Title: FOLDABLE EYEGLASS FRAME AND EYEGLASSES INCLUDING SAID FRAME

Abstract: A foldable eyeglass frame 1000 adapted to be switched between an open configuration, or use configuration, and a closed configuration, or resting configuration, said foldable frame 1000 comprising a first section or part (20) and a second section or part 40 substantially symmetrical to each other, each of said first section or part 20 and said second section or part 40 comprising a first front support portion 120, 140 adapted to support a lens and a temple 420, 440 which are reciprocally constrained in a rotatable manner so as to be switchable between an open configuration, or use configuration, and a closed configuration, or resting configuration, wherein said first and second front support portions 120, 140 are reciprocally constrained in a rotatable manner and switchable between a closed configuration, or resting configuration, and an open configuration, or use configuration; and wherein, in said closed configuration, the outer surfaces of said first front support portion 120 and second front support portion 140 are substantially adjacent to each other.
Title: Foldable eyeglass frame and eyeglasses including said frame

DESCRIPTION

Technical field of the present invention

The present invention belongs to the technical field of auxiliary optical means, such as prescription glasses, reading glasses, sunglasses and/or sports glasses in general and the like.

In particular, the present invention relates to a foldable frame for eyeglasses of the aforesaid type, the frame being switchable between an open configuration, or use configuration (such as to allow the utilization and/or use by a user), and a closed configuration, or resting configuration (in which the corresponding eyeglasses can be placed in a case).

In detail, the present invention relates to a frame of the aforesaid type, the frame allowing various component parts of the frame itself to be switched between the two open and closed configurations.

Prior art

Foldable frames for glasses, in particular (but not exclusively) for sports glasses such as sunglasses or the like, i.e. frames which are switchable by the user between an open configuration, or use configuration, and a closed configuration, or resting configuration, are widely known in the art and widely used in practice.

Foldable frames of known type are especially appreciated because, in the resting configuration, they have small dimensions and are suitable to be placed in a case or even directly in a pocket, bag or handbag or similar accessories.

However, the foldable or switchable frames of known type have several drawbacks and/or disadvantages which have limited their spread on a large scale.

For example, the mechanical features of the switchable frames of known type are such as to generate various difficulties during the assembly
process, which difficulties can often be overcome only by means of very complex technical solutions, which also results in often unacceptable, high costs, especially for potential customers who are younger.

Moreover, despite the various technical solutions suggested in the past, the foldable frames of known type have a further significant drawback as they become "unstable" with use, since the pivoting constraints interposed between the movable parts of the frame become slack and defective with use.

It should not be ignored that, in case of foldable or switchable frames of known type, the switching modes both from the open to the closed configuration and from the closed to the open configuration, are such as to make the switching operations quite complicated and definitely not immediate, whereby the user, in many cases, desists from switching (closing and/ or opening) the eyeglasses, thus only taking a partial advantage of their potentials, or the user switches (closes and/or opens) the eyeglasses according to other modes than those intended, thus stressing the eyeglasses or parts thereof, so as to often compromise their function and/ or stability.

Finally, in the foldable or switchable frames of known type, in the closed configuration, the contact between the lenses and the hard parts of the frame (such as the temples) often occurs, where the aforesaid contact often compromises the quality of the lenses with use, which are especially streaked and/ or scratched, with a consequent loss of functionality of the lenses. Moreover, in the closed configuration, the lenses face the outside and therefore they are at risk of scratches when placed in a pocket, for example, without the appropriate case.

Therefore, it is the main object of the present invention to solve or at least partially obviate the problems which characterize the solutions known from the prior art.

In particular, it is a further object of the present invention to provide a novel solution in connection with the manufacturing of a foldable eyeglass frame which has simple, or at least not too complicated, mechanical features and therefore which can be provided according to equally simple solutions and at low cost.
Moreover, it is a further object of the present invention to suggest a foldable or switchable eyeglass frame which is stable (especially in the open configuration, or use configuration, but also in the closed configuration) and strong, and keeps the stability features even after repeated switching operations.

The foldable frame according to the present invention should also provide for simple and even immediate switching modes, both in terms of switching from the open configuration to the closed configuration and switching from the closed configuration to the open configuration.

Again according to the present invention, the frame should be characterized by great strength, high stability in the two closed and open configurations, small dimensions (in particular thickness) in the closed configuration, where in the closed configuration the contact between the lenses and the hard or stiff parts of the frame itself is avoided or at least minimized, and especially where the lenses are closed again upon themselves and thus protected against scratches when placed in a pocket, for example.

And finally, according to the present invention, the frame should have several parts or components which can be switched between the closed and open configurations.

