

## TRAINING TOOL FOR STIMULATING EYESIGHT RECOVERY

### FIELD OF THE INVENTION

The present invention relates to a training tool for use to stimulate the  
5 recovery of eyesight, and more particularly, it relates to a training tool de-  
signed to improve dynamic and/or kinetic visual acuity (hereinafter referred  
to generally as "dynamic visual acuity"), and/or to correct shortsightedness.

### BACKGROUND OF THE INVENTION

10 There are many sportsmen and sportswomen who are each of a high  
athletic motility but have a poorer eyesight due to their shortsightedness or  
due to their insufficient dynamic visual acuity. In these cases, they will be  
caused to feel oppressed by a severe barrier to their best choice of sports  
events. Some tools have been proposed to try to provide those sportsmen  
15 or sportswomen with a certain display of moving training images such that  
they could enhance their eyesight.

The Japanese Patent Laying-Open Gazette No. 2000-237133 discloses  
an optometry apparatus constructed to test the dynamic visual acuity of  
sports persons. In this apparatus, a cursor moves on a flat screen along  
20 programmed directions horizontal, vertical and/or oblique, so that subject  
persons will be ordered to look at front ways the moving image or cursor.

Recent studies on the shortsightedness have revealed that if the ciliary  
muscle surrounding and stretching a human organic lens would lose elas-  
ticity to become stiffly, then this lens consequently left thicker and bulged  
25 could not precisely be focused on any remote objects. In order to rectify  
shortsightedness of people, they have had to repeat an effort to gaze into the  
distance and another effort to see at close range one after another, and some

apparatuses were proposed to enable such a discipline of human eyes.

An example of this type of apparatuses is disclosed in Patent Laying-Open Gazette No. 2001-061917 and constructed such that a cursor reciprocating fore and aft will be watched by a subject person. His or her eyes  
5 are thus caused to continuously change their focal distance from short to long, or vice versa. Another example shown in Patent Laying-Open Gazette No. 08-257078 uses an LCD panel (i.e., liquid crystal display) to provide a training image. This panel is driven fore and aft relative to an apparatus body so that the optical distance between a human eye and the  
10 image being watched thereby through an ocular point or eyepiece.

It is to be noted however with respect to dynamic visual acuity that when hitting a ball during the play of a ball game such as baseball or tennis, players have to sense the three-dimensional motion of the ball running fast towards them. The objective image or cursor projected on the flat screen  
15 provided in the Gazette No. 2000-237133 does merely make a two-dimensional motion horizontal, vertical or oblique. Even if the image moves fast, it will almost be impossible for this apparatus to bring users into a good training as to their visual sensitivity of a three-dimensionally and fast moving object. The image or cursor on the monitor flat screen may possibly  
20 be modulated so fast that it would be viewed as if coming close to or going away from the trainee. However, that is not an actual three-dimensional motion of an object, but is merely a virtual change in said image on the same flat screen.

In respect of the treatment of shortsightedness, the apparatus shown in  
25 the Gazette No. 2001-061917 is designed such that the cursor is mechanically and continuously driven at a moderate speed towards and away from a viewer. This cursor can not make any sudden change in position, so that

the apparatus is not necessarily so effective to train the ciliary muscle. On the other hand, the technology proposed in the Gazette No. 08-257078 can change only the optical distance between the image and the viewer's eye. The virtual screen appears in the ocular that is kept at a constant distance  
5 from the eye, and the image magnifies itself and then contracts itself, or vice versa. The distance between this screen and the viewer's eye does stand unvaried, thus almost failing to train the visual acuity of gazing into the distance and then seeing at close range.

