

EYEGASSES FOR RETARDING THE PROGRESSION OF MYOPIA

[TECHNICAL FIELD]

5 The present invention relates to a pair of eyeglasses, particularly for retarding the progression of myopia.

[BACKGROUND]

Myopia is defined as when the ciliary muscle within the eye
10 responsible for focus accommodation is at its highest physical relaxation level and light from distant objects is focused in front of the center of the retina. The blurry vision of distant objects not only causes visual impairment but may also lead to serious complications such as glaucoma, retinal detachment and macular degeneration, thereby causing the
15 consequence of blindness. The more progressed myopia, the more likely the development of blindness. Myopia is caused by too much reading or too short distance kept in reading, which leads to accommodative spasm and continuous contraction of extraocular importers, thereby causing excessive axial elongation (causing true myopia and rapid growth in
20 myopic degrees). Reading control is thus crucial for preventing the onset and progression of myopia.

In the reading process, the ciliary muscle of the eye contracts and change the shape of the crystalline lens to achieve eye focus (accommodation), while the extraocular intortors contract (primarily by
25 intortors and secondarily by superior and inferior rectus muscles) to obtain the binocular single vision.

Developments in the degree of myopia are essentially caused

by axial elongation. Inhibiting axial elongation can thus prevent developments in the degree of myopia. Among existing technologies, applying myopic defocus on peripheral retina to inhibit axial elongation can retard, to some extent, the developments in the degree of myopia.

5 When a patient wearing myopia glasses (to correct distant vision) reads, accommodation by intraocular ciliary muscles and contraction of extraocular intortors are constantly at work, which causes tremendous pressure on eyeballs. Such a tremendous pressure can cause accommodative spasms and excessive axial elongation caused by eye
10 stretch resulting from the contraction of extraocular intortors, thereby causing or worsening myopia. If the situation is not effectively inhibited, myopia can continue to worsen.

 Generally, typical patients who wear eyeglasses in reading can undoubtedly take off their glasses given the reading materials are close to
15 their eyes. However, doing so involves the following inconveniences and drawbacks:

(a) When astigmatism (a common eye condition) happens along with myopia, the absence of glass lenses means a lack of correction over refractive error caused by astigmatism, leading to blurred vision.

20 (b) With a high degree of myopia, for example, over 400, he must bend forward in reading, causing exhaustion and a strong sense of discomfort. A short reading distance also causes a tremendous pressure for extraocular intortors, and in the meantime, the physiological mechanism of triple dynamics also causes increased accommodation, thus
25 leading to worsened myopia.

(c) In case of a high degree of myopia, even though the reading distance is not as short as that of (a), the reader cannot enjoy the inhibitory effect of this invention on the progression of myopia since the glasses are not worn.

5 (d) When a patient with myopia wants to see distant objects, he needs to wear glasses, which prompts his eyes to readjust accommodation and extraocular intortors. When he wants to see nearby objects, he has to take off the glasses and then readjust accommodation and extraocular intortors. The repeated putting on, removing and
10 readjustment practices are definitely inconvenient and more likely to cause eyestrain.

(e) When one uses electronic products (e.g., PCs and mobile phones) or uses LEDs emitting blue lights or works under sunlight without wearing blue-light-blocking glasses, the excessive harmful blue lights are
15 left unblocked and can harm ocular and physiological health over time.

Additionally, myopic correction methods that do not have an inhibitory effect on the progression of myopia include:

First, simple myopic correction, which does not have a true inhibitory effect on the progression of myopia and instead intends to cause
20 increased myopic degree.

Second, orthokeratology does not inhibit the progression of myopia but can cause glare, corneal xerosis and infection, a rebound of myopic degree a number of years after the procedure, thus increasing the risk of retinal breaks and detachment.

25 Third, alternation of two sets of glasses, with one set for seeing

distant objects and the other for close ones. Specifically, glasses helping wearers see close objects reduce ocular accommodation and slow down the progression of myopia. The drawbacks include inconvenience, high cost and low compliance, as well as poor adaptability to reading when
5 glasses are fitted with prism lenses for close vision.

Fourth, bifocal lenses. The close vision part is used to relax accommodation for close vision to prevent progression of myopia, with shortcomings of low acceptability of their appearance, inconvenience when used to view desktop computers, and poor adaptability to sports or
10 when the close vision part is fitted with prism lenses.