**Summary of the present invention**

The present invention is based on the general consideration that the drawbacks and/or problems of the foldable frames according to the prior art can be overcome or at least minimized by providing a foldable frame which has "opposite" switching modes to those of the frames according to the prior art; in other words, according to aforesaid general consideration underlying the present invention, the parts which make up the front part of the frame itself should be reciprocally constrained in a rotatable manner but according to an opposite rotation direction to the rotation direction of the corresponding pivoting parts of the frames according to the prior art. In particular, in the end-of-travel position (corresponding to the closed configuration), the pivoting parts should be in mutual abutment but avoiding the lenses from coming into contact.
According to a further consideration underlying the present invention, the drawbacks and/or problems of the frames according to the prior art can be overcome or at least minimized by using transmission elements which are easy to be manufactured and assembled and allow to obtain, by switching predetermined component parts of the frame, the switching also of different parts of the frame itself. Thereby, indeed, for the various switching operations on all the switchable parts of the frame itself, the same number of operations or interventions by the user will not be required, but on the contrary, the user himself/herself, by switching only some of the switchable parts of the frame, will obtain the switching of the remaining switchable parts of the frame itself.

On the basis of the previously summarized considerations, according to a first embodiment, the present invention thus relates to a foldable eyeglass frame which can be switched between an open configuration, or use configuration, and a closed configuration, or resting configuration, said foldable frame comprising: a first section or part and a second section or part substantially symmetrical to each other, said first section or part and said second section or part comprising, respectively, a first front support portion adapted to support a first lens and a second front support portion adapted to support a second lens; a first temple and a second temple, where said first and second temples are rotatably constrained to said first front support portion and said second front support portion, respectively, so as to be switchable between an open configuration, or use configuration, and a closed configuration, or resting configuration, wherein said first and said second front support portions are reciprocally constrained in a rotatable manner and switchable between a closed configuration, or resting configuration, and an open configuration, or use configuration. This frame is characterized in that it further comprises a first pulling element which extends between said second front support portion and said first temple, and a second pulling element which extends between said first front support portion and said second temple, so that by switching said first and second front support portions from said open configuration to said closed configuration said first and second temples are switched from said open configuration to said closed configuration, and vice versa, by switching said first and second temples from said closed configuration to said open configuration said first and second front
support portions are switched from said closed configuration to said open configuration, the outer surfaces of said first front support portion and said second front support portion being substantially adjacent to each other in said closed configuration.

5 According to a further possible embodiment, the rotation axes for the mutual rotation of said first front support portion and said second front support portion, of said first front support portion and said first temple, and of said second front support portion and said second temple, respectively, are substantially parallel to each other.

10 According to a further possible embodiment, a first end portion and a second end of said first pulling element are fixed to said second front support portion and said first temple, respectively, where a first end portion and a second end portion of said second pulling element are fixed to said first front support portion and said second temple, respectively.

15 Each of said first temple and said second temple preferably (but not necessarily) comprises a first segment and a second segment, where said first segments of said first temple and said second temple, respectively, are rotatably constrained to said first front support portion and said second front support portion, respectively, and switchable between an open configuration, or use configuration, and a closed configuration, or resting configuration, and where said second segments of said first temple and said second temple, respectively, are rotatably constrained to said first segment of said first temple and said first segment of said second temple, respectively, and switchable between an open configuration, or use configuration, and a closed configuration, or resting configuration.

Advantageously, a first end portion, a second end portion, and an intermediate portion of said first pulling element are fixed to said second front support portion, said first segment of said first temple, and said second segment of said first temple, respectively; and a first end portion, a second end portion, and an intermediate portion of said second pulling element are fixed to said first front support portion, said first segment of said second temple, and said second segment of said second temple, respectively. In this way, by switching said first segments of said first temple and said second temple, respectively, from said open configuration
to said closed configuration, said second segments of said first temple and said second temple, respectively, are switched from said open configuration to said closed configuration, and vice versa, by switching said first segments of said first temple and said second temple, respectively, from said closed configuration to said open configuration, said second segments of said first temple and said second temple, respectively, are switched from said closed configuration to said open configuration and said first front support portion and said second front support portion are switched from said closed configuration to said open configuration.

According to a possible embodiment, the rotation axes for the mutual rotation of said first segment and said second segment of said first temple, and of said first segment and said second segment of said second temple, respectively, are substantially parallel to the rotation axes for the mutual rotation of said first front support portion and said second front support portion, of said first front support portion and said first temple, and of said second front support portion and said second temple, respectively.

Preferably, in said closed position, or resting position, said second segment of said first temple and said second segment of said second temple are arranged between said first front support portion and said first segment of said first temple, and between said second front support portion and said first segment of said second temple, respectively.

Alternatively, the rotation axes for the mutual rotation of said first segment and second segment of said first temple, and of said first segment and said second segment of said second temple, respectively, may be substantially orthogonal to the rotation axes for the mutual rotation of said first front support portion and said second front support portion, of said first front support portion and said first temple, and of said second front support portion and said second temple, respectively.

