

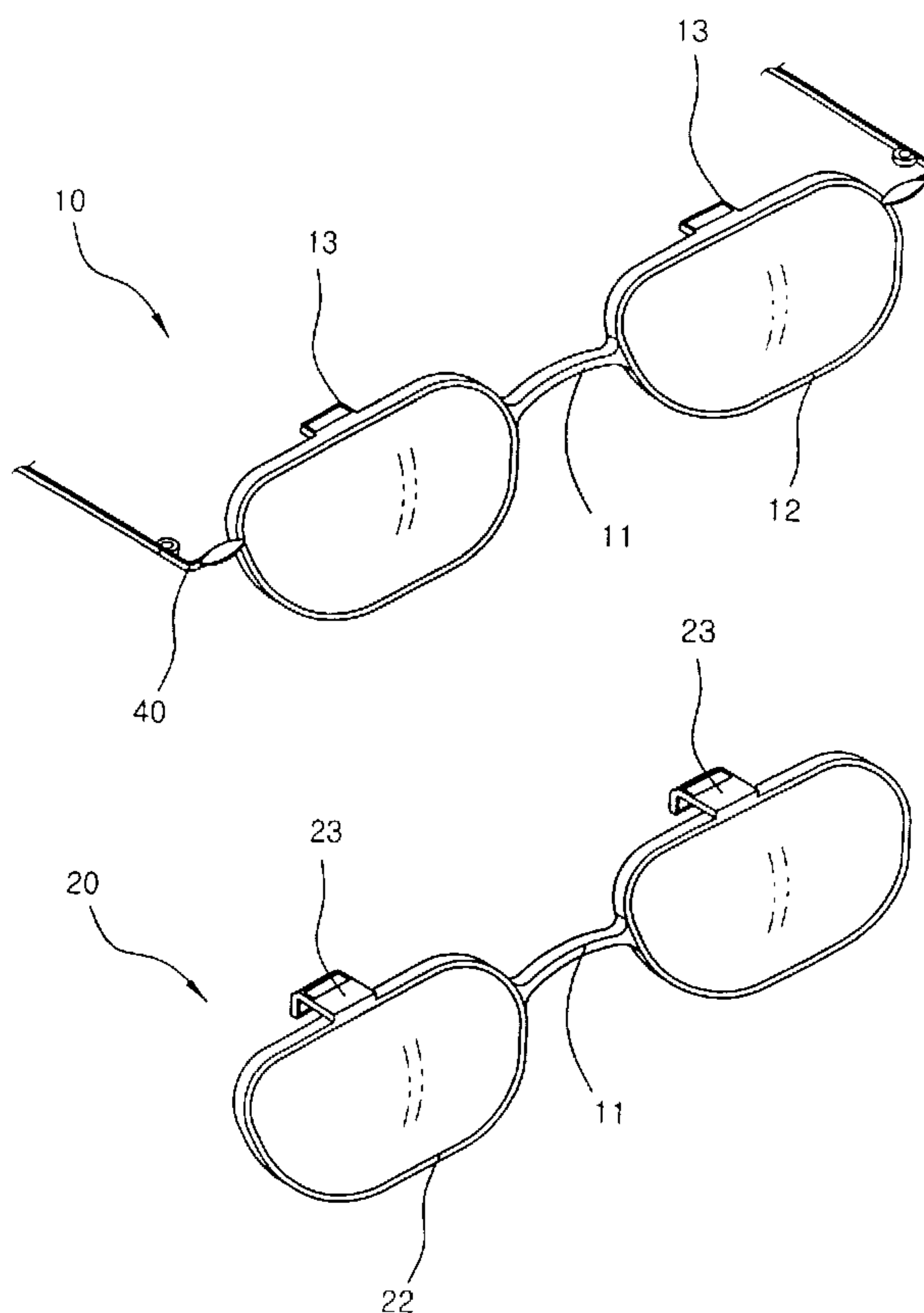


(86) Date de dépôt PCT/PCT Filing Date: 2003/10/23
(87) Date publication PCT/PCT Publication Date: 2004/05/06
(85) Entrée phase nationale/National Entry: 2005/04/05
(86) N° demande PCT/PCT Application No.: KR 2003/002239
(87) N° publication PCT/PCT Publication No.: 2004/038487
(30) Priorité/Priority: 2002/10/24 (10-2002-0065357) KR

(51) Cl.Int.⁷/Int.Cl.⁷ G02C 9/02
(71) Demandeur/Applicant:
PARK, HUN-YANG, KR
(72) Inventeur/Inventor:
PARK, HUN-YANG, KR
(74) Agent: G. RONALD BELL & ASSOCIATES

(54) Titre : SYSTEME COMPRENANT DES LUNETTES DE BASE ET DES LUNETTES AUXILIAIRES UTILISANT DES AIMANTS

(54) Title: BASE AND AUXILIARY EYEGLASS SYSTEM USING MAGNETS



(57) Abrégé/Abstract:

Disclosed are a base and auxiliary eyeglass system in which the auxiliary eyeglasses are not separated from the base eyeglasses but can be unfolded so as to exhibit a similar effect to the case of separating the auxiliary eyeglasses from the base eyeglasses,



(57) **Abrégé(suite)/Abstract(continued):**

thereby reducing inconvenience in use of auxiliary eyeglasses in typical eyeglasses including industrial eyeglasses, sunglasses, etc., having a general auxiliary eyeglasses attached thereto. A magnetic material is inserted into one side of a base eye rim, and a magnetic material is inserted into one side of an auxiliary eye rim in such a manner as to correspond to the magnet material inserted into the one side of the base eye rim, so that each of the auxiliary eyeglasses can be folded and unfolded. As a consequence, each of the auxiliary eyeglasses can be unfolded without being separated from each of the base eyeglasses.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
6 May 2004 (06.05.2004)

PCT

(10) International Publication Number
WO 2004/038487 A3

(51) International Patent Classification⁷: **G02C 9/02**

(21) International Application Number:
PCT/KR2003/002239

(22) International Filing Date: 23 October 2003 (23.10.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10-2002-0065357 24 October 2002 (24.10.2002) KR

(71) Applicant and

(72) Inventor: **PARK, Hun-Yang** [KR/KR]; 106/1402, Jeong-whawoobang-Pales APT, 72 Sang-dong, Suseong-gu, 706-828 Daegu (KR).

(74) Agent: **CHOI, Bong-Tae**; 402, 4rd Beomo Building, 33-2 Beome-dong, Suseong-gu, 706-010 Daegu (KR).

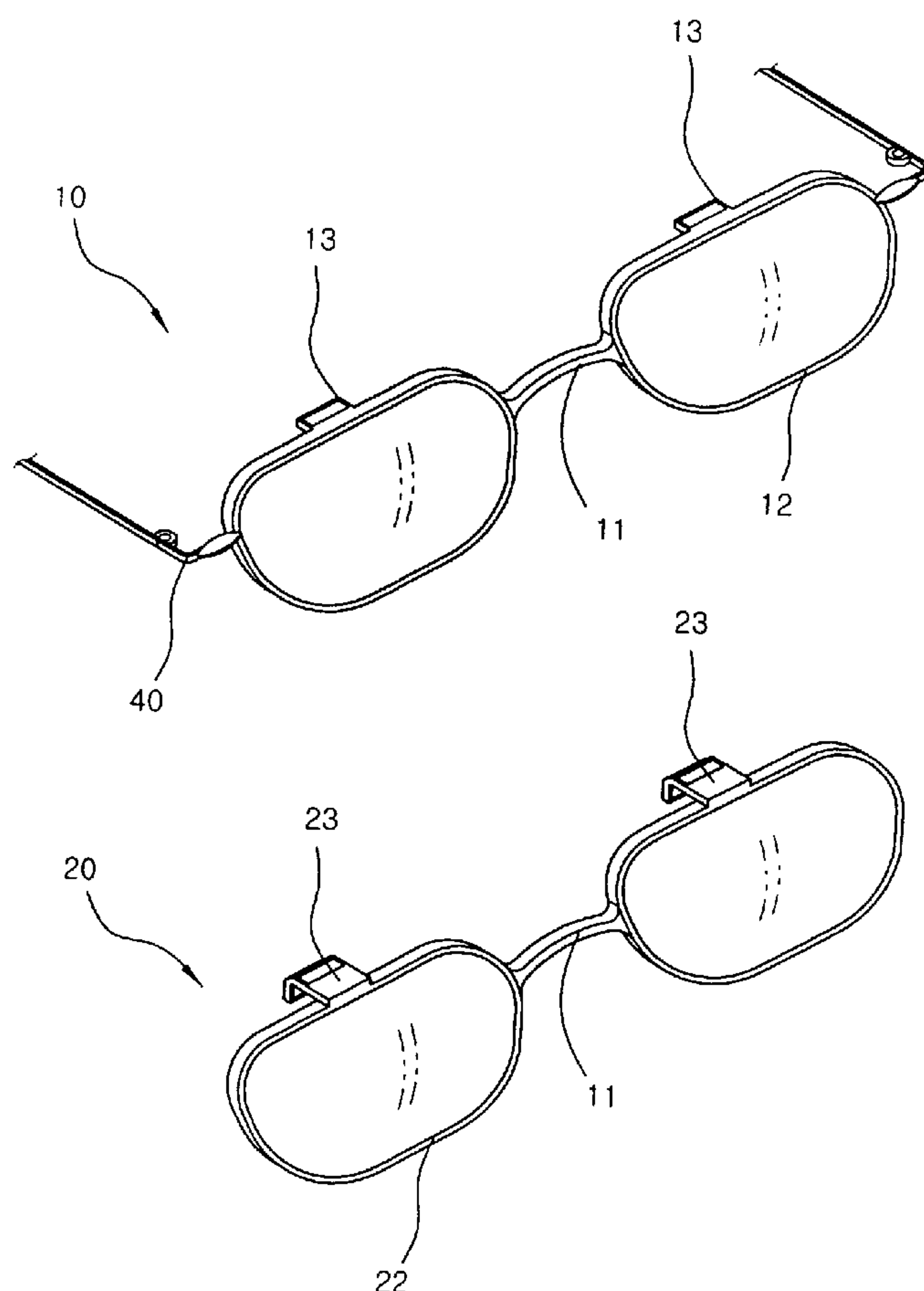
(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

