Sept. 3, 1940. R. GREENSPOON 2,213,467

MEANS AND METHOD FOR ORTHOPTIC TRAINING

Filed Aug. 29, 1935 2 Sheets-Sheet 1

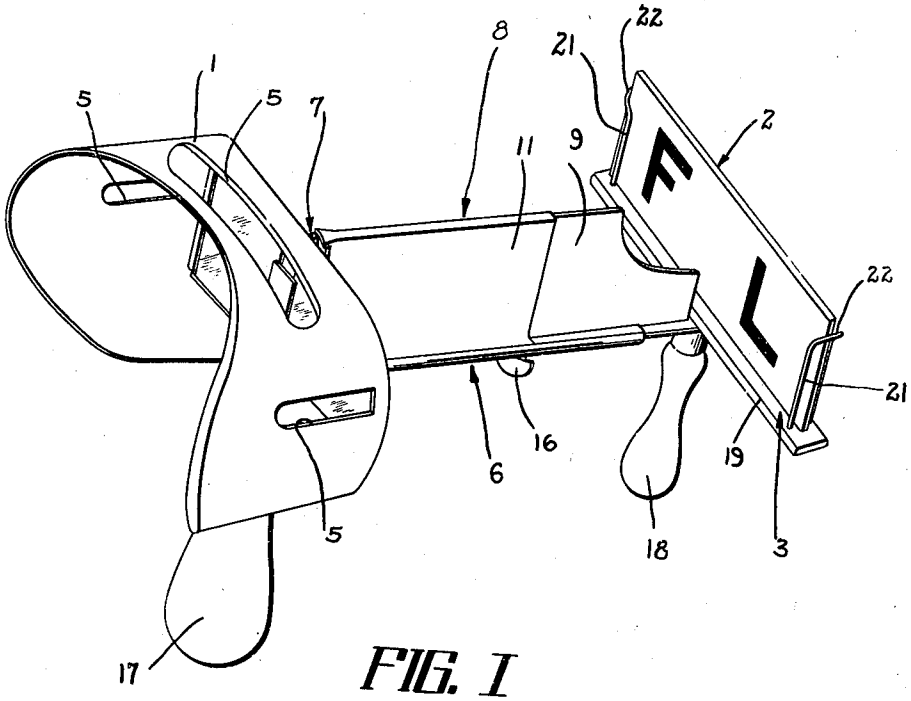


FIG. I

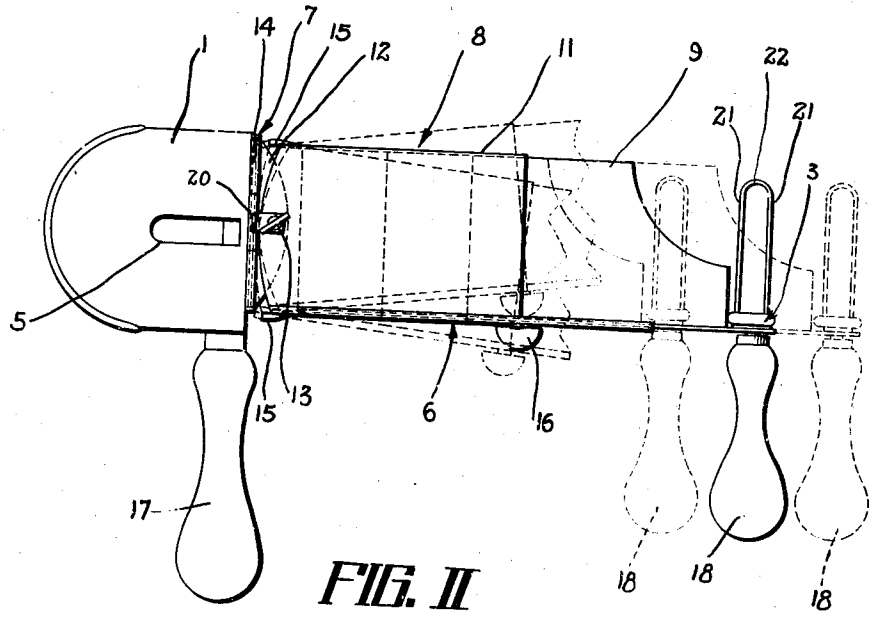


FIG. II

INVENTOR
REUBEN GREENSPOON
BY
Harry H. Stull
ATTORNEY

Sept. 3, 1940. R. GREENSPOON 2,213,467

MEANS AND METHOD FOR ORTHOPTIC TRAINING

Filed Aug. 29, 1935 2 Sheets-Sheet 2

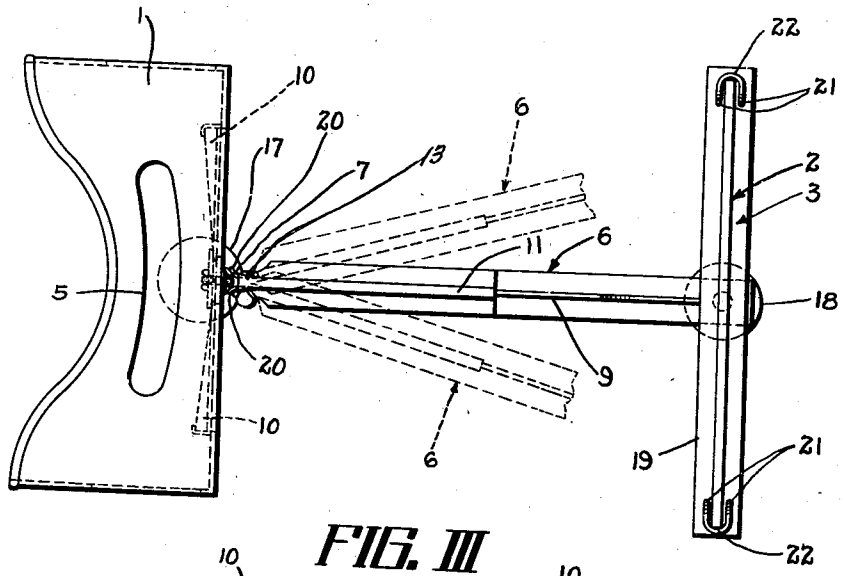


FIG. III

