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ANTI-SNORING DEVICE

Technical Field

The invention relates to an anti-snoring device for positioning within the mouth cavity of a person.

The noise made during breathing when asleep (snoring) is, in particular, very disruptive for people in the vicinity of the snorer. In addition, snoring may even pose a risk to the health of the snorer, for example in the case of obstructive sleep apnoea. Snoring is generally produced by weak muscle tone of the neck muscles during sleep. The airways become narrowed until they close completely (apnoea). This leads to an increased air flow and to the generation of noise by the structures that droop during movement. Muscle tension naturally decreases in older individuals in the throat region, which is why this group of people snore more often than younger individuals.

Prior Art

A wide range of devices, aids and breathing masks to prevent snoring are known, including surgical procedures.

Operations generally remove the structures preventing breathing, such as enlarged tonsils, polyps, etc. However, the success rate with regard to snoring varies very widely from 20 – 40 %. According to many reports the relapse rate is very high.

A breathing mask provides continuous positive airway pressure and therefore holds the airways open. Since it is a very expensive and complex piece of equipment that is uncomfortable for the snorer, it is primarily indicated in severe cases of apnoea.

Intraoral devices are worn at night and generally displace the lower jaw in a forward direction so as to open the pharyngeal portion of the airways. The base of the tongue is also entrained with the lower jaw in a forward direction, thus making it possible to open the airways. Success can be achieved using these devices, but they are usually found to be very cumbersome by the wearer as a result of their construction and design.

Known oral anti-snoring devices representative of a large number of known generic devices can be inferred from the following documents:

DE 40 26 602 C1 discloses a device for preventing snoring comprising a prosthesis part that is fixed to the teeth and to which a bow is attached via a spring mechanism in such a way that, on the one hand, the tongue is pressed away from the posterior soft palate and, on the other hand, the tongue can be pressed against the palate during swallowing.

EP 0 312 368 B1 discloses a modified mouthpiece as an anti-snoring device, onto which the teeth of the upper jaw bite, a lower sliding connecting member pressing the mouthpiece toward the mouth cavity opening against the inner faces of the teeth of the lower jaw, whereby the lower jaw is pushed forward and the distance between the tongue and the soft palate is enlarged.

EP 0 254 918 A1 discloses an upper and lower jaw plate comprising inserted magnets that hold both jaws at a specific distance by opposed magnetic repulsion. DE 27 04 709 A1 represents a normal gag.

EP 0 599 445 A1 discloses a device with rigid fixing of the upper jaw and loose fixing of the lower jaw. The oral side of the device is configured in such a way that the tongue can be placed in a sucking position.

WO 92/05752 discloses a device comprising a palate plate and a mouth base plate that simultaneously push the lower jaw forward and force the wearer to

breathe through their nose. Two variants are disclosed: one in which the device is fixed to the teeth, and one in which the device sits freely in the mouth.

WO 92/09249 discloses a device for preventing tongue thrust, teeth grinding and snoring. Adapted to the tongue and teeth, the device holds the tongue forward by suction.

US patent specification US 5,092,346 discloses a device for the upper jaw comprising a ramp for the lower jaw so as to push said jaw forward, and a breathing opening between the upper jaw part and the lower jaw ramp.

DE 23 20 501 C3 discloses a device that is constructed similarly to an orthodontic activator and comprises an additional labial and adjustable lip shield. The lower jaw is pushed forward by muscle activity and corresponding grinding guides in the device for the teeth. However, the muscles still droop during sleep and muscle tone is decreased or cancelled out completely.

The main drawback of known devices is that the devices are decidedly uncomfortable to wear owing to their voluminous expansion, their constraints caused by a bite guard, their pressure on the tongue or soft palate parts, and the restricted freedom of movement of the lower jaw and tongue. The feeling of a large, annoying foreign body in the mouth prevents the snorer from falling asleep, which generally leads to the devices not being used.

Illustration of the Invention

The object is to provide an anti-snoring device that makes it possible to overcome the above drawbacks. In particular, the object is to create an anti-snoring device to be worn orally that allows the wearer to obtain the required depth of sleep and feeling of well-being, in particular as a result of the low expansion in the jaw region and the high level of comfort when wearing the anti-snoring device.

The solution to the problem underlying the invention is disclosed in claim 1. Advantageous features further developing the concept of the invention are the subject-matter of the sub-claims and can be inferred from the rest of the description, in particular with reference to the embodiments.

In accordance with the solution an anti-snoring device for positioning within the mouth cavity of a person is configured in such a way that a displacement member is provided with a shape and size suitable for placement within the mouth cavity between the bottom of the tongue and the musculature at the bottom of the mouth, said member lifting the tongue in toward the mouth cavity. The displacement member cooperates with a mouthpiece-shaped element that can be placed between the teeth of the upper and lower jaw. The mouthpiece-shaped element provides at least one through-hole for ventilation of the mouth cavity with breathed air.

