

[54] **OPHTHALMIC FIXATION DEVICE**

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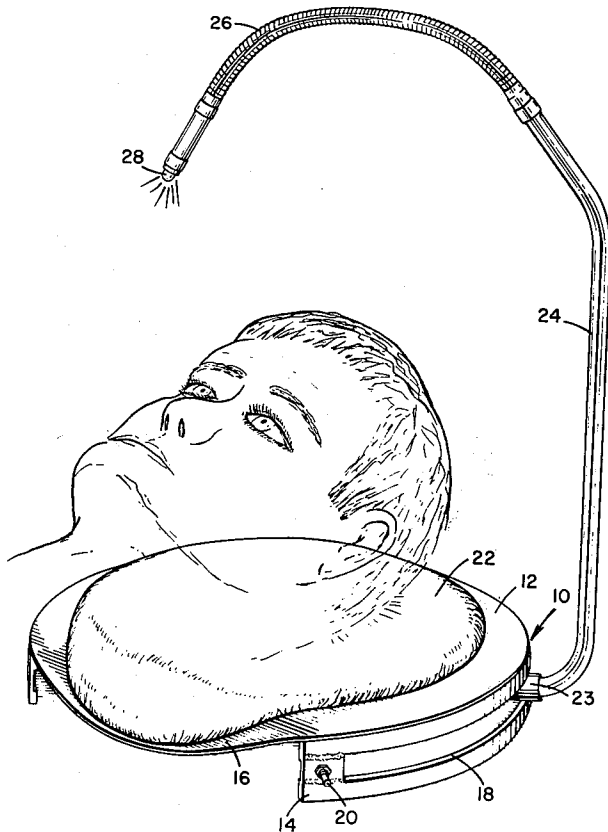
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