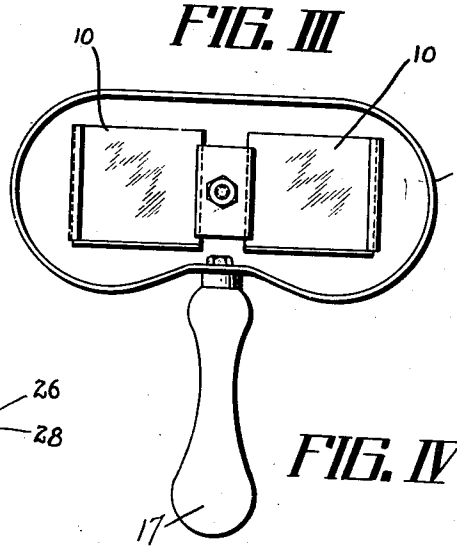


FIG. IV

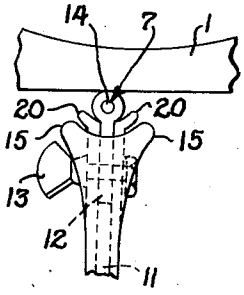


FIG VIII

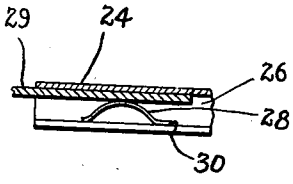


FIG. VII

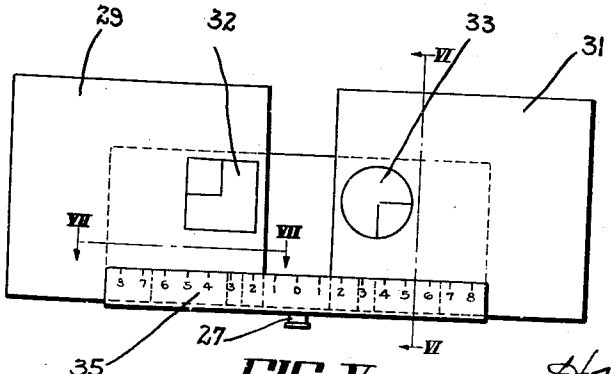


FIG. V

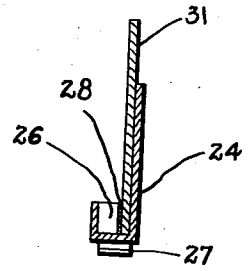


FIG. VI

INVENTOR
REUBEN GREENSPOON
BY
Harry H. Stull.
ATTORNEY

Patented Sept. 3, 1940

2,213,467

UNITED STATES PATENT OFFICE

2,213,467

MEANS AND METHOD FOR ORTHOPTIC TRAINING

Reuben Greenspoon, Los Angeles, Calif.