## 10 SUMMARY OF THE INVENTION

An object of the present invention made in view of the drawbacks inherent in the prior art apparatuses is therefore to provide a training tool for stimulating eyesight recovery, with the tool being adapted for the eyesight training in various manners. These manners may include one mode  
15 of enhancing dynamic visual acuity and the other mode of correcting shortsightedness, and these two modes may be carried out independently or in combination. In a case wherein the tool is used as the dynamic visual acuity training apparatus, users have to look at an image actually moving towards or away from them. In another case wherein the said tool is used  
20 as the shortsightedness correcting apparatus, the image should be switched over instantly and reversibly from a close-range view to a distant view, or vice versa, at regular time intervals if desirably.

In order to achieve this object, the training tool provided herein to stimulate eyesight recovery may comprise structural elements as defined in  
25 the accompanying claim 1 and as the reference numbers used in the accompanying drawings do denote. Those elements are a tool body (1) having a frontal peep hole (11) as an ocular point through which the dark interior of

said body can be looked in along a view line, an image supplier (2) installed in the tool body and providing an image for use in the training for stimulation of eyesight recovery, and an original image display (3) also installed in the tool body and showing the image delivered from the image supplier  
5 (2), wherein the original image display (3) is supported to be capable of swiveling about an axis substantially perpendicular to the view line.

From a second aspect, a training tool provided herein for stimulating eyesight recovery as defined in the accompanying claim 2 may comprise elements that are a tool body (1) having a frontal peep hole (11) as an ocular  
10 point through which the dark interior of said body can be looked in along a view line, an image supplier (2) installed in the tool body and providing an image for use in the training for stimulation of eyesight recovery, and an original image display (3) also installed in the tool body and showing as an original image 'A' the image delivered from the image supplier (2). This  
15 tool may further comprise a reflecting means (4) that serves to convert the original image 'A' to a reflected image 'B', a reflected image display (5) for causing the reflected image 'B' to intervene between the ocular point and the original image 'A', and a switching means (6) for instantly displacing the reflected image display (5) from a first position to a second position, or  
20 vice versa. If and when this means (6) operates to bring the reflected image display (5) to the first position, then the reflected image 'B' becomes viewable from the ocular point, with the original image 'A' turning out of sight. If contrarily the switching means (6) operates to bring the reflected image display (5) to the second position, then the original image 'A'  
25 becomes viewable, with the reflected image 'B' turning out.

From a third aspect, the training tool provided herein from the second aspect and as defined in the accompanying claim 3 may be constructed such

that the original image display (3) is supported to be capable of swiveling about an axis substantially perpendicular to the view line.

The first position referred to above means such a positional or spatial range of reflected image display (5) that it hides the original image display (3) not to reach the ocular point. In other words, the view line extending between the original image display (3) and the ocular point is interrupted in this case by the reflected image display (5). The second position referred to above means such another positional range of reflected image display (5) that it no longer hides the original image display (3), thereby allowing the view line to reach it from the ocular point. In other words, the view line in this case does extend between the original image display (3) and the ocular point, without being interrupted by the reflected image display (5). Anyway, the term 'position' is intended herein to indicate a considerably wide positional or spatial range.

When the training tool defined in the accompanying claim 1 is used, the angular position of the flat display or screen will be changed. The cursor or image does not only move simply in a horizontal, vertical or oblique direction as in the prior art apparatuses, but also does make a three-dimensional fore-and-aft motion. A user looking at the cursor through the frontal hole can visually follow its sophisticated spatial motion, thereby facilitating his or her training of dynamic visual acuity.

When the tool defined in the accompanying claim 2 is used, the actual distance from the user's eye to the image is instantly and reversibly altered in order that the user repeats to switch from a close-range view to a distant view, or vice versa. Thus, he or she can now train effectively his or her ciliary muscle so as to make an easier effort to correct shortsightedness.

In more detail, the close-range reflected image is able to interrupt the

view line towards the remote original image. The latter image can not be seen until and unless the former image then standing viewable is moved off the view field. Thus, it is possible for the user to alternatively and selectively look at either of the close-range and distant images.

5 Even a single training tool as defined in the claim 3 suffices well to selectively enhance dynamic visual acuity or correct shortsightedness, on demand.