Fifth, peripheral defocus lenses. When a patient with myopia wears regular prescription glasses, only objects in the center of the distant vision are focused on the central retina, while the peripheral objects are actually focused behind the retina (hyperopic defocus phenomenon). The
15 myopic degrees on both sides of a peripheral defocus lens are smaller than that of the central part. Thus, when such lenses are worn, the peripheral vision will be focused in front of the nearby retina, offsetting the eye's congenital defect of peripheral defocus and thus preventing excessive axial elongation and inhibiting the progression of myopia. The
20 shortcoming is a failure to control the reading process and an insignificant effect on preventing the progression of myopia.

Sixth, progressive lenses. The close vision part relaxes accommodation to prevent progression in myopia. The drawback is that myopic patients may erroneously find the close vision part, leading to an
25 adverse effect on the efficacy. Optical distortion on lens edges can cause

discomfort, and there is an inability to separately overlay prisms on the close vision part.

Seventh, a drug is applied to paralyze the ciliary muscle in the combination of the bifocal or progressive lens. The wearer's pupil is dilated by the drug and the accommodation ability is decreased, thus bifocal or progressive lenses are used to offset the lack of or decrease in accommodation, thus helping reduce progression in myopia. The drawbacks include susceptibility to glare, cardioacceleration, fever, and dry eye and mouth; long-term use may result in the entry of harmful ultraviolet light into the eyeball, leading to retinal and macular degeneration. A lower concentration of atropine used to paralyze the ciliary muscle still has toxicity. The toxicity of the latest ultra-low concentration (0.01%) of atropine remains to be seen, but its treatment efficacy is less than satisfactory.

Eighth, orthokeratology lenses. Orthokeratology lenses that are worn at night can somewhat flatten the myopic patient's cornea curvature, thus fulfilling the efficacy of correcting myopia and preventing its progression. Given its invasiveness, the approach results in high susceptibility to corneal damage and frequency occurrence of keratoconus.

To sum up, traditional myopia correction methods have many drawbacks and are not reliable or safe enough to use. With a growing myopic population, it is increasingly pressing to find a more convenient and safer approach to the problem.

[DISCLOSURE OF INVENTION]

It should be understood that the foregoing general descriptions and ensuing detailed descriptions of this disclosure are exemplary and explanatory and committed to providing further explanations for this disclosure as mentioned in the Claims.

5 To overcome the above problems, the present invention provides glasses retarding the progression in myopia, comprising a frame and temples and characterized in that each of said temples comprises of the first and second temples, said the second temple being connected between the said frame and said the first temple, said the second temple moving
10 telescopically in relation to said the first temple, allowing said frame in relation to eyeballs to move from primary position to post-elongation secondary position. The relationship between the effective degree and lens degree is as follows:

15
$$P_2 = P_1 / (1 - d_2 P_1)$$

where P_i is the actual lens degree at said primary position, P_2 is the effective lens degree at said secondary position and d_2 is the spacing between said primary and secondary position, which satisfy:

20
$$0 < d_2 < 60\text{mm}$$

Preferably, the present invention further provides glasses retarding progression of myopia, characterized in that

said the first temple comprises a plughole arranged at its front end, said the second temple being telescopic and arranged at the first end
25 of the said plughole.

Preferably, the present invention further provides glasses

retarding progression of myopia, characterized in that

said glasses further comprise a movable body, said movable body being embedded at the second end of the said plughole, said second temple being arranged within said plughole and connected to said movable
5 body.

Preferably, the present invention further provides glasses retarding progression of myopia, characterized in that

a number of parallel grooves are cut along the vertical direction of the said plughole, a number of parallel ribs being cut along
10 the vertical direction at the plugging head end of the said movable body, said ribs and said grooves being clamped.

Preferably, the present invention further provides glasses retarding progression of myopia, characterized in that

the plugging tail end of the said movable body is arranged
15 with a number of concave-convex strips and a convex horizontal bar-shaped operating portion.

Preferably, the present invention further provides glasses retarding progression of myopia, characterized in that

the said movable body comprises intermeshed rack and pinion,
20 an adjustment knob arranged on the side face of said first temple rotating to drive the rotation of said pinion, allowing said rack of the said movable body to move and telescopically adjust the relative spacing between said first and second temples.