In a preferred embodiment the displacement member of the device according to the solution is spherical and, with regard to shape and size, is largely adapted to the geometric conditions of the intraoral anatomy of a person in such a way that when the device is inserted orally, the spherical displacement member is placed beneath the tongue between the bottom of the tongue and the musculature at the bottom of the mouth, the tongue being pressed in toward the palate without producing an unpleasant feeling of displacement in the mouth for the person concerned. The ball diameter of the spherical displacement member should therefore be between 1.5 and 2 cm. The arrangement of the spherical element at the lower surface of the tongue supports the drooped tongue muscles and draws them toward the teeth, thus opening the airway.

In a further preferred embodiment the displacement member is configured in the form of two spherical elements, of which the ball geometries penetrate one another locally in part. A displacement member configured in this manner is

positioned orally in such a way that in each case a spherical element comes to rest to the right and left of the frenulum of the tongue.

The displacement member is preferably rigidly connected via a connection portion to the mouthpiece-shaped element, which has a curved, elongate, strand-like shape comprising an upper and lower biting surface onto which the front teeth can bite, preferably the teeth of the upper and lower jaw delimited laterally by the canines.

The mouthpiece-shaped element is penetrated by at least one, preferably lots of through-holes for the purposes of providing an unimpeded supply of breathed air for the person. In order to make the wearing comfort of the device according to the solution as agreeable as possible for the person, the mouthpiece-shaped element should not exceed a discernible thickness of 2 cm during biting.

In a further configuration of the device according to the solution, the mouthpiece-shaped element or the displacement member is connected via an adjustable tensioning device retained at the ears, in such a way that the tongue is pressed toward the palate in a clear position during sleep. The tensioning device should consist of a band-like, flexible material and should comprise means for adjusting its length.

As already mentioned, the shape and size of the spherical elements and the mouthpiece-shaped element are important for wearing comfort and must be adapted to the respective shape and size of the person's airways. This also applies to the configuration of the tensioning device, which comprises means for hanging over the ears. All materials used to form the device according to the solution must be resistant to oral fluids and physiologically safe.

In specific cases, in order to assist the anti-snoring device worn orally, it is expedient to insert a resilient moulded plug that comprises a through-hole and is held in the ala of the nose by resilient tension in order to hold the ala of the

nose open. This measure ensures that the airway is held open via the nasal cavities and the air flowing in is controlled.

Short Description of the Invention

The invention will be described hereinafter by way of example, by means of embodiments with no limitation to the general concept of the invention and with reference to the drawings, in which:

Fig. 1 is an illustration of free airways;

Fig. 2 is an illustration of closed airways in the case of obstructive apnoea;

Fig. 3 is a schematic view of the operating principle of the anti-snoring device according to the solution;

Figs 4 a-e are views of a first embodiment from various sides, and

Figs 5 a-c are views of a second embodiment from various sides.

Embodiments of the Invention, Commercial Usability

Fig. 1 shows a schematic view of a section through the human airways. The air is guided through the nasal cavities 6 and the mouth cavity 4 into the windpipe 1. It is important that the entrance to the windpipe 1 is not constricted, either completely or in part, by the tongue 2 or the soft palate. The entry of air between the tongue 2 and the soft palate 5 must also be maintained. Fig. 1 also shows the lower jaw 3, which is displaced in toward the windpipe during snoring.

Fig. 2 shows (schematically) the situation when the airways are closed, which leads to snoring, although a partial closure can also trigger snoring (not shown).

In this situation the tongue 2 is pushed rearwards by the drooping tongue muscles and closes the airway through the windpipe 1, at least intermittently.

The device according to the solution may help to avoid this situation. The device according to the invention lifts the tongue muscles, drooped during sleeping, in toward the mouth cavity, which means the windpipe is not closed completely. The central part of the lower surface of the tongue is drawn to the base of the mouth cavity and fixed forwards by a fold in the oral mucosa (the frenulum of the tongue) in such a way that only the tip and lateral edges are free.

As shown in Fig. 3, the spherical element 9 is placed at the lower surface of the tongue 2 in the central region next to the frenulum of the tongue. The anti-snoring device has two spherical elements 9, so a spherical element 9 is placed in each case to the right and left of the frenulum of the tongue. The spherical elements have a diameter of 1.5 to 2.0 cm, in each case depending on the shape and size of the wearer's tongue.