### BEST MODES OF CARRYING OUT THE INVENTION

10 A drive means (8) may be employed in the training tool of the claim 1 so that the linear distance between the ocular point and the original image display (3) can be changed.

Preferably, the reflected image display (5) may be made smaller in size than the original image display (3) where the tool of claim 2 or 3 is adopted.  
15 In this case, the users can be trained to watch a larger image and a smaller image in an alternating manner, in addition to their training to clearly look at the close-range and distant images one after another.

Also preferably, a proper cam mechanism may be used as the switching means (6) in the tool defined in claim 2 or 3. Such a mechanism will  
20 enable an instant and quick switchover of the reflected image display (5) between its first and second positions.

In addition to the drive means (8) such as to change the distance between the ocular point and the original image display (3) in the tool of claim 2 or 3, it may further employ a regulating means (9) for adjusting or varying  
25 the angle at which the reflecting means (4) has to stand. In this case of manually responding to the current state of drive means (8), the distance from the ocular point to the remote original image 'A' can be adjusted to

match the eyesight of a person being trained. In harmony with this, the other distance from the ocular point to the nearer reflected image 'B' can also be regulated taking into account the person's eyesight. Alternatively, the angle of the reflecting means (4) may automatically be adjusted in response to the control of drive means (8).

A sound generator (33) may be added to the original image display (3) so that combination of voice with the image renders pleasant the training of eyesight. Further, the target image may be produced to move not only up and down but also sideways, and/or be graduated in brightness as a whole or in part, so that various modes of eyesight training can be done along with the drilling of clear distant views into the users.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a training tool for stimulating eyesight recovery, the tool being provided in a first embodiment of the present invention;

Fig. 2 is a perspective view of the interior of the training tool shown in Fig. 1;

Fig. 3 is a side elevation of the training tool shown partly in cross section, in which one part of this tool takes its first position;

Fig. 4 is similarly a side elevation of the training tool, but with the one part taking its second position;

Fig. 5 is a schematic plan view of the training tool, in which the other part of this tool takes its first position; and

Fig. 6 is a similar schematic plan view of the training tool, but with the other part taking its second position.

## THE PREFERRED EMBODIMENTS

Now some embodiments of the present invention will be described referring to the drawings.

Fig. 1 shows a training tool provided in a first embodiment for stimulating eyesight recovery comprises a parallelepiped tool body 1 as an outer shell. A frontal peephole 11 formed of an insulating material is disposed above a DVD (viz., digital video disc) player 21. This player 21 installed (as the image supplier 2 mentioned above) in the tool body 1 has an operable front face, and a power cable with a plug 12 protrudes from rear of said body.

As seen in Fig. 2, disposed in rear of the DVD player 21 and also inside the tool body is an upright thin monitor 31 as one of principal parts constituting an original image display. Electric cords 22 connected to the monitor 31 will serve to supply power for driving same. A rotating base plate 33 firmly holds thereon the monitor 31 and is operatively connected to a drive motor 34. The motor 34 disposed beneath the base plate is subjected to remote control (in this embodiment) so that this plate 33 is driven clockwise or anti-clockwise. A shell of the motor 34 is firmly mounted on a truck 81 (as the drive means mentioned above) having four wheels or casters 82 rotatably attached to the lower side of this truck. A pair of rails 83 each engaging with two of those wheels 82 do extend longitudinally of the tool body 1. The truck 81 is thus able to run between and along the rails 83, thereby causing the monitor 31 to move fore and aft, that is, towards or away from the frontal peephole 11 (serving herein as an ocular point). A pendent block 84 having a horizontal bore threaded internally is formed integral with the center of lower face of the truck 81. This block 84 is kept in mesh with an elongate and horizontal threaded rod 85, but

incapable of spinning relative to the rod 85. This rod disposed on the bottom of tool body 1 does extend centrally and longitudinally thereof. If a manual wheel 86 is operated to rotate, then the rod 85 will force the pendent block 84 to travel along this rod so as to displace the monitor 31  
5 towards and away from the ocular point.

