

Señor Director
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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

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Referencia : Expediente No. **14.049.585**
Asunto : Solicitud de patente: **"SISTEMA DE PLATAFORMA DE
TERAPIA DE LUZ"**
Solicitante : LA LUMIERE LLC
Fecha de solicitud : 7 de Marzo de 2014

1. Yo, Luz Clemencia DE PÁEZ, en mi condición de apoderada de la sociedad solicitante de la patente de la referencia, me refiero al oficio No. **5380** notificado por fijación en lista el 19 de Mayo de 2015.

2. Mediante memorial del 24 de Agosto de 2015 se solicitó oportunamente plazo para responder la acción oficial No. **5380**.

3. Mediante oficio No. **5380** se puso en conocimiento del solicitante el informe que contiene las observaciones hechas por su Despacho sobre la presente solicitud de patente. Las observaciones realizadas en el oficio se refieren a la claridad del título, a la claridad del pliego reivindicatorio, a la novedad de las reivindicaciones 1, 2, 3, 6, 8, 9 a 17 en vista del documento **D1**: US20050070977, y al nivel inventivo de la reivindicación 1 en vista de los documentos **D1**: US20050070977 y **D2**: US2006021787.

4. **Respuesta a las objeciones**

De este modo y con el objeto de atender las objeciones arriba mencionadas, se desea presentar las siguientes modificaciones, aclaraciones y argumentos:

4.1. **Modificación de una solicitud en trámite**

"EXCELENCIA LEGAL EN UN MUNDO SIN FRONTERAS"

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De acuerdo con el artículo 34 de la Decisión 486 de la Comisión de la Comunidad Andina, donde se establece que la modificación de una solicitud es posible en cualquier momento del trámite mientras no implique una ampliación de la solicitud inicial, me permito presentar un nuevo pliego reivindicatorio conformado por 15 reivindicaciones.

Con el fin de atender a la objeción hecha por el señor examinador, se solicita el cambio de título de la presente solicitud de patente a: **"MÁSCARA PARA FOTOTERAPIA CON MARCO PARA APOYAR EL DISPOSITIVO EN EL USUARIO"**.

Se han introducido las siguientes modificaciones al capítulo reivindicatorio:

- Se eliminaron las reivindicaciones 4 y 12. Lo anterior no puede ser considerado como un desistimiento de la materia allí revelada y mi representada se reserva el derecho de volver sobre la misma durante el trámite de la presente solicitud de patente.
- Se modificó el pliego reivindicatorio con el fin de hacer claridad sobre la materia que se solicita proteger y el alcance de la misma. En particular, el nuevo pliego reivindicatorio se refiere a un dispositivo de fototerapia que comprende una plataforma de lámpara terapéutica que comprende una máscara que tiene una configuración parabólica cóncava y una rigidez maleable y que incluye una pluralidad de lámparas radiantes que tienen una combinación mixta de diferentes longitudes de onda de energía radiante que comunican la energía radiante con un área de tratamiento de un usuario, y que incluye además una primera pared y una pared reflectante que tiene aberturas que comunican la radiación de energía radiante al área de tratamiento en donde la pared reflectante dispersa la energía radiante sobre el área de tratamiento; y un marco que apoya la máscara en el usuario que incluye un lente que protege los ojos en donde al momento de la recepción del dispositivo en el usuario, la configuración parabólica de la máscara se expande de forma que coincida un tamaño del usuario.
- Es preciso aclarar que los fragmentos objetados por definir resultados a alcanzar, ventajas o efectos de la invención, no corresponden a resultados, ventajas ni efectos, sino a características técnicas funcionales de la invención, que en este

caso se hacen indispensables para que un técnico medio pueda entender a cabalidad la invención y pueda determinar adecuadamente la configuración entre los elementos para que la invención funcione correctamente; lo anterior para garantizar que una persona normalmente versada en la materia pueda reproducir la invención.

Con respecto a lo anterior, la "GUÍA PARA EXAMEN DE SOLICITUDES DE PATENTE DE INVENCION Y MODELO DE UTILIDAD" de su Despacho enuncia:

"Las características técnicas funcionales son los elementos que conforman las invenciones, descritos en términos de su uso o su función. No definen la invención, pero explican la relación que hay entre sus diversas características estructurales (...) Las reivindicaciones deben incluir características estructurales y funcionales cuando para la persona del oficio normalmente versada en la materia no sea obvio el funcionamiento de los elementos característicos y la relación entre estos" (Subraya incluida en el texto).

De acuerdo con lo anterior, los fragmentos objetados no solo pueden, sino que deben estar en las reivindicaciones, ya que resultan esenciales para que una persona del oficio normalmente versada en la materia entienda correctamente el funcionamiento de la invención.

- Finalmente, la reivindicación 6 se encuentra debidamente soportada en el capítulo descriptivo en la página 8, párrafo [0036].

Por lo anterior, las objeciones formuladas por el Examinador en cuanto a la claridad y concisión del pliego reivindicatorio se ven superadas. En consecuencia, se solicita atentamente tener en cuenta este nuevo pliego reivindicatorio para el nuevo análisis de patentabilidad.

4.2. Argumentos con respecto a la falta de Novedad y Nivel Inventivo

De acuerdo al artículo 16 de la Decisión 486, se determina:

“Artículo 16: *Una invención se considerará nueva cuando no esté comprendida en el estado de la técnica.*

El estado de la técnica comprenderá todo lo que haya sido accesible al público por una descripción escrita u oral, utilización, comercialización o cualquier otro medio antes de la fecha de presentación de la solicitud de patente, o en su caso, de la prioridad reconocida”.

La novedad de una invención se evalúa a través de la comparación uno a uno de sus características esenciales. De este modo, una invención puede ser objetada por novedad cuando sus características esenciales son exactamente iguales a las de un antecedente que represente el estado de la técnica conocido al momento de presentar la solicitud. Por lo tanto en caso que llegue a existir al menos una diferencia en dicha comparación, se afirma que la invención SI cumple con el requisito de novedad.

Por su parte, el artículo 18 de la Decisión 486 señala lo siguiente:

“Artículo 18.- *Se considerará que una invención tiene nivel inventivo, si para una persona del oficio normalmente versada en la materia técnica correspondiente, esa invención no hubiese resultado obvia ni se hubiese derivado de manera evidente del estado de la técnica”.*

Una invención se considerará inventiva si la misma no hubiese resultado obvia a partir del arte previo para una persona del oficio normalmente versada en la materia. Esto a su vez implica que el Examinador a cargo de esta evaluación debe colocarse en el momento exacto en el que el inventor buscaba resolver el problema técnico contemplado en la solicitud y para el cual poseía la literatura y el conocimiento disponibles en dicho momento.

Siguiendo entonces los lineamientos de la Jurisprudencia aplicable al análisis del nivel inventivo de una solicitud de patente, se considera que una anterioridad o una

combinación de dos anterioridades puede afectar dicho requerimiento de patentabilidad, si una persona medianamente versada en la materia encuentra enseñanzas o sugerencias claras que, a partir de un conocimiento medio en dicho campo, le permitan llegar de manera obvia a la invención reivindicada. Adicionalmente se considera que una mejora sustancial, un efecto inesperado o una ventaja con respecto al arte previo es un indicio de nivel inventivo, por cuanto aporta un salto tecnológico en la regla técnica.

Con base en lo anterior, respetuosamente solicitamos atentamente la reconsideración de las razones por las cuales se objeta la novedad y el nivel inventivo, con base en la siguiente información:

Señalamos que la presente invención se encuentra dirigida a una estructura en la que una pared reflectante incluye aberturas radiantes para comunicar la energía radiante a un usuario en tratamiento. Cuando se menciona la comunicación de la energía a través de las aberturas, quiere decir que las lámparas están dispuestas detrás de la pared reflectante; en otras palabras, se encuentran empotradas en relación con la pared, lo que es importante no solamente desde el punto de vista de la seguridad, sino también porque la pared interna presenta entonces una superficie reflectante suave para el usuario que permite controlar mejor la reflectividad y reforzar la apariencia del dispositivo. Por consiguiente, la combinación de las características son: rigidez maleable, es decir, flexibilidad, una combinación mixta de diferentes longitudes de onda de energía radiante, y una estructura de dos paredes donde la pared reflectante está en frente de las lámparas para que la energía radiante se comunique a través de la pared. Esto deja en evidencia que la naturaleza empotrada de las lámparas es mejor que montar las lámparas sobre una pared reflectante.

Por su parte, ninguno de los documentos D1 o D2 citados por el señor Examinador enseña o sugiere una estructura de este estilo. En el documento D1, son los LEDs propiamente dichos los que atraviesan los orificios (30) [0056]. Éstos no están empotrados en relación con la pared interna. Dicha estructura no es segura para el uso del consumidor debido a la posibilidad de que el usuario entre en contacto directo con el LED durante la operación y, además, inhibe la reflectividad máxima. En el documento D2,

no se observan aberturas a través de las cuales la energía radiante se comuniquen con un área de tratamiento, por lo que no es relevante puesto que meramente consiste en un pad de terapia con guía de luz que comprende un difusor óptico.

De tal manera que, es claro que dichas anterioridades no afectan la novedad del nuevo capítulo reivindicatorio toda vez que únicamente invenciones con todas las características técnicas identificadas en el mismo documento de la anterioridad **pueden afectar la novedad de invenciones reivindicadas en una solicitud presentada posteriormente y por lo tanto**, la objeción formulada a este respecto se debe tener por superada.

Resaltamos nuevamente que en el arte previo el dispositivo no tiene los LEDs empotrados detrás de una pared reflectante flexible. Las lámparas del arte previo están montadas sobre una pared reflectante de tal manera que las lámparas se encuentran entre la pared reflectante y el área de tratamiento o, como sucede en D1, las lámparas están dispuestas estructuralmente para atravesar las paredes por sí mismas, por lo que, nuevamente, el resultado final es que la lámpara se encuentra entre la pared reflectante y el área de tratamiento.

Así, en los argumentos arriba presentados se pueden identificar claramente un indicio de presencia de nivel inventivo de acuerdo con el numeral 2.13.5.3 de la "GUÍA PARA EXAMEN DE SOLICITUDES DE PATENTE DE INVENCION Y MODELO DE UTILIDAD" de su despacho:

- Efectos técnicos mejorados e inesperados, ya que el dispositivo de la presente invención presenta las lámparas detrás de la pared reflectante, mejorando la seguridad para el usuario y logrando una superficie reflectante suave que permite controlar mejor la reflectividad y reforzar la apariencia del mismo.

Por lo tanto, se le debe otorgar una compensación a mi representada que demuestra nuevos hechos (efectos sorprendentes e inesperados) a las enseñanzas descritas en el estado de la técnica y contribuyen con el desarrollo de la tecnología.

Así, la presente invención es inventiva toda vez que los ejemplos y la descripción tal como fue originalmente presentada muestran claramente la mejora aportada al estado del arte por el dispositivo acá reivindicado en términos de seguridad para el usuario y de control de la reflectividad en dichos dispositivos. Adicionalmente, es claro al señalar que el efecto (reflectividad y seguridad) del dispositivo acá reivindicado no podía haber sido esperado por un técnico medio a partir de las enseñanzas de los documentos citados tal como se demostró previamente, en consonancia con los indicios de nivel inventivo que menciona tanto el Manual Andino de Patentes como el "INSTRUCTIVO EXAMEN DE SOLICITUDES DE PATENTES DE INVENCION Y MODELO DE UTILIDAD" de su Despacho, la invención tiene nivel inventivo.

