used in cutting tooth. For example, in embodiments with thick portions to cut, a first burr can cut some layers of the portion to be cut by moving along a tool guide way 120, and a second burr can subsequently move along the same tool guide way 120 to cut the remaining layers in order to obtain a final cut shape. In another embodiment of the invention, a first burr can perform a rough cut, and a second burr can subsequently perform a precise cut.

In one embodiment using two or more burrs, the two or more burrs enter a tool guide way 120 through the same entrance. In another embodiment, referring to Figure 124, burrs can be substituted in the middle of a tool guide way 120. To allow for such substitutions, an embodiment has a middle tool hole 124a, or intermediate tool hole, formed in the middle of the tool guide way 120. Although not illustrated, some embodiments can have two or more middle tool holes in a tool guide way 120 so that it is possible to replace a burr two or more times. In an embodiment, first, a preselected first burr enters a tool guide way and cuts along a first part 120a. Then, the first burr is removed through a middle tool hole 124a located on a terminal end of the first part 120a. Next, a preselected second burr enters the tool guide way through the middle tool hole 124a and cuts teeth following the second part 120b of the tool guide way 120. Here, the first 120a and second parts 120b of the tool guide way 120 are not separated and are connected to each other, constituting a single tool guide way 120. Figure 125 is a flowchart of such embodiment.

In one embodiment, a first part 120a and a second part 120b have different internal structures, so a first burr cannot move past the first part 120a to move along the second part 120b. More specifically, the internal structure of the first part 120a of a tool guide way 120 complements the shape of the first burr, and the internal structure of the second part 120b of the tool guide way complements the shape of the second burr. Moreover, the first burr and the second burr differ with respect to one or more of the following: length of a neck 203, thickness of a neck 203, number of guide projections 208, 210, shape of guide projections 208, 210, size of guide projections 208, 210, and other considerations. The first 120a and second parts 120b can also have various structures that correspond to those of their respective burrs. Accordingly, in an embodiment, the first part 102a can accommodate the first burr, but the second part 120b cannot accommodate the first burr, and only the second burr can enter and move along the second part 120b. In other embodiments, first 120a and second parts 120b of a tool guide way 120 can have the same internal structure so that a first burr can pass through a middle or intermediate tool hole 124a and move along the second part 120b as well.

Guide grooves

Referring to Figures 39, 44, 69A, and 69B, in an embodiment of the invention, each ~~guide wall 128, 130~~ has guide grooves 132, 134 to guide a burr 200. Guide projections 208, 210 of a burr are inserted into and move along their corresponding guide grooves 132, 134. In some embodiments, the distance between guide grooves 132, 134 is constant throughout a tool guide way. Therefore, in an embodiment with a preparation guide device 100 that has two guide grooves 132, 134, the thickness of a top wall 116 near the tool guide way need not be uniform. However, in other embodiments as shown in Figures 27-30, the thickness of a top wall 116, that is, the distance between a top supporting surface 129 and the bottom supporting surface 130 is kept uniform.

Sidewall entrance for burrs

In an embodiment as shown in Figures 66 and 67, a sidewall has an entrance 125 for burrs. The entrance 125 and tool guide way 120, where cutting of teeth occurs, are connected by a non-cutting access way 1202. A burr 200 enters through the entrance (125), is guided by the non-cutting access way 1202, and after cutting teeth, exits through the same entrance 125

What Is Claimed Is:

1. A dental preparation guide apparatus in a single body, the single body apparatus comprising a lingual sidewall, a buccal sidewall opposing the lingual sidewall, and an occlusal wall interconnecting the lingual and buccal sidewalls to form the single body, wherein the lingual sidewall, the buccal sidewall and the occlusal wall in combination define an interior space in which to receive a tooth comprising a buccal surface, a lingual surface, a mesial surface, a distal surface and an occlusal surface such that the lingual surface faces the lingual sidewall, the buccal surface faces the buccal sidewall, and the occlusal surface faces the occlusal wall,

the apparatus further comprising a guide channel formed in the single body and shaped to receive a cutting tool and guide the cutting tool to travel along a trajectory;

the guide channel comprising an anti-tilting feature configured to prevent or reduce tilting of the cutting tool in a plane parallel to a direction of movement of the cutting tool at a given point of the trajectory while the cutting tool travels along the trajectory;

wherein the guide channel comprises a buccal section, a lingual section, and an interconnecting section interconnecting the buccal and lingual sections, which are connected to provide the guide channel as a single integrated channel that allows the cutting tool to travel through the buccal, interconnecting and lingual sections of the guide channel without having to remove the cutting tool therefrom; and

wherein when viewing in a direction toward the occlusal wall, the buccal section extends generally along the buccal sidewall, and the lingual section extends generally along the lingual sidewall.

2. The apparatus of Claim 1, wherein the buccal section is configured to cause a portion of the cutting tool to enter into a buccal area of the interior space between the buccal sidewall and the tooth such that the portion of the cutting tool cuts at least part of the buccal surface while traveling in the buccal section;

wherein the lingual section is configured to cause the portion of the cutting tool to enter into a lingual area of the interior space between the lingual sidewall and the tooth such that the portion of the cutting tool cut at least part of the lingual surface while traveling in the lingual section; and

wherein the interconnecting section is configured to cause the portion of the cutting tool to enter into an abutting area of the interior space between the tooth and an immediately neighboring tooth such that the portion of the cutting tool cut at least part of the mesial or distal surface while traveling in the interconnecting section.

3. The apparatus of Claim 1, wherein when viewing in the direction toward the occlusal wall, a tangential line of the buccal section at a point thereof is parallel to a tangential line of the lingual section at a point thereof,

wherein the anti-tilting feature comprises a first engagement structure and a second engagement structure extending along the trajectory and substantially parallel to each other, the first and second engagement structures being configured to engage respectively with first and second counterpart structures of the cutting tool, wherein engagement of the first and second engagement structures respectively with the first and second counterpart structures is to prevent or reduce tilting of the cutting tool in the plane parallel to the movement direction and further to prevent disengagement of the cutting tool from the guide channel while traveling along the trajectory except where a port of entry or discharge of the cutting tool is provided.

4. The apparatus of Claim 3, wherein the guide channel further comprises a second interconnecting section that further interconnects the buccal and lingual sections to provide the guide channel in the form of a closed loop when viewing in the direction toward the occlusal wall.

5. The apparatus of Claim 3, wherein the guide channel further comprises another section extending from either the buccal section or the lingual section, wherein when viewing in the direction toward the occlusal wall, a tangential line of the other section at a point thereof is parallel to a tangential line of the interconnecting section at a point thereof.

6. The apparatus of Claim 3, wherein the guide channel further comprises another section extending from either the buccal section or the lingual section, wherein when viewing in the direction toward the occlusal wall, a tangential line of the other section at a point thereof is parallel to a tangential line of the interconnecting section at a point thereof, wherein the other section does not interconnect between the buccal and lingual sections, which makes the guide channel in the form of an open loop.

