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MOUTH GUARD FOR INHIBITING SNORING

The present invention relates to a mouth guard for inhibiting snoring according to the pre-characterising part of claim 1.

There is a great desire in present-day society to be able to inhibit or completely prevent snoring. Appliances by means of which snoring can be inhibited or completely prevented will be described hereinafter by the adjective “inhibiting snoring”.

Such a device for inhibiting snoring in the form of a mouth guard is known for example from WO2007/020197. This comprises a wire-formed element, in particular a spring wire arranged in a plastic tube, which is shaped so that the palate and thereby the soft palate or velum of the user is stabilised. This is achieved in that on the pharynx side a middle or rear region of this wire-formed element engages in an arcuate manner behind the soft palate and the two front ends of this wire-formed element are supported on the lip side. In this way a clamping effect is achieved, i.e. a tensioning between the soft palate and the lip area, which prevents the soft palate flapping during relaxed sleeping and producing the undesired snoring sound.

It is understood that simply the sound of snoring produced by the soft palate and/or the velum is thereby prevented. Snoring noise that is produced by the musculature of the wall of the pharynx or in the region of the base of the tongue or epiglottis cannot be prevented in this way.

The object of the present invention is therefore to provide a mouth guard for inhibiting snoring that prevents the snoring noise produced by the soft palate as well as the snoring noise produced by the wall of the pharynx and the base of the tongue.

According to the invention this object is achieved with a mouth guard having the features of claim 1 and in particular with a mouth guard in which two guard braces are connected to one another via an elastically resilient connecting piece, wherein each of the guard braces has an angled guard end, a guard arcuate portion and at least one palate support, and wherein each of the guard braces is shaped and dimensioned so that in the inserted state this engages on the pharynx side with the palate support behind the soft palate of a user, in order to stabilise the palate, and on the lip side rests against the guard end in the lip area of the user in such a way that the guard arcuate portion is clamped between the soft palate and the lip area of the user, wherein the elastically resilient connecting piece between the two guard braces comprises a pharynx wall support and a tongue base support. This connecting

piece is shaped and dimensioned so that in the inserted state the pharynx wall support rests against the wall of the pharynx of the user and the tongue bases support rests against the base of the tongue of the user, so as to stabilise the wall of the pharynx and the base of the tongue of the user.

In a preferred embodiment of the mouth guard according to the invention the two guard braces are connected to one another via an elastic connection in the region between the palate support and the pharynx wall support.

In order to overcome these disadvantages, a device has been proposed for example in US2011/0226264, which comprises restoring elements in different shapes and configurations. These restoring elements can be folded and unfolded and in the folded state are placed over the oral cavity or the nasal cavity behind the soft palate and/or behind the tongue, before they are unfolded or expanded there, in order to exert a slight force on these tissues. It is understood that such a device is complicated and difficult to produce and is laborious for the user to use and clean.

A device from the same inventors acting in a similar way is described in US2011/0178439. This has a restoring element, which is fastened to a palate guard and is in the form of an expandable element, especially in the form of a tubular or lattice-like element, in particular of a material having shape memory, in the form of a wire mesh or wire with shape memory, in the form of a lattice that can be unfolded with a magnet. Unfortunately all these appliances have the same disadvantages as the above appliance, i.e. are difficult to produce and in use cannot be cleaned or only with difficulty, which for hygiene reasons would be imperative for reusable products in the medical sector.

