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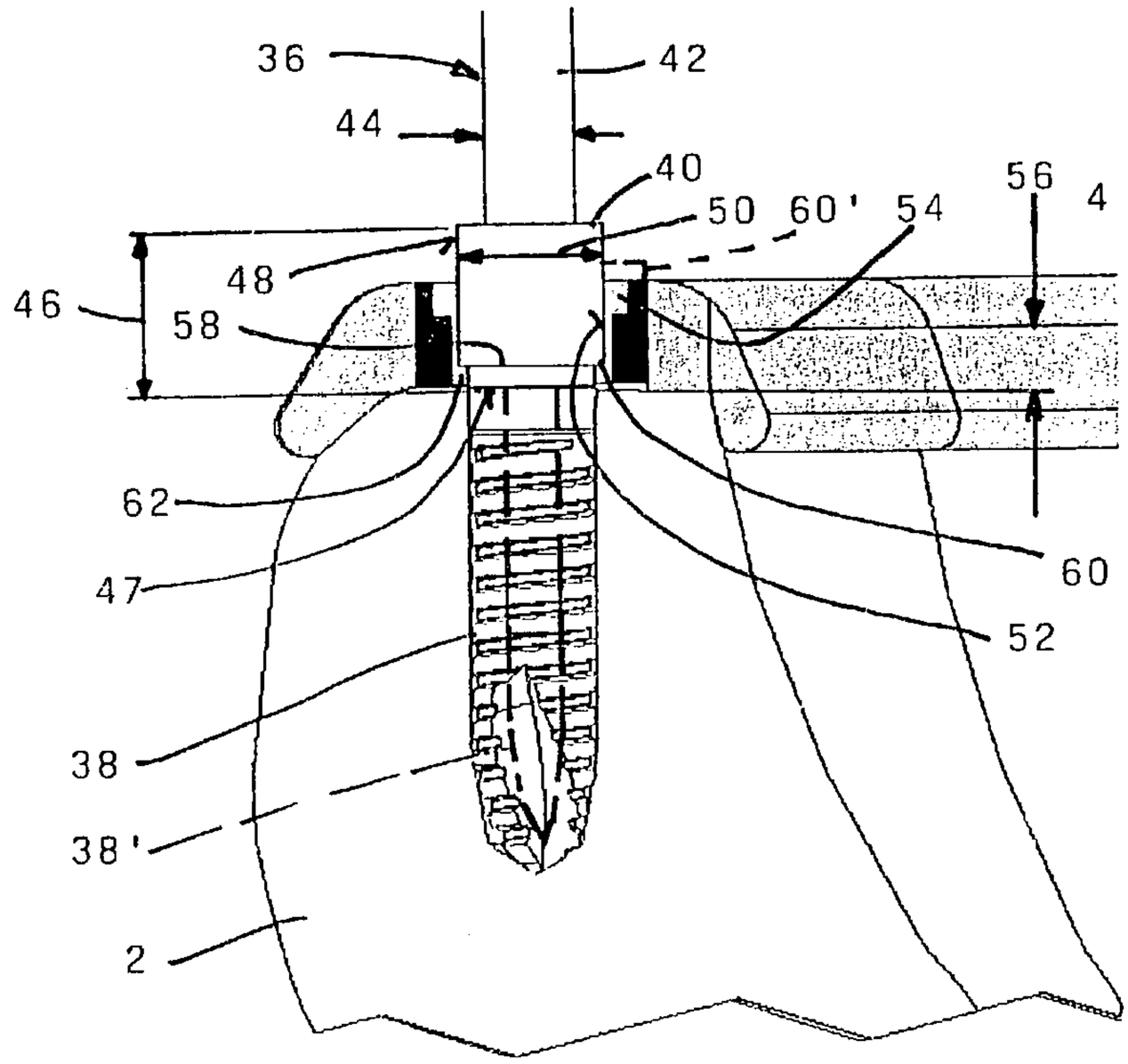

(57) Abrégé/Abstract:
A system for insertion of implants, in particular dental implants, comprises a splint (4), which is provided with a bore (6) and which is designed for positioning the implant (38) onto an area intended for the insertion, in particular a bone, and can be placed on the latter. The system also includes a screwing tool (36) for the implant (38), and the splint (4) has a guide surface (52). The system is to be further designed such that the precise insertion of the implant (38) can be predefined with a high degree of reliability. For this purpose, it is proposed that the screwing tool (36) has a head part (40) to which the implant (38) is connected and which has an outer surface (48) for bringing into engagement with the guide surface (52), that the screwing tool (36) also comprises a first abutment (58), and that the splint (4) in the area of the bore (6) comprises or at least indirectly acquires a further abutment (60), on which the first abutment (58) of the screwing tool (36) comes to rest in order to define the depth of insertion of the implant (38) when it is being screwed in.

ABSTRACT

A system for insertion of implants, in particular dental implants, comprises a splint (4), which is provided with a bore (6) and which is designed for positioning the implant (38) onto an area intended for the insertion, in particular a bone, and can be placed on the latter. The system also includes a screwing tool (36) for the implant (38), and the splint (4) has a guide surface (52). The system is to be further designed such that the precise insertion of the implant (38) can be predefined with a high degree of reliability. For this purpose, it is proposed that the screwing tool (36) has a head part (40) to which the implant (38) is connected and which has an outer surface (48) for bringing into engagement with the guide surface (52), that the screwing tool (36) also comprises a first abutment (58), and that the splint (4) in the area of the bore (6) comprises or at least indirectly acquires a further abutment (60), on which the first abutment (58) of the screwing tool (36) comes to rest in order to define the depth of insertion of the implant (38) when it is being screwed in.

The invention relates to an arrangement for inserting implants, in particular dental implants, in accordance with the features listed in the preamble to patent claim 1.