According to a further possible embodiment, in said closed position, or resting position, said second segment of said first temple and said second segment of said second temple are arranged in a lower position with respect to said first segment of said first temple)and said first segment of said second temple, respectively.
Advantageously, elastic means may be interposed between said first front support portion and said second front support portion, and/ or between said first front support portion and said first temple, and/ or between said second front support portion and said second temple, where the switching of said first front support portion and said second front support portion, and/ or of said first front support portion and said first temple, and/ or of said second front support portion and said second temple from said open configuration, or use configuration, to said closed configuration, or resting configuration, may occur against the bias of said elastic means, while the switching of said first front support portion and said second front support portion, and/ or of said first front support portion and said first temple, and/ or of said second front support portion and said second temple from said closed configuration, or resting configuration, to said open configuration, or use configuration, is facilitated by the bias of said elastic means.

Possibly, said first pulling element and said second pulling element each may comprise a substantially inextensible cord.

Preferably, said first pulling element and said second pulling element, such as respective cords, are partially embedded or accommodated in said first front support portion and in said second front support portion, respectively, so as to slide therein within sliding channels obtained in said first front support portion and said second front support portion.

According to a possible embodiment of the present invention, said first pulling element has protruding elements at predetermined positions on its length so as to be engaged, preferably by snap-engagement, to respective notches provided on said second front support portion and on said first temple and said second pulling element has protruding elements at predetermined positions on its length so as to be engaged, preferably by snap engagement, to respective notches provided on said first front support portion and on said second temple.

The present invention also refers to foldable or collapsible eyeglasses, said eyeglasses comprising a frame manufactured according to the previously summarized modes, a first and a second lens being applied to said first front support portion and said second front support portion, respectively,
of said frame.

Further possible embodiments of the present invention are specified in the claims.

**Brief description of the drawings**

Further advantages, objects and features of the present invention are defined in the claims and will be explained below by means of the following description of the embodiments of the present invention, depicted in the accompanying drawings, in which corresponding or equivalent features and/or component parts of the present invention are denoted by the same reference numerals. In particular, in the drawings:

Figure 1 shows plan and partial section views of a frame according to an embodiment of the present invention in the open configuration and in the partial switching configuration, respectively;

Figures 2a and 2b show perspective views of a frame according to an embodiment of the present invention in the open configuration and in the closed configuration, respectively;

Figure 3 shows an exploded view of a frame according to an embodiment of the present invention;

Figures 4a and 4b show a plan partial section view and a side partial section view of a frame according to an embodiment of the present invention, respectively;

Figure 4c shows show a plan partial section view of a frame according to an embodiment of the present invention;

Figure 4d shows details of the frame shown in figure 4c.

Figures 5a and 5b show a plan view and a side view of a frame according to an embodiment of the present invention, respectively, in the closed configuration;

Figures 5c and 5d show a plan view and a side view of a frame according to an embodiment of the present invention, respectively, in the partial switching configuration;
Figures 5e and 5f show a plan view and a side view of a frame according to an embodiment of the present invention, respectively, in the open configuration;

Figures 6a to 6c show the switching steps from the closed configuration to the open configuration of a frame according to an embodiment of the present invention;

Figures 7a to 7c show the switching steps from the open configuration to the closed configuration of a frame according to an embodiment of the present invention;

Figures 8a and 8b each show a plan view of a frame according to the present invention in the closed configuration and in the partial switching configuration, respectively;

Figure 9 shows a perspective view of a frame according to the present invention in the partial switching configuration;

Figure 10 shows a perspective view of a frame according to the present invention in the open configuration;

Figure 11 shows a perspective view of a frame according to the present invention in the closed configuration;

Figures 12a and 12b show a side view and a perspective view of a frame according to an embodiment of the present invention, respectively, in the closed configuration;

Figure 13 shows a perspective view of a frame according to an embodiment of the present invention in the open configuration;

Figures 14a, 14b and 14c show details of a frame according to an embodiment of the present invention.

**Detailed description of the present invention**

Although the present invention is described below with reference to the embodiments thereof shown in the drawings, the present invention is not limited to the embodiments described below and depicted in the drawings. Conversely, the embodiments described below and depicted in the
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drawings clarify some aspects of the present invention, the purpose of which is defined by the claims.

The main features and/or component parts of the frame according to a first embodiment of the present invention will be described below with reference to Figure 1.

It is apparent from Figure 1 that frame 1000 essentially comprises a front part intended to support two lenses, to which a fist temple 420 (on the left in the figure) and a second temple 440 (on the right in the figure) are rotatably constrained, said first temple 420 and said second temple 440 being switchable between an open position, or use or working position, and a closed configuration.

