US 20090092292A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2009/0092292 A1**

(43) **Pub. Date: Apr. 9, 2009**

CARVER et al.

(54) **EYE SCANNER WITH INTEGRATED FOCUS DISTANCE DETERMINATION MECHANISM**

(76) Inventors: **John F. CARVER**, Palm City, FL (US); **George William McClurg**, Jensen Beach, FL (US); **Adam Mark Will**, Boynton Beach, FL (US); **Douglas S. Hodges**, Boynton Beach, FL (US); **Dean John Fedele**, Jupiter, FL (US)

Correspondence Address:
STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.
1100 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005 (US)

(21) Appl. No.: **11/868,403**

(22) Filed: **Oct. 5, 2007**

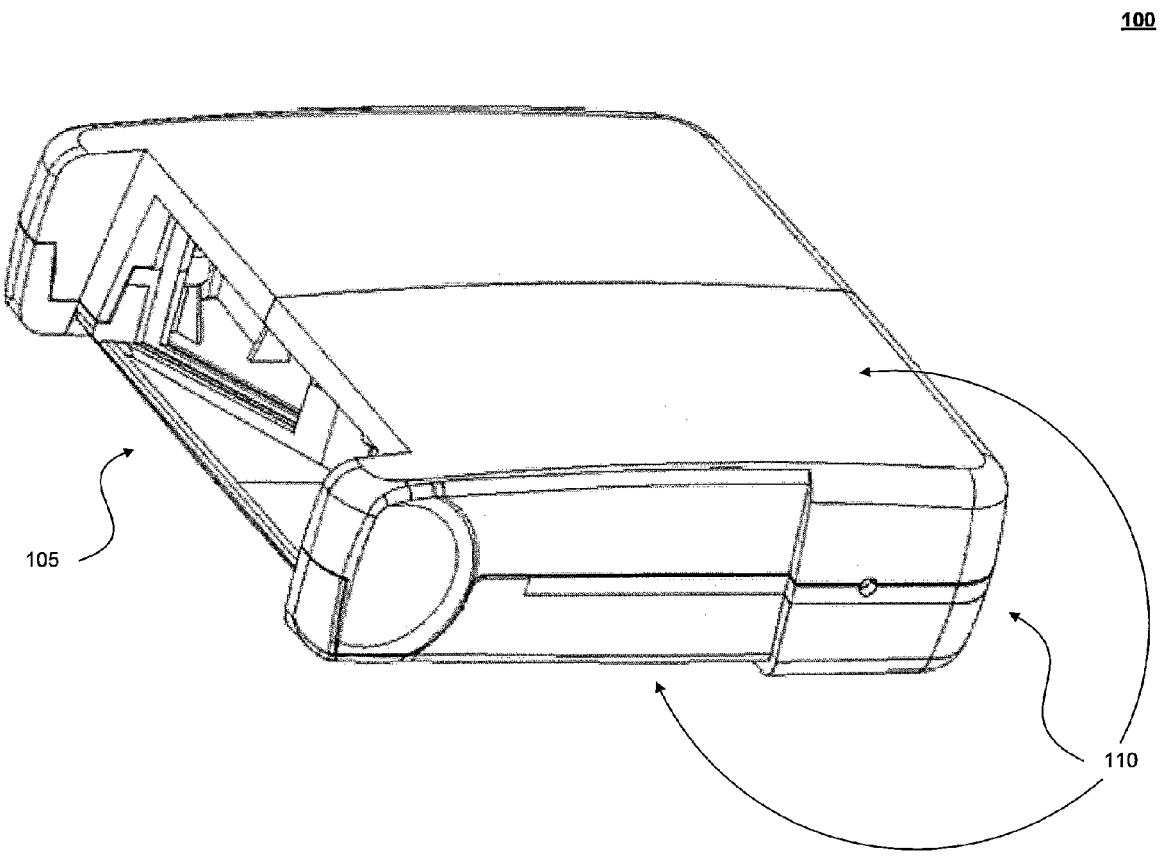
Publication Classification

(51) **Int. Cl.**
G06K 9/00 (2006.01)

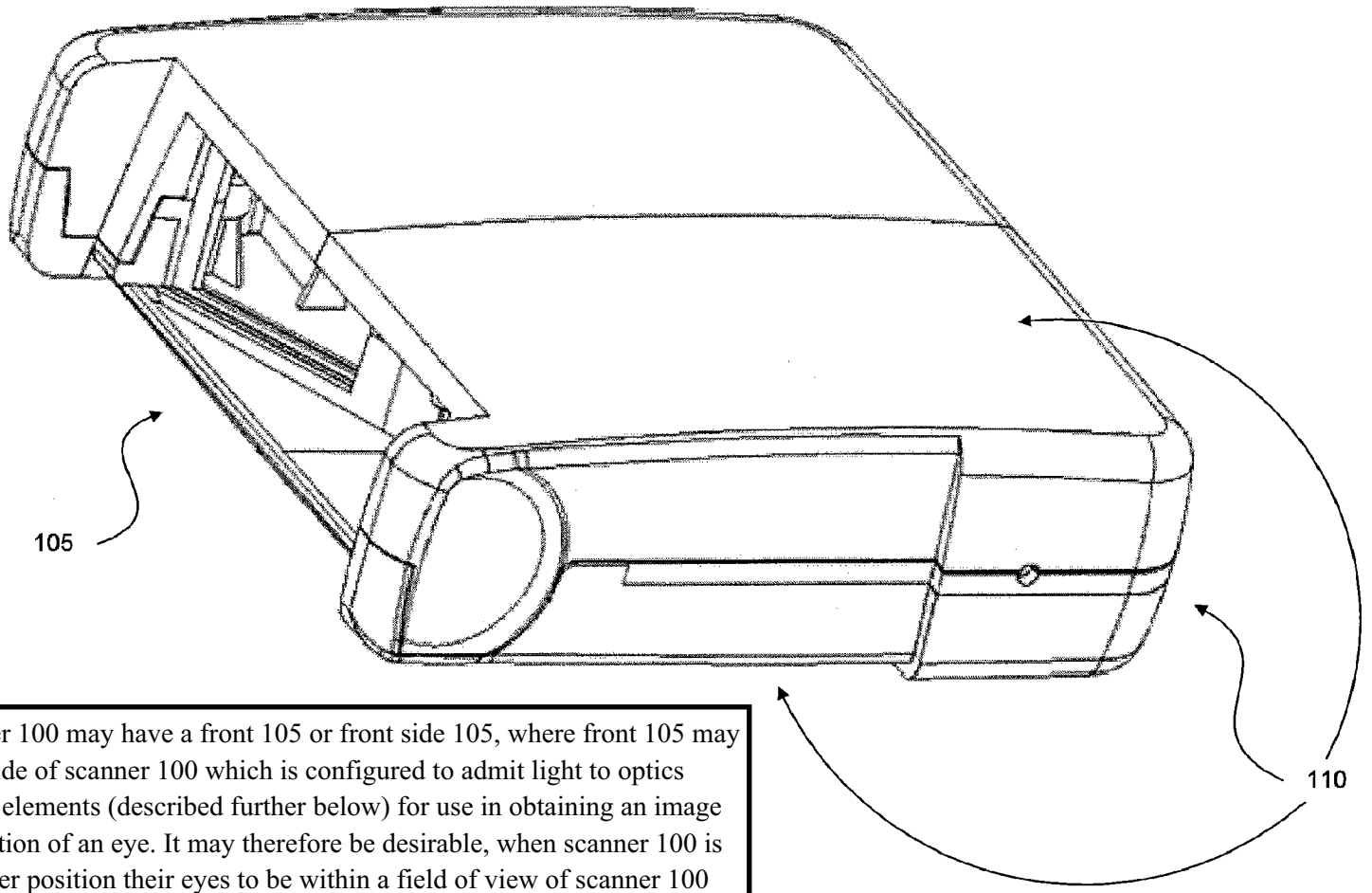
(52) **U.S. Cl.** **382/117**

(57) **ABSTRACT**

A hand-held iris scanner, used for identifying individuals, has a visor mechanism connected to the main body of the scanner via a hinged attachment. The visor mechanism can be folded and locked into an extended position, wherein the free-floating end of the visor (that is, the non-hinged end) provides a contoured surface against which a user may place his or her forehead. By placing the forehead against the visor, the user automatically positions their eyes within a field of view of the scanner optics, and at a substantially optimum distance for correctly focused imaging by the scanner optical system. The visor mechanism may also be folded and locked into a second position wherein the bulk of the visor is substantially flush with the main body of the scanner, allowing for compact storage. An optional cap attachment on the visor provides a cover mechanism to protect the scanner optics when the scanner is not in use.