The object of the present invention is therefore to provide a mouth guard for inhibiting snoring that prevents the snoring noise produced by the soft palate as well as the snoring noise produced by the walls of the pharynx and the base of the tongue.
According to the invention this object is achieved with a mouth guard having the features of claim 1 and in particular with a mouth guard in which two guard braces are connected to one another via an elastically resilient connecting piece, wherein each of the guard braces has an angled guard end, a guard arcuate portion and at least one palate support, and wherein each of the guard braces is shaped and dimensioned so that in the inserted state on the pharynx side this engages with the palate support behind the soft palate of a user in order to stabilise the palate, and on the lip side rests against the guard end in the lip area of the user in such a way that the guard arcuate portion is clamped between the soft palate and the lip area of the user, wherein the elastically resilient connecting piece between the two guard braces has a pharynx wall support and a tongue base support. This connecting piece is

shaped and dimensioned so that in the inserted state the pharynx wall support rests against the wall of the pharynx of the user and the tongue bases support rests against the base of the tongue of the user, in order to stabilise the wall of the pharynx and the base of the tongue of the user.
In a preferred embodiment of the mouth guard according to the invention the two guard braces in the region between the palate support and the pharynx wall support are connected to one another by an elastic connection.

In a preferred development of the mouth guard according to the invention this has at least partially an elastically deformable wire. In this way the mouth guard can be adapted in a simple manner to the shape of the oral cavity and to the pharyngeal area of the user. Furthermore this wire is encased in a plastic sheathing, preferably of a soft elastic material, for wearer comfort. It is understood that the person skilled in the art can select suitable materials for the elastically deformable wire, and in particular will use physiologically harmless materials, as are also known from medical technology.

It is understood that the mouth guard according to the invention can be formed in one piece or in several parts. In particular this mouthpiece can be adapted manually or mechanically, i.e. the dimensions of the oral cavity and pharyngeal area of the user can be checked, in order to shape the mouth guard automatically.

In a preferred embodiment of the present invention a plastic material introduced after the shaping is provided between the wire and the plastic sheathing. This plastic material introduced after the shaping is a flowable plastic, in particular a silicone, which quickly polymerises after the insertion.

The advantages of this mouth guard are immediately obvious to the person skilled in the art and can be seen in particular in the simple manner of production and use as well as in the surprisingly effective mode of action.

The invention will be described hereinafter with the aid of an exemplary embodiment and with reference to the drawings, in which:

Fig. 1: is a schematic representation of a mouth guard according to the invention in the inserted state;

Fig. 2: is a schematic side view of the mouth guard according to the invention;

Fig. 3: is a schematic spatial representation of the mouth guard according to the invention;

Figs. 4a-c: are schematic representations of the mouth guard according to the invention in different positions.

The mouth guard 1 illustrated in Fig. 1 lies in the oral cavity of a user 2 and is clamped between the lip area 3 and the soft palate 4 of the user 2. In this connection a rear part of this mouth guard 1 engages behind the soft palate 4 and extends further along the wall of the pharynx 5 up to the base 6 of the tongue 7 of the user 2. According to the invention this mouth guard is shaped and dimensioned so that the soft palate 4, the wall of the pharynx 5 and the base of the tongue 6 of the user 2 are prevented from freely fluttering or vibrating while breathing, as occurs in an interfering manner when snoring when sleeping with a relaxed musculature. It is understood that the mouth guard according to the invention has to be appropriately adapted to each user individually, i.e. to the shape of the oral cavity and pharyngeal area of the user, in order to achieve the optimal effect combined with maximum wearer comfort. It has been found that such a mouth guard can after the user has become accustomed to its use after a short period be employed and worn without any nausea or other discomfort. In a preferred embodiment the mouth guard according to the invention is formed in the shape of a wire and permits a gentle and easy breathing. The snoring inhibiting effect, in particular the prevention of apnoea, leads to a deep and restful sleep on the part of the user.

Fig. 2 shows schematically a side view of the mouth guard 1 according to the invention, in which the individual functional areas of the latter can clearly be recognised. The mouth guard 1 according to the invention comprises two guard braces 11, which are connected to one another via an elastic connecting piece 12. In this connection each of the guard braces 11 comprises a guard end 13, a guard arcuate portion 14 and a palate support 15. The elastic connecting piece 12 is connected in the region of the palate support 15 to the two guard braces 11 and includes at least one pharynx wall support 16 and a tongue base support 17. It is understood that these functional elements 13 can be formed as one piece or can consist of individually produced elements. In a preferred embodiment of the mouth guard 1 according to the invention this is produced, as is disclosed for example in the cited WO2007/020197, of a wire encased in a plastic tube.