4.3 Concesión de Solicitudes equivalentes

Aunque compartimos la opinión de su Despacho, en cuanto a que la concesión de una solicitud de patente en otros países, equivalente a la solicitud Colombiana, no obliga a su Despacho a otorgar el privilegio de patente para la misma invención, sí constituye un antecedente favorable para el estudio de patentabilidad que respetuosamente solicitamos tener en cuenta. Por lo tanto, informamos a su Despacho que la presente invención ha sido otorgada en Estados Unidos de América, patente No. 8.771.328 B2.

A este respecto, deseamos poner de presente que si bien cada país es autónomo de conceder o negar una solicitud luego de la realización del estudio de fondo, es claro que el hecho de que la novedad y el nivel inventivo de una invención hayan sido reconocidos por varias oficinas a nivel mundial, es un indicio de la patentabilidad de la misma toda vez que (i) el estudio de novedad y nivel inventivo en todas las Oficinas de Patentes del mundo es realizado por personas con conocimientos técnicos en el área de interés que son consideradas personas idóneas para emitir conceptos sobre la patentabilidad de una invención y que (ii) los resultados de los exámenes de novedad o de patentabilidad efectuados respecto a solicitudes extranjeras pueden ser reconocidos como suficientes para acreditar el cumplimiento de las condiciones de patentabilidad de la invención, tal como se señala en el artículo 46 de la Decisión 486:

“Artículo 46.- La oficina nacional competente podrá requerir el informe de expertos o de organismos científicos o tecnológicos que se consideren idóneos, para que emitan opinión sobre la patentabilidad de la invención. Asimismo, cuando lo estime conveniente, podrá requerir informes de otras oficinas de propiedad industrial.

De ser necesario, a efectos del examen de patentabilidad y a requerimiento de la oficina nacional competente, el solicitante proporcionará, en un plazo que no excederá de 3 meses, uno o más de los siguientes documentos relativos a una o más de las solicitudes extranjeras referidas total o parcialmente a la misma invención que se examina:

- a) copia de la solicitud extranjera;*
- b) copia de los resultados de exámenes de novedad o de patentabilidad efectuados respecto a esa solicitud extranjera;*
- (...)*

*La oficina nacional competente podrá **reconocer los resultados de los exámenes referidos en el literal b) como suficientes para acreditar el cumplimiento de las condiciones de patentabilidad de la invención**” (Negrilla fuera del texto).*

4.4 Conclusión

Por todo lo anterior, los documentos D1 y D2 no resultan anterioridades válidas capaces de afectar la novedad de la invención de la presente solicitud. De la misma manera, el documento D1, el documento D2, o su combinación, no resultan anterioridades válidas capaces de afectar el nivel inventivo de la invención de la presente solicitud.

Por lo tanto, consideramos que el Examinador está pasando por alto que una sola diferencia con respecto al estado de la técnica, permite concluir que el objeto reivindicado es nuevo. Además, está excluyendo el hecho de que el inventor en el momento de solucionar el problema técnico de la solicitud tuvo que emplear habilidad inventiva, pues la presente invención no resulta de la mera extrapolación de las enseñanzas del arte previo, como se afirma. Se está desconociendo el mérito investigativo empleado y que está aportando una ventaja al arte previo.

5. Puesto que se ha dado respuesta a todas las objeciones formuladas por el Examinador, se solicita atentamente proceder al otorgamiento de la solicitud de patente. En este sentido, respetuosamente recordamos al Examinador que la patente no podrá ser negada con base en objeciones diferentes a las expuestas en la acción oficial No. 5380, toda vez que al no haber sido trasladadas a mi representada, dicha decisión violaría tanto el tenor literal del artículo 45 de la Decisión 486 como el derecho constitucional al debido proceso. En este evento, y con base en el inciso 2 del artículo 45, respetuosamente solicitamos al Examinador expedir una nueva acción oficial que permita a mi representada contra argumentar las mismas o modificar la solicitud con el fin de cumplir los requisitos de patentabilidad.

6. Anexos

- Nuevo pliego reivindicatorio conformado por 15 reivindicaciones.
- Patente No. US 8.771.328 B2.

Señor Director,


LUZ CLEMENCIA DE PAEZ
C.C. 35.456.344 de Usaquén
T.P.A. No. 23.555

COLO-20981-0841-0001-8
CPT\CPT\ID-283378\WPC20981
No. M-2015-283378\CPT

REIVINDICACIONES MODIFICADAS

1. Un dispositivo de fototerapia que comprende:
una plataforma de lámpara terapéutica que comprende una máscara que tiene una configuración parabólica cóncava y una rigidez maleable y que incluye una pluralidad de lámparas radiantes que tienen una combinación mixta de diferentes longitudes de onda de energía radiante que comunican la energía radiante con un área de tratamiento de un usuario, y que incluye además una primera pared y una pared reflectante que tiene aberturas que comunican la radiación de energía radiante al área de tratamiento en donde la pared reflectante dispersa la energía radiante sobre el área de tratamiento; y
un marco que apoya la máscara en el usuario que incluye un lente que protege los ojos en donde al momento de la recepción del dispositivo en el usuario, la configuración parabólica de la máscara se expande de forma que coincida un tamaño del usuario.
2. El dispositivo de la reivindicación 1 en donde al menos una parte de las lámparas se interpone entre la primera pared y la pared reflectante.
3. El dispositivo de la reivindicación 2 en donde las lámparas se montan en la primera pared.
4. El dispositivo de la reivindicación 1 en donde el marco tiene un tamaño que separa la máscara del área de tratamiento usada a una posición deseada para un tratamiento terapéutico adecuado.
5. El dispositivo de la reivindicación 4 en donde el marco incluye puntos de contacto de referencia para el usuario que guían la máscara a la posición deseada.
6. El dispositivo de la reivindicación 1 en donde al menos una parte de las lámparas están empotradas en relación con la pared reflectante.
7. El dispositivo de la reivindicación 1 en donde las diferentes longitudes de onda de energía radiante comprenden al menos dos de rojo, azul o infrarrojo.

8. Un dispositivo de fototerapia que comprende:
una plataforma de lámpara terapéutica que incluye una pluralidad de lámparas radiantes que tienen una combinación mixta de diferentes longitudes de onda de energía radiante y una pared reflectante con una pluralidad de aberturas de energía radiante alineadas con las lámparas radiantes que comunican la energía radiante a un área de tratamiento de un usuario, y en donde la pared reflectante se forma, además dispersa la energía radiante sobre el área de tratamiento; y
un marco que apoya la plataforma en el usuario.
9. El dispositivo de la reivindicación 8 que incluye además una pared exterior separada de la pared reflectante y en donde las lámparas radiantes se interponen entre la pared exterior y la pared reflectante.
10. El dispositivo de la reivindicación 8 en donde las diferentes longitudes de onda de energía radiante comprenden al menos dos de rojo, azul o infrarrojo.
11. El dispositivo de la reivindicación 10 en donde la pared reflectante tiene una configuración parabólica que dispersa la energía radiante a través de un área de tratamiento del usuario.
12. El dispositivo de la reivindicación 8 en donde el marco comprende un marco de gafas.
13. El dispositivo de la reivindicación 12 en donde el marco de gafas incluye además un lente de protección de los ojos.
14. El dispositivo de la reivindicación 1 en donde el marco de soporte comprende un marco de gafas.
15. El dispositivo de la reivindicación 1 en donde el marco de soporte comprende gafas de protección.



US008771328B2

(12) **United States Patent**
Tapper et al.

(10) **Patent No.:** **US 8,771,328 B2**
(45) **Date of Patent:** **Jul. 8, 2014**

(54) **LIGHT THERAPY PLATFORM SYSTEM**

(75) **Inventors:** **Jay Tapper**, Wayne, PA (US); **Lawrence A. Blaustein**, Chagrin Falls, OH (US); **David Shuter**, Palm Beach Gardens, FL (US); **Eric Freitag**, Brooklyn, NY (US); **Charles Peter Althoff**, Brooklyn, NY (US); **Alistair Bramley**, Brooklyn, NY (US); **Allen Zadeh**, Brooklyn, NY (US); **Daniel Joseph Shuter**, Palm Beach Gardens, FL (US); **Zbigniew Paul Lorenc**, New York, NY (US)

(73) **Assignee:** **La Lumiere LLC**, Cleveland, OH (US)

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 6 days.

(21) **Appl. No.:** **13/604,012**

(22) **Filed:** **Sep. 5, 2012**

(65) **Prior Publication Data**

US 2013/0066404 A1 Mar. 14, 2013

Related U.S. Application Data

(60) Provisional application No. 61/532,140, filed on Sep. 8, 2011.

(51) **Int. Cl.**

A61N 5/06 (2006.01)
A61B 19/00 (2006.01)
A61B 18/00 (2006.01)
A61B 17/00 (2006.01)
A61N 5/067 (2006.01)

(52) **U.S. Cl.**

CPC **A61N 5/0616** (2013.01); **A61N 2005/0628** (2013.01); **A61N 2005/0654** (2013.01); **A61N 2005/0647** (2013.01); **A61B 2019/409** (2013.01); **A61B 2018/00988** (2013.01); **A61B 2018/00791** (2013.01); **A61N 2005/0659** (2013.01); **A61B 2017/00057** (2013.01); **A61B 2018/00642** (2013.01); **A61N 2005/0652** (2013.01); **A61N 2005/0626** (2013.01); **A61N 2005/0666** (2013.01); **A61N 2005/0663** (2013.01); **A61N 2005/067** (2013.01)

USPC **607/90**; 351/47; 607/88; 607/89; 600/15; 600/27; 606/9; 362/327

(58) **Field of Classification Search**

CPC **G02C 9/00**; **A61N 1/39**; **A61N 1/00**; **A61M 21/00**; **A61B 18/18**; **F21V 5/00**
USPC 351/47; 607/88, 89; 600/15, 27; 606/9; 362/327

See application file for complete search history.

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Primary Examiner — William Thomson

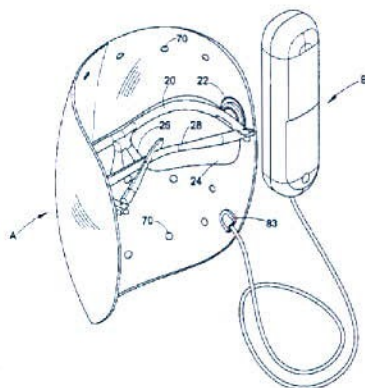
Assistant Examiner — Victor Shapiro

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(57) **ABSTRACT**

Phototherapy systems comprising a therapeutic lamp platform for radiant lamps such as LEDs disposed in an assembly comprising a first wall to which the lamps are affixed thereto and a second wall, closer to the patient, spaced from the first wall wherein the lamps are recessed relative thereto. The second wall comprises a reflective surface facing towards a patient and a plurality of light apertures substantially aligned with the LEDs on the first wall for communicating lamp radiation from the lamps to a user. The lamps and associated circuitry are disposed between the first and second wall so that the reflective surface is relatively smooth and seamless towards the patient. The walls have a malleable rigidity for flexible adjustability relative to the user. The device is mounted to the user with a frame comprising an eyeglass frame or goggles including lenses for shielding the user's eyes from lamp radiation.

