inward and defining a conical internal seat for the marginal peripheral portion of a plano-convex lens, a lens assembly mounted in the sleeve, wherein the lens assembly comprises an outer plano-convex lens closing over the open end of the sleeve and having its rear marginal peripheral portion seated upon said internal seat, a color absorbing member rearwardly of the lens, a thin washer spacing the color absorbing member from the lens, and a washer element press fitted into the sleeve into abutment with the rear of the color absorbing member, whereby the lens assembly is locked in the sleeve against slipping its position.

6. In a medical headlight including a support, an electrical lamp projecting from an end of the support, a thin metal sleeve surrounding the lamp in close spaced relation thereto and having a lens in an end thereof forwardly of the lamp, wherein the sleeve is slidable upon the support for focusing the lens relative to the lamp and is adapted to become hot to the touch, the improvement comprising an open ended jacket tightly fitted about the sleeve for movement with the latter as a unit, characterized by a succession of closely spaced narrow circumferential ribs integrally formed upon the outer surface of the jacket and serving to be manually gripped for slidably focusing the sleeve, and wherein the jacket and ribs are formed of material having low heat conductivity whereby the latter property the peripheral surfaces of the ribs are substantially cool to the touch.

7. In a device including a lamp, a thin metal lens focusing sleeve surrounding the lamp in close spaced relation thereto, and a support for the lamp upon which support the sleeve is slidably supported, wherein the sleeve is adapted to become hot from the heat of the lamp; means protectively covering the sleeve and serving to enable comfortable manual handling thereof, comprising an open-ended jacket tightly encasing the sleeve for movement with the latter as a unit, wherein the jacket has a succession of closely spaced circumferential ribs formed integral with its outer surface and extending substantially end to end thereof, and wherein the jacket and ribs are formed of material of low heat conductivity.

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