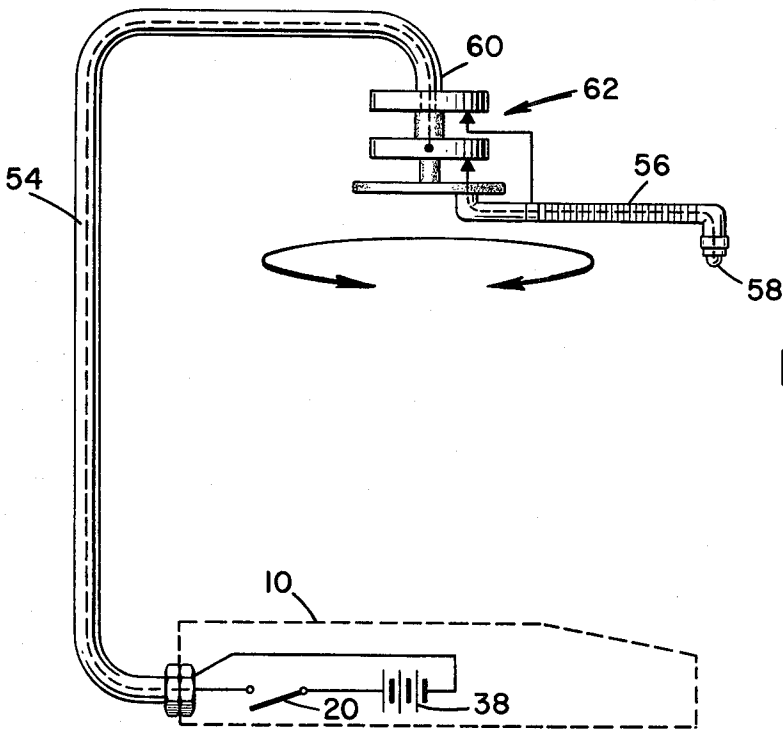
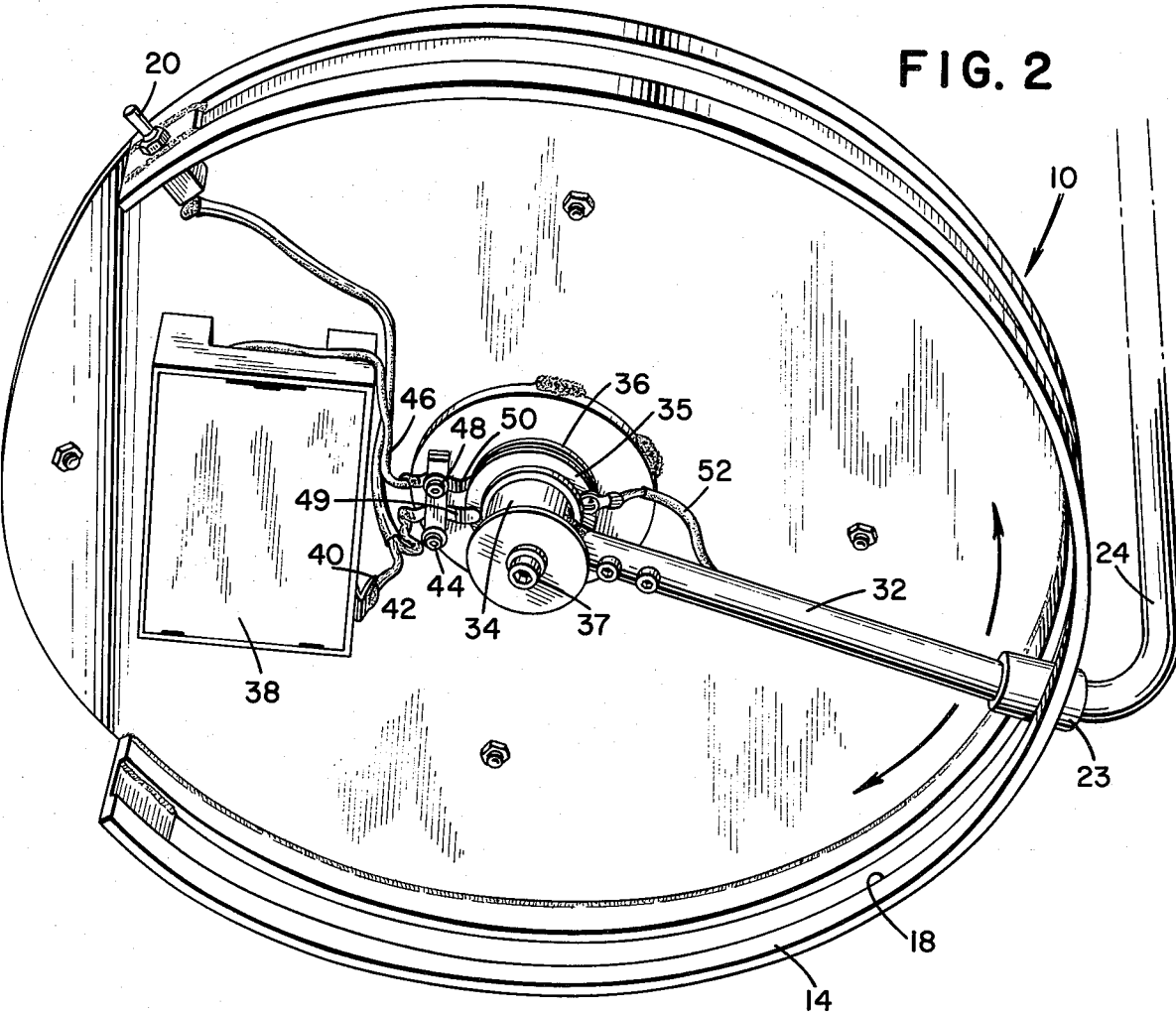
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[57] **ABSTRACT**