Preferably, the present invention further provides glasses
25 retarding progression of myopia, characterized in that

the said plughole further comprises a spring, telescopic body, turntable, pushrod and chute, said telescopic body being joined together with said second temple with its width at the tail larger than the opening of the said plughole, said spring housing being arranged on said telescopic
5 body, said telescopic body being arranged with said turntable at its end, said turntable being arranged with a number of parallel ribs along the central axis of the outer circumference, the first end of said push rod being sheathed within said chute and protruding out of the opening of the said chute, the second end of said push rod being propped against said
10 turntable, said chute being arranged with a number of one-way open parallel slots, said push rod being arranged with a number of spiky protrusions at its head, and the opposing face between the said turntable and said chute is arranged with a concave-convex meshing mechanism;

wherein, by pushing said push rod protruding out of the end
15 of the said plughole, said push rod moves along the said chute to press said turntable downward. When said turntable and said chute detach at the meshing position, the spiky protrusions at the head of said push rod contact with the oblique plane of said turntable, generating radial force to drive said turntable to rotate, making said telescopic body propped
20 against one end of the said turntable to compress, said spring outside the turntable being in a compressed state, said frame being in said primary position. When said push rod is pressed again, the spiky protrusions of the head of said push rod detach from the oblique plane of the said turntable, said turntable rotating under the radial force, said turntable
25 overlapping at the meshing location of said chute. With the stretching of

said spring, said frame arrives at said secondary position.

Preferably, the present invention further provides glasses retarding progression of myopia, characterized in that

a number of grooves are cut at outer flanks of said left and right
5 lenses, said grooves having their depth d take values within the range:

$$70\text{mm} < d < 100\text{mm}.$$

Preferably, the present invention further provides glasses retarding progression of myopia, characterized in that

10 said grooves are cut along the central horizontal baseline on the outer flanks of said left and right lenses.

Preferably, the present invention further provides glasses retarding progression of myopia, characterized in that

cross-sectional shapes of said plughole include rectangle, circle
15 and ellipse.

The present invention of glasses retarding progression of myopia employs a convenient telescopic design to fulfill comfortable and safe adjustment of myopic degrees on a pair of glasses, offering ease-to-use and low-cost advantages.

20

[BRIEF DESCRIPTION OF THE DRAWING]

Hereinafter, exemplary embodiments of the present disclosure will be described in detail with reference to the accompanying drawings. Hereinafter, describe each illustrative embodiment of the present
25 disclosure in detail with reference to accompanying drawings, wherein the embodiments are presented in the accompanying drawings. Wherever

possible, the same reference numbers will be used throughout the drawings to refer to the same or similar parts. In addition, although the terms used in this disclosure are selected from publicly known and used terminologies, some terms mentioned in the public disclosure may have
5 been selected by the applicant based on his or her discretion, the detailed definitions of which are explained in other descriptive parts of this text. Further, it is required that the present disclosure be understood not only by terms actually used but by the meaning implied by each term.

Numerous objects, features and advantages of the present
10 invention will be readily apparent to those of ordinary skill in the art upon a reading of the following detailed description of the present invention.

FIG. 1 is the working principle diagram of the special glasses of the present invention;

FIG. 2 is a specific embodiment based on the working principle
15 shown in FIG. 1;

FIG. 3 is the diagram of binocular observation when the special glasses of the present invention are used;

FIG. 4 is the local structure diagram of the first preferred embodiment of the present invention;

20 FIG. 5 is the cross-section view of the structure of A - A' shown in FIG. 4;

FIG. 6 is the side view of the first preferred embodiment shown in FIG. 4 at the primary position;

FIG. 7 is the side view of the first preferred embodiment shown
25 in FIG. 4 at the secondary position;

FIG. 8 is the local structure diagram of the second preferred embodiment of the present invention;

FIG. 9 is the cross-section view of the structure of B-B' shown in FIG. 8;

5 FIG. 10 is the local structure decomposition diagram of the third preferred embodiment of the present invention;

FIG. 11 is the cross-section decomposition diagram of C-C' shown in FIG. 10;

10 FIG. 12 is the improved structural diagram of lenses of the present invention.

Drawing reference signs

10 - Anterior frame

11 - Hinge

12 - Plughole

15 13 - Rib

14 - Groove

15 - Concave-convex strips

16 - Operating portion

17 - Temple

20 18 - Body

19 - First temple

20 - Temple tip

21 - Second temple

22 - Nose Pad

301 - Right lens

302 - Left lens

81 - Adjustment knob

82 - Rack

5 83 - Pinion

90 - Spring

91 - Telescopic body

92 - Turntable

93 - Pushrod

10 94 - Chute

921 - Rib

941 - Opening

942 - Chute notch

100 - Eyeball

15 200 - Eyeball

[SPECIFIC EMBODIMENTS]

This specification discloses one or more embodiments incorporating the features of the present invention. The disclosed
20 embodiments only exemplify the present invention. The scope of the present invention is not limited to the disclosed embodiments. The present invention is defined by the attached Claims.