Known from US 2005/0170311 A1 is such an arrangement, which contains a splint, embodied as a template, for positioning the implant or implants. The splint is produced based on data that are generated by means of computer tomography (CT), X-ray, or some other device that images the bone, in particular the jaw bone, in order to be able to plan and specify in a defined manner the position required for the implant, taking into account anatomical, surgical, and also aesthetic factors. The splint is adapted to the individual situation and factors and contains at least one continuous bore for receiving a guide sleeve having a through-bore, using which it is possible to specify the exact orientation and positioning of the bore for the implant. Furthermore provided is a bore sleeve that has a through-bore, that can be used in the guide sleeve of the splint, and the interior diameter of which is matched to the exterior diameter of the drill bit for adding the bore to the bone. The drill bit contains an annular collar or stop that can be positioned on the free upper edge of the bore sleeve in order to specify the depth of the bore in the bone. Furthermore, the splint is used for adding the implants, to which special fastening bodies are joined by means of screws. The fastening bodies each contain one cylindrical area that faces the implant and the exterior diameter of which is matched to the interior diameter of the guide sleeve fixed in the splint. The fastening body contains an area that faces away from the implant and that has for instance contact surfaces embodied as a hexagon for an insertion tool. In the axial direction between the two aforesaid areas the fastening body has a flange that is positioned against the free upper edge of the guide cylinder to limit the placement depth of the implant.

The flange has a significantly larger diameter than the cylindrical area so that problems can occur when tight space is a problem. The fastening body has an axial length that is not insignificant, so that handling while the implant is being inserted is rendered significantly more difficult in terms of the tight space issues in the oral cavity. Since as is known implant systems have implants that have different diameters, a substantial number of such fastening bodies are needed. The placement and exact positioning of so-called miniature implants or mini-implants having exterior diameters on the order of magnitude

of 1 mm and less is not possible with nothing further, that are primarily embodied in a single piece and enable minimally invasive transgingival insertion. In practice, problems result when placing the implants in the implant bed, which has been prepared by means of the aforesaid arrangement, especially with mini-implants, so that it is difficult for the surgeon to control the placement depth of the implant and furthermore, with respect to the quite large distance from the insertion tool to the implant due to the fastening body, undesired tilting moment or rotations can be caused that lead to incorrect positioning.

Furthermore, known from WO 97/49 351 A is an arrangement containing a bore plate that is arranged above the bone by means of a spacer and also containing a fastening plate having cylindrical elements that engage in bores of the bore plate. The bore plate and the guide plate are fixed with respect to the bone by means of support screws. The aforesaid cylindrical elements contain through-bores for guide elements having radial flanges, which, after the bore plate and guide plate have been fixed and assembled, are disposed on its surface. On its bottom side facing the bone the bore plate contains a stepped bore in which a spacer partially engages. The spacer is joined to an implant that was previously inserted into the bone, but no information is provided regarding specifying the exact placement depth for this implant. The two-part structure of the arrangement made of bore plate and guide plate necessitates not inconsiderable complexity in terms of material and production.

Moreover, known from WO 99/26 540 is an arrangement having a template that contains a plurality of master cylinders, each having the same exterior dimensions. Into these cylinders bore sleeves can be used, the exterior diameters of which are matched to the interior diameters of the master cylinders. However, the internal diameters of the bore sleeves are embodied differently corresponding to the diameters of the bore and implant being used.

Proceeding from this point, the object of the invention is to avoid the cited disadvantages and refine the arrangement such that it is possible to specify with great reliability the exact placement of the implant, in particular in addition for the exact positioning of the bore. The arrangement should have a simple and functionally reliable structure and should ensure that handling is reliable and problem-free when adding the bore to the bone and/or when inserting the implant.

different exterior diameters. Since no special fastening bodies are provided between the insertion tool and the implant, there is no associated production and/or provision complexity. The splint is advantageously embodied for receiving a sleeve for placing the implant, the interior diameter of the which is at least partially matched to the exterior diameter of the implant. This sleeve, hereinafter referred to as the placement sleeve, has a stop surface, and, corresponding thereto, in particular the insertion tool possesses a second stop surface such that when inserting the implant and upon positioning of the aforesaid stop surfaces further insertion is prevented and thus the exact placement depth for the implant is prespecified in a defined manner. The stop surfaces are preferably provided within the recess and/or bore of the at least one sleeve. Furthermore, in accordance with the invention the placement sleeve, can be omitted, especially in miniature implants, and the stop surface can be an integral component of the splint or can be embodied in a single piece therewith. The stop surfaces can be embodied as steps, annular collars, or the like, of the placement sleeve, guide sleeve, or bore sleeve or splint, on the one hand, and of the drill bit or of the insertion tool, on the other hand. It is particularly significant, especially in implants having small exterior diameters and in particular in miniature implants, that the exterior diameter of the head part of the placement tool is significantly larger than that of the miniature implant, so that exact placement and/or positioning is assured in a particularly advantageous manner.

Special embodiments and refinements of the invention are provided in the subordinate claims and in the following description of a special exemplary embodiment.

The invention is explained in greater detail in the following, but is not restricted thereby.

Fig. 1 is a principle depiction of the jaw with the splint of the inventive arrangement;

Figs. 2, 3 are depictions in accordance with Fig. 1 with a drill bit in various axial positions;

Fig. 4 is a depiction in accordance with Fig. 1 after the bore has been added to the jaw;

Fig. 5 is a depiction with the insertion tool and implant;

Fig. 6 schematically depicts the jaw with implant after insertion;

Fig. 7 schematically depicts the jaw with the anchoring bodies of four implants.

Fig. 1 provides a schematic depiction of a jaw 2, including mucosa, and the splint 4 provided thereupon for positioning the bore to be added and the implant. In a recess or bore 6 the splint 4 contains a guide sleeve 8 that is usefully securely joined to the splint 4, for instance by gluing. Alternatively the guide sleeve 8 can be arranged detachable or placeable in the splint 4. Arranged in the guide sleeve 8 is a detachable bore sleeve 10, the guide sleeve 8 having first, usefully radially interiorly disposed positioning elements 12 and furthermore the bore sleeve 10 having radially exteriorly disposed second positioning elements 14. The positioning elements 12 and 14 are embodied in particular as steps that correspond to one another and facilitate axial positioning of the bore sleeve 10 in terms of a longitudinal axis 16. The bore sleeve 10 furthermore contains a stop surface 18, preferably interiorly disposed, for the purpose of specifying the bore depth of the drill bit (not shown here). Alternatively, in accordance with the drawing the upper end surface 20 can act as the stop for a correspondingly embodied drill bit.