An ophthalmic fixation device comprises a base on which the patient's head rests and a small red light adapted to be moved in a circular path around and above the patient's face. During examination and/or treatment of the patient's eyes, the patient is instructed to fix his gaze upon the small red light. If the physician desires the patient to change the position of his eyes and assume a new position of fixation, the physician need only change the position of the red light, and the patient will automatically change the positioning of his eyes in order to follow the light.

15 Claims, 4 Drawing Figures





OPHTHALMIC FIXATION DEVICE

BACKGROUND OF THE INVENTION

The present invention relates to an ophthalmic device for enabling a patient to accurately and carefully fixate during the diagnosis and treatment of various eye diseases.

During diagnosis of many eye diseases, it is often necessary that the eye of the patient not move its position once the eye examination has begun. For example, when an eye is examined to locate retina lesions, it is essential that the eye not move as each area of the retina is examined. Otherwise, some or all of the lesions and especially the smaller ones could very easily be missed by the skilled ophthalmologist.

Various types of eye surgery also require that the eye being treated not move during the treatment operation. For example, surgical procedures carried out to remove a foreign body on the cornea with a needle or to remove stitches made during cataract operation, employ instruments which could very severely damage the eye if moved during treatment.

At the present time, maintaining the patient's eye in a fixed position, or "fixation" as it is referred to in the profession is accomplished by simply instructing the patient to fix his gaze upon a particular object in the room and thereafter keep his gaze fixed on that object until told to change. For example, when the interior of the patient's eye is to be examined for retina lesions, the patient is made to lie down on his back and then asked to look at his feet. With the eyes of the patient fixed in this position, the doctor looks into the interior of each eye to examine a portion of its retina with appropriate instruments. After one portion of the retina is examined and in order to enable the doctor to examine a further portion of the retina, the patient is then asked to move his eyes to the right, for example, and then to hold his gaze upon whatever object he now sees. After the doctor examines the new portion of the retina now brought into view, the patient is again asked to move his eyes an additional amount so that another new portion of the retina can be examined. This procedure of examining a portion of the retina and thereafter causing the patient to move his eyes is continuously repeated until the ophthalmologist is able to examine every portion of the retina of the eye.

Unfortunately, this method of effecting patient eye fixation has led to many difficulties when practiced in the optometrist's or ophthalmologist's office. For example, some older people and many children have trouble understanding and/or following the doctor's directions. In addition, children are often too fidgety and nervous to follow the doctor's instructions faithfully even when they do understand them. Moreover, doctors often have trouble communicating with those persons who are either deaf or speak different languages than the doctor. Finally, because many eye examinations and treatments are accomplished in a darkened office or room, it is often difficult for the patient to fix his gaze on an object which he can see only with great difficulty.

Accordingly, it is an object of the present invention to provide a process and apparatus enabling a patient to accomplish eye fixation with relative ease.

It is another object of the present invention to provide an apparatus promoting eye fixation which is so simple in operation that it will immediately become ap-

parent to the average patient where to fix his gaze, with little or no instruction from the physician being necessary.

It is still another object of the present invention to provide an apparatus for promoting easy eye fixation which is of rugged construction, simple to build, and inexpensive to manufacture.

SUMMARY OF THE INVENTION

These and other objects are accomplished by the inventive ophthalmic fixation device which is composed of a small light moveably mounted with respect to a head rest for the patient so that the light can be moved to various different positions with respect to the patient's face. In operation, the patient is made to sit or lie in such a way that the small light can move to any position within the patient's field of vision. The patient is then simply asked to keep his eyes fixed on the small light which can be simply maintained in a fixed preselected position when fixation in a constant position is necessary, or moved to successive positions when the eye being examined or treated must change its position during the examination or treatment procedure.

Because the object to be gazed upon by the patient during fixation is a positive light, the patient's attention is more easily maintained for extended periods of time. Consequently, the tendency of the patient's eyes to wander during eye treatment and/or examination is significantly reduced. Moreover, because the inventive apparatus presents a positive luminated object for the patient to view during fixation, it is far easier for the patient to understand what he is to do during examination and/or treatment processes. As a result, effecting fixation by children, elderly persons and those who are unable to understand the physician's spoken instructions is far easier. Finally because the object light to be viewed by the patient is moveable about the face of the patient, the proper change in the positioning of the eye can be accomplished by simply moving the object light, with detailed instructions from the doctor to the patient being unnecessary.

BRIEF DESCRIPTIONS OF THE DRAWINGS

The present invention may be readily understood by references to the following drawings wherein:

FIG. 1 is a perspective view of the inventive ophthalmic fixation device when in use;

FIG. 2 is a perspective view of the bottom of the inventive ophthalmic fixation device shown in FIG. 1;

FIG. 3 is a schematic view of the electrical circuitry employed in the inventive ophthalmic fixation device; and

FIG. 4 is an elevational view, partly in schematic, of a second embodiment of the inventive ophthalmic fixation device of FIG. 1.

DETAILED DESCRIPTION

Referring to FIG. 1, the inventive ophthalmic fixation device is provided with a base 10 on which the patient rests his head when the device is in use. Base 10 is formed by a headrest 12 which is shaped in the form of a circular flat plate, one portion of which 16 is lowered at an angle of about 60° with respect to the remainder of the headrest. Attached to the periphery of headrest 12 along a major portion of its circumference is a support 14, which carries an on-off switch 20 and a groove

18 therein extending from one end of the support to the other.