7. The apparatus of Claim 3, wherein the guide channel is configured to allow a proximal portion of the cutting tool pass through the occlusal wall while allowing a distal portion of the cutting tool extends into the interior, wherein each of the first and second counterpart structures is in a spherical shape as part of the cutting tool, and wherein each of the first and second engagement structures is a channel portion of the guide

channel to accommodate traveling of the spherical shape therethrough.

8. The apparatus of Claim 1, wherein the interior space defined by the lingual sidewall, the buccal sidewall and the occlusal wall is configured to receive one or more additional teeth, wherein the single body apparatus further comprises a port configured to allow the cutting tool to enter into or discharged from the guide channel, wherein the port is located in a portion of the single body that corresponds to one of the one or more additional teeth, wherein the guide channel further comprises a non-cutting access way interconnecting between the port and one of the buccal section, the interconnecting section and the lingual section, wherein the non-cutting access way does not cause the cutting tool to cut the tooth or one or more additional teeth.

9. A method of preparing a tooth for dental restoration, the method comprising:

providing the apparatus of Claim 1 for preparation of a tooth comprising a buccal surface, a lingual surface, a mesial surface, a distal surface and an occlusal surface;

engaging the apparatus with the tooth such that the tooth is received in the interior space and such that the lingual surface faces the lingual sidewall, the buccal surface faces the buccal sidewall, and the occlusal surface faces the occlusal wall;

inserting a burr as the cutting tool into the guide channel via an insertion hole;

traveling the burr along the trajectory of the guide channel comprising the buccal section, lingual section and interconnecting section, by which the burr cuts side surface of the tooth comprising at least part of the lingual surface, at least part of the buccal surface and at least part of the mesial or distal surface; and

wherein during traveling of the burr along the trajectory, the burr is not removed from the guide channel until completion of the cutting side surfaces of the tooth.

10. The method of Claim 9, wherein when viewing in the direction toward the occlusal wall, a tangential line of the buccal section at a point thereof is parallel to a tangential line of the lingual section at a point thereof,

wherein the anti-titling feature comprises a first engagement structure and a second engagement structure extending along the trajectory and substantially parallel to each other, the first and second engagement structures being configured to engage respectively with first and second counterpart structures of the cutting tool, wherein engagement of the first and second engagement structures respectively with the first and second counterpart structures is to prevent or reduce tilting of the cutting tool in the plane parallel to the movement direction and further to prevent disengagement of the cutting tool from the guide channel while traveling along the trajectory except where a port of entry or discharge of the cutting tool is provided.

11. A dental preparation guide apparatus in a single body, the single body apparatus comprising a lingual sidewall, a buccal sidewall opposing the lingual sidewall, and an occlusal wall interconnecting the lingual and buccal sidewalls to form the single body, wherein the lingual sidewall, the buccal sidewall and the occlusal wall in combination define an interior space in which to receive two or more teeth comprising a first tooth and a second tooth,

wherein the lingual sidewall comprises a first lingual sidewall and a second lingual sidewall, the buccal sidewall comprises a first buccal sidewall and a second buccal sidewall, the occlusal wall comprises a first occlusal wall and a second occlusal wall;

wherein the first lingual sidewall and the first buccal sidewall oppose each other and are configured to sandwich the first tooth when the first and second teeth are received in the interior space;

wherein the second lingual sidewall and the second buccal sidewall oppose each other and are configured to sandwich the second tooth when the first and second teeth are received in the interior space;

wherein the first occlusal wall interconnecting between the first lingual sidewall and the first buccal sidewall and is configured to overlap the first tooth when the first and second teeth are received in the interior space;

wherein the second occlusal wall interconnecting between the second lingual sidewall and the second buccal sidewall and is configured to overlap the second tooth when the first and second teeth are received in the interior space;

wherein the apparatus further comprises a first guide channel formed in the single body and shaped to receive a cutting tool and guide the cutting tool along a first trajectory, the first guide channel comprising a first engagement structure configured to engage with a first counterpart structure of the cutting tool and further configured to prevent disengagement of the cutting tool from the first guide channel while traveling along the first trajectory; and

wherein the single body comprises a second guide channel formed in the second occlusal wall and shaped to receive the cutting tool or another cutting tool to guide the same along the second guide channel.

12. The apparatus of Claim 11, wherein the first and second teeth are adjacent with each other with no tooth therebetween and with no missing tooth therebetween, wherein the first guide channel and the second guide channel are

connected together and form a single connected channel such that the cutting tool received in the first guide channel can travel to the second guide channel without having to be removed from the first guide channel.

13. The apparatus of Claim 11, wherein the first and second teeth are immediately next to each other with no tooth therebetween and with no missing tooth therebetween, wherein the first guide channel and the second guide channel are separate from each other and a portion of the single piece body blocks between the first and second channels such that the cutting tool received in the first guide channel must be removed from the first guide channel in order to be received in the second guide channel, wherein the first guide channel comprises a second engagement structure configured to engage with a second counterpart structure of the cutting tool, wherein engagement of the first and second engagement structures respectively with the first and second counterpart structures is to prevent or reduce tilting of the cutting tool in the plane parallel to the movement direction while traveling along the first trajectory.

14. The apparatus of Claim 11, wherein a missing tooth exists between the first and second teeth,

wherein the lingual sidewall further comprises a third lingual sidewall located between the first lingual sidewall and the second lingual sidewall;

wherein the buccal sidewall further comprises a third buccal sidewall located between the first buccal sidewall and the second buccal sidewall;

wherein the occlusal wall further comprises a third occlusal wall located between the first occlusal wall and the second occlusal wall;

wherein the third lingual sidewall, the third buccal sidewall and the third occlusal wall at least partially surrounds a space of the missing tooth when the first and second teeth are received in the interior space; and

wherein the first guide channel comprises a second engagement structure configured to engage with a second counterpart structure of the cutting tool, wherein engagement of the first and second engagement structures respectively with the first and second counterpart structures is to prevent or reduce tilting of the cutting tool in the plane parallel to the movement direction while traveling along the first trajectory.

15. The apparatus of Claim 14, wherein the single body comprises a third guide channel formed in the third occlusal wall and shaped to receive the cutting tool or another cutting tool to guide the same along the third guide channel,

wherein the first guide channel and the second guide channel are connected together via the third guide channel and form a single connected channel such that the cutting tool received in the first guide channel can travel to the second guide channel without having to be removed from the first guide channel.

16. The apparatus of Claim 14, wherein the single body does not comprise a guide channel in the third occlusal wall,

wherein the first guide channel and the second guide channel are separate from each other and a portion of the third occlusal wall blocks between the first and second channels such that the cutting tool received in the first guide channel must be removed from the first guide channel in order to be received in the second guide channel.