[Continued on next page]

(54) Title: BASE AND AUXILIARY EYEGLASS SYSTEM USING MAGNETS



(57) Abstract: Disclosed are a base and auxiliary eyeglass system in which the auxiliary eyeglasses are not separated from the base eyeglasses but can be unfolded so as to exhibit a similar effect to the case of separating the auxiliary eyeglasses from the base eyeglasses, thereby reducing inconvenience in use of auxiliary eyeglasses in typical eyeglasses including industrial eyeglasses, sunglasses, etc., having a general auxiliary eyeglasses attached thereto. A magnetic material is inserted into one side of a base eye rim, and a magnetic material is inserted into one side of an auxiliary eye rim in such a manner as to correspond to the magnetic material inserted into the one side of the base eye rim, so that each of the auxiliary eyeglasses can be folded and unfolded. As a consequence, each of the auxiliary eyeglasses can be unfolded without being separated from each of the base eyeglasses.

WO 2004/038487 A3

WO 2004/038487 A3



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(88) Date of publication of the international search report:

29 July 2004

BASE AND AUXILIARY EYEGLASS SYSTEM USING MAGNETS

Technical Field

The present invention relates to the field of eyeglasses and more particularly, to a base and auxiliary eyeglass system using magnets in which a user can easily attach/detach the auxiliary eyeglasses to/from the base eyeglasses as well as fold/unfold the auxiliary eyeglasses in front of the base eyeglasses according to changes in external environment and his or her feelings, thereby reducing inconvenience in use of auxiliary eyeglasses in typical eyeglasses including sunglasses, convex glasses, etc., having a general auxiliary eyeglasses attached thereto.

Background Art

In general, widely used base eyeglasses with auxiliary eyeglasses are divided into two types. One type is such constructed that each of the base eyeglasses permits a magnet to be directly inserted into one portion of a lug thereof and each of the auxiliary eyeglasses permits another magnet to be inserted into one side thereof, which is in contact with the one portion of the lug, so that a user can easily attach/detach the auxiliary eyeglasses to/from the base eyeglasses. The other type is such constructed that an auxiliary bridge for connecting the auxiliary eyeglasses is bent and caught by a base bridge for connecting the base eyeglasses, and then the auxiliary eyeglasses are fixed to the base eyeglasses by means of additional means.

The applicant of the present invention filed many applications regarding eyeglasses. Among them, Korean Patent Application No. 10-2001-0075081 and Korean Utility Model Registration No. 266471 will be described in detail with reference to FIGs. 1 and 2.

A base and auxiliary eyeglass system comprises base eyeglasses G having base eye rims E and a first bar 1 for horizontally connecting the uppermost portions of the base eye rims E, the first bar 1 having a base magnet 1m inserted into the central portion thereof, and the auxiliary eyeglasses g having auxiliary eye rims e and a second bar 2 for horizontally connecting the uppermost portions of the auxiliary eye rims e, the second bar having a horizontal portion 2a and a bent portion 2b upwardly bent from the horizontal portion 2a in an orthogonal manner to the horizontal portion 2a, the horizontal portion 2a and the bent portion 2b having magnets 2m and 2m inserted thereinto, respectively, so that a user can easily attach/detach the auxiliary eyeglasses to/from the base eyeglasses and fold/ unfold the auxiliary eyeglasses in front of the base eyeglasses. The utility model application has already been finally registered in Technical Evaluation in Korea.

In the prior art, the magnets are not directly inserted into the eye rims but the first and second bars act as guides for fixing the auxiliary eyeglasses to the base eyeglasses. Therefore, the second bar 2 and the first bar 1 should be formed in the auxiliary eyeglasses and the base eyeglasses, respectively, as additional attachment/detachment means for attaching/detaching the auxiliary eyeglasses to the base eyeglasses and folding/ unfolding the auxiliary eyeglasses. The system constructed as above has problems in that its structure is complicated

and there is restrictions in creative designs which are important in the eyeglass industry from an esthetic point of view.

Disclosure of Invention

Accordingly, the present invention is directed to a base and auxiliary eyeglass system using magnets that substantially obviate one or more problems due to limitations and disadvantages of the related art.

An object of the present invention is to provide base and auxiliary eyeglass system using magnets, which can easily unfold the auxiliary eyeglasses in front of the base eyeglasses without additional attachment/detachment means.

To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, there are provided a base and auxiliary eyeglass system using magnets, including: base eyeglasses each having a base eye rim and a base magnet insertion part horizontally protruding from on one side of the base eye rim so as to allow a magnetic material to be inserted therein; and auxiliary eyeglasses each having an auxiliary eye rim and a magnet hinge part protruding from one side of the auxiliary eye rim in such a manner as to be correspondingly coupled to the base magnet insertion part, the magnet hinge part having a magnetic material inserted therein, the magnetic material of the magnet hinge part reacting to the magnetic material inserted into the base magnet insertion part when the auxiliary eyeglasses are folded and unfolded.

Brief Description of the Drawings

The above and other objects, features and advantages of the present invention will be apparent from the following detailed description of the preferred embodiments of the invention in conjunction with the accompanying drawings, in which:

FIG. 1 is a detailed view illustrating the construction of a base and auxiliary eyeglass system in the prior art of the present applicant;

FIG. 2 is a cross-sectional view illustrating a state in which auxiliary eyeglasses are folded and unfolded in the prior art of FIG. 1;

FIG. 3 is a perspective view illustrating the construction of a base and auxiliary eyeglass system according to a first preferred embodiment of the present invention;

FIG. 4 is a side view and a cross-sectional view of the base and the auxiliary eyeglass system according to the first preferred embodiment of the present invention;

FIG. 5 is a side view and a cross-sectional view of the base and the auxiliary eyeglass system according to the first preferred embodiment of the present invention;

FIG. 6 is a perspective view illustrating a state in which the base and the auxiliary eyeglass system is used according to the first preferred embodiment of the present invention;

FIG. 7 is a side view and a cross-sectional view of a base and auxiliary eyeglass system according to a second preferred embodiment of the present invention;

FIG. 8 is a perspective view illustrating a state in which a base and auxiliary eyeglass system is used according to a third preferred embodiment of the present invention;

FIG. 9 is a top plan view illustrating the operation of a base and auxiliary eyeglass system according to a fourth preferred embodiment of the present invention;

FIG. 10 is a top plan view of a base and auxiliary eyeglass system according to a fifth preferred embodiment of the present invention; and

FIG. 11 is a top plan view and a front view of a base and auxiliary eyeglass system according to a sixth preferred embodiment of the present invention.

