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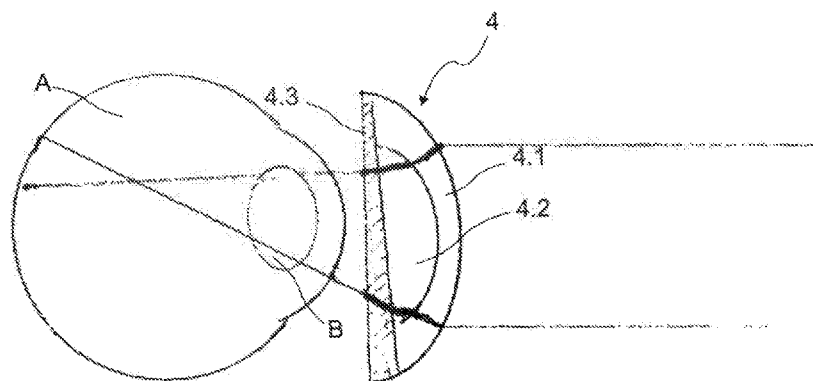
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(54) Title: A VISUAL FIELD EXPANDER OPTICAL EYEGLASSES SYSTEM

Figure 4



(57) Abstract: This Invention relates to an optical eyeglasses system (1) which is used for rehabilitation of the eye and for expanding the visual field in the cases which restrict the daily activity capability in the eye diseases which proceed with visual field stenosis; and which has different refractive Indices which enable expanding the visual field by minimizing and angling the image formed in the retina (A).



DESCRIPTION

A VISUAL FIELD EXPANDER OPTICAL EYEGLASSES SYSTEM

Technical Field

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This invention relates to a visual field expander optical eyeglasses system which is used for rehabilitation of the eye diseases such as glaucoma, retinitis pigmentosa, diabetic retinopathy, optic neuropathy which have peripheral visual field defect or tunnel visual field and which provides fitting the image forming in the retina into a narrow visual field by minimizing and angling.

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Prior Art

Eye diseases leading to peripheral visual field defect or tunnel are principally glaucoma, retinitis pigmentosa, diabetic retinopathy and optic neuropathy. Patients with said eye diseases often bump into surroundings, cannot go down the stairs or often fall and be subjected to physical injuries. In crowded places they might bump into others and be subjected to insults, criminal and psychological traumas like being accused with abuse. Their physical appearance is mostly normal; however, they are anxious patients who do not want to use a stick or visual impairment assistive device due to their anxiety for being understood as a patient with visual impairment and ostracization from the society. In the current state, patients are using stick or various visual impairment assistance devices.

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In the present state of the art, there is a reverse telescope system that can be applied to one eye or both eyes. It is in the form of a binocular and it is hard to fit the optical axis into the narrow visual field. If optical axis is not centralized exactly, there might be distortions in the sight. It can expand the visual field only by minimizing the objects, it does not have a prismatic affect. Since they are obvious as a visual impairment assistive device, most of the patients do not want to use them in social environments. At the same time their cost is very high. On the other hand, the visual field can be expanded with strabismus glasses prisms or Fresnel prisms. However, high dioptic prisms mostly impair central vision and decrease contrast sensitivity. Mostly current prism diopter is not sufficient to expand the visual field as much as the patient needs. High dioptic prisms applied to both eyes might lead to diplopia. The image forming in

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the prisms and the objects are not in their actual spatial positions. They can limit the spatial perception and activity capability of the patient.

5 In another method, glasses with digital LED screen are used. The image captured with a high-resolution digital camera is transferred to the screen in front of the eyes. The objects can be minimized or maximized at desired ratios and their contrast can be adjusted. These glasses can provide virtual digital image instead of real optical image. It is a big virtual system which is obvious that there is visual impairment assistive device in front of the eye. It is necessary to control with remote control and the cables.
10 With these glasses, it is pretty hard to walk. It requires electrical connection and charge. Using it requires a learning and adaptation curve. They are high technological products which are rather expensive and which require technical maintenance and repair. They can be easily damaged during their use by the patients with visual impairment. Most of the patients do not want to use them in social environments.

15 Another method is named as an eyeglasses system the refractivity of which can be changed by administering silicone within adjustable dioptrics. However, said eyeglasses system does not change the image size and it does not have any expanding effect for visual field. It has the characteristic of prescription glasses only for far-near vision. Besides, it is used in the treatment of eye closing treatment for amblyopic patients.
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The visual field expanding optical eyeglasses system used in the present invention consists of three-layered structure having a dioptrics and a different refractory index
25 from front to back. The refractive indices of said three-layers are different from each other and from the refractive indices of the eye lens. By gradually refracting the light by said three-layers, the image that will form in the retina is minimized and the visual field is expanded. There is an optical chamber and an optical framework that surround the liquid and gas in an impermeable manner on the anterior refractive aspheric optical
30 surface, on the posterior aspheric optical surface and within the space therebetween. Between the anterior and posterior refractive optical surface, there is an angle of four-prism diopter the base of which tapers from bottom to top. This angle is designed to facilitate walking, going down the stairs and to expand the visual field of the patient by angling, especially in the defects of the low half visual field. This prism angle and base layout can be provided by being changed according to the needs of the patient.

