Innovation, Sciences et Développement économique Canada
Office de la Propriété Intellectuelle du Canada

Innovation, Science and Economic Development Canada
Canadian Intellectual Property Office

CA 2859136 C 2020/02/25

(11)(21) **2 859 136**

(12) BREVET CANADIEN / CANADIAN PATENT

(13) **C**

(86) **Date de dépôt PCT/PCT Filing Date:** 2012/11/09
(87) **Date publication PCT/PCT Publication Date:** 2013/05/16
(45) **Date de délivrance/Issue Date:** 2020/02/25
(85) **Entrée phase nationale/National Entry:** 2014/06/12
(86) **N° demande PCT/PCT Application No.:** EP 2012/004665
(87) **N° publication PCT/PCT Publication No.:** 2013/068124
(30) **Priorité/Priority:** 2011/11/11 (DE10 2011 118 320.9)

(51) **Cl.Int./Int.Cl.** ***A61C 13/00*** (2006.01),
A61C 13/01 (2006.01)

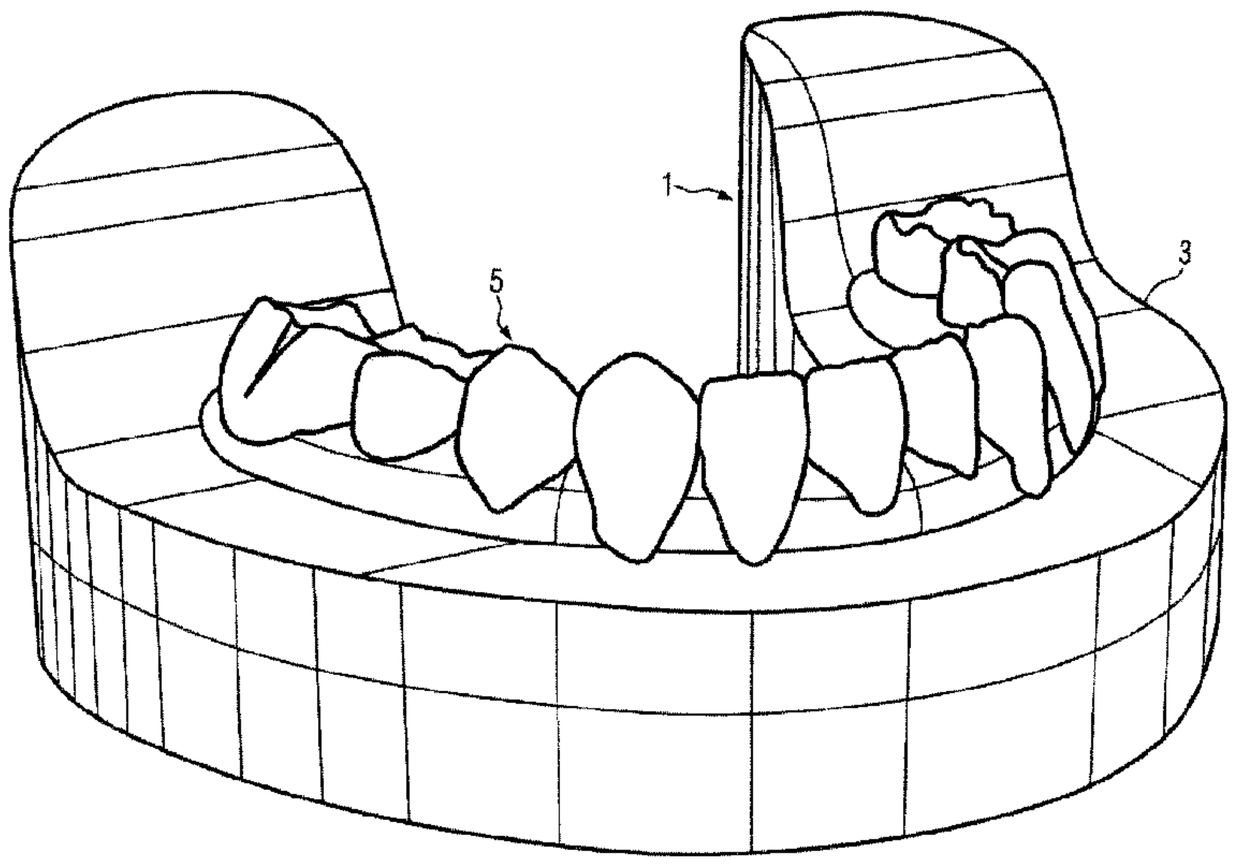
(72) **Inventeurs/Inventors:**
KLINGENBURG, FRIEDHELM, DE;
FROLICH, CAROLA, DE