Moreover, in the framework of the invention the guide sleeve 8 can be embodied as an integral component of the splint 4 and/or can be embodied in a single piece therewith. Furthermore, in the framework of the invention the bore sleeve 10 can also be embodied as an integral component of the splint 4 and/or in a single piece therewith, the splint 4 comprising a material that is strong enough and/or hard enough to prevent damage from the drill bit.

Figs. 2 and 3 additionally depict the drill bit 22 that is used in a drill 24. The drill 24 contains a positioning surface 26 that is embodied corresponding to the positioning surface 28 in the bore sleeve 10. Also, the exterior diameter of the drill 24 and the interior surface of the bore sleeve 10 are matched to one another, just like the exterior diameter of the drill bit 22 and the interior diameter of the bar 30 that in accordance with the drawing is arranged in the direction of the jaw 2 below the positioning surface 18 in the bore sleeve 10. In accordance with Fig. 3, the lower positioning surface 26 of the drill 24 is positioned against the positioning surface 28 of the bore sleeve 10, and the specified bore depth for the drill bit 22 is attained.

In accordance with Fig. 4, the jaw 2 contains the placement bore 32 or the prepared implant bed for the implant. It should be noted that the splint 4 is placed on the jaw 2, the limit area between the mucosa and the jaw bone being indicated with the broken line 34. It is furthermore expressly noted that the inventive arrangement is used in particular for transgingival implants and is embodied to be minimally invasive for a so-called flapless insertion with great precision.

Furthermore, in the framework of the invention, instead of a single bore sleeve, a plurality of bore sleeves for an implant system can be provided, the exterior geometries of which are consistent and are matched to the interior geometry of the guide sleeve or the recess in the splint. Especially in the area of the aforesaid bar these bore sleeves have interior diameters that are matched to the different exterior diameters of the drill bits that are used. Thus for instance initially a pre-bore or pilot bore can be added to the jaw using a comparatively narrow drill bit, in order to then prepare the implant bed with the required dimensions using one or a plurality of drill bits that have correspondingly larger exterior diameters.

Fig. 5 depicts an insertion tool 36 by means of which the implant 38 is inserted into the jaw 2. In a preferred manner the insertion or placement tool 36 and the implant 38 are provided preassembled so that in particular after the bore has been added to the jaw the implant 38 can be inserted without additional aids. The insertion or placement tool 36 contains a head part 40 that connects to the implant 38 and directly to a shaft 42, the exterior diameter 44 of which is preferably significantly smaller than the exterior diameter 50 of the head part 40. The implant 38 has an axial end face 45 associated with the head part 40. Axially the head part 40 has a length 46 and an exterior surface 48 having the diameter 50. Moreover, provided within the splint 4 is an axially continuous recess 52 against the interior surface of which the head part 40 is positioned and/or guided during insertion, the interior surface of the recess 52 forming the guide surface. The exterior diameter 50 of the head part 40 is at least approximately the same size as the interior diameter of the recess 52. The length 46 of the head part 40 is at least the same size as the thickness 54 of the splint 4 in the insertion area. In a preferred manner the length 46 of the head part 40 is greater than the thickness 54 by a specified factor, the factor being a maximum of 2, preferably a maximum of 1.6, and in particular 1.4. Moreover, the entire axial length of the placement tool 36 is specified relatively short, the length advantageously being specified greater than the length 46 by a maximum of a factor of 3, in particular by a maximum of a factor of 2.5. In accordance with the invention the cylindrical head part 40 is positioned with its axial end face 47 directly against the associated end face 45 of the implant 38. Due to the quite limited length of the placement tool 36 thus specified, lifting or tilting movements by the placement tool 36 are kept small and largely avoided while the implant 38 is placed into the jaw 2, which renders easier exact positioning of the implant 38. Moreover handling during placement of the implant is improved due to the small dimensions of the placement tool.

As depicted, the recess and/or guide surface 52 is disposed in the placement sleeve 54. In one special embodiment of the invention, it is possible to omit the addition of the bore and furthermore of the sleeves explained in this regard and the implant, in particular a miniature implant, can be inserted by means of a preferably self-cutting thread. Furthermore the insertion tool 36 and the implant 38 can be

joined in a suitable manner and/or by means of suitable means (not shown in greater detail) by the surgeon.

The placement or insertion tool 36 contains a stop 58, inventively embodied in the area of the axial end face 47 of the head part 40 and/or as a short step or annular collar, for exactly pre-specifying a defined insertion depth for the implant. The splint 4 and in particular the placement sleeve 54 contain another stop 60, to which the stop 58 of the insertion tool 36 corresponds. The stops 58, 60, which in accordance with Fig. 5 are preferably disposed in the lower end area of the splint 4, which end area faces the jaw 2, and/or therein, limit the depth the implant 38 penetrates into the jaw 2 when it is being inserted. The exterior geometry of the placement sleeve 54 is adapted to the interior geometry of the first guide sleeve 8. The interior diameter of the placement sleeve 54 or of the recess 52 provided therein is largely the same size as the exterior diameter of the head part 40 of the insertion tool 36, specifically apart from the additional radially inwardly oriented bar 62 of the placement sleeve 54. In a preferred manner the additional stop 60 is disposed inside the splint 4 so that when the end position is reached the additional stop 60 of the insertion tool 36 is disposed inside the splint. In the framework of the invention, alternative to the stop 60 the insertion tool 36 can have a stop 60', arranged outside of or above the splint 4, that is indicated with the broken line and that usefully comes to be positioned against the upper end surface of the placement sleeve 54, according to the drawing, upon reaching maximum insertion depth.