17. The apparatus of Claim 11, wherein a third tooth exist between the first and second teeth,

wherein the lingual sidewall further comprises a third lingual sidewall located between the first lingual sidewall and the second lingual sidewall;

wherein the buccal sidewall further comprises a third buccal sidewall located between the first buccal sidewall and the second buccal sidewall;

wherein the occlusal wall further comprises a third occlusal wall located between the first occlusal wall and the second occlusal wall;

wherein the third lingual sidewall, the third buccal sidewall and the third occlusal wall at least partially surrounds the third tooth when the first, second and third teeth are received in the interior space; and

wherein the first guide channel comprises a second engagement structure configured to engage with a second counterpart structure of the cutting tool, wherein engagement of the first and second engagement structures respectively with the first and second counterpart structures is to prevent or reduce tilting of the cutting tool in the plane parallel to the movement direction while traveling along the first trajectory.

18. The apparatus of Claim 17, wherein the single body comprises a third guide channel formed in the third occlusal wall and shaped to receive the cutting tool or another cutting tool to guide the same along the third guide channel,

wherein the first guide channel and the second guide channel are connected together via the third guide channel and form a single connected channel such that the cutting tool received in the first guide channel can travel to

the second guide channel without having to be removed from the first guide channel.

19. The apparatus of Claim 11, wherein the first guide channel comprises a first buccal section, a first lingual section, and a first interconnecting section interconnecting the first buccal and first lingual sections to provide the first guide channel as a single integrated channel that allows the cutting tool to travel between the first lingual section and the first buccal section without having to remove the cutting tool therefrom,

wherein when viewing in a direction toward the occlusal wall, the first buccal section extends generally along the first buccal sidewall, and the first lingual section extends generally along the first lingual sidewall; and

wherein the first guide channel comprises a second engagement structure configured to engage with a second counterpart structure of the cutting tool, wherein engagement of the first and second engagement structures respectively with the first and second counterpart structures is to prevent or reduce tilting of the cutting tool in the plane parallel to the movement direction while traveling along the first trajectory.

20. The apparatus of Claim 19, wherein the first buccal section is configured to cause a portion of the cutting tool to enter into a buccal area of the interior space between the first buccal sidewall and the first tooth for cutting at least part of a buccal surface of the first tooth while traveling in the first buccal section when the first and second teeth are received in the interior space;

wherein the first lingual section is configured to cause the portion of the cutting tool to enter into a lingual area of the interior space and between the first lingual sidewall and the tooth for cutting at least part of a lingual surface of the first tooth while traveling in the first lingual section when the first and second teeth are received in the interior space; and

wherein the first interconnecting section is configured to cause the portion of the cutting tool to enter into the interior space for cutting at least part of a mesial or distal surface of the first tooth while traveling in the first interconnecting section when the first and second teeth are received in the interior space.

21. The apparatus of Claim 19, wherein when viewing in the direction toward the occlusal wall, a tangential line of the first buccal section at a point thereof is parallel to a tangential line of the first lingual section at a point thereof, wherein each of the first and second counterpart structures is in a spherical shape as part of the cutting tool, and wherein each of the first and second engagement structures is a channel portion of the first guide channel to accommodate traveling of the spherical shape therethrough.

22. The apparatus of Claim 19, wherein the first guide channel further comprises a second interconnecting section that further interconnects the first buccal section and the first lingual section to provide the first guide channel in the form of a closed loop when viewing in the direction toward the occlusal wall, wherein each of the first and second counterpart structures is in a spherical shape as part of the cutting tool, and wherein each of the first and second engagement structures is a channel portion of the first guide channel to accommodate traveling of the spherical shape therethrough.

23. The apparatus of Claim 19, wherein the first guide channel further comprises another section extending from either the first buccal section or the first lingual section, wherein when viewing in the direction toward the occlusal wall, a tangential line of the other section at a point thereof is parallel to a tangential line of the first interconnecting section at a point thereof, wherein the single body apparatus further comprises a port configured to allow the cutting tool to enter into or discharged from the first guide channel, wherein the port is located in a portion of the single body that corresponds to one of the one or more additional teeth, wherein the first guide channel further comprises a non-cutting access way interconnecting between the port and one of the buccal section, the interconnecting section and the lingual section, wherein the non-cutting access way does not cause the cutting tool to cut the tooth or one or more additional teeth.

24. The apparatus of Claim 19, wherein the first guide channel further comprises another section extending from either the first buccal section or the first lingual section, wherein when viewing in the direction toward the occlusal wall, a tangential line of the other section at a point thereof is parallel to a tangential line of the first interconnecting section at a point thereof, wherein the other section does not interconnect between the first buccal section and the first lingual section to make the guide channel in the form of an open loop, wherein the single body apparatus further comprises a port configured to allow the cutting tool to enter into or discharged from the first guide channel, wherein the port is located in a portion of the single body that corresponds to one of the one or more additional teeth, wherein the first guide channel further comprises a non-cutting access way interconnecting between the port and one of the buccal section, the interconnecting section and the lingual section, wherein the non-cutting access way does not cause the cutting tool to cut the tooth or one or more additional teeth.

25. A method of providing a dental restoration kit, the method comprising:

providing a first 3D image data representing one or more teeth of a patient before a desired preparation of the one or more teeth for installing a desired dental prosthesis;

before the desired preparation and before making the desired dental prosthesis, determining an axis of insertion along which the desired dental prosthesis should approach the one or more teeth for engaging the desired dental prosthesis with the one or more teeth after the desired preparation, wherein the axis of insertion is determined relative to the one or more teeth;

generating a second 3D image data representing the one or more teeth after the desired preparation;

producing the dental preparation guide apparatus of Claim 3 based on the first 3D image data and the second 3D image data,

wherein the interior space of the dental preparation guide apparatus is configured to receive the one or more teeth for engagement therewith, wherein the guide channel of the dental preparation guide apparatus is configured to guide a burr as the cutting tool for cutting at least part of the one or more teeth for the desired preparation; and

producing the desired prosthesis based on the first 3D image data and the second 3D image data.

26. The method of Claim 25, wherein determining the axis of insertion comprises:

processing the first 3D image data to orient a 3D image of the one or more teeth in multiple directions;

providing information of undercuts in multiple directions of orientation of the 3D image; and

choosing a direction of orientation of the 3D image as the axis of insertion based on the information of the undercuts.

27. The method of Claim 25, wherein generating the second 3D image data comprises processing the first 3D image data with the input of an area of cutting and depth of cutting, wherein the single body apparatus further comprises a port configured to allow the burr to enter into or discharged from the guide channel, wherein the port is located in a portion of the single body that corresponds to one of the one or more additional teeth, wherein the guide channel further comprises a non-cutting access way interconnecting between the port and one of the buccal section, the interconnecting section and the lingual section, wherein the non-cutting access way does not cause the burr to cut the tooth or one or more additional teeth.

28. The method of Claim 25, wherein generating the second 3D image data comprises processing the first 3D image data with the input of one or more selected from the group consisting of an orientation of the burr, a diameter of the burr, a length of the burr, tapered shape information of the burr, a position of the burr relative to the one or more teeth, a distance between a rotational axis of the burr and an exterior surface of the one or more teeth, and a level of the burr relative to the one or more teeth, wherein each of the first and second counterpart structures is in a spherical shape as part of the burr, and wherein each of the first and second engagement structures is a channel portion of the guide channel to accommodate traveling of the spherical shape therethrough.