17 Claims, 14 Drawing Sheets



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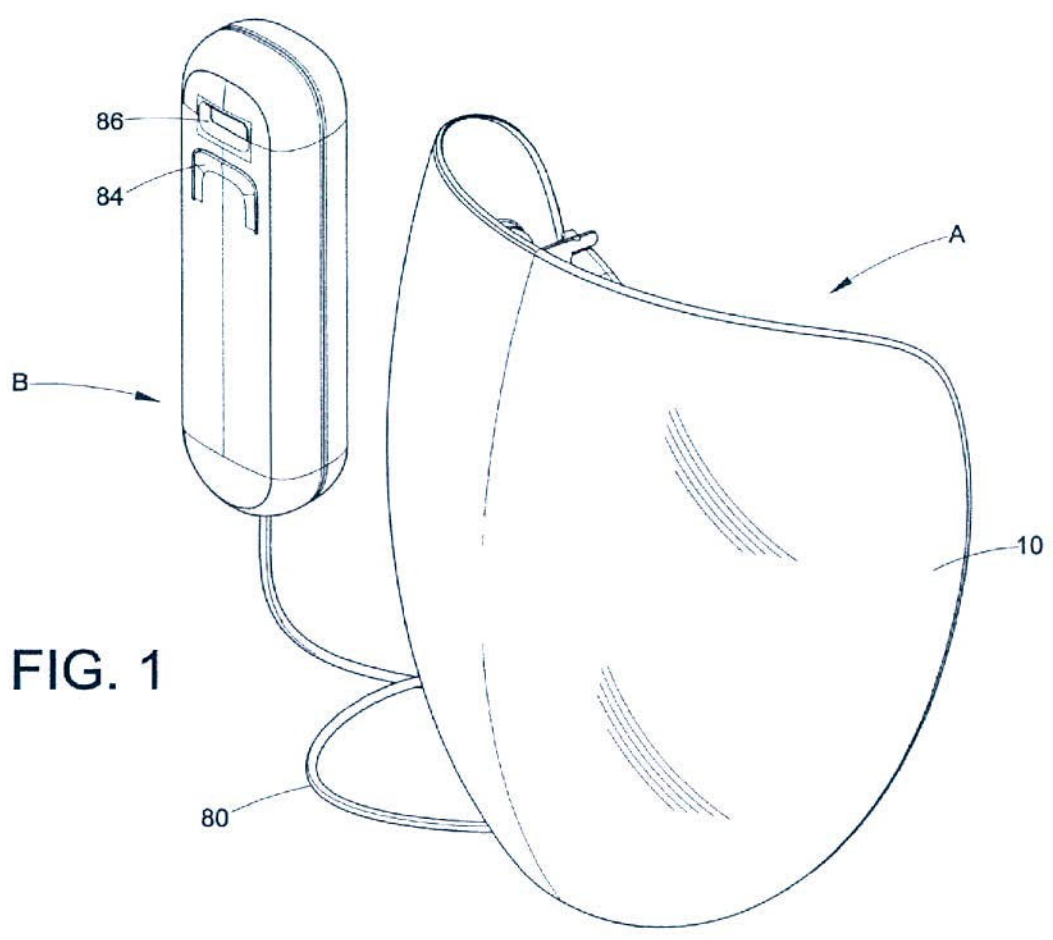