Best Mode for Carrying Out the Invention

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

FIG. 1 is a detailed view illustrating the construction of a base and auxiliary eyeglass system in the prior art of the present applicant. FIG. 2 is a cross-sectional view illustrating a state in which auxiliary eyeglasses are unfolded in the prior art of FIG. 1. FIG. 3 is a perspective view illustrating the construction of a base and auxiliary eyeglass system according to a first preferred embodiment of the present invention. FIG. 4 is a side view and a cross-sectional view of the base and auxiliary eyeglass system according to the first preferred embodiment of the present invention. FIG. 5 is a side view and a cross-sectional view of the base and auxiliary eyeglass system according to the first preferred embodiment of the present invention. FIG. 6 is a perspective view illustrating a state in which the base and auxiliary eyeglass system is used according to the first preferred

embodiment of the present invention. FIG. 7 is a side view and a cross-sectional view of a base and auxiliary eyeglass system according to a second preferred embodiment of the present invention. FIG. 8 is a perspective view illustrating a state in which a base and auxiliary eyeglass system is used according to a third preferred embodiment of the present invention. FIG. 9 is a top plan view illustrating the operation of a base and auxiliary eyeglass system according to a fourth preferred embodiment of the present invention. FIG. 10 is a top plan view of a base and auxiliary eyeglass system according to a fifth preferred embodiment of the present invention. FIG. 11 is a top plan view and a front view of a base and auxiliary eyeglass system according to a sixth preferred embodiment of the present invention.

A base and auxiliary eyeglass system using magnets includes base eyeglasses 10 and auxiliary eyeglasses 20, which will be explained separately.

Referring to FIGs. 3 to 6, each of the base eyeglasses 10 includes a base bridge 11, a base eye rim 12 having a magnetic material inserted into one side of the upper portion thereof, and a base magnet insertion part 13 horizontally protruding toward the inside of the base eyeglasses by such a predetermined distance as not to be intervened by glass lenses when the auxiliary eyeglasses are folded and unfolded, the base magnet insertion part 13 having a magnetic material inserted therein in such a manner that a magnetic force is generated in both the bottom surface 13b and the top surface 13a thereof.

A base magnet 13m inserted into the base magnet insertion part 13 has a thickness identical to or slightly smaller than that of the base insertion part 13, so that the base magnet 13m is not shown when

being seen from the outside by others but performs its given function.

As previously said, according to the present invention, the base magnet insertion part 13 protrudes from the base eye rim 12 in each of the base eyeglasses so as to allow the magnetic material to be inserted therein without using any additional attachment/detachment means.

As shown in FIGs. 3 and 4, each of the auxiliary eyeglasses 20 includes an auxiliary eye rim 22, and a magnet hinge part 23 protruding from one side of the auxiliary eye rim 22 by a predetermined distance in such a manner as to correspond in position to the base magnet insertion part 13 in each of the base eyeglasses 10 and then bent at the predetermined distance in such a manner as to surround the base magnet insertion part 13. The auxiliary magnet hinge part includes an auxiliary eyeglass folding portion 23a horizontally protruding from the auxiliary eye rim 22 in such a manner as to be correspondingly coupled to the base magnet insertion part 13, and an auxiliary eyeglass unfolding portion 23b bent from the end of the auxiliary eyeglass folding portion 23a in such a manner as to surround the base magnet insertion part 13, the auxiliary eyeglass folding portion 23a having an auxiliary eyeglass folding magnet 23m inserted therein and the auxiliary eyeglass unfolding portion 23b having an auxiliary eyeglass unfolding magnet 23m inserted therein.

That is to say, when seen from the left and right sides of each of the auxiliary eyeglasses 20, the section of the magnet hinge part 23 is of shape or shape protruding toward the inside of the base eyeglasses. The base magnet insertion part 13 protruding toward the inside of the base eyeglasses is positioned inside the inner space

formed by the auxiliary eyeglass folding portion 23a and the auxiliary eyeglass unfolding portion 23b in such a manner as to correspond to the auxiliary eyeglass folding portion 23a.

The auxiliary eyeglass folding magnet 23m and the auxiliary eyeglass unfolding magnet 23m inserted into the magnet hinge part 23 have a thickness identical to or slightly smaller than that of the magnet hinge part 23, similarly to the case of the base magnet insertion part in each of the base eyeglasses 10, so that the magnets 23m and 23m are not shown when being seen from the outside by others.

The magnetic material can be any material having a magnetic force capable of maintaining the state in which each of the auxiliary eyeglasses is folded and unfolded to be attached/detached to/from each of the base eyeglasses. That is to say, the magnetic material has a magnetic force strong enough to sufficiently control the weight of each of the auxiliary eyeglasses 20 so that the position of each of the auxiliary eyeglasses attached/detached to/from each of the base eyeglasses 10 is not changed unless an external force higher than a predetermined level is intentionally applied thereto. It goes without saying that the magnetic material can be inserted into both the base magnet insertion part 13 and the magnet hinge part 23, or the magnetic material can be inserted into either of the base magnet insertion part 13 and the magnet hinge part 23 and metallic material which reacts to the magnetic material can be inserted into the rest one.

In the base and auxiliary eyeglass system using the magnets constructed as above, a state in which the auxiliary eyeglasses are folded and unfolded in front of the base eyeglasses will be explained

in detail hereinbelow.

Referring to FIG. 4, the state in which each of the auxiliary eyeglasses 20 is folded in front of each of the base eyeglasses 10 will be explained. As previously mentioned, the magnet hinge part 23 includes the auxiliary eyeglass folding portion 23a protruding from the one side of the auxiliary eye rim 22 of each of the auxiliary eyeglasses 20 toward the inside of the base eyeglasses and the auxiliary eyeglass unfolding portion 23b bent from the end of the auxiliary eyeglass folding portion 23a, such that the magnet hinge part 23 is correspondingly coupled to the base magnet insertion part 13, which protrudes from the one side of the upper portion of the base eye rim 12 in each of the base eyeglasses 10 and has the base magnet 13m inserted therein. When the auxiliary eyeglass folding magnet 23m is inserted into the auxiliary eyeglass folding portion 23a which horizontally protrudes toward the inside of the base eyeglasses, magnetically reacts to the top surface 13a of the base magnet insertion part 13, each of the auxiliary eyeglasses 20 is rested on the base eye rim 12 in each of the base eyeglasses 10, thereby maintaining the state in which each of the auxiliary eyeglasses is folded.

Referring to FIGs. 5 and 6, when each of the auxiliary eyeglasses 20 folded in front of each of the base eyeglasses is lifted up by an external force, the state in which the auxiliary eyeglass folding portion 23a of the magnet hinge part 23 of the auxiliary eye rim 22 is fixed to the top surface 13a of the base magnet insertion part 13 into which the base magnet 13m is inserted is released by the external force. At the same time, the auxiliary eyeglass unfolding portion 23b of the magnet hinge part is bent in such a manner to surround the base

magnet insertion part 13 approaches the bottom surface 13b of the base magnet insertion part 13. Finally, the base magnet 13m of the bottom surface 13b of the base magnet insertion part 13 of the base eye rim 12 magnetically reacts to the auxiliary eyeglass unfolding magnet 23m inserted into the auxiliary eyeglass unfolding portion 23b of the magnet hinge part 23 of the auxiliary eye rim 22, thereby maintaining the state in which each of the auxiliary eyeglasses 20 is unfolded upward, away from each of the base eyeglasses 10. On the contrary, when each of the unfolded auxiliary eyeglasses 20 is lowered again by an external force in front of each of the base eyeglasses 10, the state in which each of the auxiliary eyeglasses 20 is unfolded upward, away from each of the base eyeglasses 10 is released by the external force. At the same time, the auxiliary eyeglass folding portion 23a of the magnet hinge part 23 in each of the auxiliary eyeglasses 20 is bent and approaches the top surface 13a of the base magnet insertion part 13 in each of the base eyeglasses 10. Finally, the base magnet 13m inserted into the top surface 13a of the base magnet insertion part 13 is fixed to the auxiliary eyeglass folding magnet 23m inserted into the auxiliary eyeglass folding portion 23a of the magnet hinge part 23 in each of the auxiliary eyeglasses 20, thereby maintaining the state in which each of the auxiliary eyeglasses 20 is folded in front of each of the base eyeglasses 10.

The present invention is not restricted to the auxiliary eyeglasses constructed as above but various types of auxiliary eyeglasses are included in the spirit of the present invention. As illustrated in FIG. 7, the magnet hinge part 23 may be formed at the lower side of each of the auxiliary eyeglasses 20 and the corresponding base magnet

insertion part 13 is formed at the lower side of each of the base eyeglasses 10, such that the states in which each of the auxiliary eyeglasses is folded and unfolded occur in a different manner from the case of FIGs. 3 to 6. As shown in FIG. 8, an auxiliary bridge for connecting auxiliary eye rims of the auxiliary eyeglasses 20 may be removed such that the auxiliary eyeglasses 20 are separated from each other. Therefore, the two auxiliary eyeglasses 20 are individually folded and unfolded. As depicted in FIG. 9, the base magnet insertion part 13 corresponding to the magnet hinge part 23 of the auxiliary eye rim is formed at one side of the base eye rim in such a manner that each of the auxiliary eyeglasses is not intervened by the temple of each of the base eyeglasses when the auxiliary eyeglasses are folded or unfolded. Therefore, the auxiliary eyeglasses can be unfolded in various shapes.