29. The method of Claim 25, wherein producing the desired prosthesis comprises:

generating a fourth 3D image data of the desired prosthesis; and

making the desired prosthesis using the fourth 3D image data.

30. The method of Claim 25, further comprising providing the burr, wherein at least one of the first and second counterpart structures is in a spherical shape as part of the burr, and wherein at least one of the first and second engagement structures is a channel portion of the guide channel to accommodate traveling of the spherical shape therethrough.

31. A method of making devices for dental procedure, comprising:

providing a first 3D image data representing one or more teeth of a patient before a desired preparation of the one or more teeth for installing a desired dental prosthesis;

before the desired preparation, generating a first image illustrating a first prospective shape of the one or more teeth that would exist after installation of a first dental prosthesis;

before the desired preparation, providing the first image for the patient's review of the first image;

subsequent to the patient's approval of the first image and before the desired preparation, making the first dental prosthesis based on the first image; and

subsequent to the patient's approval of the image, making the dental preparation guide apparatus of Claim 3 based on the first 3D image data, wherein the interior space of the dental preparation guide apparatus is configured to fit at least part of the one or more teeth, wherein the guide channel of the dental preparation guide apparatus is configured to guide a burr as the cutting tool to travel along the trajectory to cut the one or more teeth for fitting the first dental prosthesis without the need of additional substantial cutting of the one or more teeth.

32. The method of Claim 31, further comprising:

before the desired preparation, generating a second 3D image data representing a prospective, prepared shape of the one or more teeth that would exist after the desired preparation thereof, wherein the single body apparatus further comprises a port configured to allow the burr to enter into or discharged from the guide channel, wherein the port is located in a portion of the single body that corresponds to one of the one or more additional teeth, wherein the guide channel further comprises a non-cutting access way interconnecting between the port and one of the buccal section, the interconnecting section and the lingual section, wherein the non-cutting access way does not cause the burr to cut the tooth or one or more additional teeth.

33. The method of Claim 31, further comprising:

before the desired preparation, generating a second image illustrating a second prospective shape of the one or more teeth that would exist after installation of a second dental prosthesis;

before the desired preparation, providing a plurality of images comprising the first and second images for the

patient's review; and

receiving the patient's approval of the first image rather than the second image, wherein the first and second prospective shapes differ in at least one selected from the group consisting of length, width, surface curvature, embrasure and shading.

34. The method of Claim 31, further comprising:

subsequent to providing the first image and prior to the patient's approval, receiving the patient's request to modify the first image;

changing the first prospective shape based on the patient's request to modify the first image; and

providing an modified first image illustrating the changed first prospective shape for the patient's approval.

35. A method of dental procedure, comprising:

making a first dental prosthesis and a preparation guide device in accordance with the method of Claim 31, wherein at least one of the first and second counterpart structures is in a spherical shape as part of the burr, and wherein at least one of the first and second engagement structures is a channel portion of the guide channel to accommodate traveling of the spherical shape therethrough; and

providing the first dental prosthesis and the preparation guide device to a dental practitioner for preparing the one or more teeth and installing the first dental prosthesis onto the one or more teeth after preparation.

36. The method of Claim 35, further providing the burr along with the first dental prosthesis and the dental preparation guide apparatus, wherein the dental preparation guide apparatus further comprises a guide groove formed along the at least one guide channel, wherein the burr comprises an elongated body with a bump between two ends thereof, wherein the elongated body is configured to fit in the at least one guide channel of the preparation guide device and the bump is configured to fit the guide groove such that the guide channel and the guide groove in combination position and orient the burr relative to the one or more teeth in a predetermined manner.

37. A method of dental procedure, comprising:

providing a dental prosthesis for installing onto one or more teeth of a patient, the one or more teeth comprising a first tooth comprising an occlusal surface, a buccal side, a lingual side, a distal side and a mesial side;

providing a preparation guide device in a single piece for use in preparing the one or more teeth of the patient for installing the dental prosthesis, wherein the preparation guide device is custom-made to fit at least part of the one or more teeth and comprises at least one guide channel configured to guide a cutting tool, wherein the at least one guide channel comprises a first single channel that the cutting tool can travel along a first trajectory, the first single channel comprising a first engagement structure and a second engagement structure extending along the first trajectory and substantially parallel to each other;

mounting the preparation guide device over the one or more teeth such that the preparation guide device fit the at least part of the one or more teeth;

providing a burr as the cutting tool, the burr comprising a first counterpart structure and a second counterpart structure;

engaging the burr with the first single channel such that the first and second counterpart structures of the burr engage respectively with the first and second engagement structures of the first single channel;

moving the burr along the first trajectory to cut the first tooth on three or four of the buccal, lingual, distal and mesial sides without having to remove the burr from the preparation guide device, which completes preparation of the first tooth for installing the dental prosthesis onto the first tooth without the need of an additional preparation guide for preparing the first tooth and without the need of an additional substantial cutting of the first tooth, wherein engagement of the first and second engagement structures with the first and second counterpart structures prevents or reduces tilting of the burr in a plane parallel to a direction of movement of the bur at a given point of the first trajectory and further prevents disengagement of the burr from the first single channel while the burr is traveling along the trajectory except where a disengagement feature is provided; and

installing the dental prosthesis onto the first tooth so as to surround the three or four of the buccal, lingual, distal and mesial sides of the first tooth.

38. The method of Claim 37, wherein cutting of the three or four sides leaves at least a portion of the four sides uncut, wherein the uncut portion comprises a contact point of the first tooth that contacts a neighboring tooth, wherein at least one of the first and second counterpart structures is in a spherical shape as part of the burr, and wherein at least one of the first and second engagement structures is a channel portion of the first single channel to accommodate traveling of the spherical shape therethrough.

39. The method of Claim 37, wherein the first single channel is configured to cut the four of the buccal, lingual, distal and mesial sides, wherein cutting of the four sides entirely encircles the first tooth when viewing in a direction toward the occlusal surface, wherein the dental prosthesis comprises a ring structure contacting the four sides of the first tooth that are cut using the first single channel, wherein at least one of the first and second counterpart structures is in a spherical shape as part of the burr, and wherein at least one of the first and second engagement structures is a channel portion of the first single channel to accommodate traveling of the spherical shape therethrough.

40. The method of Claim 37, wherein the first single channel is configured to cut the four of the buccal, lingual, distal and mesial sides, wherein cutting of the four sides does not entirely encircle the first tooth and leaves at least part of one of the four sides uncut when viewing in a direction toward the occlusal surface, wherein the dental prosthesis comprises a C-shaped structure contacting the four sides of the first tooth that are cut using the first single channel, wherein the single piece device further comprises a port configured to allow the burr to enter into or discharged from the single channel, wherein the port is located in a portion of the single piece device that corresponds to one of the one or more additional teeth, wherein the single channel further comprises a non-cutting access way interconnecting between the port and one of the buccal section, the interconnecting section and the lingual section, wherein the non-cutting access way does not cause the burr to cut the tooth or one or more additional teeth.