References in the specification to "one embodiment," "an embodiment," "an exemplary embodiment," etc. indicate that the
25 described embodiment may include a particular feature, structure, or

characteristic, but not all embodiments necessarily include the particular feature, structure, or characteristic, structure or properties. In addition, these terms may not necessarily refer to the same embodiments. Further, when a particular feature, mechanism or characteristic is described in connection with one embodiment, it is considered within the knowledge of those skilled in the art to implement such feature, structure or characteristic in connection with other embodiments, whether explicitly described or not.

Additionally, it should be understood the spatial descriptions (e.g., above, below, on top of, left, right, beneath, top, bottom, vertical, horizontal, etc.) used herein are only for descriptive purposes, and the actual structural implementation method described herein can be spatially arranged in any orientation or manner.

FIG. 1 is the working principle diagram of the present invention, indicating how the back-and-forth movement of the anterior frame of myopic lens improves the degree of myopic degree.

Wherein the reference signs in the diagram have the following meanings:

C: Central corneal surface

d1: distance from C to P1 at the primary position

d2: the distance of P1 at the primary position and P2 at the secondary position, $d2 = 6\text{cm}$

0: Book reading

01': Book vision seen by eyes when the lenses are in the primary position;

02': Book vision seen by eyes when the lenses are in the secondary position;

P1: Lenses at the primary position

P2: Lenses at the secondary position

5 R1: Light that has traveled through P1

R2: Light that has traveled through P2

100: Eyeball

As can be seen from the embodiment of FIG. 1, when the first
10 and second temples of the myopia glasses, namely 19 and 21, relatively move from each other, the primary position P1 and secondary position P2 of lenses in relation to the cornea are generated.

The relationship between the spacing of the two positions and the implementable adjustment of myopic degree is further described as
15 follows, that is, the following explains in detail the effect of the adjustable glasses of the present invention in use process:

First, the parameters applied are explained as follows:

f_1 = focal length of lens (unit: meter)

f_2 = effective focal length of lens (unit: meter)

20 The vertex distance (vertex distance) = distance between the backside of the lens and the central corneal surface

d_2 = change in vertex distance (only denotes differences without considering direction, which means it always has a positive value)

Unit of d_2 : meter

25 P_1 = unit of the degree of lens [myopia lens is denoted by a

minus sign (-)]: D(Diopter)

P_2 = Unit of the effective degree of lens [myopia lens is denoted by a minus sign (-)]: D (Diopter)

Reading distance is L(meter), and adjustment coefficient is a,
5 which satisfy:

$$1 > a > 0$$

wherein, the relationship between the above parameters is defined by the following equation:

The effective focal length of lens:

$$10 \quad f_2 = f_1 - d_2 \quad (1)$$

The effective lens focal distance:

$$f_2 = 1/P_2 = 1/P_1 - d_2 \quad (2)$$

Where,

$$1/P_2 = (1 - d_2 P_1)/P_1 \quad (3)$$

15

Then,

$$P_2 = P_1 / (1 - d_2 P_1) \quad (4)$$

Where d_2 = forward movement from central corneal surface, which is of positive value; thus $1 - d_2 P_1$ is also positive;

20 $d_2 = aL$ denotes the reduction in the number of degrees needed to be adjusted due to the forward movement of the lens from the central corneal surface,

where

$$60\text{mm} > d_2 > 0\text{mm} \quad (5)$$

The embodiment incorporating the above relationships is as follows:

If the -5 D lens moves from the primary position P1 forward by 60mm to the secondary position P2, based on Equation (4), the effective
5 lens degree is:

$$\begin{aligned} p_2 &= \frac{p_1}{1 - d_2 p_1} \\ &= \frac{-5}{1 - [0.06 \times (-5)]} \\ &= \frac{-5}{1.3} = -3.85 \text{ D} \end{aligned}$$

As such, the glasses of the present invention change the effective lens degree through adjustment. When the anterior frame
10 attached with myopia lens moves forward by 60mm, the myopia degree is adjusted from the -5 D at the primary position to -3.85 D, thus resulting in a decrease in degrees by +1.15 D.