Moreover, indicated by means of the broken line in Fig. 5 is a miniature implant 64 that has a significantly smaller diameter than the implant 38. It is assumed that the depicted implant 38 is the implant that has the largest exterior diameter in a system of implants having different exterior diameters. In the framework of the invention, for all of the implants in an implant system, including miniature implants, that have an exterior diameter equal to or smaller than 1 mm, the same insertion tool 36 is provided and/or in particular an insertion tool 36 is provided that is consistent with the embodiment of the head part 40, so that in particular the complexity of producing and providing the insertion tool or tools is significantly reduced. Moreover, it has proved particularly advantageous to embody the placement sleeve 54 consistent with the bore sleeve, in particular for the implant having the largest diameter in the implant system, so that this bore sleeve is also simultaneously used for the placement sleeve. Using the inventive implant system significantly simplifies and reduces the components for the implant set, including accessory aids, specifically the aforesaid sleeves.

In one special embodiment of the invention the first sleeve and/or the bore sleeves can be omitted, the implant as a transgingival implant being placed directly and without bores or preparation of an implant bed in the jaw or jaw bone. This embodiment is provided in particular for mini-implants, the exterior

diameter of which are specified on the order of magnitude of 1 mm and where necessary even smaller. Even with such transgingival and/or single-piece implants that have a small diameter, the arrangement has the insertion tool having a stop surface and furthermore the insertion tool has a stop surface corresponding thereto for specifying an exactly defined placement depth for the implant.

Fig. 6 depicts the implant 38 completely implanted in the jaw 2 after the splint has been removed. The single-piece implant 38 is inserted transgingivally, the transition area between mucosa and jaw bone again being indicated by means of the broken 34.

Fig. 7 is a schematic depiction of the jaw 2 after four implant have been inserted. The implants are completely inserted into the jaw in accordance with Fig. 6, and what is visible is only the anchoring bodies 66 for crowns, bridges, and the like that are connected to the implants.

Legend

2	Jaw
4	Splint
6	Bore/recess
8	Guide sleeve
10	Bore sleeve
12	First positioning element for 8
14	Second positioning element of 10
16	Longitudinal axis
18	Stop surface for 10
20	Upper end surface for 10
22	Drill bit
24	Drill
26	Positioning surface of 24
28	Positioning surface of 10
30	Bar in 10
32	Bore/implant bed
34	Broken line
36	Insertion tool
38	Implant
40	Head part of 36
42	Shaft of 36
44	Diameter of 42
45	Axial end face of 38
46	Length of 36
47	Axial end face of 40
48	Exterior surface of 40
50	Exterior diameter of 40
52	Recess/guide surface
54	Placement sleeve
56	Thickness of 4
58	Stop of 36
60	Additional stop of 4
62	Bar in 54
64	Broken line/miniature implant
66	Anchoring body

CLAIMS

1. Arrangement for inserting implants (38), in particular dental implants, containing a splint (4) that is provided with a bore (6) and that is embodied for positioning said implant (38) on an area provided for the insertion, in particular a bone, and can be arranged thereon, and furthermore containing an insertion tool (36) for said implant (38), said splint (4) containing a guide surface (52), said insertion tool (36) having a head part (40) to which said implant (38) is joined and that has an exterior surface (48) that can be caused to engage with said guide surface (52), said insertion tool (36) having a first stop (58) and said splint (4) containing or having another stop (60), at least indirectly, against which said first stop (58) of said insertion tool (36) is positioned when said implant (38) is inserted for specifying its placement depth, characterized in that said additional stop (60) is arranged in a lower end area inside said bore (6) of said splint (4), which end area faces the bone, and in that in an implant system having implants (38) that have different exterior diameters said guide surface (52) provided in said splint (4) are embodied consistent, insertion tools that are consistent in exterior dimensions being used for said implants (38).

2. Arrangement in accordance with claim 1, characterized in that said additional stop (60) of said splint (4) is arranged in a placement sleeve (54).

3. Arrangement in accordance with claim 1 or 2, characterized in that said head part (40) of said insertion tool (36) has said first stop (58) and/or in that said head part (40) has an axial length (46) that is at least the same size as the thickness (56) of said splint (4) or is preferably larger than said thickness (56) by a specified factor, the factor preferably being a maximum of 2 and in particular being a maximum of 1.5.

4. Arrangement in accordance with claim 2 or 3, characterized in that a specified number of placement sleeves (54) is provided that have consistently embodied guide surfaces (52) and/or are embodied consistent overall.

5. Arrangement in accordance with any of claims 1 through 4, characterized in that said head part (40) is positioned with one axial end face (45) directly against one axial end surface (39) of said implant (38) and/or in that arranged connected directly to said head part (40) is a shaft (42), the diameter of which is significantly smaller than the diameter (50) of said head part (40).

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6. Arrangement in accordance with any of claims 1 through 5, characterized in that said splint (4) contains a guide sleeve (8) arranged at least partially inside said bore (6) and/or in that said guide sleeve (8) is securely or detachably joined to said splint (4).

7. Arrangement in accordance with any of claims 1 through 6, characterized in that at least one bore sleeve (10) can be arranged in said bore (6) and/or said guide sleeve (8) and its interior contour is adapted to the exterior contour of a drill bit (22) and/or in that said bore sleeve (10) is positioned or can be positioned by means of positioning elements (12, 14) in terms of said guide sleeve (8) and/or said splint (4), in particular in the direction of the longitudinal axis (16), said positioning elements (12, 14) being arranged in particular inside said splint (4).

8. Arrangement in accordance with any of claims 1 through 7, characterized in that said arrangement is provided for transgingival placement of said implant (38) and/or in that said implant (38) is embodied as a miniature implant.

9. Arrangement in accordance with any of claims 1 through 8, characterized in that said additional stop (60) is arranged on a radially inwardly oriented bar (62) inside said bore (6) or in that said additional stop (60) is formed by an in particular upper end surface in the area of said bore (6) of said splint (4).

10. Arrangement in accordance with any of claims 1 through 8, characterized in that said exterior diameter of a drill (24) is matched to the interior diameter of said splint (4) in the area of its bore (6), in particular of the placement sleeve (54) arranged in said recess (6).