FIG. 1

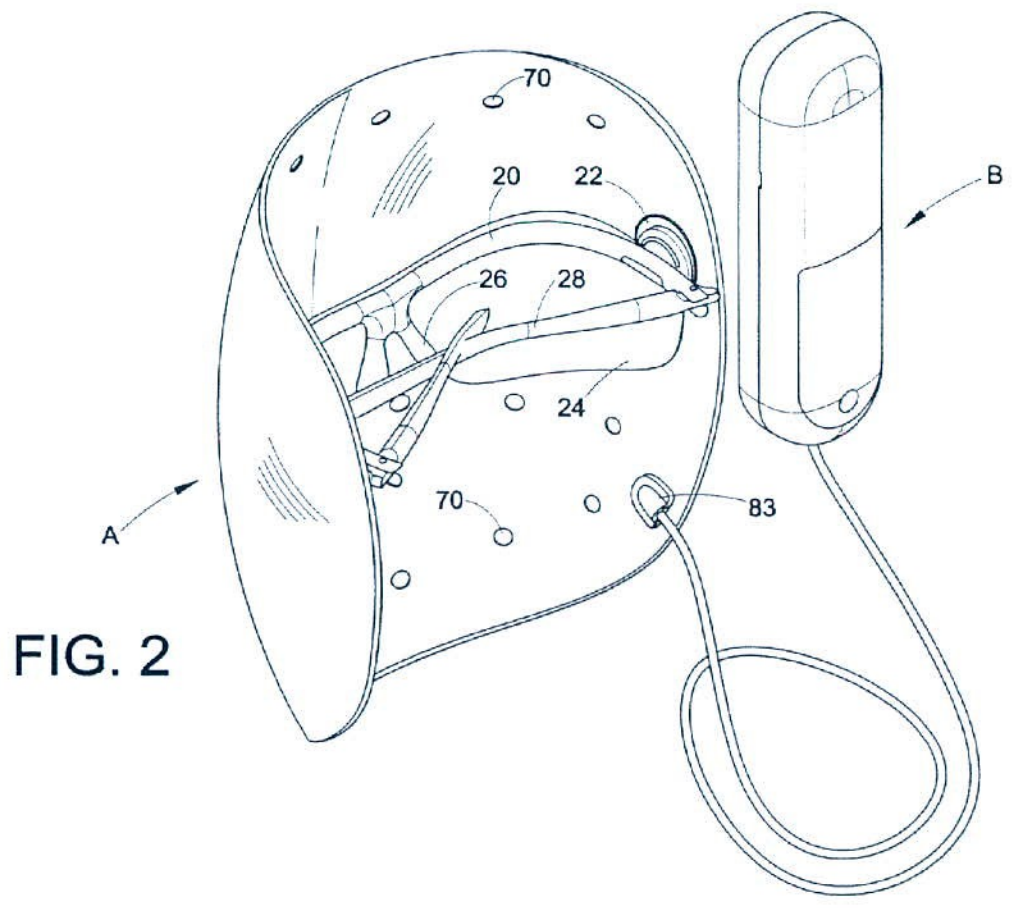


FIG. 2

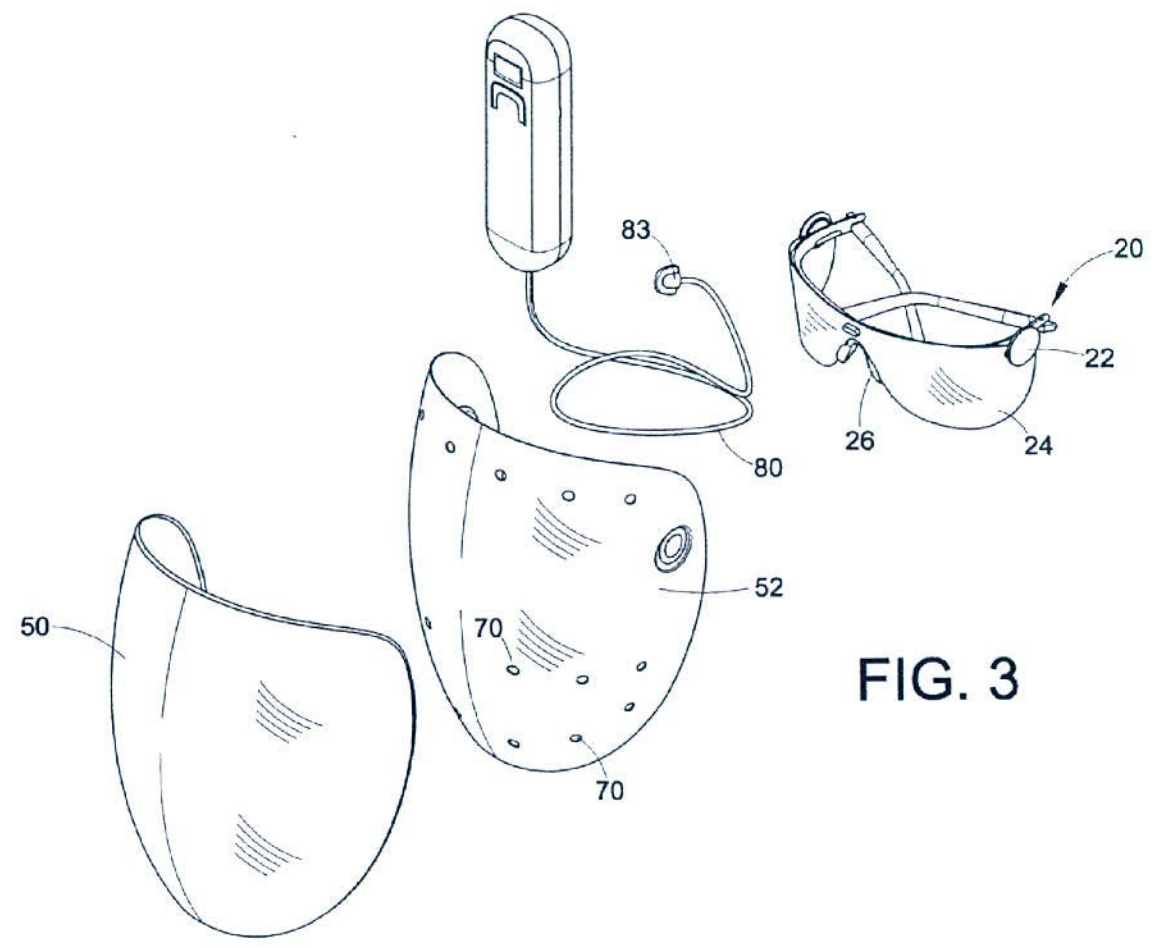


FIG. 3

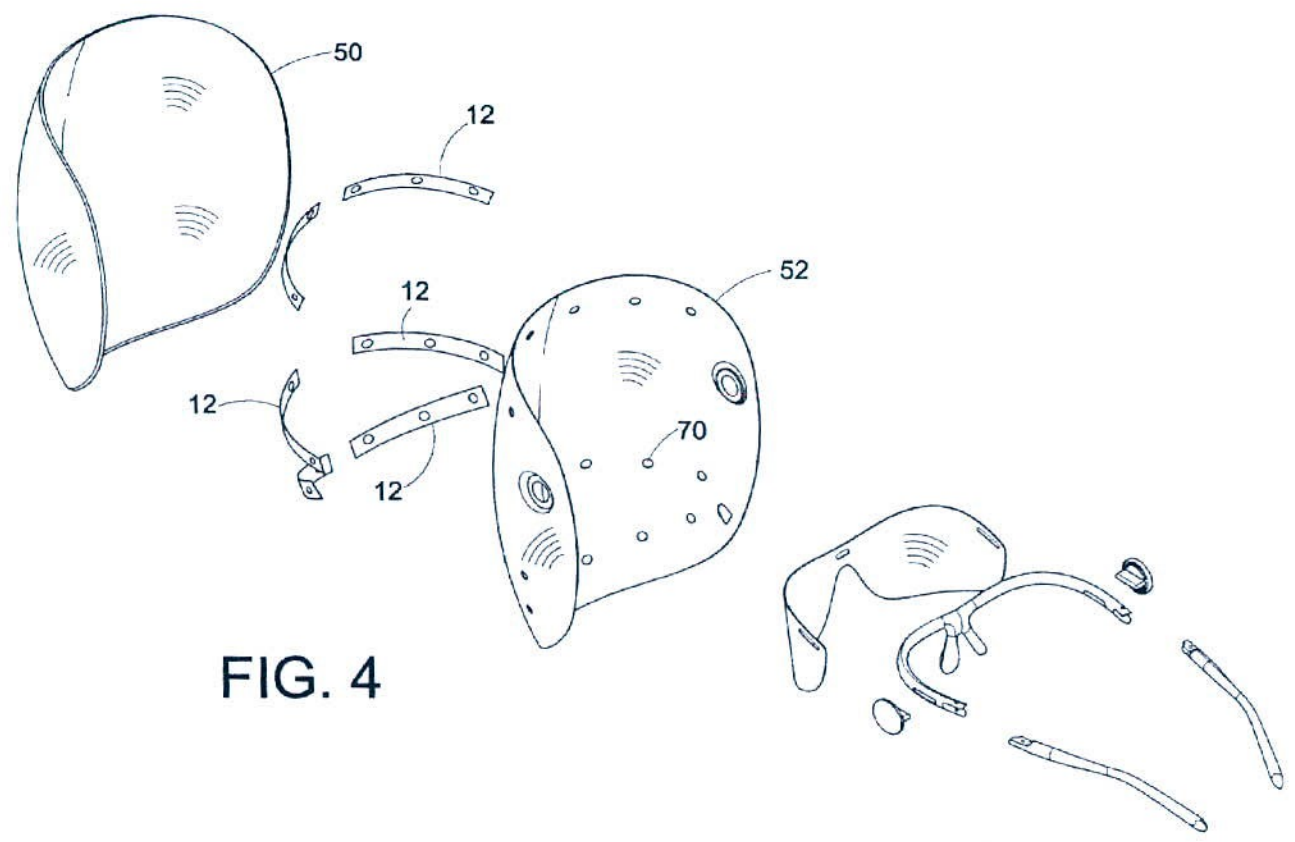


FIG. 4

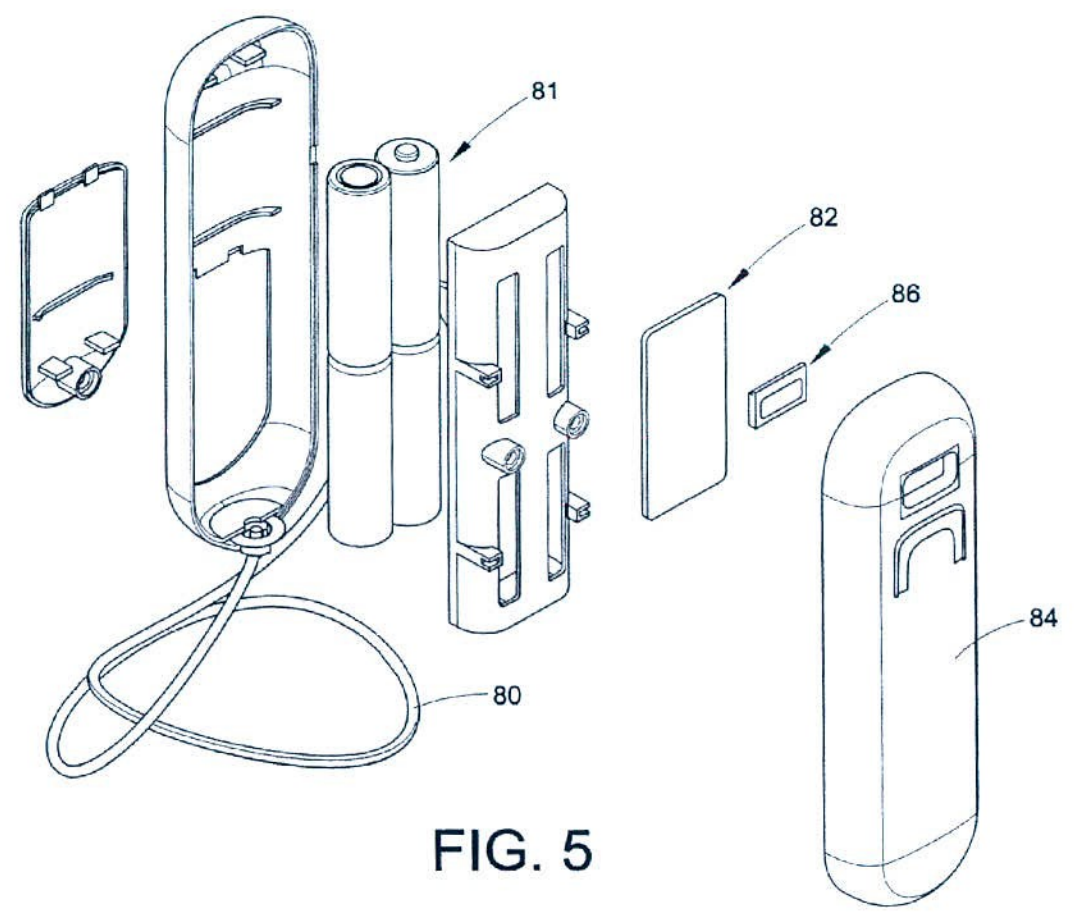


FIG. 5

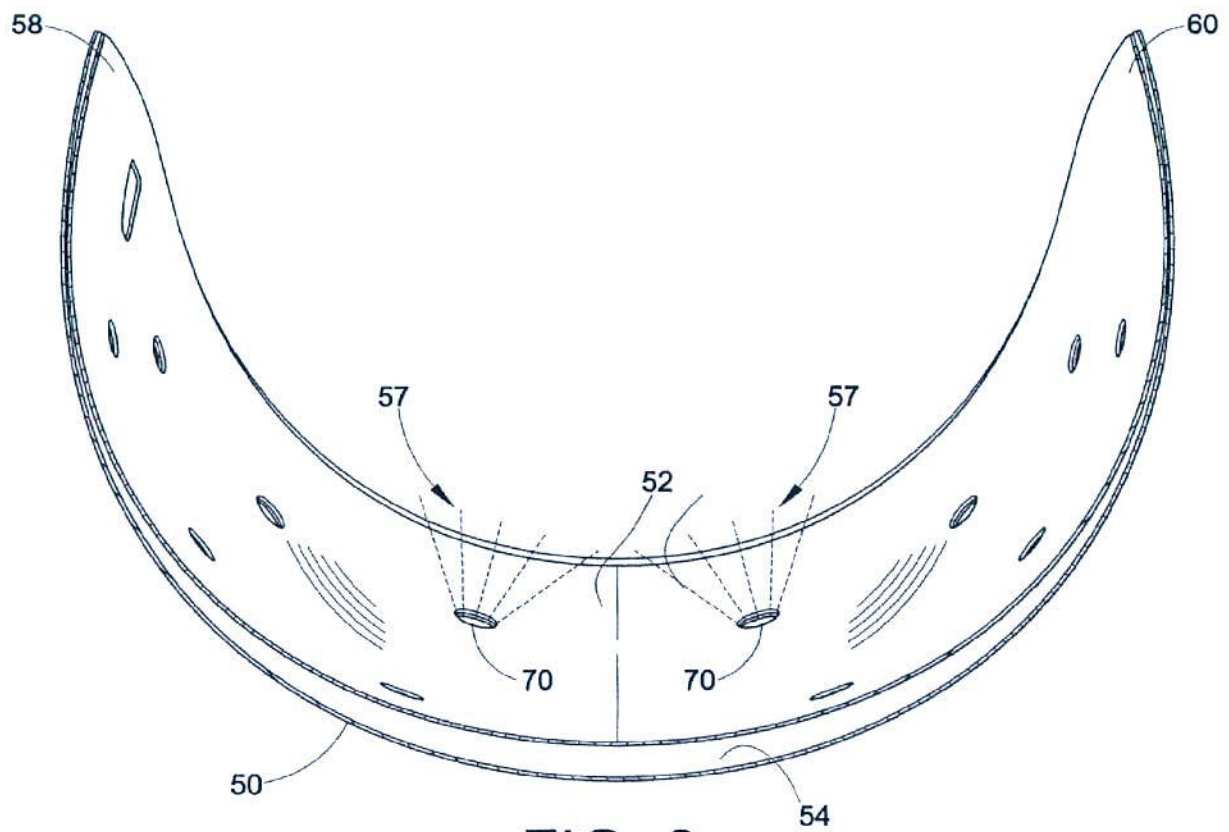
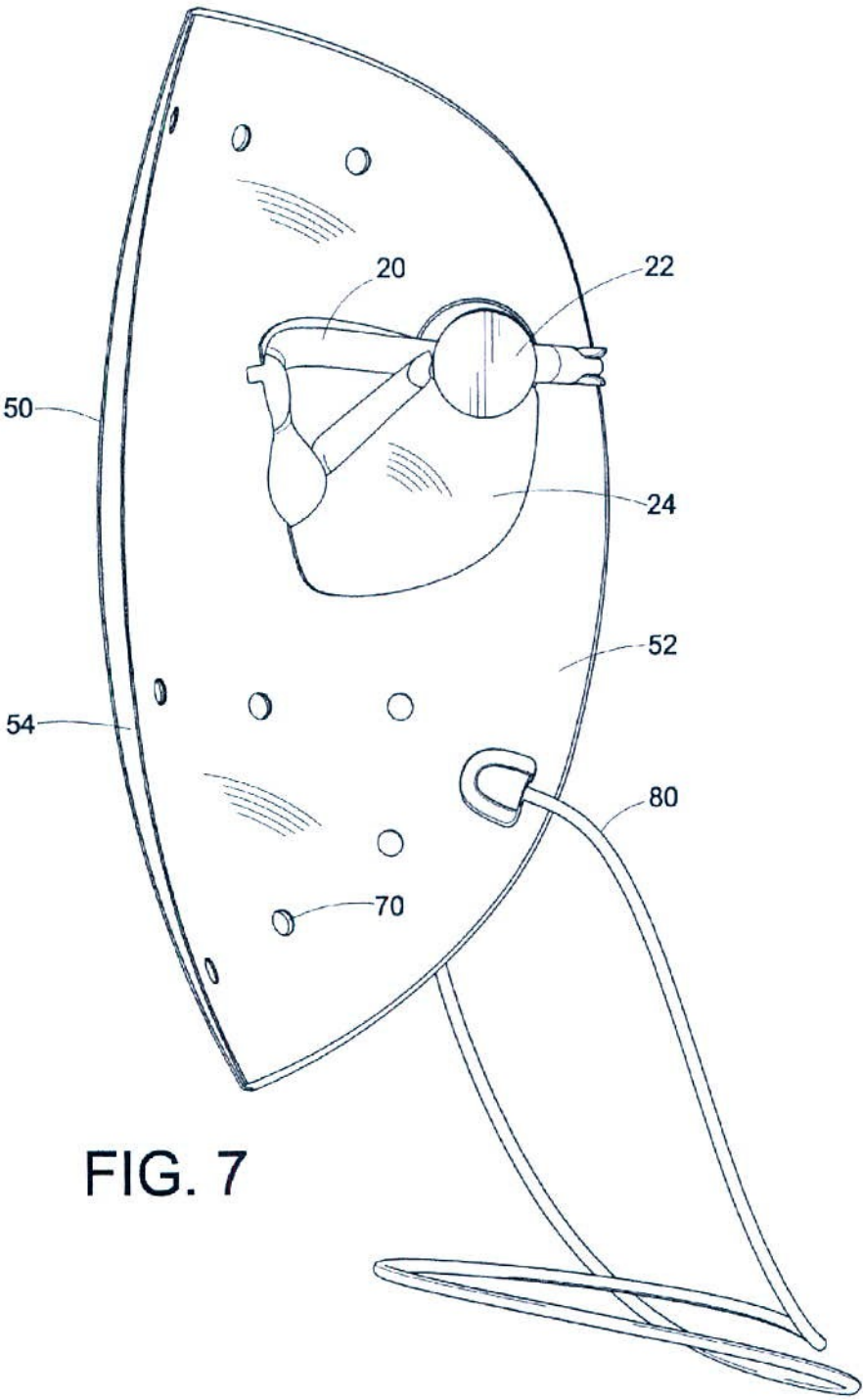