41. The method of Claim 37, wherein the one or more teeth comprise a first tooth and a second tooth, wherein cutting the one or more teeth comprises cutting the first tooth and then cutting the second tooth, wherein the preparation guide device is not disconnected from the one or more teeth between cutting the first tooth and cutting the second tooth, and wherein the first single channel is further configured to cut the second tooth in addition to cutting the first tooth without having to remove the burr from the first single channel, wherein the single piece device further comprises a port configured to allow the burr to enter into or discharged from the single channel, wherein the port is located in a portion of the single piece device that corresponds to one of the one or more additional teeth, wherein the single channel further comprises a non-cutting access way interconnecting between the port and one of the buccal section, the interconnecting section and the lingual section, wherein the non-cutting access way does not cause the burr to cut the tooth or one or more additional teeth.

42. The method of Claim 37, wherein the one or more teeth comprise a first tooth and a second tooth, wherein cutting the one or more teeth comprises cutting the first tooth and then cutting the second tooth, wherein the preparation guide device is not disconnected from the one or more teeth between cutting the first tooth and cutting the second tooth, and wherein the at least one channel comprises a second single channel that is distinct from the first single channel and configured to cut the second tooth.

43. The method of Claim 37, wherein providing the dental prosthesis comprises receiving the dental prosthesis from a third party or making the dental prosthesis in-house, wherein providing the preparation guide device comprises receiving the preparation guide device from a third party or making the preparation guide device in-house.

44. The method of Claim 37, further comprising:

causing to provide a 3D image data representing the one or more teeth of the patient before preparation sufficient to install the dental prosthesis, wherein causing to provide the 3D image data comprises at least one selected from the group consisting of:

scanning of the patient's oral features using a 3D scanning device;

taking an impression of the patient's oral features;

producing a 3D model of the patient's oral features from the impression; and

scanning the 3D model using a 3D scanning device.

45. A dental preparation guide apparatus in a single body, the single body apparatus comprising a lingual sidewall, a buccal sidewall opposing the lingual sidewall, and an occlusal wall interconnecting the lingual and buccal sidewalls to form the single body, wherein the lingual sidewall, the buccal sidewall and the occlusal wall in combination define an interior space in which to receive a tooth comprising a buccal surface, a lingual surface, a mesial surface, a distal surface and an occlusal surface such that the lingual surface faces the lingual sidewall, the buccal surface faces the buccal sidewall, and the occlusal surface faces the occlusal wall,

wherein the single body comprising a first guide channel formed in the occlusal wall and shaped to engage with a first cutting tool to guide the first cutting tool to travel along a first trajectory;

wherein when viewing in a direction toward the occlusal wall, the first guide channel comprising a section that

extends generally along at least part of the buccal sidewall;

wherein the single body comprising a second guide channel formed in at least one of the buccal and lingual sidewalls and shaped to engage with a second cutting tool to guide the second cutting tool to travel along a second trajectory; and

wherein when viewing in a direction toward the buccal sidewall, the second guide channel extends generally along at least part of the occlusal wall.

46. The apparatus of Claim 45, wherein the occlusal wall comprises an interior surface facing the occlusal surface of the tooth when the tooth is received in the interior space, wherein the second guide channel extends generally along the interior surface of the occlusal wall when viewing in the direction toward the buccal sidewall; and

wherein the buccal side wall comprises an interior surface facing the buccal surface of the tooth when the tooth is received in the interior space, wherein the first guide channel extends generally along the interior surface of the buccal wall when viewing in the direction toward the occlusal wall.

47. The apparatus of Claim 45, wherein the first guide channel further comprises another section, which is configured to have the cutting tool pass through the occlusal wall such that the cutting tool extends into the interior space, and further such that the cutting tool cuts one of the mesial and distal surfaces when the cutting tool travels in the other section.

48. A method of preparing a tooth for dental restoration, the method comprising:

providing the apparatus of Claim 45 for preparation of a tooth comprising a buccal surface, a lingual surface, a mesial surface, a distal surface and an occlusal surface;

engaging the apparatus with the tooth such that the tooth is received in the interior space and such that the lingual surface faces the lingual sidewall, the buccal surface faces the buccal sidewall, and the occlusal surface faces the occlusal wall;

inserting a burr as the cutting device into the first guide channel of the apparatus, whereby a cutting portion of the burr enters into the interior space and between the buccal sidewall and the tooth;

cutting at least part of the buccal surface of the tooth while traveling the burr along the first guide channel;

inserting the same burr or another burr into the second guide channel, whereby a cutting portion of the burr enters into the interior space and between the occlusal wall and the tooth, wherein inserting the same or other burr can occur either before or after cutting the buccal surface; and

cutting at least part of the buccal surface of the tooth while traveling the same burr or the other burr along the second guide channel.

49. A dental preparation guide apparatus in a single body, the single body apparatus comprising a lingual sidewall, a buccal sidewall opposing the lingual sidewall, and an occlusal wall interconnecting the lingual and buccal sidewalls to form the single body, wherein the lingual sidewall, the buccal sidewall and the occlusal wall in combination define an interior space in which to receive a tooth comprising a buccal surface, a lingual surface, a mesial surface, a distal surface and an occlusal surface such that the lingual surface faces the lingual sidewall, the buccal surface faces the buccal sidewall, and the occlusal surface faces the occlusal wall,

wherein the single body comprises a guide channel formed through at least one of the lingual and buccal sidewalls and shaped to engage with a cutting tool to guide the cutting tool along a trajectory; and

wherein the guide channel is configured to cause the a portion of the cutting tool enter into the interior space and to be inserted between the occlusal wall and the tooth such that the portion of the cutting tool cuts at least part of the occlusal

surface while traveling in the guide channel.

50. The apparatus of Claim 49, wherein the guide channel comprises a port configured to permit the entry of the cutting tool into the guide channel, wherein the port of the guide channel is formed through the occlusal wall such that the cutting tool enters into the guide channel formed in the at least one of the lingual and buccal sidewalls via the port through the occlusal wall, wherein the guide channel comprises an anti-tilting feature configured to prevent or reduce tilting of the cutting tool in a plane parallel to a direction of movement of the cutting tool at a given point of the trajectory while the cutting tool travels along the trajectory.

