ABSTRACT OF THE DISCLOSURE

A streak retinoscope handle is secured to the reduced neck of a head by a nut bearing against a split ring in a groove around the neck. A sleeve manipulateably axially and rotatably through handle slots carries a lamp for illuminating a lens and mirror in the head. Spring contacts connect one side of the handle electrically with the other terminal. The other terminal is connected to the viewing lens holder. Fiber bundles carry light to the fixation targets and the viewing lens holder is replaceable for corrective lens replacement.

This invention relates to a retinoscope and more particularly to a streak retinoscope in which a streak or bar of light can be focused and continuously adjusted at any angle a full 360° about the horizontal or vertical by a single control member in the handle of the instrument.

Streak retinoscopy, as distinguished from spot retinoscopy, has certain advantages in measuring the refractive state of the eye, not only in determining the axis of astigmatism, but also in detecting and measuring hyperopia and myopia. In streak retinoscopy a streak or bar of light, as distinguished from a spot of light, is focused at the eye. For efficient examination, the streak should be easily controllable by the physician for focusing the streak at the desired distance and the size and angular disposition of the streak should be readily controllable.

Retinoscopy requires that the streak be rotatable from a 90° disposition to a 180° disposition and it is frequently necessary to rotate the streak 180° from either of the starting dispositions. Full 360° rotatability is advantageous in that time is saved when the streak can be rotated in any direction to the desired starting point.

A single control for both focus and angular disposition is advantageous and the control should be easy to manipulate but firmly maintained in position once it is adjusted.

Since the patient must look to one side or the other of the physician's line of sight it is also advantageous to provide target spots on the retinoscope on which the patient can focus so that the physician can examine the pupil one eye without interruption. By providing such target spots on the retinoscope itself they are always available without lights or other easily distinguishable objects being secured at chosen points around the physician's office in relation to the examining chair, an arrangement which confines the physician to one particular position for examination.

Freedom in his choice of position and freedom in the use of his hands for the physician is also increased when the angular disposition of the light emitting head of the retinoscope is angularly adjustable with respect to the position of the light controlling means of the instrument.

Individual physicians may desire a corrective lens adapted for his use. The viewing lens therefore should be replaceable but precisely located.

The principal object of the present invention is to provide a streak retinoscope with the above noted advantages.
control sleeve is provided at either end with annular bearing washers 27 of plastic material which snap over the end of sleeve 26, as shown, and which center the control sleeve inside the outer sleeve 15.

Adjacent the bearing washers 27, each end of the control sleeve is provided with an annular slot in which are engaged a split ring spring band 28 and a split ring contact band 29, the latter band around the first, as shown. The spring bands 28 extend only around approximately 5/8 of the circumference of the control sleeve 26 and are biased strongly outward so that outward pressure is exerted on the contact bands 29 at least three perimetrically spaced points thereonward. Contact bands 29 extend completely around the control sleeve and are biased outwardly by the spring bands to insure a good frictional grip and electrical contact between sleeves 15 and 26 at all times.

Control sleeve 26 has an axially extending bore 30 which, at its upper end, partially contains the lamp 31. The lamp is a conventional streak retinoscope lamp having a filament 32 extending on three sides of a rectangle axially of bore 30 so as to provide a bar or streak of light when viewed axially.

Bore 30 adjacent the upper end of sleeve 26 is constricted at 33 and threaded so as to receive the threaded end of lamp 31 and its axially projecting central terminal 34.

Below the constricted portion 33, bore 30 extends the major portion of the length of sleeve 26 and has secured therein, as by a slide fit, a substantially tubular control sleeve insulator 35. Insulator 35 has an axially extending central passage 36 into which the upper portion of the fixed contact sleeve 18 extends.

Also carried in the passage 36 are a fixed contact 40 and a lamp contacting element 41 connected by extension coil spring 42. Each of the contacts 40 and 41 have a seat in which one end of spring 42 is engaged and the contacts and spring 42 are axially aligned by the passage 36. Element 41 has a stem 43 slidably engaged in a constricted portion 44 of the passage 36 at the upper end of insulator 35. The stem 43 is held constantly in electrical contact with the central terminal 34 of lamp 31 by the pressure of spring 42 and contacts 40 and 41 are constantly electrically connected by the spring.

Contact 40 is of metal and has a pendant pin portion 40a which is forced down into the ring 20 in electrical contact with the exposed end of wire 21 so that contact element 41 is constantly in electrical contact with the contact 190 when control sleeve 26 is moved axially within the outer sleeve 15. In addition, the spring 42 is in opposition to the weight of control sleeve 26 and assists in maintaining the moving parts in adjusted position when the retinoscope is in use.

The upper guide portion 23 of the outer sleeve is externally threaded, as shown, and stop ring 45 is secured internally of the guide portion by the set screw 46. Stop ring 45 prevents the control sleeve 26 from being moved out of the outer sleeve 15 but allows axial movement of the control sleeve in the outer sleeve and therefore, movement of the lamp 31 in the head 13.