(73) **Propriétaire/Owner:**
MERZ DENTAL GMBH, DE

(74) **Agent:** GOWLING WLG (CANADA) LLP

(54) **Titre : BLOC A FRAISER, PROCEDE DE FABRICATION DE PROTHESES PARTIELLES OU COMPLETES, ET SYSTEME DE BLOC A FRAISER COMPLET**

(54) **Title: MILLING BLOCK, METHOD FOR PRODUCING PARTIAL OR TOTAL PROSTHESES, AND COMPLETE MILLING BLOCK SYSTEM**



(57) **Abrégé/Abstract:**
The invention relates to a milling block (1) for producing partial or total prostheses, comprising a prosthesis base (3) to be processed according to the shape of the jaw, on which synthetically moulded teeth (5), preferably a full set of teeth, are provided, a milling block system consisting of a first milling block for the upper set of teeth and a second milling block for the lower set of teeth, and a method for producing partial or total prostheses

Abstract

The invention relates to a milling block (1) for producing partial or total prostheses, comprising a prosthesis base (3) to be processed according to the shape of the jaw, on which synthetically moulded teeth (5), preferably a full set of teeth, are provided, a milling block system consisting of a first milling block for the upper set of teeth and a second milling block for the lower set of teeth, and a method for producing partial or total prostheses.

(Fig. 2)

Milling block, method for producing partial or total prostheses, and complete milling block system

The invention relates to a milling block, to a method for producing partial or total prostheses and to a complete milling block system consisting of a first milling block for the upper set of teeth and a second milling block for the lower set of teeth and to a method for providing a partial or total prosthesis.

A method for producing a total prosthesis with an upper and/or lower jaw base with the aid of a milling device is already known from EP 0 501 983 B1, the respective base being milled from a synthetic block and data on the oral cavity characterising the contour or topography being used. This method described therein also uses, after preparing the adapted base for the oral cavity, the further procedural step of positioning the required teeth in wax on the upper and/or lower jaw base, the prosthesis being completed by connecting the teeth to the base with the aid of a cold-curing polymer. Next the so-called reocclusion takes place so that the respective patient is provided with an optimal bite according to the latter's chewing movements.

This known method is therefore associated with the disadvantage that after completion of the upper and/or lower jaw base individual adaptation to the patient by appropriately positioning the teeth in wax is required, and this in turn makes the whole treatment sequence for the dentist and dental technician time-consuming and expensive.

It is therefore the object of the following invention to provide a milling block and a method for producing partial or total prostheses as well as a complete milling block system which avoid the disadvantages of the prior art. Furthermore, it is the object of the following invention to reduce the working steps for individual adaptation to the patient.

Further features and exemplary advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the appended drawings, in which Figure 1 is a perspective view of an exemplary milling block in accordance with the teachings of the present invention and Figure 2 is an perspective view of an exemplary completed total prosthesis of a lower jaw in accordance with the teachings of the present invention.

According to the invention it is proposed in order to achieve the objects to provide a milling block for producing partial or total prostheses wherein a prosthesis base with synthetically moulded teeth of a full set of teeth is provided that is to be processed according to the shape of the jaw. Within this context, the corresponding milling block system is also equipped as

regards the upper set of teeth and the lower set of teeth independently of the fastening in the mouth.

With this measure according to the application it is made possible for only the prosthesis base to have to be milled or moulded, and with correct milling according to given CAD/CAM data on the oral cavity of the patient no further adaptation has to be made due to synthetically moulded teeth already anchored on the prosthesis base.