The front part of the frame in turn comprises a first front support portion 120 adapted to support a first lens and a second front support portion 140 adapted to support a second lens. Said first front support portion 120 and said second front support portion 140 are reciprocally constrained in a rotatable manner by means of a constraint 300 which in turn comprises a pivot pin 310. The first temple 420 is in turn further constrained in a rotatable manner to the first front support portion 120 by means of a constraint 520, and the second temple 440 is similarly constrained in a rotatable manner to the second front support portion 140 by means of a constraint 540. A first characteristic of the frame according the embodiment depicted in Figure 1 consists in that, as shown, constraint 300 between said first front support portion 130 and said second front support portion 140 is shaped so that, when switching from the open configuration to the closed configuration, the front surfaces (at the top in the figure) F1 and F2 of said first front support portion 120 and of said second front support portion 140, respectively, are moved towards each other; thereby, in the closed configuration, the contact between the lenses and the temples is avoided, thus avoiding or at least minimizing the risk of scratching or damaging the lenses. A second characteristic of the frame according the embodiment depicted in Figure 1 consists in that a first transmission element (in particular a pulling element) 620, such as an inextensible cord made of Teflon or similar materials, is interposed between the first temple 420 and the second front support portion 140, where, a second transmission and/or pulling element 640 is similarly
interposed between the first front support portion 120 and the second temple 440. In particular, a first end portion 622 of the first pulling element 620 is fixed to the second front support portion 140 close to constraint 300, where the second end 624 of the first transmission element 620 is fixed to the first temple 420 close to constraint 520. A first end portion 642 of the second pulling element 640 is similarly fixed to the first front support portion 120 close to constraint 300, where the second end of the second pulling element 640 is fixed to the second temple 440.

As depicted in the figure, said first pulling element 620 and said second pulling element 640 are partially embedded or generally accommodated in the first front support portion 120 and in the second front support portion 140, respectively, so as to slide therein, e.g. within sliding channels obtained in said first front support portion 120 and said second front support portion 140. The function of said first pulling element 620 and of second pulling element 640 is that of associating or combining the switching of the front support portions 120 and 140 and the switching of the temples 420 and 440. Indeed, by switching the two front support portions 120 and 140 as shown schematically in the figure, the pulling action exerted by the pulling elements 620 and 640 on the second temple 440 and the first temple 420, respectively, will cause the temples 420 and 440 to switch in a substantially simultaneous manner; similarly, for switching from the closed configuration to the open configuration, the user will achieve, by opening the temples 420 and 440 and again due to the pulling action exerted by the pulling elements 620 and 640, the almost simultaneous switching of the front support portions 120 and 140 from the closed configuration to the open configuration. It is therefore apparent that, according to the embodiment of the frame depicted in Figure 1, in order to switch all the frame parts reciprocally constrained in a rotatable manner (front portions and temples), the same number of corresponding operations by the user is not required, but on the contrary, the user, by means of a single switching operation and in particular by switching the front portions from the open configuration to the closed configuration, will also achieve the switching of the temples from the open configuration to the closed configuration, while by switching the temples from the closed configuration to the open configuration the user will also achieve the switching of the front portions from the closed configuration to the open
configuration.

A further embodiment of the foldable or collapsible frame according to the present invention will be described below with reference to Figures 2a, 2b, 3, 4a, 4b and 5a to 5f, where in Figures 2a, 2b, 3, 4a, 4b and 5a to 5f the frame features and/or component parts already described above with reference to other figures are denoted by the same reference numerals.

The most important difference between the present embodiment of the frame and the embodiment of the frame according to the present invention previously described with reference to Figure 1 relates to the shape of the temples 420 and 440. Indeed, it is apparent from the figures that temple 420 comprises a first segment 424 rotatably constrained to the front support portion 120 (by means of constraint 520) and a second segment 428 rotatably constrained to the first segment 424; similarly, temple 440 comprises a first segment 444 rotatably constrained to the front support portion 140 (by means of constraint 540) and a second segment 448 rotatably constrained to the first segment 444. In particular, in the present embodiment, the rotation axes of said second segments 428 and 448 with respect to said first segments 424 and 444, respectively, are substantially orthogonal to the rotation axes for the mutual rotations of the first segment 424 and the first front support portion 120, of the first front support portion 120 and the second front support portion 140, as well as of the second front support portion 140 and of segment 444.

A second characteristic of the frame according to the present embodiment relates to the arrangement, path and function of the pulling elements 620 and 640; since said arrangement, path and function are substantially the same for the two pulling elements, description of the arrangement, path and function of the pulling element 640 will be given below for conciseness reasons.

It is apparent from the figures that the pulling element 640 still comprises a first end portion 642 fixed to the first front support portion 120; the pulling element or cord 640 extends from said first end portion 642 about constraint 300, into the second front support portion 140 from which it comes out close to constraint 540 in order to extend further into the first segment 444 of temple 440. Element 640 further comprises an
intermediate curved portion 646 particularly extending about constraint 452 between the first segment 444 and the second segment 448 of temple 440, from which a further rectilinear portion extends ending with an end portion 644 fixed to the first segment 444 close to constraint 540 between segment 444 and the second front support portion 140. As depicted in particular in Figure 4b, the curved portion 646 is fixed to the second segment 448 by means of an engaging screw 456. It is also worth noting that the portions of cord 640 inside the first segment 444 are substantially overlapping and lie on a plane which is substantially perpendicular to the rotation axis for the mutual rotation of the second segment 448 and of the first segment 444.