A reflector 42 is pivoted to upper inner walls of the tool body, and a first mirror 41 is fixed on this reflector above the peephole 11. The original image 'A' coming from a screen 32 of the monitor 31 will be reflected by the mirror 41. The angle of tilt of the reflector 42 integral with the  
10 mirror 41 can be changed by twisting the outside head of an adjust screw 91 (as the regulating means 9 mentioned above). A ledge 71 protrudes rearwards and slightly downwards from the tool body's front wall portion below the peephole 11. A further reflector 52 is pivoted to the ledge 71 and interposed between the ocular point and the screen 32 of original image  
15 display. The main portion of this reflector overlies on said ledge and integrally holds a second mirror 51 (serving as the reflected image display 5 mentioned above). The reflector 52 normally resting on the ledge 71 (see Fig. 3) has an integral tab 53 protruding forwardly and generally below this ledge. With this tab 53 coming into engagement with a cam 62 (detailed  
20 below), the reflector 52 will be raised to an almost upright position. Consequently, the reflected image 'B' from the first mirror 41 will reflect in the second mirror 51. This state causes a viewer to watch the twice-reflected image as shown in Fig 4. In detail, the upright reflector 52 stands near the ocular point in such a way as interrupting the view line from ocular point  
25 not to reach the remote monitor screen 32. The heart-shaped cam 62 as the switching means 6 for forcing upwards the reflector 52 is rigidly secured on the output shaft of a motor 61.

The output shaft of motor 61 operates in this embodiment at a speed of 5 rpm, taking 12 (twelve) seconds per rotation, so that the cam 62 will also take 12 sec per rotation. When protuberance area of the cam 62 comes into engagement with the forward tab 53 of further reflector 52, the latter  
5 will be forced upwards suddenly. This position of the reflector 52 will continue for about 6 (six) sec, and during this period it prevents the optical or light beams from original image 'A' from advancing straight to the ocular point. As shown in Fig. 4, the light line is reflected sequentially at the first and second mirrors 41 and 51 in this order, before forming a re-  
10 flected image 'B' to be caught by the viewer's eye.

With the heart-shaped cam 62 further rotating, its protuberance area will disengage from the reflector's tab 53 so that the reflector 52 falls down and continues to lie on the ledge also for 6 sec. In this state shown in Fig. 3, the reflected image 'B' from such a fallen reflector does not advance to  
15 the ocular point, instead allowing the viewer's eye to catch the original image 'A'.

As described above, the reflector 52 for providing reflected image 'B' alters its position suddenly from upright to recumbent, or vice versa, at regular time intervals of 6 (six) sec. Thus, a distant image 'A' and a close-  
20 range image 'B' instantly alternate one with another every 6 seconds, thereby contributing to better optical accommodation of human eyes.

Other important uses of the training tool are as follows. In order to exercise a primary and simple mode of the training of a dynamic visual acuity, the motor 34 will be remote-controlled to turn at first. The monitor  
25 screen 32 will thus stand perpendicular to the view line from ocular point (see Fig. 5) as in the prior art. Then, the manual wheel 86 is operated to move the monitor 31 fore and aft so as to bring it to any desired position

matching the viewer's eyesight. A cursor or picture on the screen 32 thus standing still will subsequently drift vertically, horizontally, obliquely and /or randomly so that a user gazing this picture can train his or her dynamic visual acuity. During this operation, the motor 61 is kept off for causing  
5 the reflector 52 to lie on the ledge.

Another and more sophisticated mode of the training of dynamic visual acuity may be done as show in Fig. 6. The motor 31 will be remote-controlled to swivel for instance to the right by about 70 (seventy) degrees when seen from the ocular point. Also in this case, the manual wheel 86 is  
10 then operated to move the monitor 31 fore and aft so as to bring it to any desired position matching the viewer's eyesight. The slanting monitor screen 32 with a thus reduced apparent width will give the image a far-and-near effect and a stereoscopic effect, so that the user gazing this picture can train his or her dynamic visual acuity in a more effective manner. During  
15 this operation, the motor 61 is likewise kept off for causing the reflector 52 to lie on the ledge.