By appropriately optimised adaptation and adjustment of the prosthesis base to the oral cavity just one individual adaptation step is therefore required in order to provide for the patient optimally.

Due to the presence of a milling block or milling block system according to the application wherein there is an appropriate jaw shape for the prosthesis base to be processed with synthetically moulded teeth, one need neither take an impression of the bite in order to determine the maxillomandibular relationship nor undertake a time-consuming and expensive fitting.

With the measure according to the application subsequent insertion into an articulator to determine the positioning of the teeth is not therefore required because the synthetically moulded teeth are already prepared according to given basic data for the occlusion position.

According to the method according to the application for providing a partial or total prosthesis it is therefore possible that on the basis of the presence of upper and lower rows of teeth present in the form of the set of teeth in the occlusion position at least three different milling block systems in different proportions in the form of the set of teeth and size of the teeth can be provided in order to be able to provide for almost all patients. With this measure a time efficient and cost effective production method is achieved, and it is made possible for dentists and/or dental technicians to provide fully for the population in all countries.

Unlike the known dental prostheses and production methods for the latter the milling block according to the invention is based on a one-piece arrangement with a first region, which has a prosthesis base that can be processed according to the shape of the jaw, and a second region with a predetermined or standardised arrangement of synthetically moulded teeth or rows of teeth for upper or lower jaw sets of teeth. Therefore, as a preliminary stage for the dental prosthesis a milling block is provided which, in a particularly cost- and time-saving manner, can only be processed, i.e. milled, in its first region, namely the prosthesis base in order to be adapted to the shape of the jaw. The milling block system according to the invention comprises at least a first milling block for the upper set of teeth and a second

milling block for the lower set of teeth, i.e. the preliminary stages of a partial or total prosthesis, which in the respective second region of the first and/or second milling block has a predetermined or standardised arrangement of synthetically moulded teeth or rows of teeth for the upper and lower jaw sets of teeth positioned according to established occlusion principles.

A majority of premouldings known from the prior art with different colours, sizes and shape combinations for the mucous membrane region and tooth region for the production of the dental prosthesis is considerably simplified with the present subject matter of the invention by the predetermined or standardised arrangement of synthetically moulded, polymerised in teeth or rows of teeth for the upper or lower jaw sets of teeth. According to the application it is advantageous that only the respective prosthesis base assigned to the mucous membrane region is to be milled.

Moreover, the predetermined or standardised arrangement of synthetically moulded teeth or rows of teeth for the upper and lower jaw sets of teeth positioned according to established occlusion principles are non-individualised, prefabricated dental prosthesis parts which do not require any further post-processing.

The predetermined or standardised arrangement of synthetically moulded teeth or rows of teeth for the upper and lower jaw sets of teeth positioned according to established occlusion principles takes place according to a selection of prefabricated dental prosthesis parts, i.e. synthetically moulded teeth or rows of teeth according to pre-specified and known positioning systems.

If, moreover, the synthetically moulded teeth and the prosthesis base are made in one piece, when producing the milling block a casting or pressing mould can almost be used which therefore also respectively uses just one material for the milling block which advantageously has both a smaller allergy potential and a higher bond strength.

If, advantageously, the milling block is configured in two parts, it is thus made possible for the first region, that is processed according to the shape of the jaw, to be produced in a standardised manner and to be joined to different teeth, likewise already positioned on a second region, which are of different sizes and have different factors. With the further development that the prosthesis base can be configured flexibly, simplified adaptation to the oral cavity and adaptation to the shape of the jaw of the respective patient can be allowed for.

Materials featured as particularly advantageous for the milling block and for the milling block

system, i.e. the prosthesis base and/or teeth, are, among others, so-called PMMA plastics, as are also thermoplastics, organically and inorganically filled plastics and also low-allergy plastics. In addition, it is also advantageous to use any form of ceramic, in particular glass ceramics, leucite-reinforced ceramic, aluminium-reinforced ceramic, oxide ceramic, zirconium oxide ceramic, infiltration ceramic, feldspar ceramics, lithium disilicate ceramic .It is also conceivable to use materials that have been sintered, but that still require a further production step. The milling block or the milling block system can also be used with a combined dental prosthesis.

