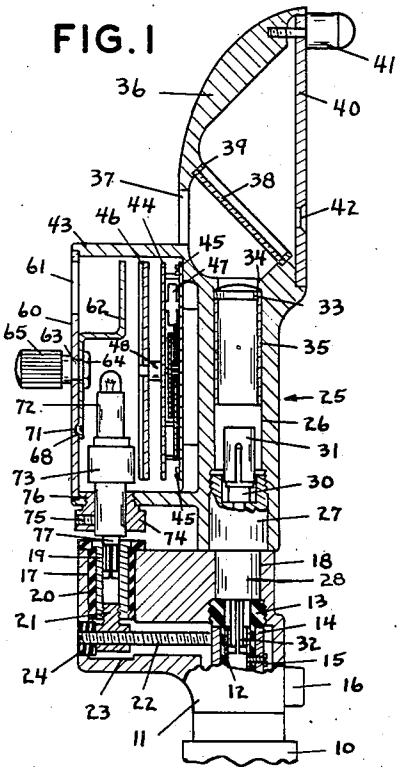
Nov. 19, 1940. E. H. RIMINGTON 2,221,928

EYE EXAMINING INSTRUMENT

Filed Dec. 31, 1938

FIG. 1



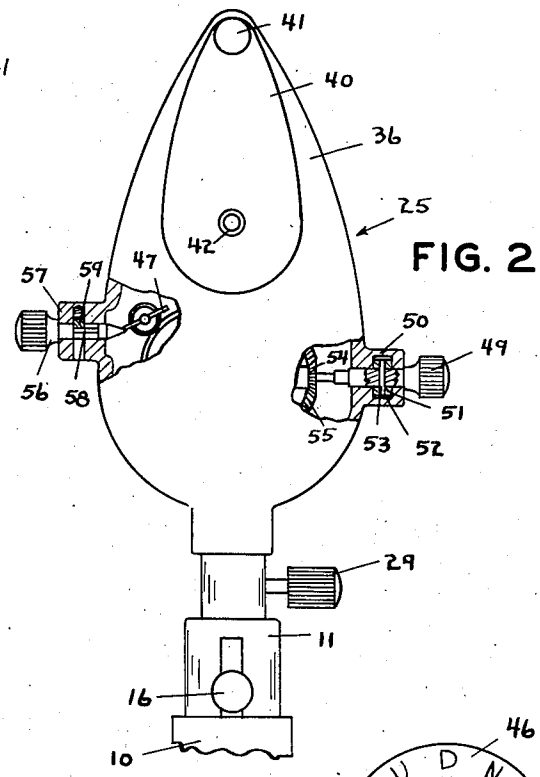


FIG. 2

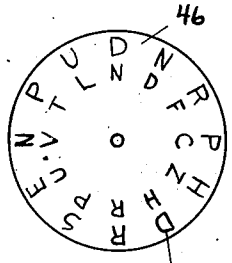


FIG. 4

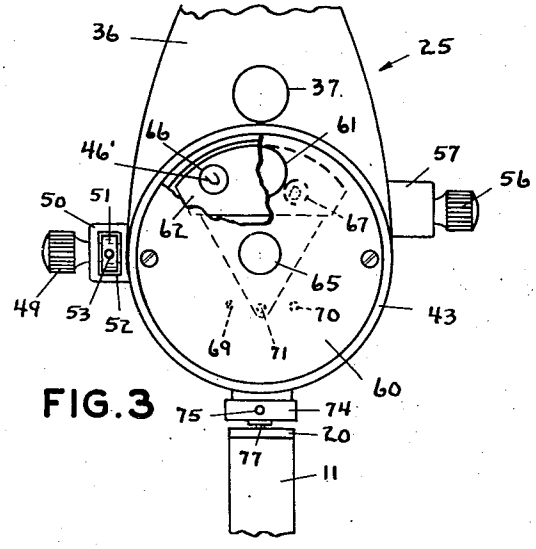


FIG. 3

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EYE EXAMINING INSTRUMENT

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2 Claims. (Cl. 88—20)

The present invention relates to optical instruments and more particularly to instruments for testing eyes.