Application August 29, 1935, Serial No. 38,420

2 Claims. (Cl. 128—76.5)

This invention relates to improvements in ophthalmic instruments and has particular reference to means and methods of training and exercising the eyes and especially the single binocular functions of the eye.

One of the principal objects of the invention is to provide improved means and methods for training the extrinsic muscles of the eyes.

Another object of the invention is to provide a novel and improved device for training the coordination of the extrinsic and intrinsic muscles of the eyes for greater efficiency in binocular single vision.

Another object is to provide an improved device for exercising the accommodative functions of the eyes and developing greater reserve fusional convergence, ductions, etc.

Another object is to provide a novel simple and improved device for exercising the eyes to bring about increased amplitude of accommodation.

Another object is to provide an apparatus and method to bring about improved coordination between accommodation and convergence for greater efficiency in the performance of the eyes in binocular single vision.

Another object is to provide a means of orthoptic exercise for training the eyes in versional movements, both laterally and vertically, as well as obliquely.

Another object is to train the fusional faculties and stimulate vision in the so-called amblyopic eye, or eye that has lost part of its visual acuity from non-use.

A further object is to provide an improved apparatus and method of orthoptic training to break up the habit of suspension of vision in one eye or the other in cases of amblyopia exanopsia, or suspenopsia.

A further object is to provide a very simple, inexpensive and efficient device capable of use with slight instruction, adapted for effecting the exercise of the ocular muscles in accordance with the main purpose of my invention.

Another object is to provide an eye exercising device having prisms adapted to be held in fixed position relative to the eyes and having a target which may be used in any desired path while maintaining the plane of the target normal to the line of sight.

A further object of the invention is to provide an improved device for exercising the eyes to train the eyes against suspension of vision.

A still further object of the invention is to provide a device for exercising the eyes having prisms to be supported in front of the eyes and a target adapted to be viewed through said prisms, the target being arranged to be moved relative to the prisms in any meridian while the axis of the target is maintained in a constant angular relation with respect to line of sight.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawings and it will be apparent that many changes may be made in the details of construction, arrangement of parts, steps of the method shown and described without departing from the spirit of the invention, as expressed in the accompanying claims. I, therefore, do not wish to be limited to the exact details and steps of the method shown and described as the preferred forms only have been shown in the way of illustration.

Referring to the drawings:

Fig. I is a perspective view of the device of my invention;

Fig. II is a side view of the device showing the manner in which the targets may be moved in a horizontal plane, toward and away from the shield or hood carrying prisms;

Fig. III is a plan view of the device showing the manner in which the targets can be moved from side to side in a horizontal plane relative to the shield or hood;

Fig. IV is a front end view of the device;

Fig. V shows a modification of the targets, different sections of which may be moved to increase the vergence power;

Fig. VI is a sectional view of Fig. V along the lines VI—VI and looking in the direction of the arrows;

Fig. VII is a section of Fig. V along the lines VII—VII and looking in the direction of the arrows; and

Fig. VIII is an enlarged fragmentary view of the pivotal connection of the septum to the hood.

The purpose of my invention is to provide a simple and efficient device with the use of which a person may subject the ocular muscles of his eye to the proper exercises to maintain them in condition to perform their proper functions and thus avoid defects in vision due to one or more of the muscles failing to properly or fully coordinate with the other muscles and, also, whereby the ocular muscles may be strengthened and restored to normal conditions and properly perform their functions should one or more of them fail to respond to or coact with the other muscles.

One of the prime causes of ocular discomfort

and inefficient vision is the failure of the two eyes to work in unison and produce similar brain stimulations of sight and perception without stress on the muscles of the eyes which control the fusion functions. Two eyes may each have normal visual acuity, but if single binocular vision is absent or poor, inefficient vision results and discomfort is experienced.

The single binocular vision function is very closely related to the muscular balance of the eye muscles or innervation balances of the same. It is obvious that if the two eyes have the same visual acuity, efficient and comfortable single binocular vision will depend upon the ability of the person to orient and accommodate both eyes on the same point so that they may receive the same stimulations of sight.