Furthermore, as illustrated in FIG. 10, the base magnet insertion part 13 may not be formed on the base eye rim of each of the base eyeglasses but extend in a long rod from a lug 40 or the base bridge 11 to a wanted position in the vicinity of the base eye rim. As shown in FIG. 11, the magnet hinge part 23 may extend in the form of a long rod from an auxiliary bridge 21 of the auxiliary eyeglasses 20 to a wanted position in the vicinity of the auxiliary eye rim, not be formed on the auxiliary eye rim.

As described above, the base and auxiliary eyeglass system using the magnets constructed as above can easily fold and unfold the auxiliary eyeglasses by changing the structure of the conventional base and auxiliary eyeglass system without additional attachment/detachment means, solve the restriction problem in designs which has occurred

due to inevitably added components in the prior art, and achieve lighter weight and smaller size while sufficiently performing their functions, thereby making users feeling higher satisfaction and convenience in use.

The forgoing embodiments are merely exemplary and are not to be construed as limiting the present invention. The present teachings can be readily applied to other types of apparatuses. The description of the present invention is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications, and variations will be apparent to those skilled in the art.

What is claimed is

1. A base and auxiliary eyeglass system using magnets, comprising:

base eyeglasses each having a base eye rim and a base magnet insertion part formed on the base eye rim; and

auxiliary eyeglasses each having an auxiliary eye rim and a magnet hinge part formed on the auxiliary eye rim in such a manner as to be correspondingly coupled to the base magnet insertion part.

2. The base and auxiliary eyeglass system according to claim 1, wherein each of the base eyeglasses has the base magnet insertion part formed on one side of the uppermost portion of the base eye rim, and each of the auxiliary eyeglass has the magnet hinge part formed on one side of the uppermost portion of the auxiliary eye rim in such a manner as to be correspondingly coupled to the base magnet insertion part.

3. The base and auxiliary eyeglass system according to claim 1, wherein two auxiliary eye rims of the auxiliary eyeglasses are separable from those of the base eyeglasses and have magnet hinge parts formed thereon.

4. The base and auxiliary eyeglass system according to claim 1, wherein the base magnet insertion part horizontally protrudes from one side of the base eye rim toward the inside of the base eyeglasses so as to allow a magnetic material to be inserted thereinto.

5. The base and auxiliary eyeglass system according to claim 1, wherein the base magnet insertion part is optionally formed on one of the base eye rims.

6. The base and auxiliary eyeglass system according to claim 1, wherein the base magnet insertion part extends in the form of a long rod from a lug of each of the base eyeglasses toward a wanted position in the vicinity of the base eye rim.

7. The base and auxiliary eyeglass system according to claim 1, wherein the base magnet insertion part extends in the form of a long rod from a base bridge toward a wanted position in the vicinity of the base eye rim.

8. The base and auxiliary eyeglass system according to claim 1, wherein the magnet hinge part has an auxiliary eyeglass folding portion horizontally protruding toward the inside of the auxiliary eyeglasses, and an auxiliary eyeglass unfolding portion downwardly bent from the end of the auxiliary eyeglass folding portion.

9. The base and auxiliary eyeglass system according to claim 1, wherein the magnet hinge part corresponds in position to the base magnet insertion part formed on the base eye rim.

10. The base and auxiliary eyeglass system according to claim 1, wherein the magnet hinge part extends in the form of a long rod from

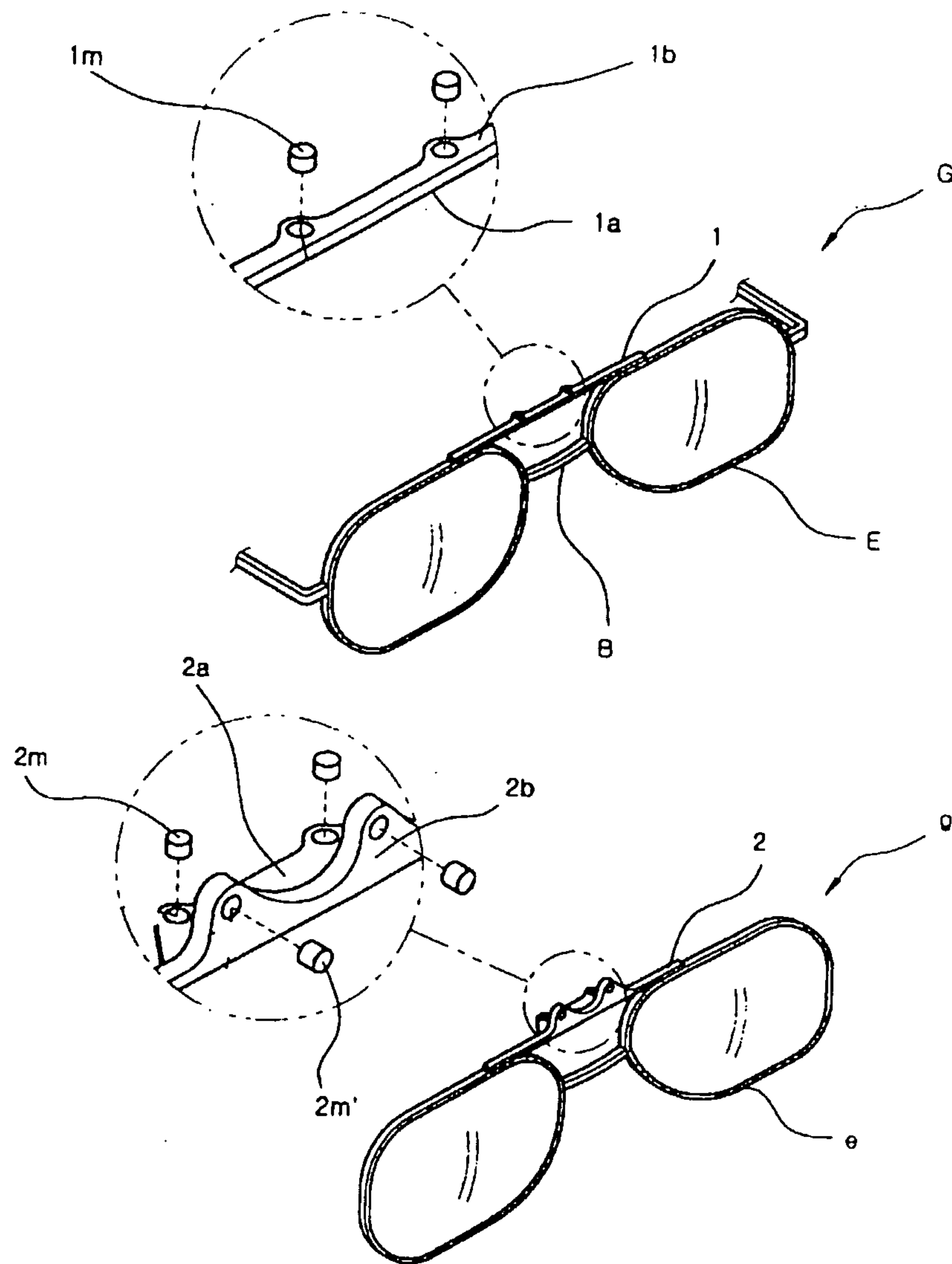
an auxiliary bridge to a wanted position in the vicinity of the auxiliary eye rim.