Figures 4c and 4d shows a preferred but not limitative embodiment of the frame according to the invention wherein the fixing of the first pulling element 620 and the second pulling element 640 to the frame is illustrated in more detail. It should be understood that such fixing is preferred but not limitative and is basically applicable to all embodiments of the frame according to the invention disclosed in the present application.

As shown in Figures 4c and 4d, each pulling element 620 or 640, such as a cord, is provided with protruding elements at predetermined positions on the length of the pulling element so as to be engaged to respective notches provided on the first front support portion 120 or second front support portion 140 and on the first temple 420 or the second temple 440, wherein the engagement of the protruding elements to the respective notches can be for example and preferably a snap-engagement (but also other types of engagement are contemplated by the present invention).

In particular, in the embodiment shown in Figure 4c, the second pulling element, such as a cord 640, has three protruding elements spaced to each other so as to be constrained to respective notches provided on the first front support portion 120 and the second temple 440 for example by snap-engagement. Namely, the second pulling element 640 has a first protruding element 901 formed close to or at the first end portion 642 of the second pulling element 640 and that is engaged by snap-engagement in a first notch 911 formed on the first front support portion 120 near to the constraint 300 which connects the first front support portion 120 and the second front support portion 140 in a rotatable manner. In addition,
the second pulling element 640 has a second protruding element 902 formed at an intermediate position on the second pulling element 640 so as to be engaged by snap-engagement to a second notch 912 provided on the second segment 448 of the second temple 440 close to the constraint which connects the first segment 444 and the second segment 448 of the second temple 440 in a rotatable manner. Also, the second pulling element 640 has a third protruding element 903 formed close to or at the second end portion 644 of the second pulling element 640 so as to be engaged by snap-engagement to a third notch 913 provided on the first segment 444 of the second temple 440 close to the constraint 540 which connects the first segment 444 of the second temple 440 and the second front support portion 140 in a rotatable manner.

Similarly, even if not shown in Figure 4c, the first pulling element, such as a cord 620, has three protruding elements spaced to each other so as to be constrained to respective notches provided on the second front support portion 140 and the first temple 420. Namely, the first pulling element 620 has a first protruding element 911 formed close to or at the first end portion 622 of the first pulling element 620 and that is engaged by snap-engagement in a first notch 910 formed on the second front support portion 140 near to the constraint 300 which connects the first front support portion 120 and the second front support portion 140 in a rotatable manner. In addition, the first pulling element 620 has a second protruding element 902 formed at an intermediate position on the first pulling element 620 so as to be engaged by snap-engagement to a second notch 912 provided on the second segment 428 of the first temple 440 close to the constraint which connects the first segment 424 and the second segment 428 of the first temple 420 in a rotatable manner. Also, the first pulling element 620 has a third protruding element 903 formed close to or at the second end portion 624 of the first pulling element 620 so as to be engaged by snap-engagement to a third notch 913 provided on the first segment 424 of the first temple 420 close to the constraint 520 which connects the first segment 424 of the first temple 420 and the first front support portion 120 in a rotatable manner.

In this way, the first and the second pulling elements are connected firmly to the frame and this allows to use the frame according to the invention in an effective manner and prolongs the useful life of the product.
It should be noted that the first and the second pulling elements, such as cords 620 and 640 can be made of any material having adequate resistance so as to allow the switching operations contemplated by the present invention in a effective and safety manner (i.e. without ruptures or failures). Thus, the first and the second pulling elements can made of any plastics or metallic material able to satisfy the above requirements. In addition, the first and the second pulling elements, such as cords 620 and 640 can be made of a single thread or multiple intertwined threads according to specific needs.

As to the protruding elements 901-903, they can be formed integral on the respective first and second pulling elements, such as cords 620 and 640 according to procedures which are per se conventional such as injection moulding or crushing application of suitable material. Such procedures allows to connect firmly the protruding elements to the respective cords 620 and 620 in the required positions without any possibility for said protruding elements to be detached from the respective cords 620 and 640.

With reference to Figure 4d, it should also be noted that before insertion in the frame according to the invention the cord 620 or 640 is longer than required as it has free portions 920 beyond the first protruding element 901 and the third protruding element 903. Such free portions 920 advantageously makes the insertion of the cord into the frame easier and can be cut when the insertion of the cord and its fixing to the frame are completed.

The switching modes of the frame according to the present embodiment from the open configuration to the closed configuration and vice versa from the closed configuration to the open configuration are described below with reference to Figures 7a to 7c and 6a to 6c, respectively.