The Objects of the Invention

The object of this invention is to realize a visual field expander optical eyeglasses
5 system which can expand the visual field significantly in cases which restrict the daily
activity capability in the diseases which proceed with visual field stenosis.

Another object of the invention is to realize a visual field expander optical eyeglasses
system which provides activity capability without the need of sticks or visual devices
10 with navigation system in the cases of visual field stenosis which restrict daily activity
capability.

Another object of the invention is to realize a visual field expander optical eyeglasses
system which prevents or minimizes the patient from experiencing a physical trauma
15 while the patient is doing his daily activities in the cases of visual field stenosis which
restrict daily motion capability.

Another object of this invention is to realize a visual field expander optical eyeglasses
system which is aesthetic and looks like normal eyeglasses instead of visual
20 impairment assistive devices which the patient cannot use due to aesthetic needs and
social drawbacks.

Summary of the Invention

25 A visual field expander optical eyeglasses system defined in the first claim and in the
other claims depended thereon for realizing the object of this invention consists of a
frame, an optical glass, a coupling latch, a magnetic element and an optical system.
The optical eyeglass system can be produced from aspheric mineral glass, acrylic or
any other optical material. It can be worn as a visual field expander eyeglass by
30 mounting on an eyeglass frame produced from any material. The large-angle optical
system can be used by being mounted to right-left clips system via being attached in
front of the prescription glasses of the patient, if any. The optical eyeglasses system is
produced as a magnetic front apparatus and can be attached and detached to/from the
eyeglasses frame by magnets after the prescription numbers of the patient, if any, are
mounted on a magnetic frame. In the optical system, an anterior refractive surface is

placed on the posterior refractive surface with the posterior refractive surface being located at its base. There is a refractive chamber between the anterior and posterior refractive surface. The anterior refractive surface, the posterior refractive surface and the refractive chamber found within the structure of the optical system have different refractive indices. Between the posterior refractive surface and the anterior refractive surface, there is an angle of four-prism diopter with their base being at the bottom. This angle is designed to facilitate walking, going down the stairs and to expand the visual field of the patient by angling, especially in the defects of low half visual field. This prism angle and base layout can be provided by being changed according to the needs of the patient. There is a refractive chamber between the anterior refractive surface and the posterior refractive surface. The lights reflecting over the object whose image will form in the eye are primarily refracted over the anterior refractive surface. The light passing into anterior refractive surface refracts towards the posterior refractive surface via fluid and gas having different refractive indices located in the light refractive chamber. Finally, a refraction occurs from the posterior refractive surface such that a minimized image will form in the retina. Thus, it becomes possible to create the visual field by expanding the visual field which the eye can see via the optical eyeglasses system. The type of the fluid and gas to be contained in the refractive chamber is determined according to the required refractive index. In the cases where the refractive index is demanded to be high, silicone and liquid perfluorocarbon or any optical transparent liquid can be used. In the cases where refractive index is demanded to be low, C3F8, SF6, C2F5 or any optical gas can be used.

Detailed Description of the Invention

The visual field expander optical eyeglasses system for achieving the object of this invention is shown in the attached figures wherein:

- Fig. 1** is a perspective view of the visual field expander optical eyeglasses system.
- Fig. 2** is a front view of an interior of the visual field expander optical eyeglasses system.
- Fig. 3** is side section view of the visual field expander optical eyeglasses system.

Fig. 4 is a schematic view of refraction of the light and image formation while the visual field expander optical eyeglasses system is on the eye.

The parts in the figures are enumerated individually and the definitions of these numbers are given below.

1. Optical eyeglasses system
 2. Frame
 3. Optical glass
 - 10 4. Optical system
 - 4.1. Anterior refractive surface
 - 4.2. Refractive chamber
 - 4.3. Posterior refractive surface
 - 4.4. Retainer
 - 15 5. Coupling latch
 6. Magnetic element
 - A. Retina
 - B. Eye lens (Cornea)
- 20 The optical eyeglasses system (1) having different refractive indices which enable expanding the visual field by minimizing the image formed in the retina (A) which is used for expanding the visual field in the cases which restrict daily activity capability in the eye diseases that proceed with visual field stenosis, comprising:
- at least one frame (2) that enables positioning the optical glass (3) such that it is
 - 25 brought into the same optical axis with the eye of the user,
 - at least one optical glass (3) which is placed into the glass space of the frame (2) and whose optical features can change depending on the defect in the eye,
 - at least one optical system (4) which comprises at least one anterior refractive surface (4.1), at least one refractive chamber (4.2) and at least one posterior
 - 30 refractive surface (4.3),
 - which is placed onto the frame (2) such that the posterior refractive surface (4.3) thereof will be in a position close to the eye,
 - which enables expanding of the visual field by minimizing and angling the image that will form in the retina (A) by the refraction of the light at different angles starting respectively from the anterior refractive surface (4.1), the

refractive chamber (4.2) and the posterior refractive surface (4.3), the optical system comprising:

- at least one anterior refractive surface (4.1) which is positioned on the optical system (4) such that it will has an angle of four-prism diopter in the front side of the posterior refractive surface (2) and which has a different refraction index than the refractive chamber (4.2) and the posterior refractive surface (4.3), such that the lights reflecting from the objects in the visual field of the eye are first refracted and that the lights emitted from the object located in the visual field is directed to the refractive chamber (4.2),
- at least one refractive chamber (4.2) which is located between the anterior refractive surface (4.1) and the posterior refractive surface (4.3), which is in an aspheric form, which contains fluid or biocompatible gas having different refraction indices than the posterior refractive surface (4.3) and the anterior refractive surface (4.1) therein, which refracts such that the refracting light from the anterior refractive surface (4.1) is directed to the posterior refractive surface (4.3) and which defines the visual field with the size of the image to be formed in the retina (A),
- at least one posterior refractive surface (4.3) which is placed close to the eye lens (B) on the optical system (4), which changes the refractivity of the light reaching to the eye lens (B) before reaching to retina (A), which has a different refraction index than the eye lens (B) such that it enables expanding the visual field by minimizing the image to be formed in the retina (A) and which refracts such that it directs the refracting light from the refractive chamber (4.2) to the eye lens (B).

The visual field expander optical eyeglasses system (1) of the present invention is used for rehabilitation of the eye and for expanding the visual field in the cases which restrict the daily activity capability in the eye diseases which proceed with the visual field stenosis. The visual field expander optical eyeglasses system (1) is preferably used as an optical instrument against the eye defects of the user. The visual field expander eyeglasses system (1) enables expanding the visual field by minimizing and angling the image forming in the retina (A). Besides the prism whose base is located at the bottom provides angling the image and expanding the visual field by prismatic effect. The visual field expander eyeglasses system (1) is in a form having different refractive indices. The visual field expander eyeglasses system (1) is used for rehabilitation of eye diseases such as glaucoma, retinitis pigmentosa, diabetic retinopathy, optic neuropathy which have a peripheral visual field defect or a tunnel visual field. The

visual field expander eyeglasses system (1) enables expanding the visual field by minimizing and angling the image forming in the retina. The visual field expander eyeglasses system (1) comprises a frame (2), an optical glass (3), an optical system (4), a coupling latch (5) and a magnetic element (6). In the optical eyeglasses system (1), optical glass (3) is optional. The optical system (4) might be on the optical eyeglasses system (1) with the optical glasses (3) or without the optical glasses (3).

The frame (2) in an embodiment of the invention enables the optical glass (3) or optical system (4) to be positioned on the same axis with the eye of the user. The frame (2) is used such that it is preferably placed on ear and nose by the user. On the frame (2), there is preferably a glass space for inserting the optical glass (3) or optical system (4). The optical glass (3) in an embodiment of the invention is placed into the glass space of the frame (2). The optical features of the optical glass (3) might change depending on the defects of the eye.

The optical system (4) in an embodiment of the invention enables expanding the visual field by minimizing the image forming in the retina (A). The optical system (4) might be used by being placed on the glass space in the frame (2), on the frame (2) or on the optical glass (3). The optical system (4) comprises an anterior refractive surface (4.1), a refractive chamber (4.2) and a posterior refractive surface (4.3). The optical system (4) is placed on the frame (2) such that the posterior refractive surface (4.3) thereof will be close to the eye. The optical system (4) enables expanding of the visual field by minimizing the image to be formed in the retina (A) by the refraction of the light at different angles starting respectively from the anterior refractive surface (4.1), the refractive chamber (4.2) and the posterior refractive surface (4.3).

In an embodiment of the invention, the anterior refractive surface (4.1) in the optical system (4) is positioned on the optical system (4) such that it will have an angle of four-prism diopter in the front side of the posterior refractive surface (2). The anterior refractive surface (4.1) has a different refractive index than eye lens (B), the refractive chamber (4.2) and the posterior refractive surface (4.3). The anterior refractive surface (4.1) is the section where the lights reflected from the objects in the visual field of the eye are refracted first. The anterior refractive surface (4.1) refracts such that the light emitted from the object located in the visual field will be directed to the refractive chamber (4.2). As a standard, the anterior refractive surface (4.1) is positioned at an

angle of four-prism diopter. This angle can be provided differently according to the need of the patient. The anterior refractive surface (4.1) is the section where the lights reflected from the objects in the visual field of the eye are refracted first. The anterior refractive surface (4.1) has a different refractive index than the eye lens (B), the refractive chamber (4.2) and the posterior refractive surface (4.3). The anterior refractive surface (4.1) refracts such that the light from the object will be directed to the refractive chamber (4.2). The anterior refractive surface (4.1) is placed on the posterior refractive surface (4.3). The anterior refractive surface (4.1) is in a convex geometrical form preferably to fit exactly inside the frame (2). The anterior refractive surface (4.1) is preferably in circular geometric form and combines with the posterior refractive surface (4.3) by all of its surfaces. The anterior refractive surface (4.1) is the section where the lights emitted from the object whose image will form are refracted first before the refractive chamber (4.2) for the image to form in the retina (A). Preferably, the refractive index of the anterior refractive surface (4.1) is arranged such that it will be at a higher angle and higher refraction ratio than the eye lens (B). The anterior refractive surface (4.1) enables the transfer of the light coming thereon to the refractive chamber (4.2) by being refracted at a high angle. The first refraction forms on the anterior refractive surface (4.1) for the image to form in the retina (A). The light emitted from the object located in the visual field of the eye refracts with a refractive index in the anterior refractive surface (4.1) preferably at a different and higher angle than the eye lens (B). The anterior refractive surface (4.1) is arranged such that it will have a refractive index which enables the light emitted by the object located in the visual field of the eye to be directed to the refractive chamber (4.2). The refractive chamber (4.2) is located behind the anterior refractive surface (4.1).

