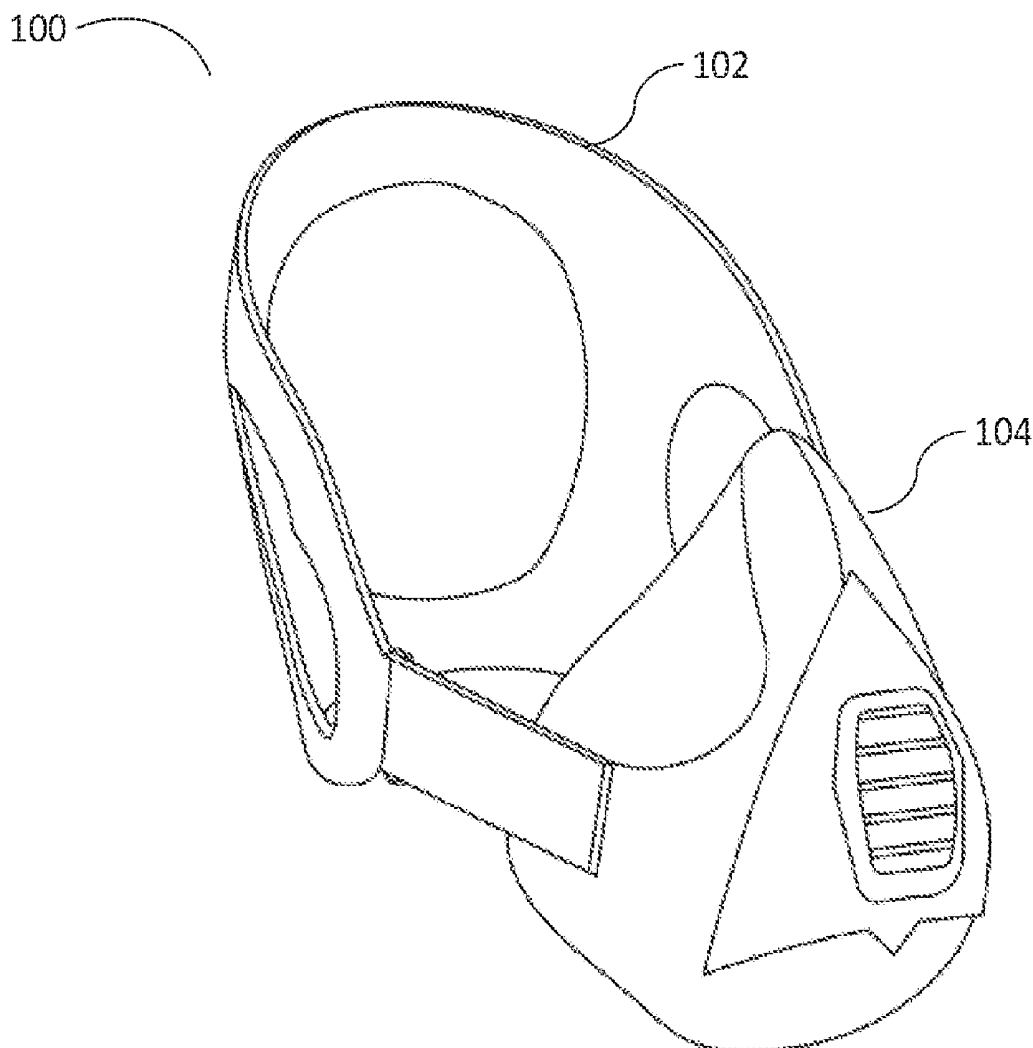




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(19) **United States**(12) **Patent Application Publication**
McKeown et al.(10) **Pub. No.: US 2017/0333749 A1**(43) **Pub. Date: Nov. 23, 2017**(54) **SPORTS MASK SYSTEM***A63B 21/00* (2006.01)*A63B 24/00* (2006.01)(71) Applicants: **Patrick McKeown**, Co. Galway (IE);
Teresa McKeown, Co. Galway (IE)(52) **U.S. Cl.**CPC *A63B 23/18* (2013.01); *A63B 21/00069*
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21/0085 (2013.01); *A63B 21/4003* (2015.10);
A61B 5/6803 (2013.01); *A61B 5/14552*
(2013.01); *A63B 2230/208* (2013.01)(72) Inventors: **Patrick McKeown**, Co. Galway (IE);
Teresa McKeown, Co. Galway (IE)(21) Appl. No.: **15/371,461**(22) Filed: **Dec. 7, 2016****Related U.S. Application Data**(60) Provisional application No. 62/337,376, filed on May
17, 2016.**Publication Classification**(51) **Int. Cl.***A63B 23/18* (2006.01)*A61B 5/1455* (2006.01)*A63B 21/008* (2006.01)*A61B 5/00* (2006.01)(57) **ABSTRACT**

The present invention provides a sports mask for breathing training. The sports mask includes a head assemble containing clips to hold the mask against the head. The sports mask further includes a face band assembly that includes straps that are received by the clips present on the head assembly to hold the face assembly against the face of a user. The face assembly includes a face mask unit comprising an airflow valve. The airflow valve includes an airflow resistance varying module that helps in varying flow of air into the airflow valve. The control of airflow resistance varying module can be either manual or automatic when the mask is connected to a wearable device or a vital parameter collection device.