The first switching step from the open configuration to the closed configuration is depicted in Figure 7a, from which it is apparent how the user, by grasping the first temple 420 (the first segment 424) and the first front support portion 120, as well as the second temple 440 (the first segment 444) between the index fingers and thumbs of his/her left hand and right hand, respectively, acts on the temples (in particular on the
corresponding first segments 424 and 444), so as to rotate and switch them closer to the respective front support portions. This switching of the first segments 424 and 444 of the temples 420 and 440, due to the bias of the pulling elements 620 and 640, results in a substantially simultaneous switching (rotation) of the second segments 428 and 448 with respect to the corresponding first segments 424 and 444. Indeed, since the intermediate curved portions 626 and 646 are fixed to the second segments 428 and 448, respectively, close to the constraints 432 and 452, respectively, the rotation of the first segments 424 and 444 results in the cords 620 and 640 being pulled, each of which thus rotates the corresponding second segment 428 and 448.

Once the switching of the first and second segments of the temples has been completed according to above-described modes, the configuration achieved is that depicted in Figure 7b (partial switching) in which the first segments 424 and 444 are arranged adjacent to the first front support portion 120 and the second front support portion 140, respectively, and the second segments 428 and 448 are embedded on the corresponding first segments 424 and 444, practically arranged substantially beneath said first segments 424 and 444. From the configuration in Figure 7b, the switching of the frame is completed by closing the front support portions 120 and 140 upon themselves, in practice by rotating them so as to move the respective front surfaces towards each other.

With regard to the "inverse or opposite" switching from the open configuration to the closed configuration, it is apparent how from the closed configuration in Figure 6a the user, by grasping the first segments 424 and 444 between the index finger and the thumb of his/her left hand and right hand, respectively, can rotate said segments so as to "open" them, practically by moving them away from the respective front support portions 120 and 140. According to modes similar to those described above and again due to the bias of the pulling elements 620 and 640, the opening of the first segments 424 and 444 results in the second segments 428 and 448 being correspondingly opened, in practice they rotate and move away from the first segments 424 and 444 so as to define or configure substantially continuous temples 420 and 440. Finally, again due to the user's action on the first segments 424 and 444, the first front support portion 120 and the second front support portion 140 will rotate
relative to each other to achieve the open configuration depicted in Figure 6c.

A further embodiment of the foldable or collapsible frame according to the present invention will be described below with reference to Figures 8a, 8b, 9, 10 and 11, in which features and/or component parts already described above with reference to other figures are denoted by the same reference numerals.

The main difference between the frame according to the present embodiment of the present invention and the above-described embodiment in that, in the case of the present embodiment, the second segments 428 and 448 of the first temple 420 and of the second temple 440, respectively, are constrained to the corresponding first segments 424 and 444 and are pivoting with respect to rotation axes which are substantially parallel to the rotation axes for the mutual rotation of the first segment 424 and of the first front support portion 120, of the first front support portion 120 and of the second front support portion 140, and of the second front support portion 140 and of the first segment 444. Therefore, in this case, the portions of the pulling elements 620 and 640 extending into the first segment 424 and the second segment 428, respectively, lie on perpendicular plane relative to the corresponding constraints 434 and 454, where the intermediate curved portions of the pulling elements 620 and 640 extend about said constraints so as to partially enclose them.

The switching modes of the frame according to the present embodiment from the closed configuration to the open configuration and vice versa from the open configuration to the closed configuration (shown schematically in Figures 8a, 8b and 9) are substantially similar to those of the above-described embodiment and summarized with reference to Figures 6a to 6c and 7a to 7c, whereby a detailed description thereof is omitted for conciseness reasons. It is also worth noting how, in the case of this embodiment, in the closed configuration (Figures 8a and 11), the second segments 428 and 448 will be arranged adjacent to the front support portions 120 and 140, respectively, and thus included between the first front support portion 120 and the second segment 428, and between the second front support portion 140 and the second segment
With reference to Figures 12a, 12b, 13, and 14a to 14c, the description of a further embodiment of the frame according to the present invention will be given below, where in Figures 12a, 12b, 13, and 14a to 14c, the frame component parts and/ or features already described above with reference to other figures are denoted by the same reference numerals.

In particular, from Figure 13 it is apparent that in the embodiment depicted therein the frame is provided with elastic means 710a, 710b and 710c interposed between the first segment 424 and the first front support portion 120, between the second front support portion 140 and the first segment 444, and between the first front support portion 120 and the second front support portion 140, respectively. In the example shown, they specifically are helical springs, where the pivot pins 520, 540 and 310 are accommodated therein. The aforesaid helical springs 710a, 710b and 710c are particularly shaped and arranged so as to promote the switching of the pivoting parts from the closed configuration to the open configuration, in practice so as to exert a bias between the aforesaid pivoting parts in their switching direction from the closed configuration to the open configuration. Conversely, the switching from the open configuration to the closed configuration will occur against the opposing bias exerted by the elastic means 710a, 710b and 710c.

The frame is further provided with engaging means adapted to be alternately engaged with and disengaged from one another, where in the engaging position the aforesaid engaging means prevent the frame from switching from the closed configuration to the open configuration caused by the elastic means 710a, 710b and 710c.