FIG. 2 shows that both eyes do not need to look relatively much downward to read and observe objects when the lenses are in the
15 secondary position (in relation to the primary position) without considering adjustment. That is because the vision at the lower end is lifted, reducing the workload of extraocular muscles. Because the more straight the eyes look forward, the more balanced the tension of each extraocular muscle.

FIG. 2 further illustrates that after the anterior frame and myopia lens move forward, the light on the book will be affected by the lenses that have moved forward, producing a base-down prism effect and causing the book to seem to have moved a little upward, thereby
5 effectively reducing the necessity of downward-looking or head lowering.

Wherein, the reference signs in FIG. 2 have the following meanings:

C: Central corneal plane

d1: Distance from C to P1 at the primary position;

10 d2: Distance from P1 at the primary position to P2 at the secondary position

0: Book reading

01': The vision in book reading seen by eyes when the lenses are at the primary position

15 02': The vision in book reading seen by eyes when the lenses are at the secondary position

P1: Lenses at the primary position

P2: Lenses at the secondary position

R1: Light that has traveled through primary position P1

20 R2: Light that has traveled through secondary position P2

Z: Height difference

100: Eyeball

FIG. 3 provides the top view of the special glasses of the present invention in use.

25 Wherein eyeballs 100 and 200, the original position P1 and

secondary position P2 of lenses are presented.

As can be known from the FIG., when the anterior frame 10 and myopia lenses are moved forward, light on the book will be affected by the lenses that have moved forward, producing a base-in prism effect. As
5 a result, the user can maintain binocular single vision without having to converge too much of his or her eyes.

Wherein, the reference signs in FIG. 3 have the following meanings:

C: Central corneal surface;

10 0: Reading book;

P1: Lenses are in primary position;

P2: Lenses are in the secondary position.

R1: light that has traveled through P1

R2: Light that has traveled through P2.

15 α : The angle of the outward shift of book vision caused by lenses at the primary position P1

β : The angle of the outward shift of book vision caused by lenses at the secondary position P2

100: Eyeball

20 200: Eyeball

First embodiment

FIG. 4 presents the local structure diagram of the first embodiment of the present invention;

The glasses retarding progression of myopia presented
25 comprise different shapes and types including full-rim, semi-rim and

rimless anterior frame 10, said anterior frame 10 is connected to a movable body 18 through a hinge 11, said movable body 18 being able to move in relation to the first end of first temple 19, said first temple 19 is connected at its second end with the temple tip 20 via temple 17.

5 Please refer to FIGs 4 and 5 which reveals the structures of said anterior frame 10 and movable body 18 in detail.

 Wherein the first end of the first temple 19 is provided with a plughole 12 which has a certain length, the first end of the movable body 18 is connected to the second temple 21 which is connected to the movable
10 body 18.

 As can be known from FIG. 5, a number of grooves 14 are created in a longitudinal direction within the plughole 12, and a number of parallel ribs 13 are also created in a longitudinal direction on the part of the movable body 18 inserted therein. The ribs 13 and grooves 14 are
15 mutually clamped to adjust the relative spacing between the first temple 19 and the second temple 21.

 Additionally, to adjust movable body 18 more conveniently, a raised horizontal strip-shaped operating portion 16 is provided at the tail of the second end of the moving body 18, and a plurality of concave-
20 convex stripes 15 are provided on the end face of the second end.

 The moving body given in the preferred embodiment shown in the FIG. is a cuboid, which is not limited by this structure in practical applications and can also be an ellipsoid, a cylinder and the like.

 The working mode of the first embodiment will be described
25 below with reference to FIGS. 6 and 7.

Wherein FIG 6 shows the structure of the movable body 18 at the primary position.

The four upright and protruding semi-cylindrical bodies 13 parallel to the longitudinal direction of the moving body 18 are embedded
5 in the longitudinally parallel semi-cylindrical grooves 14 inside the plughole 12 to form a tight locking system.

FIG. 7 shows the structure of movable body 18 at the secondary position.