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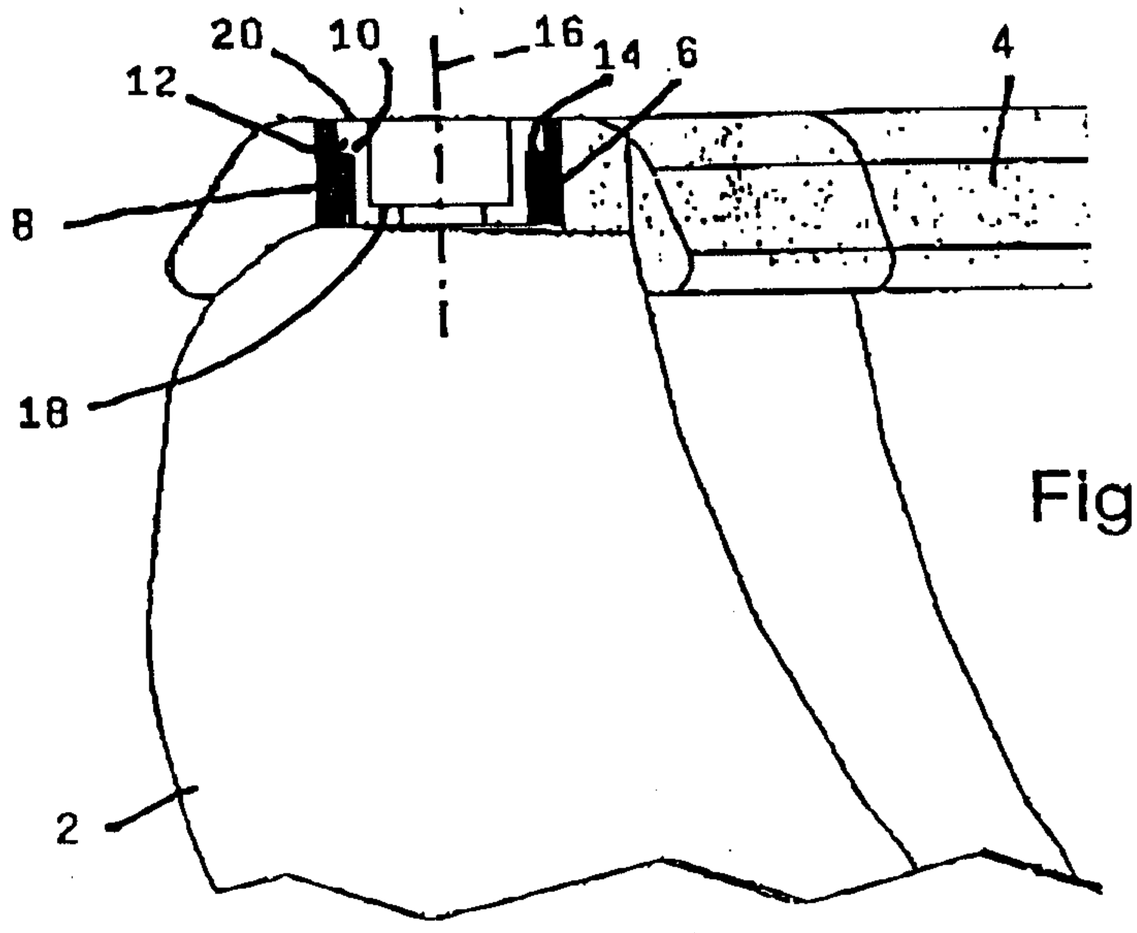
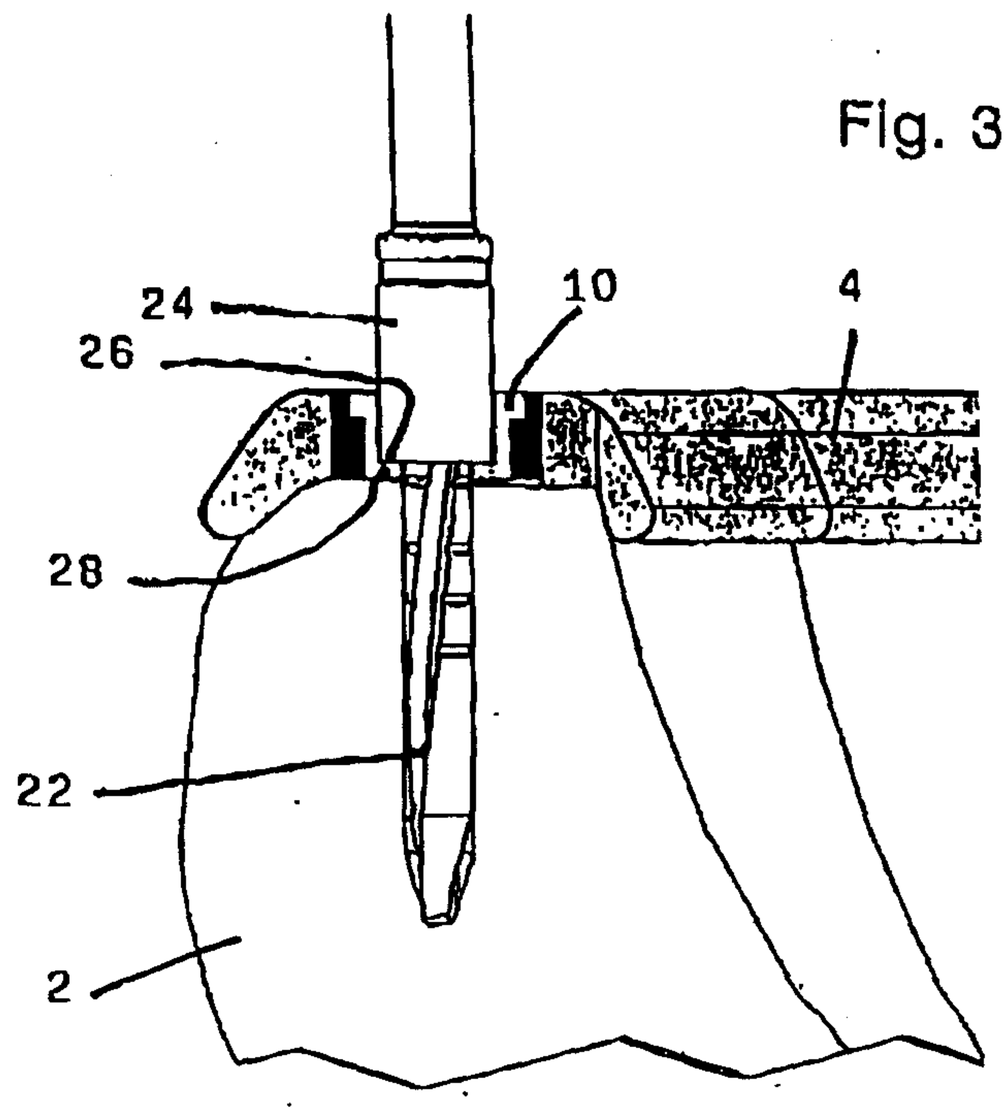