[0044] FIG. 1A is a drawing of a view of an exemplary iris scanner 100 showing some of the exterior elements, where the iris scanner does not have a visor. Scanner 100 may include a main scanner outer casing 110, which may also be referred to synonymously as the scanner main housing 110, the main scanner body 110, or simply as scanner housing 110. Scanner housing 110 may be used by a person to hold the scanner. Scanner housing 110 may also contain internally, and be used to internally anchor or fix in place, some or all of the main functional elements of scanner 100.



[0047] Scanner 100 may have a front 105 or front side 105, where front 105 may typically be a side of scanner 100 which is configured to admit light to optics and/or imaging elements (described further below) for use in obtaining an image of at least a portion of an eye. It may therefore be desirable, when scanner 100 is in use, that a user position their eyes to be within a field of view of scanner 100 optics by positioning their eyes to be looking into front 105 of scanner 100.

FIG. 1A

[0056]Exemplary iris scanner 100 may require that, in order to accurately identify a person based on characteristics of an iris or irises, the optical systems and/or imaging systems within scanner 100 should be able to obtain a substantially focused image of an iris or both irises of the person. It may also be necessary for the eye or eye's of the user to be properly aligned in relation to illumination elements. In turn, it may be necessary both that the person's eyes be within a field of view of scanner 100, and that the distance between the person's eyes and the exterior-most lenses 120 or other exterior optics 120 or light entry means of scanner 100 fall within a fairly narrow range, with that range centered around a specific, optimum distance. In particular, this may require that a person who is using scanner 100 position their eyes to be looking into front 105 of scanner 100, and further that the person have their eyes positioned at a suitable distance from front 105 of scanner 100. It may also be necessary that scanner 100 be at a suitable height relative to the eyes of a user, and that scanner 100 be suitable oriented in other respects in relation to the eyes and/or head of a user.

100

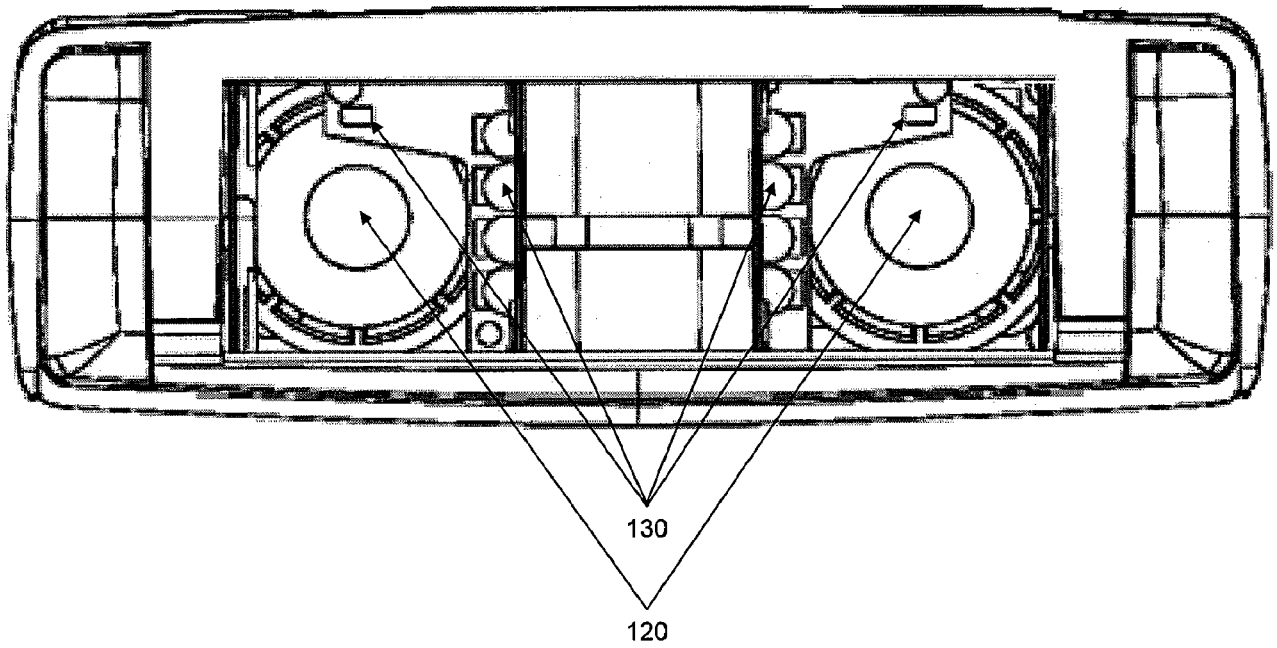


FIG. 1B

[0069]Exemplary scanner 200 may be the same, substantially the same, or similar to exemplary iris scanner 100 (discussed above in conjunction with FIG. 1A and FIG. 1B) in terms of housing 110 and in terms of internal structure, function, and operations. However, exemplary iris scanner 200 may have an attached exemplary visor 210.

200(a)

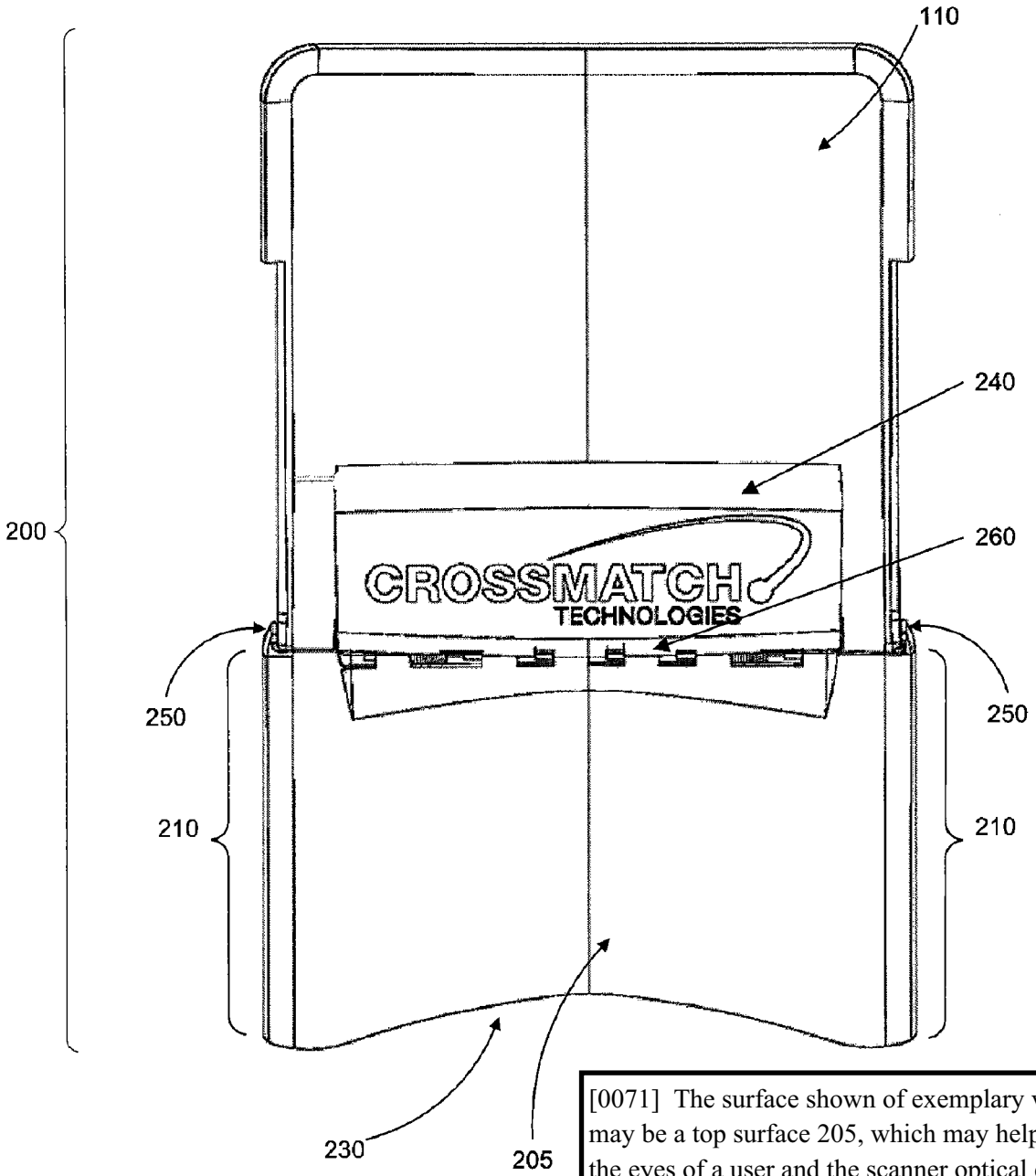


FIG. 2

[0071] The surface shown of exemplary visor 210 may be a top surface 205, which may help shield both the eyes of a user and the scanner optical elements 120 and lighting elements 130 from ambient lighting. Visor 210 may be viewed as serving both as a shield or shade from ambient lighting, and as a positioner or positioning element to properly position the head of a user in relation to scanner housing 110.