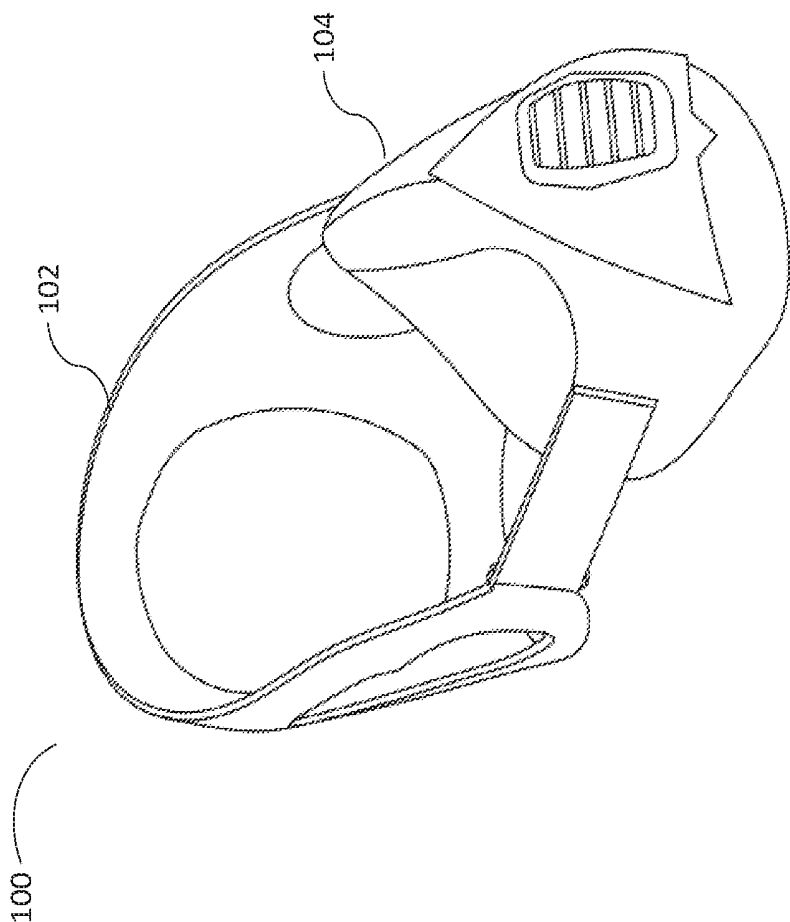


FIG.1

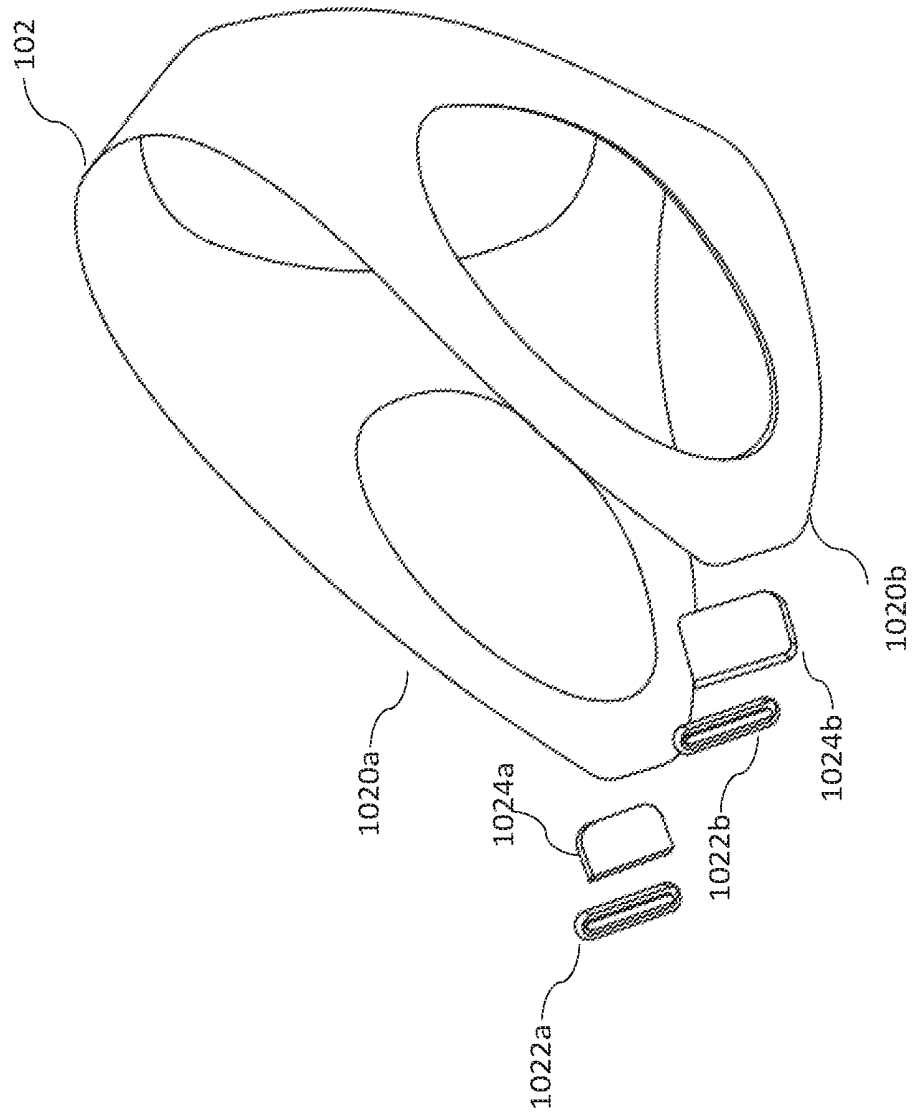


FIG. 2

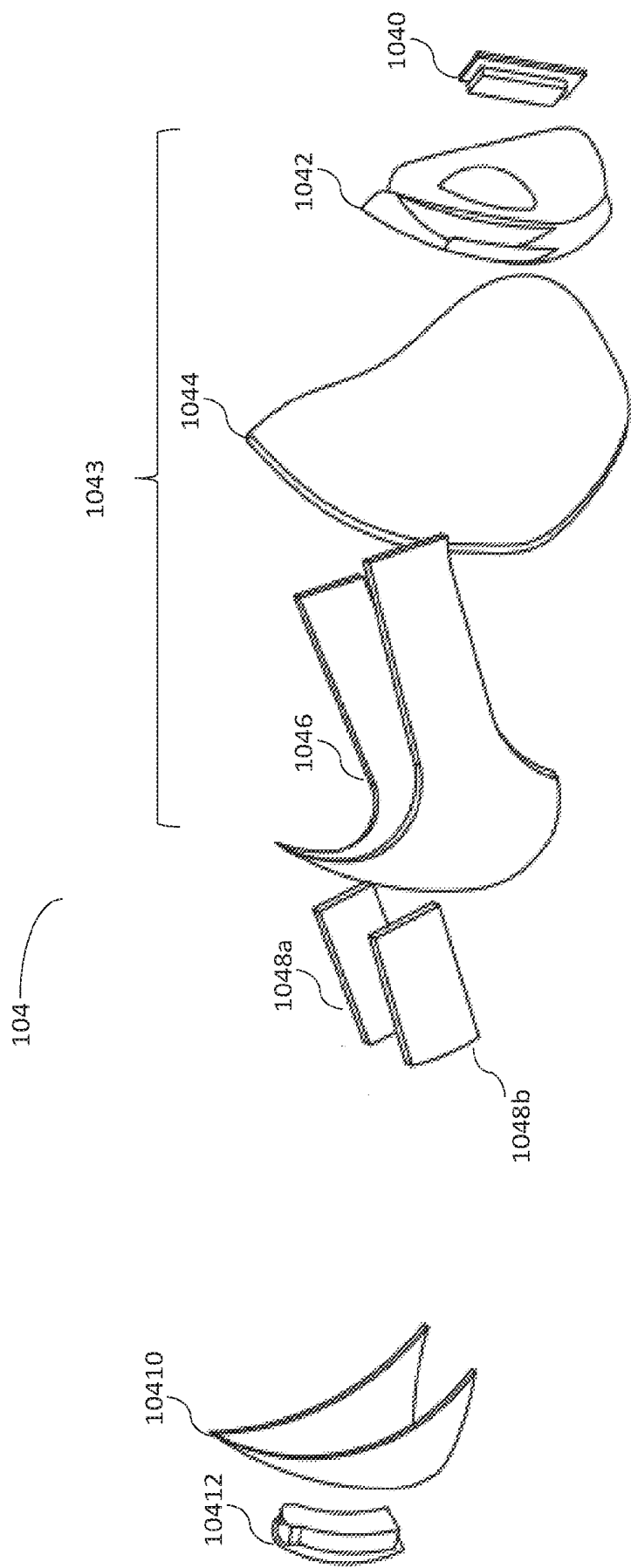


FIG. 3

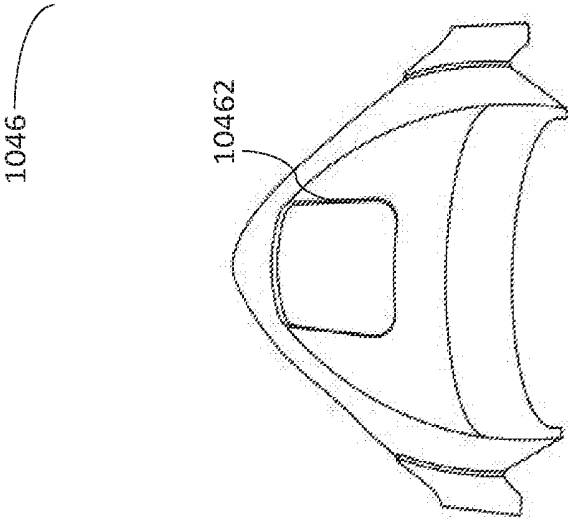


FIG. 4a