Lamp 31 projects befofd the end of the outer sleeve 15 and axial movement of the control sleeve upward in FIGURE 2 moves the lamp farther out of the outer sleeve into a central axial passage 48 in the neck portion 49 of the head 13. As best seen in FIGURE 3, the neck 49 is provided with a nut or threaded sleeve 50 for securing the head to the threaded end of the outer sleeve 15.

A split ring shoulder member 51 is snapped into an annular groove 52 provided adjacent the end of the neck. The top surface of shoulder member 51 is tapered outwardly and downwardly, as in the top of the nut 50 which engages it. As the nut 50 draws the end of neck 49 into engagement with the end of outer sleeve 15, the split ring shoulder member 51 is thereby cammed more firmly into its groove 52 for providing a firm shoulder for the nut. Should the angular position of the head 13 require adjustment with respect to the location of windows 25 on the handle extension 12, the nut 50 can be reversed so that the head may be turned and then the nut tightened again.

The head 13 has a transverse viewing passage 54 therethrough and a condensing lens 55 is secured in the usual manner in a lens holder 56 secured by a screw 57 in the end of passage 48 adjacent the passage 54. An annular mirror holder 58 is secured against the back of the viewing passage by a tab plate 59, as shown, the tab plate also being held in place by the screw 57 (FIG. 4). A mirror 60 having a central viewing orifice therein is secured by adhesive in the holder 58 at a substantially 45° angle in passage 54 so as to reflect and focus light passing through the lens 55 from lamp 31 transversely out of the passage 54 onto the eye of the patient.

The front, or proximal side, of the head 13 is closed by a plate 61 held in place by a plurality of screws 57 (FIG. 5) and a viewing lens 62 secured in a lens holder 63 is provided in back of the mirror 60 so that the physician may look through the mirror into the patient's eye. As a novel feature, lens holder 63 is provided with a threaded neck engaged in an appropriately threaded hole in plate 61 so that the physician may conveniently remove the lens 62 and substitute another when desired. A corrective lens adapted to the individual physician's eye may be used.

A rubber spectacle or forehead rest 64 is provided at the top of the instrument head along the back plate 61.

Another novel feature is provided by a bundle 65 of coated light-transmitting glass fibers secured, as by adhesive, in head 13 on either side of the head. Each bundle extends upward from a suitable hole in the head intersecting passage 48, the lower end having a polished light-receiving surface 66 substantially flush with the wall of passage 48. Adjacent the perimeter of the proximal side of the head, as shown in FIGURE 5, the bundle emerges in a passage 67, FIGURE 5. Molded in the proximal side of the head and adapted to be covered by the plate 61. From its passage 67 each bundle 65 extends to a shoulder hole 68 having a constricted orifice 70 (FIG. 1) in the side of the head facing distally. The upper end of bundle 65 is angled sharply indicated and has a polished light emitting surface facing distally.

In the shouldered holes 68, located substantially at the level of viewing lens 62 on either side of the head, green and red filters 71 and 72, respectively, are secured adjacent the orifice 70. A split ring retainer in each hole 68 is engaged as filter is in place against the shoulder of its hole 68 and the polished light emitting end of bundle 65 is secured against the surface of the filter within the retainer by adhesive means or otherwise.

In operation, the retinoscope is grasped in one hand and held at the desired distance from the patient's eye. The head may be loosened by backing off the nut 50 and turning head in respect to the handle so that the physician's thumb and forefinger may more conveniently grasp the control sleeve 26 through the windows 25. The head is then tightened in its preferred orientation. Lamp 31 is turned on by a switch (not shown) in the power handle 11.

By moving the control sleeve 26 axially of the handle, the lamp 31 is advanced toward or moved away from lens 55 and mirror 60 for focusing the streak of light at the patient's eye to the desired width or thickness. Contact bands 29 are pressed firmly against the tubular guide portions of the outer sleeve 26 to maintain at all times the desired axial adjustment of the control sleeve. At the same time the lamp 31 remains lit since the circuit is maintained from the power handle 11 central terminal, contact 19b, wire 21, contact 40, spring 42, contact 41, lamp terminals, control sleeve 26, bands 28 and 29, outer sleeve 15 and the threaded terminal of handle 11.
As the control sleeve and lamp are advanced and turned from the position shown in FIGURE 2 to the position shown in FIGURE 4, the stem 43 of contact 41 remains in contact with the central terminal 34 of the lamp. Contacts 195 and 41 remain electrically connected through the spring 42 which lengthens.

The bar filament 32 of lamp 31 lies in a single plane containing the axis of the handle extension 12 so that, as the control sleeve 26 is rotated, the streak of light passing through lens 55 and reflected and focused by the mirror 60 is caused to rotate. Since there is no obstruction to the rotation of the control sleeve for a full 360° the streak may be rotated through any angle desired.