200(b)

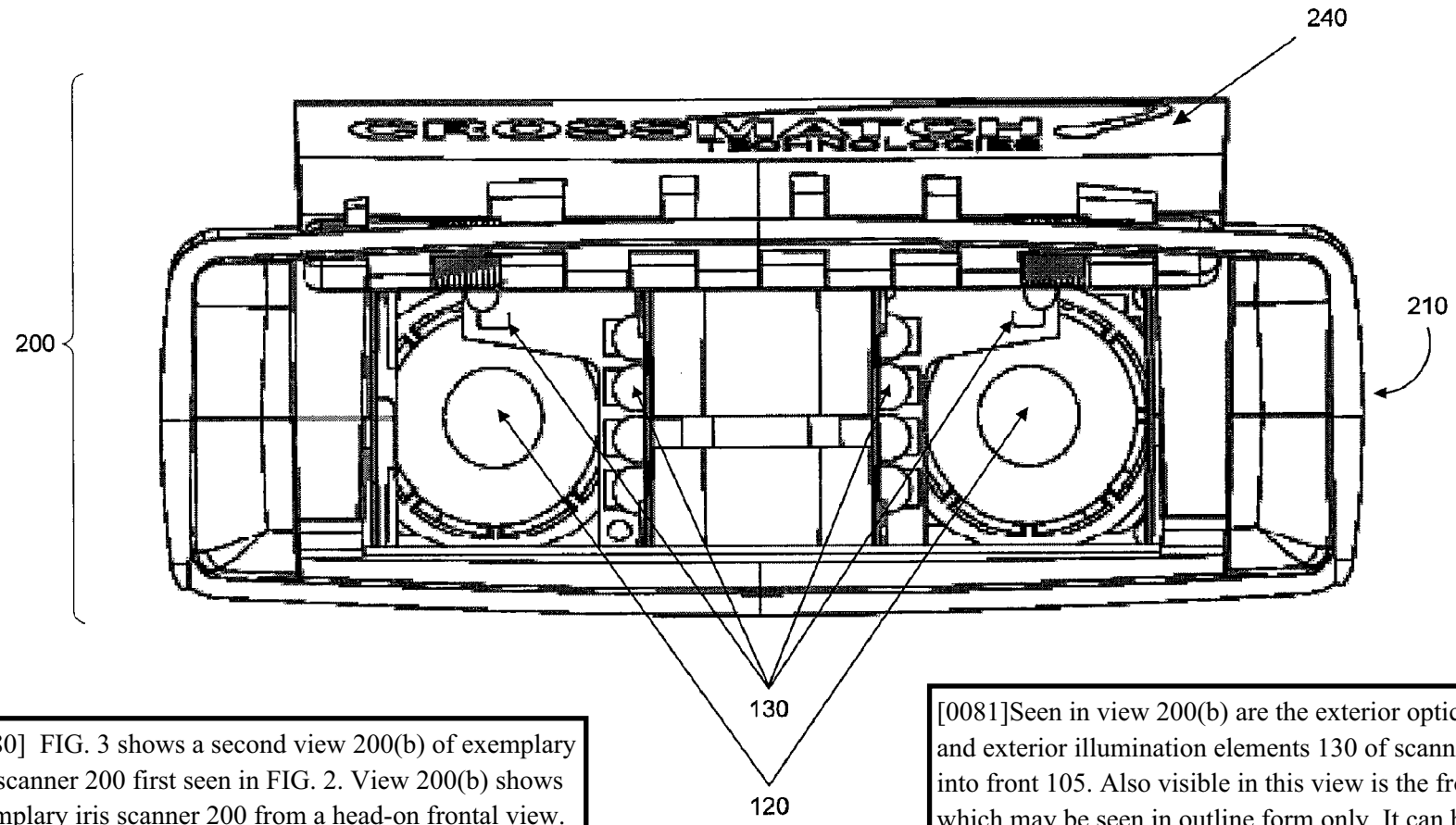


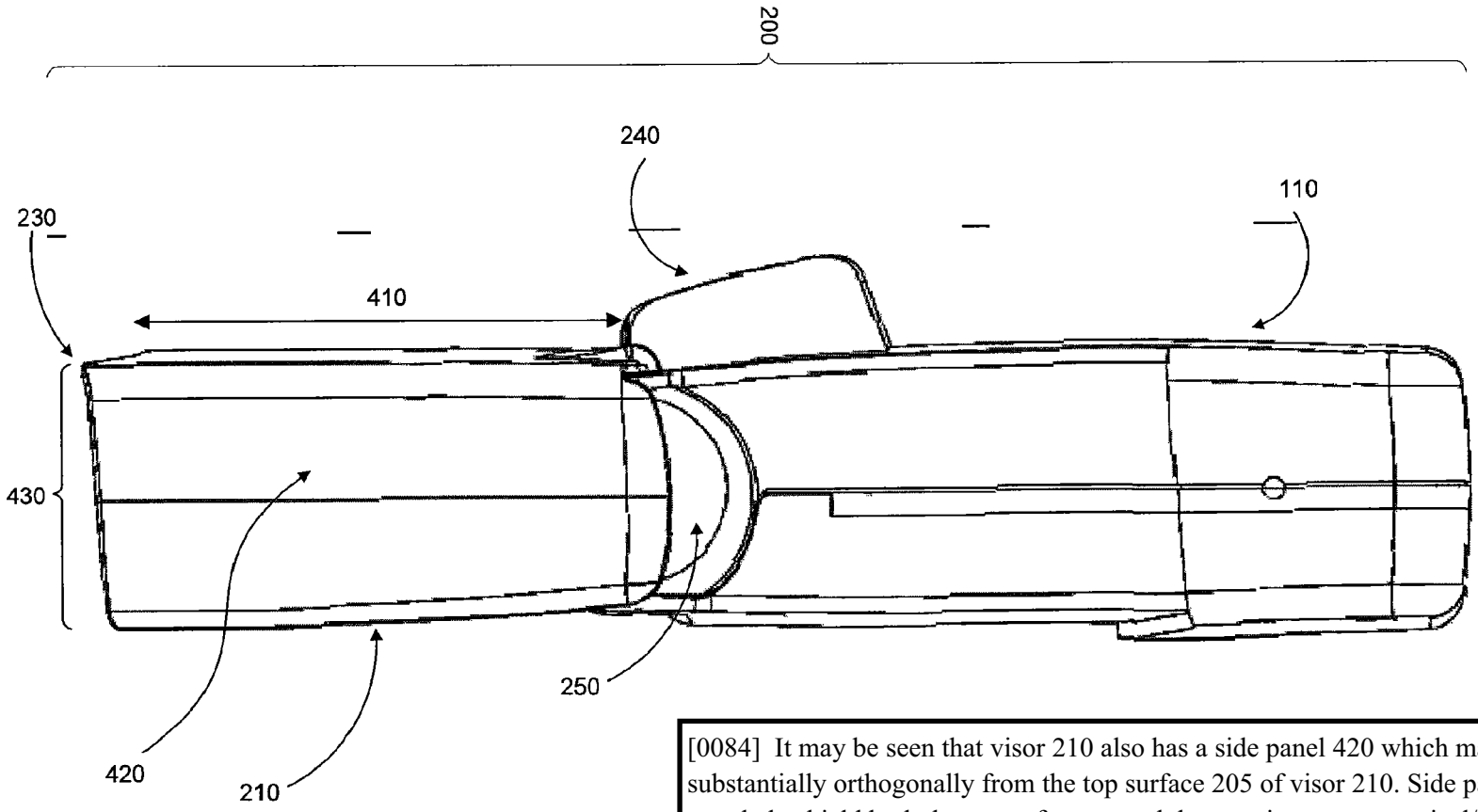
FIG. 3

[0080] FIG. 3 shows a second view 200(b) of exemplary iris scanner 200 first seen in FIG. 2. View 200(b) shows exemplary iris scanner 200 from a head-on frontal view. This is a view which may be seen by a user of scanner 200, for example as the user is holding scanner 200 in hand at eye level, and as the user is moving scanner 200 towards their forehead but does not yet have scanner 200 flush against their forehead.