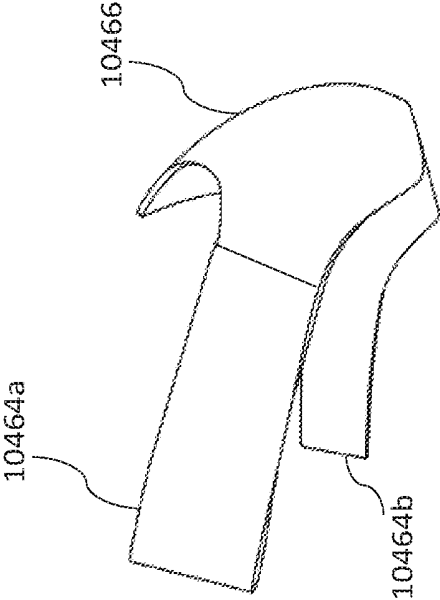


FIG. 4b

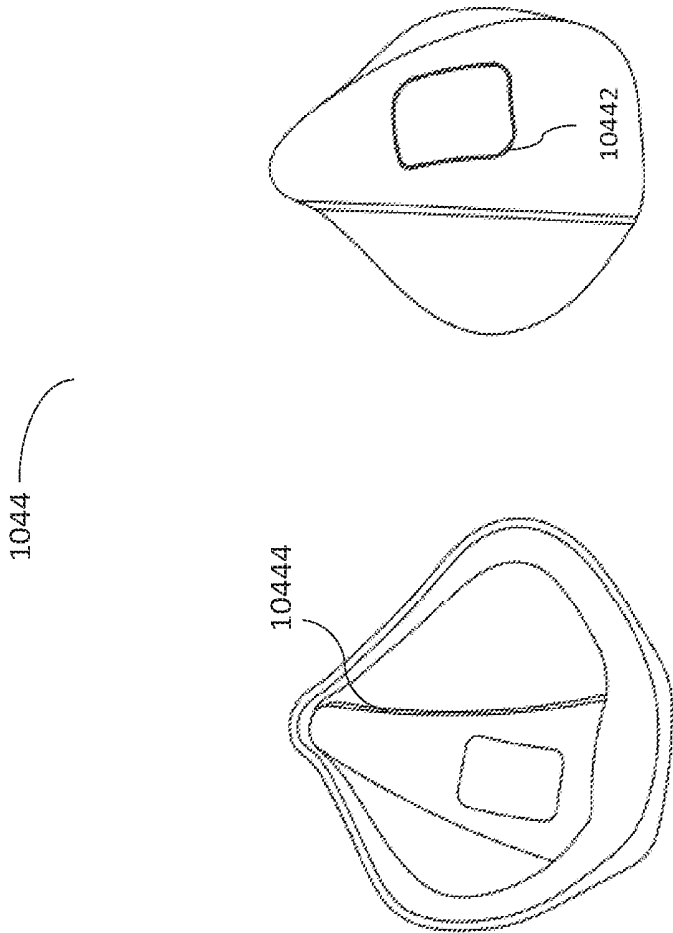


FIG.5b

FIG.5a

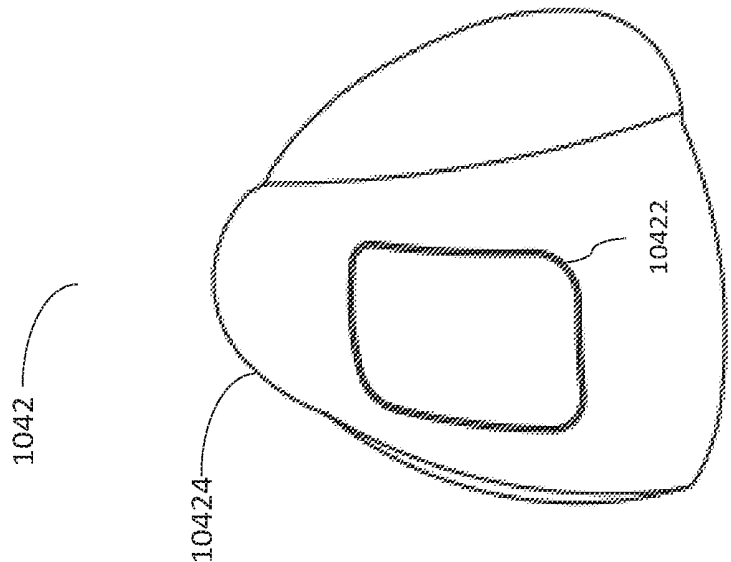


FIG. 6

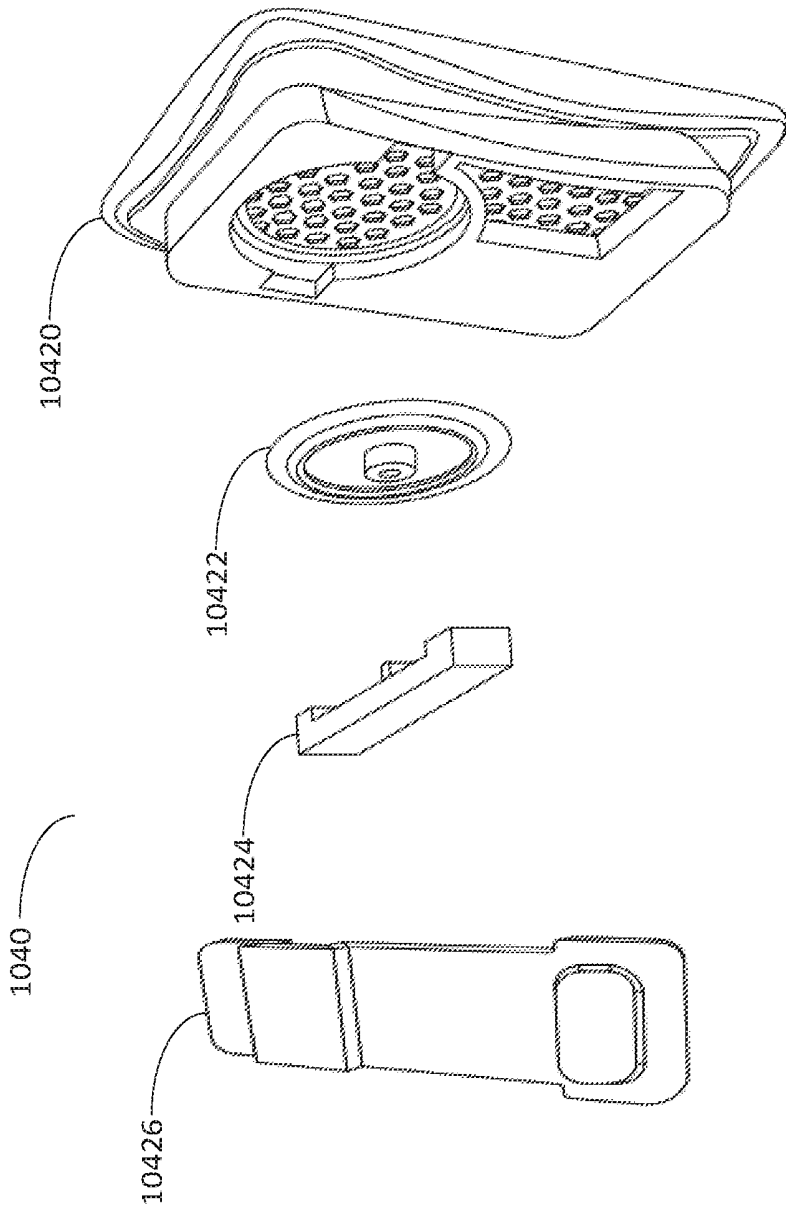
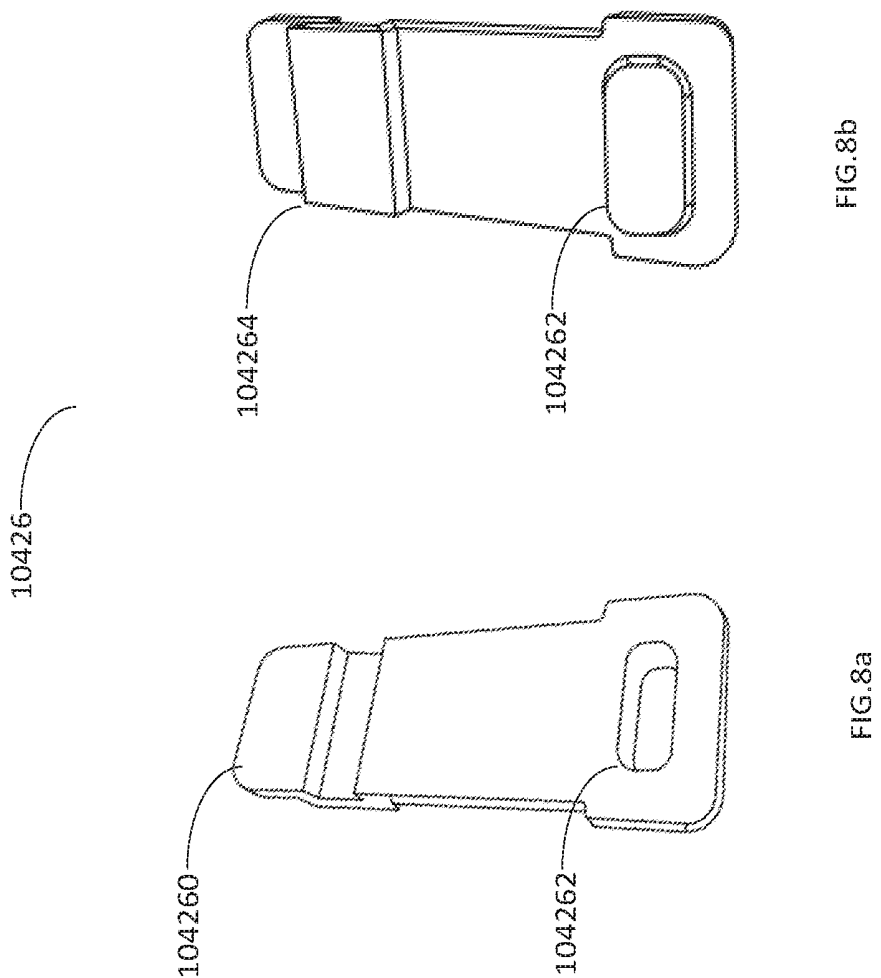