Fig. 1

Fig. 2

Fig. 3



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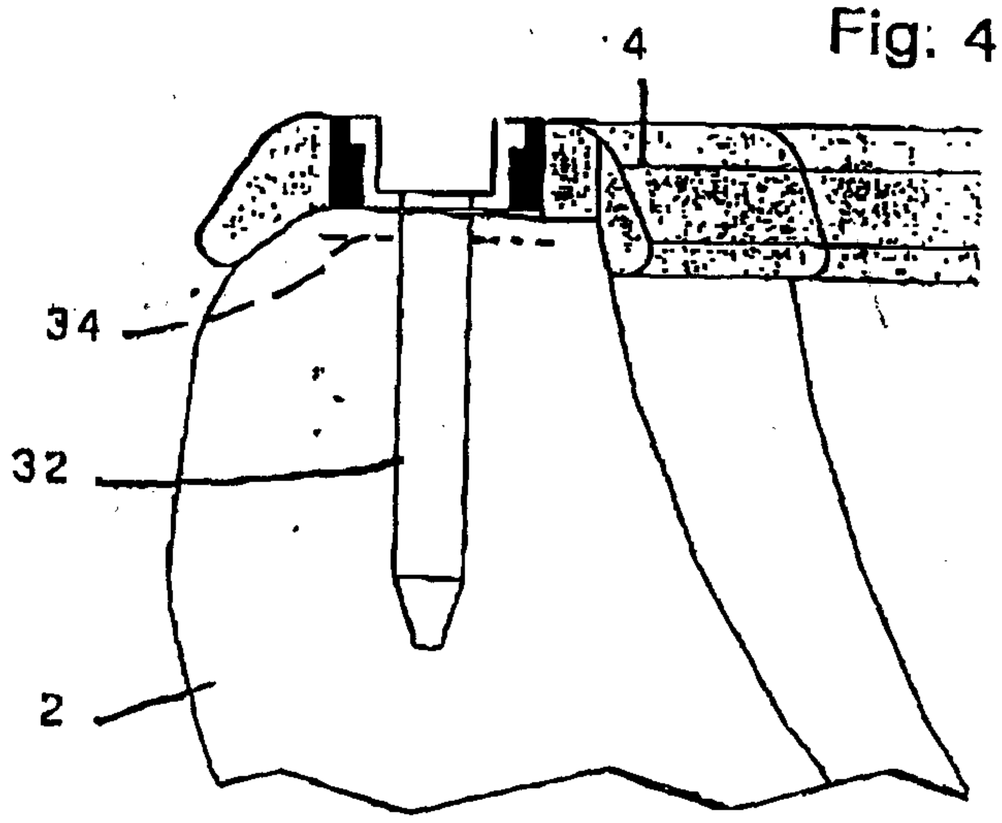