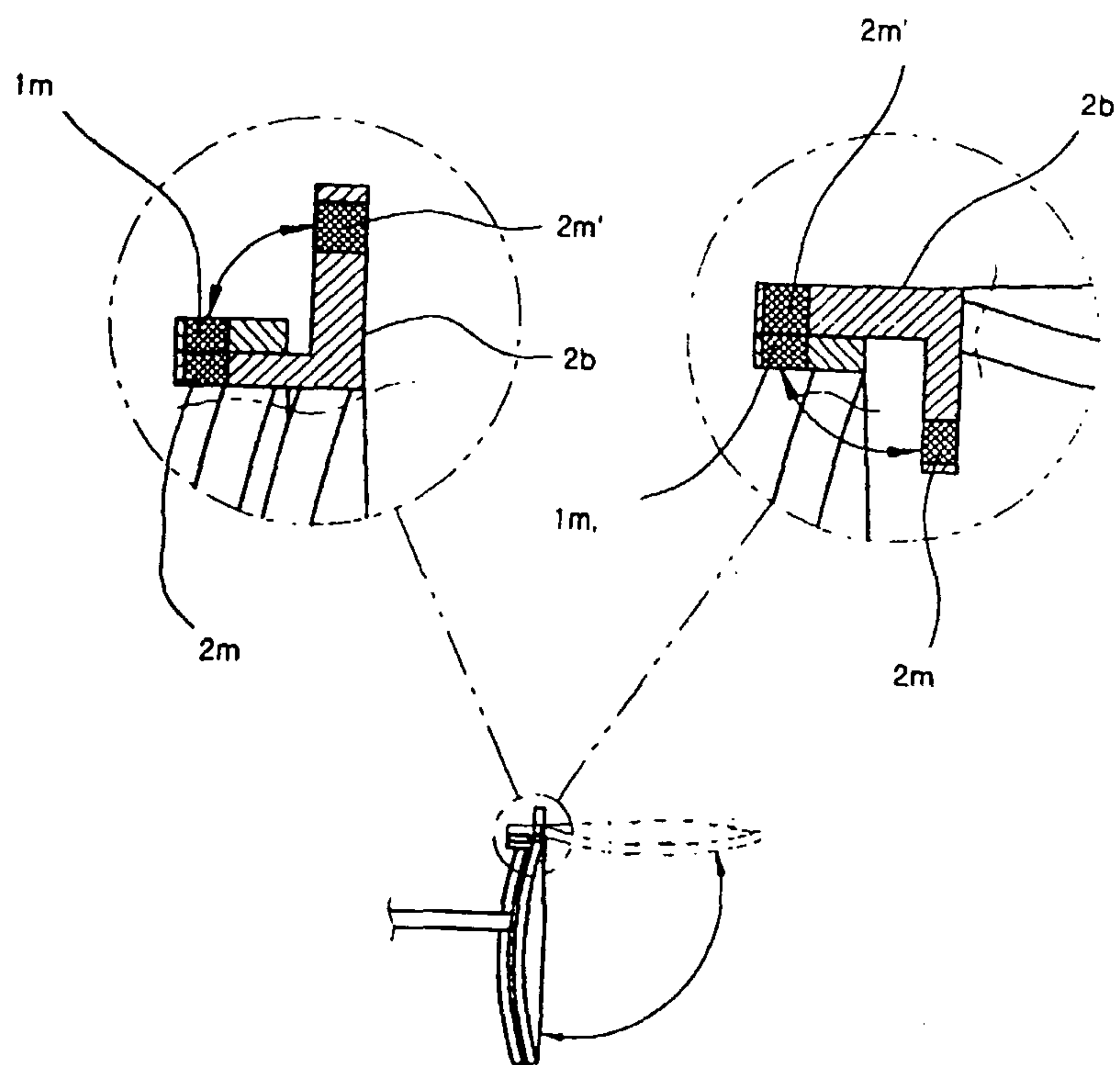
11. The base and auxiliary eyeglass system according to claims 1 or 2, wherein the magnet hinge part is constructed in the form of a semi-oval in such a manner as to surround the base magnet insertion part in each of the base eyeglasses.

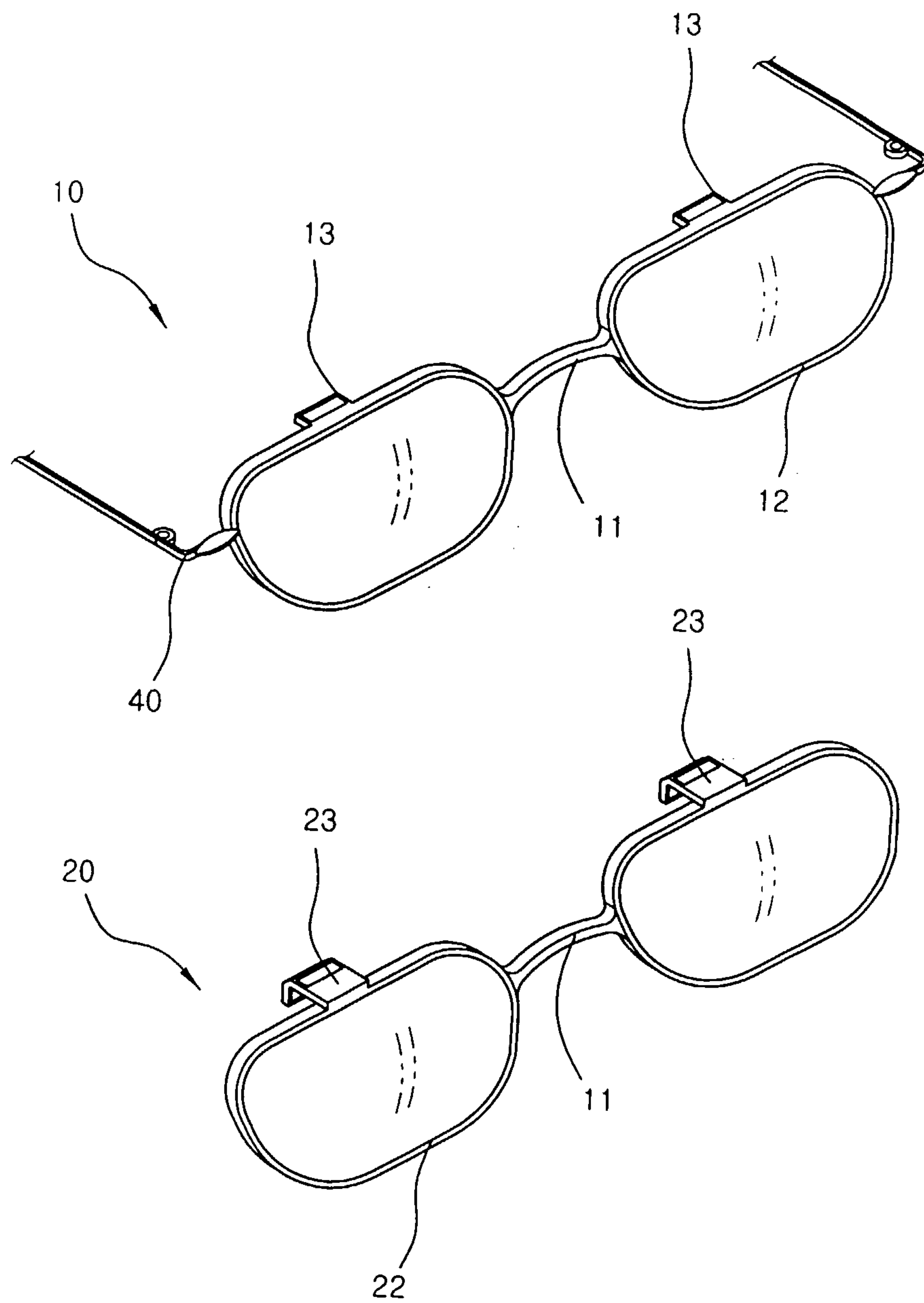
12. The base and auxiliary eyeglass system according to claim 1, wherein either of the base magnet insertion part and the magnet hinge part is formed of magnetic material and the rest one is formed of material magnetically reactable and securable to the magnetic material.