FIG. 7



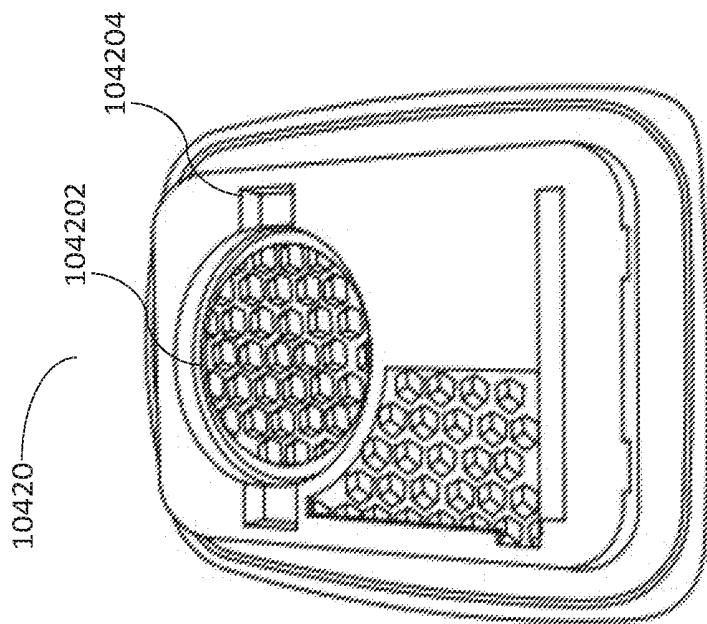


FIG. 9

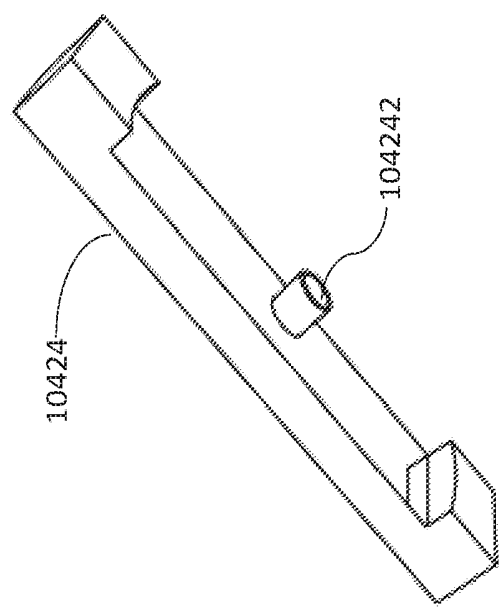


FIG.10

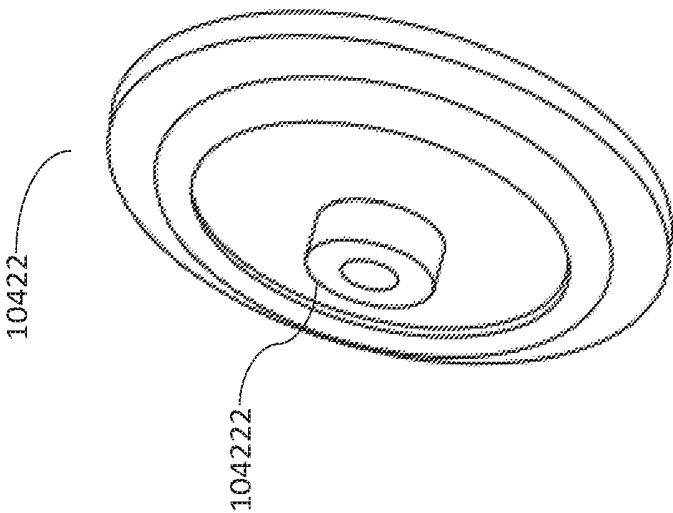


FIG.11

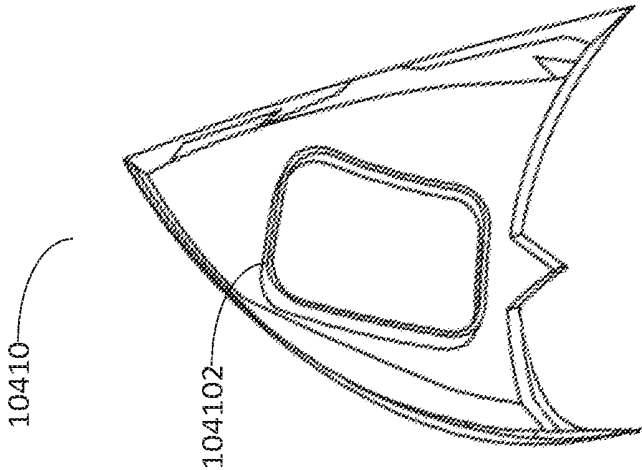


FIG.12

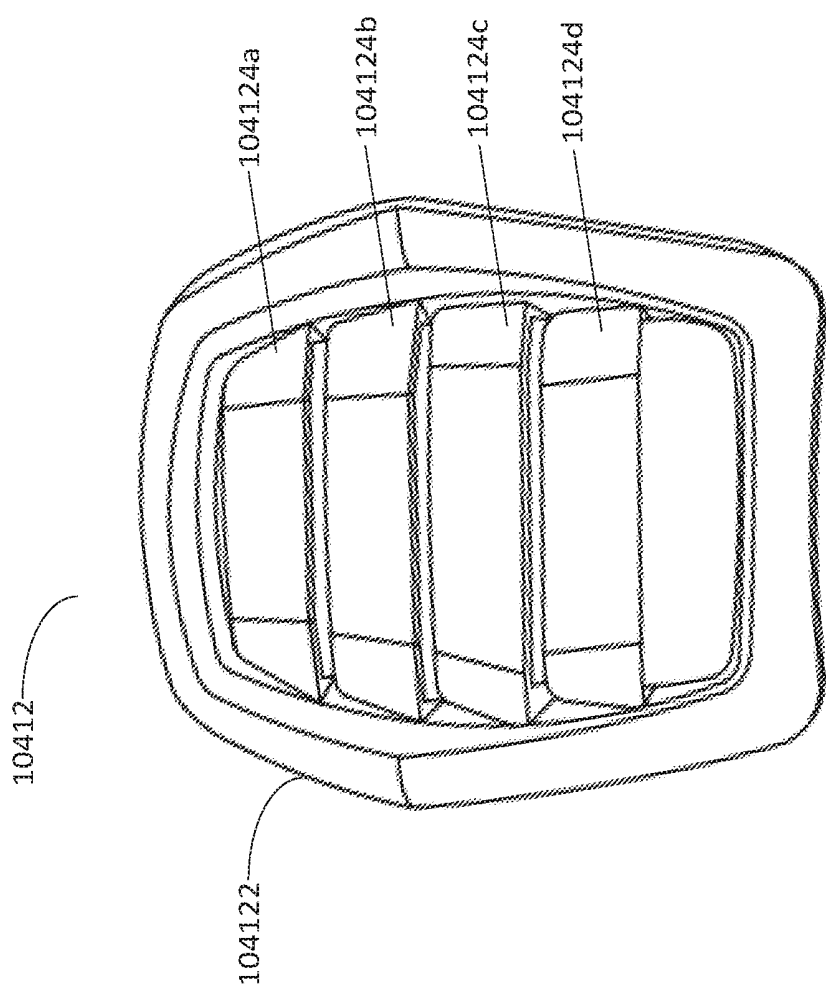


FIG. 13a

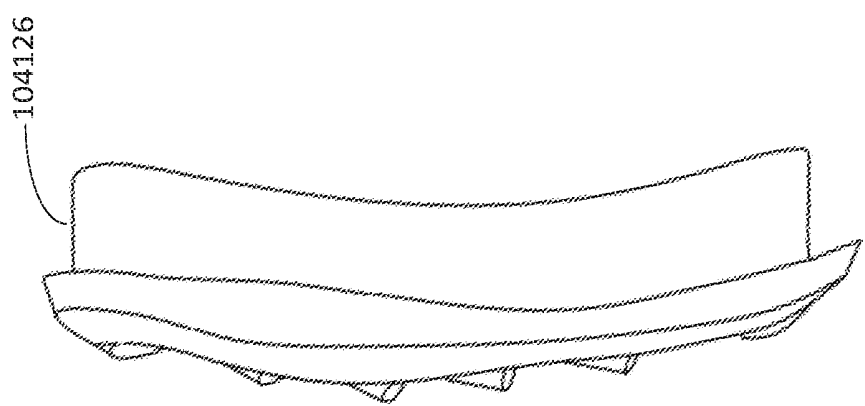


FIG. 13b

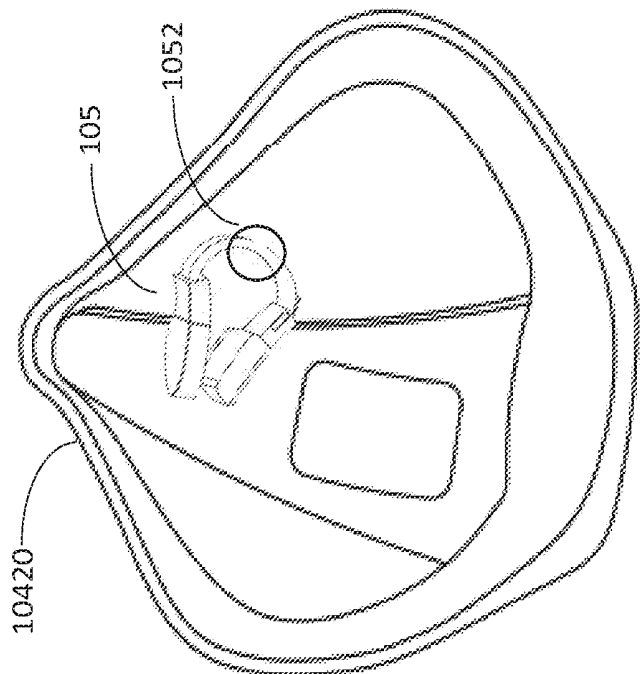


FIG.14

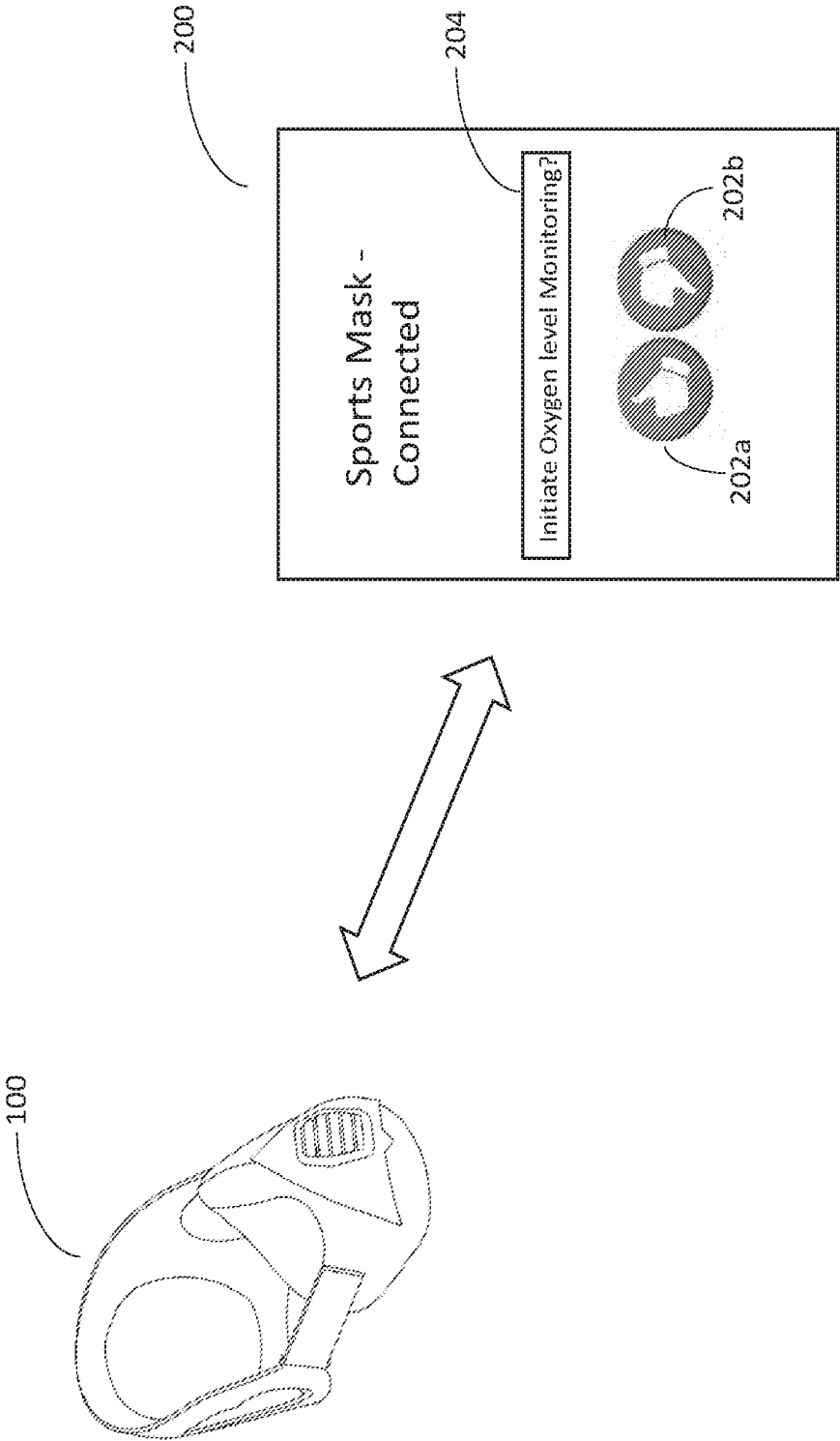


FIG.15

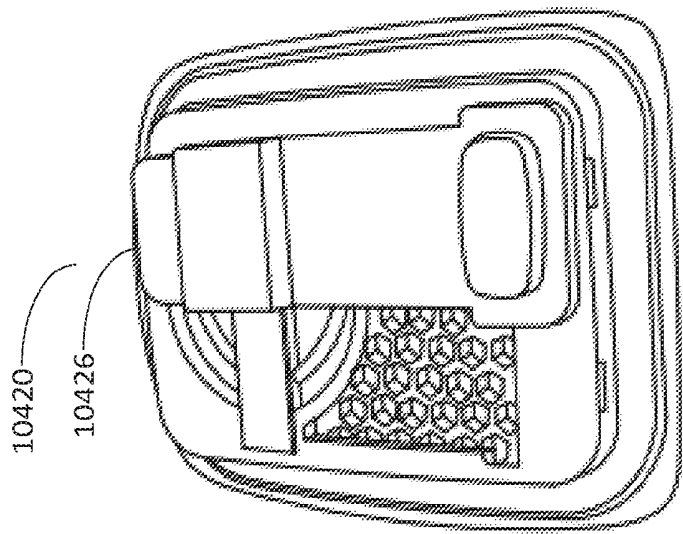


FIG. 16a

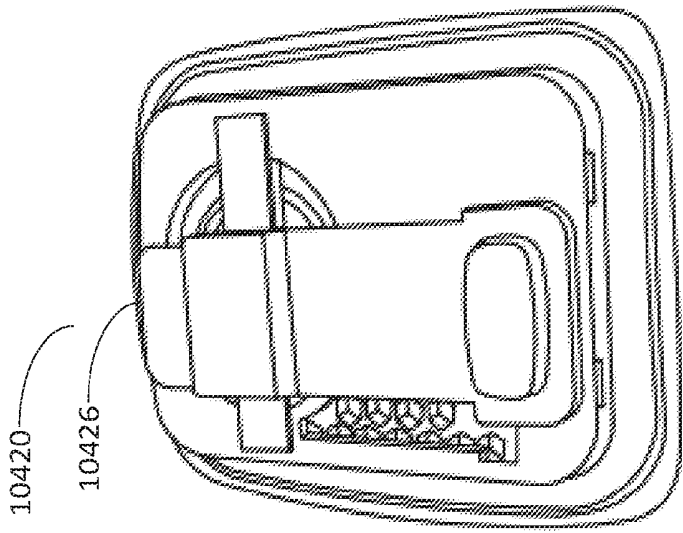


FIG. 16b

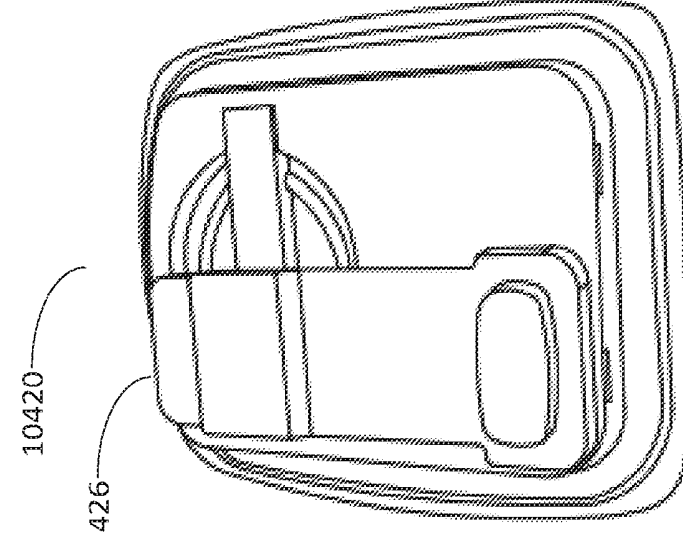


FIG. 16c

SPORTS MASK SYSTEM

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TECHNICAL FIELD

[0002] The present disclosure relates to sports mask and more particularly the disclosure relates to a sports mask for adjusting inhalation resistance settings to a user. As the user exercises, resistance settings of the sports mask can be varied based on the level of exertion of the user or blood oxygen saturation level of the user. Restricting air intake during physical exercise can provide the respiratory muscles with an extra load, which in turn works the pulmonary muscles more intensely to strengthen them. Persons with breathing difficulties including asthma, athletes and healthy persons can improve respiratory muscle strength by breathing against resistance.

BACKGROUND

[0003] Respiratory muscle training is an essential training for athletes wishing to compete at a high level. Respiratory muscle training helps athletes to prepare and get ready for high exertion programs. Restricting air intake during physical exercise can provide the respiratory muscles with an extra load, which in turn works the pulmonary muscles more intensely to strengthen them. Another function of the mask is to pool carbon dioxide during breathing, part of which is inhaled into the lungs to condition the respiratory center in the brain to a higher tolerance of carbon dioxide. This in turn reduces breathlessness during physical activity. Persons with breathing difficulties including asthma, athletes and healthy persons can improve respiratory muscle strength by breathing against resistance.