[0081]Seen in view 200(b) are the exterior optical or imaging elements 120 and exterior illumination elements 130 of scanner 200 as seen when looking into front 105. Also visible in this view is the front-most rim of visor 210, which may be seen in outline form only. It can be seen that with visor 210 in the open position, as shown, the user may have an unimpeded view of exterior optics 120 of scanner 200, and therefore exterior optics 120 may have an unimpeded view of the user's eyes. .... This enables scanner 200 to obtain an image of the user's eyes for purposes of biometric identification. Similarly, exterior illumination elements 130 may be optimally positioned to illuminate the eye or eyes of the user. Also visible in view 200(b) is the visor cap 240, which may lie flush against the top of scanner housing 110.

[0083] Visor 210 may have a length 410 which determines the distance between the front 230 of visor 210 and a front side 105 of scanner 200 which displays or reveals optical elements 120 to a user of scanner 200. In one embodiment, it may be that length 410 determines the fixed distance between the eyes of the user and the front 105 of scanner 200 which is the substantially optimal distance for effective and reliable eye scanning by scanner 200. In an alternative embodiment, it may be that length 410, in combination with or in addition with a distance from the front of scanner 200 to exterior optical elements 120, determines the fixed distance between the eyes of the user and optical elements 120 which is the substantially optimal distance for effective and reliable eye scanning by scanner 200.

200(c)



[0084] It may be seen that visor 210 also has a side panel 420 which may extend substantially orthogonally from the top surface 205 of visor 210. Side panel 420 may help shield both the eyes of a user and the exterior scanner optical/lighting elements 120, 130 from ambient lighting. The front of visor side panel 420 may have a gentle contour 430 designed to match the temples of a human user.

FIG. 4

[0085] FIG. 5 shows a fourth view 200(d) of exemplary iris scanner 200.... It may be seen that in the open position, a top surface 205 of visor 210 may be substantially parallel to and substantially co-planar with a top surface 505 of scanner housing 110. This may ensure that when a user whose torso and head are substantially in a vertical position places their forehead against a front edge 230 of visor 210, and assuming the scanner is further held in a substantially horizontal position, the user's eyes are at a correct height to be imaged by scanner 200 and are directed at a correct viewing angle to be imaged by scanner 200. It may also be seen that visor 210 has two side panels 420 which may be approximately or substantially parallel to each other, as well being approximately or substantially orthogonal to top surface 205 of visor 210.

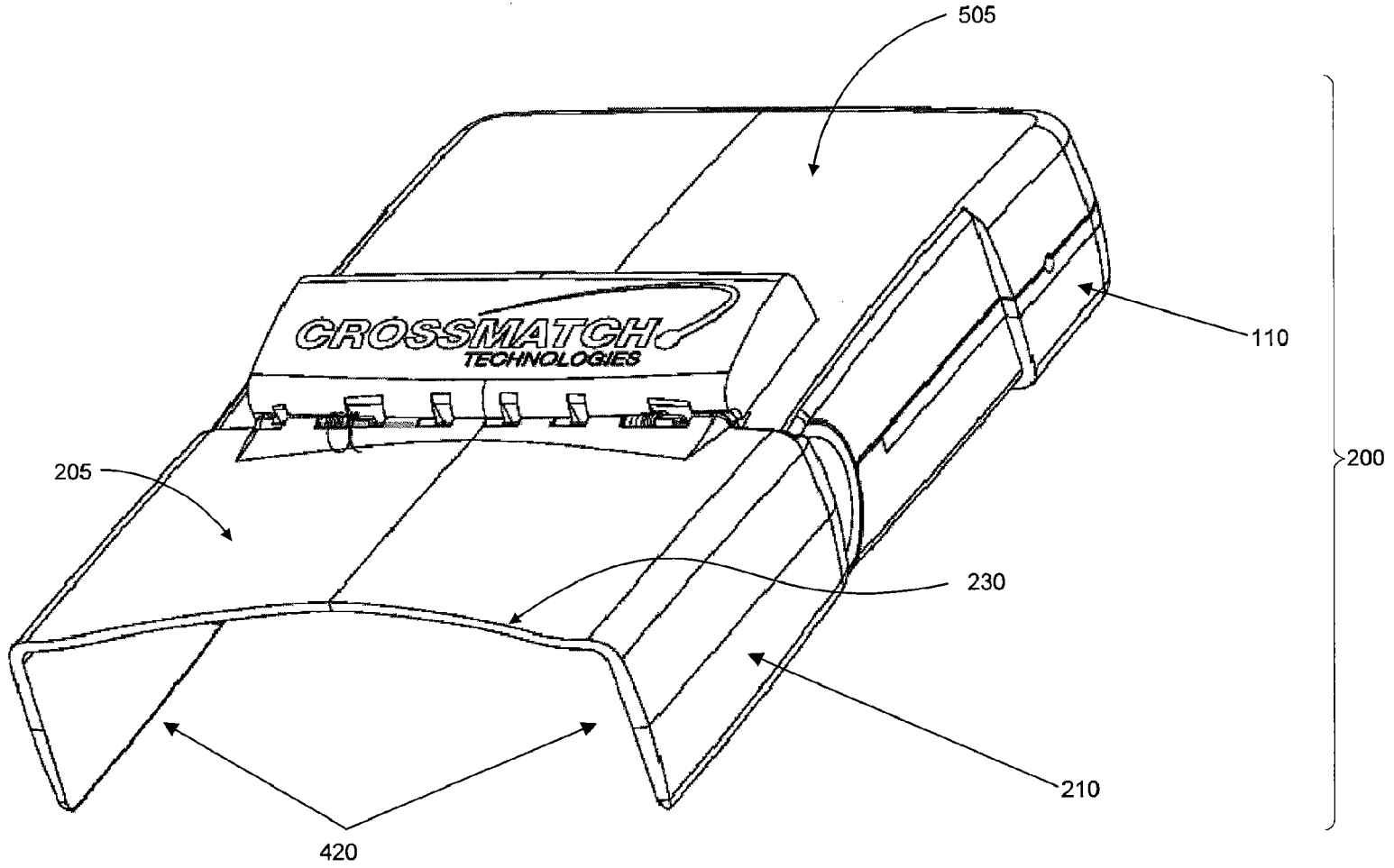


FIG. 5

[0086] FIG. 6A shows a view 600a of exemplary iris scanner 200 with visor 210 fully extended into the open position, and with the head of a person 610 who is a user of iris scanner 200 positioned at some distance from the forehead receiving edge 230 of visor 210. It may be seen, consistent with the discussion immediately above, that the eyes of person 610 are not at the substantially correct distance from scanner housing 110 for biometric imaging and identification.

[0087] However, the eyes of person 610 may be within the field of view of exterior optics 120 of scanner 200. Further, the eyes of person 610 are correctly aligned for biometric imaging and identification, in that the head of person 610 is angled at approximately a right angle to an extended axis running from the front of visor 210 through the back of scanner housing 110, the eyes of person 610 are looking into the front 105 of scanner 200, and the eyes of person 610 are level with scanner 200, this shared level being eye level 620. If person 610 were to grasp scanner 200 with their hands (not illustrated), and pull scanner 200 towards their eyes until visor 210 touched their forehead at approximately the mid-point of the forehead, as indicated by dotted line 630, then person 610 would be at a substantially correct distance from the optics of scanner 200 for effective biometric imaging and identification.

