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(54) **MOUTH PROTECTOR ADHESION METHOD**

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(57) **ABSTRACT**

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This uniquely constructed mouth protector adhesion method is designed to minimize discomfort and speech interference associated with conventional athletic mouth protectors, includes coating of a first substrate with a diffusion bond layer, moisture activated adhesive, thermoplastic polymers, surface constructions, electro-chemical deposition, physical gaseous phase deposition and chemical phase deposition applied directly to the channel formed by joining the inner wall, outer wall and bottom wall of conventional mouth protectors and a mouth protector material that is permeated throughout with suitable adhesives, is intended to prevent the mouth protector shifting or completely falling out of the mouth so as to minimize discomfort to a wearer. The system is designed to allow free movement of the tongue, thereby optimizing clear speech.

(21) Appl. No.: **14/884,758**

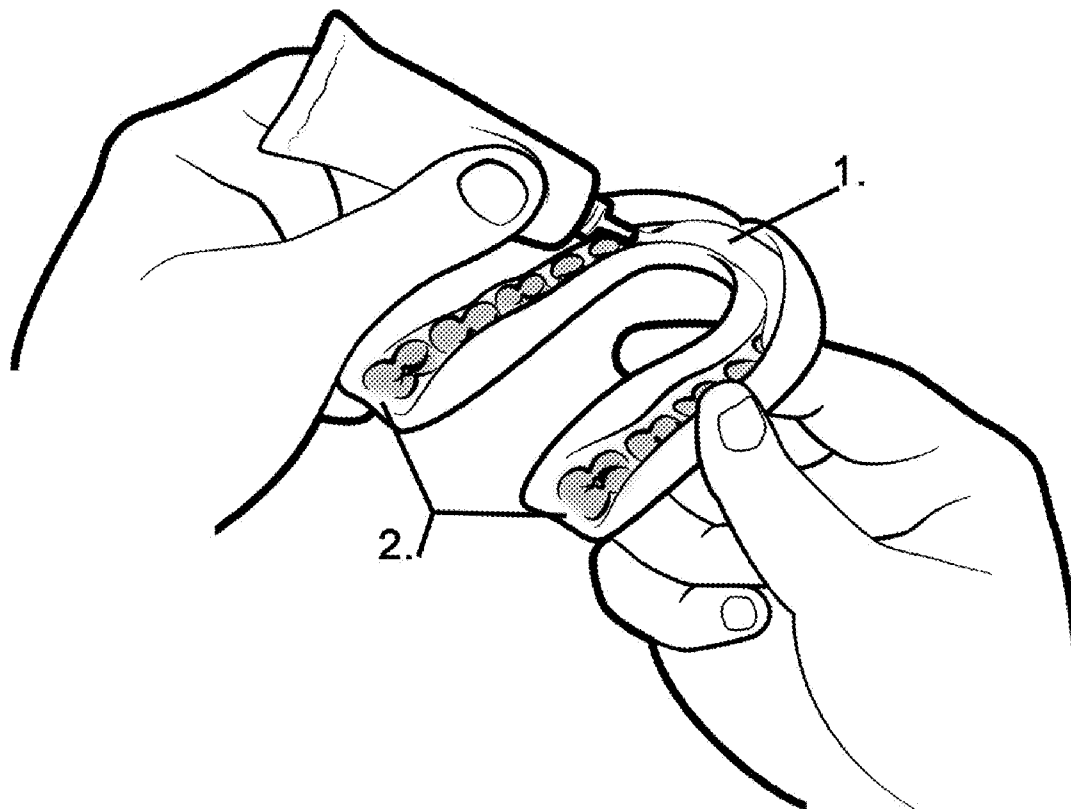
(22) Filed: **Oct. 15, 2015**

**Related U.S. Application Data**

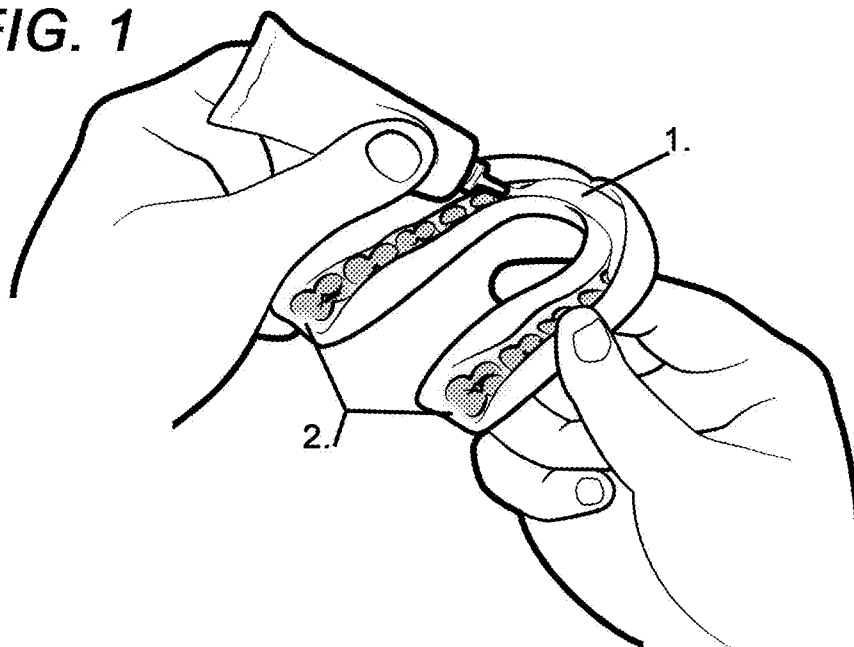
(60) Provisional application No. 62/064,162, filed on Oct. 15, 2014.

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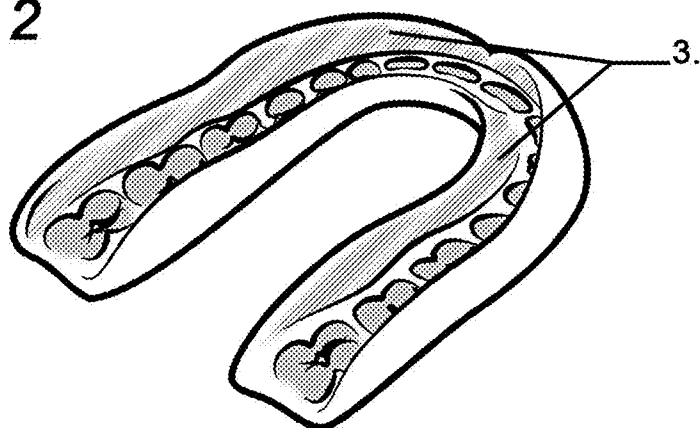
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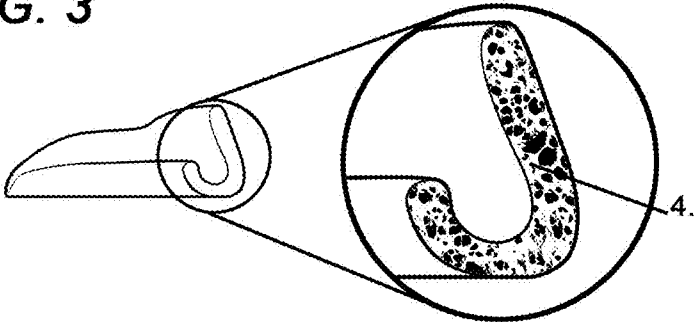
**FIG. 1**



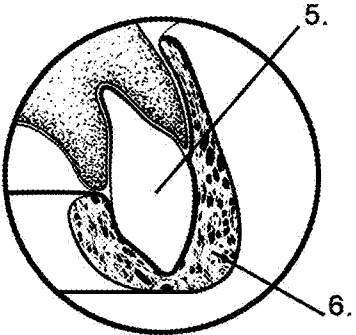
**FIG. 2**



**FIG. 3**



**FIG. 4**



## MOUTH PROTECTOR ADHESION METHOD

**[0001]** The following Non-Provisional utility patent application claims the benefit of Provisional Application No.: 62/064,162, Filing Date: Oct. 15, 2014, Title: Mouth Guard, Inventor: Carl Allen Barnes, Sr., the present invention relates to a method for coating of a first substrate with a diffusion bond layer and a method of bonding, particularly suited for athletes, that is specifically designed to minimize discomfort and speech interferences associated with conventional stock and boil and bite mouth guards.