FIG. 6



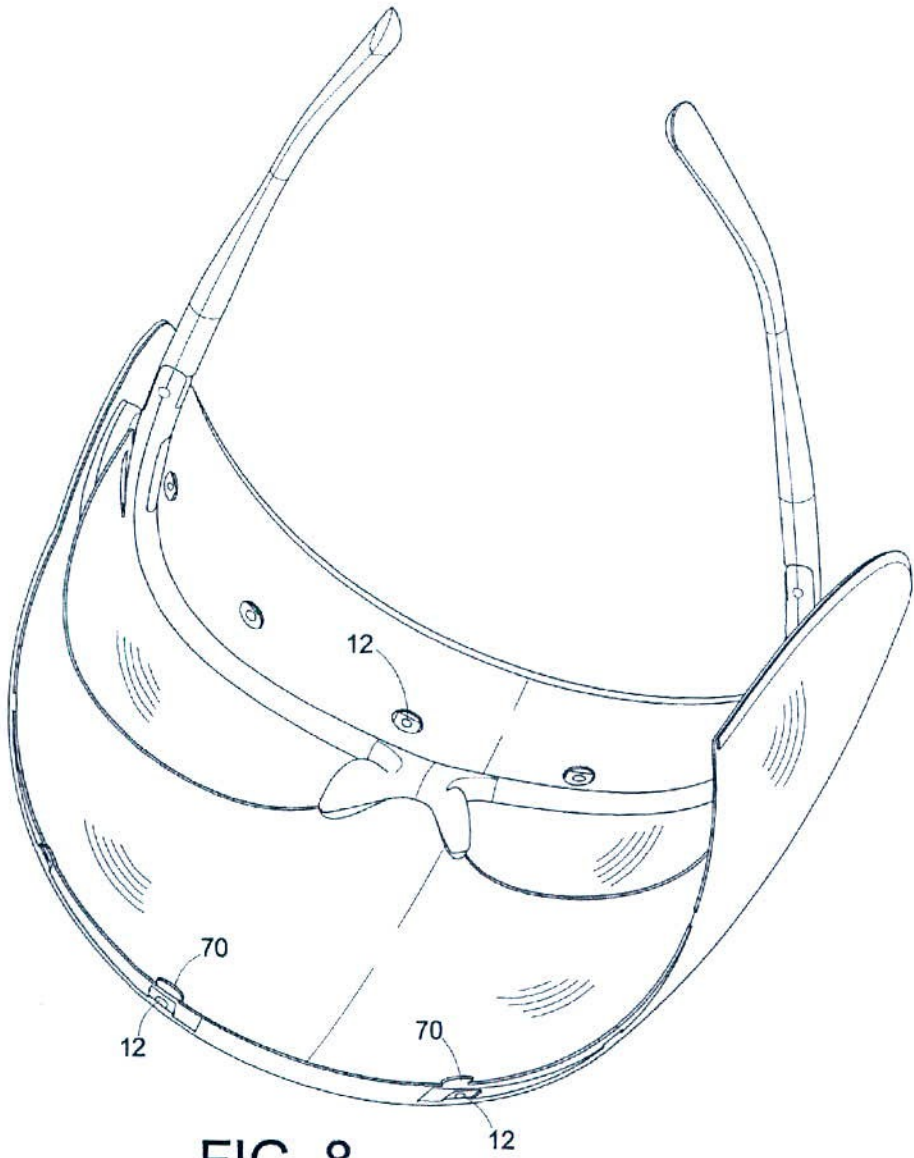
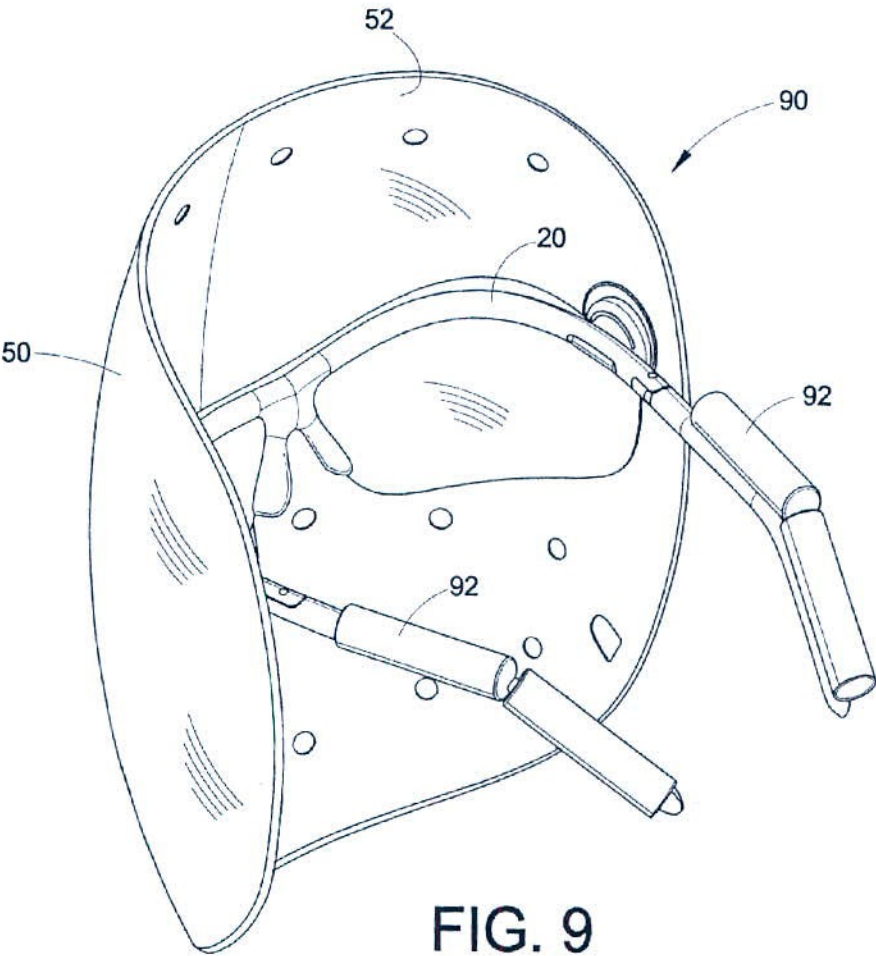
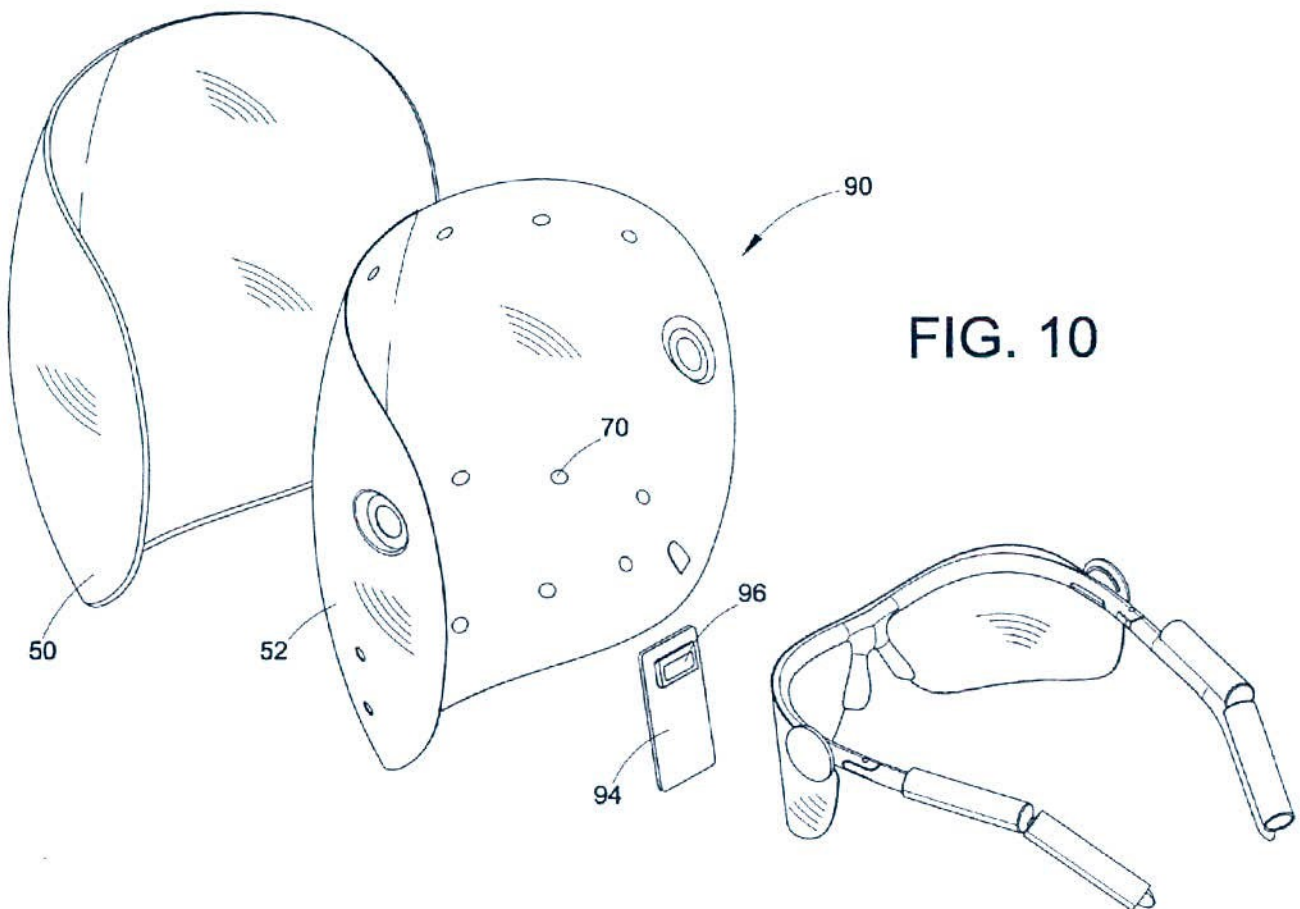