Located atop headrest 12 of base 10 is a pad 22. This pad has been provided simply to cushion the patient's head as it rests on the headrest as shown in FIG. 1 and can be omitted if desired.

Extending from the groove 18 in support 14 of base 10 and electrically insulated therefrom by sleeve 23 is arm 24. Attached to the upper end of arm 24 is flexible cable 26, which carries an electric light 28, preferably red, at its free end. The arm 24 and the flexible cable 26 therefore combine to form a supporting unit for the light 28. Arm 24, flexible cable 26 and light 28 are so constructed that light 28 can horizontally extend roughly to the outer perimeter of headrest 12 at that point radially opposite to the place where sleeve 23 extends through groove 18 to support 14. In addition, a sufficient amount of flexible cable is provided so that light 28 can always be made to be 8 to 18 inches, preferably about 8 to 11 inches from the eye of the patient regardless of the size of the patient's head.

Arm 24 is secured to base 10 in such a way that the entire arm, flexible cable and light assembly can rotatably change its position with respect to the center of the base 10. This feature is more clearly illustrated in FIG. 2 which shows arm 24 surrounded by sleeve 23 passing through groove 18 in base 14 into the center of the base 10. The end 32 of arm 24 extending towards the center of base 10 is secured to a rotating cylinder 34 adapted to rotate about a rod 37 rigidly fastened to the center of base 10. Because of this design, arm 24 can freely rotate about the center of base 10. And as can be seen from FIGS. 1 and 2, the arm 24 is free to rotate through an angle of more than 270°, on the order of 300°. In this manner, the light 28 may be moved through a full 360° during the examination by the physician.

In order to power electrical light 28, the following electrical circuit, illustrated partially in schematic in FIG. 3, is provided. Power source 38 is connected on one side to light 28 by means of electrical lead 46, slip ring 36 and electrical lead 25. And, on its other side, power source 38 is connected to light 28 by means of electrical lead 40, on-off switch 20, electrical lead 42, optional flickering switch 43, electrical lead 45, optional rheostat 47, slip ring 35 and electrical lead 52.

The actual construction of that portion of the apparatus for providing electrical power to light 28 is illustrated in FIG. 2. As shown, electrical lead 40 connects one terminal of battery source 38 with switch 20, while electrical lead 42 connects switch 20 with terminal 44. Electrical lead 46 connects the other terminal of battery source 38 with terminal 48, terminals 44 and 48 being located in close proximity to cylinder 34. Electrically connected to terminal 48 is a brush 50 which is adapted to contact slip ring 36 which is carried by and electrically connected to cylinder 34. Likewise, a brush 49 is electrically connected to terminal 44 and adapted to contact slip ring 36 which is also carried by but electrically insulated from cylinder 34. Fixedly secured to the ring 35 is another electrical lead 52, which is carried internally of and insulated from arm 24 and cable 26, and which is electrically connected to one terminal of light 28. The remaining terminal of light 28 is electrically connected to the flexible cable 26 and arm 24 which, as mentioned above, are in electrical contact with cylinder 34. Accordingly, contact of brush 50 with

slip ring 36 completes the electrical circuit thereby causing light 28 to burn when switch 20 is turned on.

When the inventive ophthalmic fixation device is employed to enable an optometrist or ophthalmologist to effect patient eye fixation, the patient, either sitting or in a supine position, rests his head on pad 22 of headrest 12 as shown in FIG. 1. The physician then turns on light 28 by means of on-off switch 20, and the patient is asked to keep his gaze fixed upon the light. If the physician desires to examine the entire 360° of the retina, for example, he can first examine the eye of the patient with light 28 in one position and thereafter move the light assembly composed of light 28, flexible cable 26 and arm 24 about the shaft 37 in incremental amounts so that light 28 assumes a new position about the head of the patient. Because the patient's eye follows the light to its new position, a new portion of the retina can be seen by the physician by each incremental rotation of the light assembly.