If the teeth are already aligned according to an occlusion position, total adaptation to the patient's oral cavity is therefore only undertaken by appropriately milling the prosthesis base. The patient can therefore be certain that with appropriate adaptation to the oral cavity or to the upper and lower jaw an optimal occlusion position is provided and so there is advantageously an unrestrictedly functional total prosthesis as regards the bite characteristics. Due to the milling block or milling block system according to the application and the corresponding method for producing partial or total prostheses it is possible, for example, to provide at least three different sizes with which a complete total prosthesis can be provided for almost every patient according to the shape of the patient's face and the size of the patient's oral cavity. Due to the simplicity of the adaptation of the total prosthesis the working steps for the adaptation to the oral cavity are therefore considerably reduced and so are also less expensive. Based on experience, with specific groups of the population the milling block system can also include just two types or more.

With regard to the preparation and positioning of the synthetically moulded teeth, with the milling block, milling block system according to the invention and the corresponding method all possible, previously known positioning systems for this purpose can be used, such as e.g. the so-called original positioning systems derived from Gysi, Gerber and Schreinemaker. Positioning systems according to APF and APF NT and TiF based on the Gysi and Gerber positioning techniques can also be used advantageously.According to Staub Cranial a mathematically calculating positioning technique is used which determines the original position of the teeth on the basis of measurements taken and accordingly positions again.

The milling block or the milling block system according to the application can also be used in particular for the production of partial prostheses if at the very least opposite quadrants of the upper or lower sets of teeth can be used. Due to the positioning prepared for the teeth in the occlusion position, after inserting in and adapting to the corresponding jaw region post-processing of the teeth is therefore also practically unnecessary.

One particularly advantageous production technique for the milling block or for the milling block system is the possibility of inserting the selected teeth, pre-polymerised, in the occlusion position in the first region of the prosthesis base and then only undertaking the final polymerisation upon joining to the second region of the prosthesis base. In this way it is made possible for the respective upper and lower jaw prosthesis to be prepared and produced in one piece and form- and force-fitted, and so it has a lower allergy potential and a higher bond strength.

With the milling block or milling block system according to the application it is made possible for fixing or marking of any type for a zero position transfer or zero point transfer for the automatic CAD/CAM processing to be undertaken. This makes it possible to save a huge amount of time, in particular due to dispensing with scanning, in order to achieve the positioning and prevents defective processing in a CAD/CAM system.

The milling block and the milling block system according to the application and the method for producing partial or total prostheses are described below in examples by means of the drawings.

In Figure 1 a milling block 1 is shown which has a prosthesis base 3 which is processed according to the shape of the jaw on which synthetically moulded teeth 5 of a full set of teeth are already provided. The synthetic teeth are already worked such that the teeth are aligned according to an occlusion position and so can interact optimally with the upper jaw (not shown). In this illustration, for example, the prosthesis base and the teeth are made in one piece, and so the production process has been simplified.

In Figure 2 the completed total prosthesis of the lower jaw is shown, the prosthesis base 3 already being adapted to the oral cavity. Figure 2 clearly shows how the shape of the oral cavity has been milled out of the prosthesis base, the teeth 5, which are aligned in the occlusion position, remaining untreated. It is thus made possible with the method according to the application that only by adapting the prosthesis base is there a complete total prosthesis the occlusion of which is coherent and does not necessitate any further procedural step, such as for example adaptation in an articulator. A further procedural step, as specified for example in the prior art, namely subsequent alignment by arranging the teeth in wax in order to achieve the occlusion position, is not necessary with the method according to the application.

Claims

1. A milling block for producing partial or total prostheses, characterised by a prosthesis base to be processed according to the shape of the jaw, on which synthetically moulded teeth are provided.

2. The milling block according to Claim 1, characterised in that the synthetically moulded teeth provide a full set of teeth.