FIG. 8





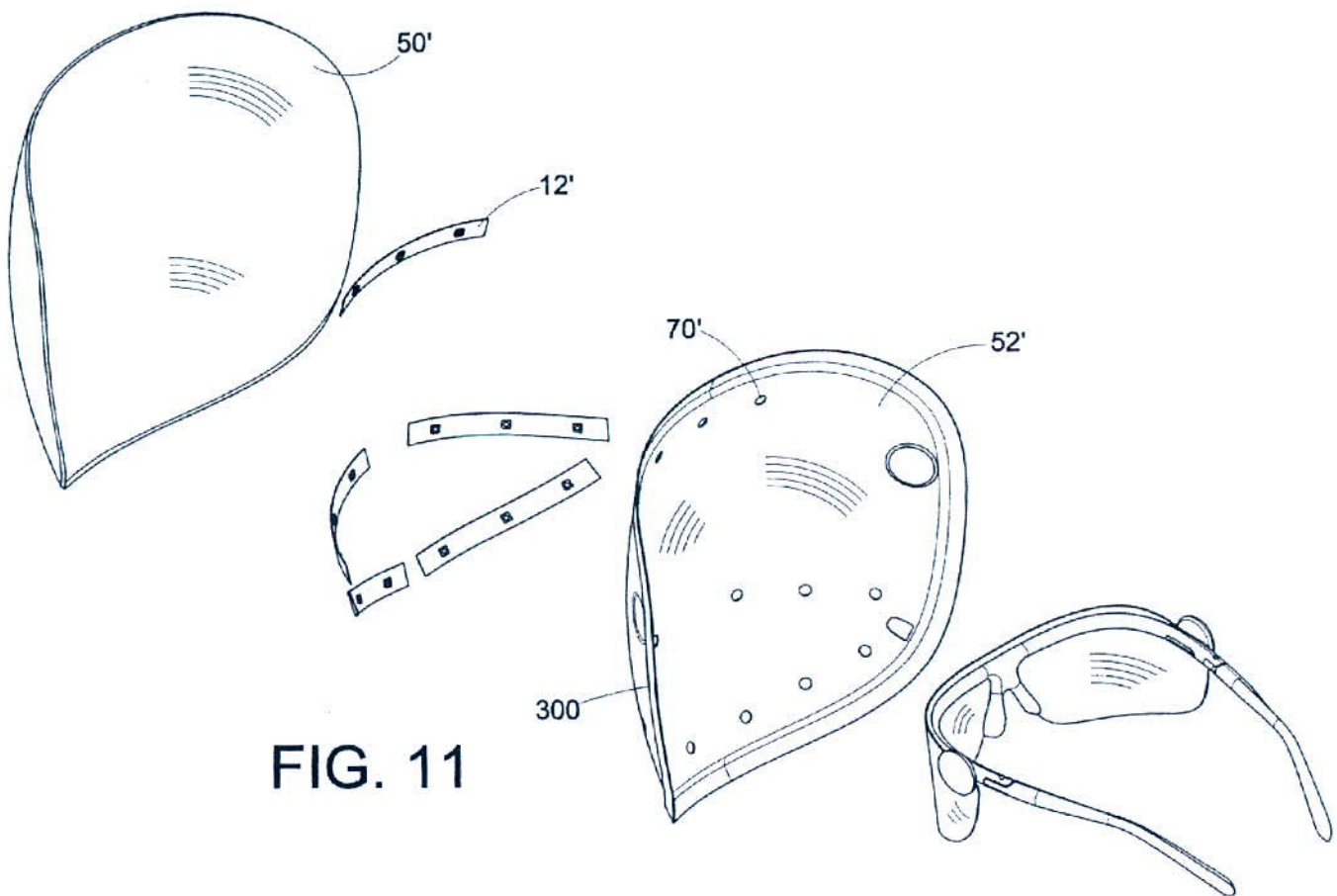


FIG. 11



FIG. 12

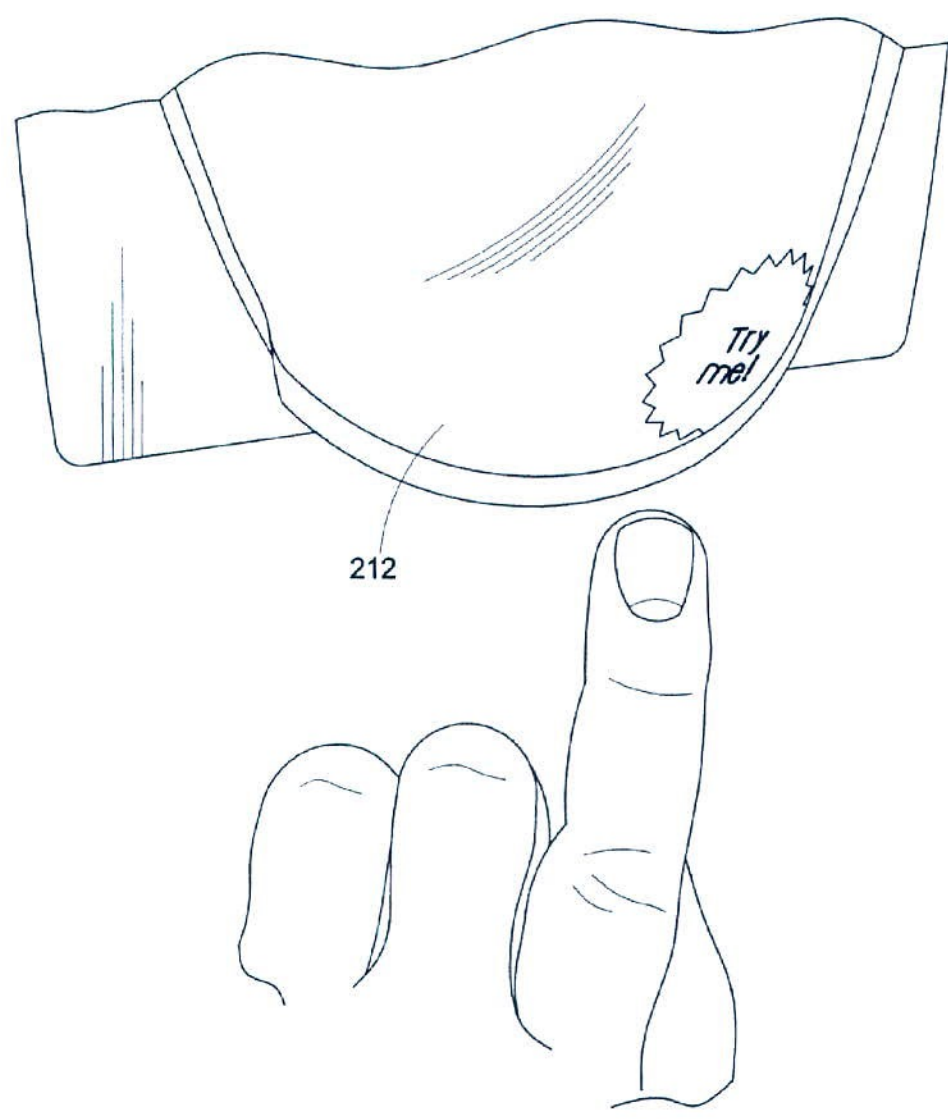
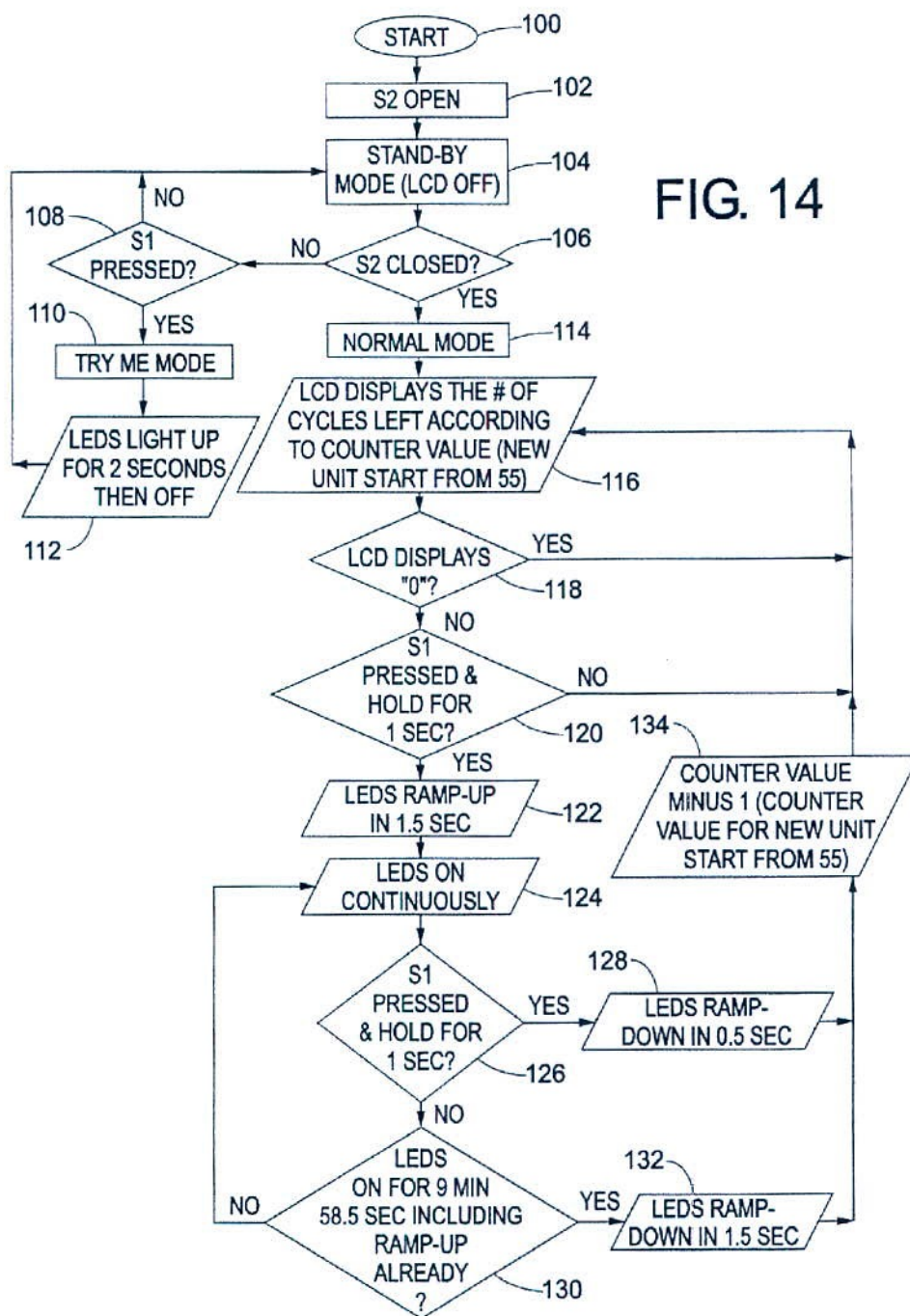


FIG. 13



LIGHT THERAPY PLATFORM SYSTEM

This application claims the priority benefit of U.S. application Ser. No. 61/532,140, filed Sep. 8, 2011, the disclosure of which is incorporated herein by reference.

FIELD

The present embodiments relate to devices and methods for delivering light-based skin therapy treatments for improving skin health, such as anti-aging enhancement or acne prevention, using light-emitting diode (LED) light therapy, although other types of light radiating sources can be used.

BACKGROUND

Certain light spectrums emitted by LEDs (blue or red) are known to be therapeutic for skin treatment against maladies such as acne, or are beneficial to inhibit skin aging. However, there is a need to provide users/patients with a convenient at-home light therapy delivery device such as a wearable mask, veil or hood that is adjustable or flexible to conform to different sizes and shapes, and that is simple to use without user discomfort. Currently available at-home, consumer usable products on the market are fixed to one-size and/or usually have to be hand-held; which generally have not proven satisfactory for providing the best or desired light dispersion. The alternative is customers visiting a doctor's office to receive treatments.

Prior known light therapy devices, particularly masks, have suffered from problems relating to the exposure of the LEDs and the associated circuitry to power the LEDs to contact by users. More particularly, in an effort to maximize light communication to a patient, the LEDs have been disposed in a manner which allow them to be physically engaged (e.g., touched) by a patient, or even contact a treatment surface, which processes are debilitating to the LEDs as a result of the accumulation of dirt and oil. In addition, any such engagement can be dangerous to patients who are exposed to the sharp or hot edges of the LEDs and the associated circuitry. The exposure of detailed circuitry presents an intimidating and unpleasant experience when the therapy requires several minutes of time for completion and the mask is disposed relatively close to the face, often causing an uncomfortable, claustrophobic sensation over time to the patient.