Said engaging means particularly include an elastic hook 840 extending from the first segment 444 and, in the closing configuration, engaging a corresponding stiff hook 820 which extends from the first segment 424 (Figure 14c). The elastic hook 840 can be operated by a pivoting lever 830, i.e. by pressing a first end portion of lever 830 in the direction denoted by the arrow in Figure 14b, the elastic hook 840 is raised and disengaged from the stiff hook 820. In practice, when switching the frame from the open configuration to the closed configuration, the elastic hook 840 will be
operated by the stiff hook 820 and will engage the stiff hook 820 due to the
elasticity thereof (snap engagement); on the contrary, for switching
from the closed configuration to the open configuration, the user can act
on lever 830 so as to disengage the elastic hook 84 from the stiff hook
820, where in this case the frame is automatically switched from the
closed configuration to the open configuration due to the bias of the
elastic means 710a, 710b and 710c, in particular according to the above-
described modes.

Therefore, by means of the foregoing description of the embodiments of the
frame according to the present invention depicted in the drawings, the
frame according to the present invention has been shown to be capable of
achieving the intended purposes.

In particular, the foldable eyeglass frame according to the present
invention has simple, or at least not too complicated, mechanical features
and therefore can be manufactured according to equally simple solutions
and at low cost.

Moreover, the foldable or switchable eyeglass frame according to the
present invention has improved stability features, in particular even after
repeated switching operations.

Furthermore, the foldable frame according to the present invention can be
switched according to simple, if not even immediate, switching modes,
both with regard the switching from the open configuration to the closed
configuration and with regard the switching from the closed configuration
to the open configuration.

Again, in the closed configuration, the contact between the lenses and the
hard or stiff parts of the frame itself is avoided or at least minimized, and
finally the frame has several parts or components which can be switched
between the closed and open configurations, even simultaneously.

Although the present invention has been described with reference to the
particular embodiments depicted in the figures, it is to be understood that
the present invention is not limited to the particular embodiments shown
and disclosed; conversely, further variants of the embodiments described
fall within the scope of the present invention. For example, within the
scope of the present invention, the elastic means and/or engaging means present in the embodiment described with reference to Figures 12b, 12b, 13, and 14a to 14c can be included in any of the other embodiments of the frame according to the present invention. Therefore, the object of the present invention is defined in the claims.
CLAIMS

1. A foldable eyeglass frame (1000) adapted to be switched between an open configuration, or use configuration, and a closed configuration, or resting configuration, said foldable frame (1000) comprising:

   a first front support portion (120) adapted to support a first lens and a second front support portion (140) adapted to support a second lens;

   a first temple (420) and a second temple (440), wherein said first and second temples (420, 440) are rotatably constrained to said first front support portion (120) and said second front support portion (140), respectively, so as to be switchable between an open configuration, or use configuration, and a closed configuration, or resting configuration;

   wherein said first and said second front support portions (120, 140) are reciprocally constrained in a rotatable manner and switchable between a closed configuration, or resting configuration, and an open configuration, or use configuration;

   characterized in that

   said frame (1000) further comprising a first pulling element (620) which extends between said second front support portion (140) and said first temple (420), and a second pulling element (640) which extends between said first front support portion (120) and said second temple (440), so that by switching said first and second front support portions (120, 140) from said open configuration to said closed configuration said first and second temples (420, 440) are switched from said open configuration to said closed configuration, and vice versa, by switching said first and second temples (420, 440) from said closed configuration to said open configuration said first and second front support portions (120, 140) are switched from said closed configuration to said open configuration,

   the outer surfaces of said first front support portion (120) and second front support portion (140) being substantially adjacent to each other in said closed configuration.

2. A foldable eyeglass frame according to claim 1, wherein the rotation
axes for the mutual rotation of said first front support portion (120) and said second front support portion (140), of said first front support portion (120) and said first temple (420), and of said second front support portion (140) and said second temple (440), respectively, are substantially parallel to each other.

3. A foldable eyeglass frame according to claim 1 or 2, wherein a first end portion (622) and a second end portion (624) of said first pulling element (620) are fixed to said second front support portion (140) and said first temple (420), respectively, and wherein a first end portion (642) and a second end portion (644) of said second pulling element (640) are fixed to said first front support portion (120) and said second temple (440), respectively.

4. A foldable eyeglass frame according to any one of claims 1 to 3, wherein each of said first temple (420) and second temple (440) comprises a first segment (424, 444) and a second segment (428, 448), wherein said first segments (424, 444) of said first temple (420) and of said second temple (440), respectively, are rotatably constrained to said first front support portion (120) and said second front support portion (140), respectively, and switchable between an open configuration, or use configuration, and a closed configuration, or resting configuration, and wherein said second segments (428, 448) of said first temple (420) and of said second temple (440), respectively, are rotatably constrained to said first segment (424) of said first temple (420) and said first segment (444) of said second temple (440), respectively, and switchable between an open configuration, or use configuration, and a closed configuration, or resting configuration.