3. The milling block according to Claim 1 or Claim 2, characterised in that the prosthesis base and the teeth are made in one piece.

4. The milling block according to any one of Claims 1 to 3, characterised in that the teeth of a milling block for the upper set of teeth and the teeth of a milling block for the lower set of teeth are aligned according to an occlusion position.

5. The milling block according Claim 4, characterised in that the teeth of the upper set of teeth and the teeth of the lower set of teeth are aligned according to the bite registration.

6. The milling block according to any one of Claims 1 to 5, characterised in that the prosthesis base is configured in two parts consisting of a first region to be processed and a second region having the synthetically moulded teeth.

7. The milling block according to Claim 5, wherein the first and the second region are connected to the prosthesis base by polymerisation.

8. The milling block according to any one of Claims 1 to 7, characterised in that the prosthesis base can be processed individually according to the contour of a patient's oral cavity.

9. The milling block according to any one of Claims 1 to 8, characterised in that ceramics such as glass ceramic, leucite-reinforced ceramic, aluminium-reinforced ceramic, oxide ceramic, zirconium oxide ceramic, infiltration ceramic, feldspar ceramics or lithium disilicate ceramic are used as materials.

10. The milling block according to any one of Claims 1 to 8, characterised in that PMMA plastics, thermoplastics, PEEK nylon composite, organically and inorganically filled plastics, low-allergy plastics, out-burnable materials and/or sintered materials are used as materials.

11. The milling block according to any one of Claims 1 to 8, characterised in that the milling blocks can be used for the combined dental prosthesis, in particular with a metal base or metal plastic or ceramic base with plastic teeth.

12. A milling block system consisting of a first milling block for the upper set of teeth and a second milling block for the lower set of teeth according to a milling block according to any one of Claims 1 to 11, each milling block having a prosthesis base which can be processed according to the contour of a patient's oral cavity.

13. The milling block system according to Claim 12, the teeth of the upper set of teeth and of the lower set of teeth being arranged in relation to one another in the occlusion position.

14. The milling block system according to either of Claims 12 or Claim 13, characterised in that the teeth are aligned according to the bite registration.

15. The milling block system according to any one of Claims 12 to 14, characterised in that the milling block system has partial prostheses of at the very least opposite quadrants.

16. The milling block system according to any one of Claims 12 to 15, characterised in that the synthetically moulded teeth are polymerised into the prosthesis base.

17. A method for producing partial or total prostheses which has the following steps:

a. providing a first milling block for the upper set of teeth and a second milling block for the lower set of teeth according to any one of Claims 1 to 16;
b. determining the contour data of the oral cavity of a patient;
c. preparing and/or processing the first and the second milling block according to the contour data of the oral cavity.

18. The method according to Claim 17, wherein the preparation and/or the processing of the first and the second milling block takes place by means of CAD/CAM systems.

19. The method according to Claim 17 or Claim 18, wherein the teeth are set up for the occlusion position.

20. The method according to any one of Claims 17 to 19, wherein the teeth are set up according to the Gysi, Gerber, APF, APF NT, TiF, Schreinemaker, Staub Cranial set-up methods and/or further similar set-up methods.

21. The method according to any of one Claims 17 to 20, wherein the selected synthetically moulded teeth are set up on a second region of the prosthesis base and this second region is joined to a first region of the prosthesis base, the region to be processed.

22. The method according to Claim 21, wherein the first and the second region are joined together by polymerisation, by adhesive bonding, by pressing and/or melting together.

23. The method according to any of Claim 21 or Claim 22, wherein the selected teeth are pre- polymerised in the occlusion position in the first region and/or then finally polymerised with the second region.

24. The method according to any of one Claims 17 to 23, wherein the prosthesis base is able to be moulded individually according to the contour of the oral cavity of a patient by inserting and adapting.

25. The method according to Claim 24, wherein the prosthesis base is flexible, and hardened or solidified by heating, irradiating with light or by the chemical reaction of at least two components present in the prosthesis base.

26. The method according to any one of Claims 17 to 25, characterised in that palatinal and vestibular regions are not processed.