In an embodiment of the invention, the refractive chamber (4.2) located in the optical system (4) is located between the anterior refractive surface (4.1) and the posterior refractive surface (4.3). The refractive chamber (4.2) is in an aspheric form. Inside the refractive chamber (4.2), there is fluid or biocompatible gas having different refractive indices than the eye lens (B), the posterior refractive surface (4.3) and the anterior refractive surface (4.1). The refractive chamber (4.2) refracts in a way to enable the direction of the light coming from the anterior refractive surface (4.1) by being refracted towards the posterior refractive surface (4.3). The refractive chamber (4.2) defines the visual field by the size of the image that will form in the retina (A). Inside the refractive chamber (4.2), there is fluid (silicone, liquid perfluorocarbon or any other biocompatible

liquid) or biocompatible gas (perfluorocarbon, SF₆ or any other biocompatible gas) having different refractive indices than the eye lens (B), the posterior refractive surface (4.3) and the anterior refractive surface (4.1). The refractive chamber (4.2) refracts in a way to enable the direction of the light coming from the anterior refractive surface (4.1) by being refracted towards the posterior refractive surface (4.3). The refractive chamber (4.2) can be preferably filled with liquid, gas or silicone material. The material that will be filled inside the refractive chamber (4.2) is arranged in a way to have refractive indices at a high or low angle depending on the eye defect different from the refractive indices of the anterior refractive surface (4.1) and the posterior refractive surface (4.3). The refractive index of the refractive surface in the refractive chamber (4.2) can be defined depending on the eye defect of the patient. The refractive chamber (4.2) enables the light refracted over the anterior refractive surface (4.1) to be directed on the posterior refractive surface (4.3). The refractive chamber (4.2) has a refractive index preferably at a lower angle than the eye lens (B) and the anterior refractive surface (4.1). The light passing through refractive chamber (4.1) is directed to the posterior refractive surface (4.3) by refracting at a low angle and enables the formation of the image in the upper half section of the retina (A).

In an embodiment of the invention, the posterior refractive surface (4.3) located in the optical system (4) is placed on the optical system (4) in a position to be close to the eye lens (B). The posterior refractive surface (4.3) changes the refractivity of the light reaching to the eye lens (B) before it reaches to the retina (A). The posterior refractive surface (4.3) has a different refractive index than the eye lens (B) such that it will enable expanding of the visual field by minimizing the image that will form in the retina (A). The posterior refractive chamber (4.3) refracts in a way to enable the direction of the light coming from the refractive chamber (4.2) to the eye lens (B). The posterior refractive surface (4.3) preferably is in a circular geometric form and serves as a prism with the angle relative to the anterior refractive surface (4.1) in the base. During its attachment to the eyeglasses frame, the base of the posterior refractive surface (4.3) is positioned such that it will be in a position close to the eye lens (B) and it will be at the bottom in the optical system (4). The base of the posterior refractive surface (4.3) can be placed on the optical system (4) at different positions and angles depending on the eye defect of the patient. The prism base of the posterior refractive surface (4.3) is arranged in a way to have a refractive index that will enable the image to be focused on the upper portion of the retina (A). The posterior refractive surface (4.3) enables the

light to be refracted in the last stage for the image to form in the retina (A). The posterior refractive surface (4.3) can be produced preferably from an acrylic, mineral glass or a different type of optical material. The size of the posterior refractive surface (4.3) can be arranged in a way that it will be suitable for the eye defect structure of the patient. The refractive index of the posterior refractive surface (4.3) can be changed depending on the damage level of the user's eye. The light refracted from the refractive chamber (4.2) reaches to the posterior refractive surface (4.3). The light reaching the posterior refractive surface (4.3) by refracting from the refractive chamber (4.2) refracts at a high angle to enable the formation of the image in the upper half of the retina (A). The light refracting at a high angle from posterior refractive surface (4.3) enables an image to form where the visual field expands by being minimized in the upper half of the retina (A) after its refraction. This, in turn, helps fixing the lower half visual defects like going down the stairs.

In an embodiment of the invention, the stabilizer (4.4) used in the optical system (4) is used for stabilizing the optical system (4) on the optical glass (3) and the frame (2). The stabilizer (4.4) is made of an impermeable and sticky material in the cases where it is preferred to place the optical system (4) on the optical glass (3). In the case in which it is preferred to place the optical system (4) on the optical glass (3), the stabilizer (4.4) is stabilized on the optical glass (3) by sticking and it has an impermeable characteristic. The stabilizer (4.4) is adapted to fit into the glass space in case the optical system (4) is placed directly into the glass space of the frame (2). In the case where the optical system (4) is placed directly into the glass space of the frame (2), the stabilizer (4.4) is used to replace the optical glass (3). The stabilizers (4.4) are positioned at 360 degrees in a way to be connected to the junction point of the anterior refractive surface (4.1) and the posterior refractive surface (4.3).