In order to provide a better understanding of the present invention, the following description illustrating how to use the inventive apparatus to examine the retina of each eye of a patient for lesions is provided. The patient in a sitting or supine position is asked to place his head on the pad 22 of headrest 12 as illustrated in FIG. 1. The light bearing assembly is then positioned so that insulating sleeve 23 is directly opposite the left ear of the patient or in a "3 o'clock" position as viewed from above. With arm 24 in this configuration, flexible cable 26 extends across the center of the device so that light 28 is located to the right of the right eye of the patient, or in a 9 o'clock position, about 8 to 11 inches away from the right eye of the patient. The red light is turned on and the patient is asked to keep his gaze fixed upon the red light. The doctor stands at about 1 to 2 o'clock with respect to the inventive device and can view the portion of the right eye retina between about 6 and 8 o'clock. The doctor then moves arm 24 so that sleeve 23 is at about the 4 o'clock position and light 28 is at about the 10 o'clock position. The doctor then moves to about the 3 o'clock position, and from this vantage point he can view the portion of the right eye retina between about 8 and 10 o'clock. The doctor then moves arm 24 so that light 28 is at the 12 o'clock position, and by moving slightly more towards the patient's feet the doctor can view the 10 to 12 o'clock portion of the right eye retina. This covers the temporal side of the retina, and the process is simply repeated from the other side of the patient's head for the nasal side of the eye. The process is then repeated for the other eye to accomplish a complete visual examination.

The use of the inventive ophthalmic fixation device has many advantages over the presently practiced techniques of effecting patient eye fixation. For example, it is possible with the inventive device to attain the patient's fixation where it was difficult or impossible to do so in the past. Moreover, because the object light of the inventive device can be moved by the doctor at will, repeated instructions by the doctor each time a new position of fixation is desired are unnecessary. This shortens the amount of time the doctor must spend in instructing the patient and hence lessens the effort expended by both the doctor and the patient during the examination and treatment procedures. Also, because a positive object light is employed which is easy to see, the patient has a far simpler time of maintaining his

gaze fixed in a proper position than if he was forced to gaze at objects in a darkened room.

A second embodiment of the inventive ophthalmic fixation device is shown in FIG. 4. In this embodiment, the power source 38 as well as the on-off switch 20 are contained in the base 10 of the device in a manner similar to the embodiment illustrated in FIGS. 1 to 3. However, in the embodiment of FIG. 4, a stationary arm 54 is connected to the base 10, and a flexible cable 56 and a light 58 are adapted to rotate about end 60 of arm 54 by means of an appropriate electrical connection 62. Here, the arm 54 and the flexible cable 56 serve to define a supporting unit on which the light 58 is mounted. This embodiment operates in the same way as the embodiment shown in FIGS. 1 to 3 and has the added advantage in that a much smaller light bearing assembly need be moved than in the embodiment shown in FIGS. 1 to 3. Furthermore, rather than being limited to a 270°-300° angle of rotation as in the embodiment of FIGS. 1 and 2, the cable 56 of the FIG. 4 embodiment may rotate a full 360°.

The inventive ophthalmic fixation device can be used for a variety of purposes in the optometrist's and ophthalmologist's office. For example, it has great applicability for diagnosing retina lesions since the ophthalmologist can very easily view the entire 360° of the retina with its help. In addition, it can also be employed for various eye treating processes, such as removing foreign bodies on corneas with needles, post-operative removal of stitches left by cataract operations, cryocoagulation of retina holes, photocoagulation of retina holes, laser coagulation, glaucoma testing, and tonography.

While only a few specific embodiments of the inventive ophthalmic fixation device have been illustrated above, it should be clear that many variations can be made without departing from the spirit and scope of the invention. For example, it is contemplated within the present invention that a rheostat or a flickering switch or both be incorporated into the circuit of the inventive device as shown in FIG. 3. The rheostat would enable the physician to vary the intensity of the light while the flickering switch would cause the light 28 to flicker in order to better keep the patient's attention. In addition, while any type of light can be used as the object light, it is preferable to employ a red light since red both stimulates the cones and further because red does not disturb the eye during those examinations and treatments conducted in the dark. Finally, it should also be understood that any type of power source, including conventional 120 V wall current can be employed to light lights 28 and 58 in the inventive device.

The foregoing description and drawings have been presented for illustrative purposes only and are not intended to limit the present invention in any way. All reasonable modifications not specifically set forth are intended to be included within the scope of the present invention, which is to be limited only by the following claims.