The viewer's shortsightedness may be corrected by improving accommodation of his or her eyes in the manner already summarized above referring to Figs. 3 and 4. Also in this case, the manual wheel 86 will be  
20 operated at first to move the monitor 31 fore and aft so as to bring it to any desired position matching the viewer's eyesight. Then, the adjust screw 91 is operated to preset the angle of reflector 42, in response to the newly adopted fore-and-aft position of monitor 31. Subsequently, the motor 61 will be actuated so that the second reflector 52 with the mirror 51 swings up  
25 and down at regular time intervals of 6 (six) seconds. In this way, a distant and larger image on the monitor screen 32 and a closer and smaller image on the mirror 51 do repeat to alternate one with another so as to be gazed by

the viewer who wants to correct his or her shortsightedness.

A lightening device not shown may be incorporated in the present training tool. Such a device turned on and off periodically will be useful to the training of looking at an object within a well-lighted or dark environment. For example, the motor 31 may be turned on and off at the intervals of 6 (six) seconds synchronously with the on-off of said lightening device. In this case, a brighter original image 'A' on the monitor screen 32 and a darker reflected image 'B' on the mirror 51 are looked at one after another in an alternating manner.

A headphone not shown may also be employed such that a voice is accelerated stepwise, thereby enabling a supplementary training of fast-listening in addition to the training of dynamic visual acuity. The trainee can improve more effectively his or her athletic ability owing to such an auditory play-ground presence. Further, the image on the display or mirror may switched over from one scene to another at an increasing frequency, whereby the trainee can enhance his or her brain's ability to quickly cognize any visual scene, object or letters.

The training tool is a multiple-purpose apparatus that is useful in practicing the training of dynamic visual acuity, the correction of shortsightedness and any other training, solely or in any combination.

The embodiments given above do not restrict the scope of the present invention, but may be modified in any appropriate manner without departing from the spirit of the present invention.

CLAIMS:

1. A training tool provided for stimulating eyesight recovery  
5 comprising: a tool body (1) having a frontal peep hole (11) as an ocular  
point through which the dark interior of said body can be looked in along a  
view line, an image supplier (2) installed in the tool body and providing an  
image for use in the training for stimulation of eyesight recovery, and an  
original image display (3) also installed in the tool body and showing the  
10 image delivered from the image supplier (2), wherein the original image  
display (3) is supported to be capable of swiveling about an axis substan-  
tially perpendicular to the view line.

2. A training tool provided for stimulating eyesight recovery  
15 comprising: a tool body (1) having a frontal peep hole (11) as an ocular  
point through which the dark interior of said body can be looked in along a  
view line, an image supplier (2) installed in the tool body and providing an  
image for use in the training for stimulation of eyesight recovery, an  
original image display (3) also installed in the tool body and showing as an  
20 original image 'A' the image delivered from the image supplier (2), a  
reflecting means (4) that serves to convert the original image 'A' to a  
reflected image 'B', a reflected image display (5) for causing the reflected  
image 'B' to intervene between the ocular point and the original image 'A',  
and a switching means (6) for instantly displacing the reflected image  
25 display (5) from a first position to a second position, or vice versa, wherein  
when this means (6) operates to bring the reflected image display (5) to the  
first position, then the reflected image 'B' becomes viewable from the ocu-

lar point, with the original image 'A' turning out of sight, and when the switching means (6) contrarily operates to bring the reflected image display (5) to the second position, then the original image 'A' becomes viewable, with the reflected image 'B' turning out.

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3. A training tool as defined in claim 2, wherein the original image display (3) is supported to be capable of swiveling about an axis substantially perpendicular to the view line.

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