51. A method of preparing a tooth for dental restoration, the method comprising:

providing the apparatus of Claim 50 for preparation of a tooth comprising a buccal surface, a lingual surface, a mesial surface, a distal surface and an occlusal surface, wherein the anti-titling feature comprises a first engagement structure and a second engagement structure extending along the trajectory and substantially parallel to each other, the first and second engagement structures being configured to engage respectively with first and second counterpart structures of the cutting tool, wherein engagement of the first and second engagement structures respectively with the first and second counterpart structures is to prevent or reduce tilting of the cutting tool in the plane parallel to the movement direction and further to prevent disengagement of the cutting tool from the guide channel while traveling along the trajectory except where a port of entry or discharge of the cutting tool is provided;

integrating the apparatus with the tooth such that the tooth is received in the interior space and such that the lingual surface faces the lingual sidewall, the buccal surface faces the buccal sidewall, and the occlusal surface faces the occlusal wall;

engaging the guide channel of the apparatus with a burr as the cutting tool, whereby a cutting portion of the burr enters into the interior space and between the occlusal wall and the tooth; and

traveling the burr along the guide channel while running the burr, thereby cutting at least part of the occlusal surface of the tooth.

used in cutting tooth. For example, in embodiments with thick portions to cut, a first burr can cut some layers of the portion to be cut by moving along a tool guide way 120, and a second burr can subsequently move along the same tool guide way 120 to cut the remaining layers in order to obtain a final cut shape. In another embodiment of the invention, a first burr can perform a rough cut, and a second burr can subsequently perform a precise cut.

In one embodiment using two or more burrs, the two or more burrs enter a tool guide way 120 through the same entrance. In another embodiment, referring to Figure 124, burrs can be substituted in the middle of a tool guide way 120. To allow for such substitutions, an embodiment has a middle tool hole 124a, or intermediate tool hole, formed in the middle of the tool guide way 120. Although not illustrated, some embodiments can have two or more middle tool holes in a tool guide way 120 so that it is possible to replace a burr two or more times. In an embodiment, first, a preselected first burr enters a tool guide way and cuts along a first part 120a. Then, the first burr is removed through a middle tool hole 124a located on a terminal end of the first part 120a. Next, a preselected second burr enters the tool guide way through the middle tool hole 124a and cuts teeth following the second part 120b of the tool guide way 120. Here, the first 120a and second parts 120b of the tool guide way 120 are not separated and are connected to each other, constituting a single tool guide way 120. Figure 125 is a flowchart of such embodiment.

In one embodiment, a first part 120a and a second part 120b have different internal structures, so a first burr cannot move past the first part 120a to move along the second part 120b. More specifically, the internal structure of the first part 120a of a tool guide way 120 complements the shape of the first burr, and the internal structure of the second part 120b of the tool guide way complements the shape of the second burr. Moreover, the first burr and the second burr differ with respect to one or more of the following: length of a neck 203, thickness of a neck 203, number of guide projections 208, 210, shape of guide projections 208, 210, size of guide projections 208, 210, and other considerations. The first 120a and second parts 120b can also have various structures that correspond to those of their respective burrs. Accordingly, in an embodiment, the first part 102a can accommodate the first burr, but the second part 120b cannot accommodate the first burr, and only the second burr can enter and move along the second part 120b. In other embodiments, first 120a and second parts 120b of a tool guide way 120 can have the same internal structure so that a first burr can pass through a middle or intermediate tool hole 124a and move along the second part 120b as well.

Guide grooves

Referring to Figures 39, 44, 69A, and 69B, in an embodiment of the invention, each tool guide way 120 has guide grooves 132, 134 to guide a burr 200. Guide projections 208, 210 of a burr are inserted into and move along their corresponding guide grooves 132, 134. In some embodiments, the distance between guide grooves 132, 134 is constant throughout a tool guide way. Therefore, in an embodiment with a preparation guide device 100 that has two guide grooves 132, 134, the thickness of a top wall 116 near the tool guide way need not be uniform. However, in other embodiments as shown in Figures 27-30, the thickness of a top wall 116, that is, the distance between a top supporting surface 129 and the bottom supporting surface 130 is kept uniform.

Sidewall entrance for burrs

In an embodiment as shown in Figures 66 and 67, a sidewall has an entrance 125 for burrs. The entrance 125 and tool guide way 120, where cutting of teeth occurs, are connected by a non-cutting access way 1202. A burr 200 enters through the entrance (125), is guided by the non-cutting access way 1202, and after cutting teeth, exits through the same entrance 125

CLAIMS

1. A dental preparation guide apparatus in a single body,

the single body apparatus comprising a first sidewall, a second sidewall opposing the first sidewall, and a top wall interconnecting the first and second sidewalls to form the single body, wherein the first sidewall, the second sidewall and the top wall in combination define an interior space in which to receive a tooth comprising a first surface and a second surface such that the first surface faces the first sidewall, and the second surface faces the second sidewall;

the single body apparatus further comprising a guide channel formed in the single body, the guide channel comprising two guide surfaces facing each other for receiving a cutting tool therebetween and for guiding the cutting tool to travel along a trajectory such that a cutting edge of the cutting tool cuts the first surface of the tooth while traveling through the guide channel; and

the guide channel comprising an anti-tilting feature formed in the two guide surfaces and configured to engage with the cutting tool for preventing or reducing tilting of the cutting tool in a plane parallel to and further in a plane perpendicular to a direction of movement of the cutting tool at a given point of the trajectory while the cutting tool travels along the trajectory.

2. The apparatus of Claim 1, wherein the anti-titling feature comprises a first engagement structure and a second engagement structure extending along the trajectory and substantially parallel to each other, the first and second engagement structures being configured to engage respectively with first and second counterpart structures of the cutting tool, wherein engagement of the first and second engagement structures respectively with the first and second counterpart structures is to prevent or reduce tilting of the cutting tool in the plane parallel to the movement direction and further to prevent disengagement of the cutting tool from the guide channel while traveling along the trajectory except where a port of entry or discharge of the cutting tool is provided.

3. The apparatus of Claim 2, wherein the first counterpart structure is in a spherical or oval shape as part of the cutting tool, and wherein the first engagement structure is configured to accommodate traveling of the spherical or oval shape therethrough as the cutting tool travels along the guide channel.

4. The apparatus of Claim 2, wherein the cutting tool comprises a burr, wherein the first counterpart structure is formed on the burr to engage with the first engagement structure of the guide channel.

5. The apparatus of Claim 2, wherein the cutting tool comprises a burr and an inserting structure of a dentist's handpiece, wherein the inserting structure is inserted between and constrained by

the two guide surfaces of the guide channel, wherein the first counterpart structure is formed on the inserting structure to engage with the first engagement structure of the guide channel.

6. The apparatus of Claim 5, wherein when the cutting tool is received by the guide channel, the inserting structure is constrained by the two guide surfaces of the guide channel whereas the burr is not directly constrained by the two guide surfaces.

7. The apparatus of Claim 1, 2, 3, 4, 5 or 6, wherein the single body apparatus further comprises a port configured to allow the cutting tool to enter into or discharged from the guide channel, wherein the guide channel further comprises a non-cutting access way configured to guide the cutting tool to travel therethrough, wherein the non-cutting access way is configured such that traveling the cutting tool therethrough does not cause cutting of the tooth or its neighboring tooth.