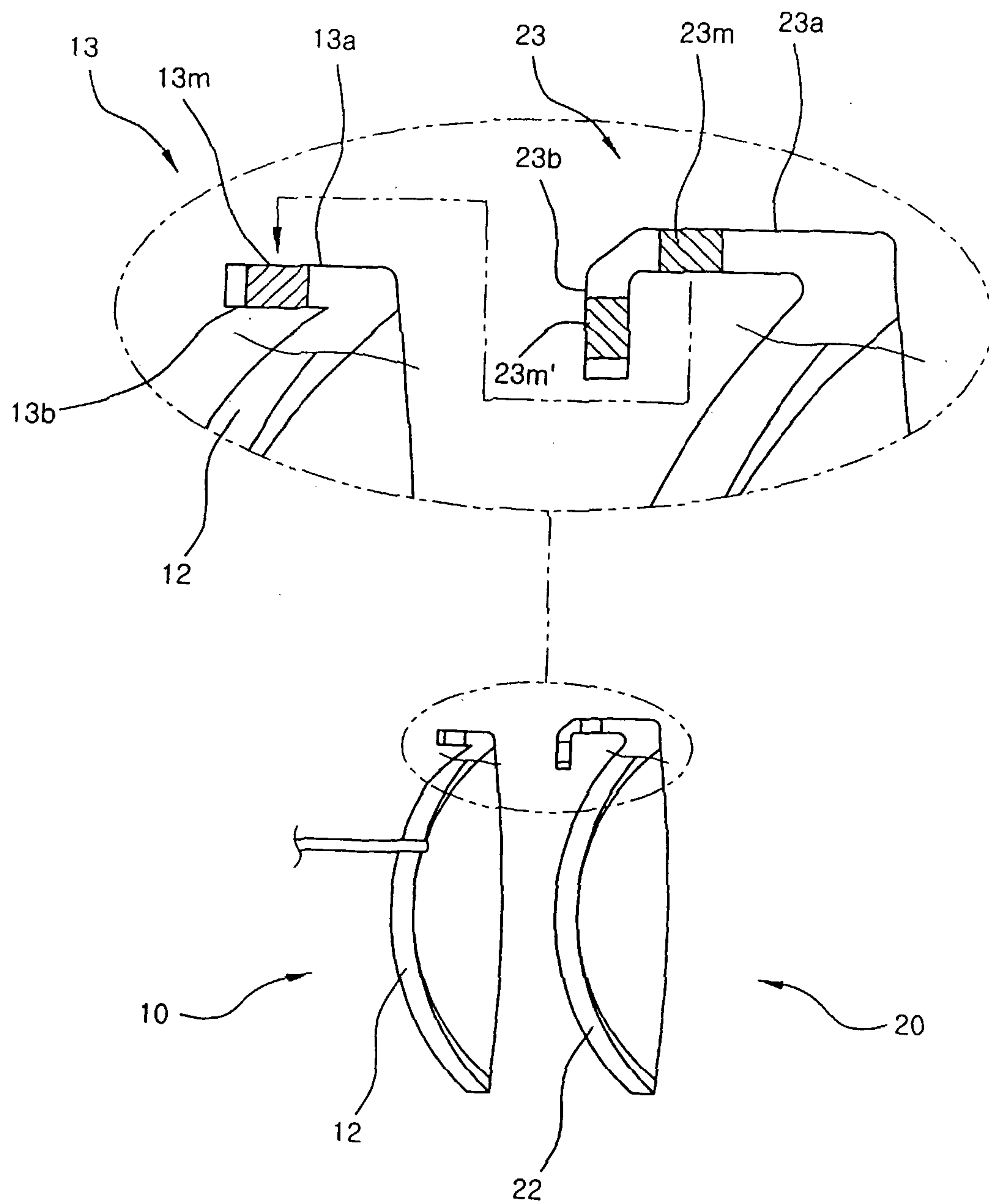
13. The base and auxiliary eyeglass system according to claim 1, wherein the base magnet insertion part formed on one side of the base eye rim and having a base magnet inserted thereinto is formed on the same axis as the base eye rim.

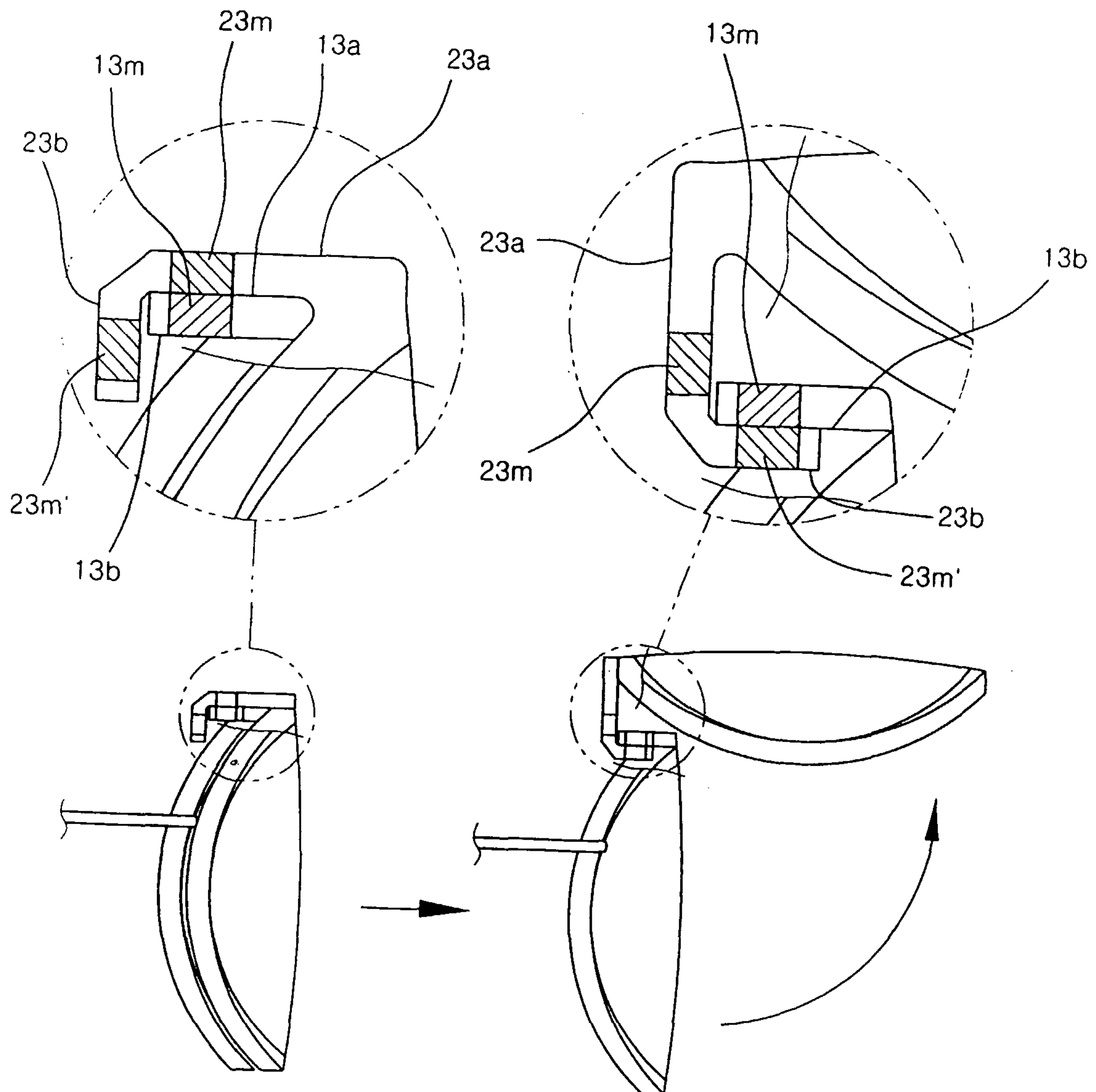
14. The base and auxiliary eyeglass system according to claim 1, wherein the magnet hinge part horizontally protrudes such that a magnetic force is generated only when each of the auxiliary eyeglasses is unfolded upward in front of the base eyeglasses.