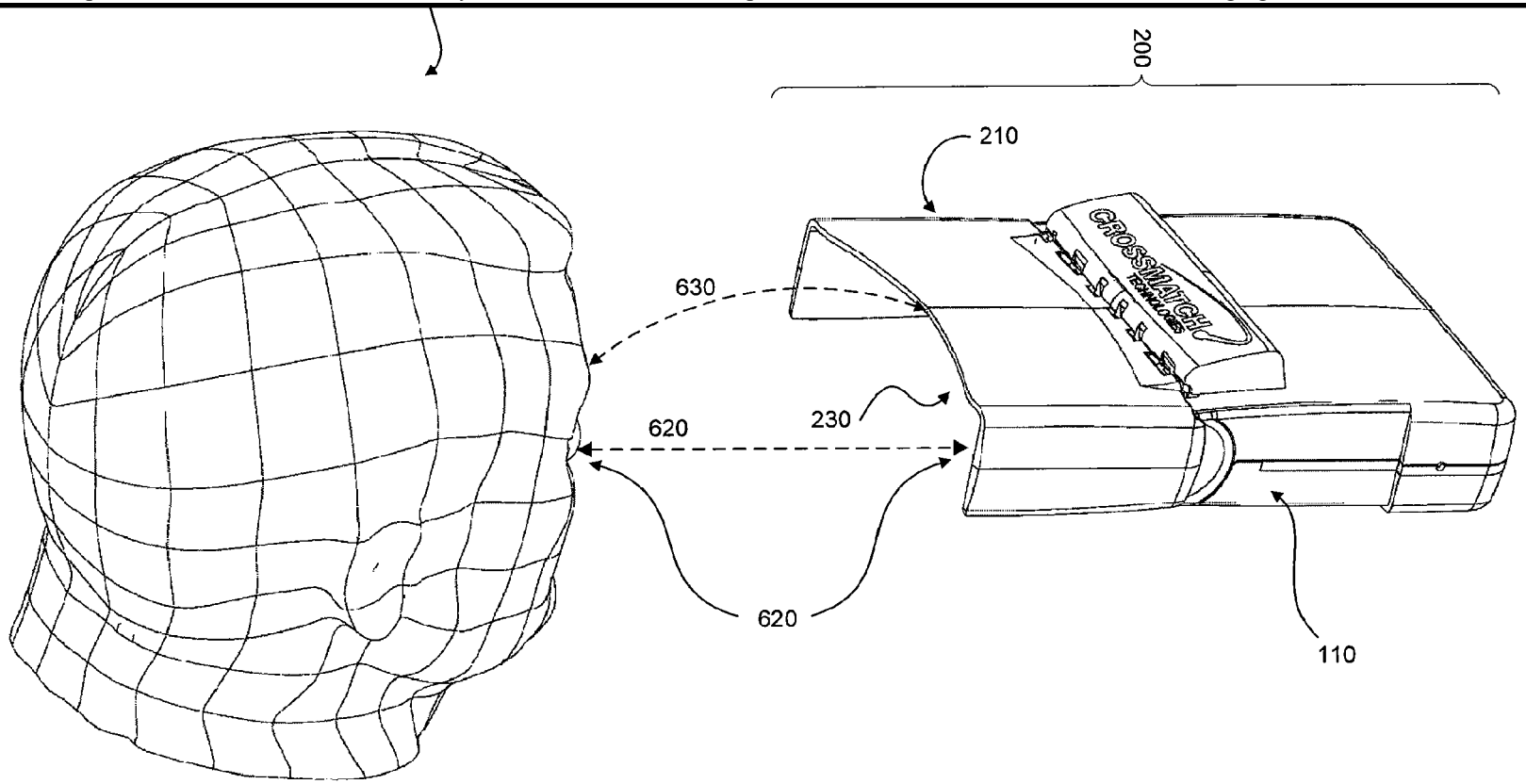


FIG. 6A

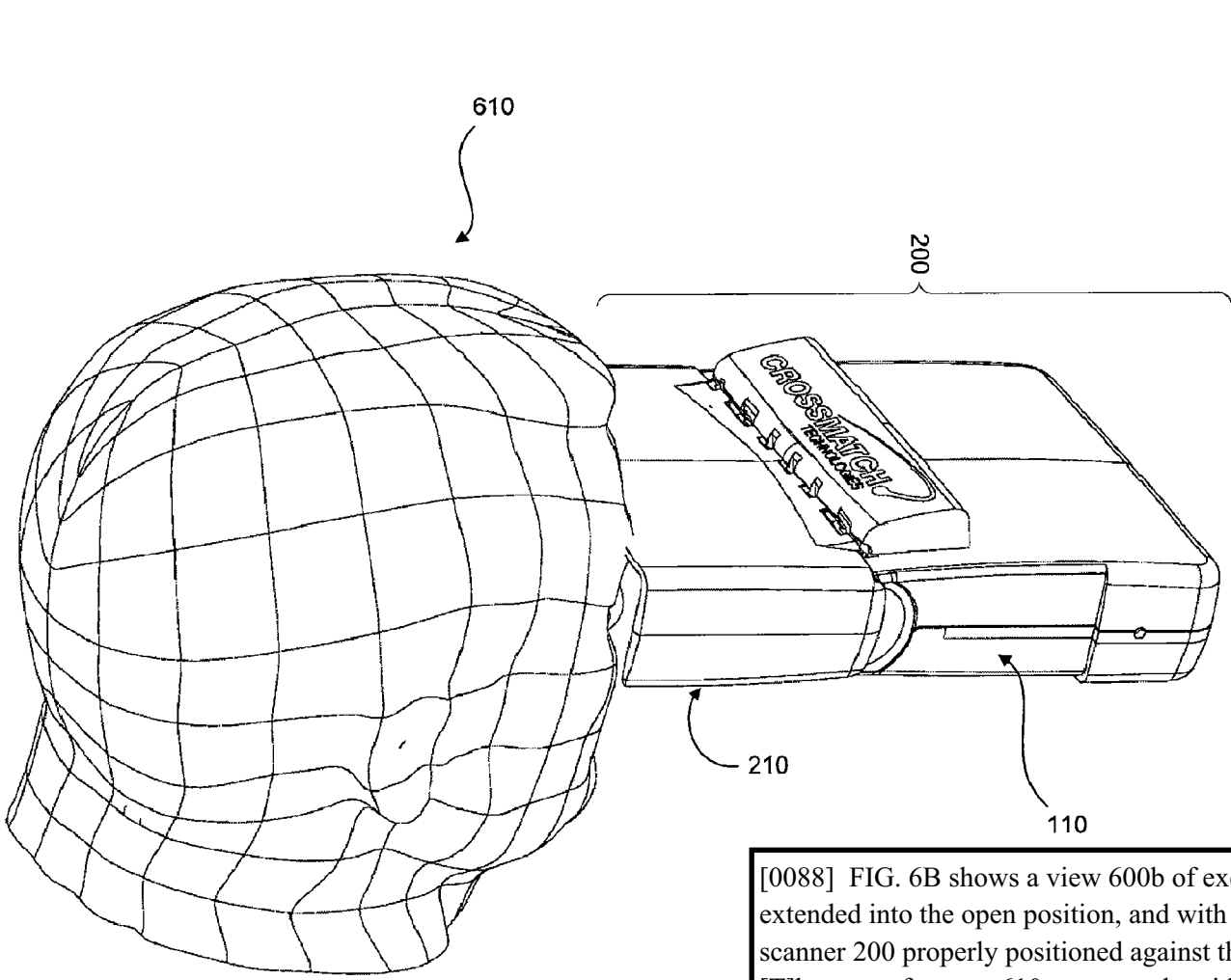


FIG. 6B

[0088] FIG. 6B shows a view 600b of exemplary iris scanner 200 with visor 210 fully extended into the open position, and with the head of person 610 who is a user of iris scanner 200 properly positioned against the forehead receiving edge 230 of visor 210..... [T]he eyes of person 610 are not only within the field of view of scanner optics 120, but further are now at the substantially correct distance from scanner housing 110 for biometric imaging and identification; and further, that the eyes of person 610 are correctly aligned for biometric imaging and identification. Finally, and assuming ambient lighting comes primarily from a light source which is at a height which is at least as high at the height of scanner 200, ... both the eyes of person 610 and the exterior optics 120 of iris scanner 200 are shielded or partially shielded from ambient light by visor 210.

[0089]FIG. 7 shows a sequence of images 710, 720, 730, and 740 which represent visor 210 being progressively folded closed over time, from starting open position 710 to finished completely closed position 740. Time series 710-740 illustrates that when visor 210 is in the fully closed position (image 740), visor 210 may be neatly tucked away, flush against a surface which may be a bottom surface of iris scanner housing 110.

[0090]It may be further seen from time sequence 710-740 that as visor 210 is folded into place under scanner housing 110, visor cap 240 may slide forward off the top surface 505 of scanner housing 110 and into place on the front of scanner housing 110, where visor cap 240 may serve as a cover protecting exterior scanner optics 120. A spring-loaded hinge, discussed further below, serves to hold visor cap 240 flush against top surface 505 of scanner housing 110 when visor 210 is in open position 710, and also serves to hold visor cap 240 flush against front 105 of scanner housing 110 when visor 210 is in closed position 740.