### BACKGROUND OF THE INVENTION

#### Description of Prior Art

**[0002]** Athletes such as football players, boxers and basketball players typically wear a mouthpiece on the upper teeth that redistributes the impact associated with blows to the jaw, mouth or chin. A conventional mouth guard includes a substantially U shaped splint, also known as a channel, constructed with a moldable plastic. The mouth guard includes a channel defined by an interior side wall, an exterior side wall and a bottom wall. Typically, the device is preheated using appropriate temperature water allowing a user to bite into the device to form a mold of the teeth within the bottom wall.

**[0003]** Such devices, however, have numerous disadvantages. The mouth guard material has elastic memory and will partially rebound away from the teeth resulting in a poor fit and significant discomfort. In addition, when a wearer opens his or her mouth the mouth guard will completely dislodge thereby interfering with clear speech and endangering the athlete's health. Accordingly, certain athletes, such as football quarterbacks, who must speak clearly when communicating signals to teammates, must repeatedly remove the mouthpiece while speaking and reinsert it which is burdensome, inconvenient and exposes both the mouthpiece and wearer to germs.

**[0004]** Furthermore, each of the above described disadvantages discourage some athletes from wearing mouth guards thereby resulting in increased frequency of brain and tooth related injuries. The present invention overcomes the above described disadvantages of conventional mouth guards by providing an adhesion method that optimize retention of conventional stock and boil and bite mouth guards to the teeth and mucosa, also known as gums, thereby improving clear speech, is comfortable to wear, minimizes concussions and diminishes exposure to germs.

**[0005]** Various mouthpieces and mouth guards exist in the prior art. Most notably, U.S. Pat. No. 8,235,052 issued to John Maurello relates to a method and apparatus to make stock mouth protectors fit properly. The apparatus includes a splint molded from thermo-plastic material formed to fit over the teeth of a wearer. The splint includes a channel molded to receive the teeth which is interconnected with a central bridge section. The apparatus is a cold formed mouth guard that allows the athlete to fit the mouth guard without the need of hot water by depressing cilia that is located throughout the channel and extends upwardly in the channel where the teeth are to be located. The device is designed to allow a stock mouth guard to fit snugly. The present invention is distinguishable in that it is designed for both stock and boil and bite mouth guards and utilizes adhesives that are not bulky and will not interfere with positioning the teeth within the chan-

nel. The unique design results in minimal discomfort to the wearer and allows the wearer to speak clearly.

### SUMMARY OF THE INVENTION

**[0006]** The present invention relates to a mouth protector and bonding method for athletes and others engaged in similar activity that may pose danger to the teeth, tongue or other oral tissue. The production method comprise a first substrate with a diffusion bond layer and a method for bonding, including, moisture activated adhesives, surface constructions, e.g., friction ridges, electro-chemical deposition, physical gaseous phase deposition, chemical phase deposition and elasticized polymers, for applying to the channel formed by the inner wall, outer wall and bottom wall of a conventional mouth guard for the purpose of bonding a conventional mouth guard to the teeth and mucosa, sometimes known as gums, thereby minimizing discomfort to a wearer. It is therefore an object of the present invention to provide a method for production of a conventional mouth guard that is comfortable to wear.

**[0007]** It is another object of the present invention to provide a method for production that allows clear speech while wearing a conventional mouth guard.

**[0008]** It is yet another object of the present invention to provide a method for production designed for temporary or reversible bonding of substrates so as to produce a connection that is strong and reversible, i.e. high bond force, between the two contact surfaces of the substrates and reversible. Other objects, features and advantages of the present invention will become readily apparent from the following detailed description of the preferred embodiment when considered with the attached drawings and the appended claims.