27. A method for providing a partial or total prosthesis, which includes a selection of a milling block of the milling block system according to any one of Claims 12 to 16 from a group of at least 3 different milling block sets or milling block system sets of at least 3 different positioned rows of teeth provided for the occlusion position.

28. The method of claim 27, wherein the different milling block sets or milling block system sets comprises 14 teeth respectively for the upper and the lower set of teeth.

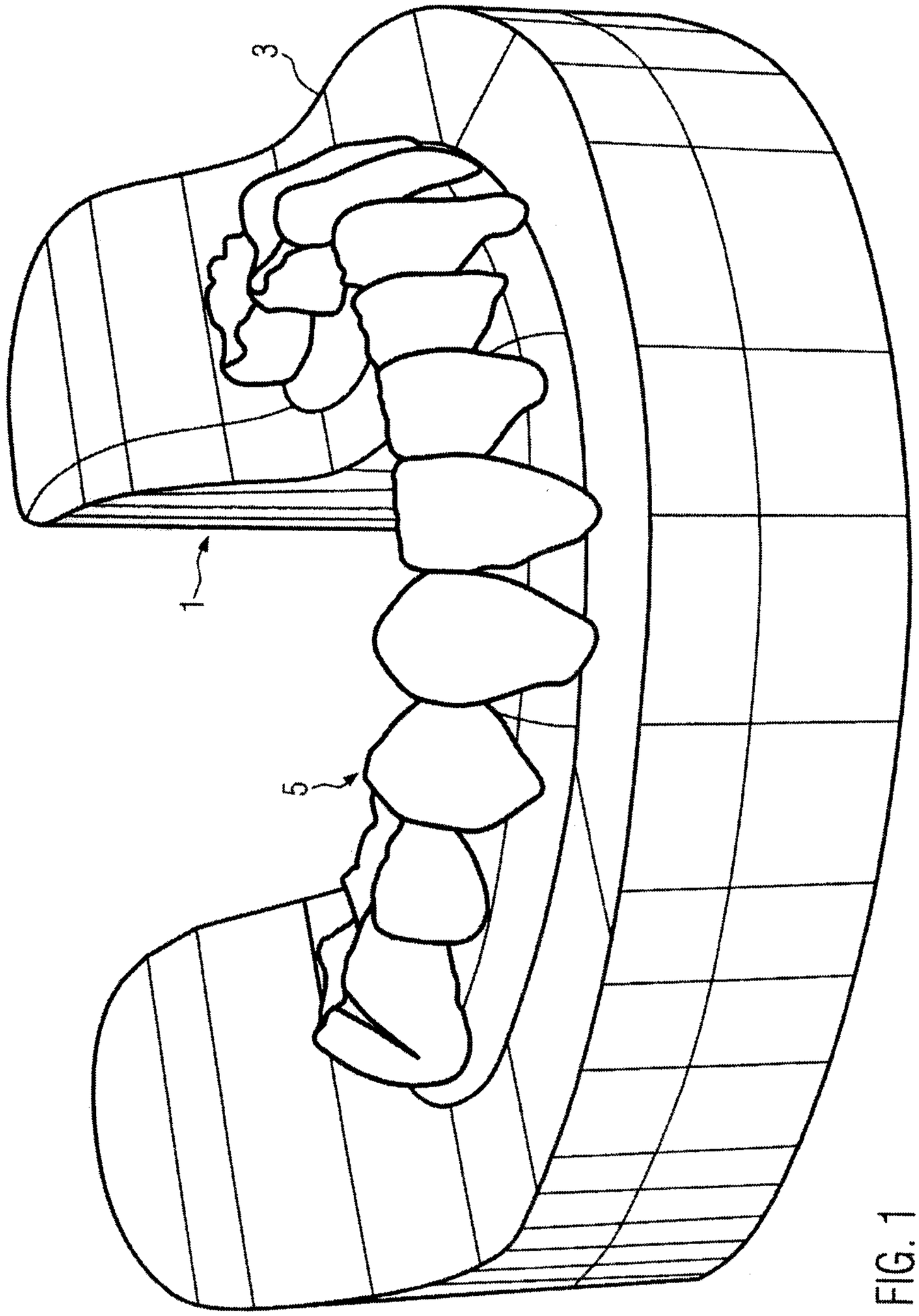


FIG. 1

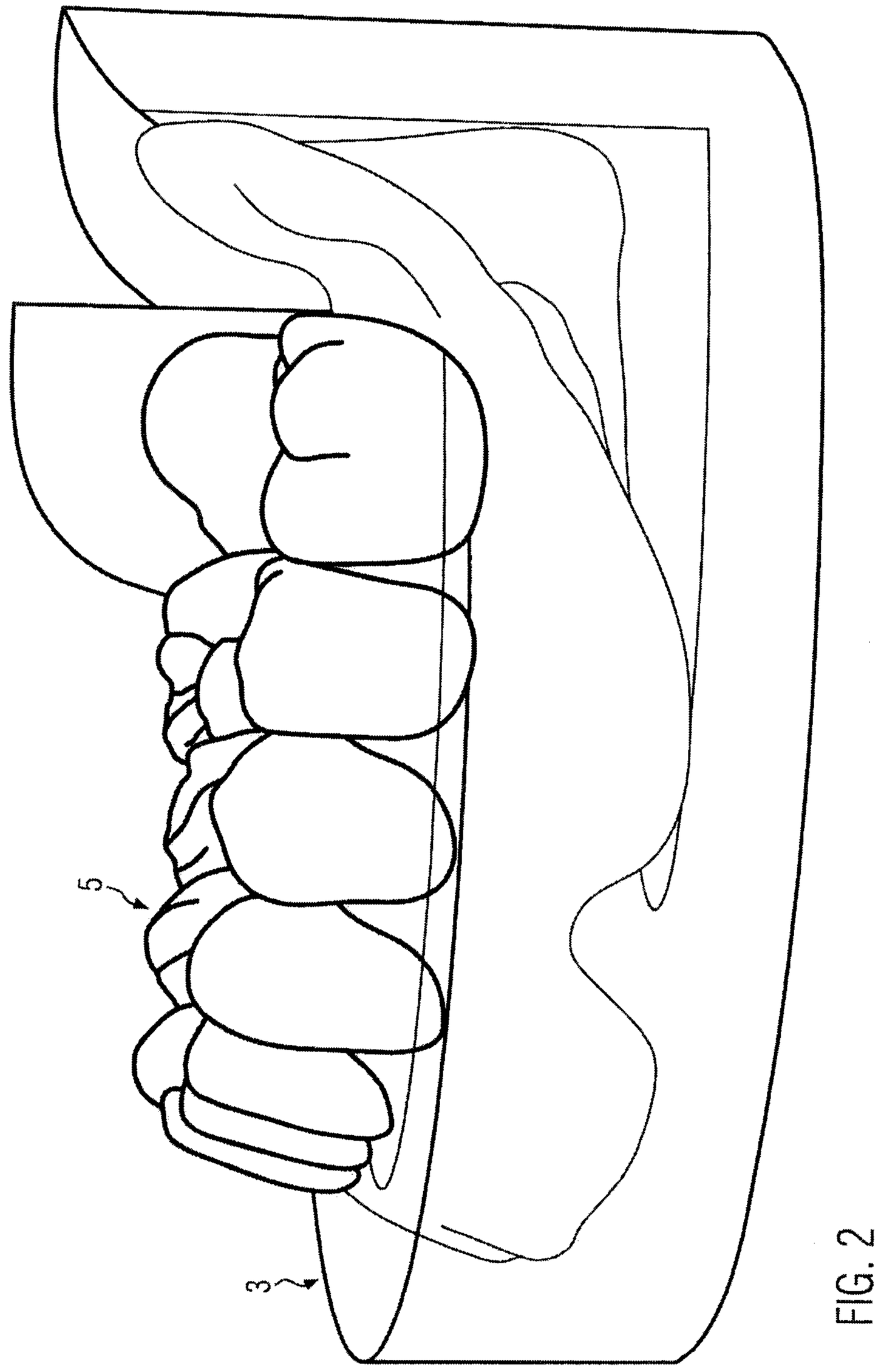
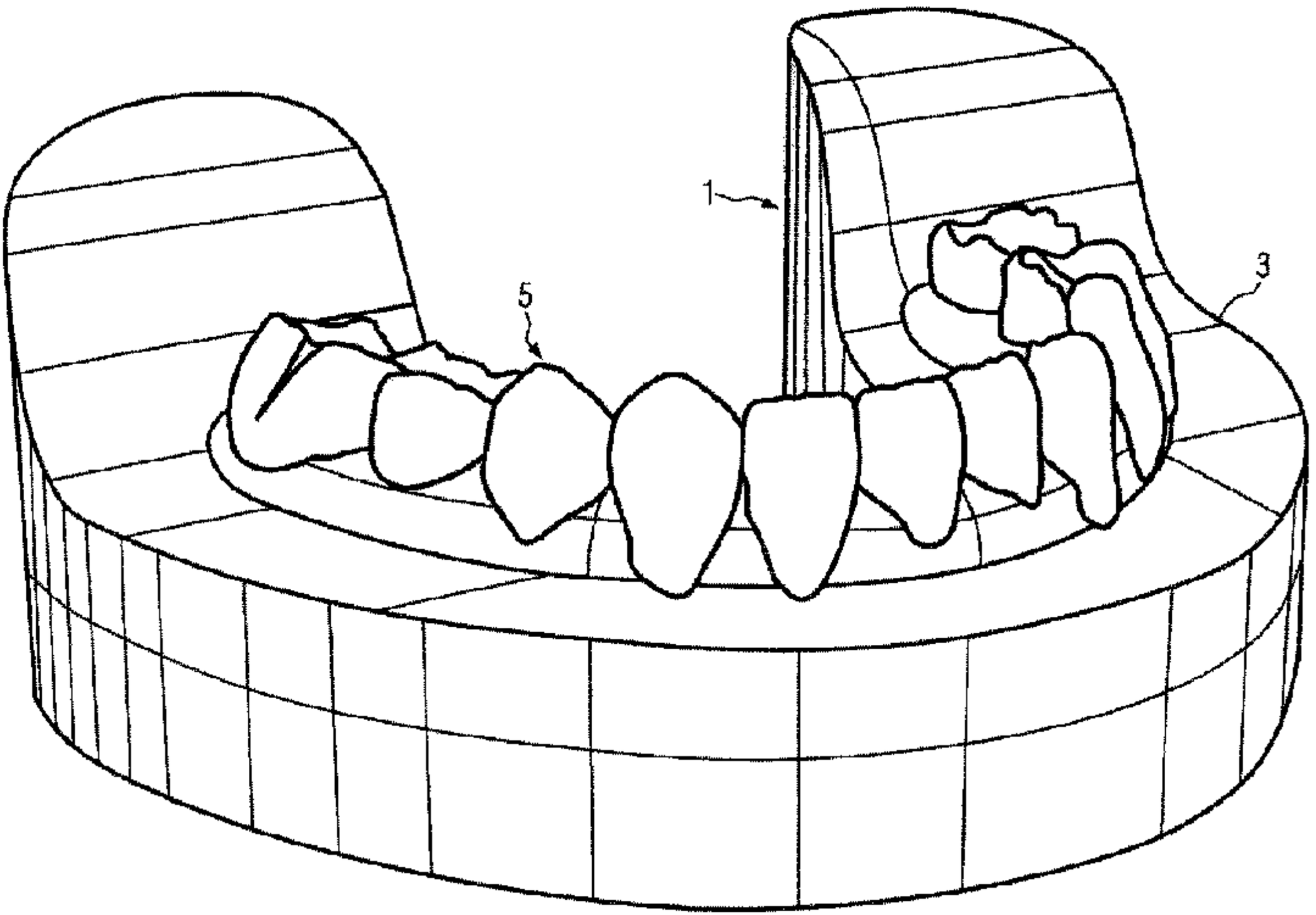


FIG. 2


1
3
5