In another embodiment of the invention, in case the optical system (4) is placed on the frame (2) by means of magnetic element (6), the stabilizers (4.4) consist of a material with a magnetic feature. In the case where the optical system (4) is placed on the frame (2), the stabilizers (4.4) are adapted as to fit onto the magnetic elements (6) on the frame (2).

The optical system (4) used in an embodiment of the invention can be used by being placed on the optical glasses (3) having different diopters of the users with different eye

defects. The optical system (4), in the current case, is placed on the frame (2) and the optical glass (3) used for different eye defects by means of a coupling latch (5).

5 The coupling latch (5) used in an embodiment of the invention is in a fixed position on the frame (2). The coupling latch (5) is used for stabilizing the optical system (4) on the frame (2) when its independent position in a separate way from the frame (2) and the optical glass (3). The coupling latch (5) can be placed in a preferred on the frame (2). In this embodiment of the invention, the coupling latch (5) is located in the nose section of the frame (2).

10 The optical system (4) stabilizers (4.4) used in another embodiment of the invention are arranged in a way to have a magnetic feature. The optical system (4) can be used by being placed on the optical glasses (3) having a different diopter of the users with different eye defects through magnetic elements (6) in the frame (2).

15 The magnetic element (6) used in an embodiment of the invention is used by being fixed on the frame (2). One or more magnetic elements (6) can be placed on the frame (2). The magnetic element (6) is used for stabilizing the optical system (4) on the frame (2). The optical system (4) is positioned such that the stabilizers (4.4) overlap with the magnetic elements (6) stabilized on the frame (2).

20 The optical system (4) used in another embodiment of the invention can be adapted to have a colored ultraviolet filter. In case it is adapted to have a colored ultraviolet filter, the optical system (4) can be covered with the anterior refractive surface (4.1), the refractive chamber (4.2) and the posterior refractive surface (4.3) filter.

25 The optical system (4) used in another embodiment of the invention can be used by attaching a LED illumination to the frame (2) for the users with visual impairment at night.

30 In this embodiment of the invention, the usage of the visual field expander optical eyeglasses system (1) and the placement of the optical system (4) is performed as follows. The optical system (4) is placed on the frame (2) or the optical glass (3) such that the posterior refractive surface (4.3) will be a prism whose base is at the bottom. The anterior refractive surface (4.1) is located on the posterior refractive surface (4.3).

Between the anterior refractive surface (4.1) and the posterior refractive surface (4.3), there is a refractive chamber (4.2) which can be filled with a material having a different refractive index. In order to enable the optical system (4) to hold on to the frame (2) or the optical glass (3) 360 degree-adhesive impermeable stabilizers (4.4) are used. The optical system (4) is stabilized to the frame (2), to the glass space inside the frame (2) or on the optical glass (3) by means of the stabilizers (4.4). After placing the optical system (4) to the frame (2) or the optical glass (3), the expanded formation of the object's image in the visual field within the upper half of the retina (A) is performed as follows. The lights emitted from the object located in the visual field of the eye firstly refracts on the anterior refractive surface (4.1). The light that refracts at a high angle inside the anterior refractive surface (4.1) is directed into the refractive chamber (4.2) within the anterior refractive surface (4.1). The light directed into the refractive chamber (4.2) reaches to the posterior refractive surface (4.3) by the second stage refraction. The light reaching the posterior refractive surface (4.3) enables an image to be formed inside the retina (A) after a last stage refraction. In the optical system (4), the first stage refraction occurs in the anterior refractive surface (4.1), the second stage refraction occurs in refractive chamber (4.2), and the last stage refraction occurs in the posterior refractive surface (4.3). As a result of the refraction that occurs prismatically in the posterior refractive surface (4.3), the image is formed in the upper half of the retina (A) in an expanded way. Thus, the problem of visual field stenosis can be expanded by the refractions the optical system (4) performs in three stages.

CLAIMS

1. An optical eyeglasses system (1) characterized by having different refractive indices which enable expanding the visual field by minimizing the image formed in the retina (A) which is used for rehabilitation of the eye diseases and for expanding the visual field in the cases which restrict daily activity capability in the eye diseases that proceed with visual field stenosis, comprising:
- at least one frame (2) that enables positioning the optical glass (3) such that it is brought into the same optical axis with the eye of the user,
 - at least one optical system (4) which comprises at least one anterior refractive surface (4.1), at least one refractive chamber (4.2) and at least one posterior refractive surface (4.3),
 - which is placed onto the frame (2) such that the posterior refractive surface (4.3) thereof will be in a position close to the eye,
 - which enables expanding of the visual field by minimizing the image that will form in the retina (A) by the refraction of the light at different angles starting respectively from the anterior refractive surface (4.1), the refractive chamber (4.2) and the posterior refractive surface (4.3), the optical system comprising:
 - at least one anterior refractive surface (4.1) the base of which is at the bottom between the posterior refractive surface (4.3) and the anterior refractive surface, which is positioned on the optical system (4) such that it will has an angle of four-prism diopter, which has a different refraction index than the anterior refractive surface (4.1), the refractive chamber (4.2) and the posterior refractive surface (4.3), and which refracts such that the lights reflecting from the objects in the visual field of the eye are first refracted and that the lights emitted from the object located in the visual field is directed to the refractive chamber (4.2),
 - at least one refractive chamber (4.2) which is located between the anterior refractive surface (4.1) and the posterior refractive surface (4.3), which is in an eye lens (B), which contains fluid or biocompatible gas having different refraction indices than the posterior refractive surface (4.3) and the anterior refractive surface (4.1) therein, which refracts such that the refracting light from the anterior refractive surface (4.1) is directed to the posterior

refractive surface (4.3) and which defines the visual field with the size of the image to be formed in the retina (A).