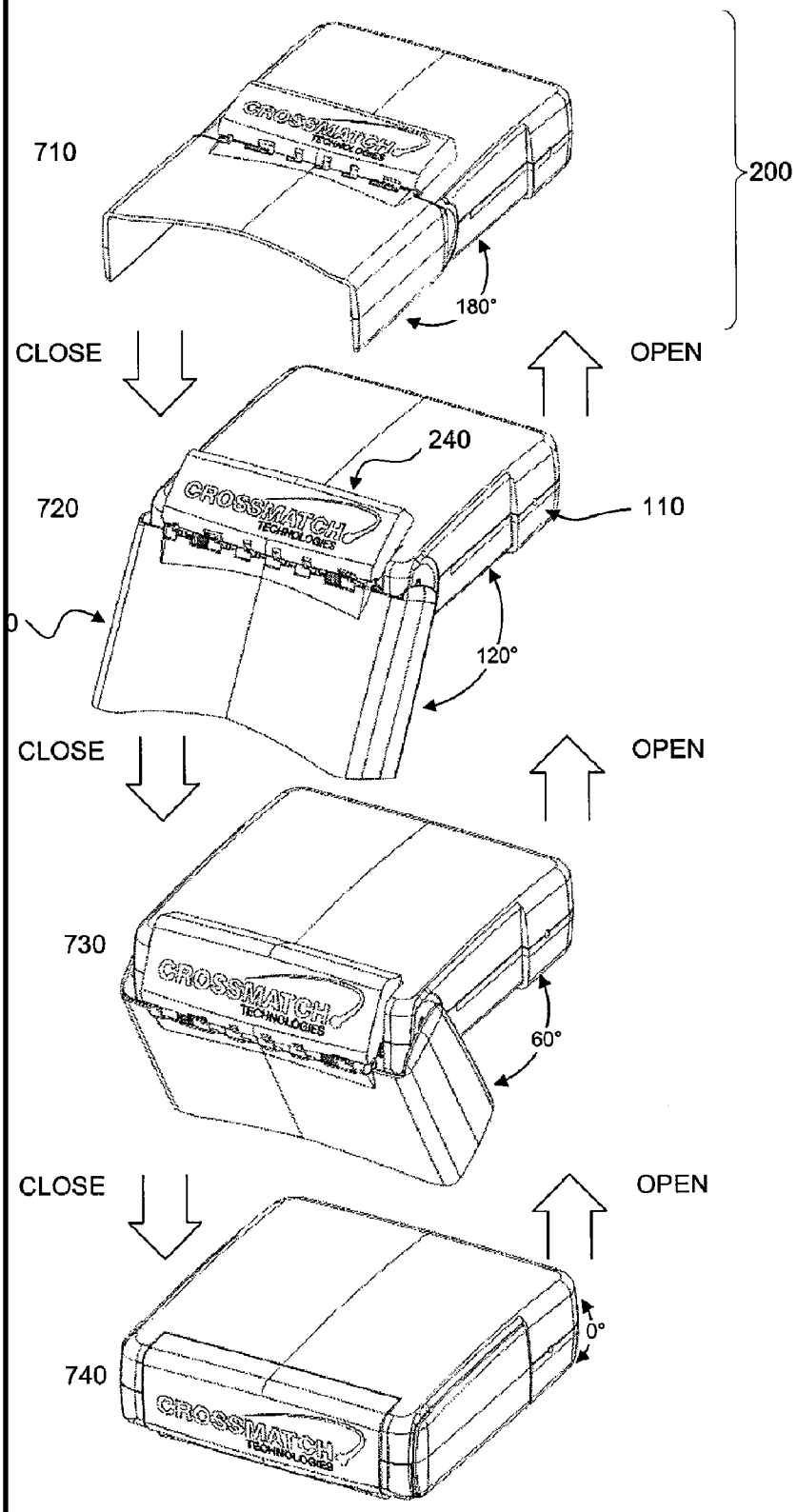


FIG. 7

EYE SCANNER WITH INTEGRATED FOCUS DISTANCE DETERMINATION MECHANISM

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates generally to the field of biometrics. The present invention relates more particularly to scanning devices used to identify persons or other living beings based on biometrics associated with the eye.

[0003] 2. Background Art

[0004] Biometrics is a science involving the analysis of biological characteristics. Biometric imaging captures a measurable characteristic of a human being or other living organism, typically a mammal, for identity purposes. See, for example, Gary Roethenbaugh, *Biometrics Explained*, International Computer Security Association, Inc. (1998), pp. 1-34, which is incorporated herein by reference in its entirety.

[0005] Eye scanners are biometric imaging systems for acquiring images of the human eye or the eye of other mammals for identity purposes. Two common types of eye scanners are iris scanners and retinal scanners, each of which rely on the distinctive patterns of the human iris or retina, respectively, to distinguish one individual from another.

[0006] Optical elements of eye scanners need to be correctly aimed at the eye or eyes of a user, and further the optical elements need to be focused correctly on the physiological features of interest (such as the iris of the eye, the retina of the eye, etc.) to obtain quality images of these features. Additional requirements for effective scanning include ensuring that the eyes are shielded from ambient light which may interfere with effective image capture; and at the same time aligning the eyes of the user with illumination from the scanner, which is intended to illuminate the eyes for purposes of image capture.

[0007] Ensuring correct focus of an eye scanner on the physiological features of interest, and further insuring correct alignment, may involve correct translational positioning of optical components relative to an eye along a line of sight from the eye. If may further involve ensuring that the optical components are at a correct height relative to the eye or eyes of a user.

[0008] For example, one approach to a sensing system may employ variable optical elements, e.g., a mechanical focusing mechanism, which may in turn entail gears, rails, springs, internal hydraulics, or similar elements. Such mechanical focusing mechanisms based on translational movement may move or otherwise adjust lenses or other optics to move closer or further from an eye along the line of sight of the eye to bring to bring features of interest to an in-focus condition. However, such focusing mechanisms introduce substantial mechanical complexity, along with a requirement that a determination be made via some means or mechanism to ascertain when the desired physiologic features of the eye are actually in focus. Such translational movement of optics further-from and closer-to the eye may also be cumbersome and undesirable for users.

[0009] Another possible means of focusing and alignment is to enable the person being measured to move their head in relation to the scanning mechanism, until the eye is in the proper position for a good focus. However, this approach may require a dynamic determination to be made as to when the person's eyes are at the proper distance from the scanning device, or at the proper height or correct angle relative to the scanner device. A further requirement is to provide visual indicators which signal to a person that he or she should move the head forward or backwards or in other directions, or keep the head at the current location.

[0010] Again, however, design complexity ensues; moreover such a system may also pose a challenge for some users who have difficulty following the visual cues which are intended to guide the position of their eyes or head. Such movement of a person closer to or further from an eye scanner may be awkward in many applications such as remote field use for hostile environments.

[0011] What is needed, then, is a mechanically and electrically simple means to ensure that a person's head, and in particular a person's eyes, are properly positioned in relation to an optical sensor in terms of distance and other related location vectors, in order to ensure proper focus by the sensor optics on the physiologic features of a person's eyes, with minimal scanner system complexity. What is further needed is a system which aligns the eyes of the user with scanner-generated lighting, while shielding the eyes from unwanted ambient lighting. What is further needed is a system and method which is simple, whose usage is straightforward for a typical or average user, and which is convenient for the user whose eyes are to be imaged via the optical scanning system.

BRIEF SUMMARY OF THE INVENTION

[0012] The present invention solves the above-mentioned needs by providing an eye scanner with an attached visor. One end of the visor is attached to the main body of the scanner. The other end of the visor is contoured in shape so that the forehead of a person tends to fit into the contour of the visor. A person may place their forehead flush against the contoured end of the visor, and consequently the person's head and eyes may be in a position for measurements to be made of their eyes. In particular, the person's eyes may be within a field of view of the optical element of the scanner to allow the optical element to obtain an image of at least a portion of the eye.

[0013] In a further embodiment, the visor mechanism may be toggled into at least two different locked or fixed positions. In at least one of these fixed positions, the visor extends from the main body of the eye scanner in such a manner that a person may place their forehead against the free-floating end of the visor, and consequently be looking into the exterior optical elements of the scanner. The other fixed position may be a storage position of the visor.

[0014] Further embodiments, features, and advantages of the present invention, as well as the structure and operation of the various embodiments of the present invention, are described in detail below with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS/FIGURES

[0015] The accompanying drawings, which are incorporated herein and form part of the specification, illustrate the present invention and, together with the description, further serve to explain the principles of the invention and to enable a person skilled in the pertinent art to make and use the invention.

[0016] In the drawings, like reference numbers indicate identical or functionally similar elements. Further, and except where specifically noted otherwise, the drawing in which an element first appears is typically indicated by the leftmost

digit(s) in the corresponding reference number (e.g., an element numbered **302** first appears in FIG. **3**).