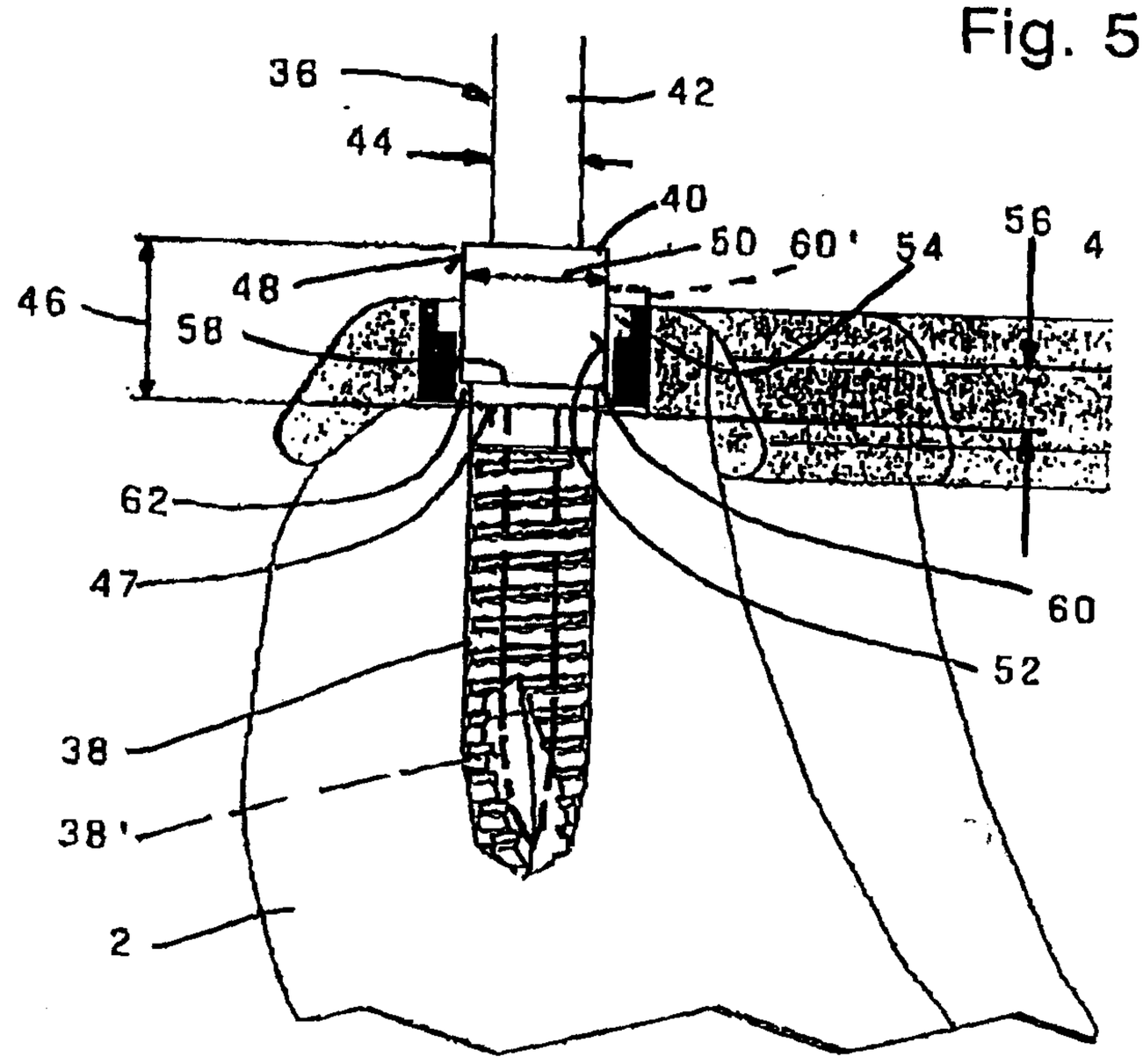


Fig. 5

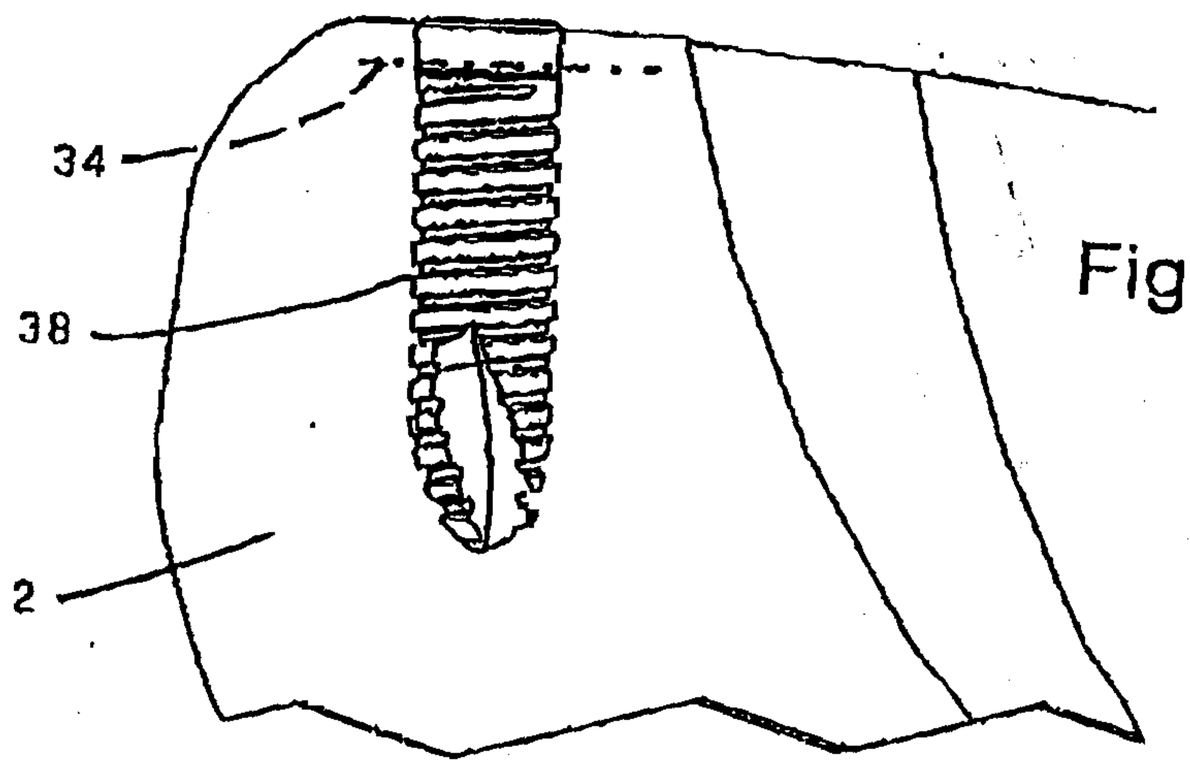
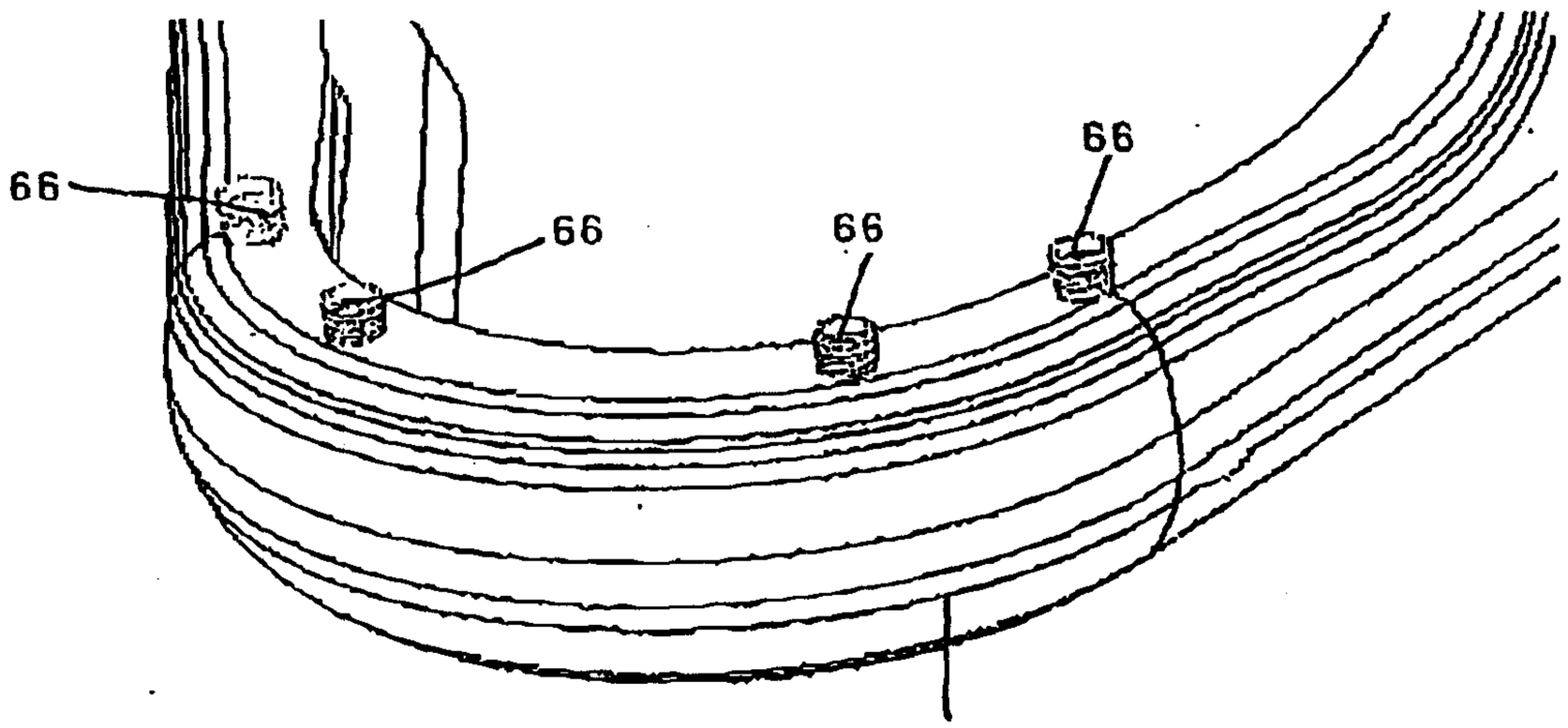