A preferred embodiment of the mouth guard 1 according to the invention is illustrated spatially in Fig. 3 and clearly shows the shaping of the two left-hand and right-hand guard braces 11 together with their functional elements 13, 14 and 15 as well as the elastic connecting piece 12 together with its functional elements 16 and 17. With a correctly adjusted mouth guard 1, the guard end 13 and the

palate support 15 generate a clamping action via the guard arcuate portion 15, which stabilises the soft palate 4. The soft palate of the user can freely move between the left side and right side palate supports 15. According to the invention the palate supports 15 are connected to an elastic connecting piece 12, which has a pharynx wall support 16 and a tongue base support 17. The pharynx support 16 and tongue base support 17 in the inserted state lie against the wall of the pharynx and against the base of the tongue respectively of the user and do not need to exert any pressure on the wall of the pharynx or of the base of the tongue. This connecting piece 12 simply holds back the slack tissue of the user when sleeping in order to ensure unhindered breathing. This also prevents or largely prevents the flowing airstream from causing these slack tissue parts to flutter or vibrate. It is understood that the mouth guard 1 according to the invention has to be adapted to the individual mouth cavity shape and pharynx shape. To this end the use of a plastic-encased wire 19 has proved especially suitable, and in particular the elasticity and dimensional stability can be determined by a suitable choice of material. In a preferred embodiment the mouth guard after it has been adapted is filled with a silicone-like material, i.e. the gap between the shaped wire 19 and the plastic sheathing 10 is filled. This allows in a first step a simple and therefore precise shaping of the mouth guard in its adaptation, and in a second step enables the dimensional stability after the adaptation to be increased. It is understood that by the precise adaptation of the mouth guard the wearer comfort can be improved, and due to the increased dimensional stability the mouth guard also has an improved long-term stability.

In a preferred development of the mouth guard according to the invention the two guard braces 11 in the region between the palate support 15 and the pharynx wall support 16 are joined to one another with an elastic connection P. This connection P simplifies the insertion of the ready-to-use adapted mouth guard by the user, as will be explained in further detail in Figs. 4a-c.

Fig. 4a shows schematically a mouth guard 1 after its adaption in its ready-to-use form with a shaping wire 19 arranged in a filled plastic sheathing 10. The plastic tubing or sheathing 10 is in the present invention preferably filled with a self-hardening and soft elastic plastic material, in particular a physiologically harmless silicone, after the final shaping of the mouth guard. The use of a connection P between the palate support 15 and the pharynx wall support 16 has been found to significantly facilitate the use of the mouth guard. In a simple embodiment this connecting element P is realised by means of a likewise cast-in additional wire 18. Fig. 4a clearly shows that before the insertion of the mouth guard 1 according to the invention the guard braces 14 lie substantially orthogonally, i.e. at a shaping angle α, to the pharynx wall support 16.

If the guard ends 13 and therefore also the respective guard braces 14 are rotated outwardly, the palate supports 15 tilt rearwards essentially on account of the connection P and are inclined rearwards by a tipping angle $\beta > \alpha$, i.e. on the pharynx side relative to a plane spanned by the guard arcuate portion 14. At the same time they entrain the pharynx wall supports 16, i.e. cause the pharynx wall support 12 to fold inwardly, as is illustrated in Fig. 4b.

If the two guard ends 13, respectively the associated guard arcuate portions 14, are rotated further outwardly in the same way, the palate supports 15 on the pharynx side lie in the plane of the guard arcuate portions 14 and allow the pharynx wall supports 16 to fold in, as is illustrated in Fig. 4c. In this position the mouth guard according to the invention can be inserted by the user in a simple manner into the pharyngeal region. When the guard ends are rotated backwards, on the one hand the palate support 16 lies behind the soft palate of the user and on the other hand at the same time the pharynx wall support 16 opens out, so as to lie against the rear wall of the pharynx and to support the base of the tongue. In this way the mouth guard 1 regains its original shape adapted individually to the user.