One of the objects of the present invention is to provide a new and improved instrument for testing eyes. Another object is to provide a dynamic retinoscope having an improved fixation means. A further object is to provide a dynamic retinoscope having a moving fixation chart. Still another object is to provide a self-illuminated retinoscope with a self-illuminated, motor-driven, fixation chart. These and other objects and advantages reside in certain novel features of construction, arrangement and combination of parts as will hereinafter be more fully set forth and pointed out in the appended claims.

Referring to the drawing:

Fig. 1 is a vertical section of my improved retinoscope.

Fig. 2 is a rear elevation thereof with parts broken away to show internal structure.

Fig. 3 is a fragmentary front elevation thereof.

Fig. 4 shows the fixation chart.

One preferred embodiment of my invention is illustrated in the drawing wherein 10 designates a conventional battery or transformer handle upon which is secured an adapter 11. A conducting sleeve 12 is secured within the adapter 11 by a threaded sleeve 13 of insulating material and a conducting ring 14 is fastened on the outside of the insulating sleeve 13 by a screw 15. This screw 15 also provides an electrically conducting connection between the sleeve 12 and ring 14. The sleeve 12 is connected to one terminal of the battery or transformer, not shown, through a rheostat indicated at 16 and the other terminal of the battery or transformer is grounded to the adapter 11.

The adapter 11 projects forwardly from the handle 12 and has a cylindrical bore 17 at its outer end parallel to the bore 18 above the sleeve 12. A conducting sleeve 19 is secured in the bore 17 and insulated from the adapter 11 by a sleeve 20. A conducting screw 21 is threaded into the lower end of the sleeve 19 and a second screw 22 is threaded through the head of the screw 21. This screw 22 extends through a transverse bore 23 in the adapter 11 and makes contact with the ring 14. A nut 24 of insulating material holds the screw 22 against contact with the adapter 11.

The instrument head indicated generally at 25 has a longitudinal bore 26 within which a socket member 27 is threaded. The lower end 28 of this socket member 27 is of a size to fit snugly in the bore 18 and may be locked therein by a set screw 29. A lamp 30 having the usual diaphragm hood 31 is secured in the socket at the upper end of the member 27 and the contact 32 for the central terminal of the lamp 30 extends down into the sleeve 12. A condensing lens 33 is mounted in the bore 26 above the lamp 30 and is secured against a shoulder 34 by a friction skirt 35.

Above the open end of the bore 26, the head is shaped to form a hollow casing 36 having an opening 37 in its front wall. A semi-reflecting mirror 38 is secured within the casing 36 by a ring 39 so that it reflects light from the lamp 30 out through the opening 37. A cover plate 40 is secured over the rear end of the casing 36 by a screw 41 which is provided with an enlarged head to serve as a forehead rest for the operator. A sight opening 42 is provided in the cover plate 40 in alignment with the opening 37. The interior walls of the casing 36 are made light-absorbing to prevent any undesirable reflections from the rear surface of the mirror 38 to the eye of the operator.

A housing 43 is formed on the front of the head 25 below the opening 37 and a source of power such as a spring motor mechanism 44 is secured within this housing 43 by screws 45. A disk 46 is mounted on the shaft 48 of the motor 44. As shown in Fig. 4, this disk 46 has a plurality of rows of test characters 46' which are preferably of different size. For example, the outer and inner rows might be of such size as to subtend the same visual angle at the different distances ordinarily used in dynamic retinoscopy. The movement of the disk 46 by the motor 44 is a great aid to fixation as the successive movement of the characters before the eye holds the attention more readily than a stationary fixation object.

The motor 44 is a small, slow-speed spring motor and I have found that the ordinary watch works is entirely satisfactory. The second hand shaft of a watch rotates at a suitable speed and the disk 46 could be mounted on this shaft but since this shaft is relatively delicate and small, I prefer to modify the watch mechanism so that one of the central shafts can be used. Mounting the disk 46 on a central shaft also conserves space and makes the mechanism more compact.

In my preferred form, the escapement mechanism is removed from the watch works and the speed is controlled by a fan 47. The disk 46 can then be mounted on the minute hand shaft 48 which makes one to four or five revolutions per minute under the control of the fan 47. A winding stem 49 is journalled in a boss 50 on the side

of the housing 43 and is held against removal by a circular plate 51. This plate 51 fits in an aperture 52 in the boss 50 and is keyed to the winding stem 49 by a pin 53. A gear 54 on the end of the stem 49 engages the winding gear 55 of the watch mechanism.