[0004] The treatment is achievable with the aid of masks which have been designed particularly for this function and which include a check valve that allows air to be inhaled with resistance whereas, little or no resistance is provided while the air is being exhaled.

[0005] Some of such masks include mask disclosed in U.S. Pat. No. 6,554,746, to McConnell et al discloses an inspiratory muscle training device including an opening for the passage of air to be both inhaled and exhaled and an inlet permitting air to be inhaled to enter the chamber and to pass through the opening. There is provided an adjustable valve to vary the resistance to inhaling. U.S. Pat. No. 4,973,047, to Norell, discloses a therapeutic device for lung exercise which requires a mouthpiece, and has a rotatably adjustable air intake valve. U.S. Pat. No. 4,549,543, to Moon, discloses an air filtering face mask and the concept of a flexible face piece which conforms to the shape of the face of the wearer, and is held in place by straps or a harness device.

[0006] However, the prior art provide separate passages for inhaling and exhaling, which may be worn by a user, in intensely vigorous exercise, without impeding the nature of the exercise conducted. Also, since the masks have manually adjustable valves and, since there is no way that the breath-

ing restrictions could be correlated with the breathing restrictions, hence the breathing training cannot reach an optimum level.

[0007] Therefore, an improvement is required on existing masks to optimize the inhalation training for athletes and healing of other ailments as discussed above.

SUMMARY

[0008] The present invention comprises a breathing exercise apparatus having one or more of the features recited in the appended claims and/or one or more of the following features, which alone or in any combination may comprise patentable subject matter.