### BRIEF DESCRIPTION OF DRAWINGS

**[0009]** FIG. 1 is a plan view of a temporary or reversible adhesive being applied thereon.

**[0010]** FIG. 2 is a plan view of primary layer constructions applied thereon.

**[0011]** FIG. 3 is a magnified cross-sectional view of the third embodiment according to the present invention.

**[0012]** FIG. 4 is a cross-sectional view of the third embodiment overlaying tooth and mucosa.

### DESCRIPTION OF PREFERRED EMBODIMENT

**[0013]** Referring to FIG. 1, the present invention as contemplated relates to a bonding method designed for cohering a conventional mouthpiece to the teeth and mucosa of a wearer. FIG. 1 illustrates the present invention 1, being applied within the channel 2, allowing the adhesive to penetrate into interproximal spaces so as to maximize contact and bonding between the substrates.

**[0014]** The adhesion method according to the present invention includes a first substrate with a diffusion bond layer and to a method for bonding. It comprises a conventional mouth guard that is molded to conform to the teeth of a wearer creating a channel 2, the present invention 1, is spread throughout the channel then the new construction is superimposed over the wearer's teeth (not clearly shown) thereby minimizing discomfort to a wearer.

**[0015]** Referring now to FIG. 2, the second embodiment is disclosed. It includes surface alterations 3 which have been constructed onto the inner walls of the channel 2, increasing surface area in contact with the teeth thereby amplifying adhesion.

[0016] Now referring to FIG. 3, the third embodiment is revealed. The third embodiment includes a resilient polymer sheet infused with moisture activated adhesive 4, resulting in greater bonding strength and temporary adhesion.

[0017] Referring to FIG. 4, the drawing depicts a tooth 5, overlaid by infused material 6, enhancing bond strength between the contact surfaces of aforementioned substrates.

[0018] Now referring to the fourth embodiment which is not shown. It consist of pliable elastic polymers of predetermined dimension, coated with an adhesive designed for improving the bonding between substrates so as to allow for clear speech.

[0019] The above described adhesion method is preferably constructed with adhesive compounds including, creams, paste, gum, cement, epoxy resin, thermoplastic resins, electro-chemical deposition, physical gaseous phase deposition and chemical gaseous phase deposition or any other similar equivalent; correspondingly, all elements of the periodic table are possible as materials for the diffusion bond layer. A boil and bite mouth guard is constructed over a wearer's upper or lower teeth so that the bonding system according to the present invention can be applied according thereto and according to the details of construction enumerated above. As is readily apparent from the above description, the present invention provides a method for bonding conventional mouth protectors to a wearer's teeth and mucosa while allowing clear speech. Furthermore, the present invention is considerably more comfortable than conventional mouth guards.

[0020] Although there has been shown and described the preferred embodiment of the present invention, it will be readily apparent to those skilled in the art that modifications may be made thereto that do not exceed the scope of the appended claims. Therefore, the scope of the invention is only to be limited by the following claims.

What is claimed is:

1. A bonding method for securing a conventional mouth guard to the upper or lower teeth or mucosa of a wearer, each mouth guard including a U shaped channel, aforesaid bonding method comprising: a first substrate and a diffusion bond layer that is temporary or reversible includes suitable adhesives applied onto the bottom wall, inner wall and outer wall of the U shaped channel so as to minimize discomfort to a wearer.

2. A bonding method according to claim 1 wherein aforesaid inner walls of the channel include friction ridges.

3. A bonding method for securing a conventional mouth guard to the upper or lower teeth or gums of a wearer, each mouth guard including a U shaped channel, aforesaid bonding method comprising: mouth guard material infused throughout by means of suitable adhesive compounds that are temporary or reversible, then molded to conform to and overlay the teeth and mucosa so as to minimize discomfort to the wearer.

4. A bonding method according to claim 2 wherein aforesaid bonding method comprises: a thermoplastic elastomer of predetermined dimension which is overlain on both front and back sides with a suitable adhesive, then applied to the inner walls of the channel of a conventional mouth guard.

5. A bonding method according to claim 4 wherein aforesaid thermoplastic elastomer include suction cups of a predetermined dimension.

6. A bonding method for securing a conventional mouth guard to the upper or lower teeth or gums of a wearer, each mouth guard including a U shaped channel, aforesaid bonding method comprising: a primary substrate and a diffusion bond layer, includes electro-chemical deposition, physical gaseous phase deposition and chemical phase deposition or any similar equivalent applied to the aforementioned U shaped channel so as to allow clear speech.

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