When the moving body 18 is pushed into the plughole 12 on
10 the first temple 19, the ribs 13 on the moving body 18 close to the operating portion 16 is pushed into the groove 14 inside the plughole 12 close to the second temple 21 and locked tight.

The concave-convex stripes 15 and the operating portion 16 on the back of the moving body 18 are to help the anterior frame 10 and
15 the myopia lens to move back and forth, and the horizontal strip-shaped operating portion 16 is to prevent the anterior frame 10 and the myopia lens from sliding forward excessively and coming out from the temples on both sides, in addition to facilitating the user to move the anterior frame and the myopia lens back to the primary position. The first temple
20 19 and the handle 17 are connected to form a horizontal line L3. The horizontal line L3 forms a right angle with the vertical lines of the upright head and body. The distance between the anterior frame 10 and the first temple 19 is about 15mm. The first temple 19 is 40mm long, 15mm high and 7mm wide.

25 Second embodiment

FIGS. 8 and 9 further illustrate another structural schematic diagram of the movement of the moving body 18 relative to the first temple 19.

Structures similar to those of the first embodiment will not be repeated.

In this embodiment, a pinion and rack movement adjustment mechanism is used. As shown in FIGS. 8 and 9, a rack 82 is arranged on the moving body 18 in the plughole 12 of the first temple 19 to mesh with a pinion 83, and the pinion 83 is adjusted by an external adjustment knob 81 to realize the adjustment of relative positions between the first and second temples, that is, 19 and 21.

When in use, the gear 83 is driven to rotate by rotating the adjusting knob 81, thereby driving the rack 82 to move back and forth. The rack 82 is integrated with the moving body 18, driving the continuous movement of the moving body 18 relative to the first temple 19, thereby fulfilling the relative adjustment from the primary position to the secondary position.

Third embodiment

FIGS. 10 and 11 show a third structural schematic diagram of the moving body 18 moving relative to the first temple 19.

Those similar to the first and second embodiments will not be discussed again.

This embodiment includes a spring 90, a telescopic body 91, a turntable 92, a pushrod 93 and a chute 94, forming a structure similar to

that of a ballpoint pen, wherein the telescopic body 91 is integrally connected with the second temple 21 and is arranged within the plughole 12 on the first temple 19, and the width of the end 10 of the telescopic body 91 is larger than the opening of the plughole 12 to prevent it from being detached from plughole 12. The spring 90 is sleeved on the telescopic body 91, the end of the telescopic body 91 is sleeved with a turntable 92, the outer circumferential surface of the turntable 92 is provided with a number of parallel protruding strips 921 along the central axis, and the first end of the pushrod 93 is sleeved within the groove 94 and protruding out of the opening 941 of the chute 94, the second end of the pushrod 93 is abutted against the turntable 92, and the chute 94 is provided with several parallel one-way chute openings 942. More specially, head of the push rod 93 is provided with a number of pointy protrusions, and the opposite surfaces of the turntable 92 and the chute 94 also have a concave-convex meshing mechanism.

When the push rod 93 extending out from the end of the socket 12 on the first temple 19 is pushed, the push rod 93 moves along the chute 94 to press the turntable 92 to move downward, and when the turntable 92 is disengaged from the engagement of the chute 94, the pointy protrusions of the top rod 93 head contacts the inclined surface of the turntable 92 to generate radial force to force the turntable 92 to rotate, with the spring 90 at its outside being in the compressed state. At this point, the lens of the glasses of the present invention is in the primary position.

When the push rod 93 is pressed again, the spiky protrusions on the head of the push rod 93 are separated from the oblique plane of the

turntable 92, which is rotated and overlaps with the engagement of the chute 94, and the spring 90 is stretched. The lens of the glasses of the present invention reaches the secondary position.

For example, if a -10 D lens is moved forward by 50mm from the primary position to the secondary position, then, the effective lens power obtained according to Equation (4):

$$\begin{aligned}
 P_2 &= P_1 / (1 - d_2 P_1) \\
 &= (-10 \text{ D}) / (1 - [0.05 \times (-10 \text{ D})]) \\
 &= (-10 \text{ D}) / 1.5 \text{ D} \\
 &= -6.67
 \end{aligned}$$

In this way, the final -6.67 D obtained is 3.33 D less than the previous -10 D, which represents a +3.33 D decrease in the required degree of accommodation.