[0009] Accordingly, in an embodiment of the invention, there is provided a sports mask. The sports mask includes a head assembly that holds the mask to the head of a user firmly. The mask further contains a face band assembly that holds a face mask unit to mouth and nose of the user. The face mask unit further contains an air flow valve that helps the user to inhale and exhale during exercise or trainings. This air flow valve furthermore includes an air flow resistance varying module. This module helps to vary flow of air in the air flow valve.

[0010] In another embodiment of the invention, there is provided a valve apparatus for a sports mask. The valve apparatus includes a valve grill that helps in protection of the innards of the valve apparatus. The apparatus further includes an airflow valve that is communicatively placed beneath the grill. There is further placed, an airflow cavity, beneath the airflow valve that allows entry and exit of air during breathing event of the user. The apparatus further includes an air flow resistance varying module that further includes a slider. The movement of the slider increases or decreases the resistance of air flow.

[0011] In yet another embodiment of the invention is provided a sports mask. The sports mask includes a head assembly that holds the mask to the head of a user firmly. The mask further contains a face band assembly that holds a face mask unit to mouth and nose of the user. The face mask unit further contains an air flow valve that helps the user to inhale and exhale during exercise or trainings. This air flow valve furthermore includes an air flow resistance varying module. This module helps to vary inflow of air in the air flow valve that varies according to the movement of the air resistance varying module. The sports mask further includes a vital parameter measuring device that is communicatively connected to the air flow resistance varying module. The vital parameter measuring device measure real time vital parameters of the user and based on the values of the vital parameters varies the position of the air flow resistance varying module that in turn increases or decreases resistance to inflow of air of the user.

[0012] Additional features and advantages are realized through the techniques of the present disclosure. Other embodiments and aspects of the present disclosure are described in detail herein and are considered a part of the present disclosure. For a better understanding of the present disclosure with advantages and features, refer to the description and to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The foregoing summary, as well as the following detailed description of various embodiments, is better under-

stood when read in conjunction with the drawings provided herein. For the purposes of illustration, there is shown in the drawings exemplary embodiments; however, the presently disclosed subject matter is not limited to the specific methods and instrumentalities disclosed.

[0014] FIG. 1 illustrates a line diagram depicting a sports mask, in accordance to an embodiment of the invention.

[0015] FIG. 2 illustrates a line diagram depicting head assembly and various parts, in accordance to another embodiment of the invention.

[0016] FIG. 3 illustrates a line diagram depicting exploded view of face assembly, in accordance with an embodiment of the invention.

[0017] FIG. 4A illustrates a line diagram depicting inner view of an outer unit of face mask unit of the face assembly, in accordance with an embodiment of the invention.

[0018] FIG. 4B illustrates a line diagram depicting side view of an outer unit of face mask unit of the face assembly, in accordance with an embodiment of the invention.

[0019] FIG. 5A, illustrates a line diagram depicting inner view of a middle unit of the face mask unit of the face assembly, in accordance with an embodiment of the invention.

[0020] FIG. 5B illustrates a line diagram depicting front view of a middle unit of the face mask unit of the face assembly, in accordance with an embodiment of the invention.

[0021] FIG. 6 illustrates a line diagram depicting innermost unit of the face mask unit of the face assembly, in accordance with an embodiment of the invention.

[0022] FIG. 7 illustrate a line diagram depicting exploded view of an airflow valve assembly of the face assembly, in accordance with an embodiment of the invention.

[0023] FIG. 8A illustrates a line diagram depicting back side view of a slider unit, in accordance with an embodiment of the invention.

[0024] FIG. 8B illustrates a line diagram depicting front view of a slider unit, in accordance with an embodiment of the invention.

[0025] FIG. 9 illustrates a line diagram depicting an airflow vent, in accordance with an embodiment of the invention.

[0026] FIG. 10 illustrates a line diagram depicting a valve catcher, in accordance with an embodiment of the invention.

[0027] FIG. 11 illustrates a line diagram depicting a valve, in accordance with an embodiment of the invention.

[0028] FIG. 12 illustrates line diagram depicting a grill cover, in accordance with an embodiment of the invention.

[0029] FIG. 13A, illustrates a line diagram depicting front view of a grill, in accordance with an embodiment of the invention.

[0030] FIG. 13B illustrates a line diagram depicting side view of a grill, in accordance with an embodiment of the invention.

[0031] FIG. 14 illustrates line diagram of a vital parameter calculating unit attached to inner side of outer cover of the face assembly, in accordance with an embodiment of the invention.

[0032] FIG. 15, illustrates a diagram depicting a wearable device connected to sports mask, in accordance to an embodiment of the invention.

[0033] FIG. 16A illustrates a line diagram depicting slider for low intake of air, in accordance with an embodiment of the invention.

[0034] FIG. 16B illustrates a line diagram depicting slider for medium intake of air, in accordance with an embodiment of the invention.

[0035] FIG. 16C illustrates a line diagram depicting slider for high intake of air, in accordance with an embodiment of the invention.

DETAILED DESCRIPTION

[0036] The presently disclosed subject matter is described with specificity to meet statutory requirements. However, the description itself is not intended to limit the scope of this patent. Rather, the inventors have contemplated that the claimed subject matter might also be embodied in other ways, to include different steps or elements similar to the ones described in this document, in conjunction with other present or future technologies. Moreover, although the term “step” may be used herein to connote different aspects of methods employed, the term should not be interpreted as implying any particular order among or between various steps herein disclosed unless and except when the order of individual steps is explicitly described.

[0037] Referring now to FIG. 1, a line diagram that depicts a sports mask **100**, in accordance with an embodiment of the invention. The sports mask includes a head assembly **102** that helps in keeping the sports mask **100** fixed to head of a user. The head assembly **102** is linked to a face assembly **104**. Details of head assembly **102** and face assembly **104** will be discussed in detail in subsequent figures. In an embodiment of the invention, the sports mask **100** may include a connecting button (not shown) to initiate a connection with a wearable device. Details of the embodiment will be described later.

[0038] Now, referring to FIG. 2, that depicts a head assembly **102** and its various constituent parts. The head assembly, as described keeps the sports mask fixed to the head of the user. In an embodiment of the invention, the head assembly **102** is made up of durable, and stretchable fabric material. However, there can be other materials as well that may be utilized like fiber, plastic etc. Head assembly **102** includes a left strip **102a** and a right strip **102b**. Each of the strips **1020a** and **1020b** further includes a locking clip **1022a** and **1022b** joined to the strips **1020a** and **1020b** by joining patches **1024a**, and **1024b**. The clips **1022a** and **1022b**, may be made up of metal, plastic, fiber, etc. The clips **1022a**, and **1022b** are utilized to receive the face assembly **104** and place it firmly on mouth and nose of the user. Details of the face assembly **104** will be discussed in detail.

[0039] Now, referring to FIG. 3 that depicts a face assembly **104** of the sports mask **100**, in accordance with an embodiment of the invention. Face assembly **104** is placed on the mouth and nose region of the user while being used. Face assembly **104** includes various components that will now be discussed in detail. There is present a face mask unit **1043**. The face mask unit **1043** is placed within the face assembly **104** to enable inhalation and exhalation of air by the user. The face mask unit further contains an outer unit **1046**, a middle unit **1044**, and an innermost unit **1042**. Details of all will be described later.

[0040] Still referring to FIG. 3, the face assembly **104**, further includes a grill cover **10410**. Grill cover **10410** is provided to keep safe and receive a grill **10412**. Grill cover **10410** may be made up of plastic, or fiber or any other strong material. The grill cover, as disclosed above receives the grill **10412**. Details of the grill **10412** will be received later.

The grill cover **10410** with the affixed **10412** is attached to the outer unit **1046** of the face mask unit **1043**. The attachment is done through attachment straps **1048a** and **1048b**. The attachment straps can be either glued or sewn to the outer unit **1046**. However, there can be other means of attaching the grill cover to the outer unit **1046**. The face assembly **104** further contains an air flow module **1040**. The air flow valve assembly **1040** can be fixed to the innermost unit **1042** of the face mask unit **1043** and is finally in communication with the grill **10412** when all the parts are connected to each other. Further details of the module will be explained later.

[0041] Now referring to FIG. 4A and 4B that depict inner view and side view respectively of the outer unit **1046** of the face mask unit **1043**. The outer unit **1046** includes a left strap **10464a** and a right strap **10434b** that are received by the left clip **1022a** and **1022b** of the head assembly. This arrangement then places this face mask unit **1043** firmly on the head of the user. The outer unit **1046** also includes a cavity **10462** that is present to place and connect the grill **10412** to the air flow valve assembly **1040**. In an embodiment of the invention, the straps **10464a** and **10464b** may have Velcro fastener at their ends to tighten or loosen and adjust the placement of the face assembly **104**. In other embodiments, the straps **10464a** and **10464b** can be flexible and can be permanently fixed to the clips **1022a** and **1022b**. The straps **10464a** and **10464b** can be fixed to main body **10466** of the mask. The main body **10466** can be made up of, however not limiting the scope of the invention, high grade plastic, fiber, foam, etc.