The spherical elements 9 are connected to a mouthpiece-shaped element 8 via a connection means, said mouthpiece-shaped element lying between the teeth when the spherical elements 9 have been brought into their intended position. The mouthpiece-shaped element 8 has at least one cross-hole with a diameter of 2.5 to 3.5 mm so air can flow through for breathing.

If needed, two or more holes can also be provided. The mouthpiece-shaped element 8 also enlarges the mouth cavity 4 in such a way that the entire mouth cavity has more air space.

The oral part of the anti-snoring device therefore consists of two interconnected parts: the spherical element 9 that lies beneath the tongue and the mouthpiece-shaped element 8 that lies between the teeth of the upper and lower jaw.

Since the mouthpiece-shaped element 8, as described above, creates more air space, in some cases it should also be ensured that the nasal opening is controlled in such a way that not too much breathed air is inhaled. All the breathed air is balanced in this instance. Resilient moulded parts comprising through-holes that are inserted under tension into the nasal cavities are used for this purpose. These moulded parts have a length of approx. 2 cm – 3 cm and a diameter of 1.0 to 1.5 cm. In the idle state the lower face of the moulded parts is flat and the upper face is curved. Before use, the moulded part is slightly rolled together in such a way that it can be inserted into the nasal opening. The moulded parts are used in pairs so it is expedient to connect them. The connection member may also be used as a tensioning element that presses the moulded parts against the inner nasal wall.

The spherical elements 9 can optionally be interconnected via an adjustable tensioning device (not shown); each end of the tensioning device is equipped with an eye that is pulled over each auricle to provide retention. The eyes can be enlarged if required. The tensioning device generally consists of a resilient strap that must be resistant to oral fluid and physiologically safe. The spherical element 9 or the two spherical elements 9 are threaded onto the tensioning device and fixed thereto in case of emergency. The spherical elements 9 therefore comprise a central hole. The contact pressure of the spherical element 9 from beneath against the tongue can be increased using the tensioning device fixed at the ear.

The representations according to Figs 4a to e show perspective views of a preferred anti-snoring device, to which reference is made as a whole below.

The spherical displacement member 9 is rigidly connected to the concave side of the longitudinally curved, mouthpiece-shaped element 8 via a connection portion 14. The anti-snoring device illustrated in Figs 4 a to e is formed in one piece and consists of a biocompatible plastics material that remains firm under biting.

The mouthpiece-shaped element 8 comprises an upper and lower biting surface 10 and 11, onto which the front teeth in particular of the upper and lower jaw, each preferably delimited laterally by the canines, bite. The mouthpiece-shaped element 8 thus has a curved length L typically between 3 and 4 cm depending on the oral anatomy of a person. In order to avoid overbiting and to assist with the intraoral self-centring positioning of the anti-snoring device inside the mouth cavity, the two bite surfaces 10, 11 are defined at least by a front defining edge 12 that rises preferably perpendicularly over the respective bite surfaces 10, 11. Not necessarily but in an advantageous configuration, the bite surfaces 10, 11 are also defined rearwardly by a corresponding defining edge 13.

The 'thickness' of the mouthpiece-shaped element 8 that determines the jaw opening is determined by the orthogonal distance d between the two defining faces 10, 11, which is at least 5 mm but should not exceed 2 cm.

In order to supply the person with sufficient breathed air through the mouth cavity, the mouthpiece-shaped element 8 provides a large number of channel-like through-holes 15, typically with opening cross-sections between 2.5 and 3.5 mm. The number and arrangement of the through-holes 15 are also adaptable depending on the breathing behaviour of the person concerned.

Owing to the longitudinally curved shaping of the mouthpiece-shaped element 8 adapted to the natural bite surface of the teeth of the upper and lower jaw, said mouthpiece-shaped element comprises a concave inner face to which the spherical displacement member 9 is attached via a connection portion 14. The length of the connection portion 14 distancing the spherical displacement member 9 from the mouthpiece-shaped element 8 is selected in such a way that when the anti-snoring device is positioned orally, the spherical displacement member 9 comes to lie between the tongue and the musculature at the bottom of the mouth directly adjacent to the frenulum of the tongue. The spherical displacement member 9 is attached relative to the mouthpiece-shaped

element 8 via the connection portion 14 in such a way that the spherical displacement member 9 comes to lie in the recessed, lowered region of the musculature at the bottom of the mouth relative to the teeth of the lower jaw. The ball centre point M of the spherical displacement member 9 is therefore arranged beneath a central plane A that extends centrally between the two bite surfaces 10, 11. In the embodiment shown the spatial position of the ball centre point M is arranged in the plane of the lower bite surface 11 of the mouthpiece-shaped element 8 (see Fig. 4c).