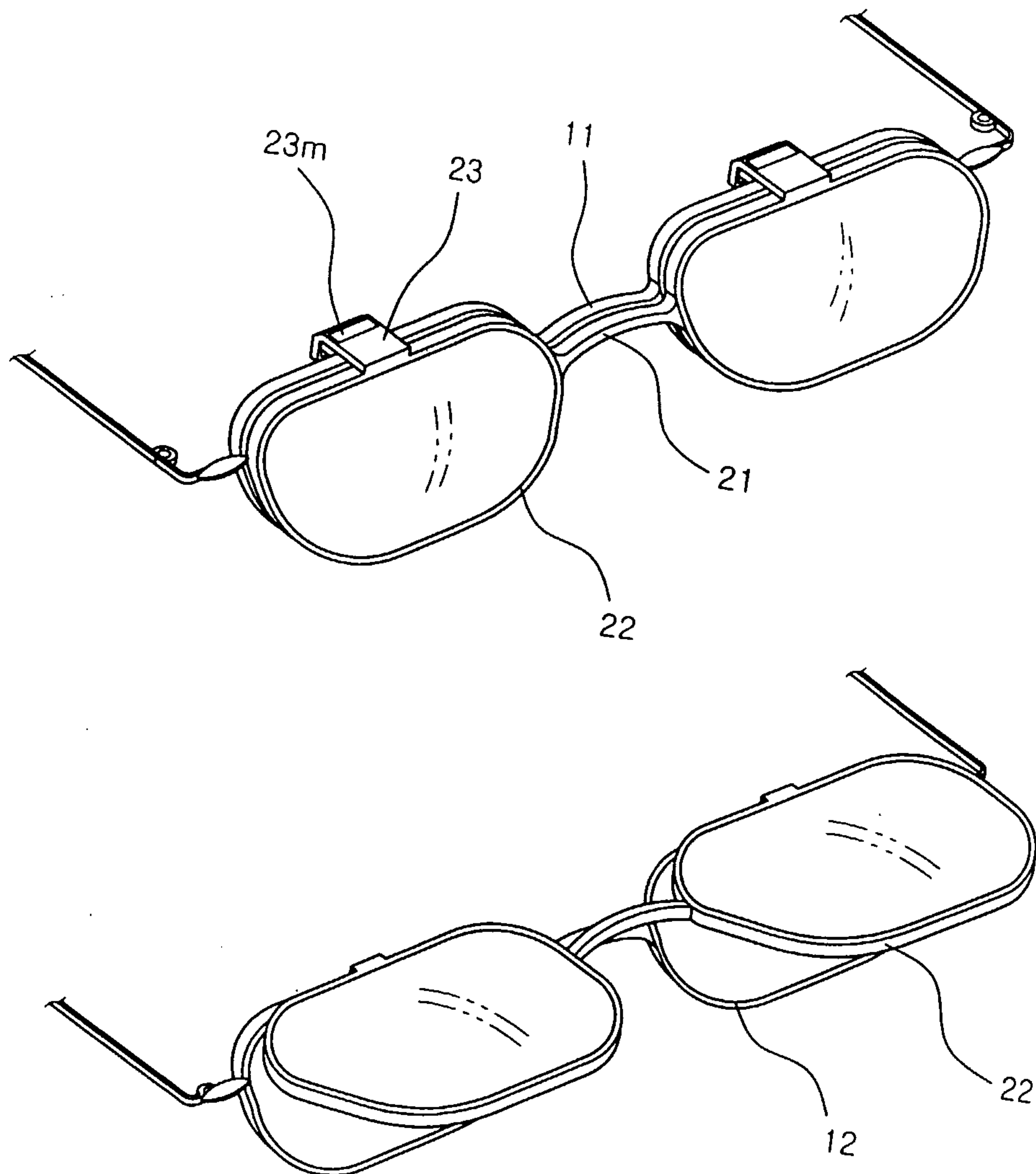
1/11
FIG.1

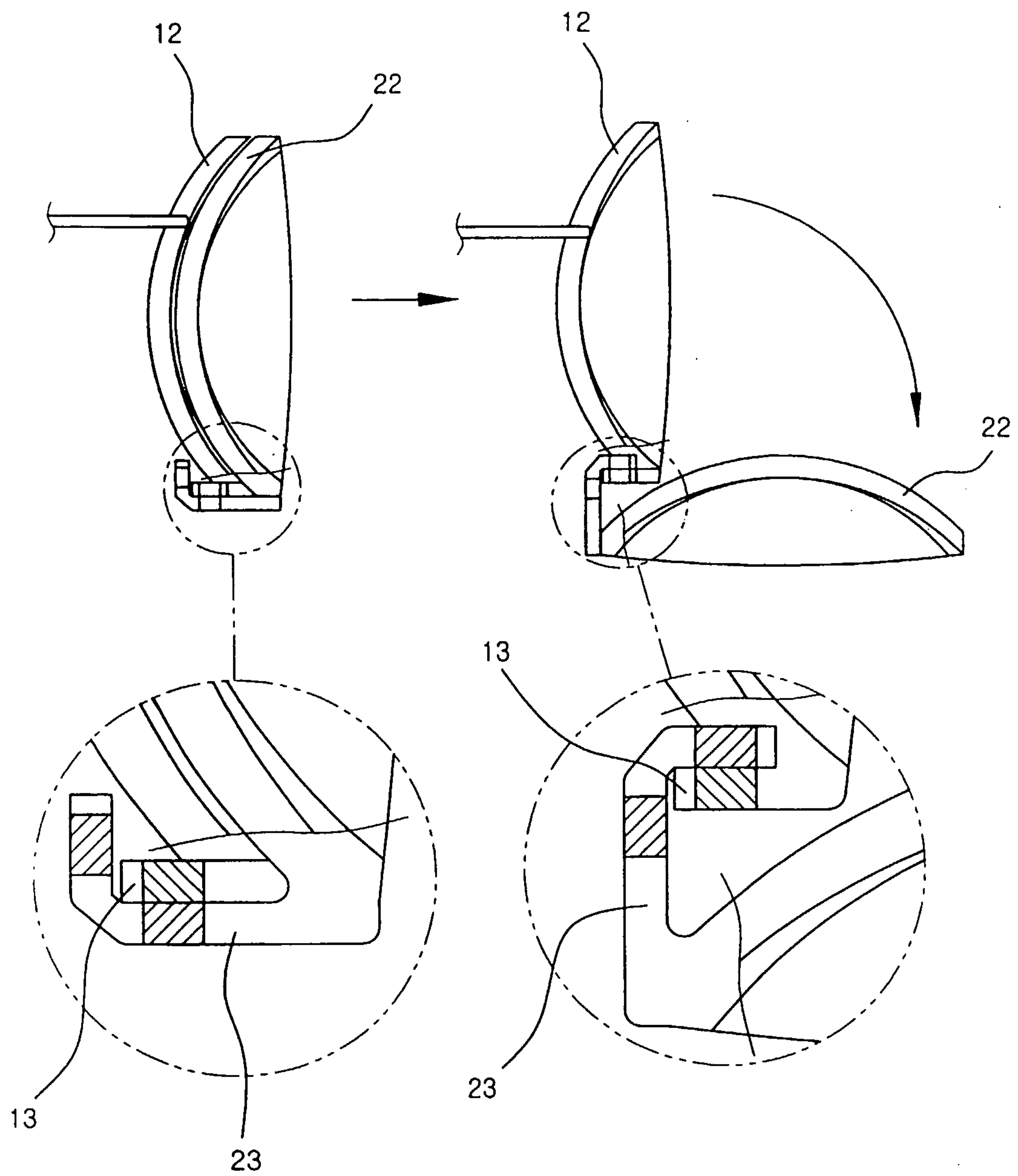
2/11
FIG.2

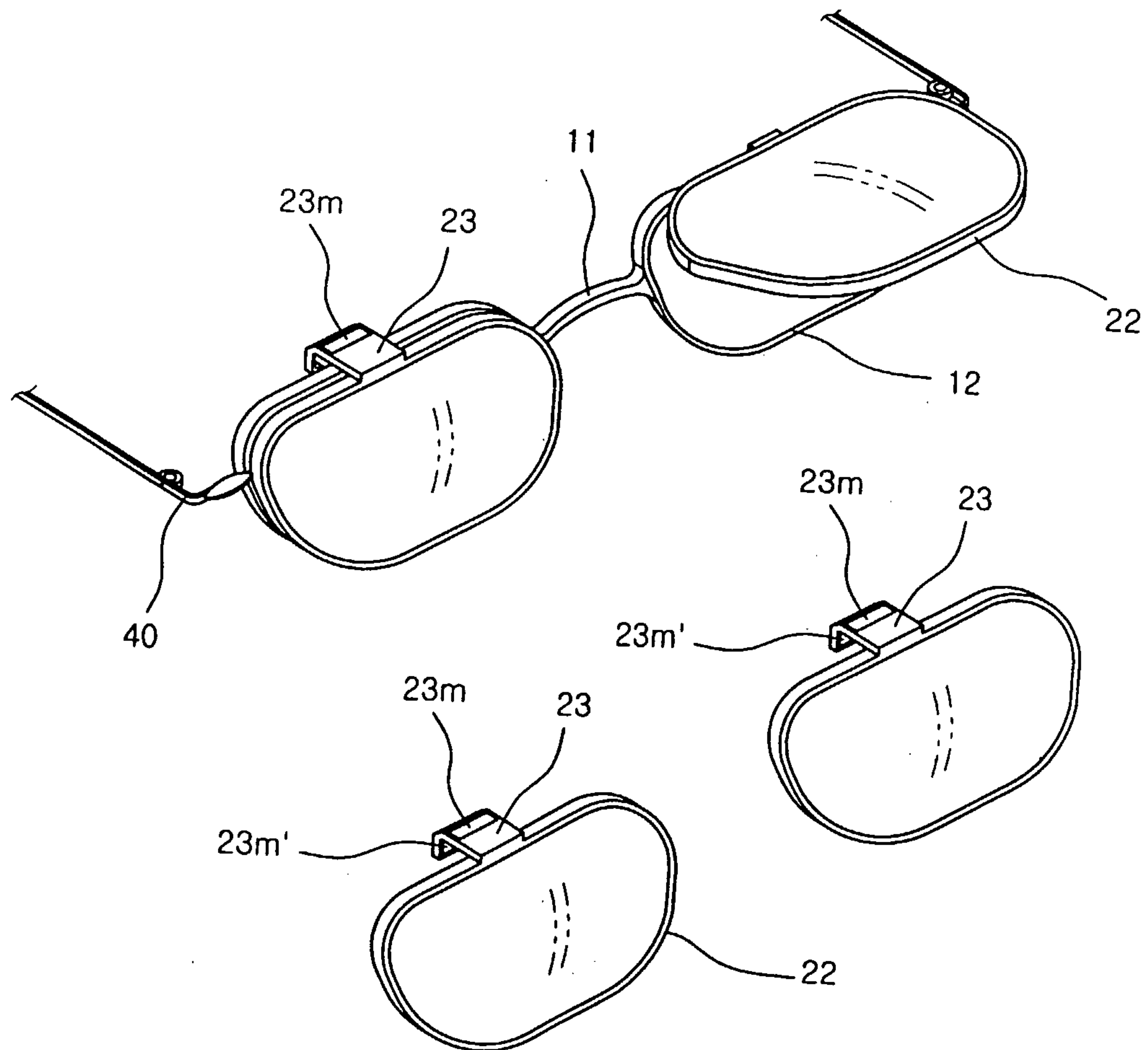
3/11
FIG.3