The ability of a person to have and maintain depth perception or stereopsis is very closely related to the ability to fuse together in the brain centers two slightly different images received by each eye. To obtain comfortable and efficient vision an individual must have good stereopsis, good quality and quantity of vergence and suspenopsia, or momentary suspension of vision must not exist. This invention is directed to an apparatus and method for exercising the eyes to obtain efficient and comfortable single binocular vision.

Broadly speaking, the present invention contemplates a suitable means, such as a shield or hood 1, adapted to fit against the face of a person and a target 2 which is connected to the hood in such a manner that the target may be moved through any desired path transversely to or in the direction of the line of sight of the person, the said movements being imparted to said target either separately or simultaneously. The arrangement of the apparatus is particularly designed to stimulate and increase the single binocular functions of the eyes.

To this end, the apparatus comprises a target support 3 which is carried by a telescoping frame 6 connected to the hood 1 by means of a suitable universal joint 7. The telescoping frame member 6 carries a telescoping septum 8 comprising members 9 and 11; the member 9 being adapted to slide inside of the member 11. This septum limits the field of vision of each eye to the corresponding part of each target in front of the eye so that each eye can see only that part of the target intended for it. The hood 1 has mounted therein two lenses 10 of any suitable power adapted to be in front of each eye when the hood 1 is placed against the person's face and adapted to stimulate and increase the stereopsis effect. The hood 1 has suitable openings 5 in the top and sides so that the movements of the person's eyes may be observed to tell when fusion is broken.

Universal joint 7 is so constructed that the target 2 may be moved in any desired path substantially normal to the line of vision of the eyes while maintaining the target 2 against rotating movement relative to the axes of vision. As shown in Figure II, the telescoping member 11 is pivotally connected to a web member 12 as at 13, and the member 12 is pivoted to the back of the hood 1 about a vertical axis 14 for pivotal movement about an axis at a right angle to the pivot 13 between the members 11 and 12. It will thus be seen from Figs. II and III that the telescoping frame 6, carrying the target 2, may be oscillated about the pivot 13 between the web member 12 and the member 11, as well as about the pivot 14 between the member 12 and the hood 1. A suitable wing nut 16 carries a stud which is adapted to be screwed in the lower edge of member 11 and engages the lower edge of the member 9 to hold the target 2 at any desired distance from the hood 1. The hood is provided with a suitable handle 17 which may be grasped by the person to position the hood in front of his eyes. Likewise a suitable handle 18 is provided near the outer end of the telescoping member 9 which may be grasped by the other hand of the operator to move the target 2 in any desired path. It will be obvious from the foregoing description that the target 2 may be moved in a circular path substantially normal to the line of vision of the person since the target is pivoted about a universal joint. It is also apparent that the operator may move the target 2 from side to side or up and down or in any meridian inclined to these paths. The member 11 may be provided with suitable stops 15 and 20 to limit the pivotal movement about the pivots 13 and 14, respectively, to limit the movement of the target to the field of vision of the person. The letters of the target may be replaced by any suitable stereoscopic card commonly known in the art. The lenses 10 assist in stimulating the depth perception, or stereopsis and may have such focal power that the target will be in focus when the target is the maximum distance from the lenses. Therefore, when the target is moved closer to the lenses, the person receives exercises of accommodation as well as convergence.

The target holder, as shown in Figs. I, II and III, comprises a bar member 19 extending transverse to the frame 6 and carrying inverted U-shaped guards 21. The upper ends of the guards are inclined upwardly and outwardly so that a card bearing any suitable fusible indicia may be slipped between the legs of the guards and the upper looped portions 22 hold the card against lateral movement in either direction. The card which serves as the target may have any suitable spaced fusible indicia, as shown in Fig. I, so spaced that neither eye can see both of the indicia. In Fig. I the indicia comprises the letter F on the left hand side and the letter L on the right hand side. The lenses 10 carried by the hood are provided to compensate for the focal distance and the convergence angle in order to assist in relieving the eyes of the patient from unnecessary effort, or to render as complete relaxation as possible to the eyes, while exercises are being carried on to increase ductions, stereopsis and versions or to eliminate suspension while the target 2 is moved by manipulation of the handle 18.