- at least one posterior refractive surface (4.3) which is placed close to the eye lens (B) on the optical system (4), which changes the refractivity of the light reaching to the eye lens (B) before reaching to retina (A), which has a different refraction index than the eye lens (B) such that it enables expanding the visual field by minimizing the image to be formed in the retina (A) and which refracts such that it directs the refracting light from the refractive chamber (4.2) to the eye lens (B).

2. The optical eyeglasses system (1) according to claim 1, **characterized by** the anterior refractive surface (4.1) which is positioned at an angle of four-prism diopter as a standard and which is the section where the lights reflected from the objects in the visual field of the eye are refracted in the first stage.

3. The optical eyeglasses system (1) according to claim 1, **characterized by** the anterior refractive surface (4.1) which has a convex geometrical form in order to fit inside the frame (2) exactly, which is positioned on the posterior refractive surface (4.3) and which is the section where the lights emitted from the object whose image will form are refracted first before the refractive chamber (4.2) for the formation of the image in the retina (A).

4. The optical eyeglasses system (1) according to claim 1, **characterized in that** the anterior refractive surface (4.1) is arranged in a way to have a refractive index with a higher angle and higher refractivity than the eye lens (B) and enables the light coming thereon to be transferred to the refractive chamber (4.2) by refracting at a high angle.

5. The optical eyeglasses system (1) according to claim 1, **characterized in that** the anterior refractive surface (4.1) has a refractive chamber (4.2) behind thereof and is arranged in a way to have a refractive index that enables the direction of the light emitted by the object located in the visual field of the eye to the refractive chamber (4.2).

6. The optical eyeglasses system (1) according to claim 1, characterized by the refractive chamber (4.2) which contains fluid (silicone, liquid perfluorocarbon or any other biocompatible liquid) or biocompatible gas (perfluorocarbon, SF₆ or any other biocompatible gas) having refractive indices different than the eye lens (B), the posterior refractive surface (4.3) and the anterior refractive surface (4.1).
7. The optical eyeglasses system (1) according to claim 1, characterized in that the refractive chamber (4.2) refracts in order to enable the direction of the light coming from anterior refractive surface (4.1) to the posterior refractive surface (4.3).
8. The optical eyeglasses system (1) according to claim 1, characterized in that the refractive chamber (4.2) is arranged in a way to have a refraction index at a high or low angle depending on the different eye defect different from the refractive indices of the material that will be filled in, the anterior refractive surface (4.1) and the posterior refractive surface (4.3).
9. The optical eyeglasses system (1) according to claim 1, characterized in that the refractive chamber (4.2) has a refraction index at a lower angle than eye lens (B) and the anterior refractive surface (4.1) and enables the direction of the light refracted over the anterior refractive surface (4.1) onto the posterior refractive surface (4.3).
10. The optical eyeglasses system (1) according to claim 1, characterized in that the posterior refractive surface (4.3) is positioned as the base thereof will be close to the eye lens (B) and will be at the bottom in the optical system (4) and the prism base of which will have a refraction index that will enable the image to be focused on the upper half of the retina (A).
11. The optical eyeglasses system (1) according to claim 1, characterized by the posterior refractive surface (4.3) which has a size that is arranged to fit into the eye defect structure of the patient and enables the refraction of the light in the last stage for the formation of the image in the retina (A).

12. The optical eyeglasses system (1) according to claim 1, characterized in that the posterior refractive surface (4.3) enables an image to be formed in the upper half of retina (A), wherein the visual field expands by minimization of the image after the light refracts thereon at a high angle.
- 5 13. The optical eyeglasses system (1) according to claim 1, characterized by a stabilizer (4.4) used for the stabilization of the optical system (4) on the optical glass (3) and the frame (2).
- 10 14. The optical eyeglasses system (1) according to claim 1, characterized in that the stabilizer (4.4) is stabilized on the optical glass (3) by sticking and has an impermeable characteristic where it is preferred to place the optical system (4) on the optical glass (3).
- 15 15. The optical eyeglasses system (1) according to claim 1, characterized by 360 degree-adhesive stabilizers (4.4) adapted to fit into the glass space when the optical system (4) is placed directly on the frame (2).
- 20 16. The optical eyeglasses system (1) according to claim 1, characterized by a stabilizer (4.4) made of a magnetic material when the optical system (4) is placed on the frame (2) via the magnetic element (6).
- 25 17. The optical eyeglasses system (1) according to claim 1, characterized by the optical system (4) which is placed on the frame (2) and the optical glass (3) via the coupling latch (5) and which is used by being onto the optical glasses (3) with different diopters of the users having different eye defects.