What is claimed is:

1. An ophthalmic fixation device for examining the eyes of a patient, the device comprising a substantially planar base sized and shaped to enable a patient to rest his head thereon; an elongated rigid supporting arm extending substantially perpendicular to the plane of said base; mounting means for attaching one end of said supporting arm to said base for movement around the

periphery of said base in a predetermined arc while at all times remaining perpendicular to the plane thereof; an elongated flexible cable fixed at one end to the end of said supporting arm remote from said base; a light attached to the end of said flexible cable remote from said supporting arm; power means for providing electrical energy to said light; wherein said mounting means attaches said supporting arm to said base in such a manner as to enable said light to rotate above the face of a patient whose head is resting on said base through an arc of approximately at least 270° in a plane substantially parallel to the plane of said base without altering the orientation of said light relative to said supporting arm; and wherein said flexible cable enables said light to complete a full 360° arc above the face of the patient.

2. The device of claim 1 wherein said supporting arm is adapted to move said light within the patient's field of vision from 8 to 18 inches from each eye.

3. The device of claim 2 wherein said supporting arm is adapted to move said light from 8 to 11 inches from each eye of the patient.

4. The device of claim 1 wherein said base defines a headrest which is circular in configuration and wherein a portion of the circular headrest is bend about a cord of the circle at an angle of about 60°.

5. The device of claim 1 wherein said light is a red light.

6. The device of claim 1 wherein said light is adapted to flicker.

7. The device of claim 1 wherein the intensity of the light can be varied.

8. The device of claim 1 wherein said base is composed of a planar headrest, and further wherein said supporting arm is rotatably attached to the underside of the approximate center of the headrest so that said supporting arm and said light can be rotated about the approximate center of said headrest.

9. The device of claim 8 wherein said supporting arm is rotatably attached to said headrest by means of a slip ring and brush assembly.

10. The device of claim 1 wherein said power means is a battery.

11. The device of claim 1 wherein said power means includes connecting means for electrically connecting said light to an external power source.

12. The device of claim 1 wherein said light can rotate through a full 360° without altering the orientation of said light relative to said supporting arm.

13. In an apparatus for examining the eyes of a patient wherein the patient must fix his eyes on a target which moves about his head through a full 360° path, the apparatus comprising: a substantially planar base on which the patient's head can rest; an elongated rigid support arm extending in a direction substantially perpendicular to the plane of said base; mounting means for attaching one end of said support arm to said base for movement around the periphery of said base in a predetermined arc while at all times remaining perpendicular to the plane thereof; an elongated flexible cable fixed at one end to the end of said support arm remote from said base; a light source mounted on the end of said support arm remote from said base; means for energizing said light source; wherein said mounting means enables said support arm and its associated light source to travel through an arc of approximately at least 270° around said base without altering the relative orienta-

tion between the light source and the support arm, said at least 270° travel being such that said light source moves in a plane substantially parallel to the plane of said base; and wherein said flexible cable enables said light source to complete a full 360° travel.

14. An apparatus for examining the eyes of a patient while the patient rests his head on a head rest defining a plane generally perpendicular to the forward line of sight of the patient, and fixes his eyes on a target moving about his head, the apparatus comprising: an elongated rigid support arm extending substantially perpendicular to said plane; mounting means for attaching one end of said support arm to said head rest for movement around the periphery of said head rest while at all times remaining perpendicular to said plane; an elongated flexible cable fixed at one end to the end of said support arm remote from said head rest; a light source target mounted on the end of said flexible cable remote from said support arm; circuitry for delivering energy to said light source; wherein said mounting means enables said support arm and its associated light source to travel through an arc of approximately at least 270° without altering the relative orientation between the light source and the support arm, said travel being such that said light source remains in a plane substantially

parallel to the plane defined by said head rest; and wherein said flexible cable enables said light source to complete a full 360° arc about the head of the patient.

15. An apparatus for examining the eyes of a patient while the patient rests his head on a substantially planar head rest and fixes his eyes on a target moving about his head, the apparatus comprising: an elongated rigid support arm fixedly connected to and extending from said head rest substantially perpendicular to the plane thereof; a flexible cable mounted on said support arm at the end thereof remote from said head rest; a light source target mounted on the end of said flexible cable remote from said support arm; circuitry for delivering energy to said light source; and mounting means for rotatably connecting said flexible cable to said mounting arm, so that said flexible cable and its associated light source can be rotated relative to said support arm and at said mounting means through an arc of approximately at least 270° in a plane substantially parallel to the plane of said head rest and substantially around the periphery of said head rest without altering other than the relative angular orientation between the light source and said support arm.

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