5. A foldable eyeglass frame according to claim 4, wherein a first end portion (622), a second end portion (624), and an intermediate portion of said first pulling element (620) are fixed to said second front support portion (140), said first segment (424) of said first temple (420), and said second segment (428) of said first temple (420), respectively; and wherein a first end portion (642), a second end portion (644), and an intermediate portion of said second pulling element (640) are fixed to said first front support portion (120), said first segment (444) of said second temple (440), and said second segment (448) of said second temple (440), respectively so
that by switching said first segments (424, 444) of said first temple (420) and second temple (440), respectively, from said open configuration to said closed configuration, said second segments (428, 448) of said first temple (420) and second temple (440), respectively, are switched from said open configuration to said closed configuration, and, vice versa, by switching said first segments (424, 444) of said first temple (420) and second temple (440), respectively, from said closed configuration to said open configuration, said second segments (428, 448) of said first temple (420) and second temple (440), respectively, are switched from said closed configuration to said open configuration and said first front support portion (120) and second front support portion (140), of said first front support portion (120) and second front support portion (140) are switched from said closed configuration to said open configuration.

6. A foldable eyeglass frame according to claim 5, wherein the rotation axes for the mutual rotation of said first segment (424) and said second segment (428) of said first temple (420), and of said first segment (444) and said second segment (448) of said second temple (440), respectively, are substantially parallel to the rotation axes for the mutual rotation of said first front support portion (120) and said second front support portion (140), of said first front support portion (120) and said first temple (420), and of said second front support portion (140) and said second temple (440), respectively.

7. A foldable eyeglass frame according to claim 6, wherein in said closed position, or resting position, said second segment (428) of said first temple (420) and said second segment (448) of said second temple (440) are arranged between said first front support portion (120) and said first segment (424) of said first temple (420), and between said second front support portion (140) and said first segment (444) of said second temple (440), respectively.

8. A foldable eyeglass frame according to one of claims 4 to 7, wherein the rotation axes for the mutual rotation of said first segment (424) and said second segment (428) of said first temple (420), and of said first segment (444) and said second segment (448) of said second temple (440), respectively, are substantially orthogonal to the rotation axes for the mutual rotation of said first front support portion (120) and said second front support portion (140), of said first front support portion (120) and
said first temple (420), and of said second front support portion (140) and said second temple (440), respectively.

9. A foldable eyeglass frame according to claim 8, wherein in said closed position, or resting position, said second segment (428) of said first temple (420) and said second segment (448) of said second temple (440) are arranged in a lower position with respect to said first segment (424) of said first temple (420) and said first segment (444) of said second temple (440), respectively.

10. A foldable eyeglass frame according to one of claims 1 to 9, wherein elastic means are interposed between said first front support portion (120) and said second front support portion (140), and/ or between said first front support portion (120) and said first temple (420), and/or between said second front support portion (140) and said second temple (440), wherein the switching of said first front support portion (120) and said second front support portion (140), and/ or of said first front support portion (120) and said first temple (420), and/ or of said second front support portion (140) and said second temple (440) from said open configuration, or use configuration, to said closed configuration, or resting configuration, may occur against the bias of said elastic means, while the switching of said first front support portion (120) and said second front support portion (140), and/ or of said first front support portion (120) and said first temple (420), and/ or of said second front support portion (140) and said second temple (440) from said closed configuration, or resting configuration, to said open configuration, or use configuration, is facilitated by the bias of said elastic means.

11. A foldable eyeglass frame according to one of claims 1 to 10, wherein said first pulling element (620) and second pulling element (640) each comprise a substantially inextensible cord.

12. A foldable eyeglass frame according to one of claims 1 to 11, wherein said first pulling element (620) and said second pulling element (640) are partially embedded or accommodated in said first front support portion (120) and in said second front support portion (140), respectively, so as to slide therein within sliding channels obtained in said first front support portion (120) and said second front support portion (140).
13. A foldable eyeglass frame according to one of claims 1 to 11, wherein said first pulling element (620) has protruding elements (901, 902, 903) at predetermined positions on its length so as to be engaged, preferably by snap-engagement, to respective notches (911, 912, 913) provided on said second front support portion (140) and on said first temple (420) and said second pulling element (640) has protruding elements (901, 902, 903) at predetermined positions on its length so as to be engaged, preferably by snap engagement, to respective notches (911, 912, 913) provided on said first front support portion (120) and on said second temple (440).

14. Foldable or collapsible eyeglasses, said eyeglasses comprising a frame (1000) according to one of claims 1 to 13, a first and a second lens being applied to said first front support portion (120) and second front support portion (140), respectively, of said frame (1000).
A. CLASSIFICATION OF SUBJECT MATTER
INV. G02C5/00 G02C5/08 G02C5/20
ADD.
According to International Patent Classification (IPC) onto both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
G02C

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Relevant to claim No.</th>
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<td>A</td>
<td>US 5 532 766 A (MATEER DAVID G [US] ET AL) 2 July 1996 (1996-07-02) abstract; figures 2,3</td>
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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search
29 August 2016

Date of mailing of the international search report
14/09/2016

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