[0017] FIG. **1**A is a drawing of a first view of an exemplary iris scanner showing some of the exterior elements, where the iris scanner does not have a visor.

[0018] FIG. **1**B is a drawing of a second view of an exemplary iris scanner showing some of the optical and illumination elements of the scanner, where the iris scanner does not have a visor.

[0019] FIG. **2** is a drawing of a first view of an exemplary iris scanner, where the iris scanner has an exemplary visor.

[0020] FIG. **3** is a drawing of a second view of an exemplary iris scanner, where the iris scanner has an exemplary visor.

[0021] FIG. **4** is a drawing of a third view of an exemplary iris scanner, where the iris scanner has an exemplary visor.

[0022] FIG. **5** is a drawing of a fourth view of an exemplary iris scanner, where the iris scanner has an exemplary visor.

[0023] FIG. **6**A is a drawing of an exemplary iris scanner with an exemplary scanner visor extended into a open position, and with the head of an exemplary user of the scanner positioned at a distance from the scanner which is not the correct distance for optimum scanning.

[0024] FIG. **6**B is a drawing of an exemplary iris scanner with an exemplary scanner visor extended into a open position, and with the head of an exemplary user of the scanner properly positioned against an exemplary forehead receiving edge of the visor.

[0025] FIG. **7** is a series of images representing an exemplary visor being folded from an open position to a closed position, or vice-versa.

[0026] FIG. **8***a* is an exploded view of exemplary hinges connecting an exemplary iris scanner visor to an exemplary iris scanner housing.

[0027] FIG. **8***b* is a detailed view of an exemplary joint of an exemplary hinge component on an exemplary iris scanner housing.

[0028] FIG. **9** is an exploded view of an exemplary hinge joining an exemplary visor cap with an exemplary iris scanner visor.

[0029] The features, objects, and advantages of the present invention will become more apparent from the detailed description set forth below when taken in conjunction with the drawings in which like reference characters identify corresponding elements throughout. In the drawings, like reference numbers generally indicate identical, functionally similar, and/or structurally similar elements. The drawings in which an element first appears is indicated by the leftmost digit(s) in the corresponding reference number.

DETAILED DESCRIPTION OF EMBODIMENTS

I. Overview

[0038] Embodiments of the present invention provide a scanner suitable for scanning the eye or eyes of a person. A suitable, approximately fixed relative position between the scanner optics and the person's eyes, as well as a suitable orientation between the scanner and the person's head, may be established by means of a rigid or substantially rigid visor which extends from the main body of the scanner. In particular, a suitable distance between the scanner optics and the person's eyes may be established by means of the rigid or substantially rigid visor which extends from the main body of the scanner. The suitable position, orientation, and/or distance of the person's eye or eyes and head in relation to the scanner optics ensures that at least a portion of the person's eye or eyes are within the field of view of the scanner optics. This enables the scanner optics to obtain an image of at least a portion of the person's eye or eyes.

[0039] Exemplary embodiments are described in terms of exemplary iris scanners, which may be used for identifying persons based on features of a person's iris. However, the present invention may equally well be employed in the context of other eye scanning devices which may scan, for example and without limitation, the human retina or the pattern of blood vessels of the choroid (which may be visible through the sclera).

[0040] Embodiments illustrated herein may be portable eye scanners, and may further be handheld eye scanners, but the present invention is not limited to such devices. It will be apparent to persons skilled in the relevant arts that the present system and method may apply equally to non-portable eye scanners and to eye scanners which are held in place in relation to a person's head and/or eyes by means other than being held in the person's hands.

[0041] For brevity, this document sometimes uses the singular term "eye", or the plural term "eyes", where it may be understood that either the singular term "eye", the plural term "eyes", or both may be applicable, depending on particular configurations of particular embodiments of the present invention.

[0042] For purposes of background information, FIG. **1**A and FIG. **1**B pertain to illustrating elements of an exemplary iris scanner.

[0043] FIG. **2** through FIG. **9** pertain to illustrating aspects of exemplary embodiments of the present invention. In particular, FIG. **2** through FIG. **5** pertain to illustrating elements and features of an exemplary iris scanner with a visor. FIG. **6**A, FIG. **6**B, and FIG. **7** pertain to illustrating an exemplary usage of an exemplary iris scanner by an exemplary user, and to illustrating how an exemplary visor of an exemplary iris scanner may be opened and closed. FIG. **8**A, FIG. **8**B, and FIG. **9** pertain to illustrating exemplary hinge and joint elements and an exemplary cap of an exemplary scanner with visor.

II. Exemplary Scanner

[0044] FIG. **1**A is a drawing of a view of an exemplary iris scanner **100** showing some of the exterior elements, where the iris scanner does not have a visor. Scanner **100** may include a main scanner outer casing **110**, which may also be referred to synonymously as the scanner main housing **110**, the main scanner body **110**, or simply as scanner housing **110**. Scanner housing **110** may be used by a person to hold the scanner. Scanner housing **110** may also contain internally, and be used to internally anchor or fix in place, some or all of the main functional elements of scanner **100**.

[0045] In one embodiment of the present system and method, scanner housing **110** may be approximately cuboid in shape (that is, having a shape which is approximately a

semitranslucent. In particular, visor **210** may be composed of a material or materials which permit passage of a color of light or colors of light which do not affect the imaging process, while still blocking a color of light or colors of light which would interfere with the imaging process. An advantage of such an embodiment may be that permitting the passage of some ambient light may induce the pupil(s) of the eye(s) of user **610** to close, resulting in a larger area of the iris to be present for imaging. In an alternative embodiment, visor **610** may be translucent or partly translucent to all colors of light.

[0129] Visor **210** has been disclosed above in embodiments with a top surface **205** and two side panels **420**, but no bottom. In an alternative embodiment of the present system and method, visor **210** may have a bottom side. With a bottom side component, visor **210** may form an approximately rectangular tube configured to extending from scanner housing **110** to the forehead of user **610**. With a bottom side component, visor **210** may be effective in shielding against ambient light which comes from a source which is at or below the height at which scanner **200** is itself used. In one embodiment, a bottom side may be comprised of a detachable panel which may be clipped onto or snapped onto the bottom of side panels **420** of visor **210** when visor **210** is in open position **710**.

[0130] In an alternative embodiment, a bottom side may be composed of two semi-flexible elements attached to side panels **420** of visor **210**. When visor **210** is in the open position **710**, the semi-flexible elements may extend and meet each other to form a bottom side which shields from ambient light coming from below. When visor **210** is returned to closed position **740**, such elements may fold into place between visor top **205** and side panels **420**, and scanner main body **110**. Persons skilled in the relevant arts will recognize that other means may exist to create a bottom side component of visor **210** consistent with the present system and method.

[0131] The present system and method has been disclosed in relation to embodiments where scanner **200** has optical elements **120**, illumination elements **130**, and possibly other elements suitable for imaging and scanning two eyes of a user. Moreover, visor **210** as disclosed in embodiments throughout this document approximately spans the full width of a person's forehead.

[0132] In an alternative embodiment, scanner **200** may be configured with optical elements **120**, illumination elements **130**, and possibly other elements suitable for scanning only one eye at a time. In one embodiment, visor **210** may still be configured to span an entire width of a forehead of a person. In an alternative embodiment, visor **210** may be configured to span and to conform to a partial width of a forehead of a person, which may for example be a left side of a forehead, a right side of a forehead, or a center of a forehead.

[0133] The present system and method has been disclosed in relation to embodiments wherein visor **210** has a fixed width, and in particular has a fixed width of an end which is configured to accept a forehead of a person. In an alternative embodiment, visor **210** may be configured with an adjustable width, or may be configured with additional elements to adjust a shape or width of a forehead receiving end to be suitable for foreheads of different persons. For example, visor **210** may be supplied with removable, clip-on attachments which are configured to adjust the size or shape of the forehead receiving end for different users. Other means to adjust the shape or width of the forehead receiving end of visor **210** may be envisioned as well.

VIII. CONCLUSION

[0134] The present invention is not limited to the embodiment of an iris scanner. The present invention can be used with any system that utilizes optics for measuring a physiological property of the human eye, such as a retinal scanner. The previous description of exemplary embodiments is provided to enable any person skilled in the relevant art(s) to make or use the present invention. While the invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those skilled in the relevant art(s) that various changes in form and detail may be made therein without departing from the spirit and scope of the invention.