A further embodiment is illustrated in Figs 5a to c, which also show three-dimensional views from different viewing angles of the same embodiment. In contrast to the embodiment described above, the embodiment illustrated in Fig. 5 comprises two spherical elements 91, 92 that, together, constitute the displacement member 9. The mouthpiece-shaped element 8 is largely identical to that in the embodiment according to Fig. 4. The spherical elements 91, 92 are nestled symmetrically about the axis of symmetry S indicated in Fig. 5b and practically seamlessly against the mouthpiece-shaped element 8. The spherical elements 91, 92 are placed in each case to the left and right of the frenulum of the tongue when positioned orally, in such a way that the frenulum of the tongue comes to lie approximately along the axis of symmetry S indicated in Fig. 5b. Even if the anti-snoring device according to Fig. 5 becomes trapped, the spherical elements 91, 92 are slightly lowered relative to the central plane A described above (see Fig. 5c) in such a way that the spherical elements 91, 92 come to lie within the region of the musculature at the bottom of the mouth.

All the surfaces of the anti-snoring device configured according to the solution are smooth and rounded in such a way that there is no risk of injury within the mouth cavity. In order to improve the wearing comfort for a person, the biocompatible plastics material that remains firm under biting should be as light as possible. The anti-snoring device according to the solution also enables cost-effective production, for example by an injection moulding method.

List of reference numerals

1	windpipe
2	tongue
3	lower jaw
4	mouth cavity
5	soft palate
6	nasal cavity
7	upper jaw
8	mouthpiece-shaped element
9	displacement member, spherical element
91, 92	spherical element
10	upper bite surface
11	lower bite surface
12	front defining edge
13	rear defining edge
14	connection portion
15	through-hole
M	ball centre point
L	curved length of the mouthpiece-shaped element
A	central plane
d	distance between the bite surfaces
S	axis of symmetry

CLAIMS

1. An anti-snoring device for positioning within the mouth cavity of a person, characterised in that a displacement member is provided with a shape and size suitable for placement within the mouth cavity between the bottom of the tongue and the musculature at the bottom of the mouth, said member lifting the tongue in toward the mouth cavity, in that the displacement member cooperates with a mouthpiece-shaped element that can be placed between the teeth of the upper and lower jaw, and in that the mouthpiece-shaped element provides at least one through-hole for ventilation of the mouth cavity with breathed air.
2. The anti-snoring device according to claim 1, characterised in that the displacement member is spherical.
3. The anti-snoring device according to claim 1, characterised in that the displacement member forms two uniform spherical elements, of which the ball shapes penetrate one another locally in part.
4. The anti-snoring according to either claim 2 or claim 3, characterised in that the spherical displacement member or the spherical elements each have a diameter between 1.5 and 2.0 cm.
5. The anti-snoring device according to any one of claims 1 to 4, characterised in that the displacement member and the mouthpiece-shaped element are rigidly connected via a connection portion.
6. The anti-snoring device according to any one of claims 1 to 5, characterised in that the mouthpiece-shaped element is longitudinally curved, with an upper and lower bite surface that have a distance of at least 5 mm oriented orthogonally to the two bite surfaces, between which the at least one through-hole extends in a channel-like manner

largely orthogonally to the longitudinal extension of the mouthpiece-shaped element

7. The anti-snoring device according to claim 6, characterised in that the displacement member is connected via the connection portion with the concave side of the mouthpiece-shaped element to this element.
8. The anti-snoring device according to either claim 6 or claim 7, characterised in that the spherical displacement member or the spherical elements each comprise a ball centre point, in that the ball centre point of the spherical displacement member or the ball centre point of both spherical elements projects parallel to at least one bite surface outside a central plane distanced largely uniformly between the two bite surfaces.
9. The anti-snoring device according to claim 8, characterised in that the ball centre point or the ball centre points project(s) toward at least one bite surface closer to the lower bite surface than to the upper bite surface.
10. The anti-snoring device according to any one of claims 6 to 9, characterised in that the upper and lower bite surfaces each provide a defining edge longitudinally to the curved longitudinal extension of the mouthpiece-shaped element, against which defining edges each of the front faces of the teeth of the upper and lower jaw contact.
11. The anti-snoring device according to any one of claims 6 to 10, characterised in that the mouthpiece-shaped element has a curved length of 3 to 4 cm, and in that the at least one through-hole comprises an opening cross-section of 2.5 to 3.5 mm.
12. The anti-snoring device according to any one of claims 1 to 11, characterised in that the mouthpiece-shaped element or the

displacement member is connected via an adjustable tensioning device that is retained at the ears, in such a way that the tongue is pressed in toward the palate during sleep.

13. The anti-snoring device according to claim 12, characterised in that the tensioning device consists of a band-like, flexible material and comprises means for adjusting its length.