Figure 1

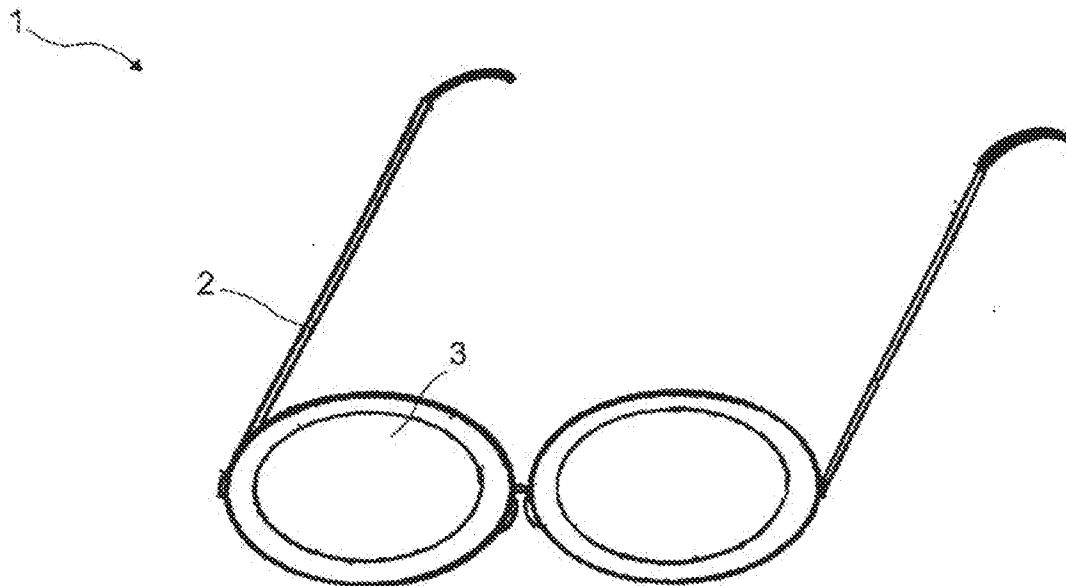


Figure 2

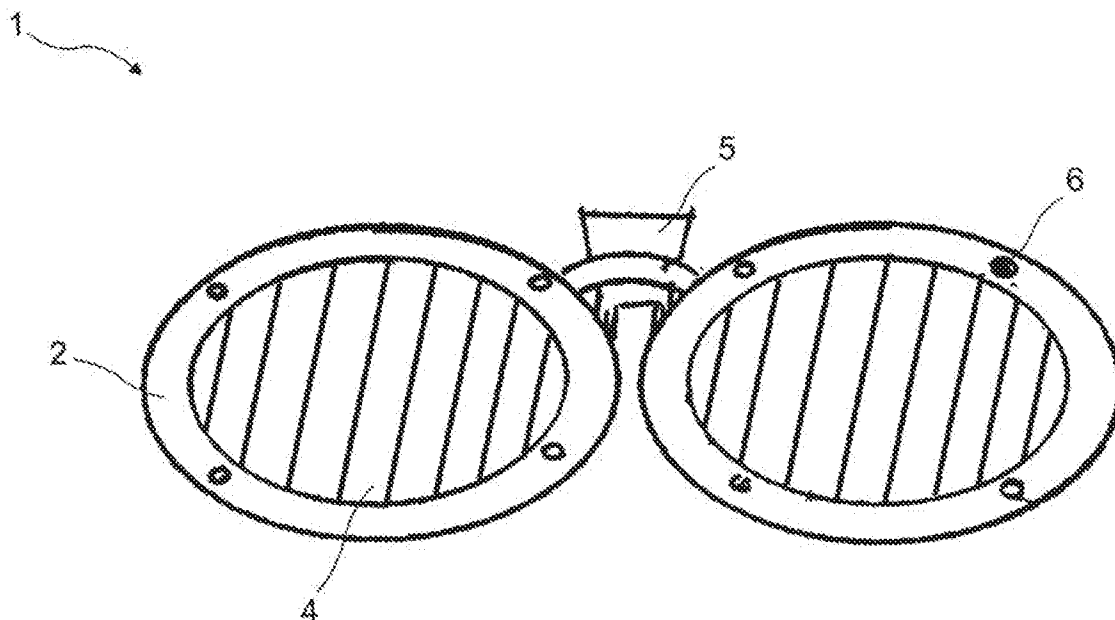


Figure 3

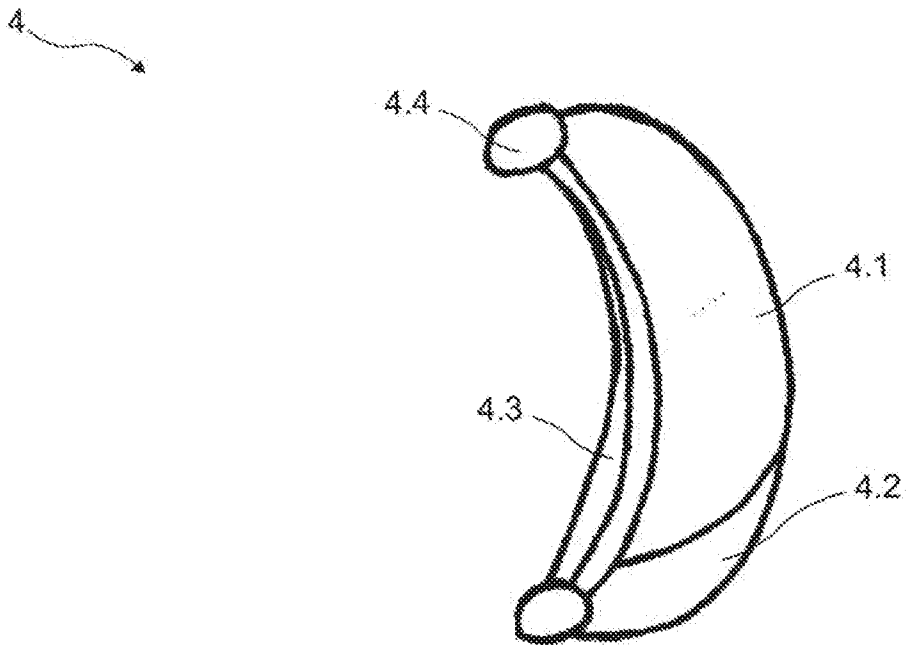
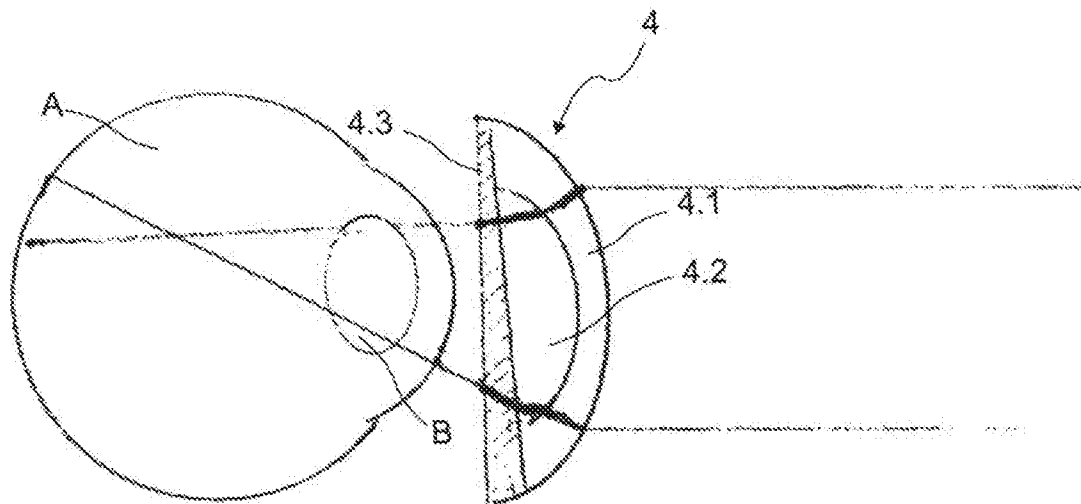


Figure 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/TR2019/000006

A. CLASSIFICATION OF SUBJECT MATTER

A61F 9/08 (2006.01)i; A61F 9/02 (2006.01)i; G02C 7/02 (2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61F; G02C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published patent and utility model applications of Turkey, 2005-2019

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO Abstract & Fulltext Databases, WPI Data, NPL & Keywords: eyeglasses, goggles, spectacles, eyepiece, eyewear, expand, expansion, enhance, visual field, visible, rehabilitate, refract, indice, index, angle, retina, stenosis, magnet, defect, glaucoma, retinitis pigmentosa, diabetic retino, optic neuropathy, bump, stairs, fall, injure, fluid, gas, wearable, bodyworn, extraocular, minimize, smaller, downsize, multi-focal, peripheral, periferik, görme alanı, genişletici, optik, gözlük, küçültme, kırıcı yüzey, kırıcı hazne, indis

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 3187514 U (MORI Y) 05 December 2013 (2013-12-05) abstract; description especially paragraphs 2, 18, 28, 31; figures 1, 3-5	1-17
A	EP 0414890 A1 (OKANO HITOSHI [JP]) 06 March 1991 (1991-03-06) the whole document	1-17
A	JP 2006280807 A (TOTSUKA SHINKICHI) 19 October 2006 (2006-10-19) the whole document	1-17
A	US 2007097316 A1 (THE SCHEPENS EYE RESEARCH INSTITUTE, INC) 03 May 2007 (2007-05-03) the whole document	1-17
A	US 2009122264 A1 (INST EYE RES LTD [AU]) 14 May 2009 (2009-05-14) the whole document	1-17



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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11 February 2020

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/TR2019/000006**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	XP007007824 (Fernando Vargas-Martín and Eli Peli; The Schepens Eye Research Institute; Harvard Medical School); P-16: Augmented View for Tunnel Vision: Device Testing by Patients in Real Environments; 2001 SID International Symposium - June 3-8, 2001, page 602 (2001-06-03), San Jose Convention Center, California; the whole document	1-17
A	CN 105807446 A (UNIV NANKAI) 27 July 2016 (2016-07-27) the whole document	1-17