For another example, if the lens of -8 D is moved forward by 40mm from the primary position to the secondary position, the effective lens power obtained according to Equation (4):

$$\begin{aligned}
 P_2 &= P_1 / (1 - d_2 P_1) \\
 &= (-8 \text{ D}) / (1 - [0.04 \times (-8 \text{ D})]) \\
 &= (-8 \text{ D}) / 1.32 \text{ D} \\
 &= -6.06 \text{ D}
 \end{aligned}$$

In this way, the final -6.06 D obtained is 1.94 D less than the previous -8 D, which represents a +1.94 D decrease in the required degree of accommodation.

For another example, if the lens of -5 D is moved forward forward by 60mm from the primary position to the secondary position, (as shown in FIG. 1), the effective lens power obtained according to Equation (4):

$$\begin{aligned}
 P_2 &= P_1 / (1 - d_2 P_1) \\
 &= (-5D) / (1 - [0.06 \times (-5D)]) \\
 &= (-5D) / 1.3 \\
 &= -3.85 D
 \end{aligned}$$

In this way, the final -3.85 D obtained is 1.15 D less compared to the previous -5 D, which means that the required degree of accommodation is reduced by +1.15 D.

From the above three examples, the glasses designed by applying the improved idea of the present invention can achieve the technical effect of retarding the progression of myopia, and specifically achieve the following benefits:

First, only one set of glasses is used, which means the cost is low. It also has a regular appearance, is easy to use and safe. The same prescription lenses are used, pointing to high adaptability. There is also no optical distortion caused by the use of bifocal and progressive lenses, increasing comfort for wearers.

Second, the secondary position has a distinct appearance when the glasses are used, which helps parental supervision and improves compliance.

Third, this method provides the largest field of view without distortion and requires the shortest reading time compared to methods

using only one set of fixed eyeglasses.

Fourth, the pushed-forward prescription myopia lens slightly shrinks the image of the book, which visually causes the eye to read the book farther away, thus reducing the need for eye accommodation.

5 Fifth, when the current frame and the myopia lens are moved forward, the user will move the book/file forward to continue reading the full text to continue reading the full text. Increasing the reading distance of the document can reduce the pressure of the ciliary muscle for accommodation and help slow down the progression of myopia.

10 Sixth, when the user keeps the head and body upright, the anterior frame and the myopia lens that are pushed out flat, as well as the upper frame edge of the anterior frame, remain at the original level of the primary position, which helps the user to focus with the smallest eye. The accommodative force and extraocular intortor contraction force are at the
15 same horizontal line of the eyes, making it easier to read through the myopic lenses in the forward and upright anterior frame.

Seventh, when both the anterior frame and the myopia lens are moved forward, the light of the book will be affected by the lens moving forward, causing a base-down prism effect by which the book seems to
20 have moved forward a bit, thereby effectively reducing eyes looking down, lowering the head and closer reading distance.

Eighth, when both the anterior frame and the myopia lens are moved forward, the light of the book will be affected by the lens moving forward, resulting in a base-inward prism effect. As a result, the user does
25 not have to invert the eyes as much to maintain a binocular single vision.

That's because the physiological mechanism of the triple linkage reduces accommodation pressure while reducing intortor pressure.

Ninth, when both the anterior frame and the myopia lens are moved forward to the secondary position, the light from the book image
5 becomes less radiated after passing through the lens, so the user can focus the vision of the book even by using a little less accommodation power.

Tenth, the distance vision at the secondary position when using the present invention is not unacceptably poor, so there is no need to move the anterior frame and the lens back to the primary position to
10 see the distance, making it very convenient.

In addition, FIG. 12 also shows the improved structure of the present invention on the left and right lenses. It should be noted that this improvement can be applied to the design of rimmed or rimless glasses. The shape of the lens is designed for the desired baseline length so that
15 when reading, peripheral images that do not pass through the lens are focused directly on the peripheral retina. (to offset the eye's congenital defect of peripheral defocus)

As can be seen from the figure, the outer edges of the left and right lenses 30 are symmetrically provided with grooves 301 inward along
20 the baseline direction indicated by the dotted line (only one is shown in the figure, the other side is the same), the depth range between the groove 301 and the outer edge is d, and the value range of d is:

$$70\text{mm} < d < 100\text{mm}$$

25 With this structure, less adjustment is required in the secondary position than when reading in the primary position because the

effect of the lens edge power is reduced.