It is understood that the tongue base support of the mouth guard according to the invention can additionally be shaped, in particular in order to produce a shape of the tongue base support that rests over a large area against the base of the tongue. The previously described embodiments are given only by way of example. The person skilled in the art will in particular be able to use other suitable materials for producing such a mouth guard, in particular plastics that can be processed in a simple manner, for example that can be shaped by heat treatment, or are suitable for the automatic production, in particular by injection moulding, of a mouth guard according to the invention, for example based on a pharyngeal region whose dimensions can be checked.

List of reference numerals:

1	Mouth guard
2	User
3	Lip area
4	Soft palate
5	Pharynx wall
6	Tongue base
7	Tongue
10	Plastic sheathing
11	Guard brace
12	Connecting piece
13	Guard end
14	Guard arcuate portion
15	Palate support
16	Pharynx wall support
17	Tongue base support
18	Additional wire
19	Wire
P	Connecting element
α	Shaping angle
β	Tilting angle

Patentkrav

1. Snorke-hæmmende mundbøjle (1), med to bøjlebuer (11), som er forbundet med hinanden med et elastisk fjedrende forbindelseselement (12), hvorved hver af bøjlebuerne (11) omfatter en vinklet bøjleende (13), en bøjlekurve (14) og mindst en ganestøtte (15), og hver bøjlebue (11) er formet og dimensioneret således at, når den er indsat, er den på svælgsiden, strækkende med dens ganestøtte (15) bag om den bløde gane på en bruger (2) for at stabilisere denne gane, og er på dens læbeside, tætsluttende med dens bøjleende (13) på brugerens læbe (2) således at bøjlebuen (14) klemmes mellem den bløde gane og brugerens læbe (2),
kendetegnet ved at
det elastisk fjedrende forbindelseselement (12) mellem de to bøjlebuer (11) omfatter en svælgvægsstøtte (16), som, når den er indsat, strækker sig langs svælgvæggen (5) til tungeroden (6) på tungen (7), og en tungerodsstøtte (17), som ligger ved roden, som er svælgsideenden af svælgvægsstøtten (16), som er formet og dimensioneret således at, når den er indsat, støder svælgvægsstøtten (16) op til svælgvæggen (5) på brugeren (2) og tungerodsstøtten (17) støder op til tungeroden (6) på brugeren (2) for at stabilisere svælgvæggen (5) og tungeroden (6) på brugeren (2).

2. Mundbøjle ifølge krav 1, **kendetegnet ved at** de to bøjlebuer (11) er forbundet med hinanden mellem ganestøtten (15) og svælgvægsstøtten (16) via et elastisk forbindelseselement (P).

3. Mundbøjle ifølge et hvilket som helst af kravene 1 eller 2, **kendetegnet ved at** den omfatter mindst delvist en elastisk deformerbar tråd (19).

4. Mundbøjle ifølge krav 3, **kendetegnet ved at** denne tråd (19) er omsluttet af en plastkappe (10).

5. Mundbøjle ifølge krav 4, **kendetegnet ved at** plastkappen (10) er blød og elastisk.

6. Mundbøjle ifølge krav 1, **kendetegnet ved at** den består af et fysiologisk acceptabelt materiale.

7. Mundbøjle ifølge krav 1, **kendetegnet ved at** den deformeres manuelt eller mekanisk.

8. Mundbøjle ifølge krav 4, **kendetegnet ved at** den tilvejebringes med et plastmateriale der indføres efter formgivning mellem tråden (19) og plastkappen (10).

9. Mundbøjle ifølge krav 8, **kendetegnet ved at** plastmaterialet der indføres efter formgivning er et silikone-lignende plastmateriale.