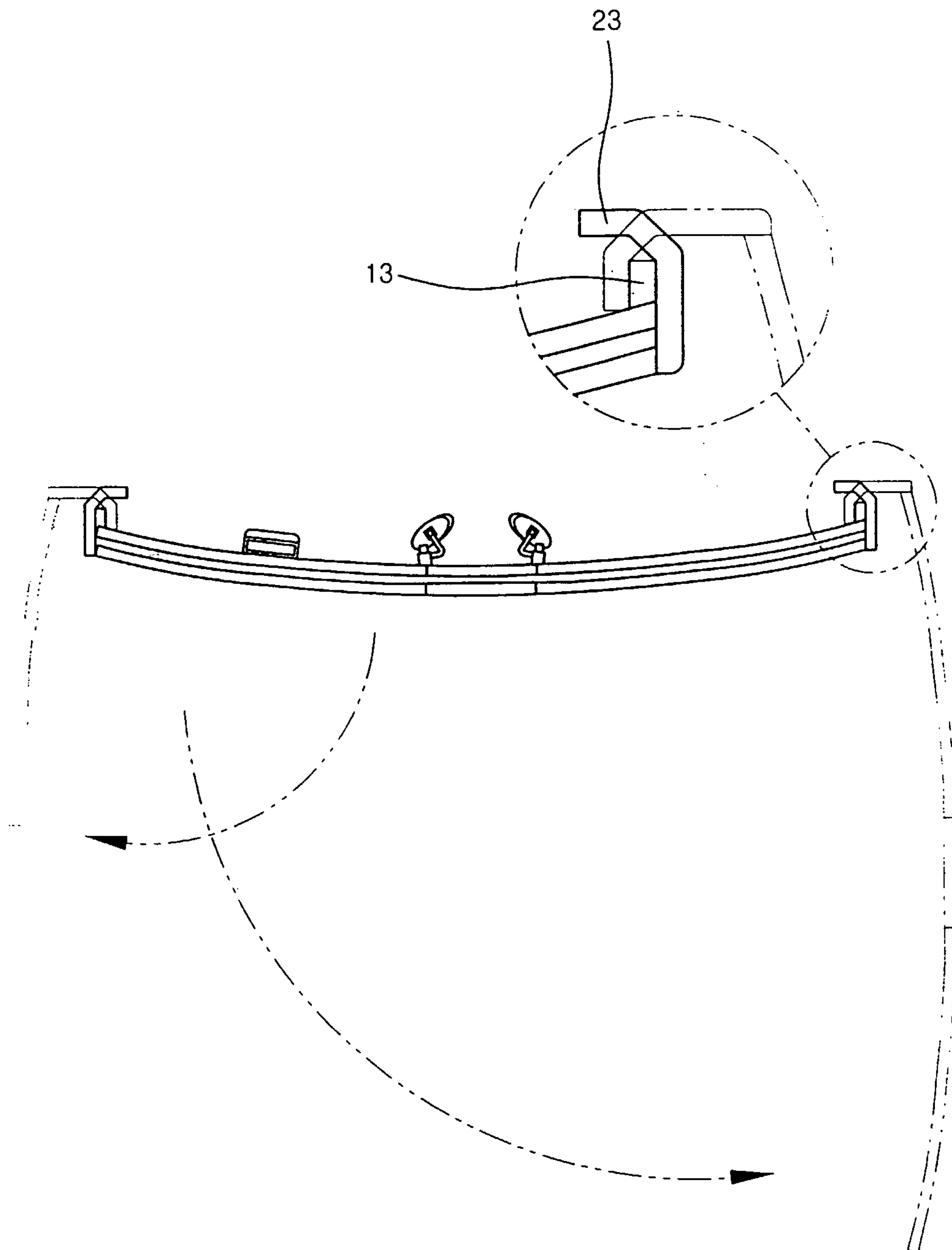
4/11
FIG. 4

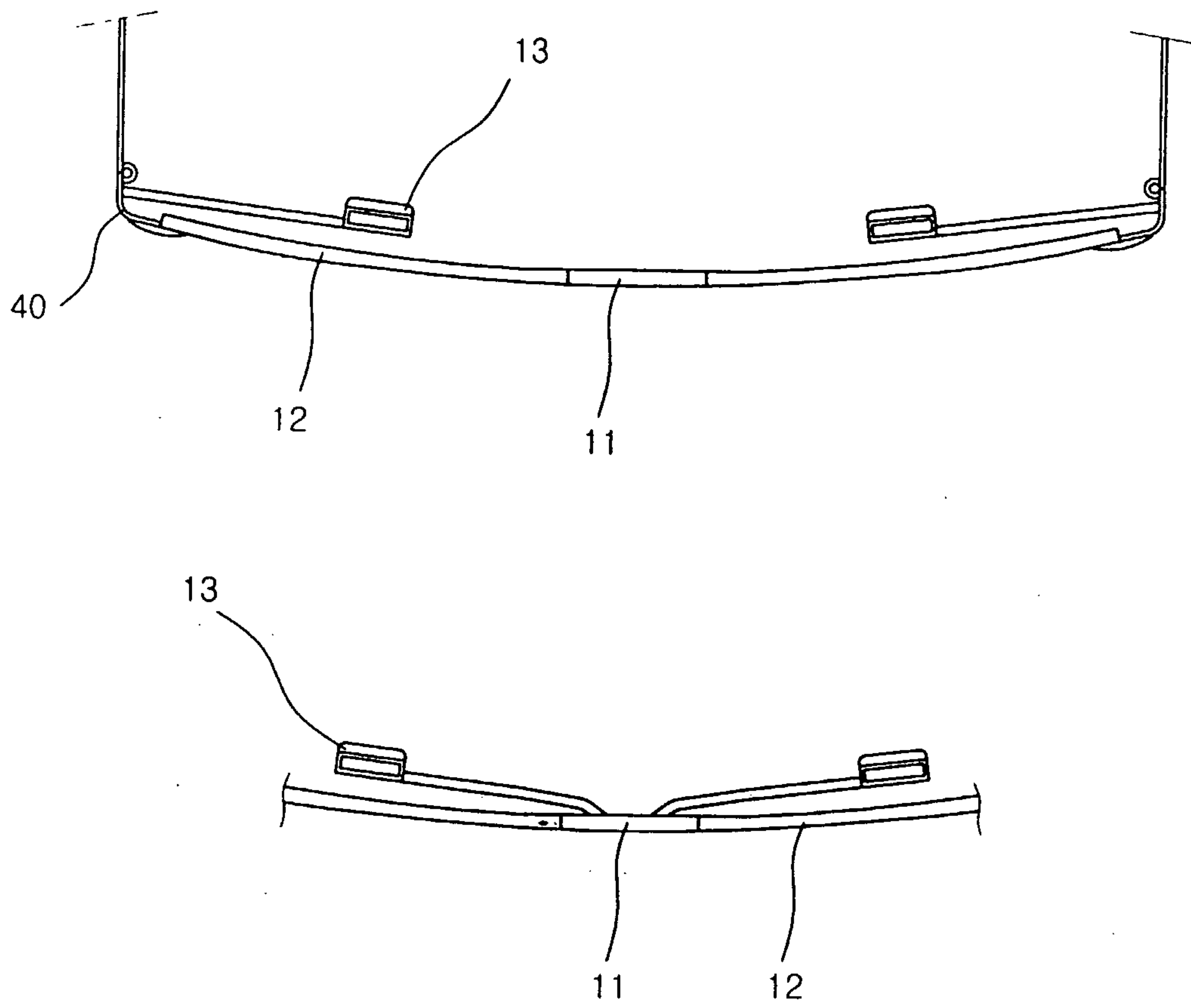
5/11
FIG.5

6/11
FIG.6

7/11
FIG.7

8/11
FIG.8

9/11
FIG.9

10/11
FIG.10

11/11
FIG.11