The letters of the target may be replaced by any suitable stereoscopic cards commonly known in the art.

A modified form of the target and target holder is shown in Figs. V, VI and VII, wherein a pair of cards having the fusible or stereoscopic indicia, may be moved laterally relative to each other to exercise the power of convergence and stereoscopic perception. As shown in Fig. VI, the target holder 24 has a channel 26 at its lower end and is provided with a block 27 on its lower side to be engaged by the screw member on the upper end of the handle 18. Suitable leaf springs 28, see Fig. VII, are bowed and have one end secured in any suitable manner as by soldering or riveting, as at 30, to the front of the channel 26 and are adapted to frictionally hold the cards 29 and 31 against the back side of the holder 24.

The outer side of the front edge of the channel 26 is provided with a double scale 35 reading from the center toward each end. The scale may be graduated in millimeters and any suitable mark may be placed on the cards, or the edges of the cards may serve to indicate the distance between the symbols 32 and 33 on the cards 29 and 31, respectively. If desired these scales may be calibrated in degrees of prism diopters to indicate the amount of prism effect when the target is at a predetermined distance from the lenses. The symbol 32 may comprise a square inside of which are two legs of a cross, while the symbol 33 may comprise a circle of the same radius as the square, inside of which the other half of the cross is located. When the two symbols are fused together the patient will see a circle, square and cross in superimposed relation. It is to be noted that any desired set of stereoscopic cards may be substituted for the cards shown.

It will be apparent from the foregoing description that if it is desired to exercise the ocular muscles that move the eyes from side to side, the patient will hold the hood 1 before the eyes with one hand and will move the target holder from side to side with the other hand, it being understood that a target has been selected which causes the person to attain binocular fixation while viewing parts of the target monocularly. By moving the target in a vertical meridian the muscles which move the eyes in that meridian will be exercised, while movement of the target in any other desired meridian will exercise the muscles of the eyes which move the eyes in the corresponding meridians.

The thumb screw 16 may or may not be screwed tight to engage the member 9 during the above exercises. If the member 9 is moved in and out during the above described movements, the accommodative as well as versional muscles of the eyes will be exercised and their coordination will be developed. By screwing the thumb screw up and fixing the target a predetermined distance from the lenses, the versional movements of the target above described will exercise the versional functions of the eyes while the accommodation is fixed. It is to be understood that the target is so supported relative to the hood that it is capable of being moved in the direction of the line of a circle, ellipse, or any other desired shape of path. The movement of the target is such that if its path of movement were projected on a plane normal to the line of straight ahead vision it would describe a circle, ellipse or any other desired shape of path and its actual path will deviate slightly from said plane.

When it is desired to exercise the accommodation only, the screw 16 is loosened and the target is moved toward and away from the eyes in directions substantially parallel to the line of straight ahead vision of the person.

It is to be noted that the telescoping septum makes it possible to vary the distance of the target 2 toward and away from the lenses 10 and move the target laterally of the line of straight ahead vision while preventing either eye from seeing more of the target than is intended for it, thus maintaining monocular vision on the separate portions of the fixation means during the exercises.

In the description and claims the word "lenses" is used in a generic sense to include all types of refractive devices, such as prisms, lenses, or prisms combined with all forms of lenses.

From the foregoing description it will be apparent that I have provided a novel, simple, inexpensive and efficient device which may be used by any person to give very beneficial exercises to his eyes. Since this device is very simple and inexpensive it may be used in the home or school for exercising the eyes in order to keep them at their maximum efficiency.

Having described my invention, I claim:

1. An orthoptic training device comprising a stereoscopic eye-piece, said eye-piece comprising a hood having spaced lenses thereon, a septum attached to said eye-piece intermediate said lenses by a joint pivoted on a horizontal and a vertical axis, said septum comprising two separate sections in telescopic relation with each other and having target supporting means adjacent the end thereof opposite the hood.

2. An orthoptic training device comprising a stereoscopic eye-piece, said eye-piece comprising a hood having spaced lenses thereon and a longitudinal opening therein spaced from said lenses, a septum attached to said eye-piece intermediate said lenses by a joint pivoted on a horizontal and a vertical axis, said septum comprising two separate sections in telescopic relation with each other and having target supporting means adjacent the end thereof opposite the hood.

REUBEN GREENSPOON.