1. A scanner for determining the identity of a person, comprising:

a main scanner body;

an optical element coupled to main scanner body for obtaining an image of at least a portion of an eye of the person; and

a visor comprising a first end for attaching to the main scanner body and a second end for receiving a head of the person, the second end of the visor having a substantially fixed relative position in relation to the first end;

wherein the substantially fixed relative position of the second end in relation to the first end determines a relative position between the optical system and the eye of the person whose head is positioned at the visor, such that at least a portion of the eye is located in a field of view of the optical system allowing the optical system to obtain an image of at least a portion of the eye.

2. The scanner of claim **1**, wherein the substantially fixed relative position of the second end in relation to the first end comprises a length of the visor between the second end and the first end;

wherein the length of the visor determines a distance between the optical system and the eye of the person whose head is positioned at the visor, such that at least a portion of the eye is located at a focal length of the optical system allowing the optical system to obtain an image of at least a portion of the eye.

3. The scanner of claim **1**, wherein the second end of the visor is contoured to substantially conform to a shape of a forehead of the head of the person.

4. The scanner of claim **1**, wherein the visor further comprises a first surface extending from the first end to the second end, wherein the first surface is shaped to substantially conform to a surface of the main scanner body.

5. The scanner of claim **4**, wherein the main scanner body has a shape which is approximately a cuboid.

6. The scanner of claim **5**, wherein the first surface is at least one of substantially flat, substantially planar, and quasiplanar.

7. The scanner of claim **5**, wherein a length of the visor between the first end and the second end is at least one of substantially the same length as a length of the surface of the main scanner body and a length on the order of half of the length of the surface of the main scanner body.

8. The scanner of claim **5**, wherein the first surface of the visor has a width which is substantially the same as a width of the main scanner body.

9. The scanner of claim **8**, wherein the visor further comprises two side panels attached to opposite edges of the first surface of the visor and separated by the width of the visor;
- wherein each side panel extends from the first end of the visor to the second end of the visor;
- wherein each side panel is approximately parallel to the other side panel;
- wherein each side panel extends in a common direction approximately orthogonal to the first surface of the visor; and
- wherein the visor with the side panels forms a shroud to shield at least one of the eye of the person and an optical system of the scanner from ambient lighting.

10. The scanner of claim **9**, wherein the visor further comprises a bottom element configured to shield from an ambient lighting coming from below the scanner.

11. The scanner of claim **10**, wherein the bottom element is configured to be attached to the side panels.

12. The scanner of claim **10**, wherein the bottom element is configured to be removable.

13. The scanner of claim **1**, further comprising a visor hinge attaching the visor to the main scanner body, wherein the visor hinge permits the visor to be pivoted through a range of angles in relation to the main scanner body.

14. The scanner of claim **13**, wherein the visor hinge comprises a pair of joints between the visor and the main scanner body.

15. The scanner of claim **14**, wherein a joint comprises at least one of:
- a hole in a side of the main scanner body and a corresponding plug on a side panel of the visor; and
- a plug on the side of the main scanner body and a corresponding hole in the side panel of the visor.

16. The scanner of claim **13**, wherein the visor hinge further comprises a locking element for temporarily locking the visor into one of a plurality of fixed angles of connection in relation to the main scanner body.

17. The scanner of claim **16**, wherein the locking element is configured to temporarily lock the visor in an angle of approximately one hundred and eighty degrees in relation to the main scanner body;
- wherein a first surface of the visor is substantially parallel to a surface of the main scanner body; and
- wherein the visor is extended outward from the main scanner body to receive the forehead of the person and to determine a distance between the main scanner body and the head of the person.

18. The scanner of claim **16**, wherein the locking element is configured to temporarily lock the visor in an angle of approximately zero degrees in relation to the main scanner body, wherein a first surface of the visor is substantially flush with a surface of the main scanner body.

19. The scanner of claim **16**, wherein the plurality of fixed angles determine at least:
- an open position of the visor in relation to the main scanner body, wherein the visor is configured to accept the head of the person for scanning; and
- a closed position of the visor in relation to the main scanner body, wherein the scanner is in a most compact configuration.

20. The scanner of claim **16**, wherein:
- the locking element comprises at least one of a notch on the main scanner body or a locking plug on the main scanner body; and
- the locking element further comprises at least one of a locking plug on the visor corresponding to the notch on the main scanner body or a notch on the visor corresponding to the locking plug on the main scanner body;
- wherein the fixed angle of connection between the visor and the main scanner body is created by at least one of the locking plug on the visor locking into the notch on the main scanner body or the notch on the visor locking into the locking plug on the main scanner body.

21. The scanner of claim **1** further comprising a cap attached to the visor, wherein the cap is configurable to protect an exterior area of the main scanner body.

22. The scanner of claim **21**, further comprising a cap hinge coupling the cap to the visor.

23. The scanner of claim **22**, wherein the cap hinge comprises:
- a first piano-hinge element on an edge of the visor;
- a second piano-hinge element on an edge of the cap; and
- a torsional spring;
- wherein the first piano-hinge element and the second piano-hinge element interlock to form a rotating joint along the edge of the visor; and
- wherein said rotating joint is a spring-actuated joint.

24. The scanner of claim **1**, further comprising:
- a visor hinge which attaches the visor to the main scanner body;
- a locking mechanism of the visor hinge configured to create a plurality of fixed angles of connection between the visor and the main scanner body, wherein the fixed angles determine at least one of an open position of the visor in relation to the main scanner body and a closed position of the visor in relation to the main scanner body; and
- a cap attached to the visor, wherein the cap covers an exterior area of the scanner when the visor is in the closed position and the cap uncovers the exterior area of the scanner when the visor is in the open position.

25. The scanner of claim **24**, further comprising a gasket for protecting the scanner when the visor is in the closed position.

26. The scanner of claim **25**, wherein the gasket is at least one of a gasket of the cap or a gasket of the main scanner body, wherein the gasket of the main scanner body is substantially aligned with the cap.

27. The scanner of claim **24**, further comprising a cap hinge coupling the cap to the visor.

28. The scanner of claim **27**, wherein said cap hinge comprises:
- a first piano-hinge element on an edge of the visor;
- a second piano-hinge element on an edge of the cap; and
- a torsional spring;
- wherein the first piano-hinge element and the second piano-hinge element interlock to form a rotating joint along the edge of the visor.
- wherein the torsional spring is configured to press the cap closed over the exterior area when the visor is in the closed position; and
- wherein the torsional spring is configured to press the cap flush against a surface of the scanner when the visor is in the open position.

29. The scanner of claim **1**, wherein said visor further comprises a bottom element for shielding from an ambient lighting coming from below said scanner.

30. The scanner of claim **29**, wherein said bottom element is configured to be removable.

31. The scanner of claim **1**, wherein the visor is substantially opaque to light.

32. The scanner of claim **1**, wherein the visor is configured to be substantially translucent to a first color of light and to be substantially opaque to a second color of light.

33. The scanner of claim **1**, wherein the scanner is configured to image at least a portion of a single eye of a person.

34. The scanner of claim **1**, wherein the scanner is configured to image at least respective portions of a respective two eyes of a person.

35. The scanner of claim **1**, wherein the visor is configured to substantially conform to a fall width of a forehead of the person.

36. The scanner of claim **1**, wherein the visor is configured to substantially conform to a partial width of a forehead of the person.

37. The scanner of claim **1**, wherein the visor is configured to adjust to a size of a forehead of the person.

38. A system for establishing a relative position between an optical system and the eye of a person comprising a visor with a first end coupled to the optical system and a second end for receiving a forehead of the person, the second end of the visor having a substantially fixed relative position in relation to the first end;

wherein the substantially fixed relative position of the second end in relation to the first end determines a relative position between the optical system and the eye of the person whose head is positioned at the visor, such that at least a portion of the eye is located in a field of view of the optical system allowing the optical system to obtain an image of at least a portion of the eye.

39. The system of claim **38**, wherein the substantially fixed relative position of the second end in relation to the first end comprises a length of the visor between the second end and the first end;

wherein the length of the visor determines a distance between the optical system and the eye of the person whose head is positioned at the visor, such that at least a portion of the eye is located at a focal length of the optical system allowing the optical system to obtain an image of at least a portion of the eye.

40. The system of claim **38** further comprising an attaching element, wherein the visor is coupled to the optical system by being attached to the optical system.

41. The system of claim **40**, wherein the attaching element comprises a visor hinge.

42. The system of claim **38**, wherein the second end of the visor is contoured to substantially conform to a shape of a forehead of the person.

43. The system of claim **38**, further comprising a cap attached to the visor, wherein the cap is configured to cover an exterior area of the optical system.

44. The system of claim **38**, further comprising a locking element for temporarily locking the visor into a plurality of fixed angles of connection in relation to the optical system.

* * * * *