A hands-free therapeutic experience is always better than having to hold the device in a particular position for extended periods of time during the therapy. Numerous assemblies have been conceived for mounting masks and helmet-like devices to varieties of straps, bands, wraps and cords, which can result in a pressing of the support and mounting assembly closely against the hair or scalp of a patient. There is always a need to minimize the extent of such attachment assemblies so that on the one hand the subject device is securely attached on the patient, but also that the attaching structure has minimal consequence to the patient's comfort during the therapy itself. Being relatively light in weight, and easily and minimally supported during therapeutic use are important to consumer acceptance.

As users come in a variety of shapes and sizes, devices should be size or area adjustable so that the therapy can be efficiently applied and/or selectively intensified to desired treatment areas.

Lastly, particularly in therapeutic devices treating facial areas, eye protection is needed to avoid light damage or irritation to a patient's eyes. Prior known devices have typically used separable patches which must rest on the eye area

to block the therapeutic light from communication to the eye system itself. There is a need for a better way that is readily adaptable to communicate therapeutic light to areas near the eyes, particularly with regard to anti-aging treatments, and still protect the patient.

It is desired to provide alternative means of using the benefits of the light therapy in a manner to maximize therapeutic efficiencies in exposure while maintaining ease and convenience of use. For this reason, a variety of light weight, flexible and adjustable embodiments are disclosed within this disclosure incorporating a variety of energy varying applications responsive to user conditions or needs.

SUMMARY

The present embodiments comprise phototherapy systems and devices comprising a therapeutic lamp platform for radiant lamps such as LEDs are disposed in an assembly comprising a first wall to which the lamps are affixed thereto and a second wall, closer to the patient, spaced from the first wall wherein the lamps are recessed relative thereto. The second wall comprises a reflective surface facing towards a patient and a plurality of light apertures substantially aligned with the LEDs on the first wall for communicating lamp radiation from the lamps to a user. The lamps and associated circuitry are disposed between the first and second wall so that the reflective surface is relatively smooth and seamless towards the patient. The number of lamps are minimized, as is the circuitry therefor, and other assembly materials are purposefully selected for a relatively light weight assembly resulting in enhanced user comfort during therapy sessions. The walls have a malleable rigidity for flexible adjustability relative to the user. More particularly, the walls have a concave configuration relative to the face of the user which is adjustable relative to a rest position to be expandable relative to a size of the head of the user for a close fitting and secure engagement to the user during use. The device is mounted to the user with a frame comprising an eyeglass frame or goggles including lenses for shielding the user's eyes from lamp radiation. The adjustability of the embodiments is further enhanced by the walls being pivotable relative to the support frame and where the frames may include telescopic temple arms for selective adjustability relative to the head size of the user. The device is thus supported on the patient as a wearable hands-free mask or the like. A power source communicates energy to the lamps and comprises a remote battery pack and may also include a control processor for counting the number of uses by the device for the user and for indicating a need for device replacement after a predetermined number of uses.

The present embodiments comprise an adjustable/flexible platform for providing a light-based therapy that is adaptable to the user's receptive surfaces, whether based on size or condition, wherein the light therapy can be applied without limitation of the kind of light and without limitation of the ultimate purpose of the therapy, i.e., beauty, health, and/or wound healing. Such sources can vary in the form of the radiant energy delivery. Pulsed light (IPL), focused light (lasers) and other methods of manipulating light energy are encompassed within the present embodiments. Other methods of light emission may comprise continuous, pulsed, focused, diffuse, multi wavelength, single wavelength, visible and/or non-visible light wavelengths.

A present embodiment describes forms such as a shaped/fitted mask, goggles, eye mask, shroud or hood, and facial mask (collectively referred to as "mask") with LED light emitted from LED bulbs or LED strips that are capable of being adjusted to accommodate the variances in face size or

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areas intended for therapeutic attention. Control systems are included to vary light intensity, frequency or direction.

The platform can be secured to the head by multiple means: eyeglass frames, straps, drawstring, harness, velcro, turn dial or snap and buttons. As the mask is secured it can be adjusted upward, for chin to forehead coverage. It can also be adjusted outward, for side-to-side coverage. In addition, once the platform has been bent/slid to cover the face area, the distance of the platform from the skin can be adjusted for achieving a desired light intensity relative to a user's skin surface. Thus, the light therapy can be maximized in up to three physical dimensions.

The subject adjustability may be implemented through "smart" processing and sensor systems for enhanced flexibility/adjustability in the form of adjustable energy output, adjustable wavelengths, priority zones, timers, and the like. The sensors of the sensor systems will enable the subject embodiments to have the ability to evaluate the skin of the face and body of a patient with sensors for color, wrinkles, age spots, acne, lesion density, and the like, and plan a smart treatment, utilizing more or less energy on the priority zones. The subject embodiments can be smart from the standpoint of skin type, age, overall severity of problems and have the ability to customize the treatment accordingly.

In yet another embodiment, the lamps are embedded in a flexible sheet of formable material and are integrally molded as strips within a material sheet.

In addition, control systems can measure or count device usage and communicate historical usage, and indicate a time for replacement.

The present disclosure thus describes a fully flexible and adjustable LED device which provides improved usability and light dispersion.

BRIEF DESCRIPTION OF THE DRAWINGS

- FIG. 1 is a perspective view of one embodiment of a therapeutic lamp platform comprising a wearable mask;
- FIG. 2 is another perspective view of the device of FIG. 1;
- FIG. 3 is an exploded perspective view of FIG. 1;
- FIG. 4 is an exploded perspective view of FIG. 2;
- FIG. 5 is an exploded perspective view of the controller B;
- FIG. 6 is a cross-sectional view showing a two-wall structure of the embodiment of FIG. 1 wherein an inner wall includes light apertures aligned with the LEDs for communicating the therapeutic light to the user;
- FIG. 7 is a second cross-sectional view taken along a vertical center-line;
- FIG. 8 is a partial cross-sectional perspective view illustrating disposition of recessed LED lamps relative to inner wall apertures;
- FIG. 9 is a perspective view of an alternative embodiment wherein the power supply and control circuitry are integrally formed with the mask assembly;
- FIG. 10 is an exploded view of the device of FIG. 9;
- FIG. 11 is an exploded view of an alternative embodiment wherein the mask walls are spaced by a flange;
- FIG. 12 is an embodiment of a packaging assembly containing the device of FIG. 1;
- FIG. 13 illustrates a try-me feature of the packaging of FIG. 11 wherein a user can view a sample operation of the device; and
- FIG. 14 is a flowchart of operational device control.

DETAILED DESCRIPTION

The subject embodiments relate to a phototherapy system including methods and devices, preferably comprising a

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wearable hands-free device with a remote battery pack for powering therapeutic lamps in the device. The subject devices display numerous benefits including a light platform wherein the platform and the lamps therein are properly positionable relative to a user during use with no human touch. That is, structural componentry of the device not only supports the lamp platform on the user, but functions as a guide for the appropriate disposition of the lamps relative to the treatment areas of the user. The structural assembly of the device precludes sharp or hot surfaces from being engageable by a user as the lamps are recessed relative to an inner reflective surface closest to and facing the patient treatment surface. Circuit componentry to communicate power to the lamps is also encased within the wall structure. Therapeutic light, shining through wall apertures, is communicated to the user while the lamps and the circuitry are effectively encased within the spaced wall structure. A smooth seamless surface is thus presented to the user that is properly spaced for the desired therapeutic treatments, yet provides improved ventilation so that an aesthetic and appealing device surface is presented to the user that minimizes user discomfort. Other benefits relate to the adjustability of the device in the form of a flexible mask which forms upon user receipt to match a treatment surface, e.g., a head size, of the user. Smart componentry not only measures device usage, but may also calculate lamp degradations so that a time for proper replacement can be communicated to a user. The overall assembly is purposefully constructed of relatively light weight and minimized componentry for ease of user use and comfort.

More particularly, and with reference to FIGS. 1-4, subject embodiments preferably comprise a lamp platform A and a remote battery pack B. The platform A is comprised of a wall structure 10 encasing the plurality of therapeutic lamps such as red and blue LEDs 12 and circuitry 14 for communicating power to the lamps via cable 80 and connector 83 from the battery pack B. Other radiant energy forms could also include fluorescents, lasers or infrareds. The wall structure 10 is mounted on a support frame 20 connected via snap-out pivotal connections 22 which allows the wall structure to adjust position via a slight pivot relative to the frame 20. The frame 20 also includes protective lenses 24 and a nose bridge 26. The temple arms 28 may be fixed or telescopic and hinge relative to the frame 20 so that the platform A can be mounted on a user in a hands-free support manner via resting on the nose with the nose bridge 26 and the ears with temple arms 28.

With reference to FIGS. 3, 4, 6, 7 and 8 it can be seen that the wall structure 10 is comprised of an outer wall 50 and an inner wall 52. The outer wall is disposed furthest away from the treatment surface of the user, while the inner wall 52 is disposed closer thereto. The walls have a concave configuration in both horizontal and vertical directions and are constructed of a plastic material having a malleable rigidity so that the structure 10 can be bent and deflected slightly during use. The concavity comprises a multi-dimensional parabolic curvature for catching and reflecting the radiation back to the treatment areas. It is intended that the concavity is slightly smaller than the head of the user so that the mask has to be bent out when applied thereby providing a close but comfortable tightness on the user which will keep the assembly A in a desired position during use. The concavity also positions the therapeutic lamps or LEDs 12 in desired positions relative to the user. The spacing 54 between walls 50 and 52 receives the lamps 12 and circuitry 14 so that the lamps and circuitry are interposed between the walls for enhanced safety and convenience purposes. It can be seen that the spacing is diminished from the middle of the device towards the end portions 58, 60; however, the entire end perimeter of the assembly 10 is sealed

as the walls come together. Such a mating seal is typically effected through a sonic weld arrangement. Alternatively, local sealing points (not shown) can be employed to assemble the walls together with spaced intermediate seals. Thus, the inner and outer masks have different radii of concavity but present an integral structure as far as the user is concerned. The outer wall 50 primarily functions as a support for the lamps 12 and circuitry 14. With reference to FIG. 4 it can be seen that the lamps are disposed on the wall 50 in a predetermined manner for radiating treatment areas most susceptible for the phototherapeutic treatment. A minimum number of lamps 12 are intended but still enough to provide effective therapy. Alternatively, the lamps could be fixed to the inner wall 52. Regardless of which wall supports the lamps, the lamps need to be properly aligned with apertures 70 to desired treatment areas.

Rather than placing a plurality of LEDs randomly, the subject LEDs are specifically minimized in number and disposed relative to the treatment areas and wall parabolic reflectivity to effect the desired therapy. More particularly, it can be seen that the individual lamps 12, and associated inner wall apertures 70, are disposed to treat the most common areas benefiting from the therapy. The present embodiments illustrate a placement pattern useful for skin acne treatment. Other placement patterns are certainly intended to fall within the scope of the disclosed embodiments. Here three LED strips are seen and would typically comprise two blue strips on the top and bottom of a middle red strip, as these frequencies are most useful for acne treatment. The subject invention may include only blue, only red, or any other mixed combination of LED or other radiant energy form pattern. The illustrated pattern would thus have intensified therapeutic effect on the jaw line, chin, cheek and forehead, but not the eyelids. Light sources can include LEDs, fluorescents, lasers or infrareds as an example. Such sources can vary in the form of the radiant energy delivery. Pulsed light (IPL), focused light (lasers) and other methods of manipulating light energy are encompassed within the present embodiments. Other methods of light emission may comprise continuous, pulsed, focused, diffuse, multi wavelength, single wavelength, visible and/or non-visible light wavelengths.