10. Mundbøjle ifølge krav 1 eller 2, **kendetegnet ved at** den er udformet i ét stykke.

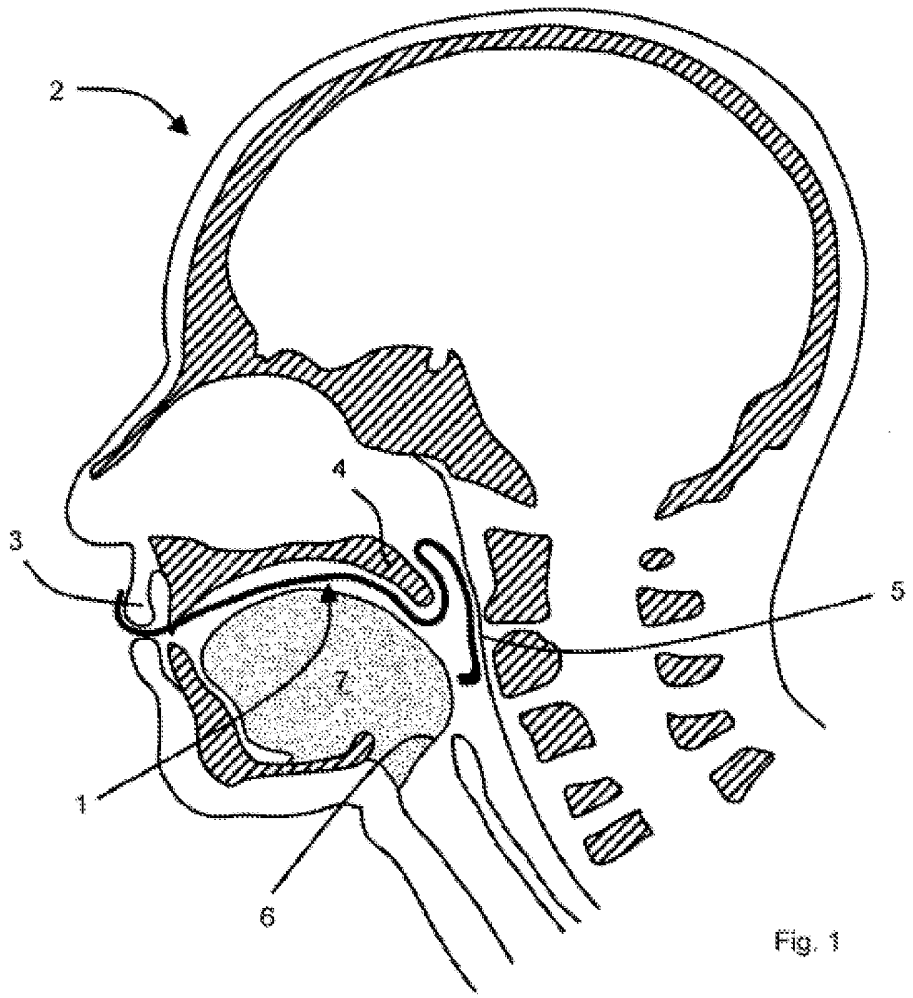

Fig. 1

5

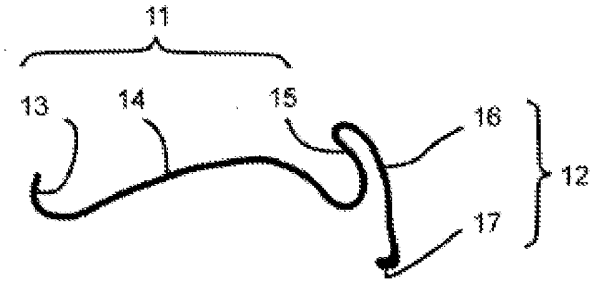

Fig. 2