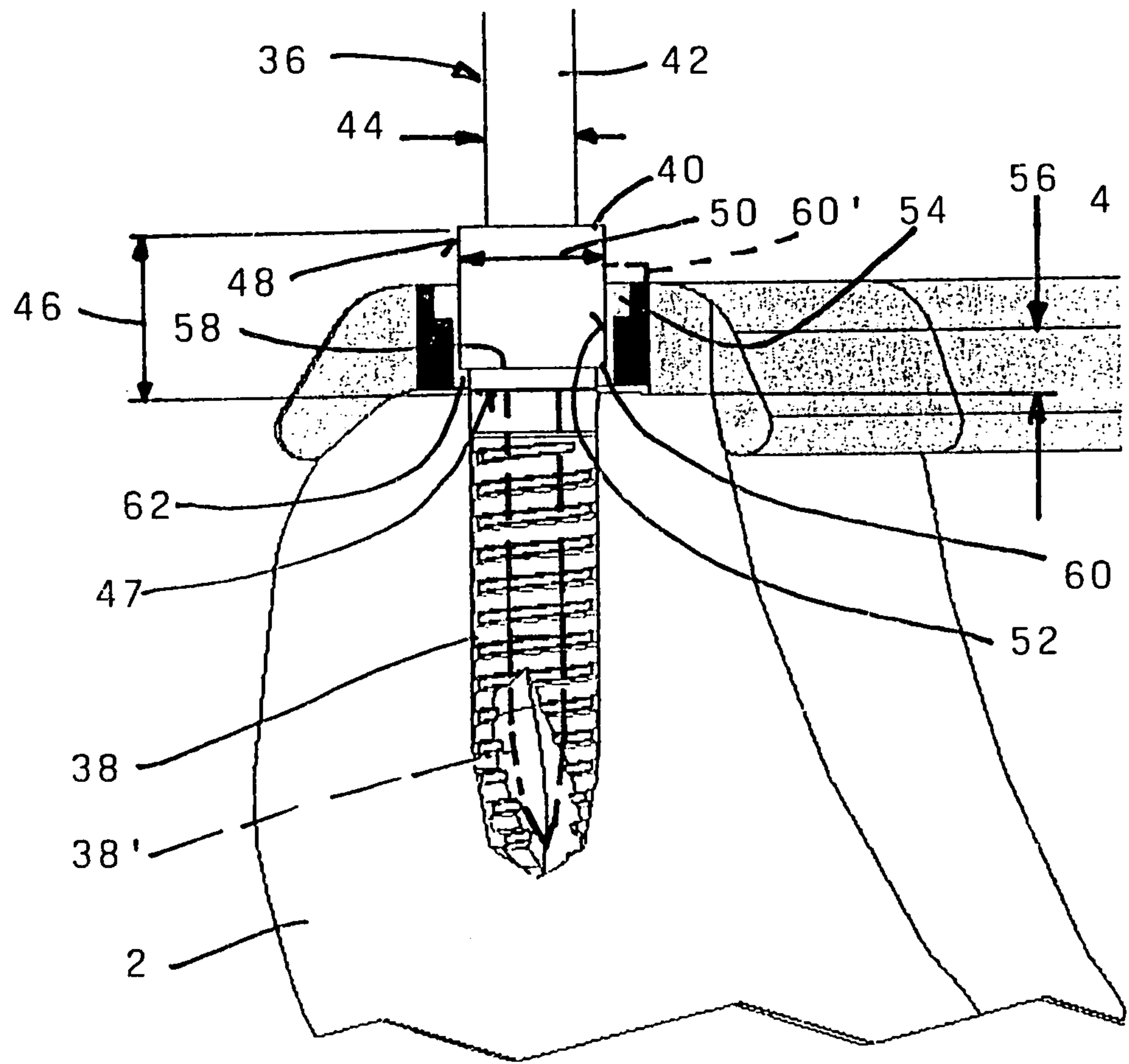


Fig. 6

Fig. 7

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