The inner wall 52 is comprised of a smooth seamless reflective surface facing the treatment area and includes a plurality of apertures 70 matingly aligned relative to the lamps so that the lamps can radiate the therapeutic light through the apertures 70. Accordingly, the LEDs 12 are recessed relative to the inner wall 52 to preclude contact with the treatment surface and to make it very difficult for the lamps themselves to be in any way contacted by the user. Such an assembly results in a controlled communication of radiating therapy in a manner to impart a predetermined cone of therapeutic light on to a treatment area. The apertures are disposed relative to desired treatment areas and wall parabolic configuration for even light distributions across the treatment area. A combination of such a controlled cone of light, predetermined disposition of the lamps themselves on the platform, an inner reflective surface on the inner wall 52, and a controlled positioning of the assembly relative to the treatment area via a platform position relative to contact areas of the nose and the ears, presents an assembly which presents a highly predictable distributive pattern of the light (predetermined cones of light per light source), thereby minimizing the number of lamps 12 that need to be included for effective treatment.

With reference to FIGS. 2, 3 and 4, one embodiment comprises a support frame essentially comprising eyeglass frames as the associated support structure for the platform 10. Inter-

changeable lenses 24 can be used to adjust the level of protection afforded by the lenses or their relative shape. Although not shown therein, telescopic temple arms 28 may telescope for better sizing relative to the head size of the user. Formable ear latches can also be included as part of the temple arms. Alternatively, the arms could include a head strap. The pivotable joints 22 allow the wall structure to pivot relative to the frames so that a user may adjust light intensity relative to a treatment area by moving the layers closer or farther away. As noted above, the platform 10 is flexible with a concave parabolic bias, but still has a malleable rigidity. When the frame 10 is received on the user, it is disposed to expand the platform parabolic bias to form a match to the size of the user. Eyeglass frame reference contact points of the user may comprise the nasion area, the nose bridge and the ears of the user. Alternatively, the support frame can comprise a goggle and head strap configuration relying on the nasion area.

Battery pack B (FIG. 5) holds the supply batteries 81 and processing controller 82 that is in electrical communication with the lamps through wire 80. The wiring between connectors 83 and LED strips 12 is not shown to avoid drawing clutter but is contained between walls 50, 52. The battery pack will include an on-off switch 84 and a user interface 86. The processing controller 82 may include a variety of control systems indicating device usage to the user. Such a system would be a counter. The user interface may comprise a display for a variety of useful information from the controller control systems to the user, such as a count of the number of times of usage and communication that the device has been used enough times such that the LEDs themselves have degraded and a replacement is recommended for the therapy.

"Try-me packaging", FIGS. 11 and 12, presents a demonstrative use opportunity to a potential user while still packaged. The subject embodiments further include a packaging assembly 210 containing the device wherein a switch S1 (not shown) for operating the lamp assembly has a multi-position effect functionality including an on-mode, an off-mode and a try-me mode. The try-me mode is accessible while the lamp assembly is contained in packaging for displaying lamp operation to a user. The packaging includes a clear or translucent cover 212 over the device A. A try-me time-out circuit is included for limiting the try-me display time of lamp operation, such as, for example two seconds. Lamp on-time as measured by the counter is segregable from the try-me mode so that try-me usage will not affect dosage count of the device for actual therapy. It is assumed try-me usage time will be negligible relative to a dosage use time.

The subject devices include multiple benefits to the user in a wearable hands-free device with a remote battery pack. The device is properly positionable in a relatively automatic way with minimal human touch by exploiting user reference contact points, and is particularly hand-free during use. No sharp or hot surfaces are engageable by the user. A smooth seamless surface faces the user and is properly spaced from the treatment area to provide enhanced ventilation and minimal discomfort during treatment.

With particular reference to FIG. 13, a flowchart illustrating an operational embodiment of a device control is illustrated. The device envisioned as operational by FIG. 10 includes two switches, S1, S2, at least one of which are required to be closed to communicate energy from an energy source to the therapeutic lamps. S2 is a safety switch which is open when the device is in sales packaging so that only the "try-me" mode is enabled when S2 is open. After removal from the packaging, S2 can be closed and the device can be operated in a normal mode. Accordingly, after start 100, and in a situation when S2 is opened 102, such as when the device is still within

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the packaging, the system will remain in a stand-by mode wherein the GUI interface (such as an LCD) is off 104. If S2 remains closed 106 but S1 is pressed 108 (e.g. FIG. 12), then the device can enter the "try-me" mode 110 wherein the LEDs will light up for two seconds, then turn off 112. Such a "try-me" mode operational demonstration to a user while the device is in a packaging communicates to the user actual operation and can assist in a decision to purchase, or have a better understanding of how the device operates. If the device is removed from the packaging, and S2 is closed, the device will enter normal mode 114 wherein the GUI will include an LCD displaying the number of cycles left according to a counter value. Note that counter value 134 is not affected by any try-me sampling operation.

In one embodiment, the unit will count down from 55 to 1, as 55 uses is deemed to be enough to diminish enough LED efficiency from the peak operational mode of LEDs when they are used as the therapeutic radiant lamps. Accordingly, upon a user picking up the device, they will immediately know how many cycles are left for acceptable and recommended operation of the device from 55 more uses all the way down to 0 118. If the display shows a count greater than 0, and the user is interested in a therapy session, the user will turn the unit on by pressing S1 120 wherein the LEDs will ramp up to radiant operation 122 in approximately 1.5 seconds and then will radiate continuously 124 until either the user desires to turn off the unit by again pressing S1 126 so that the LEDs can ramp down 128 or until a therapy session has timed out 130 such as for remaining radiant for approximately ten minutes. After completing an appropriate run time of a therapy session, the LEDs will ramp down 132 and the GUI display to the user will subtract 1 from the counter value 134.

With reference to FIGS. 9 and 10, an alternative embodiment is shown wherein a controller B is eliminated and the energy source and processing control are all integrally assembled in the device 90. In this case, the platform 20 and walls 50, 52 remain substantially the same as per the FIG. 1 device. However, the energy source such as batteries 92 are disposed as part of the eyeglass temple arms wherein wires provide energy from the batteries 92 to the LEDs through the hinge points of the frame 20 and into the spacing 54 for ultimate connection to the LEDs themselves. The controller 94 including LCD display 96 is also housed behind the reflective wall 52 relative to the user, which wall 52 can include a relatively small cutout (not shown) for the screen 96.

The embodiment of FIGS. 9 and 10 is thus even more compact than the embodiment of FIG. 1, and more hands-free therefrom, as it eliminates the need to somehow manage the controller B during operation.

FIG. 11 shows yet another alternative embodiment wherein the outer wall 50' and the inner wall 52' are not spaced by being configured with different curvatures. Rather, the walls 50', 52' have the same curvature, but the inner wall 52' has an off step 300 depending from the wall perimeter to form a flange raised from the surface of the wall 52' towards the outer wall 50' to effectively form a spacer between the two. In one embodiment, the flange 300 is about 8 millimeters wide, continues around the entire perimeter of the wall 52' and is about 0.5 millimeters thick for effecting the desired spacing between the inner and outer walls. In this embodiment the flange 300 is part of the inner wall 52', and as in the foregoing embodiment, both walls are vacuumed formed plastic, either PET or PVC. The assembly of FIG. 11 can be sonic welded, glued, or adhered with double-sided adhesive. Alternatively, a plurality of intermediate sealing points (not shown) could be used instead of a continuous seal. In this embodiment it can be seen that there is an alternative number

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of LEDs 12' opposite the forehead portion of the assembly relative to the user so that the number of apertures 70' and LEDs 12' are reduced from the foregoing embodiment from eighteen to fifteen. Either number are viable implementations of the desired therapy, although the other componentry of the assembly FIG. 11 is substantially the same as that shown in the foregoing Figs.

Another alternative embodiment from the device shown in FIG. 1, etc. includes disposition of a transparent flexible polymer sheet (not shown) incorporating working LED lights between outer wall 50 and inner wall 52. Such a configuration would comprise the polymer film being coated with a transparent thin layer of carbon nanotubes in a specific configuration to act as the wire pathways to connect LED lights. The polymer would protect the LEDs from user contact. Such protective polymers are available under the Lumisys brand.

Yet another alternative embodiment includes such a transparent flexible polymer sheet wherein a reflective film is applied on top of the flexible polymer sheet including cutouts opposite the LEDs for allowing the radiant light to communicate through a reflective area in a manner as shown in the relationship of FIG. 4 between the LEDs' 12 inner wall 52 through aperture 70. This arrangement may also include a flexible outer wall 50 on the other side of the flexible polymer sheet to provide malleable rigidity to the film, reflective coating assembly.

Yet another alternative embodiment includes a plurality of sensors (not shown), such as temperature or radiant energy sensors, disposed relative to inner wall 52 to monitor radiant energy exposure of a user during therapy. If such exposure is deemed inappropriate for any reason, sensing thereof is recognized by controller B and the therapy can be halted.

It will be appreciated that variants of the above-disclosed and other features and functions, or alternatives thereof, may be combined into many other different systems or applications. Various presently unforeseen or unanticipated alternatives, modifications, variations or improvements therein may be subsequently made by those skilled in the art which are also intended to be encompassed by the following claims.

What is claimed is:

- 1. A phototherapy device comprising:
 - a therapeutic lamp platform comprising a mask having a concave parabolic bias and a malleable rigidity and including a plurality of radiant lamps having a mixed combination of different wavelength radiant energy and disposed to communicate the radiant energy to a treatment area of a user, and further including a first wall and a reflective wall having apertures for communicating the radiation radiant energy to the treatment area wherein the reflective wall disperses the radiant energy over the treatment area; and
 - a frame for supporting the mask on the user including an eye shielding lens wherein upon device receipt on the user, the mask parabolic bias expands to a form to match a size of the user.
- 2. The device of claim 1 wherein at least a portion of the lamps are interposed between the first and reflective wall.
- 3. The device of claim 2 wherein the lamps are mounted on the first wall.
- 4. The device of claim 1 wherein the reflective wall is relatively smooth and seamless towards the user.
- 5. The device of claim 1 wherein the frame is sized to space the mask from the used treatment area at a desired position for proper therapeutic treatment.
- 6. The device of claim 5 wherein the frame includes user contact points disposed to guide the mask to the desired position.

- 7. The device of claim 1 wherein at least a portion of the lamps are recessed relative to the reflective wall.
- 8. The device of claim 1 wherein the different wavelength radiant energy comprises at least two of red, blue or infrared.
- 9. A phototherapy device comprising:
 - a wearable therapeutic lamp platform including a plurality of radiant lamps comprising a mixed combination of different wavelength radiant energy and a reflective wall with a plurality of radiant energy apertures aligned with the radiant lamps and disposed to communicate the radiant energy to a user treatment area, and wherein the reflective wall is further formed to disperse the radiant energy over the treatment area; and
 - a frame for supporting the platform on a user.
- 10. The device of claim 9 further including an outer wall spaced from the reflective wall and wherein the radiant lamps are interposed between the outer wall and the reflective wall.
- 11. The device of claim 9 wherein the different wavelength radiant energy comprises at least two of red, blue or infrared.
- 12. The device of claim 9 wherein the reflective wall is a smooth and seamless wall towards the user.
- 13. The device of claim 12 wherein the reflective wall has a parabolic bias for the dispersing of radiant energy across a treatment area of the user.
- 14. The device of claim 9 wherein the frame comprises an eyeglass frame.
- 15. The device of claim 14 wherein the eyeglass frame further includes an eye shielding lens.
- 16. The device of claim 1 wherein the support frame comprises an eyeglass frame.
- 17. The device of claim 1 wherein the support frame comprises goggles.

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