8. The apparatus of Claim 1, 2, 3, 4, 5 or 6, wherein the tooth received by the interior space is referred to as a first tooth, wherein the interior space is configured to receive one or more additional teeth comprising a second tooth;

wherein the first sidewall and the second sidewall oppose each other and are configured to sandwich the first tooth when the first and second teeth are received in the interior space;

wherein the guide channel formed in the single body is referred to as a first guide channel, wherein the trajectory of the first guide channel is referred to as a first trajectory;

wherein the single body apparatus further comprises a second guide channel formed in the single body, the second guide channel comprising two guide surfaces opposing each other for receiving therebetween the cutting tool or another cutting tool and for guiding the cutting tool or the other cutting tool along a second trajectory such that a cutting edge of the cutting tool or the other cutting tool cuts a surface of the second tooth while traveling through the second guide channel.

9. The apparatus of Claim 8, wherein the first guide channel and the second guide channel are separate from each other and a portion of the single body blocks between the first and second channels such that the cutting tool traveling through the first guide channel must be removed from the first guide channel before the cutting tool is received in the second guide channel for traveling through the second guide channel.

10. The apparatus of Claim 8, wherein the single body apparatus further comprises a third guide channel formed in the single body, the third channel comprising two guide surfaces opposing each other for receiving therebetween the cutting tool or another cutting tool and for guiding the cutting tool or the other cutting tool along a third trajectory such that a cutting edge of the cutting tool or the other cutting tool cuts a surface of the second tooth while traveling through the third guide channel,

wherein the first guide channel and the second guide channel are connected together via the third guide channel and form a single connected channel such that the cutting tool received in the first guide channel can travel to the second guide channel without having to be removed from the first guide channel.

11. The apparatus of Claim 8, wherein the first and second teeth are immediately next to each other with no tooth therebetween and with no missing tooth therebetween, wherein the first guide channel and the second guide channel are connected to each other such that the cutting tool received in the first guide channel can travel to the second guide channel without having to be removed from the first guide channel.

12. The apparatus of Claim 8, wherein a missing tooth or an additional tooth exists between the first and second teeth, wherein the first guide channel and the second guide channel are separate from each other and a portion of the single body blocks between the first and second channels such that the cutting tool traveling through the first guide channel must be removed from the first guide channel before the cutting tool is received in the second guide channel for traveling through the second guide channel.

13. The apparatus of Claim 8, wherein a third tooth exist between the first and second teeth, wherein the single body apparatus further comprises a third guide channel formed in the single body, the third channel comprising two guide surfaces opposing each other for receiving therebetween the cutting tool or another cutting tool and for guiding the cutting tool or the other cutting tool along a third trajectory such that a cutting edge of the cutting tool or the other cutting tool cuts a surface of the second tooth while traveling through the third guide channel,

wherein the first guide channel and the second guide channel are connected together via the third guide channel and form a single connected channel such that the cutting tool received in the first guide channel can travel to the second guide channel without having to be removed from the first guide channel.

14. The apparatus of Claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 or 13, wherein the first surface of the tooth comprises a buccal surface of the tooth, the second surface of the tooth comprises a lingual surface of the tooth;

wherein the guide channel comprises a buccal section, a lingual section, and an interconnecting section interconnecting the buccal and lingual sections, which are connected to provide the guide channel as a single integrated channel that allows the cutting tool to travel through the buccal, interconnecting and lingual sections of the guide channel without having to remove the cutting tool therefrom;

wherein when viewing in a direction toward the top wall, the buccal section extends generally along the first sidewall, and the lingual section extends generally along the second sidewall;

wherein the buccal section is configured to cause a portion of the cutting tool to enter into a buccal area of the interior space between the first sidewall and the tooth such that the portion of the cutting tool cuts at least part of the buccal surface while traveling in the buccal section;

wherein the lingual section is configured to cause the portion of the cutting tool to enter into a lingual area of the interior space between the second sidewall and the tooth such that the portion of the cutting tool cut at least part of the lingual surface while traveling in the lingual section; and

wherein the interconnecting section is configured to cause the portion of the cutting tool to enter into an abutting area of the interior space between the tooth and an immediately neighboring tooth such that the portion of the cutting tool cut at least part of a mesial or distal surface while traveling in the interconnecting section

wherein the guide channel further comprises another section extending from either the buccal section or the lingual section, wherein the other section either interconnect between the buccal and lingual sections making the guide channel in the form of a closed loop when viewing in the direction toward the top wall or does not interconnect between the buccal and lingual sections making the guide channel in the form of an open loop when viewing in the direction toward the top wall.

15. The apparatus of Claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 or 14, wherein the tooth further comprises an occlusal surface such that the occlusal surface faces the top wall,

wherein the single body apparatus comprises a fourth guide channel formed in at least one of the first and second sidewalls of the single body and shaped to engage with the cutting tool to guide the cutting tool to travel along a fourth trajectory such that a cutting edge of the cutting tool cuts at least part of the occlusal surface of the tooth while traveling through the fourth guide channel.

16. A method of making the dental preparation guide apparatus of Claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 or 15, the method comprising:

providing a first 3D image data representing one or more teeth of a patient before a desired preparation of the one or more teeth for installing a desired dental prosthesis;

before the desired preparation and before making the desired dental prosthesis, determining an axis of insertion along which the desired dental prosthesis should approach the one or more teeth for engaging the desired dental prosthesis with the one or more teeth after the desired preparation, wherein the axis of insertion is determined relative to the one or more teeth;

generating a second 3D image data representing the one or more teeth after the desired preparation; and

producing the dental preparation guide apparatus based on the first 3D image data and the second 3D image data, wherein the interior space of the dental preparation guide apparatus is configured to receive the one or more teeth for engagement therewith, wherein the guide channel of the dental preparation guide apparatus is configured to guide the cutting tool for cutting of at least part of the one or

more teeth for the desired preparation.

17. The method of Claim 16, wherein determining the axis of insertion comprises:

processing the first 3D image data to orient a 3D image of the one or more teeth in multiple directions;

providing information of undercuts in multiple directions of orientation of the 3D image; and

choosing a direction of orientation of the 3D image as the axis of insertion based on the information of the undercuts.

18. The method of Claim 16, wherein generating the second 3D image data comprises processing the first 3D image data with the input of one or more selected from the group consisting of an orientation of the burr, a diameter of the burr, a length of the burr, tapered shape information of the burr, a position of the burr relative to the one or more teeth, a distance between a rotational axis of the burr and an exterior surface of the one or more teeth, and a level of the burr relative to the one or more teeth, wherein each of the first and second counterpart structures is in a spherical shape as part of the burr, and wherein each of the first and second engagement structures is a channel portion of the guide channel to accommodate traveling of the spherical shape therethrough.

19. A system for dental preparation, comprising:

the apparatus of Claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 or 15;

a dental handpiece comprising an inserting structure, wherein the inserting structure and a burr in combination constitute a cutting tool to be received by the guide channel of the apparatus; and

the inserting structure comprising a counterpart structure configured to engage with the anti-tilting feature of the guide channel such that the inserting structure is constrained by the anti-tilting feature of the guide channel rather than the burr.