In order to start and stop the motor 44, a pin 56 is slidably mounted in a boss 57 on the side of the housing 43 adjacent the fan 47. The end of this pin 56 is pointed and, when the pin 56 is pressed in, the point engages the fan 47 to stop the motor 44, as shown in Fig. 2. The pin 56 has a reduced central portion 58 and a spring pressed detent 59 engages this reduced portion 58 to prevent withdrawal of the pin 56 from the boss 57. When the pin 56 is pulled out, that is, pulled toward the left as shown in Fig. 2, the fan 47 is released and the motor 44 operates to rotate the disk 46.

The front of the housing 43 is closed by a cover 60 which has an aperture 61 adjacent the opening 37. This aperture 61 is in alignment with the characters on the disk 46 and is sufficiently large that both rows of characters 46' can be seen. A diaphragm or masking plate 62 is fixed on a shaft 63 by a nut 64 and this shaft 63 is rotatably mounted in the cover 60. A knob 65 is fixed on the shaft 63 outside the cover 60 for convenient operation of the diaphragm or masking plate 62. This masking plate 62 has two spaced apertures 66 and 67. The size and location of the aperture 66 from the shaft 63 corresponds to the size and position of the outer row of characters on the disk 46 and the size and location of the aperture 67 similarly corresponds to the size and position of the inner row of characters on the disk 46. Thus, when the aperture 66 is in alignment with the aperture 61, characters of the outer row are visible to the patient and when apertures 61 and 67 are in alignment, those of the inner row are visible. The two apertures 66 and 67 are spaced apart by a distance greater than the diameter of the aperture 61 so that the aperture 61 may be closed and the instrument used as an ordinary retinoscope. The masking plate 62 has a detent 68 at its lower end and this detent 68 engages selectively in the three depressions 69, 70 and 71 to position the masking plate 62, respectively, to expose the outer row of characters, the inner row of characters or close the aperture 61 completely.

Within the housing 43 is an incandescent lamp 72 to illuminate the characters 46' on the chart disk 46. This lamp 72 is mounted in a socket 73 which is secured in a nut 74 by a set screw 75. The nut 74 is threaded into a tapped hole 76 in the bottom wall of the housing 43. The central terminal 77 of the socket 73 extends down into the sleeve 19 of the adapter 11.

In operation, the two lamps 30 and 72 are lit and their intensity is regulated by the rheostat 16. The operator adjusts the masking plate or diaphragm 62 to select the row of characters suitable for the distance at which he is to work. The pin 56 is pulled out and the motor 44 rotates the disk 46 causing the characters to move slowly by the aperture 66 or 67. The patient is directed to watch the characters and the retinoscopy is performed in the usual manner.

From the foregoing, it will be apparent that I am able to attain the objects of my invention and provide an improved dynamic retinoscope in which the fixation object moves during the examination. While I have described a spring motor for moving the fixation object, obviously other suitable forms of actuating mechanism could be used. Various other modifications can also be made without departing from the spirit of my invention or the scope of the appended claims.

I claim:

1. A retinoscope comprising a support, a retinoscope mirror carried by said support, a chart movably carried by said support adjacent said mirror, a plurality of rows of different test characters on said chart, a diaphragm plate movably carried by said support and having a plurality of spaced apertures, one for each row, means for moving said plate to bring one of said apertures into position to expose a particular row of characters, means carried by said support for covering the other apertures in said plate, and a motor carried by said support and operatively connected to said chart to move said chart and present the characters in the exposed row successively at said one of said apertures.

2. A retinoscope comprising a support, a source of light carried by said support, a retinoscope mirror carried by said support for directing light from said source to the eye of a patient, a housing carried by said support adjacent the mirror, said housing having an opening facing the patient, a disk rotatably mounted within said housing behind said opening, a plurality of concentric rows of characters on said disk, the size of the characters in each row being different from the size of the characters in another row, a diaphragm plate movably mounted on said housing and having an aperture for each row of characters, means for moving said plate to bring one of said apertures into alignment with said opening to select a particular row of characters, and a spring motor mounted in said housing and operatively connected to said disk to rotate the disk and present the selected characters successively at said aperture.

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