While the lamp 31 is lit, casual light is conveyed by the bundles 65 to the filters 71 and 72 in the orifices 70 so that the patient has a concentration or focusing point conveniently located on the instrument to the right or left of the physician’s line of sight.

As will be apparent to those familiar with the art, the invention can be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The embodiments disclosed is therefore to be considered in all respects as illustrative rather than restrictive of the scope of the invention as indicated by the appended claims.

What is claimed is:

1. A retinoscope having a bar filament lamp, a mirror for reflecting light from the lamp, and a condensing lens between lamp and mirror, the combination of a slotted tubular handle, a control sleeve axially slideable and freely rotatable within the handle, an insulated axial passage in the sleeve, terminals on the handle electrically connected to a source of electricity, one terminal being electrically connected to an electrically conductive portion of the sleeve, the insulated portion being electrically connected to a fixed contact in the sleeve passage, the lamp being carried on the sleeve, means for electrically connecting one lamp terminal to the conductive portion of the sleeve, and insulated electrical connecting means in contact with the other lamp terminal and carried in the passages, the insulated connecting means including a compression coil spring in contact with the fixed contact in the passage, whereby the sleeve is digitally manipulatable through the handle slots for axial movement of the lighted lamp and capable of unlimited rotation of the lamp.

2. A streak retinoscope having a comparatively large head and a handle of smaller diameter, the head having a transverse viewing passage and an intersecting axial passage, a condensing lens and a mirror for reflecting light from the lens in the axial passage, a slotted tubular handle, the head having a reduced neck secured to the handle, a control sleeve axially and freely rotatably movable within the handle, an insulated axially extending passage in the sleeve, terminals on one end of the handle electrically connected to a source of electricity, one terminal being electrically connected to the handle and the other terminal being electrically connected to a fixed contact mounted on the handle within the sleeve passage, a bar filament lamp being carried on the sleeve at the other end of the handle, spring means associated with the sleeve for electrically connecting sleeve and handle and for frictionally positioning the sleeve in the handle, one lamp terminal being in electrical contact with the sleeve, an insulated terminal in the sleeve passage in contact with the other lamp terminal, and spring means in the sleeve passage electrically connecting the insulated terminal and the fixed contact and biasing the insulated terminal against the lamp terminal, the handle slots being of such size as to adapt the sleeve for digital manipulation therewith, whereby the sleeve is axially movable to carry the lamp toward and away from the lens for focusing light from the lamp and the sleeve is completely rotatable for rotating streak light in either direction to any desired angle by manipulation of the sleeve through the handle slots.

3. A retinoscope as defined in claim 2 having means for securing the handle to the head comprising an annular slot around the neck, a split ring in the slot having an annular portion projecting radially of the slot, and a nut having an inwardly projecting flange at one end around the neck adapted to engage the projecting portion of the split ring, the nut being adapted at its other end for threaded engagement with the handle, the ring projecting portion and the nut flange having engaging surfaces tapered outwardly toward the handle for locking the split ring in the groove.

4. The retinoscope as defined in claim 2 having a viewing lens in the proximal end of the viewing passage, the lens being carried in an annular lens holder, the lens holder having a restricted threaded neck portion engaged in a threaded hole in the head so as to be easily removable from the head and replaceable by another holder having a corrective lens therein.

5. The retinoscope as defined in claim 3 having target orifices in the distal side of the head thereof on either side of the viewing passage, a colored filter secured at each orifice, and a bundle of coated light-transmitting glass fibers in either side of the head, each bundle having a light-emissive surface facing the filter and a light receptive surface at the axial passage for receiving light from the lens and lighting up the filters.

6. In a diagnostic instrument having a separable head and handle, the head having a reduced neck adapted to be secured to the handle, the head having light-transmitting means for directing light in a transverse direction radial of the handle and the handle having digitally operated light control means located at limited portions of the handle perimeter, means for releasably and adjustably securing head to handle, comprising: the neck having an annular slot therearound, a split ring in the slot having an annular portion projecting radially of the slot, a nut having an inwardly projecting flange at one end around the neck adapted to engage the projecting portion of the split ring, the nut being adapted at its other end for threaded engagement with the handle, the ring projecting portion and the nut flange having engaging surfaces tapered outwardly toward the handle for locking the split ring in the groove.

References Cited

UNITED STATES PATENTS

1,066,386 7/1913 DeZeng -------------- 351—6
1,720,035 7/1927 DeZeng -------------- 351—6
1,804,151 5/1931 Copeland -------------- 351—14
1,889,456 11/1932 Tillyer -------------- 351—6
1,981,214 11/1934 Allyn -------------- 351—11
2,586,973 2/1952 McMillin -------------- 351—7

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,439,978

William C. Moore et al.

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 61, "befond" should read -- beyond --.
Column 6, line 27, claim reference numeral "3" should read -- 2 --.

Signed and sealed this 14th day of April 1970.

(SEAL)

Attest:

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