20. A method of preparing a tooth for dental restoration, the method comprising:

providing the apparatus of Claim 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 or 15 for preparation of a tooth comprising a first surface and a second surface and a cutting tool comprising a burr;

engaging the apparatus with the tooth such that the tooth is received in the interior space and such that the first surface faces the first sidewall and the second surface faces the second sidewall;

inserting the cutting tool into the guide channel via an insertion hole;

traveling the cutting tool along the trajectory of the guide channel, by which the burr cuts at least a portion of the first surface of the tooth.

21. A dental preparation guide apparatus in a single body,

the single body apparatus comprising a lingual sidewall, a buccal sidewall opposing the lingual

sidewall, and an occlusal wall interconnecting the lingual and buccal sidewalls to form the single body, wherein the lingual sidewall, the buccal sidewall and the occlusal wall in combination define an interior space in which to receive a tooth comprising a buccal surface, a lingual surface, a mesial surface, a distal surface and an occlusal surface such that the lingual surface faces the lingual sidewall, the buccal surface faces the buccal sidewall, and the occlusal surface faces the occlusal wall,

the single body apparatus further comprising a guide channel formed in the single body, the guide channel comprising two guide surfaces facing each other for receiving a cutting tool therebetween and for guiding the cutting tool to travel along a trajectory such that a cutting edge of the cutting tool cuts at least part of the occlusal surface of the tooth while traveling through the guide channel; and

the guide channel comprising an anti-tilting feature formed in the two guide surfaces and configured to engage with the cutting tool for preventing or reducing tilting of the cutting tool in a plane parallel to and further in a plane perpendicular to a direction of movement of the cutting tool at a given point of the trajectory while the cutting tool travels along the trajectory.

22. The apparatus of Claim 21, wherein the guide channel comprises a port configured to permit entry of the cutting tool into the guide channel, wherein the port of the guide channel is formed through the occlusal wall, the lingual wall or the buccal wall..

23. A method of preparing a tooth for dental restoration, the method comprising:

providing the apparatus of Claim 22 for preparation of a tooth comprising a buccal surface, a lingual surface, a mesial surface, a distal surface and an occlusal surface, wherein the anti-titling configuration comprises a first engagement structure and a second engagement structure extending along the trajectory and substantially parallel to each other, the first and second engagement structures being configured to engage respectively with first and second counterpart structures of the cutting tool, wherein engagement of the first and second engagement structures respectively with the first and second counterpart structures is to prevent or reduce tilting of the cutting tool in the plane parallel to the movement direction and further to prevent disengagement of the cutting tool from the guide channel while traveling along the trajectory except where a port of entry or discharge of the cutting tool is provided;

mounting the apparatus with the tooth such that the tooth is received in the interior space and such that the lingual surface faces the lingual sidewall, the buccal surface faces the buccal sidewall, and the occlusal surface faces the occlusal wall;

engaging the cutting tool engaging the guide channel of the apparatus with the cutting tool whereby the cutting edge of the cutting tool enters into the interior space and between the occlusal wall and the tooth; and

cutting at least part of the occlusal surface of the tooth while traveling the cutting tool along the guide channel.

24. A method of dental procedure, comprising:

providing a dental prosthesis for installing onto one or more teeth of a patient, the one or more teeth comprising a first tooth comprising an occlusal surface, a buccal side, a lingual side, a distal side and a mesial side;

providing a preparation guide device in a single piece for use in preparing the one or more teeth of the patient for installing the dental prosthesis, wherein the preparation guide device is custom-made to fit at least part of the one or more teeth and comprises at least one guide channel configured to guide a cutting tool, wherein the at least one guide channel comprises a first single channel that the cutting tool can travel along a first trajectory thereof, the first single channel comprising a first engagement structure and a second engagement structure extending along the first trajectory and substantially parallel to each other;

mounting the preparation guide device over the one or more teeth such that the preparation guide device fit the at least part of the one or more teeth;

providing the cutting tool comprising a first counterpart structure and a second counterpart structure;

engaging the cutting tool with the first single channel such that the first and second counterpart structures of the cutting tool engage respectively with the first and second engagement structures of the first single channel;

moving the cutting tool along the first trajectory to cut the first tooth on at least one of the buccal, lingual, distal and mesial sides, which completes preparation of the first tooth for installing the dental prosthesis onto the first tooth without the need of an additional preparation guide for preparing the first tooth and without the need of an additional substantial cutting of the first tooth, wherein engagement of the first and second engagement structures with the first and second counterpart structures prevents or reduces tilting of the cutting tool in a plane parallel to a direction of movement of the cutting tool at a given point of the first trajectory and further prevents disengagement of the burr from the first single channel while the cutting tool is traveling along the trajectory except where a disengagement configuration is provided; and

installing the dental prosthesis onto the first tooth as prepared.

25. The method of Claim 24, wherein the cutting tool comprises a burr and an inserting structure connected to a dentist's handpiece, wherein at least one of the first and second counterpart structures is in a spherical or oval shape as part of the cutting tool, and wherein at least one of the first and second engagement structures is configured accommodate traveling of the spherical shape therethrough.

26. The method of Claim 24 or 25, wherein the first single channel is configured to cut the four of the buccal, lingual, distal and mesial sides, wherein cutting of the four sides entirely encircles the first tooth when viewing in a direction toward the occlusal surface, wherein the dental prosthesis

comprises inner surfaces contacting the four sides of the first tooth that are cut using the first single channel.

27. The method of Claim 24, 25 or 26, wherein the one or more teeth comprise a first tooth and a second tooth, wherein cutting the one or more teeth comprises cutting the first tooth and then cutting the second tooth, wherein the preparation guide device is not disconnected from the one or more teeth between cutting the first tooth and cutting the second tooth, and wherein the first single channel is further configured to cut the second tooth in addition to cutting the first tooth without having to remove the cutting tool from the first single channel.

28. The method of Claim 24, 25, 26 or 27 wherein the one or more teeth comprise a first tooth and a second tooth, wherein cutting the one or more teeth comprises cutting the first tooth and then cutting the second tooth, wherein the preparation guide device is not disconnected from the one or more teeth between cutting the first tooth and cutting the second tooth, and wherein the at least one channel comprises a second single channel that is distinct from the first single channel and configured to cut the second tooth.

29. The method of Claim 24, 25, 26, 27 or 28 wherein providing the dental prosthesis comprises receiving the dental prosthesis from a third party or making the dental prosthesis in-house, wherein providing the preparation guide device comprises receiving the preparation guide device from a third party or making the preparation guide device in-house.

30. The method of Claim 24, further comprising:

causing to provide a 3D image data representing the one or more teeth of the patient before preparation sufficient to install the dental prosthesis, wherein causing to provide the 3D image data comprises at least one selected from the group consisting of:

scanning of the patient's oral features using a 3D scanning device;

taking an impression of the patient's oral features;

producing a 3D model of the patient's oral features from the impression; and

scanning the 3D model using a 3D scanning device.