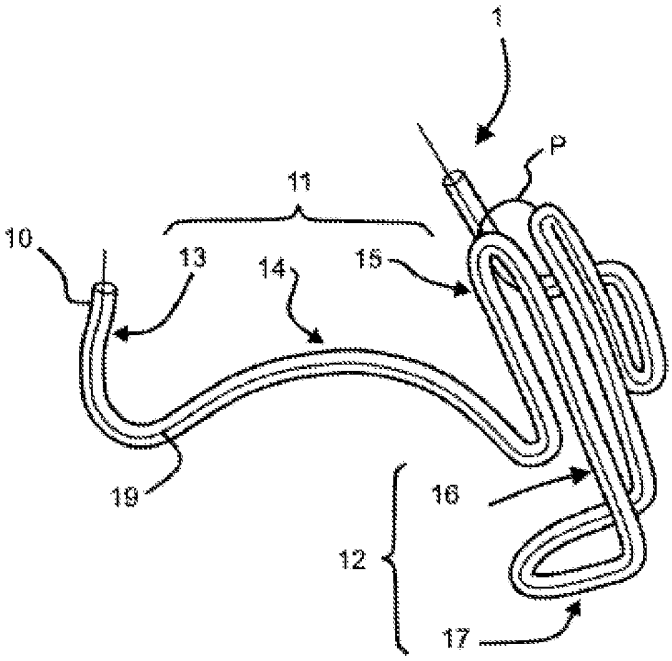

Fig. 3

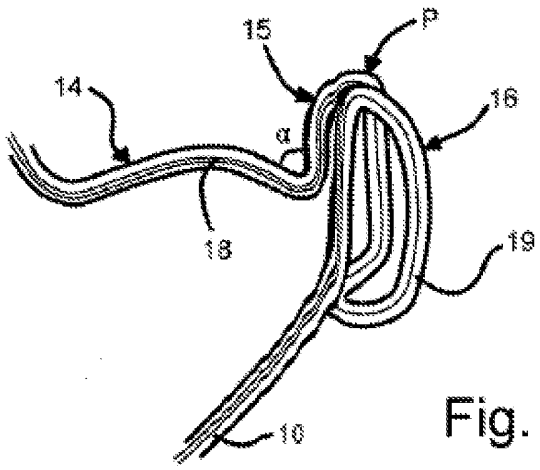

Fig. 4a

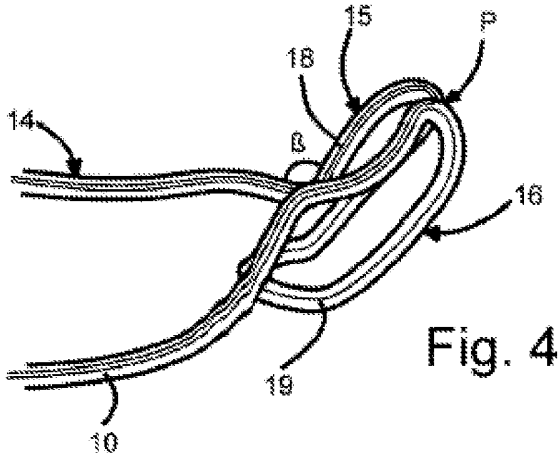

Fig. 4b

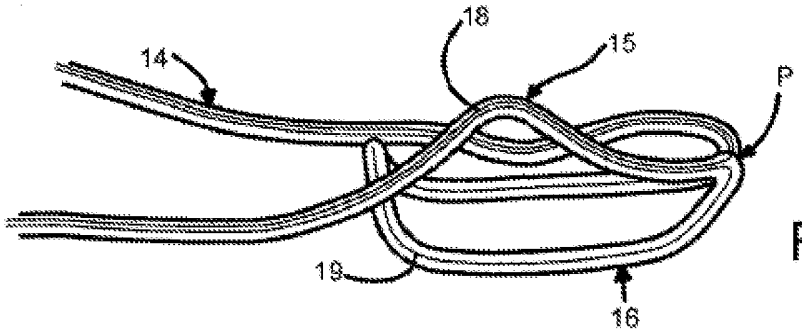

Fig. 4c