[0042] Now, further referring to FIG. 5A, .5B depicting inner view and front view respectively of the middle unit **1044** of the face mask unit **1043**. The main body **10444** of the middle unit **1044** can be made up of any of a plastic, a fabric, a foam, etc. the middle unit **1044**, includes a cavity **10442** that is configured to receive and connect the grill **10412** and the air flow valve assembly **1040**.

[0043] Now referring to FIG. 6, that illustrates the innermost unit **1042** of the face mask unit **1043**. The innermost unit **1042** includes a cavity **10422** for helping the air flow valve assembly **1040** to connect with the grill **10412**. The main body **10421** of the innermost unit **1042** is made up of any of a plastic, a foam, and a fabric.

[0044] Now referring to FIG. 7 that illustrates exploded view of an airflow valve assembly **1040**, in accordance with an embodiment of the invention. The airflow valve assembly **1040**, includes an airflow vent **10420**. This is the innermost unit of the airflow valve assembly **1040**. The airflow vent **10420** is in direct communication with nose and mouth of the user. The airflow vent **10420**, receives an airflow valve **10422** that is fixed on the airflow vent **10420** using a valve catcher **10424**. The airflow valve catcher **10424**, fixes the airflow valve **10422** on to the airflow vent **10420**. The airflow valve assembly **1040**, further includes a slider unit **10426**. The slider unit **10426**, is connected to the valve catcher **10424** on which the slider unit **10426** may be able to slide. The sliding mechanism can be either manual or automatic. The slider unit **10426**, can also be further connected to a motor (not shown in figure) that may help it to slide left or right for opening or closing of the airflow vent **10420**. The opening and closing increases or decreases flow of air for the user performing or undergoing training exercise.

[0045] Now referring to FIG. 8A and 8A, illustrating back side view and front view respectively of the slider unit **10426**. In an embodiment of the invention, slider unit **10426** includes a sliding button **104262** for manually sliding the slider unit **104262**. Also, there may be present a sliding notch **104264** that helps in sliding movement. However, in other embodiments the slider unit **104262** can be connected to a small motor (not shown in figure) to facilitate the sliding movement. The slider unit **104262** may be made up of rubber, plastic, or metal.

[0046] Now referring to FIG. 9, illustrating an airflow vent **10420** that helps in inflow and outflow of air to the user. The airflow vent **10420** includes air holes **104202** in hexagonal form. However, there may be different form factor of holes that may be utilized for the same purpose. The airflow vent **10420** also, includes a valve catcher notch **104204** that receives the valve catcher **10424**. It is to be noted that the airflow vent **10420** can have any other different configuration. The present configuration (vertical configuration) of half body of the airflow vent **10420** having air holes **104202** and half body being opaque has been shown for exemplary purposes. In other embodiments, the configuration can be changed to a horizontal configuration.

[0047] Now referring to FIG. 10, illustrates the valve catcher **10424** that includes a catching notch **104242** to fix the valve **10422** on to the airflow vent **10420**. The material of the valve catcher can be anyone of a metal, plastic, or fiber, etc.

[0048] Now referring to FIG. 11 illustrating the valve **10422** in accordance with an embodiment of the invention. The material of the valve can be a plastic, a rubber, or a foam. It is to be understood that the shape of the valve can be varied as per the design preferences. Here however, for the purposes of example, the shape has been chosen as to be circular. The valve **10422** includes a notch **104222** that receives the catching notch **104242** to fix the valve on to the airflow vent **10420**.

[0049] Now referring to FIG. 12, illustrating the grill cover **10410**. The grill cover **10410** can be made up of anyone of a metal, plastic, fiber, foam or a hardened cloth. Grill cover **10410**, includes an opening **104102** that facilitates in communication of the airflow assembly **1040** with the grill **10412** as depicted in FIG. 13A and 13B. FIG. 13A and 13B illustrate front view and side view respectively of the grill **10412**. Grill **10412** includes a side frame **104122**. The side frame **104122** can be made up of any one of a metal, a plastic, a rubber, or foam, etc. further, the grill **10412** includes a base frame **104126** (shown in FIG. 13B). The base frame is again made up of anyone of a metal, a plastic, a rubber, or foam, etc. There are also present additional fins **104124a-104124d**, which help in filtering of the air.

[0050] Now referring to FIG. 14, illustrating a vital parameter collection device **105**, attached to the innermost unit **10420** of the face mask unit **1043**, in accordance with an embodiment of the invention. In an embodiment of the invention, the vital parameter collection device **105** is a pulse oximeter. Pulse oximeter is a medical device that indirectly monitors the oxygen saturation of a patient's blood (as opposed to measuring oxygen saturation directly through a blood sample) and changes in blood volume in the skin, producing a photoplethysmogram. The pulse oximeter **105** is in direct communication with a microcontroller (not shown in figure) embedded within the face assembly **104**.

The microcontroller includes stored instructions for various levels blood oxygen saturation readings. Hence, the microcontroller, as per the increased or decreased levels of blood oxygen saturation levels, may control the sliding of the slider unit **10426** by controlling the motor (not shown in figure) to slide. Based on pre-fed instructions, if the blood oxygen level falls below a threshold level, the microcontroller may open the slider unit **10426** to allow more air intake and vice versa.

[0051] In other embodiment of the invention, the sports mask may be connected to a wearable device through a network. The wearable device could be a smart watch. The network for communication could be any short range wireless connection like Bluetooth, Wi-Fi, etc. There may be placed a microcontroller placed on the sports mask to collect readings from the pulse oximeter **105** and send these to the wearable device. The sliding function of the slider unit **10426** may also be controlled by the wearable device or smart watch by user's interference or the control can be automatic based on the pre-fed instructions. Based on pre-fed instructions, if the blood oxygen level falls below a threshold level, the microcontroller may open the slider unit **10426** to allow more air intake and vice versa.

[0052] Now referring to FIG. **15**, illustrating a wearable device **200** connected to the sports mask **100**, in accordance with an embodiment of the invention. The sports mask **100** may include a button (not shown in figure) to initiate a connection request to the wearable device **200**. The connection can be through any of the small range wireless connections including Wi-Fi, Bluetooth, ZigBee, Near Field Communication (NFC), etc. The connection, once successful, initiates an application launch that may present an interface as shown in the figure. There may be present various icons on the application interface. There may be provided a query field **204** wherein the user is provided with a query "Initiate Oxygen Level Monitoring?" if the user wants to use auto-slide control feature, the user may choose thumbs up icon **202a**. On choosing this, the user enables the automatic control of the slider unit **10426**. On choosing thumbs down, the user can control the sliding manually.

[0053] Now referring to FIG. **16A-16C**, illustrates the multiple positioning of the slider unit **10426** on the airflow vent **10420**. FIG. **16A** displays low oxygen intake level. At this level, there is very minimal intake of air and thus Oxygen. FIG. **16B** illustrates medium oxygen intake level. At this position, the intake of Oxygen is at a medium level. Further, FIG. **16C**, illustrates high intake level that is the highest possible opening of the airflow vent **10420**. At this level, the slider unit **10426** is at the extreme right position. It should be understood, POSITA can generate various other intermediate levels. The levels described above are exemplary and can be modified. It is to be noted that the air inflow restriction control does not interfere too much with air outflow control.

[0054] Aspects of the present subject matter are described herein with reference to flowchart illustrations and/or block diagrams of methods and apparatus (systems) according to embodiments of the subject matter. It will be understood that each block of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart illustrations and/or block diagrams, can be implemented by computer readable program instructions.

[0055] While there has been shown, and described herein what are presently considered the preferred embodiments of

the present disclosure, it will be apparent to those skilled in the art that various changes and modifications can be made therein without departing from the scope of the present disclosure as defined by the appended claims.

[0056] The flowchart and block diagrams in the Figures illustrate the architecture, functionality, and operation of possible implementations of systems, methods, and computer program products according to various embodiments of the present subject matter. In this regard, each block in the flowchart or block diagrams may represent a module, segment, or portion of instructions, which comprises one or more executable instructions for implementing the specified logical function(s). In some alternative implementations, the functions noted in the block may occur out of the order noted in the figures. For example, two blocks shown in succession may, in fact, be executed substantially concurrently, or the blocks may sometimes be executed in the reverse order, depending upon the functionality involved. It will also be noted that each block of the block diagrams and/or flowchart illustration, and combinations of blocks in the block diagrams and/or flowchart illustration, can be implemented by special purpose hardware-based systems that perform the specified functions or acts or carry out combinations of special purpose hardware and computer instructions.

[0057] While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the present disclosure. Indeed, the novel methods, devices, and systems described herein may be embodied in a variety of other forms. Furthermore, various omissions, substitutions, and changes in the form of the methods, devices, and systems described herein may be made without departing from the spirit of the present disclosure. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the present disclosure.