The above idea can also be applied to opening a plurality of grooves on the side of the lens and placing them in different positions as shown in the figure, which can also achieve the adjustment effect.

5 The foregoing description of the preferred embodiments is provided to enable any person skilled in the art to use or utilize the present invention. Various modifications to these embodiments will be readily apparent to those skilled in the art, and the general principles described herein may be applied to other embodiments without innovative steps.

10 Thus, the present invention is not to be limited to the embodiments shown herein but should be accorded the widest scope consistent with the principles and novel features disclosed herein.

Claims

1. A kind of glasses for retarding the progression of myopia, comprising a frame and temples and characterized in that each of said temples comprises of the first and second temples, said second temple
5 being connected between the said frame and said first temple, said second temple moving telescopically in relation to said first temple, allowing said frame in relation to eyeballs to move from primary position to post-elongation secondary position, the relationship between the effective degree and lens degree is as follows:

10
$$P2 = P1 / (1 - d2P1)$$

wherein P1 is the actual lens degree at said primary position, P2 is the effective lens degree at said secondary position, and d2 is the spacing between said primary and secondary position, which satisfy:

15
$$0 < d_2 < 60\text{mm}$$

2. The glasses for retarding myopia progression according to claim 1, wherein the said first temple comprises a plughole arranged at its front end, the said second temple being telescopic and arranged at the first end
20 of the said plughole.

3. The glasses for retarding myopia progression according to claim 2, characterized in that said glasses further comprise a movable body, said movable body being embedded at the second end of the said
25 plughole, said second temple being arranged within said plughole and connected to said movable body.

4. The glasses for retarding myopia progression according to claim 3, characterized in that a number of parallel grooves are cut along the vertical direction of the said plughole, a number of parallel ribs being cut along the vertical direction at the plugging head end of the said
5 movable body, said ribs and said grooves being clamped.

5. The glasses for retarding myopia progression according to claim 4, characterized in that the plugging tail end of the said movable body is arranged with a number of concave-convex strips and a convex
10 horizontal bar-shaped operating portion.

6. The glasses for retarding myopia progression according to claim 3, characterized in that said movable body comprises intermeshed rack and pinion, an adjustment knob arranged on the side face of said first
15 temple rotating to drive the rotation of said pinion, allowing said rack of the said movable body to move and telescopically adjust the relative spacing between said first and second temples.

7. The glasses for retarding myopia progression according to claim
20 3, characterized in that said plughole further comprises a spring, telescopic body, turntable, pushrod and chute, said telescopic body being joined together with said second temple with its width at the tail larger than the opening of the said plughole, said spring housing being arranged on said telescopic body, said telescopic body being arranged with said
25 turntable at its end, said turntable being arranged with a number of

parallel ribs along the central axis of the outer circumference, the first end of said push rod being sheathed within said chute and protruding out of the opening of the said chute, the second end of said push rod being propped against said turntable, said chute being arranged with a number of one-way open parallel slots, said push rod being arranged with a number of spiky protrusions at its head, and the opposing face between said turntable and said chute is arranged with a concave-convex meshing mechanism;

wherein, by pushing said push rod protruding out of the end of the said plughole, said push rod moves along said chute to press said turntable downward, when said turntable and said chute detach at the meshing position, the spiky protrusions at the head of said push rod contact with the oblique plane of the said turntable, generating radial force to drive said turntable to rotate, making said telescopic body propped against one end of the said turntable to compress, said spring outside the turntable being in a compressed state, said frame being in said primary position, when said push rod is pressed again, the spiky protrusions of the head of said push rod detach from the oblique plane of the said turntable, said turntable rotating under the radial force, said turntable overlapping at the meshing location of the said chute. With the stretching of said spring, said frame arrives at said secondary position.

8. The glasses for retarding myopia progression according to any of claims 1-7, characterized in that a number of grooves are cut at outer

flanks of said left and right lenses, said grooves having their depth d take values within the range:

$$70\text{mm} < d < 100\text{mm}.$$

9. The glasses for retarding myopia progression according to claim
5 8, characterized in that said grooves are cut along the central horizontal baseline on the outer flanks of said left and right lenses.

10. The glasses for retarding myopia progression according to claim
9, characterized in that cross-sectional shapes of said plughole include
10 rectangle, circle and ellipse.