What is claimed is:

1. A sports mask comprising:

a head band assembly configured to hold the sports mask to head of a user while the sports mask is in use; and
a face mask having,

a face mask unit to cover a mouth and nose region of the user, the face mask comprising an outer unit, a middle unit and an inner most unit coupled to each other, each of the outer unit, the middle unit and inner most unit having a cavity located concentrically,

a face band assembly extending from the face mask unit and coupled to the head band assembly to hold the face mask assembly to cover the mouth and nose region of the user,

a grill cover coupled to the outer unit, the grill cover having an opening, wherein the opening is located concentrically to the cavities,

a grill adapted to be received by the opening of the grill cover, and

an air flow valve assembly having an air flow resistance varying module, the air flow valve assembly adapted to be received by the cavity of the inner most unit to enable the air flow valve assembly to be in communication with the grill, wherein the air flow resistance varying module is capable of enabling multiple positioning thereof to generate various intermediate levels

between a minimum and a maximum opening levels to vary flow of air flowing through the grill in the air flow valve assembly.

2. The sports mask of claim 1, wherein the face band assembly comprises a left strap and a right strap, each extending from the outer unit of the face mask unit.

3. The sports mask of claim 2, wherein the head band assembly comprises a left clip to receive the left strap and a right clip to receive the right strap of the face band assembly.

4. The sports mask of claim 3, wherein the left strap and the right strap are releasably attached to the left clip and the right clip, respectively.

5. The sports mask of claim 4, further comprising a fastener at ends of the left strap and the right strap to releasably attach with the left clip and the right clip, respectively.

6. The sports mask of claim 1, wherein the air flow resistance varying module functions comprises:

an airflow vent directly in contact with the mouth and nose region of the user, the airflow vent having air holes;

an airflow valve adapted to be disposed on over the airflow vent;

a valve catcher adapted to place the airflow valve in the engaging position with the airflow vent; and

a slider unit adapted to engage with the valve catcher to slide over the valve catcher to open and close the air holes, the slider unit adapted to be shifted to multiple positioning to generate various intermediate levels between the minimum and the maximum opening levels of air holes to vary flow of air flowing from the grill in the air flow valve assembly.

7. The sports mask of claim 6, wherein the slider unit comprises:

a sliding notch through which the sliding unit is slidably affixed to the valve catcher to slide over the valve catcher; and

a sliding button coupled to the sliding unit to be pushed to enable movement of the sliding unit, through the sliding notch, over the valve catcher to open and close the air holes to vary flow of air flowing from the grill in the air flow valve assembly.

8. The sports mask of claim 7, wherein the slider unit further comprises a motor to automatically push the sliding button to facilitate sliding movement of the slider unit, through the sliding notch, over the valve catcher to open and close air holes to vary flow of air flowing from the grill in the air flow valve assembly.

9. The sports mask of claim 7, wherein the sliding button is manually pushed by the user to facilitate sliding movement of the slider unit, through the sliding notch, over the valve catcher to open and close air holes to vary flow of air flowing from the grill in the air flow valve assembly.

10. The sports mask of claim 1, wherein the grill comprises:

a frame with a frame base, the frame, through the frame base, secured in the opening of the grill cover to couple the grill with the grill cover; and

a plurality of fines disposed along the frame to filter the air passing there-through.

11. The sports mask of claim 8, further comprising:

a vital parameter collection device attached to the innermost unit of the face mask, the vital parameter collection device adapted to collect and monitor data related

to requirement of oxygen, carbon dioxide, nitric oxide, respiratory rate and breathing effort to the user; and a microcontroller embedded within the face assembly, and, in direct communication with the vital parameter collection device the microcontroller, as per the respiratory rate, breathing effort, and oxygen saturation of the user, may simultaneously control the sliding of the slider unit by controlling the motor.

12. A valve apparatus for a sports mask, the valve apparatus, comprising;

an airflow vent, the airflow vent having air holes;

an airflow valve adapted to be disposed on over the airflow vent;

a valve catcher adapted to place the airflow valve in the engaging position with the airflow vent; and

a slider unit adapted to engage with the valve catcher to slide over the valve catcher to open and close air holes, the slider unit adapted to be shifted to multiple positioning to generate various intermediate levels between a minimum and a maximum opening levels of the air holes to vary flow of air flowing in the air flow valve assembly.

13. The valve apparatus of claim 12, wherein the slider unit comprises:

a sliding notch through which the sliding unit is slidably affixed to the valve catcher to slid over the valve catcher; and

a sliding button coupled to the sliding unit to be pushed to enable movement of the sliding unit, through the sliding notch, over the valve catcher to open and close air holes to vary flow of air flowing from the grill in the air flow valve assembly.

14. The valve apparatus of claim 12, wherein slider unit further comprises a motor to automatically push the sliding button to facilitate sliding movement of the slider unit, through the sliding notch, over the valve catcher to open and close air holes to vary flow of air flowing from the grill in the air flow valve assembly.

15. The valve apparatus of claim 12, wherein the sliding button is manually pushed by the user to facilitate sliding movement of the slider unit, through the sliding notch, over the valve catcher to open and close air holes to vary flow of air flowing from the grill in the air flow valve assembly.

16. The valve apparatus of claim 12, wherein the air flow resistance varying module varies resistance to inflow of air based on a level of exercise being performed by the user.

17. (canceled)

18. (canceled)

19. (canceled)

20. A sports mask comprising;

a head band assembly configured to hold the sports mask to head of a user while the sports mask is in use; and a face mask unit to cover a mouth and nose region of the user, the face mask comprising an outer unit, a middle unit and an inner most unit coupled to each other, each of the outer unit, the middle unit and inner most unit having a cavity located concentrically,

a face band assembly extending from the face mask unit and coupled to the head band assembly to hold the face mask unit to cover the mouth and nose region of the user,

a grill cover coupled to the outer unit, the grill cover having an opening, wherein the opening is located concentrically to the cavities,

a grill adapted to be received by the opening of the grill cover, and
 an air flow valve assembly adapted to be received by the cavity of the inner most unit to enable the air flow valve assembly to be in communication with the grill, the air flow valve assembly comprising,
 an airflow vent, the airflow vent having air holes,
 an airflow valve adapted to be disposed on over the airflow vent,
 a valve catcher adapted to place the airflow valve in the engaging position with the airflow vent, and
 a slider unit adapted to engage with the valve catcher to slide over the valve catcher to open and close air holes, the slider unit adapted to be shifted to multiple positioning to generate various intermediate levels between a minimum and a maximum opening levels of the air holes to vary flow of air flowing in the air flow valve assembly.

21. The sports mask of claim 1 further comprising:

a button electronically embedded in the sports mask to wirelessly couple the sports mask to an external device.

22. A system for monitoring oxygen, carbon dioxide, nitric oxide respiratory rate and breathing effort level in a user, the system comprising:

a sports mask comprising,

a head band assembly configured to hold the sports mask to head of a user while the sports mask is in use; and

a face mask assembly having,

a face mask unit to cover a mouth and nose region of the user, the face mask comprising an outer unit, a middle unit and an inner most unit coupled to each other, each of the outer unit, the middle unit and inner most unit having a cavity located concentrically,

a face band assembly extending from the face mask unit and coupled to the head band assembly to hold the face mask assembly to cover the mouth and nose region of the user

a grill cover coupled to the outer unit, the grill cover having an opening, wherein the opening is located concentrically to the cavities,

a grill adapted to be received by the opening of the grill cover, and

an air flow valve assembly having an air flow resistance varying module, the air flow valve assembly adapted to be received by the cavity of the inner most unit to enable the air flow valve assembly to be in communication with the grill, wherein the air flow resistance varying module is capable of enable multiple positioning thereof to generate various intermediate levels between a minimum and a maximum opening levels to vary flow of air flowing from the grill in the air flow valve assembly; and

a wearable device wirelessly connected to the sports mask, the wearable device having monitoring function to control the air flow resistance varying module to vary flow of air flowing from the grill in the air flow valve assembly.

22. The system of claim 21 further comprising:

a vital parameter collection device attached to the innermost unit of the face mask, the vital parameter collection device adapted to collect and monitor data related to requirement of oxygen, carbon dioxide, nitric oxide, respiratory rate and breathing effort to the user and send the same to the wearable device; and

a microcontroller embedded within the face assembly, and, in communication with the vital parameter collection device and the wearable device, the microcontroller, as per requirement of the respiratory rate, breathing effort, and oxygen saturation of the user, may control the air flow resistance varying module, by controlling a motor, based on instruction of the wearable device.

* * * * *

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[标]申请(专利权)人(译)	MCKEOWN PATRICK		
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当前申请(专利权)人(译)	MCKEOWN , PATRICK		
[标]发明人	MCKEOWN PATRICK MCKEOWN TERESA		
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CPC分类号	A63B23/18 A63B21/00069 A63B21/0085 A63B2230/208 A63B24/0087 A61B5/14552 A61B5/6803 A63B21/4003 A61B5/08 A61B5/087 A63B21/0088 A63B2024/0093 A63B2225/09 A63B2225/50		
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摘要(译)

本发明提供一种用于呼吸训练的运动面罩。运动面罩包括头部组件，该头部组件包含夹子以将面罩保持在头部上。运动面罩还包括面罩组件，该面罩组件包括由头部组件上存在的夹子接收的带子，以将面部组件保持抵靠使用者的面部。面部组件包括面罩单元，面罩单元包括气流阀。气流阀包括气流阻力变化模块，其有助于改变进入气流阀的空气流量。当面罩连接到可穿戴设备或生命参数收集设备时，气流阻力变化模块的控制可以是手动的或自动的。

